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Greg Bowden and Kerryn Maguire

# Practice IT

for the **Australian Curriculum**


## Book 2
## Middle Secondary

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for the **Australian Curriculum**


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# Teaching notes

## Introduction

*Practice IT* has been developed to provide practical computing activities for students in Year 9 and Year 10. Students have far greater access to computer equipment in schools than ever before and specific Information Technology subjects are being introduced, or current subjects across the curriculum incorporate ICT units; for example, Spreadsheets in Mathematics.

The aim of the book is to cater for both scenarios by breaking the book up into a series of modules. Some modules could be used in current subjects and others in a separate Information Technology subject, or all the modules could form the Information Technology course.

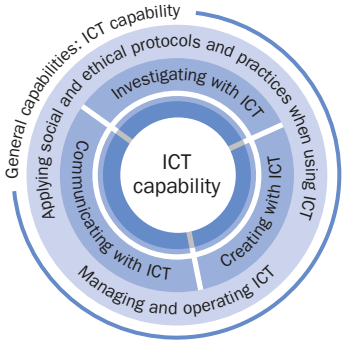
The book also aims to cater for different teaching methods by providing brief instructions followed by an activity.

## Alignment with the Australian Curriculum

Information and Communication Technology (ICT) is represented in two ways in the Australian Curriculum (version 8.0). This is through the ICT Capability, which is one of the General Capabilities that applies across all learning areas, and within the Technology curriculum through the Digital Technologies syllabus. Our approach blends theoretical learning with practical exercises, and lends itself particularly to the five interrelated elements of the ICT capability:

- Applying social and ethical protocols and practices when using ICT
- Managing and operating ICT
- Investigating with ICT
- Creating with ICT
- Communicating with ICT

Organising elements for ICT capability




## Software

We use a range of software packages in exercises throughout the book, and offer selected exercises in the Interactive Textbook for alternative programs. Below is a list of programs catered for. Note that although new versions of programs are released all the time, book content is still relevant to many versions of the same program:

- **Internet:** Google Chrome, Safari, Microsoft Internet Explorer, Mozilla Firefox
- **Word processing:** Microsoft Word 2013 , Microsoft Word 2016, Google Docs
- **Flash animation:** Adobe Flash
- **Computer graphics:** Adobe Illustrator
- **Photo editing:** Adobe Photoshop
- **Spreadsheets:** Microsoft Excel 2013, Microsoft Excel 2016, Google Sheets
- **Databases:** Microsoft Access 2013, Microsoft Access 2016, FileMaker Pro
- **Webpage authoring:** Adobe Dreamweaver CC, Adobe Dreamweaver CS6
- **Desktop publishing:** Adobe InDesign
- **Algorithms and programming:** Scratch

Other software may become available. Please check PIT2 Support Files on *Cambridge GO* for updates.



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# Teaching suggestions

The modules can be completed in any order. Module 1 ('Computer awareness') can be completed in stages over the two middle years. Many of the activities could be set for homework. You may also prefer to use Module 2 early in Year 9.

The following table provides an example of how the modules could be used over the two middle years.

| Year 9 | |
|---|---|
| **Module 1** | Computer awareness exercises 1–7 |
| **Module 2** | Social and ethical practice exercises 1–5 |
| **Module 3** | Word processing exercises 1–4 |
| **Module 4** | Flash animation exercises 1–8 |
| **Module 6** | Photo editing exercises 1–8 |
| **Module 7** | Spreadsheets exercises 1–8 |
| **Module 11** | Algorithms and programming exercises 1–10 |
| **Year 10** | |
| **Module 1** | Computer awareness exercises 8–11 |
| **Module 2** | Social and ethical practice exercises 6–11 |
| **Module 3** | Word processing exercises 5–8 |
| **Module 5** | Computer graphics exercises 1–6 |
| **Module 7** | Spreadsheets exercises 7–17 |
| **Module 8** | Databases exercises 1–6 |
| **Module 9** | Webpage authoring exercises 1–10 |
| **Module 10** | Desktop publishing exercises 1–3 |

# Sample projects

Sample projects are provided at the end of each module.

# Extension activities

Students who complete all the activities in the textbook can be extended using the additional content in the Interactive Textbook, which includes extra exercises and mini projects.

# Sample graphics and data sets

Sample graphics and data sets for use in Module 3 'Word processing' and Module 5 'Computer graphics' can be found in the Interactive Textbook edition, or in PIT2 Support Files on *Cambridge GO*.



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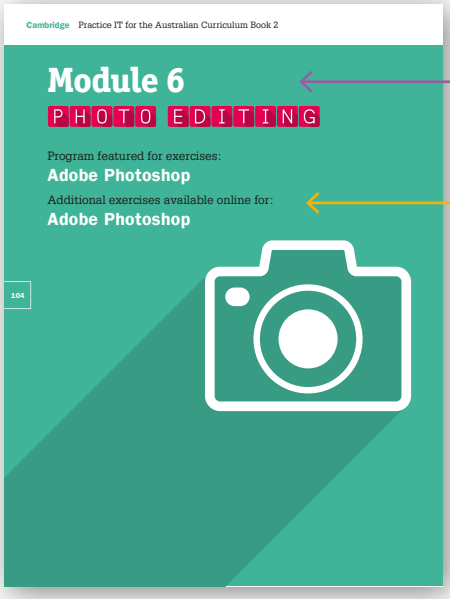
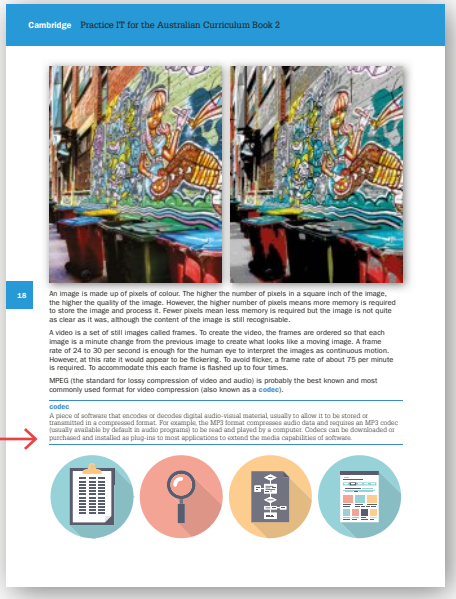
# How to use this resource




**Module openers** clearly indicate which computer programs are featured.

**Additional** or **alternative** content, to offer further learning support, is available in the Interactive Textbook. This will be explained on the module opening page.

**Glossary terms** are bolded and defined in the text, and collated at the end of the textbook for easy reference.






The **Teacher information** page is designed to give the teacher an overview of how the module covers syllabus content from the Australian Curriculum.

This information is broken into five sections:

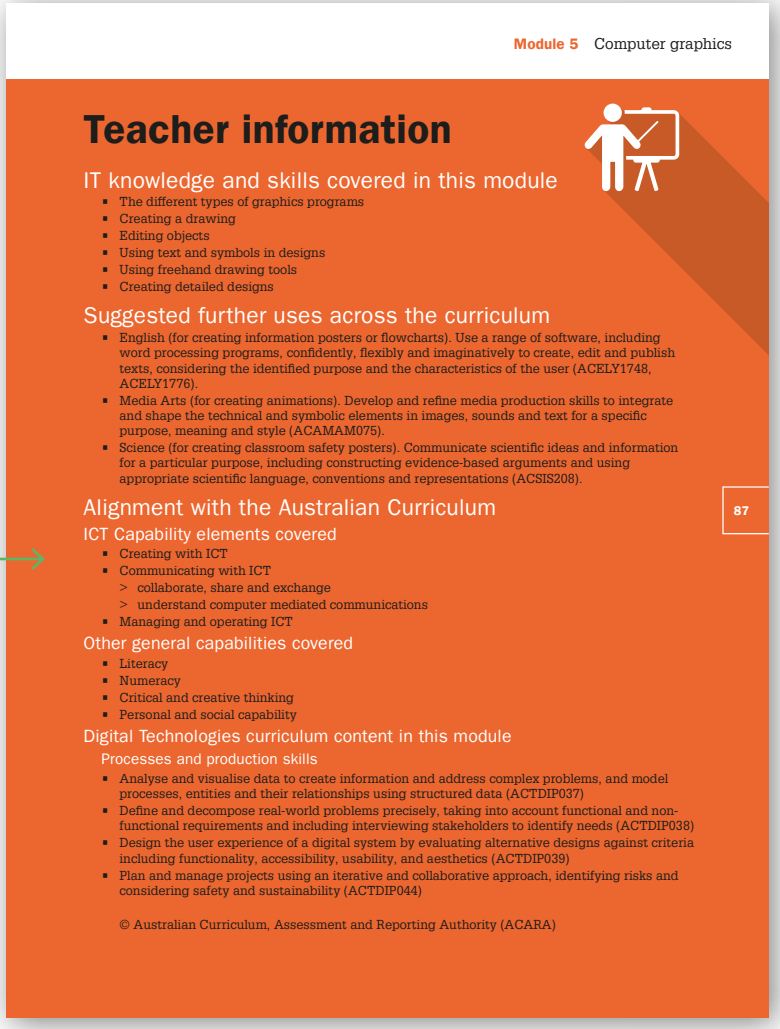
**1** a general snapshot of the IT knowledge and skills covered in the module

**2** suggestions for how the module could be used across the school curriculum, in the English or Maths areas, for example

**3** suggestions for how the ICT capability elements from the AC are addressed in the module

**4** a sketch of the other relevant general capabilities from the AC

**5** specific content descriptions and codes from the AC's Digital Technologies syllabus, divided between the Knowledge and Understanding and the Processes and Production Skills strands.

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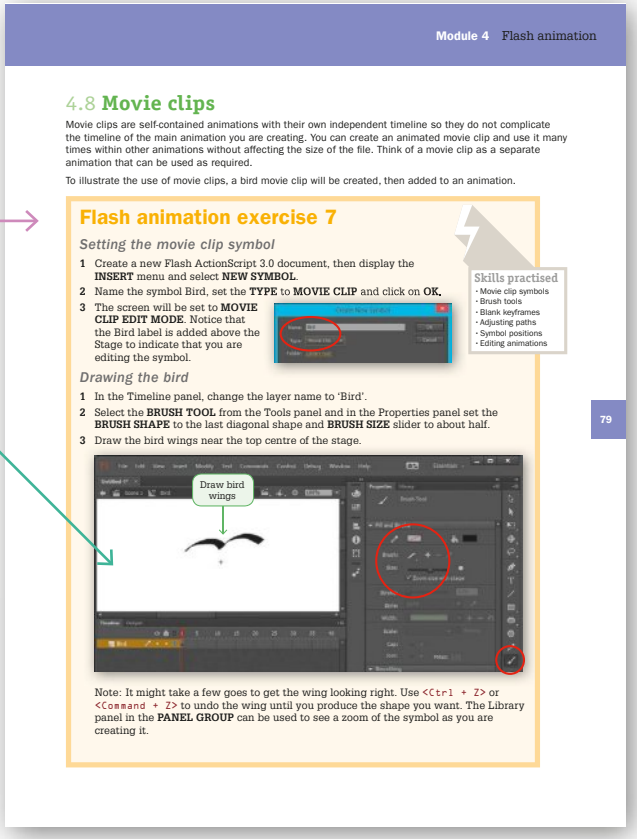
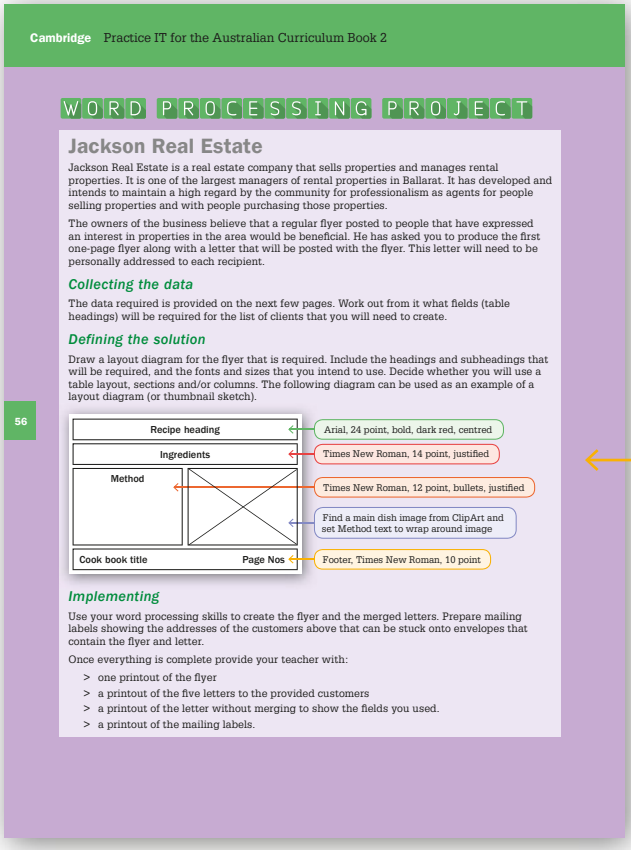
A variety of practical **exercises** explore key concepts, develop skills and draw back to the general learning capabilities of the AC.




**Screenshots** from computer programs are designed to support student comprehension and bring step-by-step instructions to life.




**Projects** at the end of each module are designed to get students to test their knowledge of digital technology through the application of IT skills.

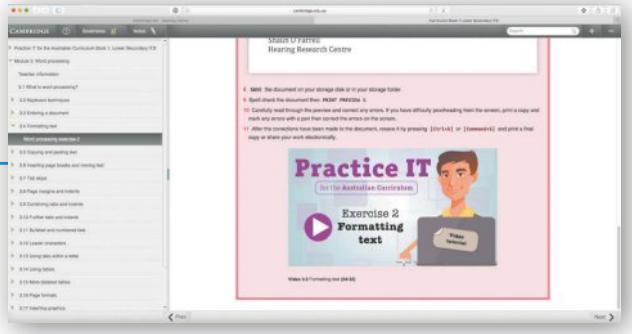
**Data** files include text or images that students require to complete certain projects or practice exercises. Text is provided at the end of projects, such as the word processing module.

All data files are available for download in the Interactive Textbook for students to use.

In the Interactive Textbook, **instructional videos** enrich the learning experience.

Each module in the Interactive Textbook includes additional **interactive activities** (e.g. drag and drop or multiple-choice questions) to assist recall of facts and understanding of concepts.

All exercises and end-of-module projects are available as **downloadable documents**.

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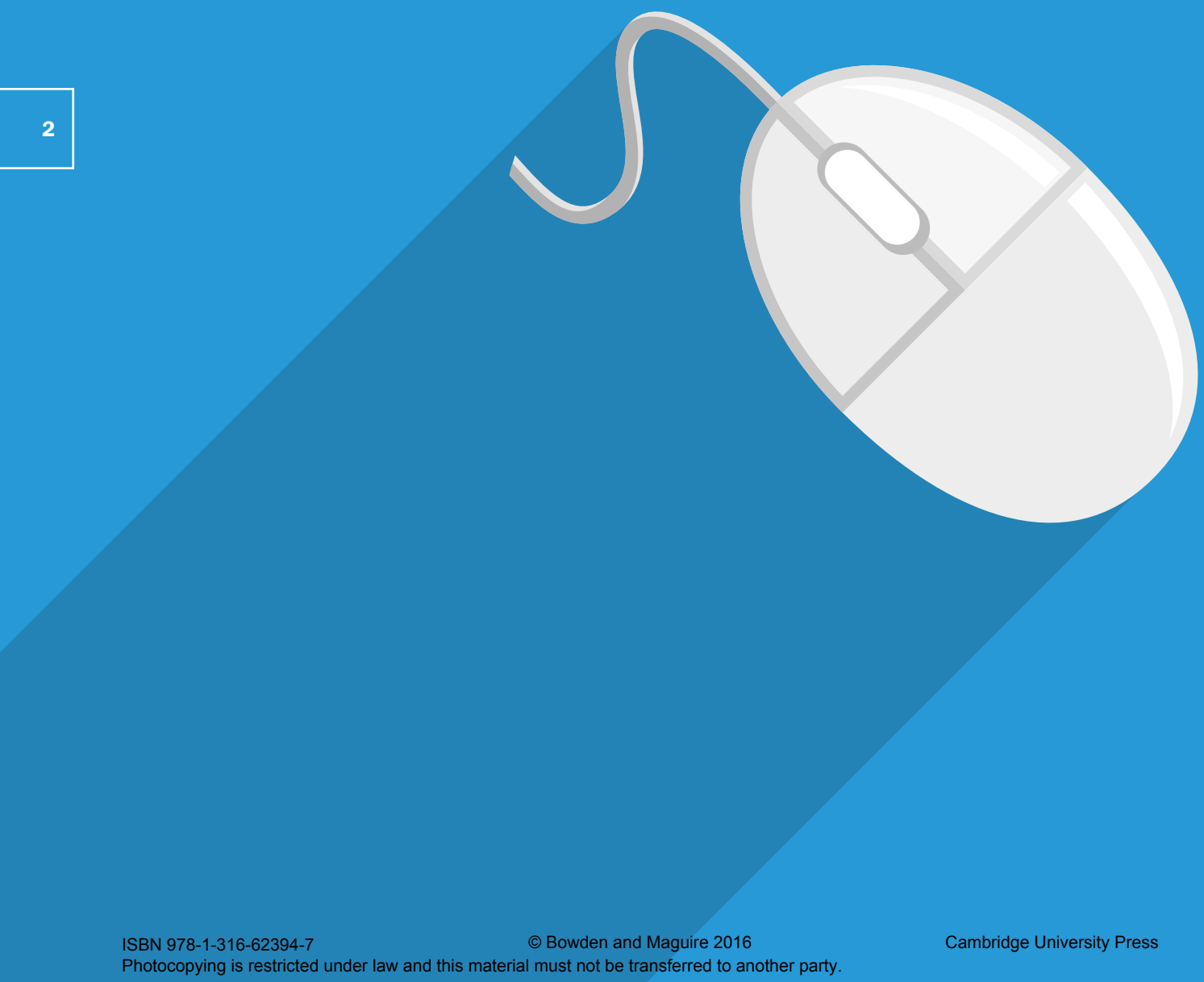
# Module 1

## COMPUTER AWARENESS





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# Teacher information

## IT knowledge and skills covered in this module

- The digital information system
- Computer hardware
- Computer software
- Networks
- Data
- The information processing cycle

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications

### Other general capabilities covered

- Literacy
- Numeracy
- Critical and creative thinking
- Personal and social capability
- Managing and operating ICT

### Digital Technologies curriculum content in this module

#### Knowledge and understanding

- Digital systems – Investigate the role of hardware and software in managing, controlling and securing the movement of and access to data in networked digital systems (ACTDIK034)
- Representation of data – Analyse simple compression of data and how content data are separated from presentation (ACTDIK035)

#### Processes and production skills

- Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements (ACTDIP036)
- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Evaluate critically how student solutions and existing information systems and policies take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)
- Create interactive solutions for sharing ideas and information online, taking into account safety, social contexts and legal responsibilities (ACTDIP043)





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# 1.1 Introduction

The computer industry is constantly changing, with new technologies emerging in a continuing effort to push the boundaries and limitations of current technology. Developers are always searching for faster and better ways to do various tasks.

New technology is generally aimed at improving some situation. However, a change to using the new technology will affect users of the current system in various ways. These effects can be to the advantage or disadvantage of the user, depending on the situation. For example, new technology that will recognise and convert speech to text is fantastic for disabled people who cannot type, as well as for other people who find it difficult to use a word processor. On the other hand, new technology that further automates a commercial system, while an advantage to the owners, can result in job losses for employees, which is a negative effect. Can you imagine the effect on employment opportunities for shop assistants if all purchases were made via online shopping on the internet?

In this section you will look at the components of digital information systems, the users and developers of these systems and the effect of new technologies on the user.

A supermarket would use an automated system to record purchases at the checkout, as well as accounting and inventory procedures to keep track of sales and stock movements.

An airline would use an information system to keep track of flights and baggage, and to facilitate check-in procedures.




# 1.2 Digital information system

This subject focuses on the use of a computer, which you already know. However, the computer is just one part of a larger system – the digital information system. The purpose of the information system is to collect and process **data** and transform it into information – the information processing cycle – which is covered in detail on page 21.

**data**
May include characters (for example, alphabetic letters, numbers and symbols), images, sounds and/or instructions that can be manipulated, stored and communicated by digital systems.

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A digital information system consists of the following parts, which will be looked at in detail:

- hardware
- people
- software
- processes
- data.

## Hardware

The computer hardware is what you can see in the system – the cold, hard equipment: the PC, the printer, the screen, the keyboard and also things like pen and paper, order forms, etc.

## People

People design and code the software programs, control how and when the software works on the hardware, and also use the software and hardware as users of the system. The manager of a store determines how the accounting package is to work and the security of the data. The customer receives the resultant receipt as part of using the system. The efficiency of the system will have a direct effect on the customer.

## Software

Software is essential for controlling the hardware and how each part works together. Software is also an integral part of the procedure: accounting software, inventory software, word processing, etc. These programs can be bought retail or custom designed for the requirements of the system.


## Processes

The processes are the set of rules or guidelines on how the system should be used; for example, how to enter a sale.

## Data

Data are the raw facts and values; for example, item prices, quantity purchased. The data is purchased to become information; for instance, the amount owed at the checkout.



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# 1.3 Computer hardware

Hardware is the term used for physical components connected together to create the system. Every **digital system** has the following components:

- device for input of data
- memory for data and information storage
- central unit for processing of data
- device for output of information.

**digital system**
Digital hardware and software components (internal and external) used to transform data into a digital solution. When digital systems are connected, they form a network. For example:

- A smartphone is a digital system that has software (e.g. apps, an operating system), input components (e.g. touch screen, keyboard, camera and microphone), output components (e.g. screen and speakers), memory components (e.g. silicon chips, solid state drives), communication components (e.g. SIM card, wifi, bluetooth or mobile network antennas), and a processor made up of one or more silicon chips.
- A desktop computer with specific software and hardware components for dairy farming is connected via cables to milking equipment and via wifi to sensors that read tags on the cows. Through these hardware components the software records how much milk each cow provides. Such systems can also control attaching milking equipment to each cow, providing feed and opening gates.

The power of a computer lies in its ability to store and process data. However, the computer must have a way of getting the data input. Devices such as the keyboard and mouse are used to input data. Once the data is input, it is stored in various types of memory until it is required. There are primary and secondary storage areas.



A computer can also manipulate the data, such as presenting it in various ways or performing calculations. It can only do these things because of programs located on the system unit. A program is a set of instructions to the computer on what to do with the data given to it. The resultant information can be output using devices such as the screen and the printer. The input and output devices are often called peripherals.

In a digital information system there are various devices that take on the role of each component. In each setting, a particular input or output device is more useful than another because of the nature of the task. For instance, at a supermarket checkout, using a barcode reader on items is much more efficient than typing in the price of each item with a keyboard.

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## Input technology

Below is a list of the more common input devices. While reading about them, think about whether you have seen the device in use or situations where it could be used.

> **Keyboard**: The most commonly used input device is based on pressing keys to enter characters into a document and to perform some functions in a program.

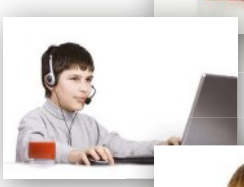
> **Scanner**: Usually a flatbed device that will scan data such as photos and text into machine code, which can then be stored and manipulated.

> **Barcode reader**: Commonly used in supermarkets and retail stores. It works by passing a laser light over a barcode – a series of lines that represent a code. Light is reflected, which inputs the code and, hence, data about the item being scanned.

> **Mouse**: Another commonly used device, particularly in the home PC (personal computer) and the office PC. The mouse controls the position of the cursor on the screen and determines selections and some actions.

> **Touch-sensitive screen**: Will input the user's choice based on the point on the screen that the user touches. Most appropriate when there are a relatively small number of choices per screen – 12 or fewer – and high precision is not required.

> **Digital camera**: Replaces the traditional camera. It will input and store images, which can then be transferred to a computer for processing.



> **Microphone**: Records voice and sound into audio files.

> **Speech recognition**: A microphone is used to record the speech, which is then converted to text using appropriate software and displayed on a screen. Commands can also be spoken that will move the cursor around the text.

> **Optical mark recognition reader**: Will scan documents such as questionnaires and tests for specific marks such as a tick or a cross.

> **Magnetic ink character recognition (MICR) reader**: Will scan numbers printed at the base of a cheque or similar document. It is used widely and predominantly in the banking industry.



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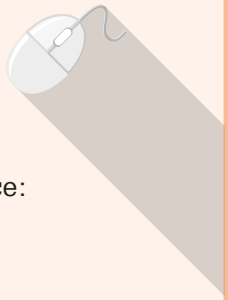
## Computer awareness exercise 1



### *Input technology*

For each of the input devices listed on the previous page, find out and explain the following using one type of organisation or industry per device:

1 Where it is used.
2 Why it is used instead of other input devices.
3 How it is used.

For example, the keyboard:

1 A keyboard is used on a PC in the office setting because many documents in the office involve text.
2 The keyboard enables the user to enter specific text for the job being carried out.
3 The keyboard is used simply by the user pressing down the keys on the keyboard. Each key generally inputs one character into the document.

# 1.4 Storage technology

The computer system must have some way of storing data, information and programs. There are various types of memory devices but they are all based on bits and bytes – the building blocks of memory. (Bits and bytes are explained in more detail in 1.7 Data on page 15). A drive is a collection of storage bits. There are two types of storage: primary and secondary.



## Primary storage

Primary storage is the term given to **internal memory**, which will temporarily store the data and information, and program instructions while they are in use. It is located with the central processing unit. **RAM** and **ROM** are the two main types of primary storage.

- **ROM – read-only memory**: The computer can read information that is stored here – as the name suggests. Read-only also means other information cannot be stored here – it is **one-way**. The information stored in ROM is input as it is being manufactured. It is not possible to change or delete this information. It generally holds the information required to get the computer started. The information is stored there regardless of power supply.
- **RAM – random-access memory**: This is the memory used while processing is in progress. It is a **two-way** memory in that it both stores and recalls data at any time, as long as there is a power supply. Once the power supply is turned off, any data in the RAM is lost unless it has been stored on another secondary storage device. The RAM stores the operating system, any application currently being used and the data required for that application.
- **Memory address**: You can imagine that with millions of cells available to store each byte of memory, an organised method is required when this data is to be recalled. Each memory cell is numbered. This number is called the **address** of the cell.

## Secondary storage

Secondary storage is for permanent storage of data and information. It does not rely on a power supply, as it uses magnetic or sometimes optical systems to store data. This enables a computer to be turned off but data is retained for use at a later date. It also stores programs that are not in use. Secondary storage can store hundreds of times as much as primary storage. Once other portable methods of storage are used, the amount of storage is unlimited.

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There are various secondary storage devices:

- **Memory sticks**: A convenient way to store and move data. A memory stick can store up to 128 MB of data. Most devices now cater for a memory stick because it is durable and safe.

- **Memory card**: These are inserted into devices such as laptops and digital cameras to increase memory available for data storage.

- **External hard disks**: These are also popular as a way of transporting large amounts of data. Capacity can vary and cost increases with capacity, but is generally more expensive than the equivalent capacity in an internal hard disk because the technology is different.

- **Internal hard disk**: These can store hundreds of gigabytes (GB) to several terabytes (TB). The hard disk or **disk drive** is really just a collection of disks similar to a stack of CDs. Data or information stored here can be retrieved at any time from any location – this is called **random access**. It is similar to the ability to pick out a track on a CD without first playing the preceding tracks. The hard disk is permanently located within the unit, unlike other storage devices, which are all portable.

- **CD-ROM**: These can store about 650 MB permanently. They are primarily used as a permanent source of a program, and are often used to store video tutorials and large books such as encyclopaedias.

- **CD-R** and **CD-RW**: Writable CDs are a cheap alternative to superdisks. The CD-R is a 'write once – read many' medium, while the CD-RW can be erased and new data saved, similar to a disk.

- **DVD (digital versatile disc)**: These hold over 4 GB of data, including sound and audio. A DVD drive connects to a computer in a similar way as CD-ROMs. However, the disc can be double-sided and even two layers with double sides giving a total of 17 GB. Because of their size, DVDs can be used to store full-length movies.

- **Blu-ray**: These hold 25 GB of data per layer and are designed to store high-definition video (1080P). The name refers to the blue laser used to read the disc.

- **Cloud storage**: Files can also be stored offsite in the **Cloud**. Cloud is the term given to offsite storage where the files are transmitted via internet technology – cable, wireless, ADSL, etc. The Cloud is really just the storage available from internet service providers.



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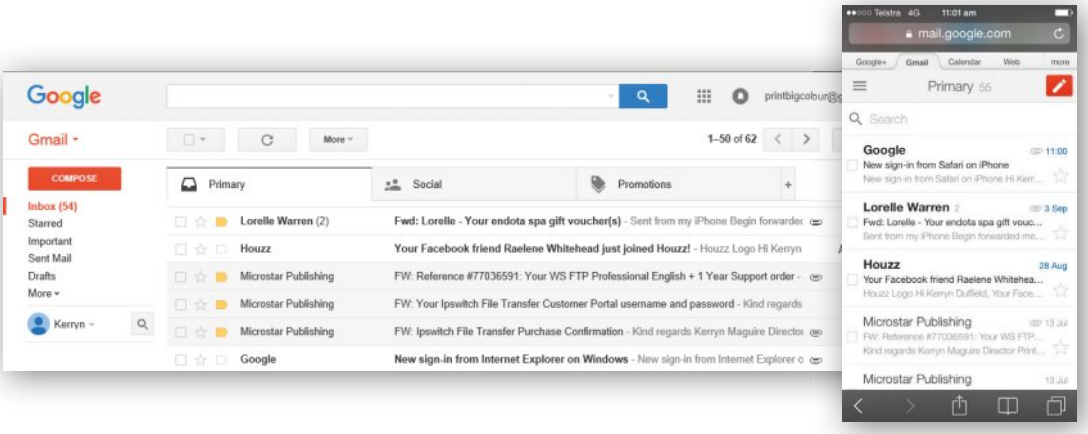
Don't be confused by some products that are called My Cloud, which can be physically attached to your computer or device in your home or office. These are just an external hard drive product cashing in on the name Cloud.

iTunes is an example of **Cloud computing**. You purchase tunes on iTunes and download them to your phone, for example. They are still stored in the iTunes Cloud. You can also access them from, say, a PC over the internet as well through the iTunes app. iTunes has stored information about which tunes you have purchased in the past. You can choose to download all, some or none of the tunes to your PC. Google is another example of Cloud storage. For example, you can access a Gmail account from various devices that can access the internet, provided you have your login details.

**Cloud computing**
Distributing computing over a network where storage of files, processing of data and/or access to software occurs automatically on interconnected server computers to which the user's device is connected. Typically, people use the term to refer to accessing files and software over the internet. For example, photo files may be stored in the Cloud from a smartphone to be accessed later from a different location; where they are actually stored can be anywhere in the world on a server computer used by the Cloud service.






## Computer awareness exercise 2

### *Primary and secondary storage*

1 What is primary memory?
2 What is the main difference between ROM and RAM?
3 What is secondary memory?
4 When is sequential access used?
5 When is random access used?
6 What is the difference between a CD and a DVD?
7 Explain why discs do not require the presence of electricity to hold their memorised information. Why is this an advantage?
8 Which device would be most suitable in the following situations:
   **a** To copy a text file from your school PC to take home.
   **b** To copy a large image file to give to your friend who has only a CD and a hard drive. Your PC now has every type of storage device attached to it.
   **c** To backup financial records for a business to keep a permanent copy at the end of each month.
   **d** To make a backup copy of a movie you created on your PC or laptop.

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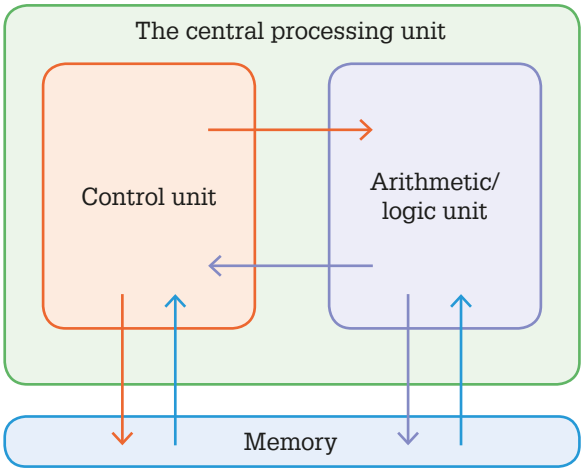
# 1.5 Central processing unit

The central processing unit (CPU) is 'central' to the workings of a computer. The CPU controls the movement of data between devices and directs how and when the other devices work together to perform processing and storage tasks. However, it still relies on an initial program to start it and the addition of other programs so it will perform required tasks.

The CPU consists of an arithmetic/logic unit or ALU and a control unit.

The role of the arithmetic/logic unit is to manipulate data. It will do this in two ways. The first is by arithmetic operations – addition, subtraction, multiplication and division of numbers.

The second is by logical operations that will compare data then direct a course of action depending on the result. For example, when checking the expiry date on a credit card to proceed with a sales transaction the ALU will compare today's date with the expiry date on the credit card. If today's date is greater than the expiry date, the transaction is denied; if today's date is less than the expiry date, the transaction is authorised.




The **control unit** has the role of directing and coordinating the overall operation of the computer. The control unit is instructed by the program in RAM, and it sends data to the ALU for manipulation, as well as controlling the various output, storage and communication procedures. In the example above, the control unit would have sent the two dates to the ALU. The control unit would then send the result from the ALU to the screen so the salesperson could view the result.



## Computer awareness exercise 3

### *Central processing*

**1** Which part of the central processing unit – the ALU or the control unit – would control each step of the following examples of data processing?

**a** A salesperson is checking the expiry date of a credit card to be used to pay for a purchase:

**i.** The salesperson enters the date of expiry of the credit card.

**ii.** The date is sent to the ALU for processing.

**iii.** The expiry date on the card is compared to today's date.

**iv.** The result is displayed on the cash register screen.

**b** A librarian wants to print out the current loans of a student:

**i.** The librarian keys in the student's code.

**ii.** The code is put into memory.

**iii.** The code is moved from memory to the ALU.

**iv.** A search is made for the code in borrowing records.

**v.** A list of books borrowed by that student is printed.

**2** Outline the steps that would take place in the following process and state which part of the CPU would control each step: A police officer checks the registration number of a suspect car.

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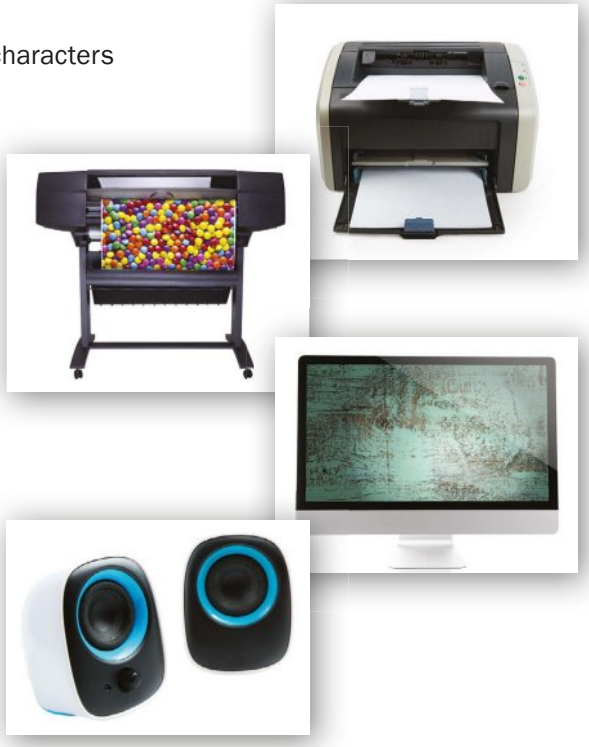
## Output technology

Information can be output either as hard copy using a printer, or as soft copy on a screen or some kind of display device, or as sound or **multimedia**.

**multimedia**
The use of digital technologies to present combinations of text, graphics, video, animation and/or sound in an integrated way. Where there is facility for a user to interact with multimedia, the term 'interactive multimedia' may be used. Examples include interactive games, media-rich websites, electronic books (ebooks) and animated short films.

Examples include:

- **Printer**: Produces a hard copy of the information as characters and graphic images on paper or a similar medium.
- **Plotter**: Produces a hard copy. Will produce special prints of technical drawings, maps, designs and so on that are very precise.
- **Screens**: Produce a soft copy. Will display the contents of the file being retrieved or manipulated.
- **Speakers**: Will output audio (e.g. music, instructions, warning signals).





## Computer awareness exercise 4

### *Output devices*

For each of the output devices listed above, explain the following using one type of organisation or industry per device.

1 Where it is used.
2 Why it is used instead of other input devices.
3 How it is used.

For example, a plotter:

1 It is used in a draughtsman's office to plot house plans onto large pieces of paper.
2 A plotter is appropriate because it will work with large pieces of paper and is very accurate and the output is of a high quality. The plans can then be given to the builder to start work on building the house.
3 The plans are created on the computer using software designed to create plans or technical drawings. The plans are then printed on large pieces of paper using the plotter.

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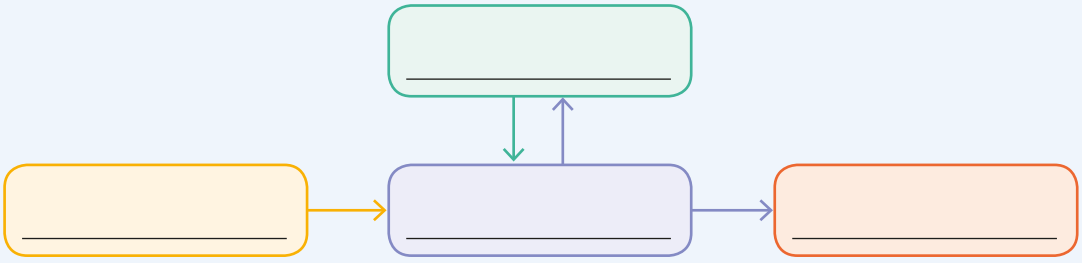
## Computer awareness exercise 5

### *Computer operation*

1 Enter the heading 'How a computer works' in your workbook.
2 Copy the diagram below into your workbook.
3 Enter each of the following terms into the appropriate box: input, output, memory, central processing.



## Computer awareness exercise 6

### *Computer devices*

Below are listed devices for three different systems. Draw a diagram like the one in Exercise 5 for each system and label it with the devices to display the structure of the technology (input, memory, central processing, output). If you are not sure about the system, you may need to research it more on the internet or at your library.

1 Home-based PC: printer, mouse, central processing unit, hard disk.
2 Computerised cash register: display screen, scanner, CPU, memory.
3 Automatic teller machine: keypad, receipt printer, bank processing, bank memory.



# 1.6 Networks

A network is created when two or more digital devices are connected by a modem, network cable or wireless technology. Each point on the network that connects a device is called a node. A network within a small area such as a room for one person is a PAN (personal area network). A network within a building or buildings close together, such as a school or hospital, is called a LAN (local area network). A MAN (metropolitan area network) is a larger network over the size of a town or city. A network where devices are connected in different towns or countries is known as a WAN (wide area network).

## Purpose of a network

### Sharing resources

It is not uncommon for an office or home to have a number of computers before realising that a network would be useful. Without a network, each office computer would need a dedicated printer but because of the number required, they would be basic models to keep costs down. Alternatively, staff could share the

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printer by copying the document to be printed onto a flash drive and then loading it onto the computer connected to the printer. As well as being expensive, this is inefficient for both the person printing the document and the main user of the computer. If the computers are networked, only one printer is needed. This can reduce the time lost in printing and can also mean that a better printer can be purchased to improve the output of information. Other devices such as scanners and CD burners can also be shared.

### Sharing programs

Purchasing software for each computer can become expensive. Many software vendors now provide a user licence that permits the program to be installed onto more than one computer. This type of licence may be expensive but it may be cheaper than purchasing an individual copy for each computer. Accounting software such as QuickBooks Pro and MYOB Premier provide multiuser licences that suit small businesses with small networks.

### Sharing files

The ability to share files is very useful on a network. A user can access a file to be edited from anywhere on the network. This reduces duplication of work and use of computer memory. For example, a graphics program loaded on a single computer to work with digital images can share the resulting files with other computers on the network.

### Communicating

Networks are very useful for communication within an organisation. For example, four computers on a network may be located on a different floor. The time taken for a staff member to print out a customer list, for example, or copy it onto a flash drive and then walk down to the next floor takes a lot longer than simply emailing via the company intranet.



## Network computers

There are various types of network computers. These are two of the basic setups.

- **File server networks**: One computer is the main host that stores all programs and data files.
- **Peer to peer networks**: Computers are connected so they can share files and peripheral devices without the need of a central, host computer.

## Backup equipment

It is important to have a backup system that will protect the network if it crashes because of power failure or damage. This is usually achieved by using a mirror image on the server or an additional, dedicated server that is a copy of the main server. This way, if something happens to the network, it can be restored quickly using the backup server.

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## Computer awareness exercise 7

### *Networks*

1 Find out what a thin client network is. List two benefits and two disadvantages in using this type of network.

2 Find out what a client–server network is. List two benefits and two disadvantages in using this type of network.

3 The network topology, or structure, refers to how the components of the network are connected. Search for information on the following network types. Explain how they are connected. List an advantage and disadvantage of each type. Draw a diagram of the topology:

- **a** Point to point.
- **b** Bus network.
- **c** Star network.
- **d** Ring network.
- **e** Mesh network.

# 1.7 Data

Data is based on bits and bytes. One bit is the smallest unit – it is the building block of all pieces of data. The term 'bit' is derived from the term '**binary** digit'. A bit is represented by either a 1 (one) or 0 (zero). 1 is 'on', 0 is 'off'.



**binary**
A use of two states or permissible values to represent data, such as ON and OFF positions of a light switch or transistors in a computer silicon chip that can be in either the electrical state of ON or OFF. Binary data are typically represented as a series of single digits referred to as binary digits (or bits) due to each taking on the value of either 0 or 1.

A byte is a group of bits that can be in groups of 8, 16, 32 or 64. There are 256 possible combinations of bits 1 or 0 when grouped in eights. Each character of the alphabet, numbers and other symbols have a unique byte combination. This set of combinations is known as a code. The **ASCII (American Standard Code for Information Interchange)** code is one commonly used code.

**ASCII (American Standard Code for Information Interchange)**
An early numeric code, later extended, used to represent 128 specific characters, including 0–9 and a–z, in computer systems. For example, capital A is represented by the binary code 0100 0001.

The first 10 letters of the alphabet are displayed below with their ASCII codes. Can you see a pattern? Can you work out what the ASCII code for K is?

| | |
|---|---|
| A | 01000001 |
| B | 01000010 |
| C | 01000011 |
| D | 01000100 |
| E | 01000101 |
| F | 01000110 |
| G | 01000111 |

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H 01001000

I 01001001

J 01001010

Memory on the computer is divided into bytes. Each character stored uses about one byte of memory. So the word *appointment* would use about 11 bytes.

- 1 kilobyte is about 1000 bytes
- 1 megabyte is about 1000 kilobytes
- 1 gigabyte is about 1000 megabytes

## Computer awareness exercise 8

### *Data*

**1** Write the following words in bytes (one letter under another as displayed in question 2 below):

| BEAD | DIG | HIDE | FADE | DICE |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**2** Can you decipher this word:

01000100
01000101
01000001
01000110

**3** Make up your own words using the letters given above and give them to a friend to decipher. Programs such as word processors enable us to simply hit a key on the keyboard and the data is stored instantly. Millions of bytes of data can be stored or recalled every second.

Data while in various combinations of 1 and 0 can represent more than just characters of text and numbers and symbols, also known as alphanumeric. Images and sound are also able to be manipulated, stored and communicated by digital systems. The ability of digital devices to do this has revolutionised the entertainment industry. How data is transferred and stored is looked at in the next section.

Alphanumeric data does not take up a lot of memory. Sound and images can take up a large amount of storage, depending on the quality required for display or broadcast.

An image is a collection of pixels. The mixture of red, green and blue (RGB) is used to determine the actual colour for the pixel. Each pixel can be represented by one eight-bit byte. Eight bits means that 256 colours in a palette can be used. Twenty-four bit true colour is more commonly used now because of advancement in data storage and display. Twenty-four bits means that many more colours can be used – 16,777,216 in fact. This 24-bit colour is also called True Colour. Not every colour is stored with a file but the colours that are used are stored in a palette for the file. The image file then does not have every colour coded for each pixel on the image as this would need a lot of memory. What is stored is a reference to the colour in the palette.



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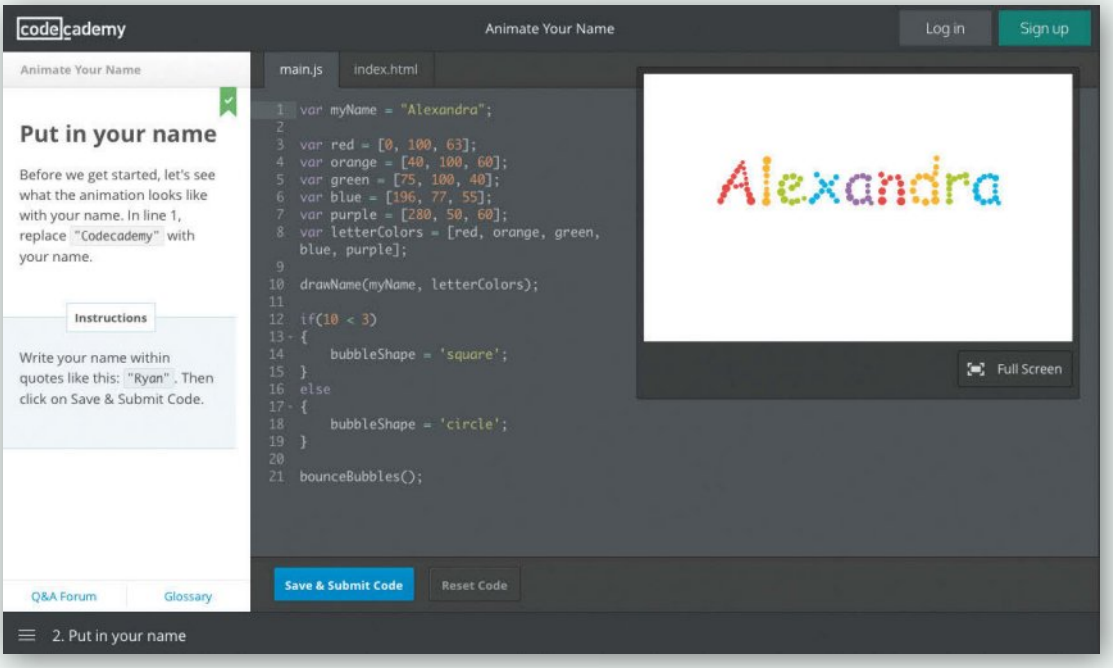
# Computer awareness exercise 9

## *Data colour*

In the example below from Codecademy, the shades of each colour are coded. This code is a reference to a palette of colours.

1 Go to the Codecademy website.

2 Follow the instructions on screen. You should be able to alter the coding for the name to insert your own, and play around with the colour shades and see the immediate effect on the screen.




## Data compression

Data files can be compressed to save space when storing and transmitting. There are two types of compression – lossless and lossy:

> Lossless compression means the original data will be restored, for an example an image will be as it was originally. The advantage is a losslessly compressed file can be restored to the original. For example, converting an image from PNG format to JPEG format will reduce the amount of storage required for the image file, but some data will be permanently lost. Even more data will be lost if you convert it to a BMP file.

> Lossy compression actually loses data but the data is still recognisable. For example, images used on websites are still easy to view and recognise but if you try to enlarge them it becomes very obvious that they have lost a lot of detail.

Lossy compression deletes the bits of data that are not necessary for the compressed version. The advantage is that the file does not take up as much memory as it would have. Lossless compression is achieved using compression applications such as WinZip to zip up the files. A file compressed losslessly will take up less memory than the original but more than that compressed result of using a lossy method.



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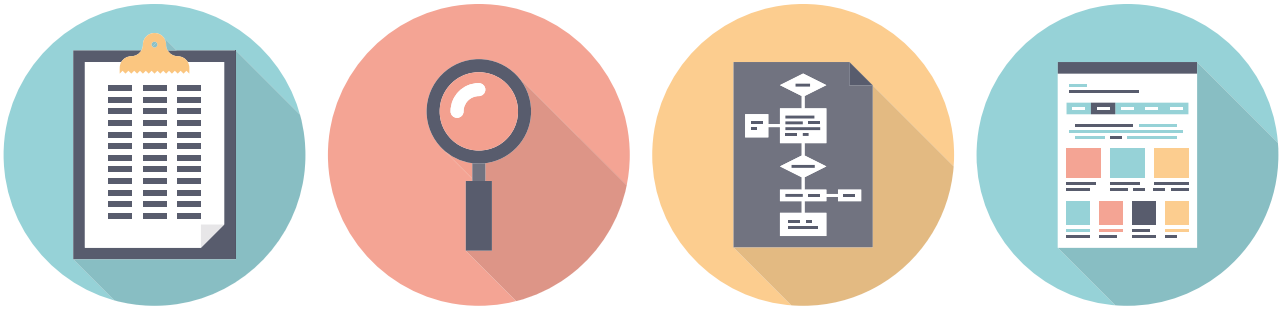
An image is made up of pixels of colour. The higher the number of pixels in a square inch of the image, the higher the quality of the image. However, the higher number of pixels means more memory is required to store the image and process it. Fewer pixels mean less memory is required but the image is not quite as clear as it was, although the content of the image is still recognisable.

A video is a set of still images called frames. To create the video, the frames are ordered so that each image is a minute change from the previous image to create what looks like a moving image. A frame rate of 24 to 30 per second is enough for the human eye to interpret the images as continuous motion. However, at this rate it would appear to be flickering. To avoid flicker, a frame rate of about 75 per minute is required. To accommodate this each frame is flashed up to four times.

MPEG (the standard for lossy compression of video and audio) is probably the best known and most commonly used format for video compression (also known as a **codec**).

**codec**
A piece of software that encodes or decodes digital audio-visual material, usually to allow it to be stored or transmitted in a compressed format. For example, the MP3 format compresses audio data and requires an MP3 codec (usually available by default in audio programs) to be read and played by a computer. Codecs can be downloaded or purchased and installed as plug-ins to most applications to extend the media capabilities of software.



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# 1.8 Computer software

So far we have talked about hardware in a system. The hardware will only work as well as the software – programs that coordinate it to process the data. The software cannot actually be seen. You can see the result of using the program on the screen. You can see the CD or disk it is stored on but you cannot see the actual program.

There are four main categories of software in a computer system:

- operating system software
- application software
- utility software
- programming languages.

## Operating system software

A computer's operating system is a system program or programs that control the operations of a computer. The operating system determines how each hardware component of the computer system is used. Common operating systems are Microsoft Windows, Linux and Apple Mac OS, IOS and Google's Android.

The operating system enables us to print a document while at the same time opening a file or entering text. On a smartphone you can conduct a phone call while checking messages or using other **apps**.

The operating system also provides an interface between the user and the programs. The interface – sometimes known as the graphical user interface – makes the device much more user friendly.

An operating system is used to:

- start apps up and then close them down
- manage the location of saved files
- control peripheral devices such as printers and scanners.

An operating system is the base program on which other applications run.

**app**
A software application with a very specific or narrow purpose designed to run on mobile devices (such as smartphones or tablets) through a web browser or on a personal computer. The feature set of an app is limited when compared with a full-featured desktop application for a similar purpose. For example, a photo editing app has a smaller set of features than an industry-standard photographic suite.

## Application software

Application software determines how the data is processed to produce information. Well-known application software programs include Microsoft Word, Adobe Photoshop, Instagram and WhatsApp.


## Utility software

These programs are maintenance-type programs that are used to keep the computer running smoothly. They are important for the efficient organisation of files. File processes such as copy, move, delete, backup are carried out in these programs.

Windows Explorer, Windows Disk Defragmenter and Microsoft Backup are some commonly used utility software programs.



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## Programming languages

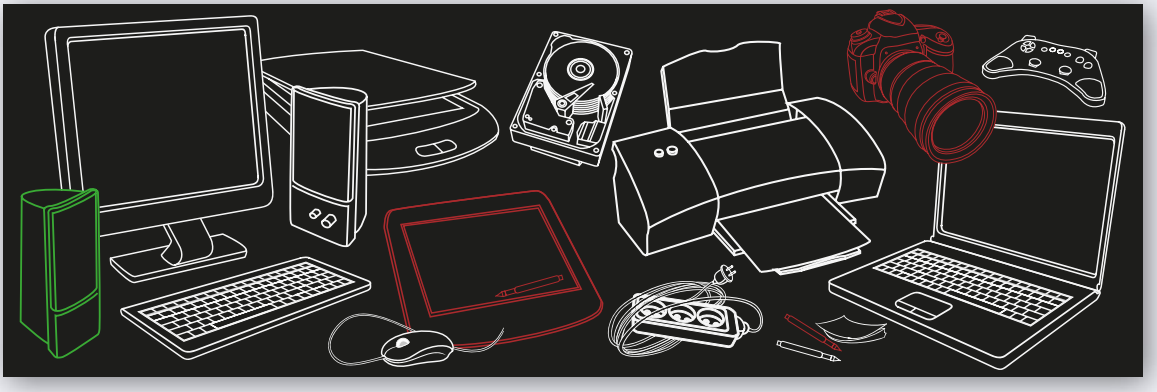
Programming languages are used to produce custom applications. Though it is outside of the scope of this book to go into this topic in great detail, it is worth knowing that **general-purpose programming languages** are the most commonly used for developing software. These languages include C#, C++, Java, JavaScript, Python, Ruby and Visual Basic, and allow the creation of software through logical instructions. We will consider programming languages once again in Module 11: Algorithms and programming and introduce some exercises using Python.

**general-purpose programming languages**
Programming languages in common use designed to solve a wide range of problems. They include procedural, functional and object-oriented programming languages, including scripting and/or dynamically typed languages. Examples of general-purpose programming languages include C#, C++, Java, JavaScript, Python, Ruby and Visual Basic.

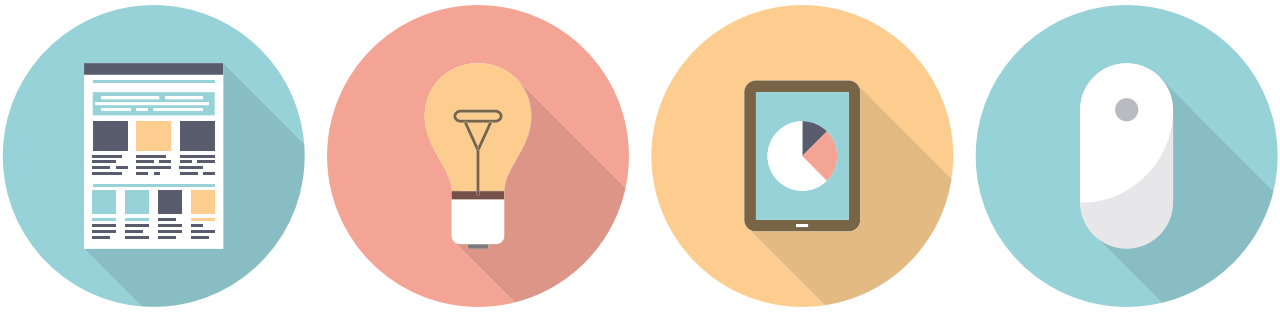
## Computer awareness exercise 10

### *Computer software*

1 What is the difference between hardware and software?
2 On the computer you use at school:
   **a** Which operating system software does it use?
   **b** List five applications available for you to use.
   **c** List two utilities programs.







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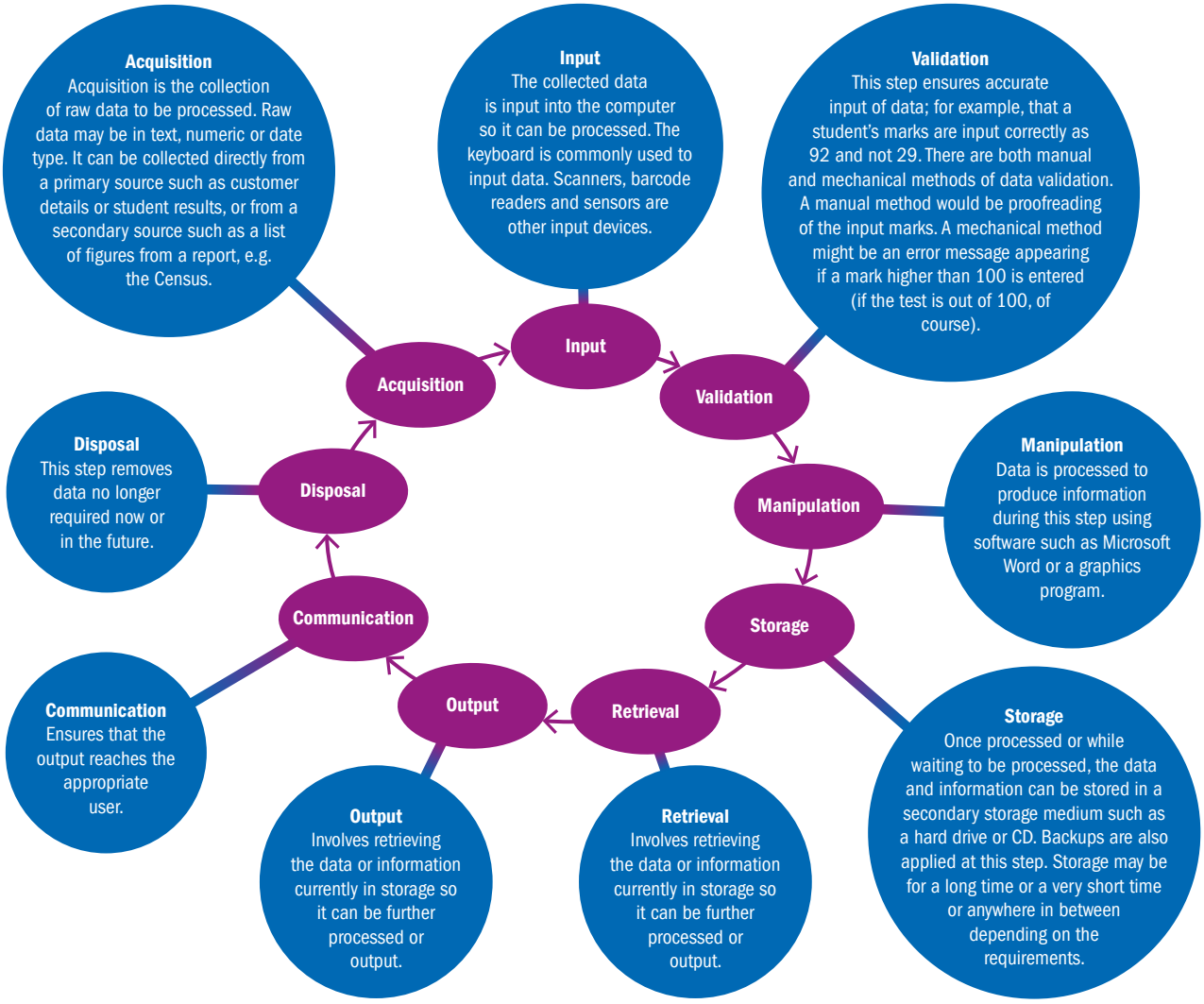
# 1.9 Information processing cycle

Computerised information systems are usually employed to solve a particular problem or opportunity. No matter what the problem is, the method of solving it through the use of a digital networked system is most efficient if a series of steps are followed. These steps are called the information processing cycle. It is a cycle rather than simply a list because the steps are continually being readdressed to further use and refine the system.

Each step is explained below.




The information processing cycle is developed by working out the requirements throughout the cycle so an appropriate solution is produced for the problem or opportunity.

Working out requirements involves the following:

1. Interviewing stakeholders, the people who are involved in the system.
2. Identifying the functional requirements such as processing speed, security, calculations.
3. Identifying the non-functional requirements such as usability, reliability and portability.

Sometimes a complex problem will need to be **decomposed** into smaller parts to be more easily understood.

**decompose**
Separate a complex problem into parts to allow a problem to be more easily understood.



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# Computer awareness exercise 11

## *The information processing cycle*

When a new DVD game is purchased it must be entered into the inventory system.

1 The list below contains steps involved in entering a new DVD game into the inventory system. The steps are out of order. Sort the steps into the information processing cycle.
   > A new video is purchased and numbered by the operator.
   > The operator saves the **database**.
   > The operator reads the data that has been input to check it is correct.
   > The operator sorts the DVD list so the new DVD game appears in order on the list of DVDs currently held.
   > The number and details are entered into the database.
   > The operator prints out the new list.

2 What is missing? Can you add detail to the cycle?

3 Determine the steps for the following problem:

   Your local tennis club has asked you to create a system that will store details about its members. It must keep the membership list current.



**database**
A collection of data organised by records and fields that can be easily stored, accessed, managed and updated. Each discrete piece of data to be stored is represented by a field (for example, song title, song artist or bank account number, date of transaction); and values in the fields that are associated with an entity (for example, a song, a bank transaction) are a record. Interaction with a database usually takes place through a user interface designed specifically for the structure and use of the data stored in it.

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COMPUTER AWARENESS PROJECT

# Designing a network

Your brief is to design a network that incorporates appropriate peripheral devices to improve the following information processing cycle.

Willbuild Industries is a small carpentry business that constructs cabinetry for retail use in large department stores and chemists.

Willbuild have three office staff who are responsible for controlling orders, invoicing customers, receiving payments, ordering stock, paying suppliers, paying staff, creating reports and creating advertising material, etc. An accounting package on one computer is used to process invoices and receive payments. All staff members are involved in the accounting transactions, so a lot of time is wasted waiting for a turn on the computer. The other computer is used for generating cabinet designs and advertising material. It has a colour laser printer connected to it, so if a draft of an advertising piece is required, the file is copied onto the disk and taken to the other computer, which has a black-and-white printer attached.

Office staff members enter orders received from customers into a template on their office computer, then print it out and take it downstairs to the building supervisor who puts it in an order book. (Orders sometimes get lost and so production is held up.) When the order is complete, the supervisor signs it off, removes it from the order book and returns it to the office for invoicing and delivery. This is time-consuming for both the supervisor and the office staff.

## *Collecting the data*

Who should be consulted in creating a solution? What data do you have? What else do you need?

## *Defining the solution*

Decompose, or break the problem down into chunks.

- > Draw a diagram of the network depicting each floor of the factory side by side.
- > Describe how the office staff and building supervisor will use the network to achieve their goals.
- > What new equipment will need to be purchased?
- > Which network topology would be preferable here and why?
- > Why will the network be useful?
- > What are the benefits to the organisation?
- > How can the data on the network be protected?

## *Implementing*

How does your solution fit with the steps in the information processing cycle?

## *Evaluating, collaborating and managing*

1. Look at the result of your work. Has it worked as you had planned? Can you improve it in any way?
2. Ask your friends and classmates to look at your network design and provide you with feedback.



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# Module 2

## SOCIAL AND ETHICAL PRACTICE IN IT



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# Teacher information

## IT knowledge and skills covered in this module

- ICT in the workplace
- Advantages and disadvantages of computer use
- Privacy and emotional safety with ICT
- Being cybersmart to stay safe
- Intellectual property and piracy
- Computer crime

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Applying social and ethical protocols and practices when using ICT
  - > recognise intellectual property
  - > apply digital information security practices
  - > apply personal security protocols
  - > identify the impacts of ICT in society
- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Personal and social capability
- Ethical understanding
- Intercultural understanding

### Digital Technologies curriculum content in this module

#### Knowledge and understanding

- Digital systems – Investigate the role of hardware and software in managing, controlling and securing the movement of and access to data in networked digital systems (ACTDIK034)

#### Processes and production skills

- Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements (ACTDIP036)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Evaluate critically how student solutions and existing information systems and policies take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)
- Create interactive solutions for sharing ideas and information online, taking into account safety, social contexts and legal responsibilities (ACTDIP043)
- Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)





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# 2.1 ICT in the workplace

The components of a computerised information system are hardware, software, people, procedures and data. In this section we are looking at the people, the users of the system.

Digital information system users are those who use the technology in the course of their work or general day-to-day activities. Providers enable the technology to be used by developing and implementing it. There are various groups of users of technology. The users are affected by the use of technology to either their advantage or disadvantage or both. For example, an office worker's job is improved by the use of a word processor. The task of typing letters is now much quicker and errors or changes are easy to fix compared to the days of a typewriter. However, to their disadvantage is the fact that fewer office staff are now needed for typing so there is the possibility of loss of employment. Change in any situation will have an effect on people involved.



There are many issues and effects associated with technological developments. An issue arises when two sides have conflicting opinions about the use of the technology. Issues generally only arise when the use of a piece of technology is negative for some reason – the group of users who are subject to the negative effects will argue with the group that stands to benefit from the use of the technology.

Common effects associated with the use of computer technology are the resulting unemployment, alienation, crime, loss of privacy and errors. But on the bright side, convenience, efficiency, employment and improved equal opportunity have also resulted from the use of computer technology.

The social effect of new technology relates to how the technology affects society as a whole in terms of employment, environment, advancement and generally improving quality of life. Technology should ideally contribute to a state of **social sustainability**. However, social, or **ethical** issues arise when a group of users will be unfairly disadvantaged by the use of the technology. For example, the loss of jobs when a process previously carried out by people (e.g. tram conductors) is replaced by machines (e.g. automatic ticketing machines and the Myki system in Melbourne), loss of human interaction, increased difficulties for the disabled, fare structures that disadvantage certain groups depending on the state.

**social sustainability**
Practices that maintain quality of life for people, societies and cultures in a changing world for a long period of time, ensuring health and wellbeing without disproportionate costs or side effects.

**ethical**
Moral principles – also known as right or wrong behaviour.

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## Social and ethical practice in IT exercise 1

### *User groups*

Below is a list of users and a jumbled list of technologies. Match the user group with the technology.

| User | Technology |
|---|---|
| Accountants | Personal computer |
| Graphic artists | Online learning |
| Commuters | Use plotters to draw plans and other technical drawings |
| Students | Accounting software |
| Office workers | Graphic art programs to create layouts for artwork and webpages |
| Assembly-line workers | Synthesising software to create music |
| Musicians | Metcard |
| Draughtsmen | Robotics |



Computer technology has had a large impact on the way we live and work. Many jobs have been replaced or changed substantially due to the introduction of computer technology. A computer can completely replace a worker when all the tasks the worker used to perform can now be performed by a computer. For example, in cutting cloth for garments a computer can be used to lay out the pattern then cut the material ready for sewing. The material cutter's job is replaced by a computer. The designer who makes up the pattern pieces is still required to design the garment and create the pattern; however, their job has changed because graphical applications can now help in the production of patterns, making the designer's job easier. So some jobs are replaced while others are changed.

# 2.2 Advantages and disadvantages of computer use

Digital technology is now tightly wound into the fabric of our society. Smartphones in particular have revolutionised how people interact with each other. Advancements in technology have affected the workplace and job opportunities.

## Advantages

Advantages of computer use include:

- New ways to communicate personally – social media, smartphones.
- Text-based computer communication opens a world of opportunities to those with physical or social problems.
- Technology automates manufacturing to provide goods at a cheaper price.
- Technology assists in medical research and creativity.
- New industries develop based on evolving computerisation increasing job opportunities.
- Games and educational tools are more sophisticated and fun to use.
- New technology means computers are far more portable than before.

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## Disadvantages

Disadvantages of computer use include:

- Communicating via smartphone interferes with personal communication face to face.
- Gaming addiction can be a real problem interfering with other normal parts of life.
- Portability of computers enables them to encroach in areas where they wouldn't normally be and so interfere with other parts of life.
- New technology in some industries reduces the workforce required, resulting in job losses.
- Money is invested in technology rather than people.
- Older people sometimes feel alienated in the workplace because of their lack of computer skills.

## Social and ethical practice in IT exercise 2

### *ICT in the workplace 1*

1. In the last 10 years, which kinds of jobs have been replaced by computers?
2. For three of those jobs, explain why they were overtaken by a computer. What are the advantages in using a computer for this particular job?
3. In the last 10 years, which kinds of jobs have been changed by computers?
4. For three of those jobs, explain how the job has changed and what the advantages are.
5. In the next 10 years, which kinds of jobs do you think could be replaced or changed by computers?



While many jobs have been lost through the development of technology, there have also been many new types of jobs created such as:

- computer technicians
- computer graphic designers
- computer programmers
- content writers for internet sites
- computer trainers
- help desk
- call centre operators
- data entry operators
- computer cleaners.

Jobs in other industries have also expanded or changed due to increased leisure time because of advancements in technology; for example, tourism.

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## Social and ethical practice in IT exercise 3

### *ICT in the workplace 2*

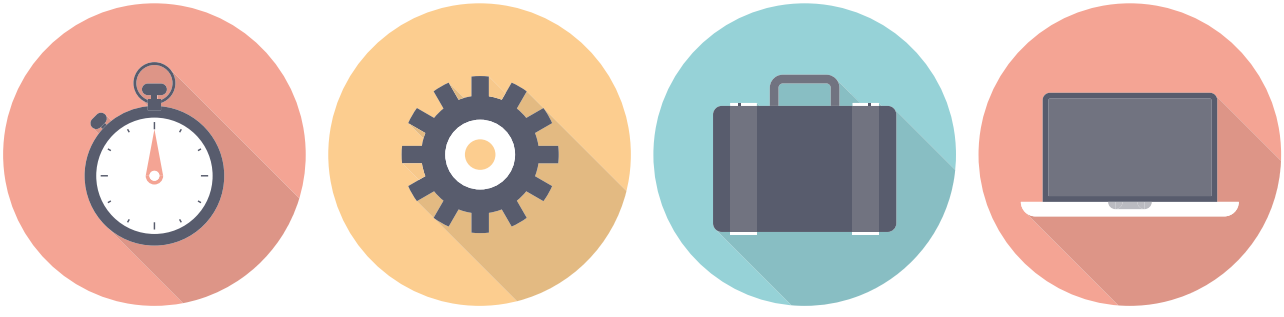
1 What kinds of jobs have been created by the use of computers and the development of the internet?
2 From your list above, pick two occupations and find out what they do and what qualifications are required for the position.
3 In the next 10 years, what new kind of jobs do you think will be created by computers?
4 What could you do if you wanted to ensure employment in a computerised workforce?
5 What steps can an older person take to ensure they stay in the workforce?

## Social and ethical practice in IT exercise 4

### *ICT in the workplace 3*

Consider this scenario: You may already have noticed a facility in some supermarkets allowing self-serve checkouts where the shopper scans their purchases then pays with a credit card or even cash, which means there's no need for a checkout operator. Each item's barcode is also fitted with a security device, which is deactivated on scanning to prevent theft. The cost of a swiping station is much less than the combined cost of a cash register and checkout operator. Because they cost less, the store can have more stations, which results in keeping queues to a minimum. Customers move through the self-serve stations more quickly because they have control over the speed of the process.

1 Who are the users of the traditional system at a supermarket checkout?
2 Which group is helped by this new technology? What problems could still be associated with this new system?
3 Which group is adversely affected?
4 Who would benefit the most from this new system?
5 What new employment opportunities could arise from this technological development?
6 Can you think of other organisations where this type of system could be used?





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# 2.3 How the digital age impacts society

Computers are now part of most people's everyday lives in Australia and other westernised countries. Access to the internet is also commonplace. There are many advantages and disadvantages of using the internet. Can you add to the list that follows?

## Advantages

Advantages of using the internet:

- It provides people with membership to a worldwide library and resource centre.
- It allows greater communication between all people throughout the world and breaks down geographical and cultural boundaries.
- It is changing the workplace environment by allowing people to work from home and in remote locations.
- It provides education, health and commercial services to people anywhere in the world.
- It allows people who are otherwise isolated from society for whatever reason to interact with society.
- It provides entertainment and information for millions of people.

## Disadvantages

Disadvantages of using the internet:

- It can isolate people from direct social interaction.
- It promotes the spread of computer viruses and other **malware**.
- No controlling body verifies the validity of information or restricts illicit material.
- Because knowledge is power, it extends the division between the privileged and the underprivileged.
- It enables opportunities for fraud.
- The security of information belonging to individuals, businesses or governments may be jeopardised.



**malware**
Malicious software designed to interfere with the regular operation of a computer system. Often used to gain access to other people's computers or to gather sensitive information, it is usually hidden in other software to avoid user detection. Examples can include viruses, Trojan horses, key loggers and spyware. Anti-malware software is often relied on to help users detect and remove malware from their computers.

## Social and ethical practice in IT exercise 5

### *Advantages and disadvantages of the increased use of digital technology*

1. Add two points to the lists for advantages and disadvantages of using the internet.
2. Add two points to the lists for advantages and disadvantages of the use of computerised technology.
3. For each complete list, including your new points, what is the most important point for you?

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# 2.4 Privacy and emotional safety with ICT

Have you ever had junk mail arrive specifically addressed to you? Did you think, how did they get my address? Likewise, do you have junk email sent to you? You didn't request it, yet it's been sent to your address. How did they get your email address? Why do they think you might be interested in what they are selling or saying?

You would probably be surprised at how many organisations have details about you in their database. These organisations can be government, semi-government or private/commercial.

For legitimate reasons, your details will be stored with government organisations. At birth, your details were registered and the process continues from there on. Visits to the doctor go on file, with address, medical records and so on. When you started school, more details went into the system. Your address details and family status may be updated. These types of records are confidential and are not passed on to third parties.

There are other scenarios where you can be unwittingly handing out personal details to a range of people. A simple example is purchasing an item through lay-by or online (**ecommerce**). You give your name and address to the shop assistant who enters it into the store database. In this way the store can start to build a customer database, which they can use for their own advertising purposes or sell to other commercial enterprises who use the details for their advertising – hence the junk mail addressed to you.

**ecommerce**
The electronic (e) selling of a product or service online or through other electronic means, with an online mechanism for payment. Examples include online shopping sites and travel websites where hotel accommodation and airline tickets can be purchased.

The Flybuys cards store details about you. They can also store details about the items you purchased. The retailer can develop a profile on their customer and use this to their advantage.

Competitions are a classic data-building exercise. This could be seen to be relatively harmless because, in the end, the retailer is trying to give us what we want. However, do you know what the promoters do with your details when the competition is over? These simple examples remind us that we all leave a **digital footprint** online.

**digital footprint**
A total set of data left behind by a person using a digital system. A person's digital footprint includes all information actively provided by that person such as interactions on social networks (for example, comments, photographs), online purchases, website logons, emails and instant messages. It also includes passive information such as logs of software installed and used on a computer, metadata associated with files, a user's IP address, a device being used to access a webpage, and a user's browsing history stored as cookies or by internet service providers.

There are other areas where details stored about you can be a distinct disadvantage. A simple example of this is credit ratings. When your home is connected to electricity you are expected to pay the resulting bills promptly. This applies to all bills, credit cards, mobile phone, store cards and so on. If you repeatedly do not pay on time, you risk being listed as a credit risk. This may not affect you immediately, as you still have your electricity, credit card and mobile phone.

However, when you go to the bank for a loan to buy a car or home, or a finance company to buy a computer or some other large piece of equipment, you may be denied. These companies always check credit ratings before lending money. If you are listed as a credit risk, you will be unlikely to get a loan. Your details are stored, along with your credit rating for the past five years. The company may be wise not to lend you money.

On the other hand, it may not have been your doing that you now have a bad credit rating. You may never have received the bill that you are now listed as not having paid. They may be looking at the details for the wrong person. The data entry operator may have entered the details incorrectly. The person doing the checking on the payments may not have scrolled up high enough to see that payment had actually been made. The information in a computer is only as accurate and safe as the person entering it or able to modify it.



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A different example is if you win Tattslotto – but you want to keep it quiet because you don't want others hounding you. You deposit the money into your bank account – you go to another town to do it because you don't want the locals to know. How many people do you think have access to your bank account details?

Another example is when you visit your local doctor, who enters your latest medical condition onto the file on screen then puts your paper file away and sends you on your way (but doesn't close the screen on the computer). Their next patient is a friend of your mother's with very good eyesight. How safe are your medical records?

## Social and ethical practice in IT exercise 6

### *Privacy 1*

1 Can you recall the last three times where you gave personal details, either in written or electronic form? What was the purpose and who was it to? Do you know what each organisation will do with your details?

2 Think about the organisations who record details about you and discuss in a group or as a class the rules or protocols that these organisations should adhere to in order to protect your privacy.

Rapid advancements in technology and the ability to gather information about an individual are making it increasingly difficult to control the information stored on an individual, who has access to it and for what it is used. The *Privacy Amendment (Private Sector) Act 2000* is an attempt to increase protection of individuals' right to privacy and the use of personal information about them.

More information can be obtained at the Office of the Australian Information Commissioner website.


## Social and ethical practice in IT exercise 7

### *Privacy 2*

1 Go to the Office of the Australian Information Commissioner website.

2 Under 'For individuals', click on 'Privacy fact sheets'.

3 Scroll through until you find 'Privacy fact sheet 8: Ten tips to protect your privacy'.

4 Click on the link to the sheet. This fact sheet is a good summary of steps you should take to protect your personal information.

5 Look for the 'Privacy fact sheet 7: Ten steps to protect other people's personal information'.



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# Social and ethical practice in IT exercise 8

## *Create a presentation on privacy*

1 Design a presentation that could be used to educate others on protecting their privacy based on 'Privacy fact sheet 8' and others privacy based on 'Privacy fact sheet 7'.
2 Enter text and images to illustrate each step.
3 Save the file as 'Ten steps to protect your and others' personal information' in the folder.
4 Share it with your friends and classmates to get feedback.
5 Make any modifications you think necessary or an improvement.




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# 2.5 Being cybersmart to stay safe

It would be nice to think that all people can be trusted. The sad fact is that there are some people purposely trying to trick you and others so they can get something from you or hurt you in some way. These may be people you know or people you don't know. The people you don't know can come from anywhere – next door, the next town or suburb, even the other side of the world.

You can control the effect these people have on you by being aware of what you are doing when you are on the internet or phone, and by being aware of what is going on around you. You should therefore develop your own set of **ethical protocols** for safe internet use as a responsible **digital citizen**.

**ethical protocols**
Generally accepted 'rules' or behaviours when undertaking research and collecting and using information from primary and secondary sources; for example, confidentiality, informed consent, citation and integrity of data.

**digital citizenship**
An acceptance and upholding of the norms of appropriate, responsible behaviour with regard to the use of digital technologies. This involves using digital technologies effectively and not misusing them to disadvantage others. Digital citizenship includes appropriate online etiquette, literacy in how digital technologies work and how to use them, an understanding of ethics and related law, knowing how to stay safe online, and advice on related health and safety issues such as predators and the permanence of data.

Safe internet use:

- Keep your details and those of your friends and family private. Always check with your parents or an adult before giving out any personal details.
- If you make new friends online and want to meet them, always go with a parent or adult friend to a busy public place to start with. The person you think you are friends with may in fact be someone quite different, even dangerous.
- Never give your passwords to anyone, not even your friends (although, you may provide them to your parents or caregivers when appropriate for safekeeping).
- If you feel uncomfortable about something you see on the net or something that is sent to you, leave the page or the chat room and don't respond to the message or email. Make sure you tell someone about it, such as a parent or teacher.
- Sites may expect you to fill out forms and include personal details before they enable you to download free items, or register an email address. You should always check with a parent or adult first; and only give minimal information.
- People may offer you things that seem fantastic and you feel very lucky. These offers may be bogus, another ploy to get information from you that they can use to your detriment or it may be an avenue to install malicious software onto your computer. If it seems too good to be true, it probably is.
- If you have a webpage or blog, be very careful about the information you put on it. You may think only your friends are reading it, but in reality you may have a much wider audience – it is easy to forget and put personal information on it. You should also be careful about the photos you load – think about who may be looking at them. You should also be considerate of others' privacy – never upload photos of other people without their consent.
- Treat others as you would like to be treated. Only send the types of messages you would like to receive. Don't write things you would not like other people to write about you.
- Tell someone if you or someone you know is being treated badly.

There is a wealth of information online about cybersafety and cyberbullying. Use a search engine with these terms to find sites and activities that can help you learn how to protect yourself and others. Note: Make sure you consider the site you are using – does it look legitimate?



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# 2.6 Intellectual property and piracy

Further to keeping your and others' information secure is respecting others' **intellectual property**, which is when someone or some group has an 'idea'. For instance, some bright spark at Cadbury came up with the idea of making chocolate wrappers the distinctive purple colour we all know today. Likewise, the founders of Google came up with that name from their garage workspace in the early inception of the company.

**intellectual property**
A legal concept that refers to creations of a mind for which exclusive rights are recognised. Common types of intellectual property include copyright, trademarks, patents, designs and plant breeder's rights.

Intellectual property covers a range of things. The term Google is trademarked – it is the most valuable trademark today. The Microsoft trademark is not far behind. The colour purple of Cadbury chocolate is protected – no other company selling chocolate can use the same shade of purple.

Copyright is an aspect of intellectual property that is commonly breached. When you download music or movies from any organisation other than an authorised distributer you are breaching copyright. Copyright is also breached if you then make this available to others by streaming it or making copies and distributing it. This is called **digital piracy**.

**digital piracy**
The act of illegally copying a computer program, music, a film, etc. and selling it.

Intellectual property copyright also extends to your friends and classmates. Files they have created belong to them. You should not copy them or parts of them and pretend they are your own work – this is known as **plagiarism**.

**plagiarism**
A serious type of copying where someone claims that another's work is their own.



iTunes is an example of a legal distributor where you can download various types of media – music, movies, books – for a small fee. One day you may be a creator of this type of work and you will surely want to be paid for the time, effort and money you spend on creating your work. Of course, if you want to distribute your work for free, you can do so. But you must respect the rights of others to want to be paid for their work and ideas.

The social impact of piracy is a reduction in production and jobs. There are many blockbusters that make millions of dollars. This money is used to create films that are not always successful in order to encourage a diverse range of topics and film genres that require the funding from mainstream films. If the movie industry dies, entertainment is reduced, people who work in that industry and those in associated support industries are out of work.

You are also putting yourself at risk when you download illegal files. Often these files will have malicious software attached that may harm your computer or steal information without you even knowing.

## Copyright and Creative Commons

**Copyright** means that any person other than the creator or owner of a piece of work cannot make copies of that item. Copyright was introduced into Australia by federal legislation in the *Copyright Act 1968*. A breach of copyright is an illegal act.

**copyright**
The legal right to control all use of an original work, such as a book, play, movie, or piece of music, for a particular period of time.

In Australia, copyright protection is free and automatic. The © symbol indicates that there is a copyright to protect a particular work. However, even when the copyright symbol is not present, copyright is still applicable.

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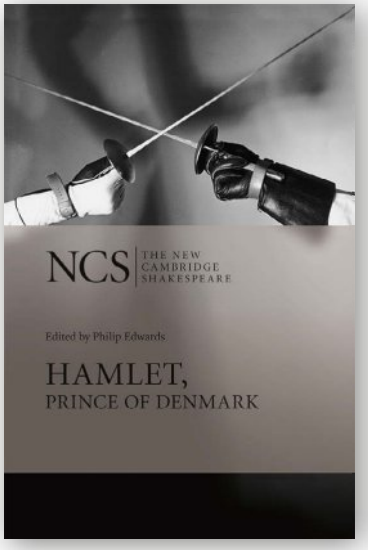
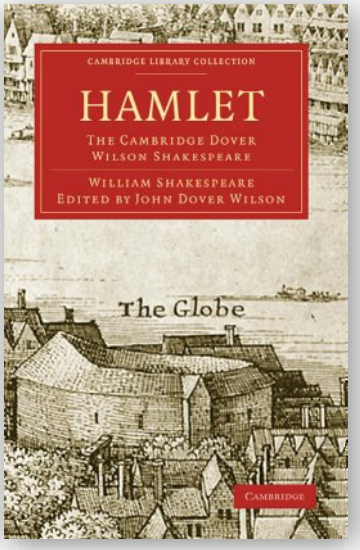
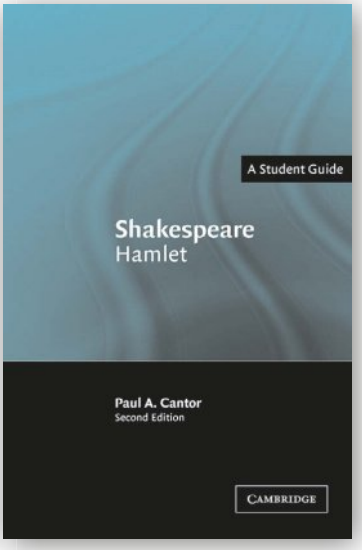
Copyright is infringed when copies are made of a book, audio, video or software, etc. without the permission of the author or owner of the copyright. In the software world this is called piracy. It is also a breach of copyright to sell the item that is copied.

You should seek clarification if you are in doubt as to whether you are breaching copyright laws. Further information can be obtained at the Australian Copyright Council website.

Copyright does not last forever. In Australia a person's legal claim to copyright lasts until 70 years after their death. After that the work can be copied and redistributed. However, there are conditions on this. For example, the works of Shakespeare. These can be formulated into a new publication that you have created from scratch using the words of Shakespeare. You can then copy and distribute your creation of his words. You cannot just copy and distribute another publisher's creation of the same words of Shakespeare. The publisher's creation is copyright.






## Social and ethical practice in IT exercise 9

### *Understanding copyright*

1 Go to the Australian Copyright Council website.
2 Click on 'Find an Answer'.
3 Open the PDF file 'An Introduction to Copyright in Australia'.
4 Create a Prezi or PowerPoint presentation based on the topic of copyright in Australia. Imagine you are explaining the concept to a friend who has seen the word 'copyright' before but does not really know what it means. Your presentation should include:
   > at least five key points explaining in your own words what copyright is
   > the name of the copyright law in Australia
   > at least five examples of things that copyright law protects
   > at least five examples of things that copyright law does not protect
   > images to illustrate your points.

   Tip: Be inventive with your presentation, and try not to put too many points per slide! The best presentations use only a few dot points of text per slide, and use images and other visual means to make the presentation interesting.

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Creative Commons is a source of works that you can use in certain situations. There are still controls on how you can use it. Go to the Creative Commons Australia website for more information.

Wikimedia has a large collection of works that are free under the Creative Commons licence or simply in the public domain because they are no longer copyright.


# Social and ethical practice in IT exercise 10

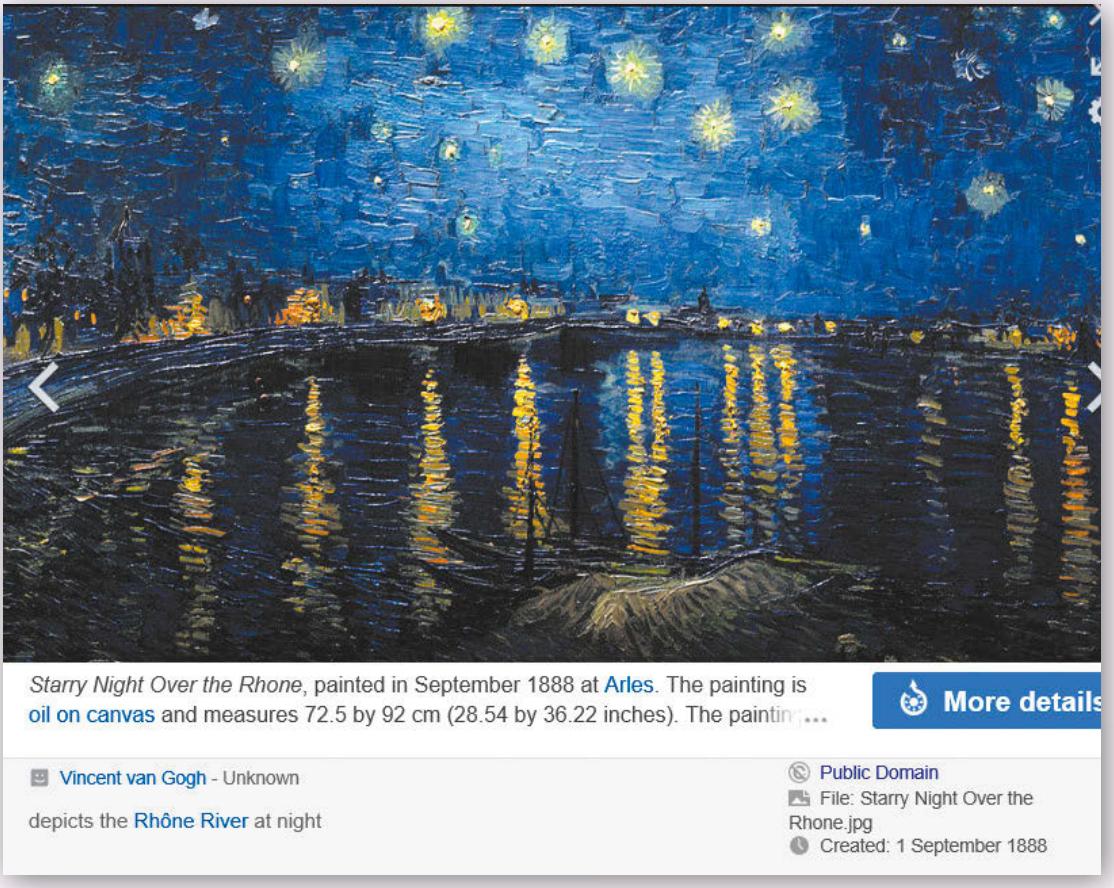
## *Public domain*

1 Go to the Wikimedia Commons website.

2 Type `Van Gogh` in the Search box and press `<Enter>`.

3 Search through the image files of varying quality of Van Gogh's works and open one of them.

4 Click on 'More details' to find out why the work is in the public domain. Can you distribute copies of this image? Why or why not?




5 Type `Picasso` in the search box – what message appears? Can you distribute copies of his work? Why or why not?



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## 2.7 Computer crime

Computer crime involves gaining a financial or personal advantage using a computer as a tool. Juniper Research recently predicted that by 2019 breaches of cyber security would cost companies and individuals over 2 trillion dollars globally per year. While computers make everyday activities easier, the advancements in technology also mean that computer crime is easier to commit and harder to detect.

The main types of computer crime are:

- theft of information
- malice or damage
- financial theft
- falsifying accounts
- altering information illegally
- unlawful access to a computer.

### Social and ethical practice in IT exercise 11

*Computer crime*

1 Why do you think computer crime is so hard to detect and prosecute?
2 Research major newspapers for an article on a specific computer crime. Explain what the crime was. Was the perpetrator convicted? Which type of crime does it belong to?
3 How can you protect yourself and others from computer crime?



## 2.8 Computer errors

There are two main types of errors: program errors and data input errors.

**Program errors** result in incorrect results that may or may not be noticeable. Program testing will hopefully be rigorous enough to ensure that a program works properly before being let loose on the unsuspecting public.

**Data input errors** are a result of the data entry operator entering data incorrectly. For humans there is a saying 'You are what you eat'. For computers, the corresponding saying is 'Garbage in, garbage out' or GIGO.

Even if the programs are near perfect, the worth of data processing results relies on the accurate input of data. Accurate data input should lead to accurate information output. For example, a customer pays for a $10 sale with a fifty dollar note. The salesperson can enter the cash tendered as shown below – one with the correct result – the other rubbish.

| | | |
|---|---|---|
| Input Sale total | 10.00 | 10.00 |
| Input Cash tendered | 50.00 | 5000.00 |
| Display Change required | 40.00 | 4990.00 |

Please see the Interactive Textbook for additional content and an additional exercise on the different types of computer errors.

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# SOCIAL AND ETHICAL PRACTICE IN IT PROJECT

You are to create a story that is an example to others on how to conduct themselves ethically and responsibly in a situation. You can work on this as an individual or you could work in a group. Depending on the tools you have at your disposal you could create a video based on recordings of you and your classmates, if necessary role playing. Or you could create the video using illustrations.

## *Collecting the data*

Decide on what the topic will be. You should discuss this with your teacher and with your group. For example, it could be:

- What to do if you are being cyberbullied.
- Protecting your personal information.
- What intellectual property and copyright are.

What are the main points you want to convey? For examples and inspiration you could watch the eSafety Office's videos (search for them on Vimeo).

## *Defining the solution*

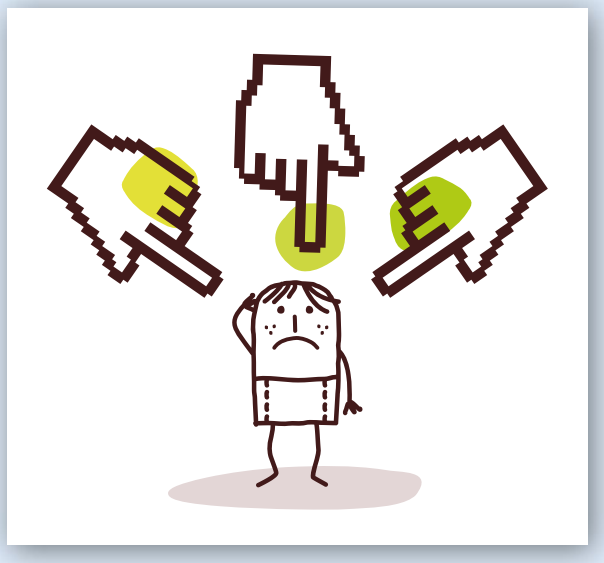
Create an outline of the message to be conveyed in the video or poster. Will you have just one person or will there be two or more people in the story? Design the scenes or scene of the story. Check that you have included everything necessary. Is your message clear?

## *Implementing*

Record the scenes based on your script or draw them.

## *Evaluating, collaborating and managing*

1. Look at the result of your work. Has it worked as you had planned? Can you improve it in any way?
2. Ask your friends and classmates to look at your video or comic strip and to give you feedback.





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# Module 3

## WORD PROCESSING

Programs featured for exercises:

**Microsoft Word**
**Google Docs**



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# Teacher information

## IT knowledge and skills covered in this module

- Creating business letters
- Inserting graphs
- Using sections
- Publishing tasks
- Creating more detailed newsletters
- Mail merge

## Suggested further uses across the curriculum

- English (for presenting information). Use a range of software, including word processing programs, confidently, flexibly and imaginatively to create, edit and publish texts, considering the identified purpose and the characteristics of the user (ACELY1748, ACELY1776).
- History (for presenting information). Select and use a range of communication forms (oral, graphic, written) and digital technologies (ACHHS193).
- Geography (for communicating information). Present findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies as appropriate (ACHGS079).

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Creating with ICT
- Communicating with ICT
  - collaborate, share and exchange
- Managing and operating ICT

### Other general capabilities covered

- Literacy
- Critical and creative thinking
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)
- Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)





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# 3.1 Business letters

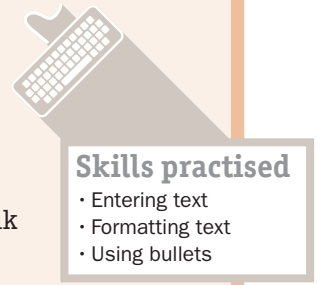
To revise your word processing skills from previous years, the next exercise directs you to produce a business letter. The letter will also revise the use of bullets (solid dots) to highlight points in a list.

When entering business letters, certain rules for the appearance and structure of the letter should be followed. Some of these include:

- Always use a plain or regular font throughout, set the size to 12 point and only use bold to highlight very important words. You can use a different font and font size to highlight the company name.
- Avoid the use of fancy fonts as they are difficult to read and are not very businesslike. Times New Roman or Arial are good fonts to use in a business letter.
- The line structure in the letter should be only four blank lines or one blank line. Four blank lines are used after the company address, after the date and after the 'Yours sincerely'. All other line spacing should be one blank line.
- Any text in point form should have a hanging indent.

## Word processing exercise 1

### *Business letters*



**Skills practised**
- Entering text
- Formatting text
- Using bullets

1. Start a new blank document in Microsoft Word or Google Docs.
2. Enter the business letter shown on the next page. Do not carry out any text formatting. There should be either one blank line or four blank lines throughout the letter.
3. The bulleted points can be entered without any bullets at first.
4. Once all the text has been entered, format the text in the desired fashion, referring to the points above. The business name should be larger and bold, and the exhibition name should be set to bold.
5. Highlight the three points to be bulleted and set them to be bulleted points using the **BULLETED LIST** icon in the home tab of the ribbon or in the toolbar. This should also create the hanging indents.

   Note: You can format the bullets to be different from solid dots if you wish.
6. Once complete, save the document in your storage disk or folder under an appropriate name.
7. Spell check the document then select **PRINT PREVIEW** to see how it looks.
8. Carefully read through the preview and correct any errors. If you have difficulty proofreading from the screen, print a copy, mark any errors with a pen then correct the errors on the screen.
9. After the corrections have been made to the document, resave it and print a final copy or share your document electronically.



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**Technology in Action**
1095 Glenfern Road, Sydney NSW 2000

3 April 2018

Ms R Nettlebeck
Innovation Marketing Ltd
43 Welling Road
Alstonville NSW 2477

Dear Ms Nettlebeck

Are exhibitions a waste of time? Not according to the 43 275 visitors who attended this year's Business Technology and Communications exhibition in Brisbane.

- 85% of visitors were sufficiently impressed to say that they intended to return for next year's exhibition.
- Visitors rated our exhibition as an excellent source of industry information.
- 65% of visitors discovered new ideas and new products at the exhibition.

If you agree that exhibitions are not a waste of time, and you would like to see some 300 exhibits in Sydney, please phone 8329 9222 for a complimentary invitation to visit Australia's largest information technology event – **Business Technology and Communications** – at the Sydney Convention Centre on 11 to 14 August 2018.

Yours sincerely

Mark Chan
Exhibitions Manager



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# 3.2 Inserting graphs

Graphs or charts can be placed into word processing documents to display data in a more visual way.

## Word processing exercise 2

### *Inserting graphs*

**Skills practised**
- Formatting text
- Inserting charts
- Wrapping text

In this exercise you will create the business flyer shown on the following page.

1 Open the WP Exercise 2 document from the Word Processing folder of the Practice IT Book 2 (PIT2) Support Files. It contains the text for the document.

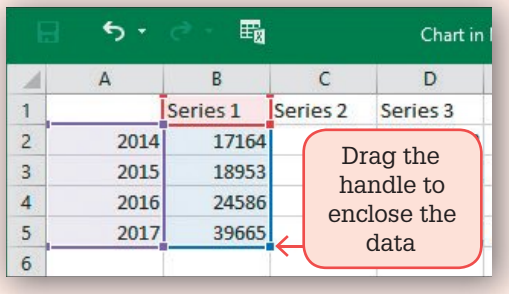
2 Create a company logo using WordArt or styles at the top of the document.

3 Place the cursor after the second paragraph.

4 If you are using Microsoft Word:

   a Use the **CHART** icon from the **INSERT** tab of the ribbon to start the chart and select the **COLUMN** chart option. A Microsoft Excel DATA pane will open.

   b Enter the values shown in the diagram and drag the bottom right handle to enclose the entries.



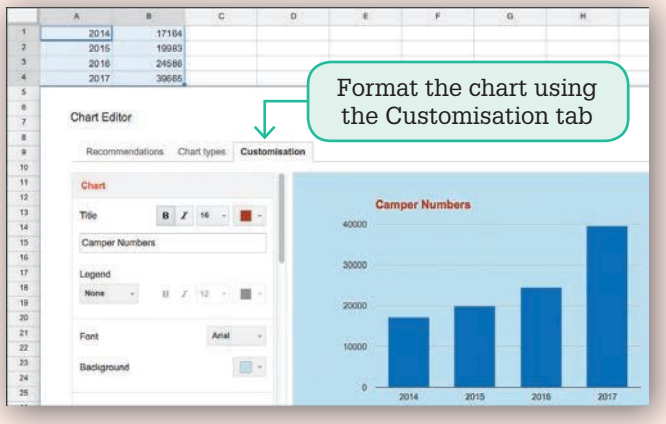

   c Close the **DATA** pane, set the **LAYOUT OPTIONS** icon to set the **TEXT WRAPPING** to **TOP AND BOTTOM** so that the text is placed above and below the chart.

   d Format the chart. You can use the **CHART STYLES** in the ribbon or format each section of the chart by selecting its individual sections in turn.

5 If you are using Google Docs, the chart needs to be created in Google sheets.

   a Open Google Sheets, start a new document, enter the data and highlight it.

   b Select **CHART** from the Insert menu, select a chart from the **RECOMMENDATIONS** tab then open the **CUSTOMISATION** tab.




   c Enter a **CHART TITLE**, add a **BACKGROUND**, turn off the **LEGEND** and, in the **AXIS HORIZONTAL** section, turn on **TREAT LABELS AS TEXT** so that the years are displayed correctly.

   d Select **INSERT** to complete the chart then save it as an image using the down arrow at the top right of the chart.

   e Open your Google Docs file and insert the image from your Downloads folder.

6 Once the flyer is complete, save it, spell check it and proofread it. Once corrections have been made, print a final copy or share your work electronically.



ISBN 978-1-316-62394-7

# XsactioN
## Camping Tours

Imagine being paid for doing the things you love or have always wanted to do. XSACTION Camping Tours have provided fun tours to thousands of kids over the past 4 years. Our outstanding success means a great opportunity for you. We urgently need enthusiastic assistants to help run activities and care for the kids.

You can see from the chart below that we are growing each year. You can grow with us, gaining experience in all types of outdoor fun and activities.


We provide great facilities, which you can use when not on duty. You will work with other people your own age.

Any experience you have in the following will be well regarded, however, we also provide full training.

| | |
|---|---|
| Abseiling | Rock climbing |
| Horse riding | Sailing |
| Skiing | Bush cooking |

Sound like fun? If you are interested in working for us, please contact Shelley at our Head Office on 02 7865 4567.



ISBN 978-1-316-62394-7

# 3.3 Using sections

There are times when you want part of a page formatted in one way and other parts of the same page formatted differently. For example, you might want part of a page to have text in three columns and other parts of the page to have a single column. Sections allow you to do this.

If you are using Google Docs, sections are not available. You will need to skip this exercise or insert three two-column one-row tables for the car details and copy and paste the text into the appropriate cells.

## Word processing exercise 3

### *Using sections*

**Skills practised**
- Using sections
- Section breaks
- Columns
- Column breaks
- Inserting images
- Drawing tools

In this exercise you will create an advertising page for a used-car company. It will need sections to be inserted throughout the page. The text and image can be inserted from the Word Processing folder within the PIT2 Support Files.

1. Access the PIT2 Support Files and open the WP Exercise 3 document.
2. Your task is to format the page as shown on the following page. Start by formatting the main headings and use the Drawing tools to shade them.
3. Centre the 'Small Cars' subheading and format it.
4. Set the cursor at the beginning of the first small car, '2010 Ford Fiesta …' and insert a Continuous Section Break using the **BREAKS** icon in the **LAYOUT** or **PAGE LAYOUT** tab or **INSERT** menu.
5. Set the page to two columns. This will only occur in the new section.
6. Set another Continuous Section Break at the beginning of the 'Family Cars' subheading. Set the Columns back to 1, then centre the subheading and format it in the same way as you did for the 'Small Cars' subheading. Remember, you can use the **FORMAT PAINTER** tool to copy formats.
7. Repeat steps 4 to 6 for the rest of the family cars and sports car text.
8. In the blank line after the last sports car, insert another Continuous Section Break and set the columns back to one.
9. Insert the Car picture from the Word Processing folder of the PIT2 Support Files. Reduce the size of the picture so that it fits neatly under the text and then centre it.
10. Format the name of each car in the columns to Italic.
11. Open the Header and Footer view and add a border around the page.
12. Check the document and then print a copy of your finished product or share your work electronically.



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# Deals on Wheels
## Quality Used Cars

### Small Cars

*2010 Ford Fiesta Zetec, $9,990*
5-speed manual, 4cyl 1.6L engine, alloy wheels, 83,500 km.

*2012 Holden Cruze. $10,750*
4cyl. 1.8L, auto, full service history, 6-speaker stereo, 105,000 km.

*2014 Honda Civic VTi, $13,990*
Auto, tinted windows, cruise control, one-owner, 95,000 km.

*2015 VW Golf 90 TSI, $14,990*
1.4L turbo, 7-speed DSG auto, 16" alloy wheels, 73,000 km

### Family Cars

*2011 Toyota Camry Altise, $9,990*
One-owner, 2.5L Automatic, leather seats, 18" alloys, 110,000 km.

*2014, Honda CR-V, $16,990*
4WD VTi Auto, reversing camera, touch-screen display, 67,000 km

*2015 Hyundai ix35 SE, $15,990*
Auto, reversing camera, leather seats. 18" alloy wheels, 55,000 km

*2015 BMW 316i 3-Series, $28,990*
8-speed Auto, 1.6L turbo, reversing camera, leather seats, 83,000 km

### Sports Cars

*2012 Toyota 86, $19,990*
1998 cc, 147 KW, 6-speed manual, cruise control, alloys, 75,000 km

*2012 Subaru WRX, $17,990*
2.0L turbo, 6-speed manual, ABS brakes, one-owner, 92,000 km

*2013 VW Golf GTi, $20,990*
2.0L turbo, 147 KW, 6-speed DSG auto, 18" alloy wheels, 80,000 km

*2014 Ford Focus ST, $22,990*
2.0L turbo 184 KW, 6-speed manual, Recaro seats, 18" alloys, 75,000 km



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# 3.4 Publishing tasks

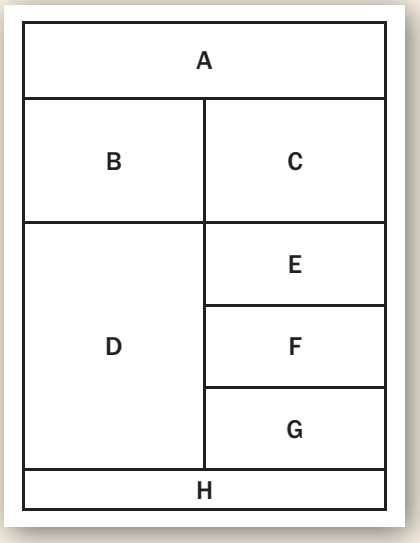
You can use Microsoft Word or Google Docs to create detailed publishing tasks.

## Word processing exercise 4

### *Creating a page layout*

**Skills practised**
- Using tables
- Merging cells
- Formatting tables
- Adjusting borders

Your task is to create the layout shown on the following page. The layout of the page follows the diagram below. You will be able to copy and paste text from the WP Exercise 4 file, which can be opened from the Word Processing folder in the PIT2 Support Files into the new document.




1 Start a New Blank Document and insert a two-column six-row table.

2 Merge the top two cells into one, the left column of rows three, four and five into one cell and the two cells in the last row into one cell so that your table looks like the layout diagram.

3 Copy the top two headings from the WP Exercise 4 file, paste them into cell A and format the text to fill the cell. Set the cell alignment to **ALIGN CENTRE**.

4 Use the **INSERT** tab – **PICTURE** or Insert menu – **IMAGE** to insert the Microscope image from the Word Processing folder of the PIT2 Support Files into cell B and set the cell alignment to **ALIGN CENTRE LEFT**.

5 Copy the Microscope Details text from the WP Exercise 4 file, paste it into cell C, format the text to 14 pt and set the model numbers to bold. Set the cell alignment to **ALIGN CENTRE LEFT**.

6 Copy the Contents text from the WP Exercise 4 file, paste it into cell D, format the heading to **BOLD** and 14 pt and add leader characters to the numbers. Google Docs does not support tabs in tables, but you can highlight the content items and in the Ruler set the **LEFT INDENT** to 6 cm and the **FIRST LINE INDENT** to 0 to align the numbers.

7 Increase the size of the Microscope image to be level with the text in cells C and D.

8 Copy the Thank-You text into cell E, leaving a blank line at the top and format the text to **JUSTIFY**.

9 Insert the Horizon image into cell F from the PIT2 Support Files and centre it.

10 Enter `HORIZON` in cell G and format and centre it, then increase the size of the Horizon image to match the Horizon heading.

11 Set cells E, F and G to a similar shade to the Microscope background.

12 In Microsoft Word select the whole table, turn off all the borders then set the border weight to 6 pt, select a shading and turn on the **TOP** and **BOTTOM** borders of cell A and the **BOTTOM** border of cell H.

13 In Google Docs use the down arrow at the top right of cell A to select the **TOP BORDER** then set its **BORDER WIDTH** to 6 pt and a **COLOUR**. Repeat this for the cell's **BOTTOM** border then set the cell's **LEFT** and **RIGHT** borders to 0 pt. Set the **BOTTOM** border of cell H to 6 pt and a shading and its other borders to 0 pt. Set the borders of all the other cells to 0 pt.



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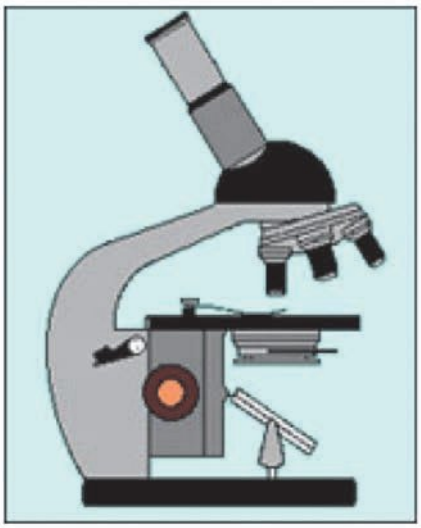
**14** Adjust the height of the cells so that the text and images are displayed clearly.

**15** Check the document, save the file in your storage folder and then print a copy of your finished product or share your work electronically.

# HORIZON MICROSCOPES
# OPERATING INSTRUCTIONS



PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

THEY ONLY APPLY TO THE MODELS LISTED.

Series: **250**
Models: **4A-116** through **4A-120**

Series: **1300** through **1600**

## CONTENTS



We thank you for purchasing the Horizon Microscope. The device was built to strict specifications and carefully checked to ensure optimum performance. If, however, you find problems with the microscope, contact your dealer immediately.

HORIZON



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# 3.5 More detailed newsletters

Sections allow you to produce quite complex documents as the following exercise demonstrates. In the exercise you will create a newsletter for a travel agency. It will need sections to be inserted. The text and images can be inserted from the PIT2 Support Files.

If you are using Google Docs, which doesn't support sections, you will need to use a five-row, three-column table and merge appropriate cells to create the newsletter layout.

## Word processing exercise 5

### *More detailed newsletters*

**Skills practised**
- Using sections
- Using columns
- Inserting images
- Drawing tools
- Tab stops
- Page borders

1. Access the PIT2 Support Files and open the WP Exercise 5 document.
2. Your task is to format the page as shown on the following page. Start by formatting the main heading and use the Drawing tools to shade it.
3. Set a right tab stop at the right edge of the screen for the second line (Issue 4 ...).
4. Format the 'May Madness Again, Cut Price Tours to Europe' lines to bold, larger and centre, then add horizontal lines above and below them.
5. Insert a Continuous Section Break (Layout or Page Layout tab) at the beginning of the line 'Due to the success ...' and format the section to three columns with 0.5 cm column spacing. There is a More Columns option at the base of the Columns icon for this.
6. Insert another Continuous Section Break at the beginning of the subheading 'Contents' and set the columns back to 1. Press <Enter> or <Return> to add a blank line above 'Contents'.
7. At the first blank line after the Brisbane phone number, insert the Big Ben picture from the Word Processing folder of the PIT2 Support Files.
8. Format the text in the three columns to be fully justified and add a left tab stop to the 'Melbourne', 'Sydney' and 'Brisbane' lines at the end of the second column so that the phone numbers are in line. Set the tab stop to have leader characters.
9. Use a text box to add a caption after the Big Ben picture that says 'London tours become very popular at this time of year'. Format the caption text to italic, turn off the text box border.
10. Position the cursor at the beginning of the 'Contents' subheading and insert the Venice picture from the Word Processing folder of the PIT2 Support Files.
11. Reduce the size of the picture to 50% and format its **WRAP TEXT** to **TIGHT** so that the 'Contents' text is to the right of the picture.
12. Set the four sections of 'Contents' to have a right tab stop and dotted leader characters. If you wish, you can cut the five lines of the Contents section, paste them into a text box next to the Venice picture and then shade the text box and format the text.
13. Add a border around the page in the Header and Footer view. Check the document and then print a copy of your finished product or share your work electronically.



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# MyWorld Travel

*Issue 4* *April, 2018*

## May Madness Again, Cut Price Tours to Europe

Due to the success of last year's May promotion, we have decided to repeat the offer this year. We have again cut the prices of all our May European tours. May is the best time to visit Europe: summer is fast approaching and the tourist season of June to August hasn't quite started.

In this newsletter we will describe the European destinations that we can provide. You can also contact us if you would like us to customise your tour. Whether you want the old world charm of England, the vitality of Italy or the hospitality of Germany, we have the tour for you.

You can stay in 5-star hotels, or quaint bed-and-breakfast inns. All your needs are catered for by our experienced couriers who ensure that your tour is enjoyable and trouble free.

Our tours start between 5 May and 10 May, so don't delay your booking. There are limited places and last year they sold out before the end of April!

Our agents have all the necessary details. You can contact them at:

Melbourne ..... (03) 6310 3622
Sydney..... (02) 2213 0241
Brisbane ..... (07) 8382 5900

*London tours become very popular at this time of year.*

**CONTENTS**





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# 3.6 Inserting equations

Equations such as mathematical formulas or scientific equations can be placed into word processing documents.

## Word processing exercise 6

### *Inserting equations*

**Skills practised**
- Inserting equations
- Nesting equation elements

1. Start a new document, enter the text below, leaving space for the equation after each question and format the text appropriately.
2. Click on the blank line after each question in turn and use **EQUATION** from the **INSERT** tab of the ribbon or **EQUATION** from the **INSERT** menu to insert the equation.
3. Create each equation by inserting equation elements from the **DESIGN** tab of the ribbon in Microsoft Word or the **EQUATION** bar in Google Docs. You enter items into the provided slots in the equation element then press the right arrow key to move the cursor out of the slot before inserting another element.
4. Once the document is complete, save it, spell check it and proofread it. Once corrections have been made, print a final copy or share your work electronically.

**YEAR 10 MATHEMATICS**

**REVISION SHEET**

1 Find the first four terms in the sequence defined by:

$$U_n = \frac{1}{2n-1}$$

2 Find the sum of the first six terms of the linear sequence {2, 7, 12,...} using:

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

3 Find the sum of the first four terms of the power sequence {4, 2, 1,...} using:

$$S_n = \frac{a(1-r^n)}{1-r}$$

4 Evaluate:

$$\int_1^3 x^3 . dx$$



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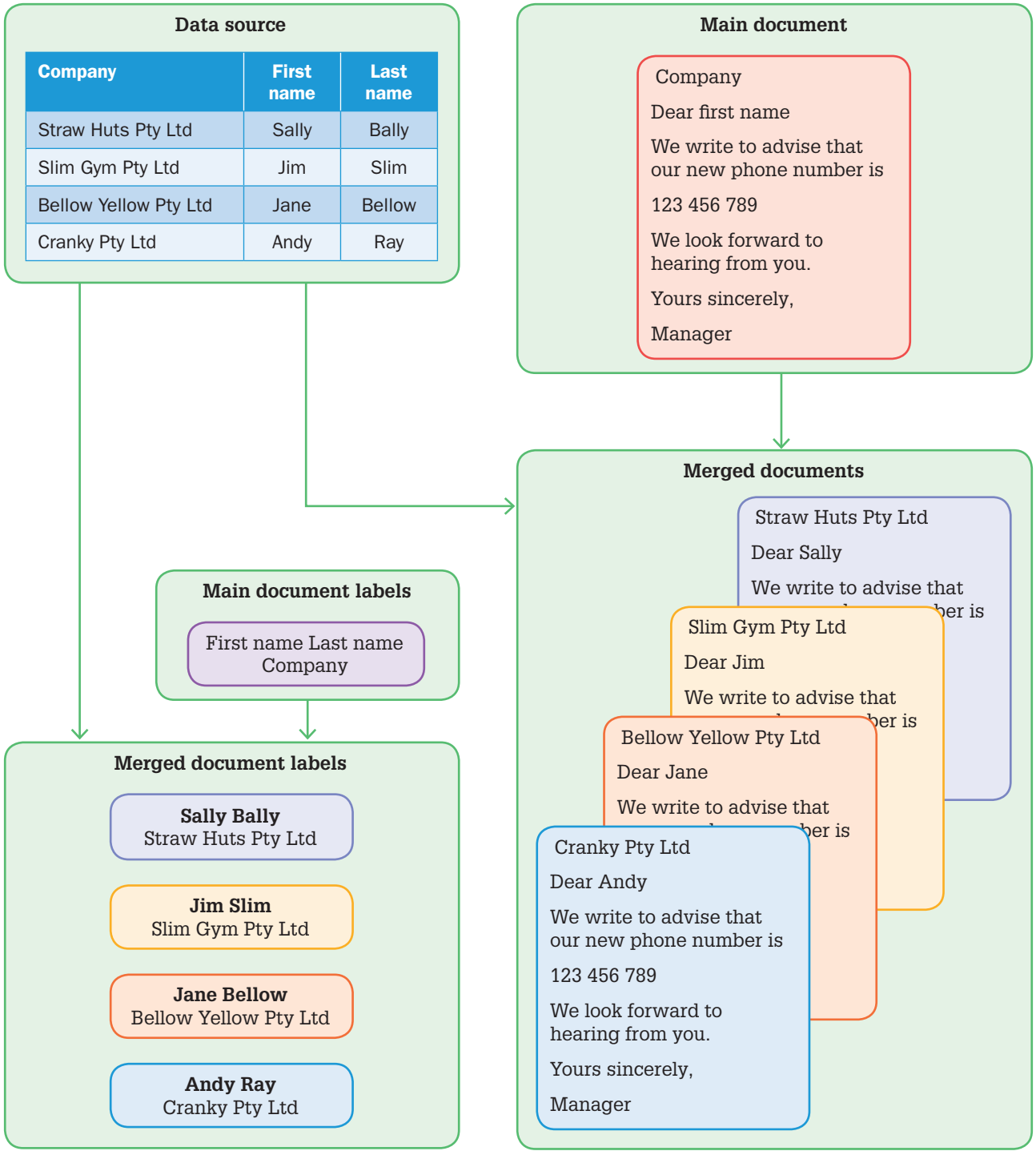
# 3.7 Mail merge

Mail merge is the term given to the process where we start with a main document, and a set of details (the data source) about customers, suppliers, members and so forth. We 'merge' the two together to produce a set of documents individualised for each customer, member and so forth. This process is more efficient than individualising each document with details, one at a time.

Another advantage is that the data source can be used repeatedly for various documents. In the example shown below the same data has been used to produce individualised documents regarding a change of phone number, and then to produce name labels.



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# Word processing exercise 7

## *Mail merge letters*

**Skills practised**
- Using tables
- Merging data into letters
- Inserting fields

The instructions in this exercise apply to Microsoft Word. If you are using Google Docs, you need a script installed to carry mail-merging processes.

The first requirement of a mail merge is a main document. The main document consists of the general information that will go to all recipients. The main document is often a letter or flyer. Next most common is a mailing label. In this exercise you will create a letter to send out to prospective customers to take part in an expo you are organising.

1 Open the WP Exercise 7 document from the Word Processing folder of the PIT2 Support Files. It contains a prepared business letter.

2 Use **SAVE AS** from the **FILE** tab or menu to save the file as: Expo Invite in your storage folder and leave it open for the next section.

3 Now for the Data Source File. Start a new document; insert a seven-column, five-row table and enter the following data.

| First name | Last name | Company | Address | Town | State | Postcode |
|---|---|---|---|---|---|---|
| Sally | Bally | Straw Huts | 1 Willow Street | Warwick | WA | 6024 |
| Jim | Slim | Slim Gym | 10 Albion Street | Warwick | WA | 6024 |
| Jane | Bellow | Bellow Yellow | 15 Holden Road | Claremont | WA | 6010 |
| Andy | Ray | Cranky | PO Box 101 | Claremont | WA | 6010 |

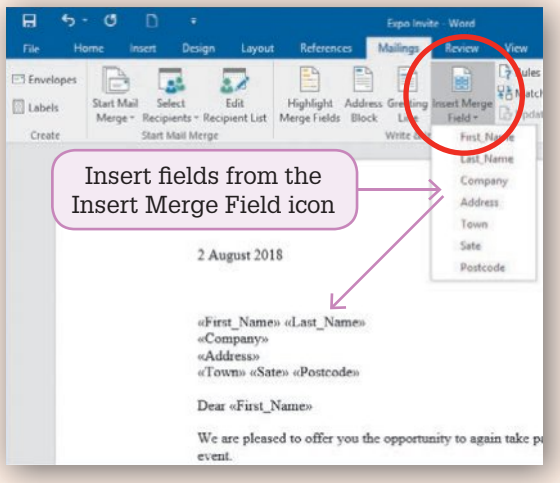
4 Save the document as: Expo Exhibitors.

5 Check your work, save and close the Expo Exhibitors file. You now have the two files required for a mail merge: the main document and the data source. The main document, Expo Invite, should be open and displayed on the screen.

6 Open the **MAILINGS** tab of the ribbon, select the **START MAIL MERGE** icon and select **LETTERS**. The open Expo Invite file will be the Main document.

7 Click on the Select **RECIPIENTS** icon in the ribbon, select **USE EXISTING LIST**, navigate to your Expo Exhibitors file and open it. This sets the source file.

8 Insert Merge Fields into the letter using the diagram at the right as a guide, starting at the line above 'Dear'. Position the insertion point where the field is to appear then click on the **INSERT MERGE FIELD** icon in the **MAILINGS** tab and choose the appropriate field. Remember to include a space between fields that are on the same line.




9 Use the **PREVIEW RESULTS** icon to check that the details are correct for each letter.

10 **FINISH & MERGE** by printing the letters. This creates four letters because there are four recipients and the main document is one page long.



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# Word processing exercise 8

## *Mail merge labels*

This exercise only applies to Microsoft Word. Mail merge labels are often created along with a set of mail merge letters for the purposes of addressing the envelope. Self-adhesive labels can be purchased from stationery suppliers. Once printed on with address, all you need to do is peel and stick onto envelopes.

**Skills practised**
- Merging data
- Inserting fields
- Printing labels

| | | | |
|---|---|---|---|
| **Sally Bally**<br>Straw Huts Pty Ltd<br>1 Willow Street<br>Warwick WA 6024 | **Jim Slim**<br>Slim Gym Pty Ltd<br>10 Albion Street<br>Warwick WA 6024 | **Jane Bellow**<br>Bellow Yellow Pty Ltd<br>15 Holden Road<br>Claremont WA 6010 | **Andy Ray**<br>Cranky Pty Ltd<br>PO Box 101<br>Claremont WA 6010 |

1 Start a new document – this will be used as the main document – the mailing label setup.

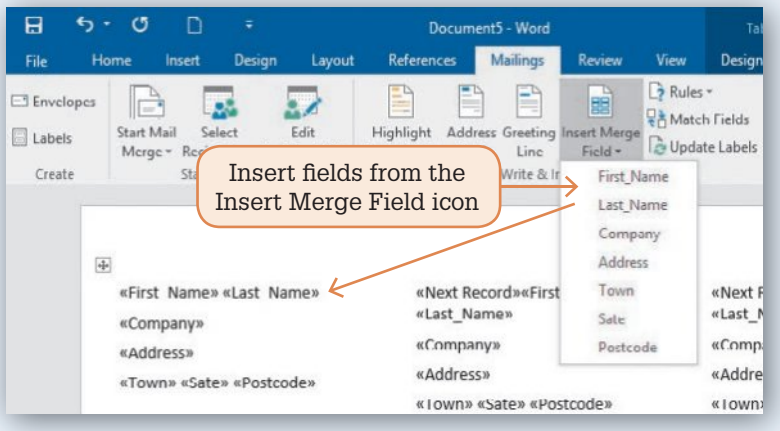
2 Now you have the two files required for a mail merge: the main document and the data source file from the previous exercise. The main document should be open and displayed on the screen.

3 In the **MAILINGS** tab of the ribbon set the **START MAIL MERGE** icon to **LABELS** so that the main document produces mailing labels.

4 Choose a **LABEL VENDOR**, such as Avery A4/A5 and a **PRODUCT NUMBER** such as L7160. This is a commonly used size for envelope labels. You can save yourself an enormous amount of grief by selecting the correct size labels, which is easy if you know the Brand name and code from the label's box.

5 Click on the **SELECT RECIPIENTS** icon in the **MAILINGS** tab, select **USE EXISTING LIST** and open your Expo Exhibitors file. This is the source file.

6 Insert fields into the first label using the diagram as a guide. Position the insertion point where the field is to appear then click on the **INSERT MERGE FIELD** icon and choose the appropriate field.




7 Click on the **UPDATE LABELS** icon in the **MAILINGS** tab to update the other labels.

8 Preview the results and check that the details are correct for each label. Finish the Merge by printing the labels.



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WORD PROCESSING PROJECT

# Jackson Real Estate

Jackson Real Estate is a real estate company that sells properties and manages rental properties. It is one of the largest managers of rental properties in Ballarat, Victoria. It has developed and intends to maintain a high regard by the community for professionalism as agents for people selling properties and with people purchasing those properties.

The owner of the business believes that a regular flyer posted to people that have expressed an interest in properties in the area would be beneficial. He has asked you to produce the first one-page flyer along with a letter that will be posted with the flyer. This letter will need to be personally addressed to each recipient.

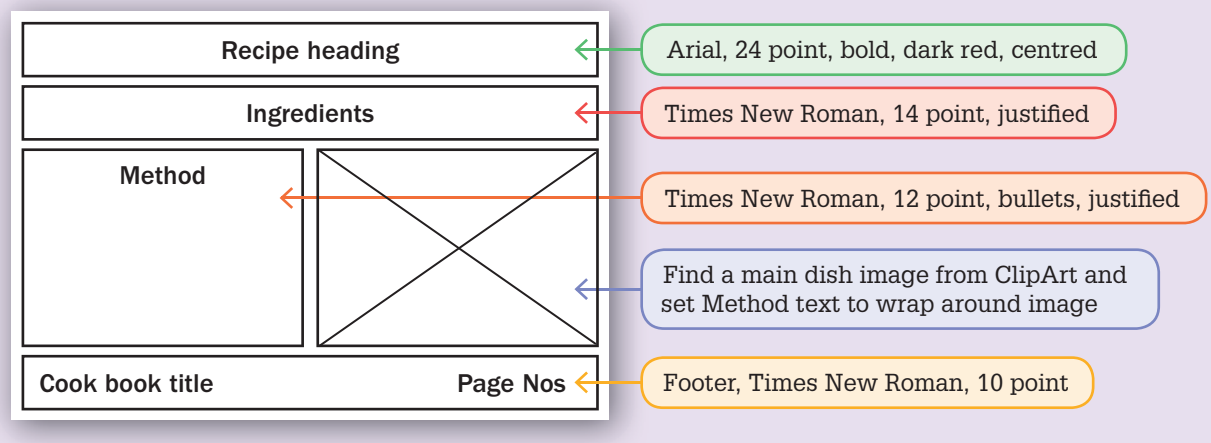
## Collecting the data

The data required is provided on the next few pages. Work out from it what fields (table headings) will be required for the list of clients that you will need to create.

## Defining the solution

Draw a layout diagram for the flyer that is required. Include the headings and subheadings that will be required, and the fonts and sizes that you intend to use. Decide whether you will use a table layout, sections and/or columns. The following diagram can be used as an example of a layout diagram (or thumbnail sketch).






## Implementing

Use your word processing skills to create the flyer and the merged letters. Prepare mailing labels showing the addresses of the customers above that can be stuck onto envelopes that contain the flyer and letter.

Once everything is complete provide your teacher with:

- one printout of the flyer
- a printout of the five letters provided to the customers
- a printout of the letter without merging to show the fields you used.
- a printout of the mailing labels.

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## Evaluating, collaborating and managing

1 Ask other people to look at your flyer and give you feedback on how effective it is. Describe what was said and the changes you made to your publication because of their comments.
2 How will your solution make the operation of Jackson Real Estate more efficient? Comment on the time, cost and effort to produce the publications.
3 How will your solution make the operation of Jackson Real Estate more effective? Comment on the accuracy and quality of the publications.

## Project data: Jackson Real Estate flyer

The one-page flyer needs to include the following text. It is up to you to design the page and include any images that you feel are appropriate.

### *New property releases*

***Sebastopol***

This appealing double-storey home comprising sunroom, double glass doors opening to wide entrance hall, spacious lounge and separate dining room, kitchen, 3 bedrooms, bathroom with vanity unit and laundry. Large garage and established garden.

Special Price $402 500

Agent: Graeme Vickery

***Wendouree***

Just listed and won't last long, this sound home offers 4 very good bedrooms, nice lounge and northerly aspect. Central kitchen plus family room. Excellent parking makes this a most appealing home. Book now for your inspection.

Asking only $454 000

Agent: Helen Lock

***Ballarat North***

A delightful BV home in a most pleasant street, featuring 3 bedrooms each with BIR and a study. Updated kitchen/meals, very pleasant lounge with northerly outlook. Your inspection of this top-class home is recommended.

Priced to sell at $438 000

Agent: Robert Grills

### *Current property list*

Wendouree 3-Bedroom, Weatherboard, Colonial style $321 850

Sebastopol 4-Bedroom, Brick veneer, 5 years old $525 950

Ballarat North 2-Bedroom cottage, 5 Hectare Hobby Farm $455 000



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## The letter

The following letter needs to be created and printed to the five customers provided on the next page. It is up to you to develop the best way to produce the letters for these customers, but remember the intention is that the letters are sent on a regular basis and in an actual office, letters would be printed to more customers.

Jackson Real Estate
PO Box 293
Ballarat VIC 3353

Today's Date

<Title> <First Name> <Last Name>
<Street>
<Suburb> <State> <Postcode>

Dear <Title> <Last Name>

As a follow-up to your enquiry about properties in the Ballarat area please find enclosed a newsletter describing properties newly released to the market and the existing properties that we have for sale.

The properties listed are available at the time of sending this letter. If you would like to inspect any of the listed properties please call our office and an agent will arrange a suitable time with you to view the property.

Yours faithfully

George Jackson
Owner/Manager
Jackson Real Estate



## Customer list

Letters will be required to be sent to the following customers:

Mr Andrew Walker, 323 Narelle Court, Ballarat VIC 3353

Mrs Betty O'Hare, 12 Blush Street, Fitzroy VIC 3065

Ms Catherine Jessop, 1/224 Albian Road, Ararat VIC 3377

Mr Paul Richardi, 6 Hamersby Lane, Sebastopol VIC 3356

Ms Anna Galis, 22 Prosser Street, Wendouree VIC 3355

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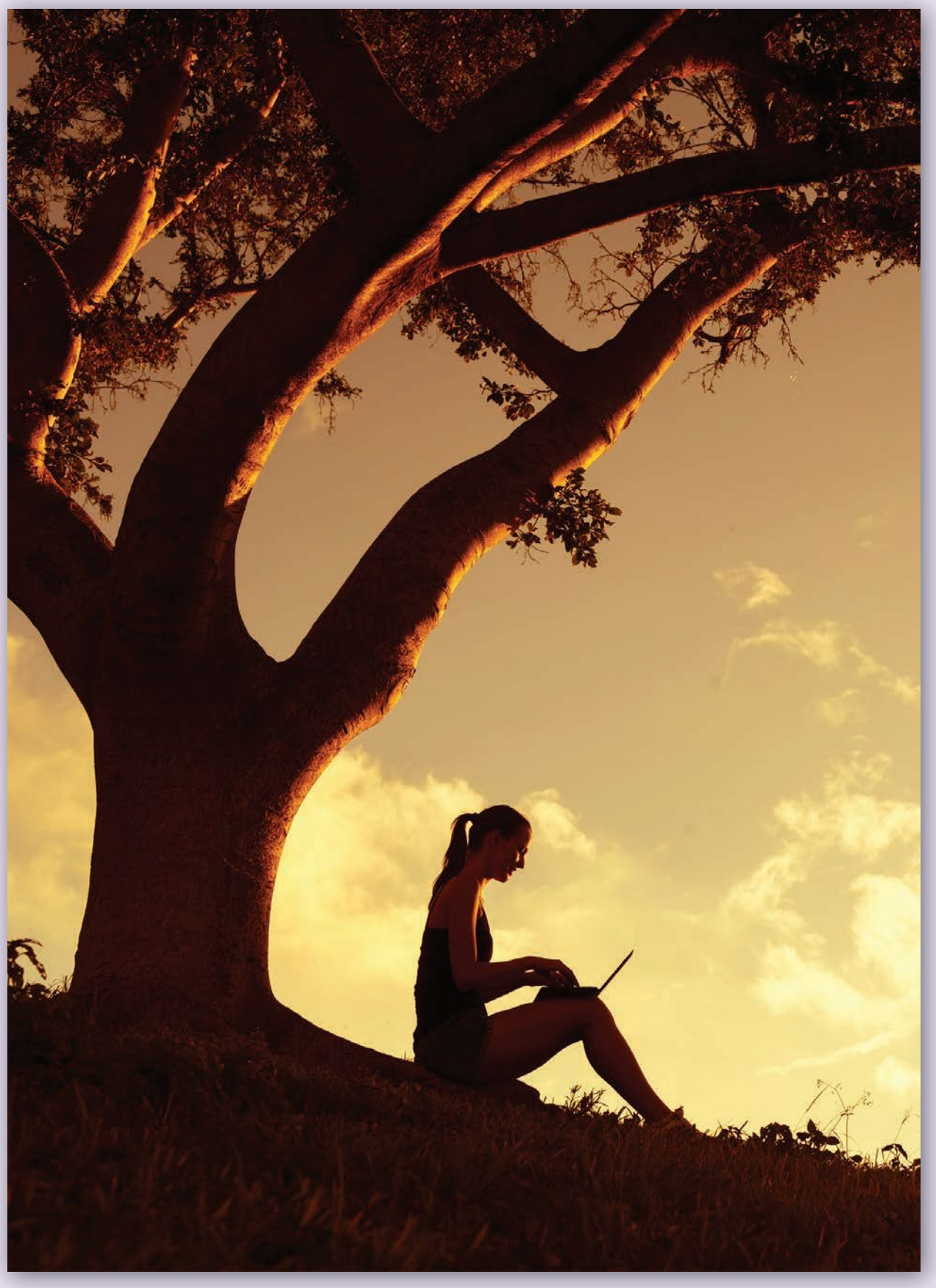



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# Module 4

## FLASH ANIMATION

Program featured for exercises:

**Adobe Flash**

Alternative exercises available online using:

**Adobe Animate**



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# Teacher information

## IT knowledge and skills covered in this module

- Using Flash animation
- Animating along a path
- Fixed point animations
- Shape tweening
- Movie clips
- Publishing animations

## Suggested further uses across the curriculum

- Media Arts (for creating animations). Develop and refine media production skills to integrate and shape the technical and symbolic elements in images, sounds and text for a specific purpose, meaning and style (ACAMAM075).
- English (for creating animations). Create sustained texts, including texts that combine specific digital or media content, for imaginative, informative, or persuasive purposes that reflect upon challenging and complex issues (ACELY1756).

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Critical and creative thinking
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)





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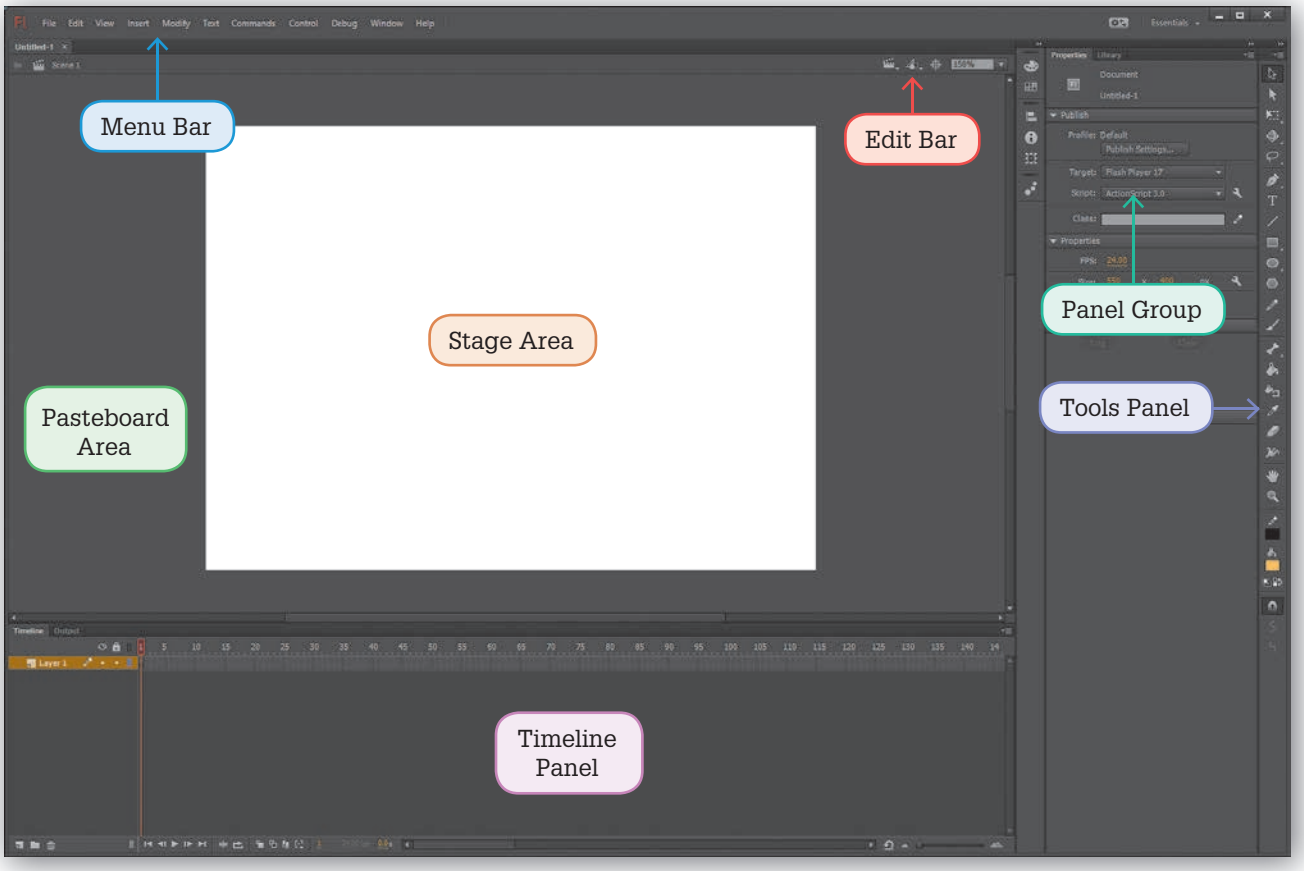
# 4.1 Flash animation

Adobe Flash is a popular program for creating animations that can be used in computer games, online displays or websites. Recently its name was changed to Adobe Animate and the instructions in the module can be used with either Adobe Flash or Adobe Animate. There are also exercises available online that refer specifically to Adobe Animate.

The Flash screen has the sections labelled in the following diagram:




## The Flash workspace

There are two parts to the Flash workspace, which is at the centre of the screen:

- The **Stage Area**, which is the white area at the centre of the screen.
- The **Pasteboard Area**, which is the dark area that surrounds the stage.

Only objects within the Stage Area are included in a movie. The Pasteboard Area is mainly used to allow objects to move on and off the stage.

## The Flash panels

There are a series of panels around the stage:

- The **Tools panel** at the right of the screen contains the Drawing tools, View tools, Colour tools and tool options.
- The **Timeline panel** at the bottom of the stage is used to control the animations.
- The **Panel Group** at the right of the stage contains the Properties panel, which is used to format objects that you place on the stage and the Library Panel that stores the assets of the animation. More panels can be added to the Panel Group.



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# 4.2 Creating an animation

A simple animation of your name moving around the screen will be created to introduce you to the basics of creating an animation.

## Flash animation exercise 1

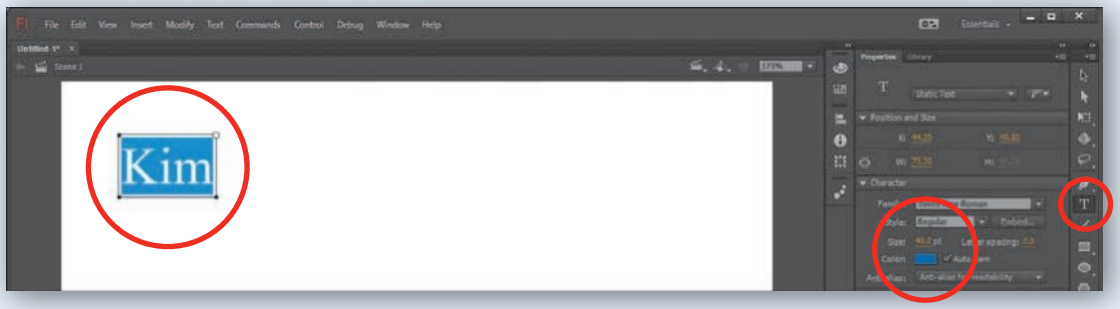
### Starting the animation

**Skills practised**
- Entering text
- Motion tweens
- Running animations
- Resizing objects
- Moving objects
- Rotating objects

1 Load Flash (or Animate) and in the Welcome screen, click on **ACTIONSCRIPT 3.0** in the **CREATE NEW** Section

2 Click on the **TEXT TOOL** (T) from the Tools panel, click near the top left of the stage area and enter your first name.

3 Highlight the letters of your name and use the Properties panel to set the Font Size to 40 pt and the **TEXT COLOUR** to a colour of your choice.




Note: The Properties panel can be used to set other text formats such as font types, alignments and styles, etc.

### Setting a motion tween animation

To animate an object, frames are inserted in the Timeline panel. There are two types of frames in Flash: Frames and Keyframes. Frames are small segments of your animation. Keyframes are important frames where some change occurs; for example, an object changes direction.

1 At the moment there is a **KEYFRAME** at Frame 1 of the **TIMELINE** panel. This is automatically inserted as soon as you add content to the stage. To create a motion tween animation, the animation is inserted and the object moved to a new location.

Note: Tween is an abbreviation of between. You animate objects beTWEEN two points.

2 Click on the **KEYFRAME** marker (▪) at Frame 1 in the **TIMELINE** panel.

3 Display the Insert menu and select **MOTION TWEEN**. This inserts 23 extra frames into the **TIMELINE**.

4 Referring to the diagram at the top of the next page, click on the **SELECTION** tool at the top of the Tools panel and drag your name to the top right of the stage. This sets the position of your name and inserts a **PROPERTY KEYFRAME** at Frame 24.



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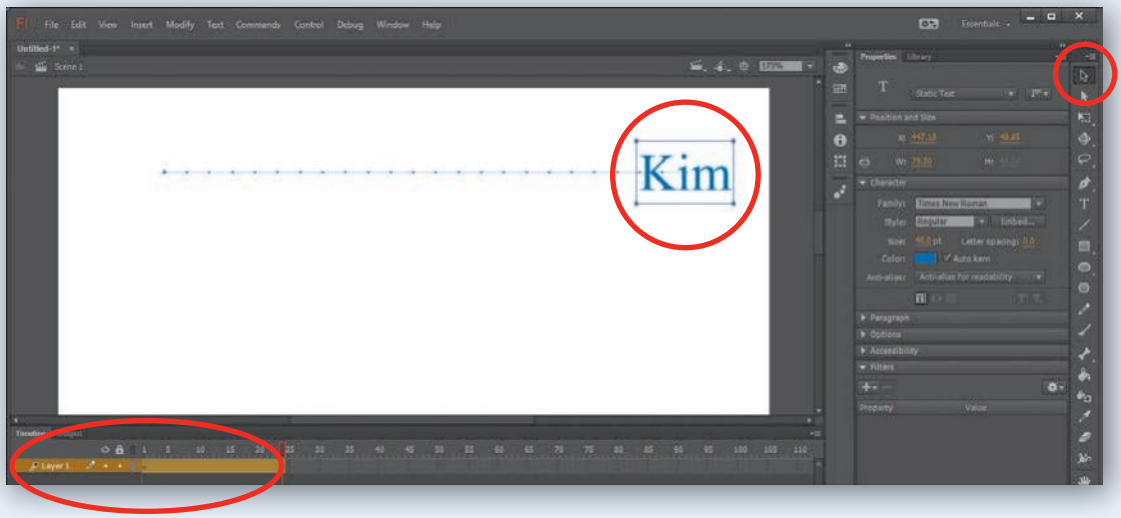


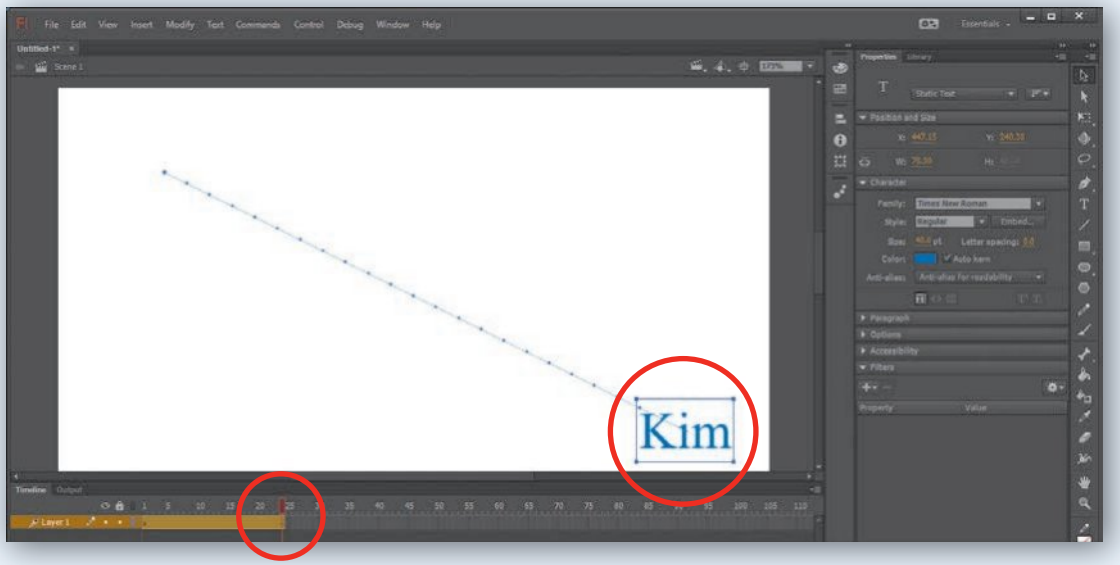

5 To test the movie, display the **CONTROL** menu and click on **TEST**. A test screen is opened and your name should move across the screen continuously.

6 Close the Text Movie screen by clicking on the **CLOSE** box at the top of the Test Movie window.

## *Adjusting the animation*

You can adjust the animation in numerous ways. For example, you can change the position of your name on the screen, change the size of one name so that the name changes size as the animation runs, or make your name rotate as it animates, etc.

1 Click on the **KEYFRAME** marker at Frame 24 and use the **SELECTION** tool to drag your name to the bottom right of the stage.




2 Press `<Enter>` or `<Return>` to play the animation once without opening the Test Movie screen. This is a shortcut to quickly test how the animation looks. Your name should now animate diagonally down the screen.

Note: `<Ctrl+Enter>` on the Windows system or `<Command+Return>` on the Mac system is the shortcut for opening the Test Movie screen.



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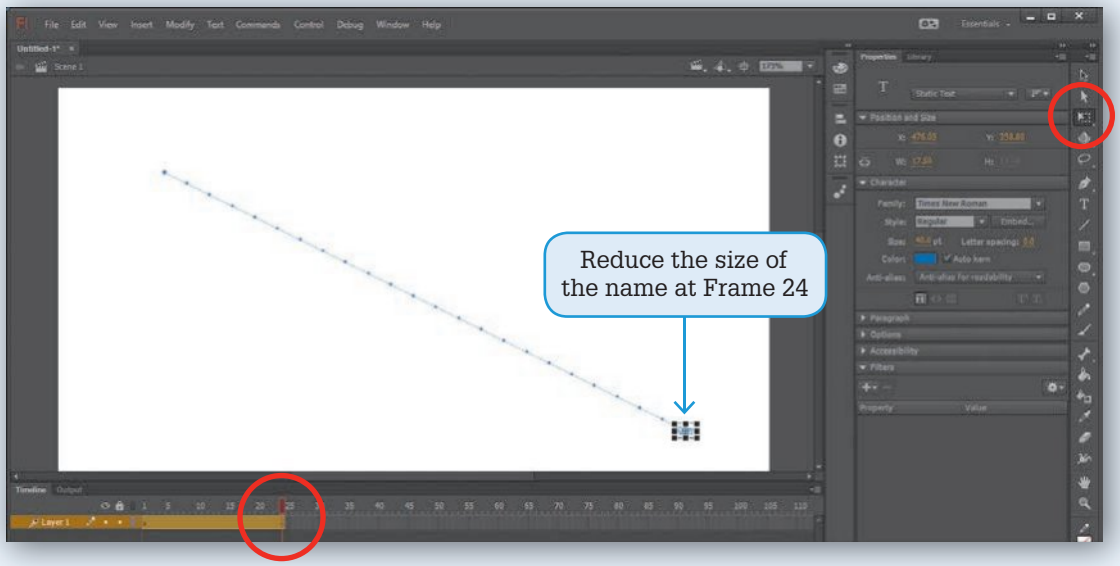
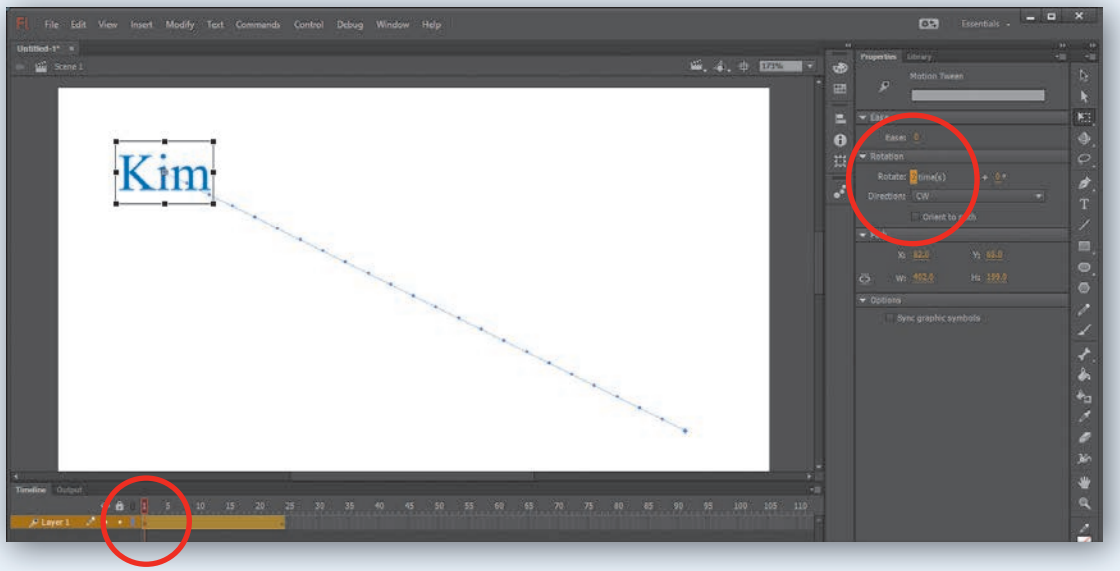
3 Click on the **KEYFRAME** marker at Frame 24, select the **FREE TRANSFORM TOOL** from the Tools panel and handles should be placed around your name.

4 Drag the bottom right handle to the centre of your name to reduce its size to be very small.




5 Test the animation again and your name should reduce in size as it moves.

6 Click on the **KEYFRAME** marker at Frame 1 and, in the Properties panel, set the **DIRECTION** box to **CW** (for clockwise) and the **ROTATE** box to 2 times so that your name will rotate twice as shown in the following diagram.




7 Test the movie to see the effect.

8 Save the movie in your storage folder under an appropriate name, for example: Flash Exercise 1.



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# 4.3 Animating along a path 1

The animation does not have to flow along a straight path. You can set your own animation path. To do this, you adjust the path that is added to an animation.

## Flash animation exercise 2

### *Animating along a path*

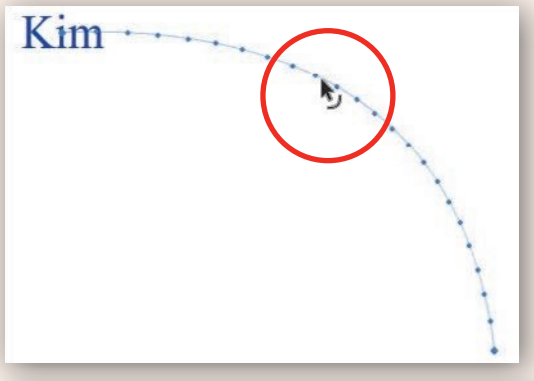
**Skills practised**
- Editing motion paths
- Editing animations
- Inserting keyframes

1 Open your Flash Exercise 1 file that you saved from the previous exercise.

2 Select the **SELECTION TOOL** from the Tools panel and move the pointer over the motion path until an arc is added to the pointer.

3 Drag the path to create a curve.

4 Test the movie to see the effect.



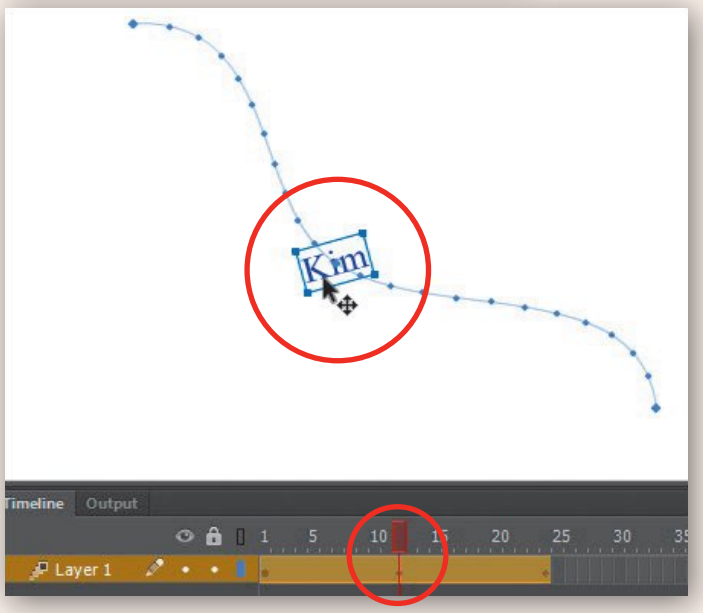

5 In the **TIMELINE** panel, move the red **PLAYHEAD** marker to **FRAME 12**.

6 Use the **SELECTION TOOL** to drag your name to a different part of the stage. Another **PROPERTY KEYFRAME** is added to the **TIMELINE** panel and you now have two separate paths.

7 Test the movie to see the effect.

8 Try adjusting the two paths using the **SELECTION TOOL**.

9 Try moving the **PLAYHEAD** in the **TIMELINE** panel to a different frame and adjust the position of your name. Another **PROPERTY KEYFRAME** is inserted.




10 Use **SAVE AS** from the **FILE** menu to save the movie in your storage folder under a different name, such as: Flash Exercise 2.



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# 4.4 Creating a bouncing ball

In this exercise you will create an animation of a ball that bounces off a floor.

## Flash animation exercise 3

### *Creating the floor*

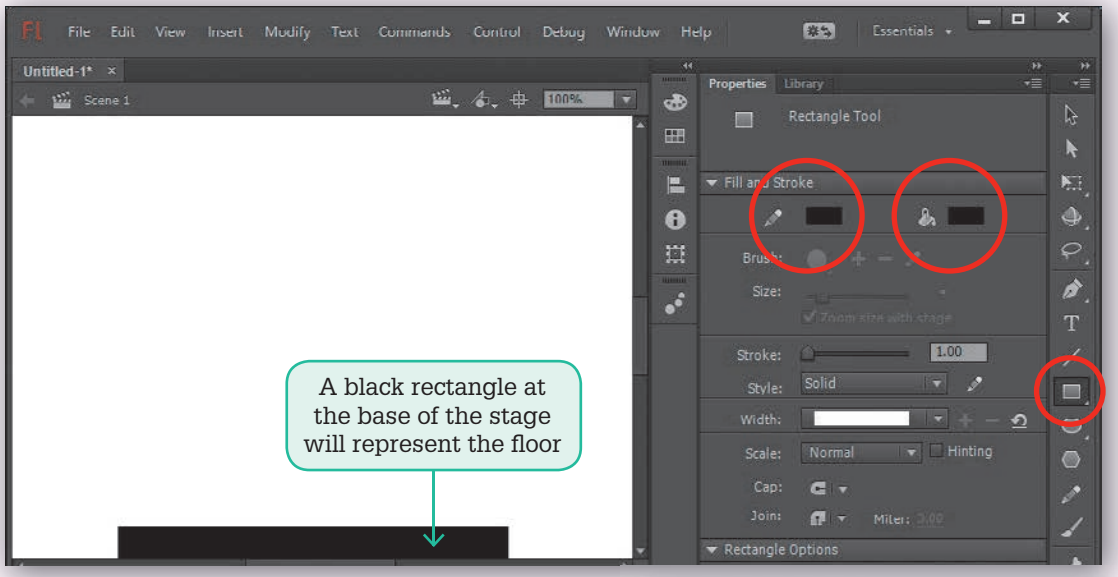
**Skills practised**
- Using layers
- Inserting frames
- Drawing shapes
- Fills and strokes
- Motion tweens
- Motion paths

A rectangle will be used to represent the floor.

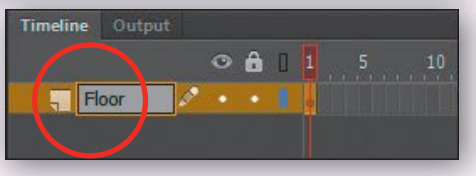
1 Create a new Flash ActionScript 3.0 document.

2 Click on the **RECTANGLE TOOL** from the Tools panel and, in the **FILL AND STROKE** section of the Properties panel, set both the **STROKE** and **FILL COLOUR** boxes to Black.

3 Drag a thin rectangle across the bottom of the stage.

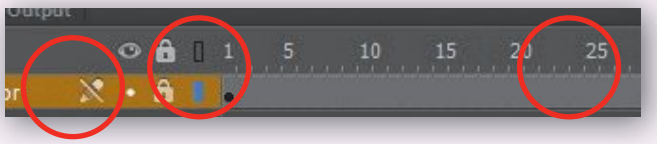



4 It is good practice to name the layers in the **TIMELINE** panel when you are going to use more than one layer. Double-click on the **LAYER 1** label and call the layer 'Floor'.




5 Click on Frame 30 of the **FLOOR** layer. Display the **INSERT** menu, highlight **TIMELINE** and select **FRAME** to set 30 frames for the animation. (The F5 key can be pressed as a shortcut.)

6 Click on the dot under the **LOCK** symbol in the **FLOOR** layer to lock the layer. This prevents changes being made accidentally to the rectangle.




Note: If you need to make changes to the layer, it can be unlocked at any time.



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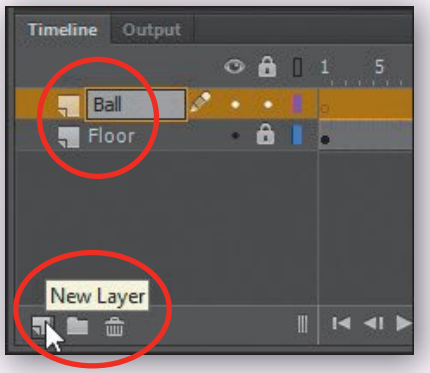
## Drawing the ball

A circle will be used to represent the ball and the circle will need to be converted to a Symbol. Symbols reduce the file size of an animation and they can be used over and over in an animation without increasing the animation's file size.

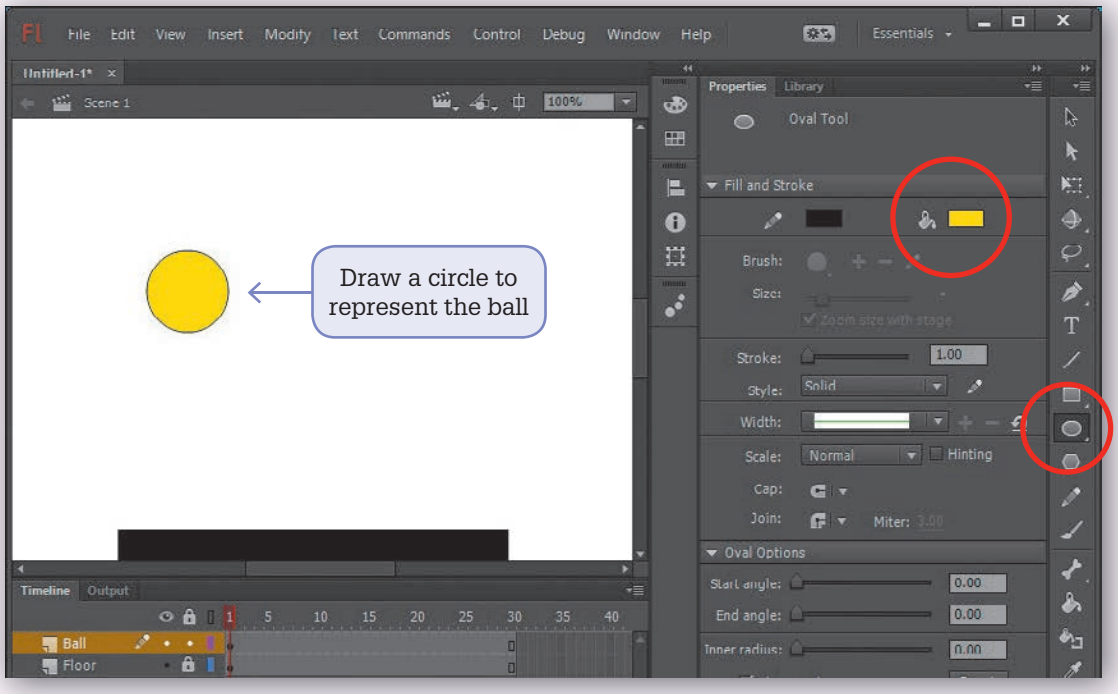
1 Click on the **NEW LAYER** button at the bottom left of the **TIMELINE** panel to insert a new layer and call the new layer 'Ball'.

2 Click on the **KEYFRAME** marker at **FRAME 1** of the Ball layer.




3 Click on the **OVAL TOOL** from the Tools panel and set the **FILL COLOUR** to Yellow.

4 Hold down the <Shift> key and drag a small circle near the top left of the stage. The <Shift> key ensures that the oval is a perfect circle.

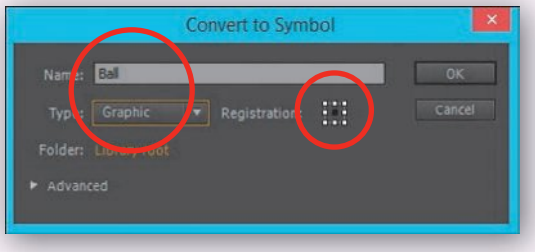



5 Click on the **SELECTION TOOL** from the Tools panel and double click on the ball. This selects both the fill and the border of the circle, which are considered as two separate objects by Flash.

6 Display the **MODIFY** menu and click on **CONVERT TO SYMBOL.**

7 Name the symbol Ball, set its **TYPE** to **GRAPHIC**, its **REGISTRATION** to the **CENTRE** and select **OK**.

Note: Objects must be converted to symbols before they can be animated. The Registration is the position on the graphic symbol where it connects to other objects.



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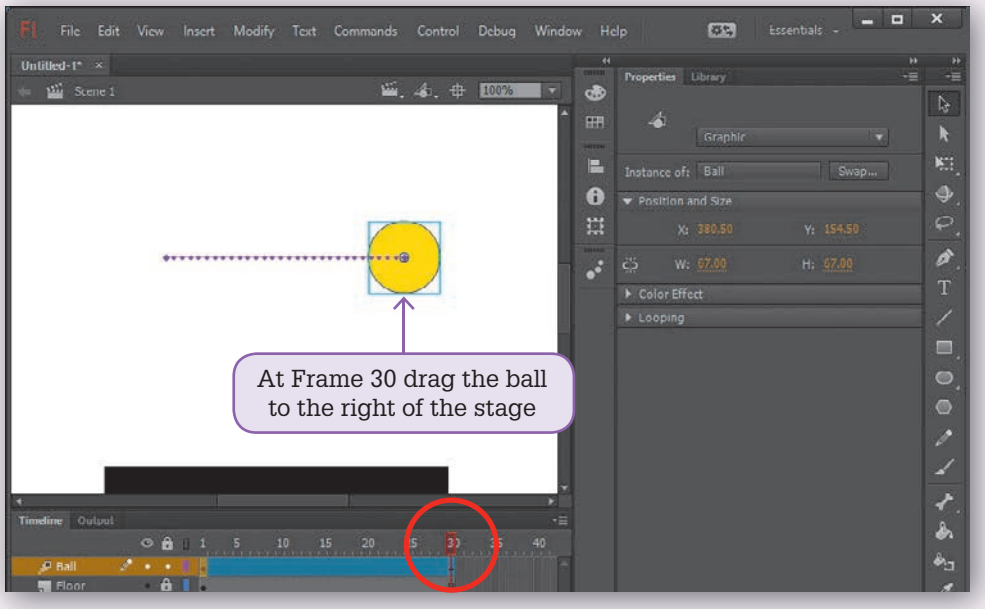
## *Animating the ball*

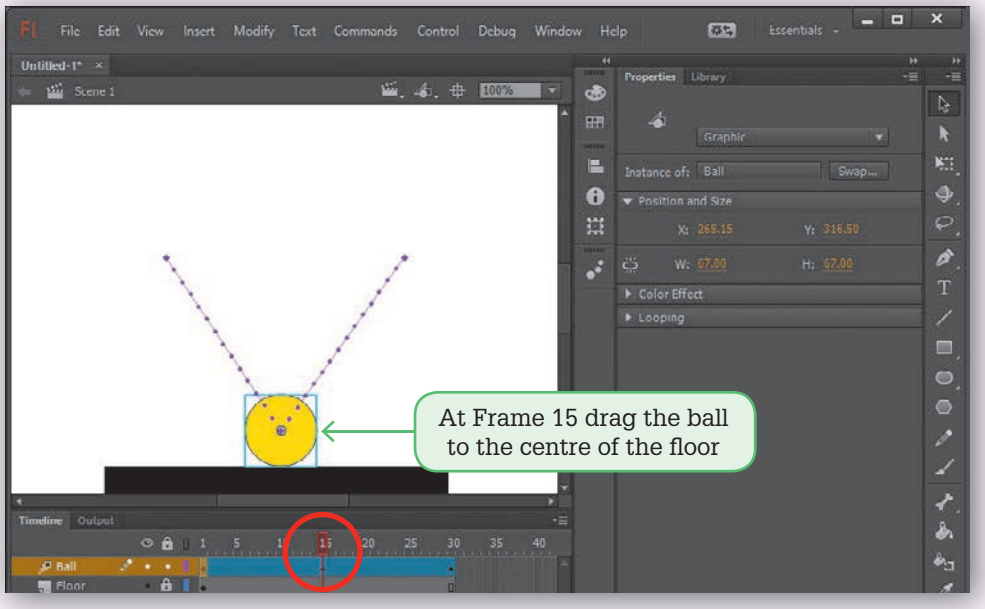
1 Click on the **KEYFRAME** marker at **FRAME 1** of the BALL layer.

2 Insert a motion tween by selecting **MOTION TWEEN** from the **INSERT** menu.

3 Move the **PLAYHEAD** in the **TIMELINE** panel to **FRAME 30** then use the **SELECTION TOOL** to move the ball to the top right of the stage to create the animation.




4 Move the **PLAYHEAD** in the **TIMELINE** panel to **FRAME 15** then use the **SELECTION TOOL** to move the ball to the centre of the floor to create the bounce.




5 Test the animation by pressing <Enter> or <Return>.

6 You can add a background to the stage. Click on the stage and, in the Properties section of the Properties panel, set the **STAGE** box to a colour.

7 Save the movie in your storage folder under an appropriate name, such as: Flash Exercise 3.



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# 4.5 Animating along a path 2

You can set objects to animate along paths that you draw. To illustrate this, an animation of the moon orbiting the Earth will be created.

## Flash animation exercise 4

### Creating the Earth

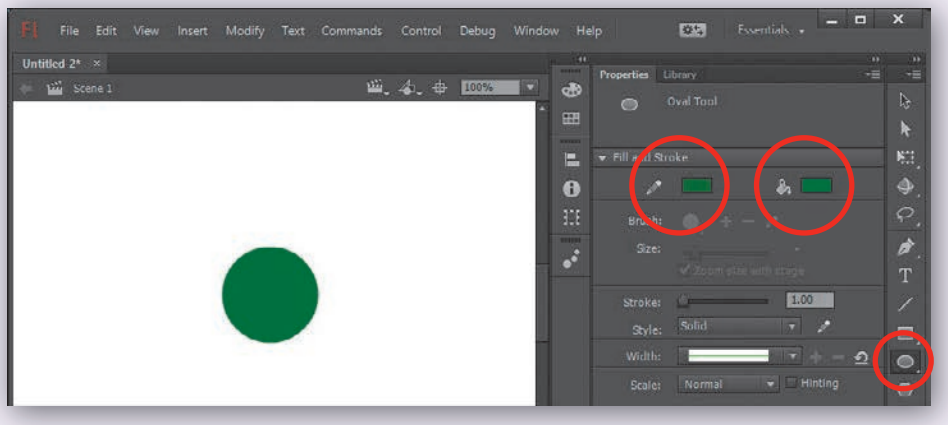
A large green circle will be used to represent the Earth.

**Skills practised**
- Using layers
- Drawing tools
- Motion tweens
- Motion paths
- Editing animations
- Inserting keyframes

1 Create a new Flash (or Animate) ActionScript 3.0 document.

2 Select the **OVAL TOOL** from the Tools panel and set the **FILL** and **STROKE** colours to green.

3 Hold down the <Shift> key and draw a large circle (about 2 cm in diameter) near the centre of the stage.




4 Select the **SELECTION TOOL** and click on the stage area to set the circle.

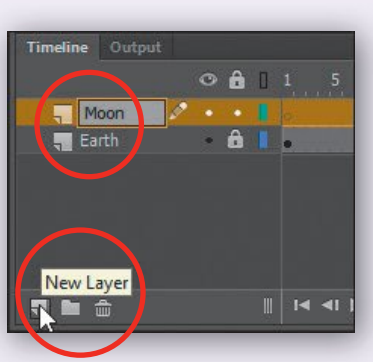
5 Name its layer 'Earth' in the **TIMELINE** panel then click on Frame 24 of the layer and press the F5 key to insert frames to Frame 24. You can also use the **INSERT** menu – **TIMELINE** – **FRAME** to insert frames.


6 Lock the layer so that no changes can be accidentally made to it.

### Creating the moon

A smaller orange circle will be used to represent the moon.

1 Create a new Layer in the **TIMELINE** panel and call it 'Moon'.



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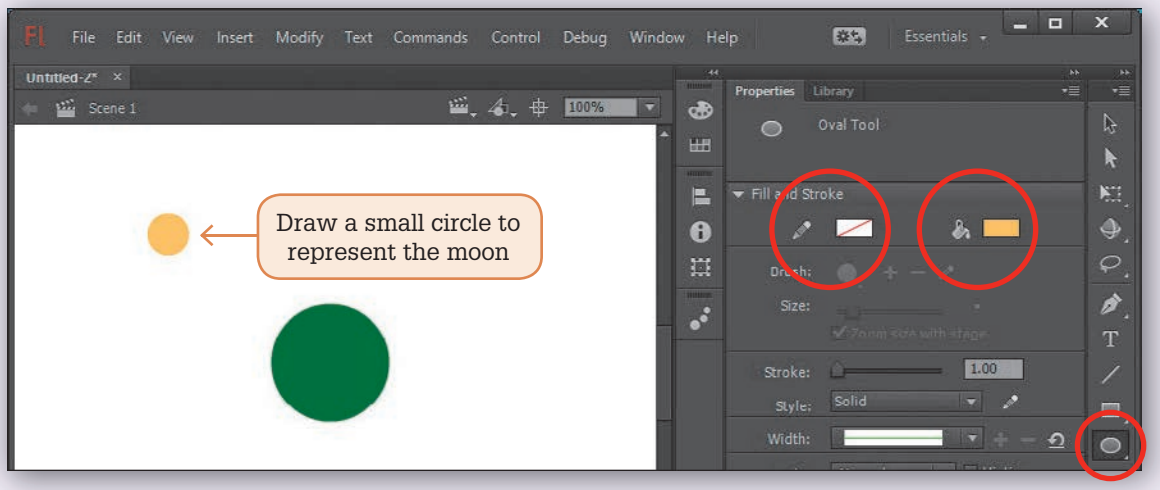
2 Click on **FRAME 1** of the **MOON** layer then select the **OVAL TOOL** from the Tools panel and set the **STROKE** colour to **NO COLOUR** and the **FILL COLOUR** to a light orange.

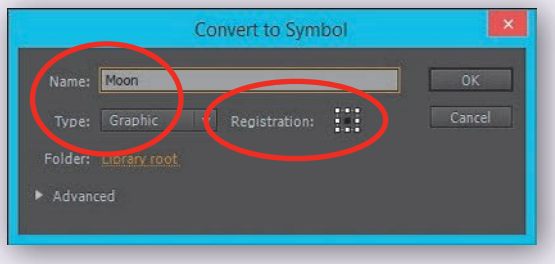
3 With the <Shift> key depressed, draw a small circle near the left of the Earth.




4 The moon needs to be converted to a symbol. Click on the **SELECTION** tool in the Tools panel and click on the orange circle.

5 Select **CONVERT TO SYMBOL** from the **MODIFY** menu.

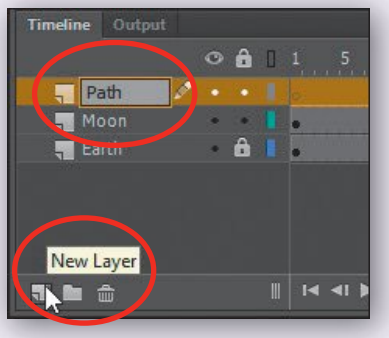
6 Name the symbol Moon, set its **TYPE** to **GRAPHIC**, its **REGISTRATION** to **CENTRE** and select **OK**.




## *Creating a path for the moon*

To create the orbit of the moon around the Earth, a circle will be added with a small hole cut in it so that the moon can be set to have a start and finish point.

1 With the **MOON** layer selected in the **TIMELINE** panel click on the **NEW LAYER** button and call the new layer 'Path'.



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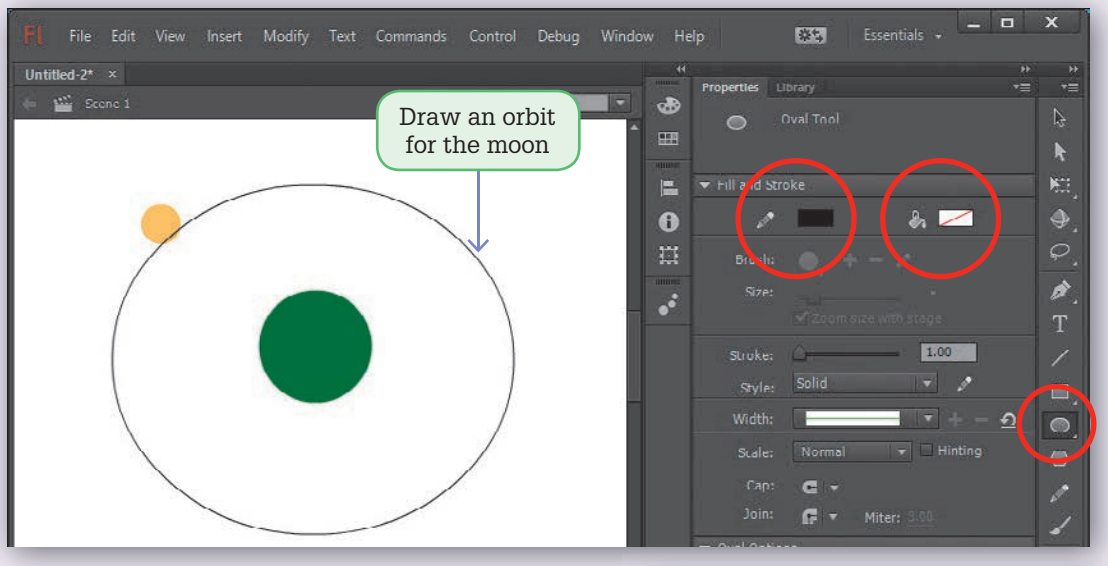
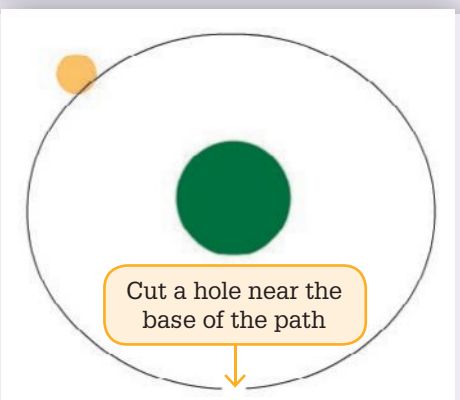
2 Select the **OVAL TOOL** from the Tools panel and set the **STROKE COLOUR** to Black and the **FILL COLOUR** to No Fill.

3 Draw a large circle around the Earth to represent the path that you want the moon to take. You can click on the **FREE TRANSFORM TOOL**, click on the circle and use its handles to adjust its size if need be.




4 Select the **ERASER TOOL** from the Tools panel and cut a small hole near the base of the circle.

Note: Cutting away from the circle should force the circle to attach to the left of the hole and rotate clockwise. If you cut the hole near the orange circle, the moon might orbit counter-clockwise.




## *Animating the moon*

To attach an object to the path, the path is cut and pasted into the object's layer.

1 Select the **SELECTION TOOL**, click on the circle and press `<Ctrl+X>` or `<Command+X>` to cut the path from the stage.

2 Select the **KEYFRAME** marker at Frame 1 of the **MOON** layer in the **TIMELINE** panel.

3 Display the **INSERT** menu and select **MOTION TWEEN** to create the motion tween animation.



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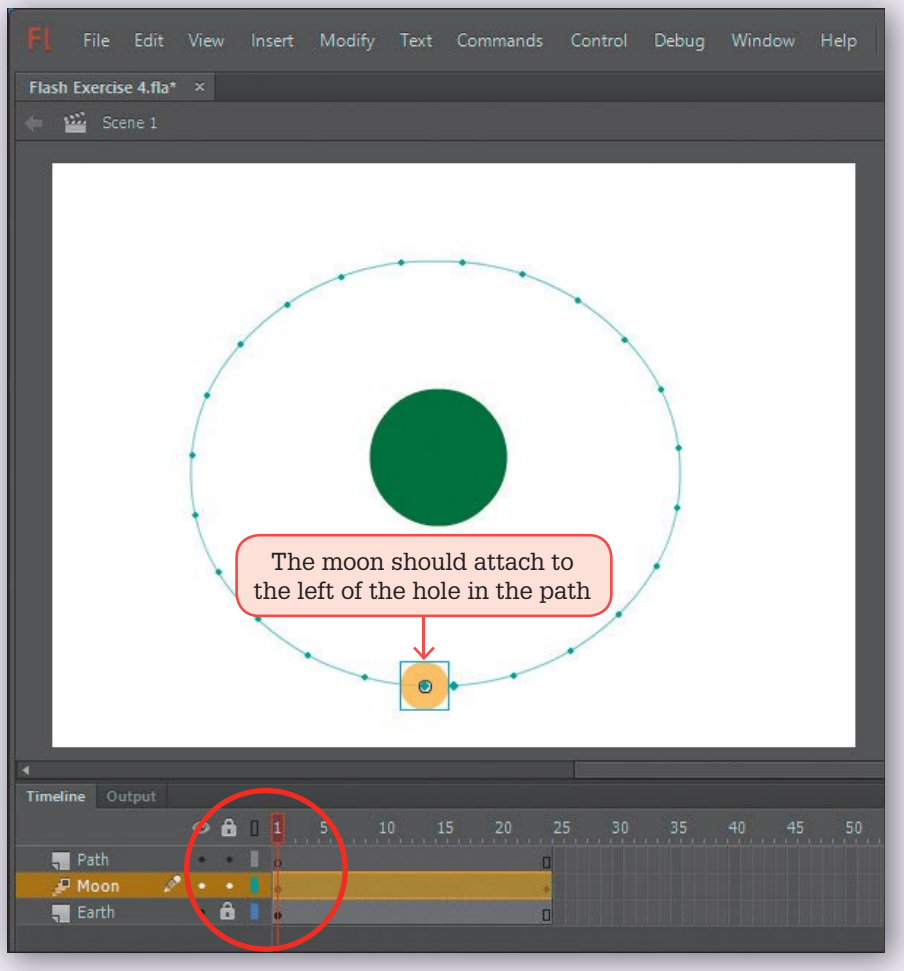
4 Display the **EDIT** menu and select **PASTE IN PLACE** to paste the path onto the **MOON** layer at its same position. The moon should attach itself to the path.




5 Save the file in your storage folder as: Flash Exercise 4.

6 Test the movie and the moon should orbit the Earth.

7 You might like to click on the white area of the stage and set the **STAGE** to a dark colour in the Properties panel, then retest your movie.

Note: Paths do not have to be circular. You can use the **PENCIL** tool to draw any path you like. As long as it is one continuous line, a symbol can be set to follow that path.



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# 4.6 Fixed point animations

There are times when you want an object to stay fixed at one end and move around that point. Some examples of this are the hands of a clock, the dials on speedometers or fuel gauges, or levels in a computer game. In the next exercise a car speedo with an animating dial will be created.

## Flash animation exercise 5

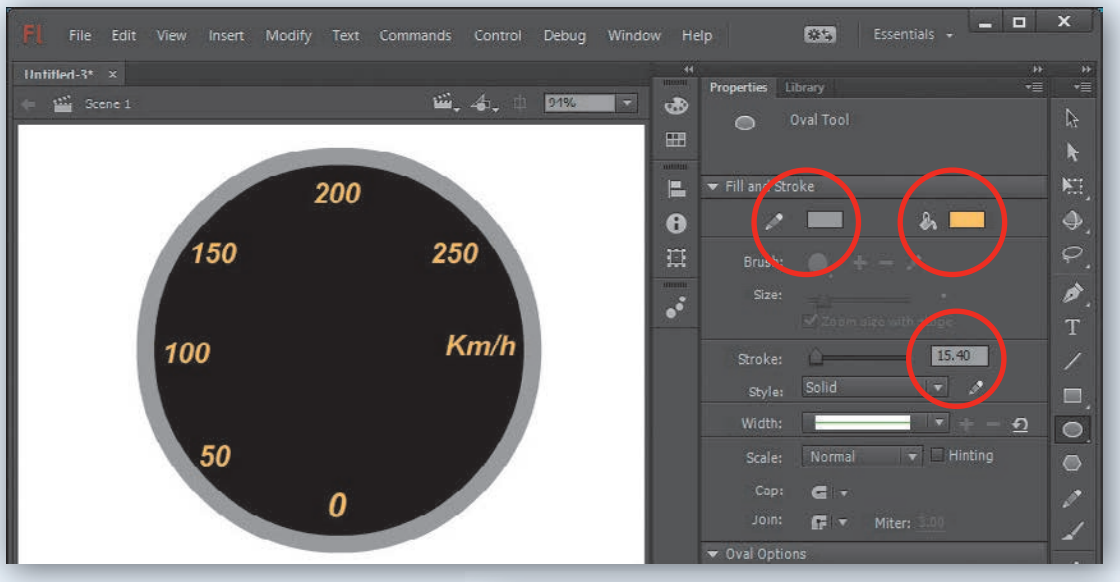
### *Creating the speedo*

**Skills practised**
- Using layers
- Drawing tools
- Motion tweens
- Editing a symbol
- Rotating a symbol
- Editing animations

1 Create a new Flash (or Animate) ActionScript 3.0 document.

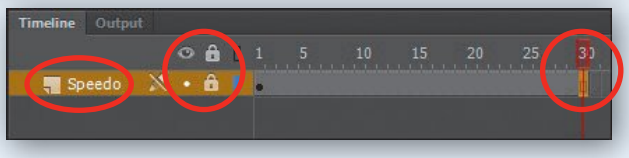
2 Select the **OVAL TOOL**, set the **FILL COLOUR** to black, the **STROKE COLOUR** to grey, the **STROKE SIZE** to about 15 pt and draw a large circle on the stage.

3 Use the **TEXT TOOL** to add the speeds to the speedo.




4 Rename the layer 'Speedo', add 30 frames to the layer by clicking on Frame 30 and pressing the F5 key, then lock the layer.

5 Save the file in your storage folder as: Flash Exercise 5.



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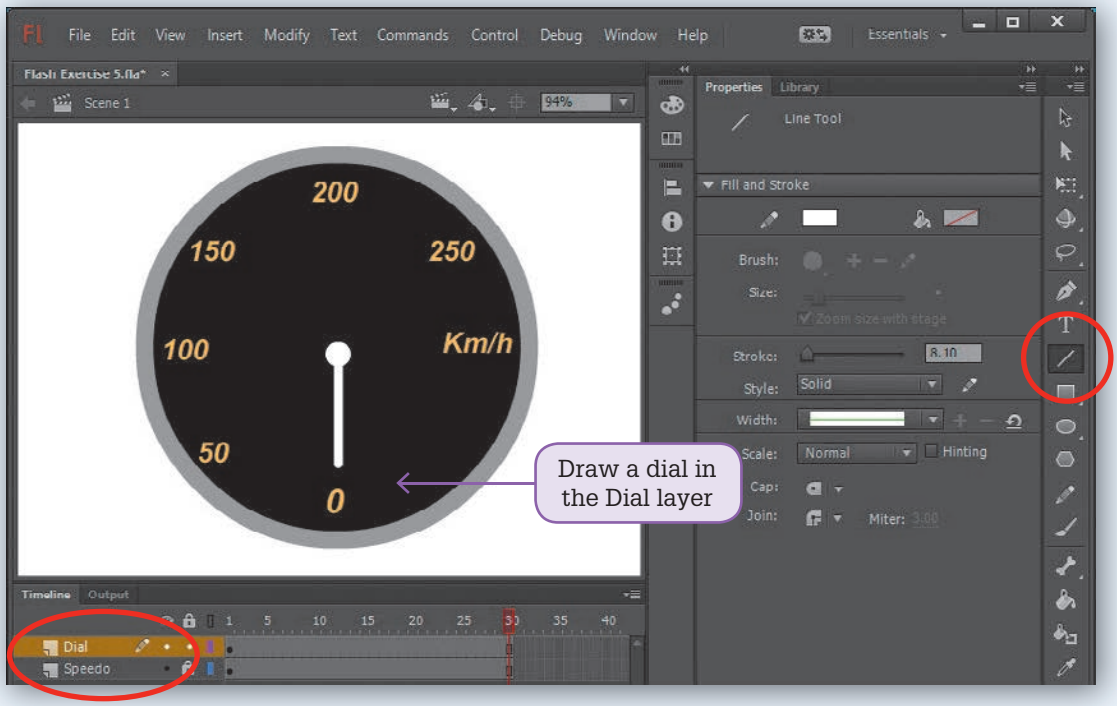
## Creating the dial

1 Create a new layer and rename it 'Dial'.

2 Use the **OVAL** and **LINE** tools to create a dial on the speedo.

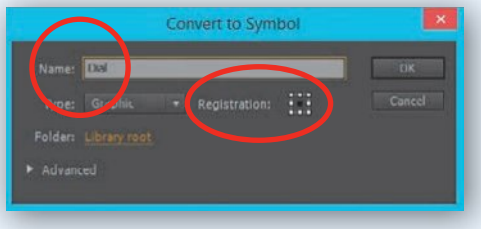



## Converting the dial to a symbol

The dial needs to be a symbol so that it can be animated.

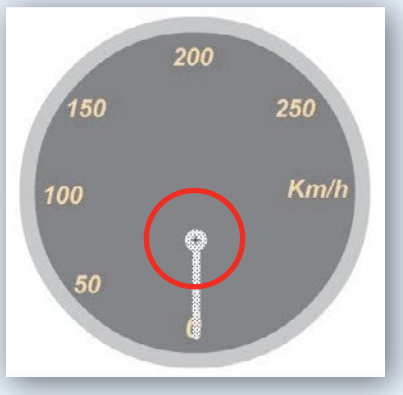
1 Use the **SELECTION TOOL** and <Shift> key to select all the dial components then display the **MODIFY** menu and select **CONVERT TO SYMBOL.**

2 Call the symbol, Dial, set its **TYPE** to **GRAPHIC**, leave **REGISTRATION** at the **CENTRE** position and select **OK**.




3 Double click on the symbol to open the **EDIT SYMBOL MODE** screen.

4 Press the **DOWN ARROW** key on the keyboard to move the symbol down until the **REFERENCE POINT** (+) is at the top of the dial.



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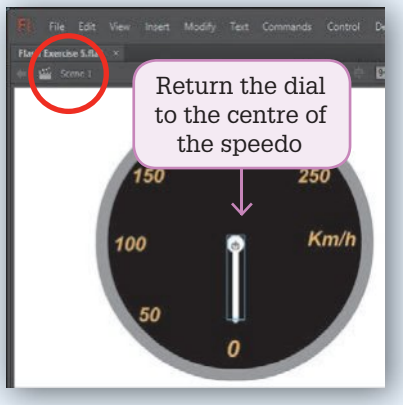
5 Click on the **SCENE 1** icon at the top of the screen to return to the normal Flash screen and move the dial back to the centre of the speedo.

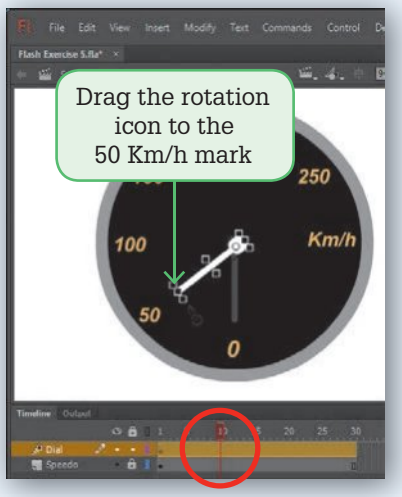



## *Animating the dial*

1 Click on Frame 1 of the **DIAL** layer and select **MOTION TWEEN** from the **INSERT** menu to create the animation.

2 Click on Frame 10 in the **DIAL** layer and select the **FREE TRANSFORM TOOL**. Move the pointer over the bottom right 'handle' of the dial until the **ROTATION** icon is added to the pointer.

3 Drag the dial to the 50 km/h mark, keeping the top of the dial at the centre of the speedo. A **PROPERTY KEYFRAME** is added at Frame 10.

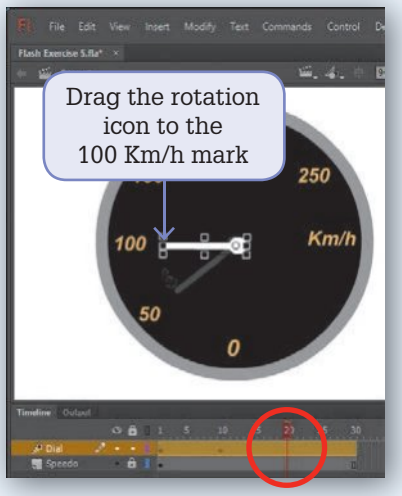



4 Click on Frame 20 in the **DIAL** layer, move the pointer over the bottom right 'handle' of the dial and drag the **ROTATION** icon to the 100 km/h mark, keeping the top of the dial at the centre of the speedo.

5 Test the animation to check that it works correctly.

6 Try animating the dial to 150 km/h at Frame 30 of the **DIAL** layer then test the animation again.

Note: You might like to try adding some extra keyframes and frames to make the dial return to the 0 position.



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# 4.7 Shape tweening

Shape tweening allows you to animate one shape into another. It operates on objects drawn using tools such as the rectangle, circle or pencil tools. It does not work with grouped objects or symbols.

## Flash animation exercise 6

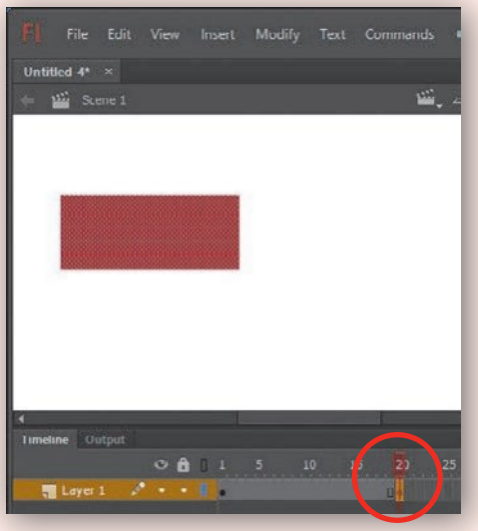
### *Shape tweening*

**Skills practised**
- Drawing tools
- Shape tweens
- Editing shapes

Let's change a rectangle into a circle.

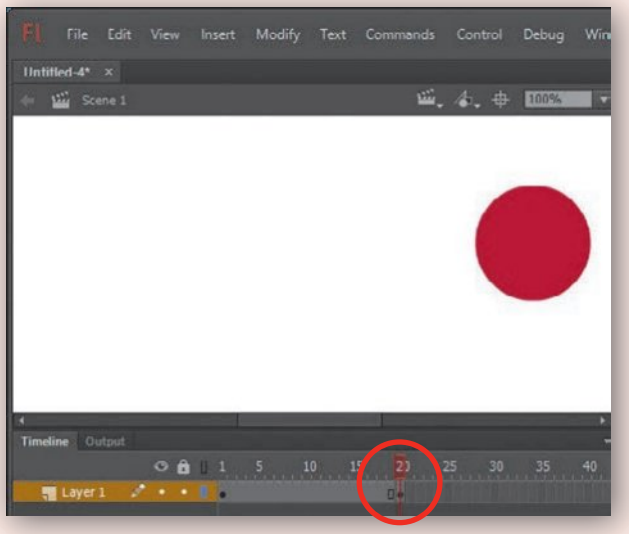
1 Create a new Flash (or Animate) ActionScript 3.0 document and draw a filled rectangle that has no stroke near the left of the stage.

2 In the **TIMELINE** panel click on Frame 20 then display the **INSERT** menu, highlight **TIMELINE** and select **KEYFRAME** to insert a keyframe. The F6 key can be pressed as a shortcut.




3 Select the **SELECTION TOOL**, click on the **KEYFRAME** marker at Frame 20, delete the rectangle and draw a circle near the right of the stage.

Note: The rectangle is still at the Keyframe at Frame 1.



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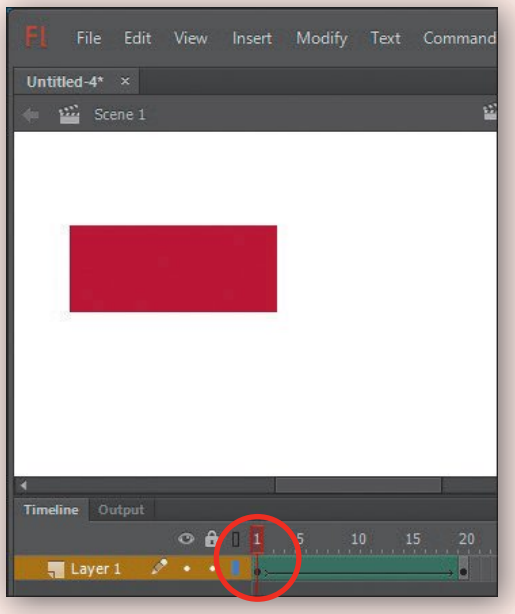
4 Select the **KEYFRAME** marker at Frame 1 then display the **INSERT** menu and select **SHAPE TWEEN** to create the shape animation.

Note: Notice that the Timeline is green indicating that a Shape tween has been created. Motion tweens are light blue.

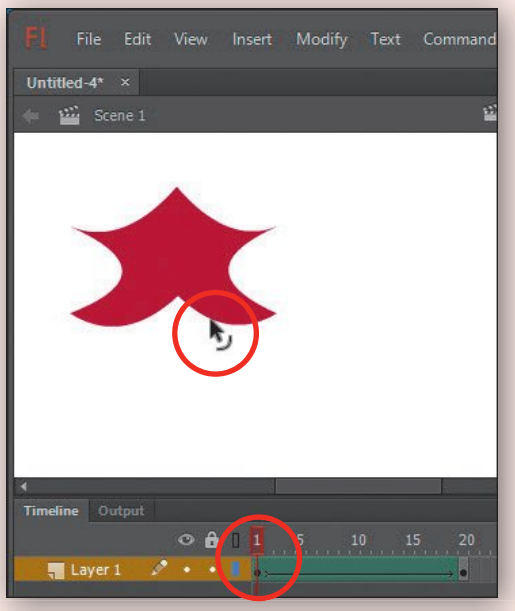
5 Test the animation and the rectangle should change into a circle.




6 Select the **KEYFRAME** marker at Frame 1 and select the **SELECTION TOOL**.

7 Click outside the rectangle to deselect it then move the pointer close to a border until an arc is added to the pointer. Try dragging the borders of the rectangle to create an irregular shape. You can hold down the <Alt> or <Option> key and drag a border to split the sides in two.

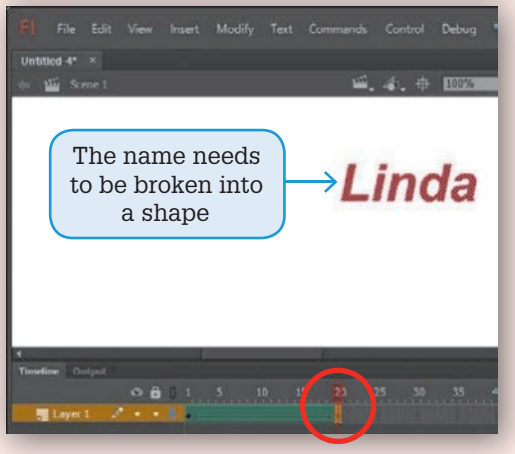
8 Test the animation to see the effect.




9 You can also shape tween text. Click on the **KEYFRAME** marker at Frame 20, delete the circle and use the **TEXT** tool to enter your first name.

10 Press <Ctrl+B> or <Command+B> twice to break the text into letters then into a shape.

11 Test the animation and the irregular shape should change into your name.



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# 4.8 Movie clips

Movie clips are self-contained animations with their own independent timeline so they do not complicate the timeline of the main animation you are creating. You can create an animated movie clip and use it many times within other animations without affecting the size of the file. Think of a movie clip as a separate animation that can be used as required.

To illustrate the use of movie clips, a bird movie clip will be created, then added to an animation.

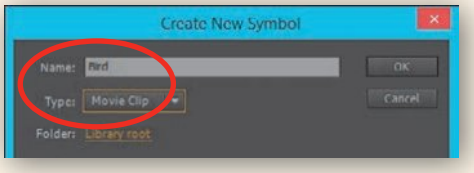
## Flash animation exercise 7

### Skills practised

- Movie clip symbols
- Brush tools
- Blank keyframes
- Adjusting paths
- Symbol positions
- Editing animations

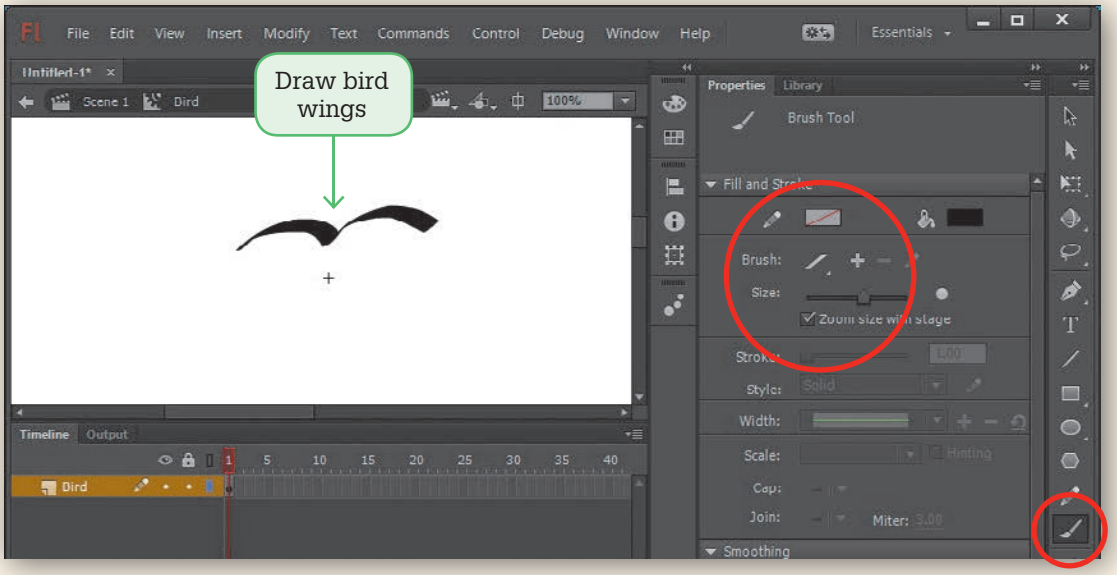
### *Setting the movie clip symbol*

1. Create a new Flash (or Animate) ActionScript 3.0 document, then display the **INSERT** menu and select **NEW SYMBOL**.
2. Name the symbol Bird, set the **TYPE** to **MOVIE CLIP** and click on **OK**.
3. The screen will be set to **MOVIE CLIP EDIT MODE**. Notice that the Bird label is added above the Stage to indicate that you are editing the symbol.




### *Drawing the bird*

1. In the Timeline panel, change the layer name to 'Bird'.
2. Select the **BRUSH TOOL** from the Tools panel and in the Properties panel set the **BRUSH SHAPE** to the last diagonal shape and **BRUSH SIZE** slider to about half.
3. Draw the bird wings near the top centre of the stage.




Note: It might take a few goes to get the wing looking right. Use `<Ctrl+Z>` or `<Command+Z>` to undo the wing until you produce the shape you want. The Library panel in the **PANEL GROUP** can be used to see a zoom of the symbol as you are creating it.



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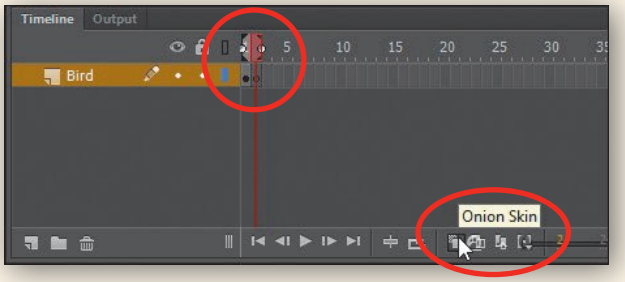
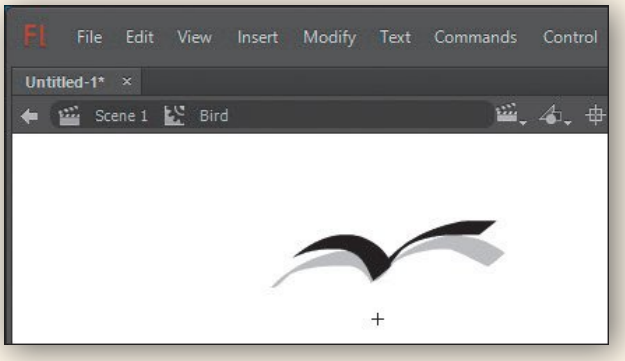
4 Display the **INSERT** menu, highlight **TIMELINE** and select **BLANK KEYFRAME** to add a second (empty) keyframe to the Timeline. The bird disappears.

5 Click on the **ONION SKIN** button at the base of the **TIMELINE** panel to see a watermark of the bird from Frame 1.

Note: The Blank Keyframe will allow you to alter the shape of the bird. The Onion Skin image is just a watermark on the screen. It cannot be altered.




6 Draw another set of wings over the Onion Skin image, but make the wings a little higher and narrower.



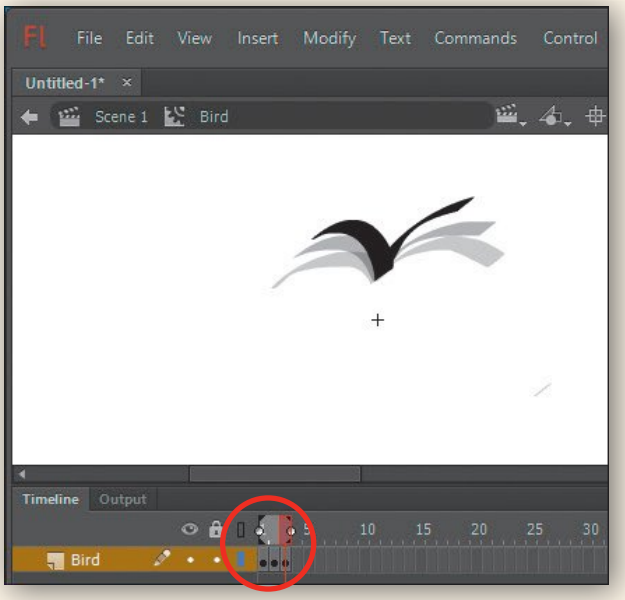

7 Use the **INSERT** menu – **TIMELINE** – **BLANK KEYFRAME** to insert another empty keyframe and the two previous images will be displayed as Onion Skins.

8 Draw another set of wings over the Onion Skin image, but make the wings a little higher and narrower.

9 Run the **PLAYHEAD** over the frames to see the animation.

10 Click on the **SCENE 1** heading at the top of the stage to return to the normal screen. The bird will disappear. It is in the **LIBRARY** panel.

11 Save the document in your storage folder as: Flash Exercise 7.




Note: This is an example of a Keyframe animation where the object is altered a little at Keyframes that are next to one another. A Motion or Shape tween could have been used. Movie clips do not have to involve Keyframe animations.



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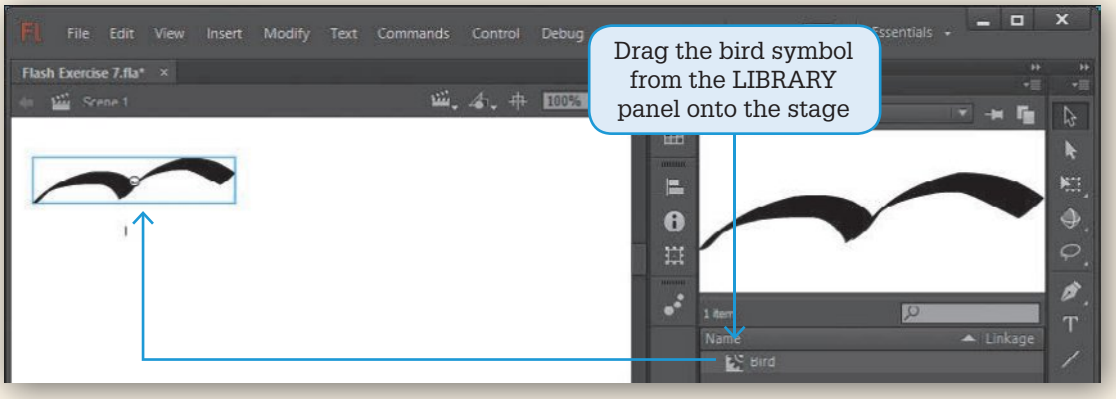
## *Using the movie clip*

The movie clip can now be used in animations as many times as needed.

1 Turn off the **ONION SKIN** button in the **TIMELINE** panel, open the **LIBRARY** panel in the **PANEL GROUP** and drag the bird symbol onto the stage.



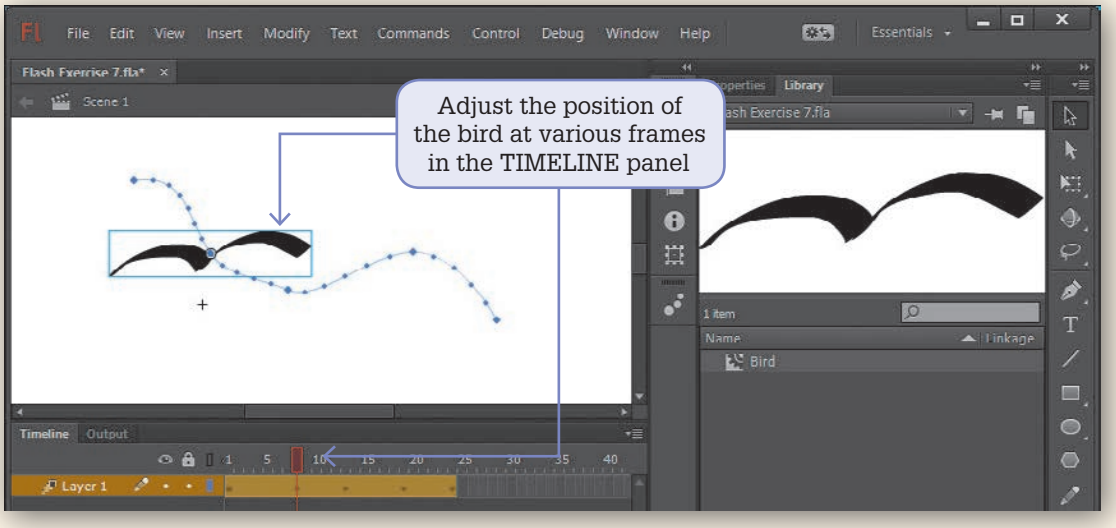

Note: Notice that none of the keyframes are displayed in the Timeline panel. If you need to edit the bird movie clip you simply double click on it on the stage or in the **LIBRARY** panel and the screen will be returned to **MOVIE CLIP EDIT MODE**.

2 Test the movie and the bird should simply flap its wings. Movie clips do not operate when you simply play an animation. You need to use **TEST** from the **CONTROL** menu to see them operate.

3 Click on Frame 1 in the **TIMELINE** panel and insert a **MOTION TWEEN** from the **INSERT** menu.

4 Use the **SELECTION TOOL** to move the bird to a new position at Frame 24 and then adjust its path to be curved.

5 Move the **PLAYHEAD** in the **TIMELINE** panel to some other positions and change the position of the bird to further adjust the path.




6 Test the movie and the bird should flap its wings as it moves.



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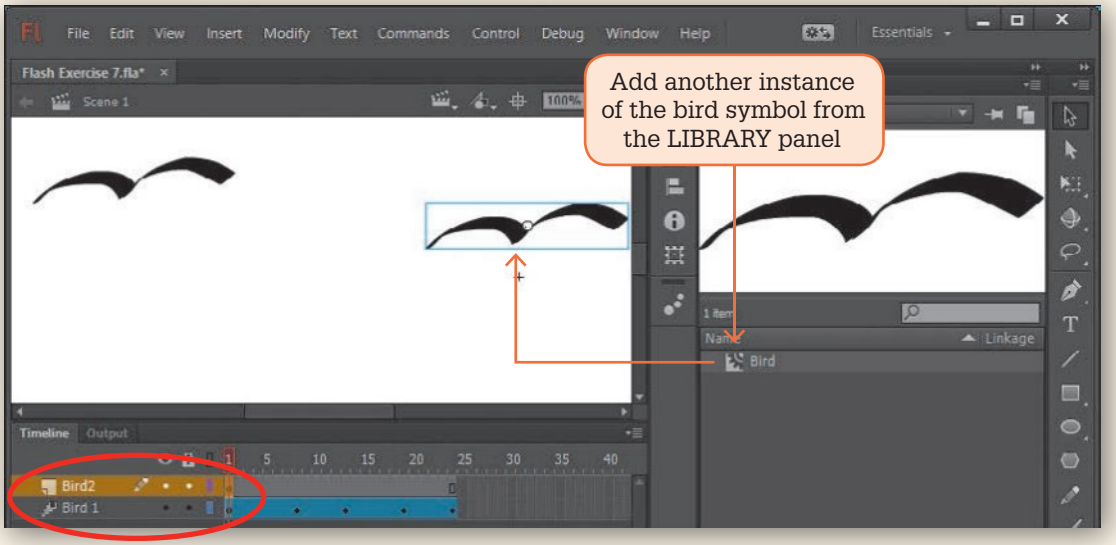
## *Adding another movie clip instance*

More instances of the movie clip can be added to the animation.

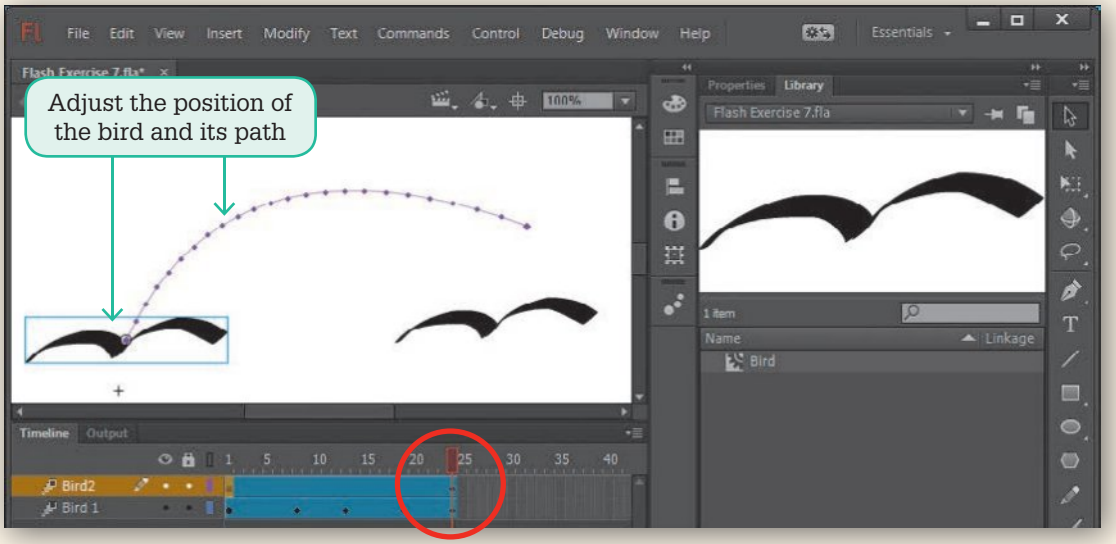
1 Rename the layer in the Timeline panel to 'Bird 1', insert a **NEW LAYER** and call it 'Bird 2'.

2 Select **FRAME 1** of the Bird 2 layer and drag another instance of the bird to the stage from the **LIBRARY** panel.




3 Use **MOTION TWEEN** from the **INSERT** menu to animate the second bird symbol.

4 Move the **PLAYHEAD** in the **TIMELINE** panel to Frame 24 and move the second bird symbol to a new position on the stage, then adjust its path to be curved.




5 Test the movie and both birds should move as they flap their wings.

6 Adjust the position of the second bird symbol at various frames of the **TIMELINE** panel if you wish to.

Note: You might like to set the **STAGE** to blue to simulate the sky, or insert a picture to the stage for the birds to fly over. You might also like to use the **FREE TRANSFORM** tool to adjust the size of the birds at various keyframes.



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# 4.9 Publishing animations

You can publish your animations as a Flash (SWF) file or export them as video file in a variety of different formats.

## Flash animation exercise 8

**Skills practised**
- SWF files
- Video files
- Exporting files

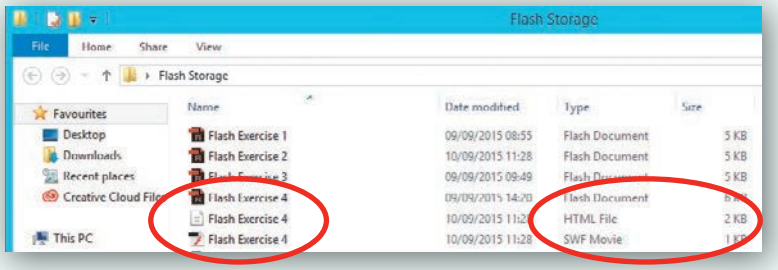
### *Publishing as a SWF file*

Flash animations can be published as a SWF file, which stands for small web format and it indicates that the file has been compressed to its smallest size.

1 Load your Flash Exercise 4 file of the moon orbiting the Earth.

2 Display the **FILE** menu and select **PUBLISH**.

3 Open your storage folder outside Flash and you should see two extra Flash Exercise 4 files, a HTML file and a SWF file.




4 Notice that the SWF file is considerably smaller than the original Flash document.

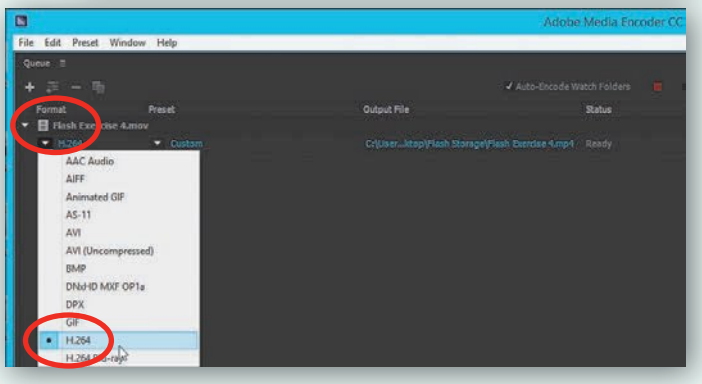
### *Publishing as a video file*

More recent versions of Flash allow you to export your animations as video files. These can be played on media players, such as QuickTime Player, Windows Media Player and DivX Player. You might want to create video files of your animations because some devices, such as iPads and some browsers, such as Firefox, do not support SWF files.

1 With your Flash Exercise 4 file open, display the **FILE** menu, highlight **EXPORT** and select **EXPORT VIDEO**.


2 In the **EXPORT VIDEO** dialogue box you can browse to the folder you want to export the file to then click on **EXPORT**. It is probably set to your storage folder.

3 Adobe Media Encoder should open with the exported file installed.




4 You can click on the arrow to the left of the file name to choose the video format you want (H264 is a common format) then click on the green arrow (**START QUEUE**) to export the video.

5 Open a media player and try playing the exported files. The animation will just play once.



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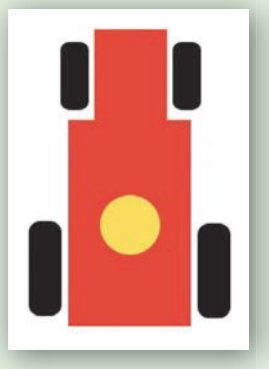
FLASH ANIMATION PROJECT

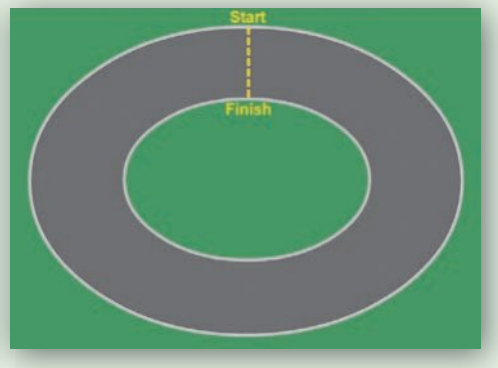
# Car racing

You have been asked to create an animation for a car race showing a car animating around a racetrack, which can be included on a website advertising the race.

## Collecting the data

Look at some sample images of racetracks and sketches of cars. Web searches for 'race track sketches' and 'race car sketches' should provide examples, or the following images can be used to help you decide on designs.








## Defining the solution

Draw a mock-up sketch on paper of the racetrack and car that you will be creating. Decide on whether you will create the car as a movie clip symbol or simply a graphic symbol. For example, as a movie clip symbol you could animate some smoke puffing from the rear of the car.

## Implementing

> Create the racetrack in a layer and lock that layer.
> Create the car as a graphic symbol or a movie click symbol.
> Animate the car to move around the racetrack. You can create an oval motion guide for the car to follow or move the car to different frames in the **TIMELINE** panel and adjust the motion path to the shape you want.
> To set the car to always face in the right direction as it moves around the track you will need to turn on **ORIENT TO PATH** in the **ROTATION** section of the Properties panel at **FRAME 1** of the car's layer.
> Export the animation as an SWF file and a video file.

## Evaluating, collaborating and managing

**1** Ask other people to look at your animation and to give you feedback on the quality and accuracy of your production. Describe what was said and what changes you made to your animation because of it.

**2** What are the advantages of having animations such as these on websites? Are there any disadvantages?

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# Module 5

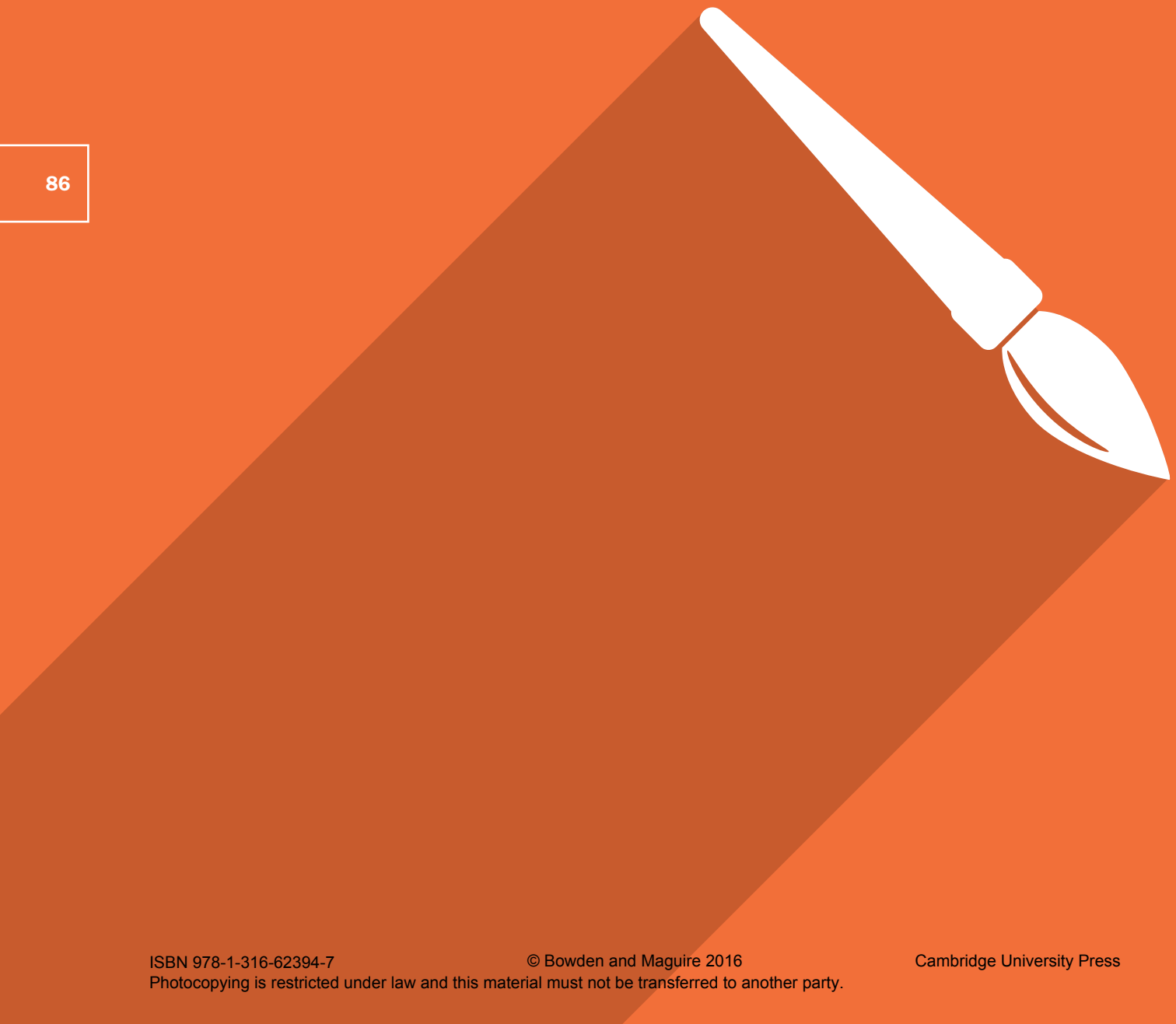
## COMPUTER GRAPHICS

Program featured for exercises:

**Adobe Illustrator**

Additional exercise available online for:

**Adobe Illustrator**





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# Teacher information

## IT knowledge and skills covered in this module

- The different types of graphics programs
- Creating a drawing
- Editing objects
- Using text and symbols in designs
- Using freehand drawing tools
- Creating detailed designs

## Suggested further uses across the curriculum

- English (for creating information posters or flowcharts). Use a range of software, including word processing programs, confidently, flexibly and imaginatively to create, edit and publish texts, considering the identified purpose and the characteristics of the user (ACELY1748, ACELY1776).
- Media Arts (for creating animations). Develop and refine media production skills to integrate and shape the technical and symbolic elements in images, sounds and text for a specific purpose, meaning and style (ACAMAM075).
- Science (for creating classroom safety posters). Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (ACSIS208).

## Alignment with the Australian Curriculum



### ICT Capability elements covered

- Creating with ICT
- Communicating with ICT
  - collaborate, share and exchange
  - understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Literacy
- Numeracy
- Critical and creative thinking
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)
- Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)



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# 5.1 Different types of graphics programs

Graphics programs allow you to create your own sketches or make changes to existing sketches. There are two main types of graphics programs: bitmapped or pixel-based programs and object-oriented or vector-based programs.

## Bitmapped or pixel-based programs

These are commonly called **digital painting** programs and are used for artistic painting or freehand drawing. The painting is created by the program turning screen lights (called pixels) on or off, or to colours. Some common pixel-based programs are Corel Painter, Microsoft Paint, Adobe Photoshop and the Painting section of Adobe Fireworks. Book 1 provided activities on pixel-based programs.

## Object-oriented or vector-based programs

These are commonly called **Drawing** (or computer-aided design) programs and are commonly used for detailed sketches, designs and architectural drawings. Some common vector-based programs are Adobe Illustrator, the drawing section of Adobe Fireworks and Google Drawings, as well as high-powered architectural programs such as AutoCAD. Vector-based programs usually require less file space to store their files than pixel-based programs.

In this book you will be using a vector-based program to create and modify drawings. Each shape created in a drawing program is termed an **object**. You can select an object by placing the mouse pointer over it and clicking the mouse button. **Handles** around an object tell you that it has been selected and the object can be deleted, resized, copied or moved. The exercises are based on Adobe Illustrator.



# 5.2 Creating a drawing

All drawing programs provide a range of drawing tools that allow you to accurately produce designs. Some of these tools include Line, Arc, Rectangle and Ellipse tools.

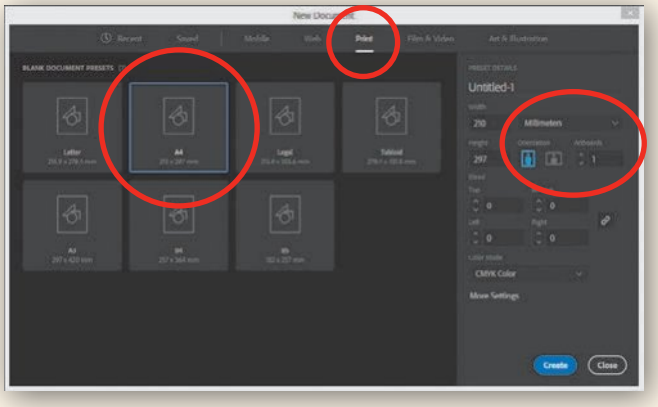
## Computer graphics exercise 1

### *Setting the grid*

A cone shape will be created using the drawing tools. Most vector-based drawing programs provide a grid to make accurate drawings easier to do.

**Skills practised**
- Rectangle tool
- Line segment tool
- Ellipse tool
- Arc tool
- Rulers and grid

1. Load Adobe Illustrator and, in the Welcome screen, click on **NEW** to open the **NEW DOCUMENT** dialogue box.
2. Open the **PRINT** category and select the **A4** preset (or use the default settings). Check that the **UNITS** are in **MILLIMETRES**, the **ORIENTATION** is set to **PORTRAIT** and select **CREATE**.
3. Display the **VIEW** menu, highlight **RULER** and select **SHOW RULERS** to add rulers to the left and top of the canvas.
4. Display the **VIEW** menu again and select **SHOW GRID** to add a grid to the canvas.
5. Display the **VIEW** menu again and turn on **SNAP TO GRID** and turn off **SNAP TO POINT**.

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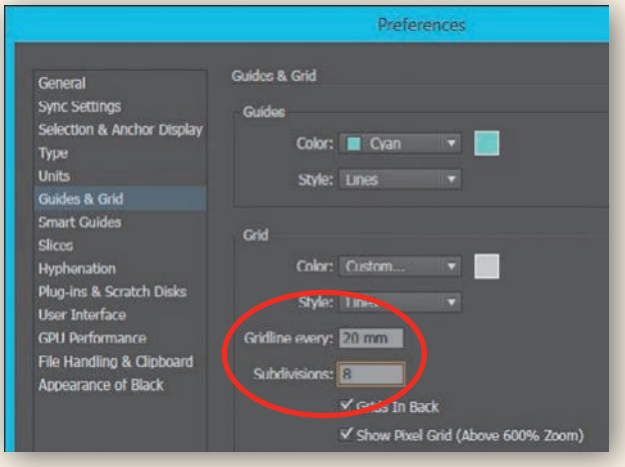
6 The grid can be set to match the increments in the **RULERS**. Display the **EDIT** menu on the Windows system or the **ILLUSTRATOR** menu on the Mac system, highlight **PREFERENCES** and select **GUIDES & GRID**.

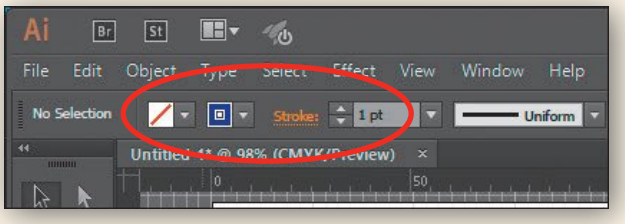
7 Set the **GRIDLINE EVERY** box to 20 mm and the **SUBDIVISIONS** box to 8, then select **OK**.



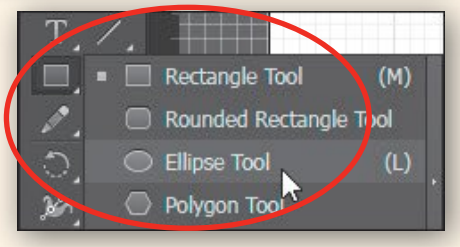

## *Drawing the ovals and lines*

The base of the cone will be created using an oval and lines. When creating these you should decide what fill and stroke colours are required. In this case we do not want any objects to be filled and the lines need to be a dark colour.

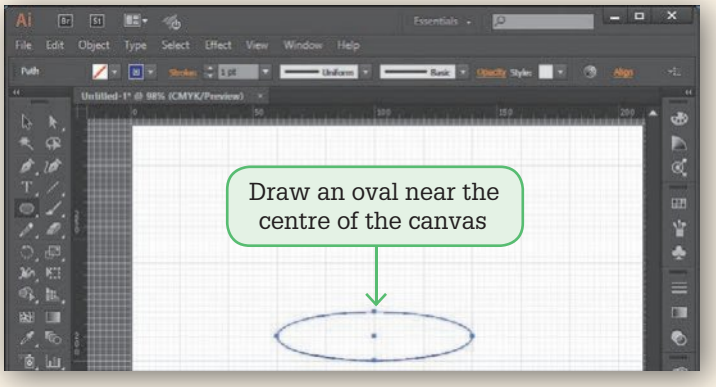
1 In the **CONTROL** panel at the top of the screen set the **FILL** box (the left box) to **NONE** and the **STROKE** box to the dark colour. The **STROKE WEIGHT** box should be set to 1 pt.




2 Click and hold on the **SHAPES** box in the Tools panel at the left of the screen and select the **ELLIPSE TOOL**.




3 Drag an oval 80 mm across and 30 mm down near the centre of the canvas. That is, 4 solid grid lines across and 1 solid grid line down.



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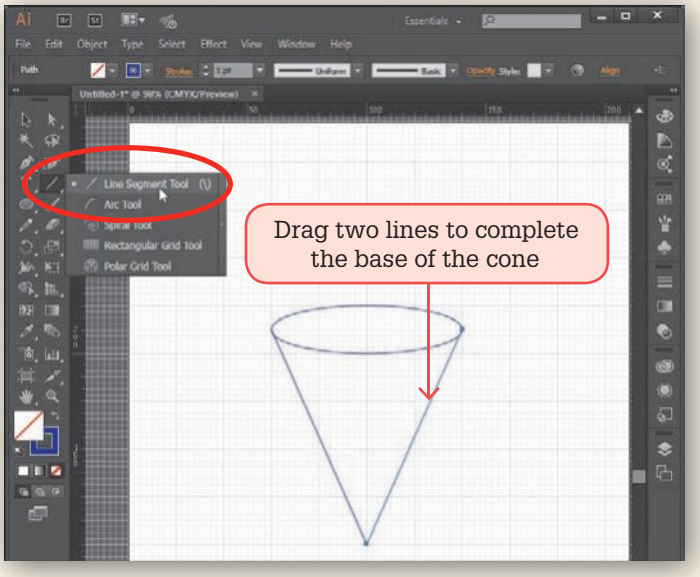
4 Select the **LINE SEGMENT TOOL** from the Tools panel and drag a line from the left edge of the oval down 90 mm and 40 mm to the right (four-and-a-half solid grid lines down and two solid grid lines to the right).

5 Drag another line from the bottom point of the line to the right edge of the oval.



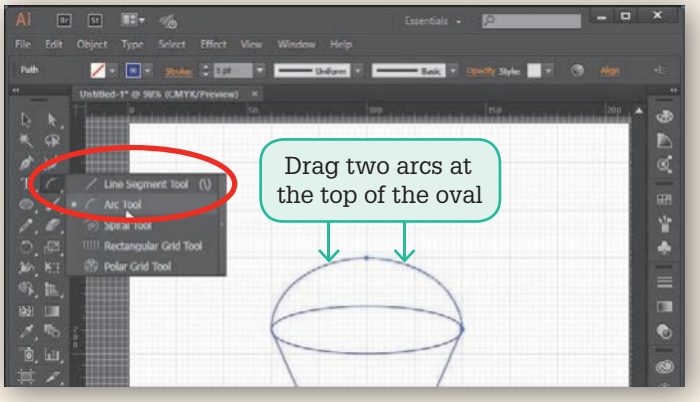

## *Drawing the arcs*

Two arcs will be added to the oval to complete the cone.

1 Select the **ARC TOOL** from within the **LINE SEGMENT TOOL**.

2 Drag an arc from the left edge of the oval up 30 mm and 40 mm to the right.

3 Drag another arc from the right edge of the oval to the right point of the first arc.



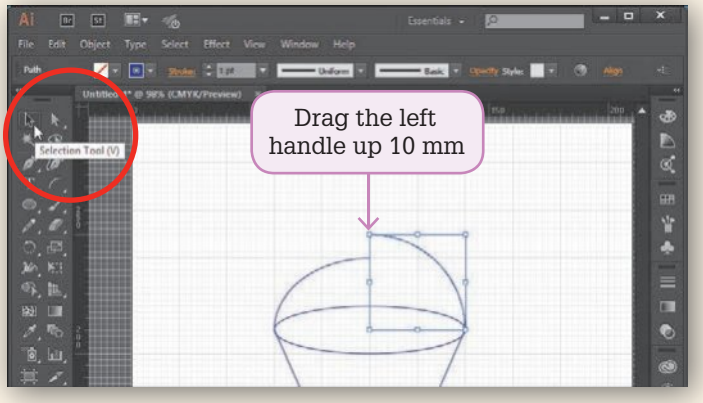

4 Vector drawings can be easily edited at any time. Let's make the arcs a little larger. Select the **SELECTION TOOL** from the Tools panel.

5 Click on the right arc and drag its left handle up 10 mm.

6 Repeat step 5 for the right handle of the first arc.

7 Select **SAVE AS** from the **FILE** menu and save the file in your storage folder as: Cone.

8 Select **OK** to the Save Options.



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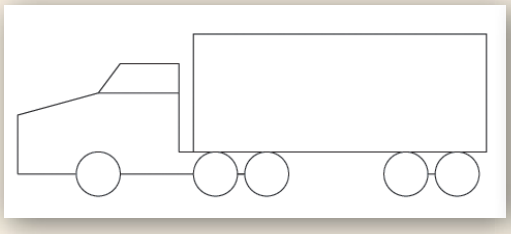
### *Other drawings*

Use the **LINE SEGMENT**, **RECTANGLE**, **ELLIPSE** and **ARC** tools to create the following drawings.



## 5.3 Editing objects

When handles are displayed around an object that has been selected, the object can be deleted, resized, copied or moved.

## Computer graphics exercise 2

### *Editing objects*

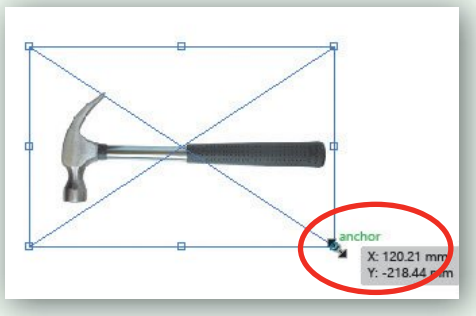
**Skills practised**
- Placing images
- Resizing images
- Flip horizontal
- Flip vertical
- Rotating objects

1 Start a **NEW** Illustrator document and select **PLACE** from the **FILE** menu.

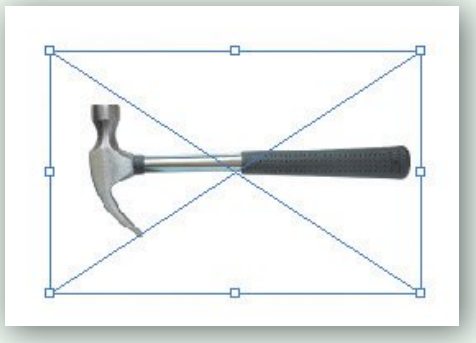
2 Insert an object from your school's Clip Art library or the Hammer from the PIT2 Support Files.

3 Click on the canvas to place the image.

4 With the **SELECTION TOOL** selected in the Tools panel, use one of the 'handles' to drag diagonally in to reduce the object's size or diagonally out to increase the object's size. Holding down the Shift key as you drag a 'handle' maintains the proportions of the object.




5 Display the **OBJECT** menu, highlight **TRANSFORM** and select **REFLECT**. Select **HORIZONTAL** followed by **OK** to change the horizontal direction that the object faces.





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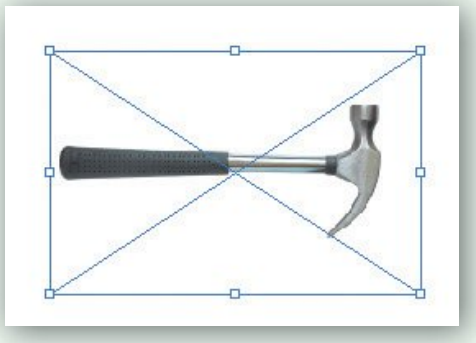
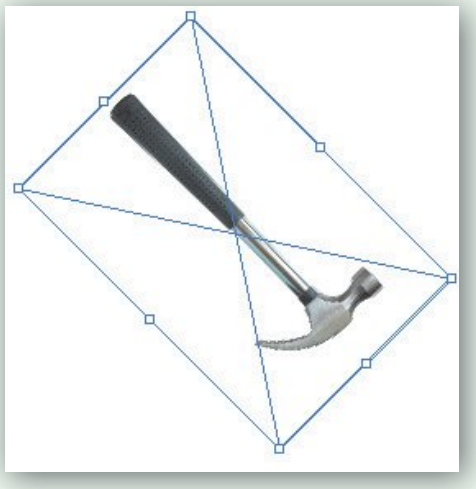
6 Use the **OBJECT** menu – **TRANSFORM** – **REFLECT** and select **VERTICAL** followed by **OK** to change the vertical direction that the object faces.

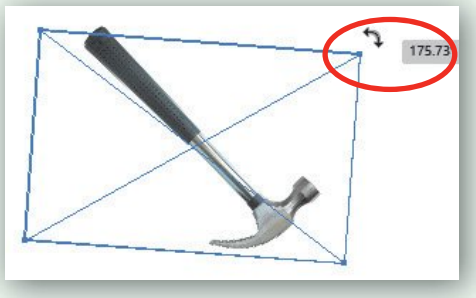


7 Use the **OBJECT** menu – **TRANSFORM** – **ROTATE** and enter -45° followed by **OK** to rotate the object 45° clockwise.

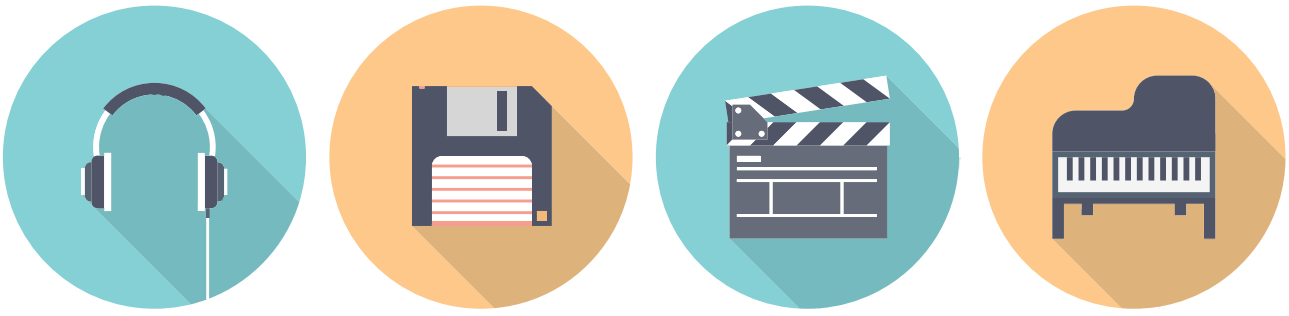
Note: Entering 45° in the **ROTATE** dialogue box will rotate the object 45° anticlockwise.



8 Move the pointer to the outside of one of the handles until the rotate symbol is added to the pointer. Drag the handle to rotate the object at any angle.





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# 5.4 Using symbols in designs

All graphics programs allow you to import images or sketches. Some provide their own library of symbol images that can be used to enhance designs. To illustrate the use of symbols in Adobe Illustrator, a garden scene will be created using the symbols it provides.

## Computer graphics exercise 3

**Skills practised**
- Rectangle tool
- Fill and stroke colours
- Locking objects
- Copy and paste
- Importing symbols
- Adjusting symbols

### *Creating the background*

Rectangles will be used to create the sky and grass areas.

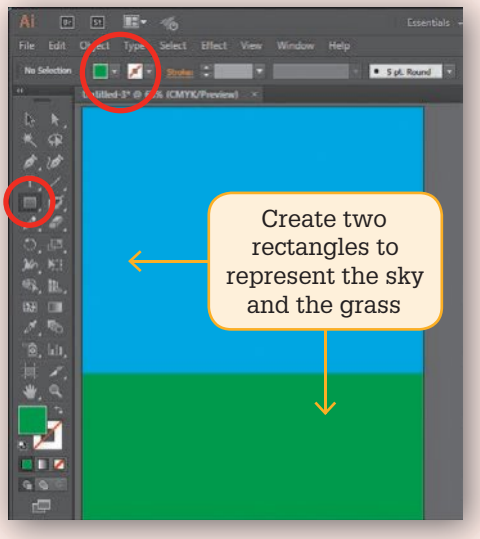
1 Start a new Adobe Illustrator document with the same settings as in Exercise 1.

2 Select the **RECTANGLE TOOL**, set the **FILL COLOUR** to a sky blue, the **STROKE COLOUR** to **NONE** and drag a rectangle around the whole canvas.

3 The rectangle can be locked so that it does not get accidentally moved. Display the **OBJECT** menu, highlight **LOCK** and select **SELECTION**.

4 Drag another rectangle over the lower one-third of the canvas and set the **FILL COLOUR** to **GREEN**.

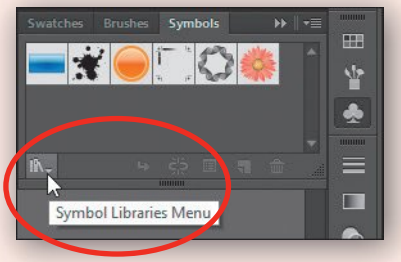
5 Lock this rectangle by repeating step 3.

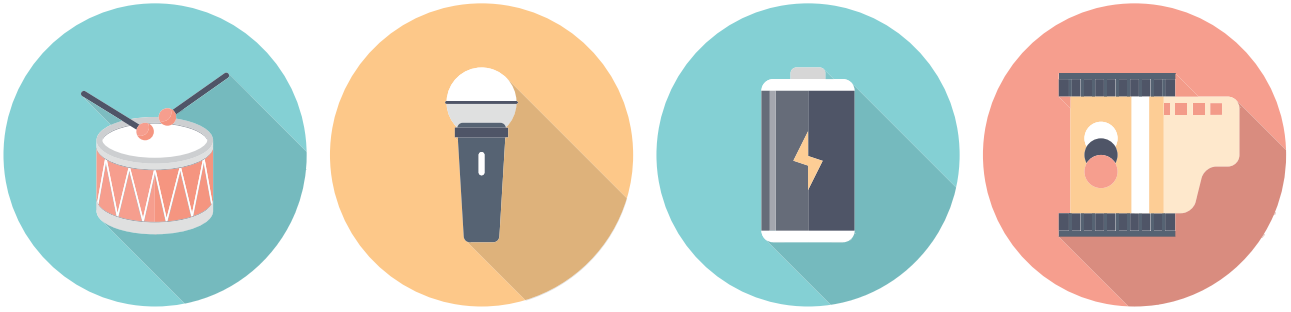



### *Adding the symbols*

Symbols are added from the **SYMBOLS** panel in the Panel Group at the right of the screen.

1 Click on the **SYMBOLS** icon in the **PANEL GROUP** and click on the **SYMBOLS LIBRARY MENU** icon at the bottom left of the panel.





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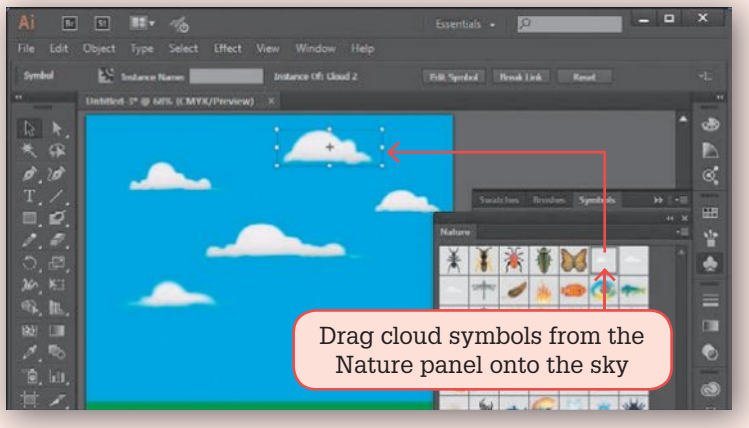
2 Open the **NATURE** symbols and drag some clouds onto the sky.

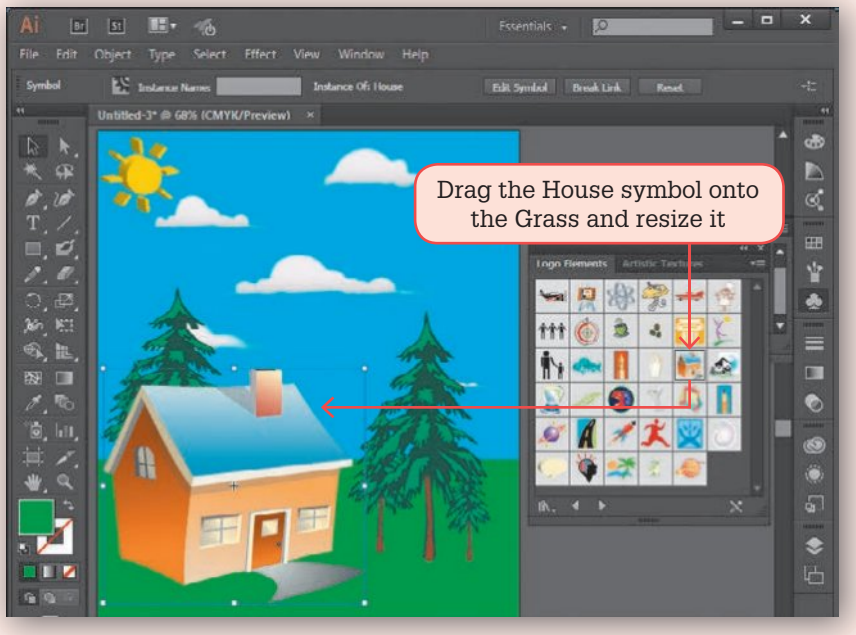
3 The **SELECTION TOOL** can be used to move the cloud symbols into place and to resize any of the symbols.




4 Add some trees from the **NATURE** panel onto the grass area and resize them.

5 Click on the **SYMBOLS LIBRARY MENU** icon at the bottom of the **NATURE** panel, open the **3D SYMBOLS** and drag the **SUN** symbol onto the sky.

6 Click on the **SYMBOLS LIBRARY MENU** icon at the bottom of the **3D SYMBOLS** panel, open the **LOGO ELEMENTS** symbols and drag the **HOUSE** symbol onto the grass and resize it.




7 Try adding some other symbols to the scenes, such as flowers to the front of the house, grass and a table in the garden, butterflies in the sky, etc.

Note: If a symbol is behind another symbol, but you want it to be in the front, select the symbol and select **BRING TO FRONT** from **ARRANGE** in the **OBJECT** menu.

8 Select the **TYPE TOOL**, click near the base of the canvas, set the **FILL COLOUR** to **WHITE**, the **FONT SIZE** to **24 PT** and enter your name.

9 Close the Symbols panels by clicking on their close box and save the document in your storage folder as: Symbols.



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# 5.5 Freehand drawing tools

Vector-based graphics programs provide tools to create freehand drawings. These tools emulate painting tools from pixel-based programs. The freehand drawing tools include the paintbrush tool, the blob brush tool and the eraser tool.

## Computer graphics exercise 4

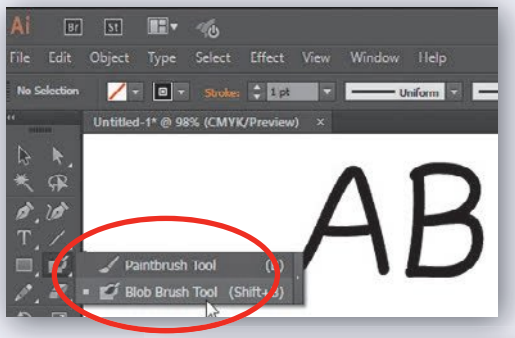
### *Using the blob brush tool*

**Skills practised**
- The blob brush tool
- The eraser tool
- Combining objects
- Separating objects

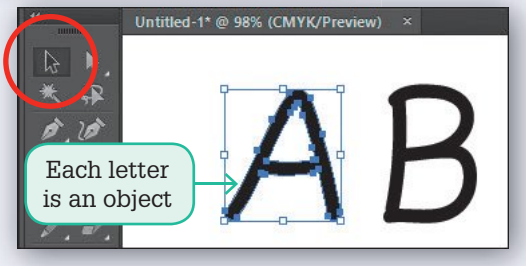
The **BLOB BRUSH TOOL** is a little more flexible than the paintbrush tool, so it will be used for the freehand sketches.

1 Start a new Adobe Illustrator document with the same settings as in Exercise 1.

2 Select the **BLOB BRUSH TOOL** from within the **PAINTBRUSH TOOL** in the Tools panel and paint your initials on the canvas. Make sure the letters are separate from one another.



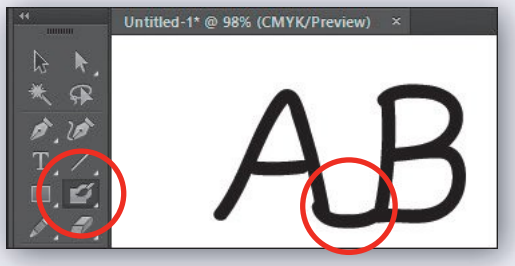

3 Select the **SELECTION TOOL**, click on one of the letters and move it. The letter is a separate object.




4 Select the **BLOB BRUSH TOOL** and drag a line to connect the two letters.

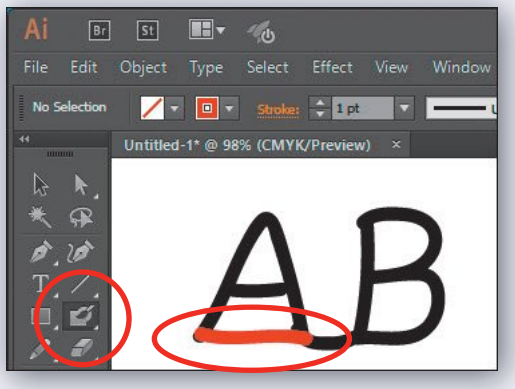
5 Select the **SELECTION TOOL** and drag a letter. Both letters should move as they have been joined.

6 Click outside the letters to deselect them.




7 Select the **BLOB BRUSH TOOL** and select a **FILL COLOUR** that is very different to the colour of the letters.

8 Drag a line to connect parts of one of your initials.



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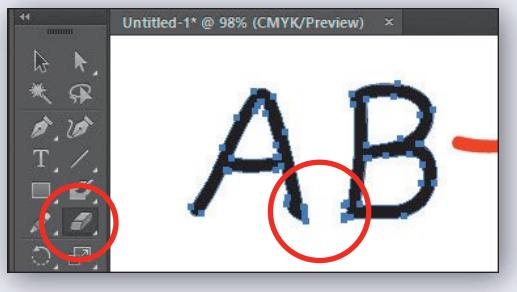
9 Select the **SELECTION TOOL** and try to move the new join. It should move individually as it is a separate object.

Note: The **BLOB BRUSH TOOL** uses colours to identify objects so, if you want to join objects together, you need to ensure that the paint colour is similar to the colour of the object to be joined.

### *Eraser tool*

The eraser tool can be used to erase lines from a sketch. The difference with this tool and similar tools in a painting program is that in a vector-based program, the object to be erased must first be selected.

1 Select the **SELECTION TOOL** and click on your initials to select them.
2 Select the **ERASER TOOL** from the Tools panel and erase the joint between the two letters.
3 You now have two separate letters again.
4 Try erasing the different coloured line that you drew. You should not be able to do so until you select it.






## Computer graphics exercise 5

### *Creating a freehand sketch*

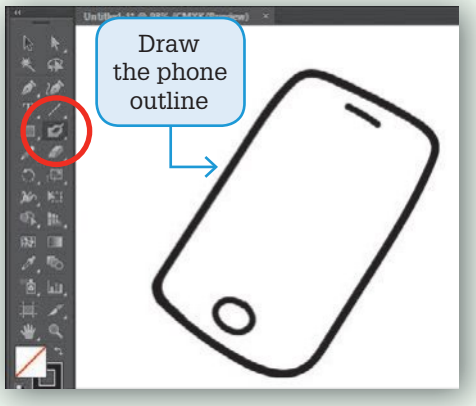
To practise the use of the freehand drawing tools, a simple sketch of a mobile phone will be created.

**Skills practised**
- Blob brush tool
- Eraser tool
- Live Paintbrush tool
- Filling objects

### *Drawing the phone outline*

1 Start a new Adobe Illustrator document with the same settings as in Exercise 1.
2 Select the **BLOB BRUSH TOOL** from the Tools panel, set the **FILL COLOUR** to **BLACK** and draw the outline of the phone. The < and > keys can be used to increase or decrease the size of the brush.

Note: The **ERASER TOOL** can be used to remove any parts of the outline you are not happy with.

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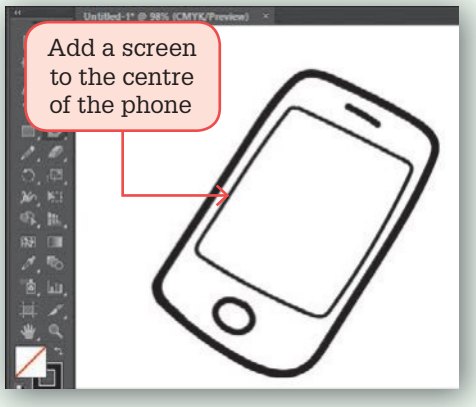
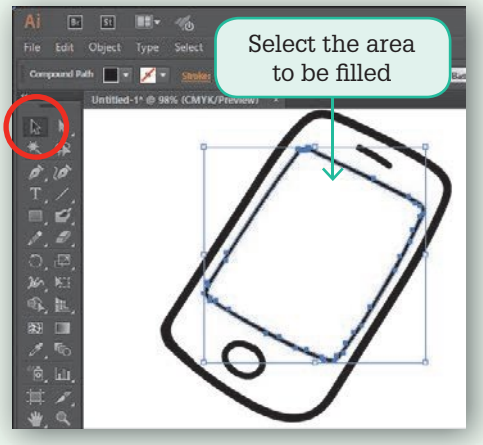
**3** Reduce the size of the brush by pressing the [ key and draw the outline of the viewer screen in the centre of the phone.




## *Filling the sketch*

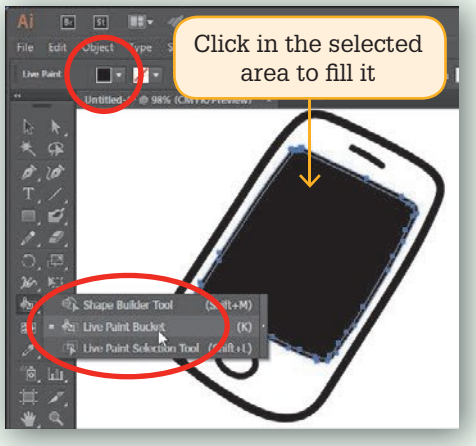
The sketch can be filled with colours.
The limitation with a vector-based program is that the area to be filled must first be selected.

**1** Select the **SELECTION TOOL** and click on the view screen to select it.




**2** Select the **LIVE PAINTBUCKET TOOL** in the Tools panel, set the **FILL COLOUR** to **BLACK** and click the pointer in the selected area to fill that area.

Note: The **LIVE PAINTBUCKET TOOL** is within the **SHAPE BUILDER TOOL**.



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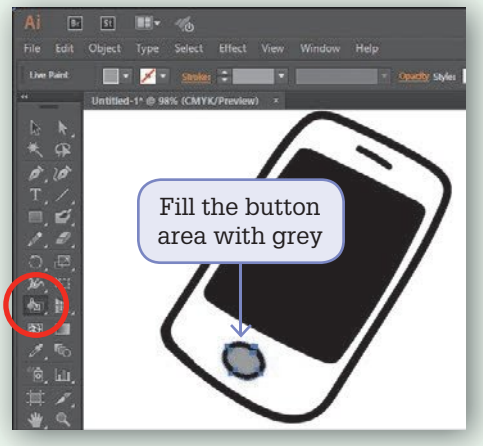
3 Select the **SELECTION TOOL** and select the button at the base of the phone.

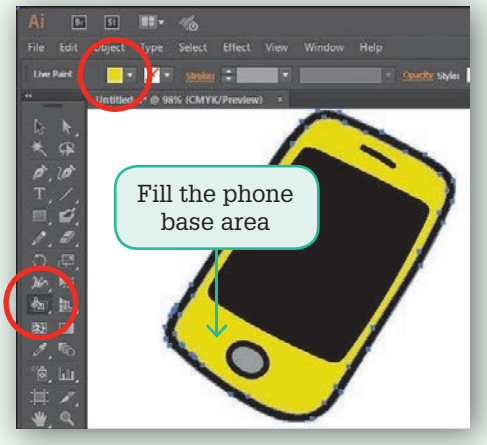
4 Select the **LIVE PAINTBUCKET TOOL**, set the **FILL COLOUR** to a medium grey and click inside the button area to fill it.




5 Select the **SELECTION TOOL** and select the base area of the phone.

6 Select the **LIVE PAINTBUCKET TOOL**, set the **FILL COLOUR** to a different colour and click inside the selected area to fill it.

7 Save the document in your storage folder as: Phone.



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# 5.6 Creating a detailed design

Drawing programs allow you to create highly accurate designs using the tools available.

## Computer graphics exercise 6

### *Creating designs*

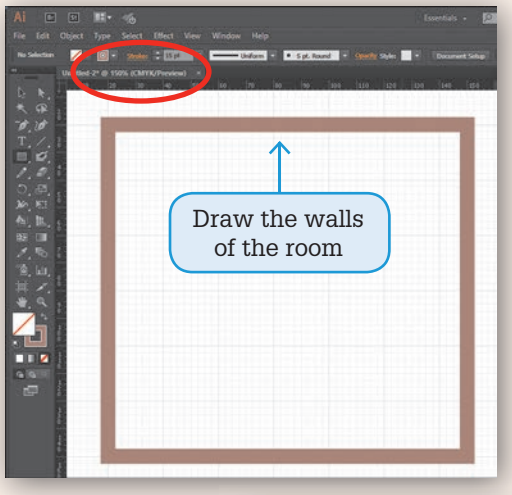
In this exercise you will create the following design of a conference room. The steps will guide you through the production of the design. Once the design is complete, save it and print a copy of it. Check the printout carefully, make any necessary adjustments and print a final copy if any changes were made.

**Skills practised**
- Drawing tools
- Fill and stroke colours
- Stroke weight
- Rulers and grid
- Placing objects
- Transforming objects

1 Start a new Adobe Illustrator document with the same settings as in Exercise 1.

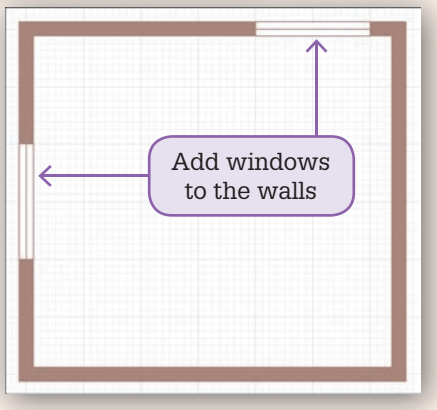
2 Use the **VIEW** menu to turn on **SHOW RULERS**, **SHOW GRID** and **SNAP TO GRID**.

3 Draw a rectangle 130 mm across and 120 mm down on the canvas then set the **FILL COLOUR** to **NONE**, the **STROKE COLOUR** to **LIGHT BROWN** and the **STROKE WEIGHT** to 15 pt.



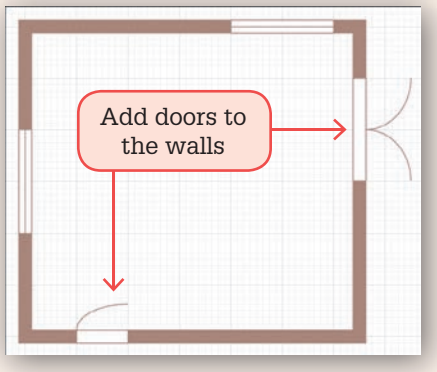

4 Deselect the rectangle by selecting **DESELECT** from the **SELECT** menu then draw two white filled rectangles to the left side of the first rectangle and to the top.

5 Drag a straight line through the two rectangles. These represent windows.




6 Add two white-filled rectangles to the right side of the first rectangle then draw two arcs from their intersection. These represent double doors.

7 Add another white-filled rectangle and arc to the bottom line of the first rectangle to represent another door.



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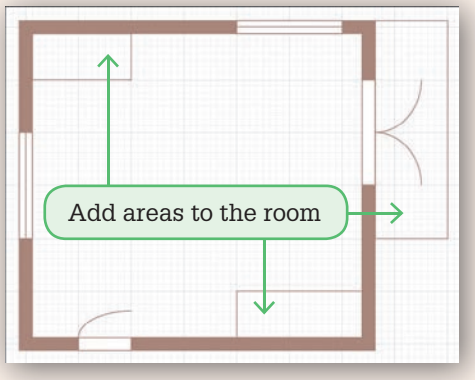
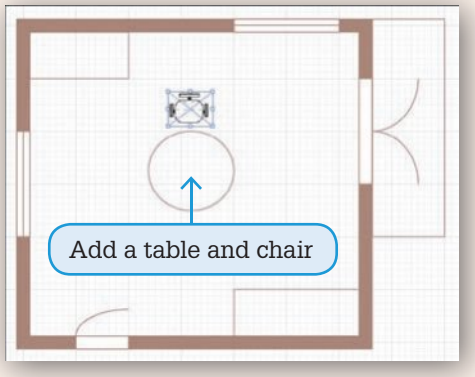
8 Add three unfilled rectangles to the top left and bottom right corners of the room, and outside the double doors. These represent specific areas of the conference room.

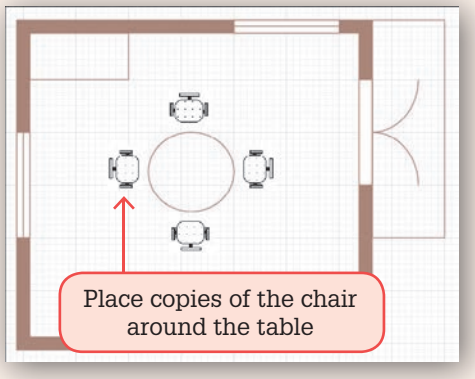



9 Use the **ELLIPSE TOOL** to draw a circle near the centre of the room. This is the conference room table.

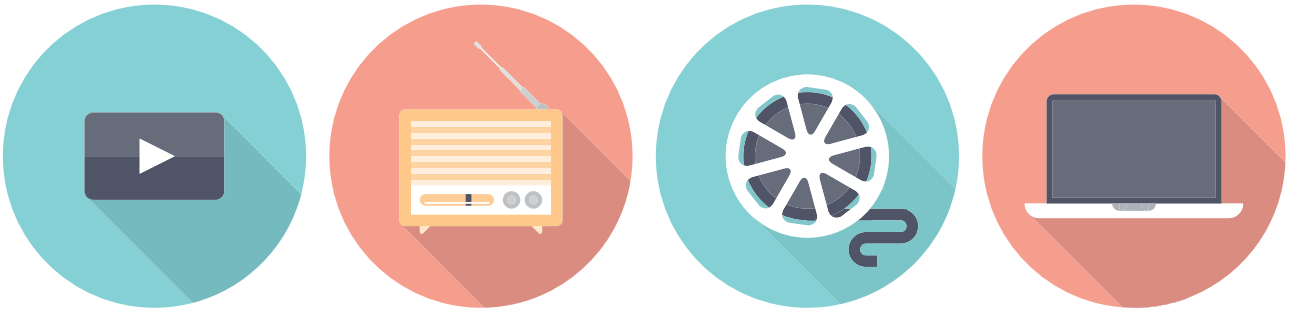
10 Display the **FILE** and select **PLACE**. Insert the **CHAIR** image from PIT2 Support Files and move it to the top of the table.




11 Make three copies of the chair, rotate one copy by 90°, the second by -90° and flip the third vertically using **TRANSFORM** from the **OBJECT** menu. Move the copies around the table.





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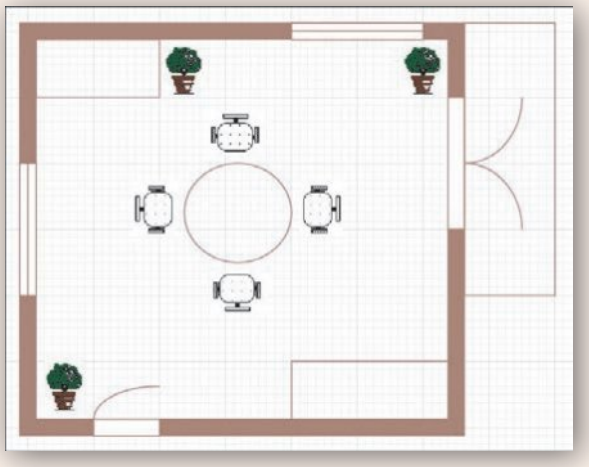
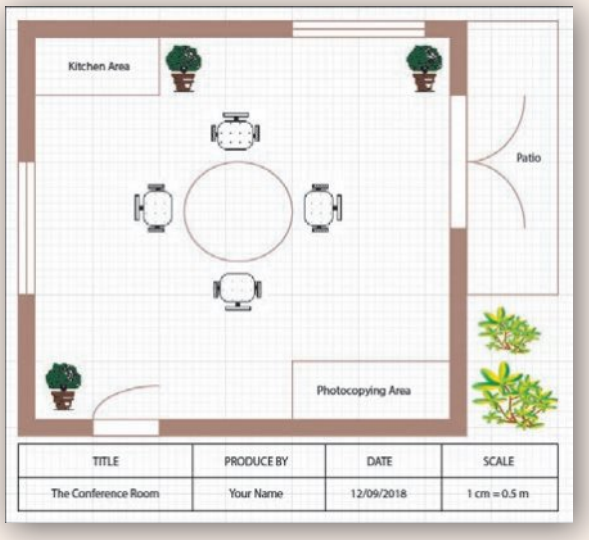
**12** Insert a pot plant from PIT2 Support Files. Make two copies of the plant and place them at corners of the room.



**13** Add labels to the three rectangles and produce an information table below the room.

**14** Add some plants symbols from the **NATURE** symbols library under the patio.

**15** Save the file in your storage folder under the name: Conference Room.






## 5.7 Using text in designs

Please see the Interactive Textbook for additional instructions and Exercise 7 on using text in designs in Illustrator.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# COMPUTER GRAPHICS PROJECT

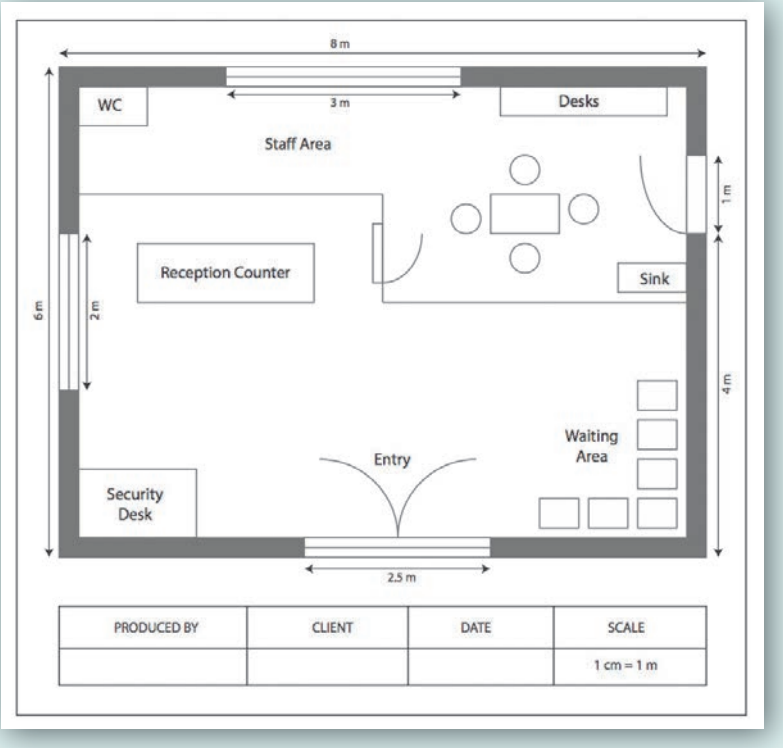
Friends of your family have asked you to develop a design for the backyard of their newly built house. The dimensions of the yard are 12 metres deep by 16 metres across. You are free to design the yard as you see fit, but they require a driveway to the double garage, which is under the house, a barbeque area, a play area for their children, a garden area and an area to dry clothes.

## Collecting the data

Collect any images and symbols you intend to use. You might also like to look at a few backyard designs on the internet or visit some backyards in your spare time to give you ideas.

## Defining the solution

Draw a mock-up (or layout) sketch on paper of the design you are going to create. Include on the sketch the scale that you will use for your design, where each component will be placed, the type of graphics that will be needed, what labels will be required, their font and size, and where the information table will be placed. The following diagram shows a mock-up diagram for a small business.




## Implementing

Use the vector-based graphics program to produce your design.

## Evaluating, collaborating and managing

1. Ask other people to look at your design and give you feedback on how effective it is. Describe what was said and the changes you made because of their comments.
2. What other changes did you make from your original design?
3. What are the advantages of producing a design using a vector-based graphics program?



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# Module 6

## PHOTO EDITING

Program featured for exercises:

**Adobe Photoshop**

Alternative exercises available for:

**Pixlr Editor**

Additional exercises available online for:

**Adobe Photoshop**



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# Teacher information

## IT knowledge and skills covered in this module

- Introducing photo editing
- Selecting parts of images
- Adjusting image sizing
- Saving files for the internet
- Repairing parts of photographs
- Using filters

## Suggested further uses across the curriculum

- Media Arts (for creating animations). Develop and refine media production skills to integrate and shape the technical and symbolic elements in images, sounds and text for a specific purpose, meaning and style (ACAMAM075).

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Literacy
- Numeracy
- Critical and creative thinking
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)





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# 6.1 Selecting parts of images

Photo editing programs allow you to accurately edit photos and they normally provide many tools to do this. These tools allow you to remove backgrounds, remove blemishes, improve skin tones, change eye colour, etc.

The following exercises have been prepared using Adobe Photoshop, which is the most common photo editing program. You will need access to the PIT2 Support Files, which can be downloaded from the Interactive Textbook or the Cambridge University Press website.

## Photo editing exercise 1

Mario has had his car for a few years now and he has decided it is time to update to a newer model. He intends to advertise the car on the internet. He has taken a photograph of the car, but he does not want the background to be so prominent.

**Skills practised**
- Quick selection tool
- Editing a selection
- Refining selections
- Naming layers
- Layer visibility
- Applying filters

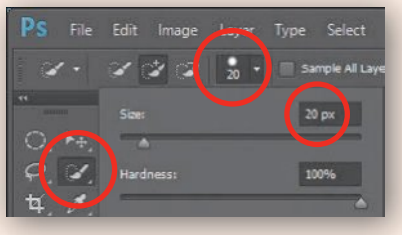
### *Selecting the car*

A selection will be placed around the car then the background will be altered.

1 Load Adobe Photoshop and select **OPEN** from the **FILE** menu or select the **OPEN** icon in the Welcome screen.

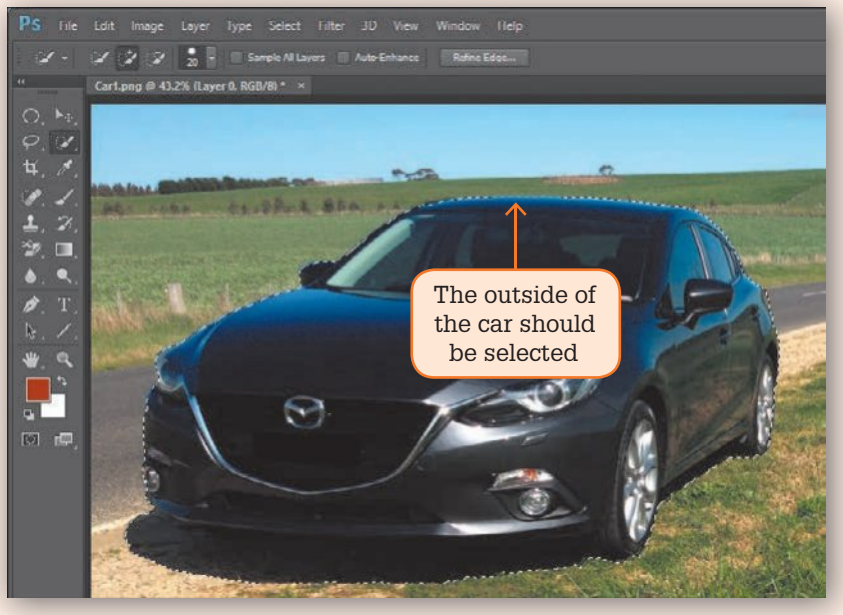
2 Access the PIT2 Support Files then open the Car 1 file. This is a photograph of Mario's car.

3 Select the **QUICK SELECTION TOOL** from the Tools panel at the left of the screen and, in the **OPTIONS BAR** across the top of the screen, click on the arrow next to the **BRUSH PICKER** box and set the brush **SIZE** to 20 px.




4 Click on the **BRUSH PICKER** box arrow again to set the brush size.

5 Set the view to **FIT IN WINDOW** (<Ctrl+0> or <Command+0>) and drag around the inside of the car until the whole car is selected.



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## *Refining the selection*

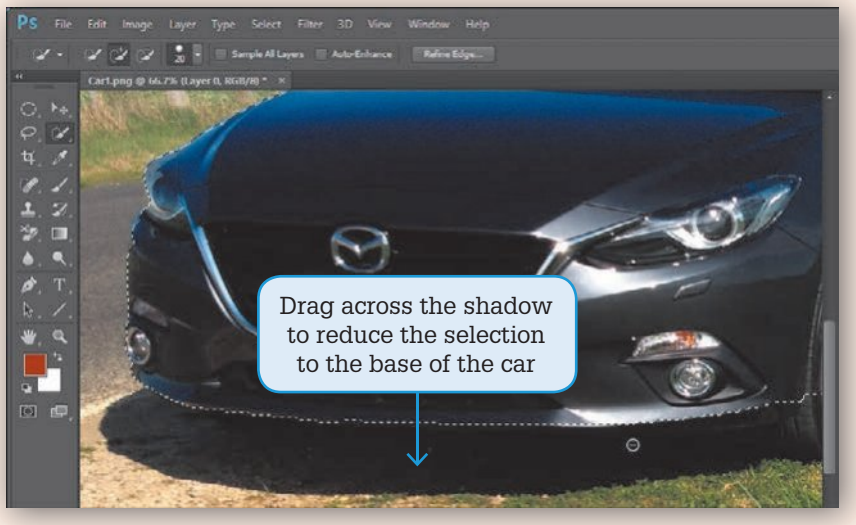
The **QUICK SELECTION TOOL** does a reasonable job of selecting the car, but it does have trouble when the colour of the background is close to the colour of the object being selected. In this case, that occurs with the shadows at the front and side of the car. The selection can be refined.

1 Press <Ctrl+> on the Windows system or <Command+> on the Mac system a couple of times to zoom in on the car.

2 Scroll to the front of the car where part of the background has been included in the selection.

3 Press the **OPEN SQUARE BRACKET** key ([) a few times to reduce the Brush Size to 5 px.

4 Hold down the <Alt> or <Option> key and drag the cursor in the background area that has been included in the selection to reduce the selection.




5 Release the <Alt> or <Option> key and click the + marker in any areas of the car that have not been included in the selection.

6 Scroll around the rest of the car and repair any parts of the selection that are not close to the edge of the car. You keep the <Alt> or <Option> depressed when you want to reduce the selection and drag normally when you want to add to the selection. You can zoom in on one area of the car to make the selection easier.

Note: The selection does not need to be perfect, just close to the outline of the car. You can increase the **BRUSH SIZE** when needed by pressing the ] key and you can use **STEP BACKWARD** from the **EDIT** menu to remove steps that you are not happy with.

7 Once you are happy with the selection, press <Ctrl+0> or <Command+0> to set the view to **FIT ON SCREEN** so the whole car is in view.



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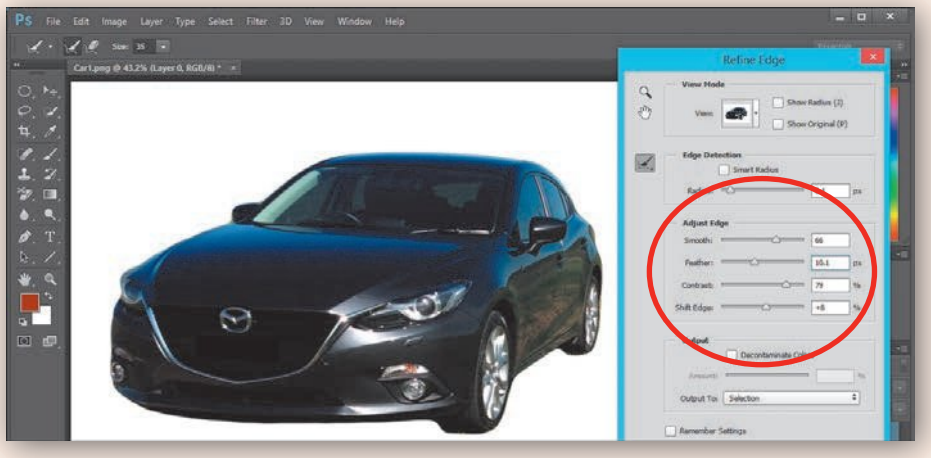
## Refining the edges

To complete the selection you can refine the edges of the selection to give it a more professional look.

1 Click on the **SELECT AND MASK** button in the **OPTIONS BAR** and set the **VIEW** box in the Select and Mask dialogue box to **ON WHITE** with a 100% **OPACITY**.

2 Adjust the **RADIUS**, **CONTRAST**, **SMOOTH** and **SHIFT EDGE** settings to improve the look of the selection.

3 Increase the **FEATHER** to about 10 px to soften the edges of the selection.






4 You can look at different previews of the selection by clicking on the **VIEW BOX** arrow at the top of the **REFINE EDGE** dialogue box then return the **VIEW** to **MARCHING ANTS**.

5 Once you are happy with the settings, select **OK**.

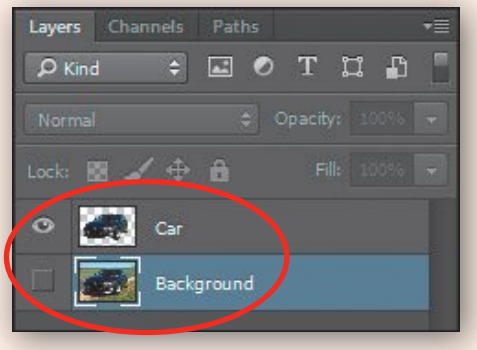
## Copying the car to another layer

The car needs to be placed in a separate layer so that the background can be altered without affecting the car.

1 Display the **LAYER** menu, highlight **NEW** and select **LAYER VIA COPY**. A new layer is created with just the car in it.

2 Double click on the **LAYER 1** label in the Layers panel and rename it 'Car', then rename **LAYER 0** to 'Background'.

3 Turn the background layer off by clicking on its **VISIBILITY** box so that just the car is visible on a transparent background.

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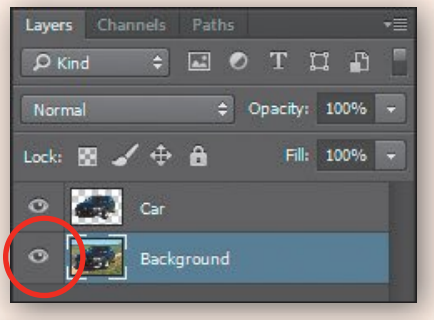
## *Altering the background*

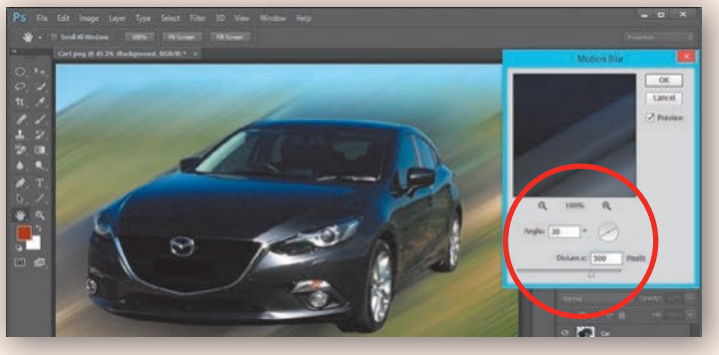
In Photoshop each layer is a separate entity and must be selected if you need to make changes to objects in that layer.

1 Click on the **BACKGROUND** layer to make it active and click on its **VIEW** box to turn its view back on.

2 Display the **FILTER** menu, highlight **BLUR** and select **MOTION BLUR**.




3 Set the **ANGLE** box to 30° and move the **DISTANCE** slider until you get the effect that you like. About 500 pixels should produce the effect of the car moving.



4 Select **OK** to accept the change. You can experiment with other background effects if you wish. For example, **FILTER** – **BLUR** – **GAUSSIAN BLUR**.

5 Display the **FILE** menu and select **SAVE**. In the **SAVE AS TYPE** (or **FORMAT**) box set the image format to a Photoshop .PSD file and call the file: Car selected.

6 Select **OK** and you will be asked whether to Maximize the Compatibility. Select **OK** to save the file.

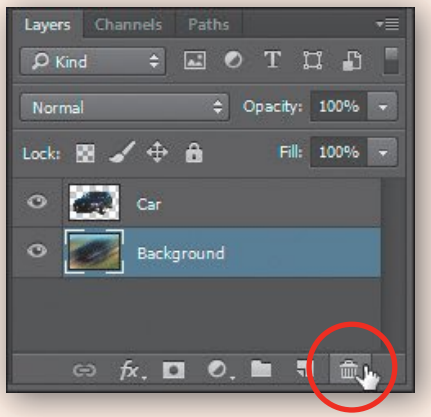
## *Displaying just the car*

Perhaps Mario would prefer no background at all behind the car. As the car is in its own layer this is easy to achieve.

1 Select the **BACKGROUND** layer in the **LAYERS** panel and click on the **DELETE LAYER** icon to delete it.

2 Click on **YES** in the warning dialogue box to remove the background.

3 Use **SAVE AS** from the **FILE** menu to save the image as a Photoshop .PSD file in your storage folder under the file name: Car only.



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# 6.2 Adjusting image sizes

The image that has been created is quite large. If Mario intends to place the image on the internet, it needs to be made significantly smaller.

## Photo editing exercise 2

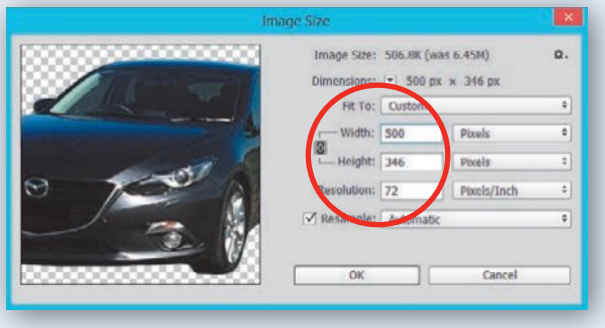
**Skills practised**
- Image size
- Aspect ratio

1 With the Car only file open, display the **IMAGE** menu and select **IMAGE SIZE**.

2 Set the **WIDTH** to 500 pixels and the **HEIGHT** should adjust accordingly. If it doesn't, turn on **CONSTRAIN ASPECT RATIO** icon connected to the **WIDTH** and **HEIGHT** labels.

3 Select **OK** and the image will be resized.

4 Use **SAVE AS** from the **FILE** menu to save the image as a Photoshop .PSD file in your storage folder under the file name: Car smaller.






# 6.3 Saving files for the web

When placing images on a website, you want the image size to be as small as possible. Photoshop allows you to save the file in a format that has the highest quality at the lowest file size.

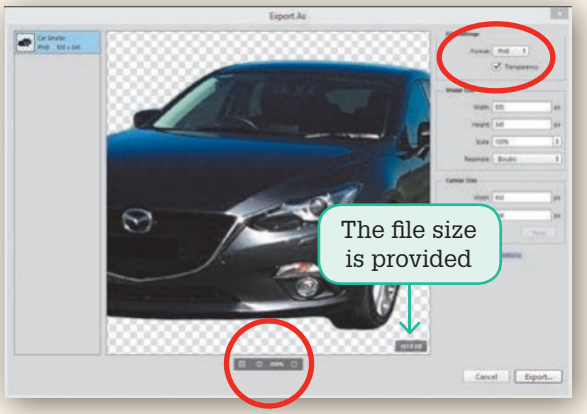
## Photo editing exercise 3

**Skills practised**
- File formats
- Image quality
- Image size

1 With the Car smaller file open, display the **FILE** menu, highlight **EXPORT** and select **EXPORT AS**. Earlier versions of Photoshop have **SAVE FOR WEB** in the **FILE** menu.

2 Set the **ZOOM** at the bottom left of the window to 200% so that the car can be clearly seen and scroll so that most of the car is visible.

3 The file was saved as a PNG file, so those settings are displayed. The **FILE SIZE** of the image is displayed in the **FILE** name at the left of the dialogue box and it is about 150K. This is a little larger than you would want on a webpage that has a few images.

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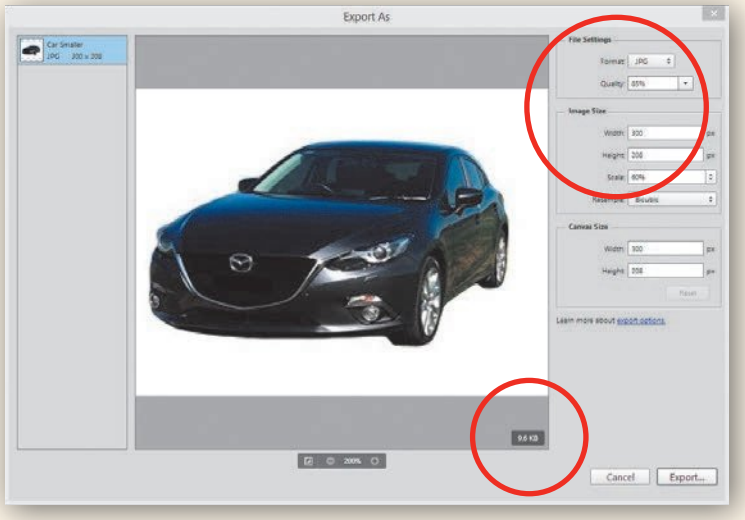
4 Try changing the **FORMAT** to JPG and the **QUALITY** to 70%. This reduces the file size to about 15 K.

5 Another way to reduce the file size is to reduce the size of the image. Reduce the **WIDTH** to 300 px and the **HEIGHT** will be reduce accordingly.

6 Increase the **QUALITY** to 85% and the file size should still be around 10 K.

Note: JPG files have a white background and this is sometimes not desired on a website.




7 Try some of the other formats and select the one you think provides the best quality at the lowest file size.

8 Click on the **EXPORT** button and save the file in your storage folder as: Car reduced.

# 6.4 Repairing parts of photographs



Sometimes there are small blemishes over parts of a photograph or image that you wish to repair. For example, you might want to cover a freckle or bruise on a photograph of a person, or remove scratches from the paintwork of a car. Photo editing programs provide many tools to do this. We will look at two here: the spot healing brush tool and the healing brush tool.

## Photo editing exercise 4

### *The spot healing brush tool*

**Skills practised**
- Editing images
- Spot healing brush
- Healing brush

The spot healing brush tool is a quick way to replace blemishes with areas from close to the problem area.

1 Load Photoshop and select **OPEN** from the **FILE** menu. Access the PIT2 Support Files and then open the Car 2 photo.

2 Notice that there appears to be a white scratch along the rear of the car near the fuel cap (it is actually a reflection). Let's remove it to avoid confusion.

3 Select the **SPOT HEALING BRUSH TOOL** from the Tools panel.

4 In the **OPTIONS** bar set the **BRUSH SIZE** to about 20 px and the **HARDNESS** to 100%, then set the Zoom to 200% by pressing `<Ctrl+>` or `<Command+>` and scroll so that the fuel cap of the car is in view.

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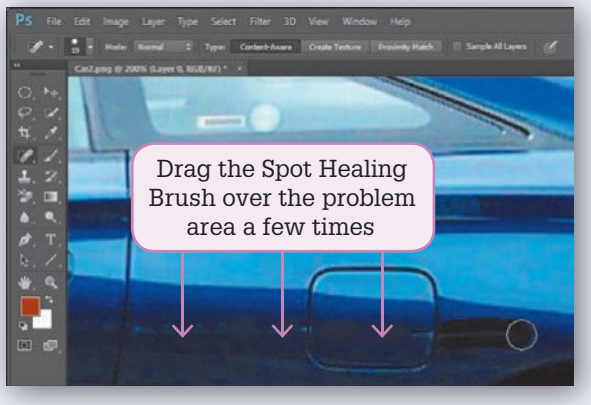
5 Drag the **SPOT HEALING BRUSH** across the white lines a few times to remove them.

Note: You can increase or decrease the Brush Size using keyboard shortcuts. Press the Close Square Bracket key <]> to increase the size of the brush. Press the Open Square Bracket key <[> to decrease the size of the brush.




6 Press <Ctrl+0> or <Command+0> to return the view to **FIT ON SCREEN** to see the effect of the adjustment.

7 Save the file in your storage folder if you wish to then close the file.

## *The healing brush tool*

The healing brush tool is more accurate for repairing images because you select the sample area to be applied to the blemish, so if the spot healing brush tool does not do an adequate job, the healing brush tool can be used.

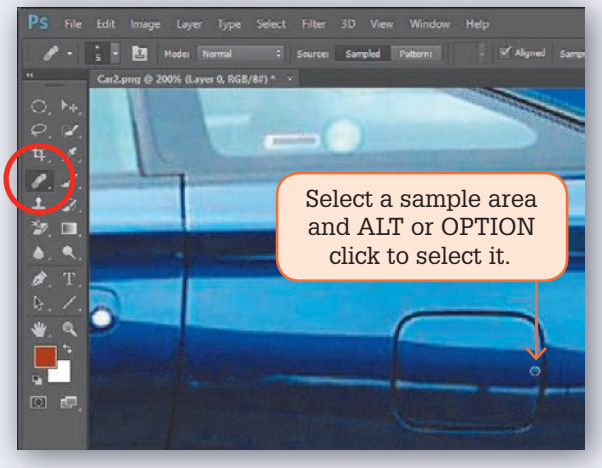
1 Reload the Car 2 file from the PIT2 Support Files.

2 Zoom to 200% and scroll to the fuel tank cap.

3 Select the **HEALING BRUSH TOOL** from the Tools panel – it is within the **SPOT HEALING BRUSH TOOL**.

4 Press the [ key until the brush size is reduced to about 5 px.

5 Move the point to the dark blue area above the white in the fuel cap, hold down the <Alt> or <Option> key and click the mouse button to select that area.

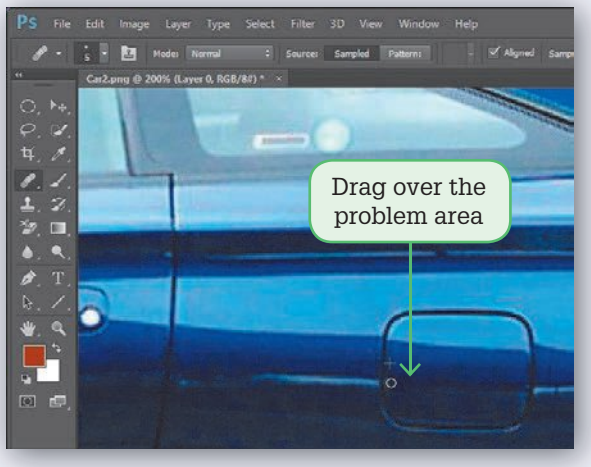



6 Release the <Alt> or <Option> key and drag over the white in the fuel cap. The + marker shows you the area of the images that is replacing the problem area

7 You can <Alt> or <Option> click on a new sample area if you wish to or simply drag over the white areas on either side of the fuel tank.

8 Press <Ctrl+0> or <Command+0> to return the view to **FIT ON SCREEN** to see the effect of the adjustment.

9 Save the file in your storage folder if you wish to then close the file.



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# Photo editing exercise 5

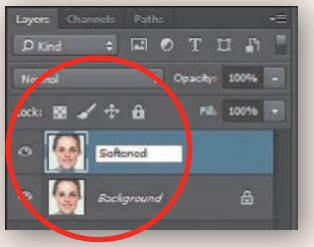
## *Enhancing skin complexion*

**Skills practised**
- Duplicating layers
- Applying filters
- Spot healing brush

The skin complexion in a photo can be enhanced to reduce blemishes and spots so that the skin looks smooth.

1 Open the Face image from the PIT2 Support Files.

2 A duplicate of the layer will be made so that major changes can be made to the copy without affecting the original image. Press <Ctrl+J> or <Command+J> to duplicate the background layer.




3 Double click on the new layer label in the **LAYERS** panel and change its name to 'Softened'.

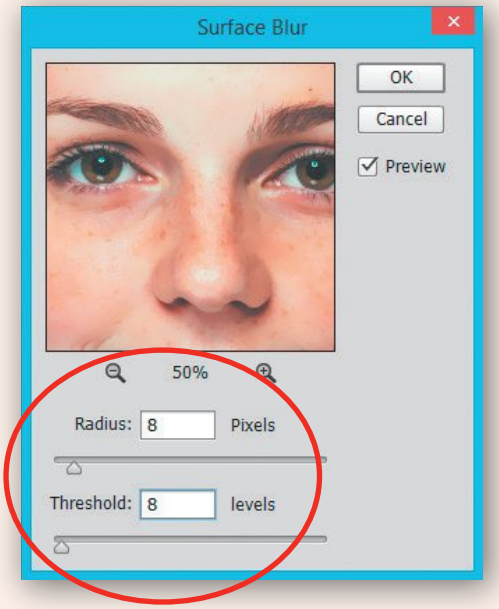
Note: You can also select **DUPLICATE LAYER** from the Layer menu to duplicate the layer.

4 The duplicated layer will be blurred to give the skin a softer, more even look. After this, sections of the image such as the eyes and mouth can be sharpened.

5 Display the **FILTER** menu, highlight **BLUR** and select **SURFACE BLUR**.

6 Click on the **ZOOM OUT** icon to reduce the view to 50% so that you can see most of the face then set the **RADIUS** to about 8 pixels and the **THRESHOLD** to 8.

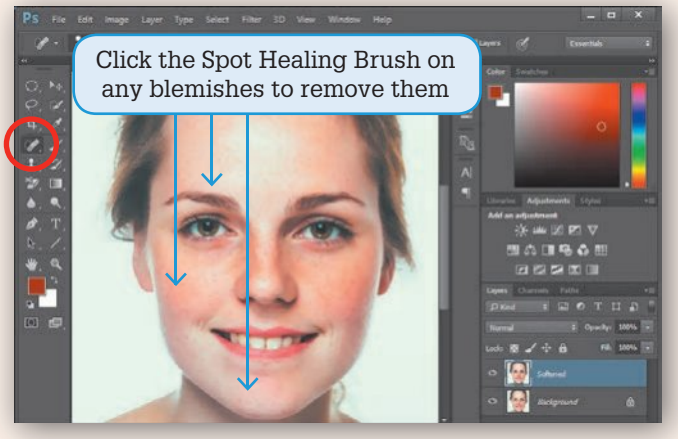
Note: In the **PREVIEW** box you can scroll the picture around. Click and hold on the image in the **PREVIEW** box and the original image is displayed. When you release the mouse button the effect of the blur is shown.




7 Select **OK** and the tone of the skin should look softer and smoother.

8 Select the **SPOT HEALING BRUSH TOOL** from the Tools panel and click on any blemishes on the face to remove them.

Note: If the blurring is too artificial, you can reduce the Opacity of the Softened layer so that a little of the Background layer is seen through it. The **OPACITY** box is at the top right of the Layers panel.




9 You can turn the visibility of the softened layer off to see the original image then turn the view back on.

10 Save the image in your storage folder as a Photoshop file under the name: Face.



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# Photo editing exercise 6

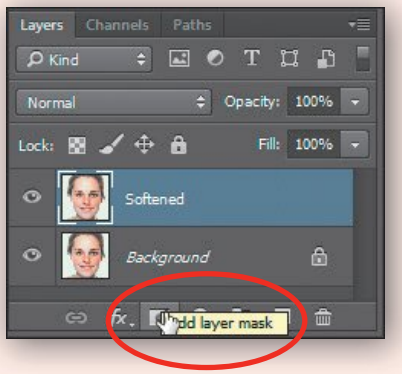
## *Sharpening facial features*

Painting on a transparent mask to display the original features through the blurred layer can highlight important parts of the face such as the eyes, eyebrows, mouth and hair.

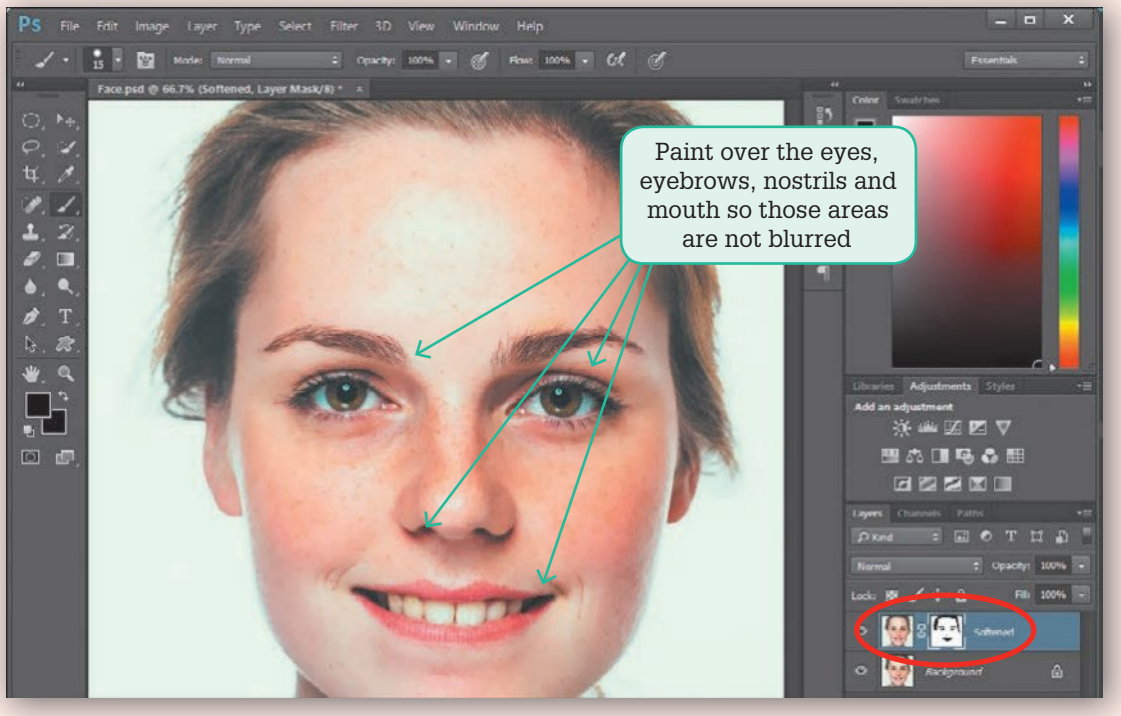
**Skills practised**
- Layer masks
- Painting a mask

1 With the Face image open, select the **SOFTENED** layer and click on the **ADD LAYER MASK** icon at the base of the Layers panel to add a mask to it.

2 Select the **BRUSH TOOL** from the Tools panel and, in the options bar, select a 15 px brush and **NORMAL** mode.




3 Set the **FOREGROUND COLOUR** to black, paint over the eyes, eyelids, mouth, nostrils and hair and those parts of the image from the background layer will become visible hence look a little brighter.




Note: By blurring the image we have set the skin tones to look more consistent and then sharpened the important parts of the image. You should see the areas you painted in the Mask thumbnail box next to the Softened layer.



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# Photo editing exercise 7

## *Whitening the eyes and teeth*

**Skills practised**
- Duplicating layers
- Deleting a mask
- Lasso tool
- Feathering
- Colour saturation

You can improve an image by making the whites of the eyes and the teeth a little whiter.

1 Zoom in on the eyes and mouth.

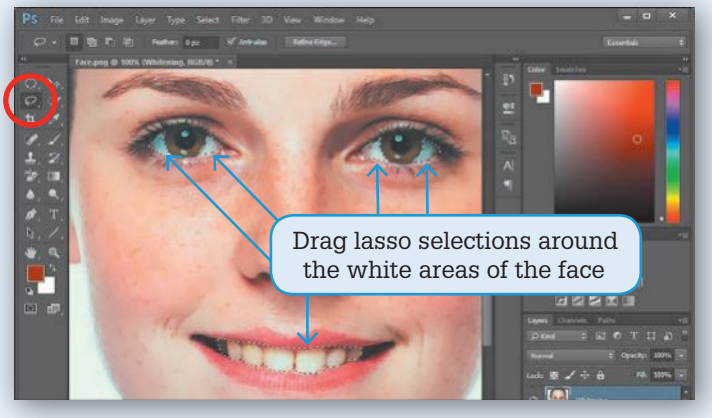
2 Press <Ctrl+J> or <Command+J> to duplicate the Softened layer then click on the duplicated mask box and click on the **DELETE** icon at the base of the Layers panel followed by **DELETE** to remove it.

3 Rename the new layer 'Whitening'.


4 Select the **LASSO TOOL** from the Tools panel and drag a selection around the white area at the left of the left eye.

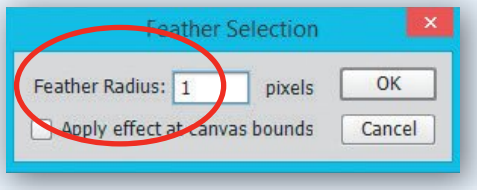
5 Hold down the <Shift> key and drag selections around the other white areas of the eyes and around the teeth.

Note: If you make a mistake with a selection, press <Ctrl+Z> or <Command+Z> to undo the selection and try again.



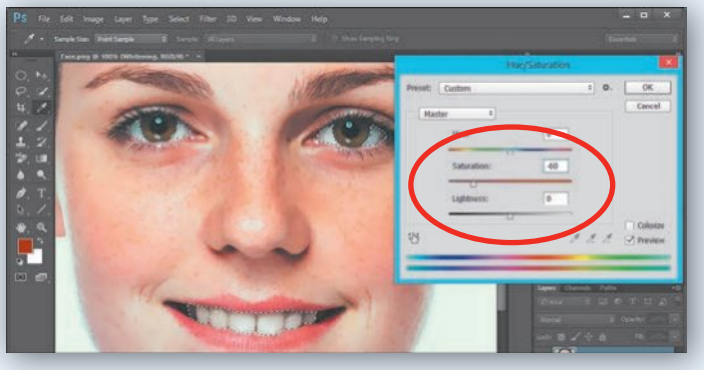

6 The selections can be feathered to smooth the effect. Display the Select menu, highlight **MODIFY** and select **FEATHER**.

7 Set the **FEATHER RADIUS** to 1 px and select **OK**.




8 Display the **IMAGE** menu, highlight **ADJUSTMENTS** and select **HUE/ SATURATION**.

9 The colour (hue) does not need to be changed, just the **SATURATION**, so set the **SATURATION** bar to –60 and select **OK**.



10 Press <Ctrl+0> or <Command+0> to return the view to **FIT ON SCREEN** and press <Ctrl+D> or <Command+D> to deselect the parts of the image that are selected.



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# Photo editing exercise 8

## *Changing eye colour*

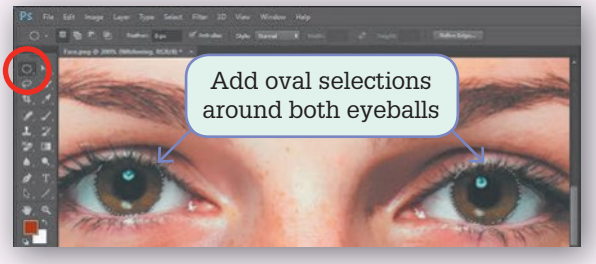
The eye colour can be enhanced or completely altered.

**Skills practised**
- Copying a layer
- Elliptical Marquee tool
- Colour hue
- Colour saturation

1 Zoom in on the eyes by pressing <Ctrl+> or <Command+>.

2 Select the **ELLIPTICAL MARQUEE TOOL** from the Tools panel and drag an oval around the left eyeball.

Note: It doesn't matter that part of the eyelashes are included in the selection.

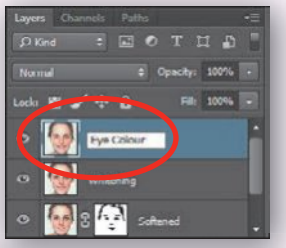



3 Hold down the <Shift> key and drag another oval around the right eyeball.

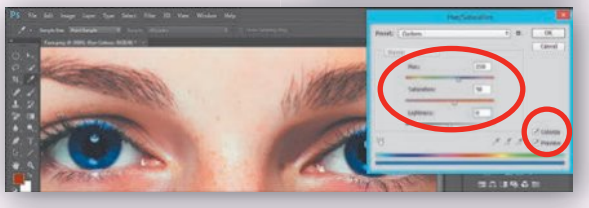
4 Display the **LAYER** menu, highlight **NEW** and select **LAYER VIA COPY** to place the eyeballs selections in a separate layer.

5 Rename the new layer 'Eye colour'.

6 Display the **IMAGE** menu, highlight **ADJUSTMENTS** and select **HUE/SATURATION**.

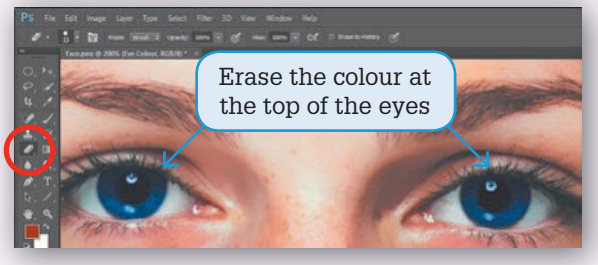


7 Turn on the **COLOURIZE** box and adjust the **HUE** and **SATURATION** bars to create the eye colour that you want then select **OK**.



8 Part of the eye colour is overlapping the eyelashes. To remove this, select the **ERASER TOOL** from the Tools panel and erase the part of the eye colour that overlaps the eyelashes.

Note: The eyelashes won't be removed when you erase part of the eye colour because the erase part is visible from other layers.




9 Press <Ctrl+0> or <Command+0> to return the view to **FIT ON SCREEN** and resave the image.



# 6.5 Using filters

Photoshop provides a range of filters that can be used to enhance photographs or create backdrops such as clouds, oceans and walls. To illustrate this a brick wall will be created and some graffiti added to it.

Please see the Interactive Textbook for an additional four exercises on using filters in Photoshop.

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# PHOTO EDITING PROJECT

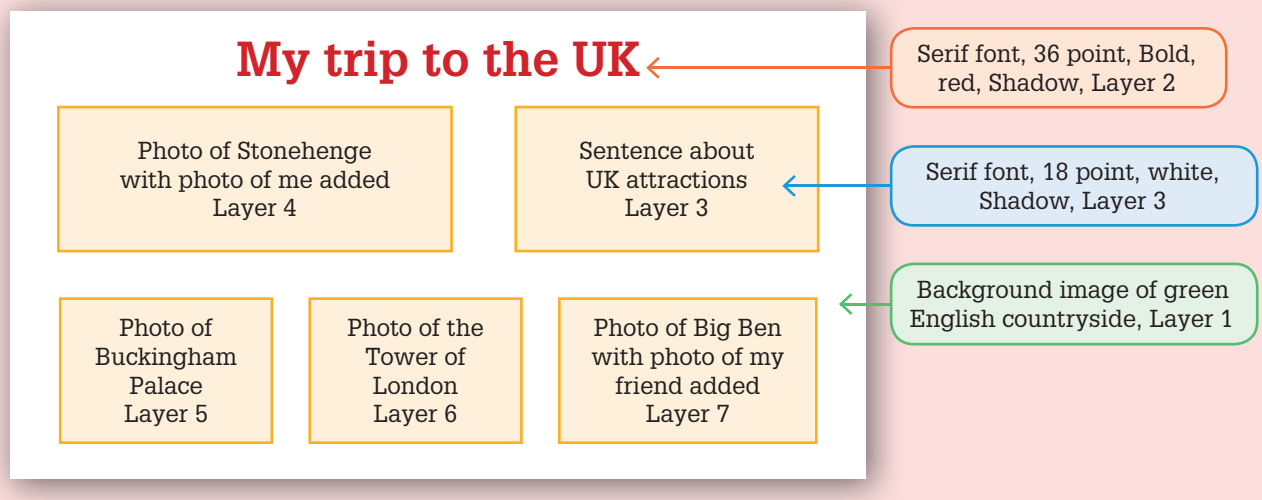
Your task for this project is to create a collage of a series of photos on a topic of your choice. Some examples of the topic might be: My family; My favourite car; My autobiography; My school; My favourite pop group; My favourite country.

## Collecting the data

Have your topic approved by your teacher and collect or take photos related to the topic. A maximum of six photos should suffice.

## Defining the solution

Draw a mock-up (or layout) sketch on paper of the collage you are going to create. Include on the sketch where each photo will be placed, the text that you are going to include and any other effects that you are going to use. You can select a photo of yourself or a friend and add them to some of the photos. The following diagram can be used as an example.




## Implementing

Use the photo editing program to make any enhancements and repairs to photos you have chosen. Select parts of photos to be added to other photos; for example, you can add yourself or friends to some photos. Add some text, text effects and shapes if you wish to.

## Evaluating, collaborating and managing

1. Ask other people to look at your design and give you feedback on how effective it is. Describe what was said and the changes you made to your design because of their comments.
2. Indicate what enhancements and adjustments you made to each photo and what Photoshop tools you used. Comment on the effectiveness of these tools.



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# Module 7

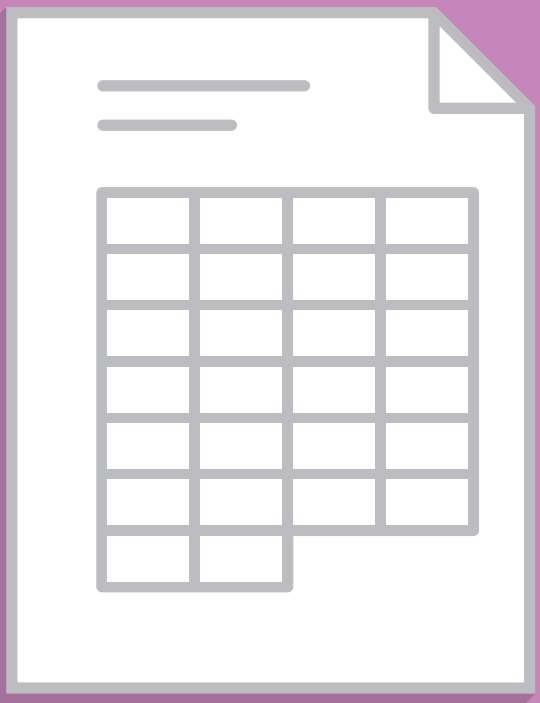
## SPREADSHEETS

Programs featured for exercises:

**Microsoft Excel**
**Google Sheets**

Additional exercises available online for:

**Microsoft Excel**
**Google Sheets**





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# Teacher information

## IT knowledge and skills covered in this module

- Reviewing spreadsheet use
- Working with multiple worksheets
- Working with lists and sorting
- Using the subtotal
- Filtering and function types
- Pivot tables

## Suggested further uses across the curriculum

- Mathematics (for a range of applications across the maths curriculum).
- Economics and Business (for organising data). Gather relevant and reliable data and information from a range of digital, online and print sources (ACHES056).
- Civics and Citizenship (organising information). Identify, gather and sort information and ideas from a range of sources and reference as appropriate (ACHCS096).

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Literacy
- Numeracy
- Critical and creative thinking
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)
- Evaluate critically how student solutions and existing information systems and policies, take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)





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# 7.1 Reviewing spreadsheets

A spreadsheet is an application that is used to organise and manipulate data. A spreadsheet is divided into columns and rows, enabling data to be organised in a systematic manner.

The columns and rows create cells that are used to store data and formula.

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Hi Fi Buy Stores Australia Ltd | | | | | | |
| 2 | Inventory - Hardware department | | | | | | |
| 3 | | | | | | | |
| 4 | **Name** | **Code** | **Supplier** | **Cost** | **No on Hand** | **Value** | **Retail Price** |
| 5 | MP3 Player | ACD10AS | Akai | $ 80 | 6 | $ 480 | $ 120 |
| 6 | MP3 Player | TCD10AS | TEAC | $ 69 | 9 | $ 621 | $ 104 |
| 7 | MP3 Radio | PCRC50W | Panasonic | $ 143 | 5 | $ 715 | $ 215 |
| 8 | MP3 Radio | PCRC130W | Panasonic | $ 210 | 2 | $ 420 | $ 315 |
| 9 | MP3 Radio | SHCRC12W | Sharp | $ 157 | 7 | $ 1,099 | $ 236 |
| 10 | MP3 Radio | SCRC90W | Sony | $ 114 | 4 | $ 456 | $ 171 |
| 11 | MP3 Radio | SCRC3B | Sony | $ 163 | 5 | $ 815 | $ 245 |
| 12 | MP3 Player | SCDWDIG | Sony | $ 123 | 3 | $ 369 | $ 185 |
| 13 | Clock Radio | SCRAMFM | Sony | $ 25 | 8 | $ 200 | $ 38 |
| 14 | Clock Radio | SCRDIG | Sony | $ 129 | 5 | $ 645 | $ 194 |
| 15 | Micro System | SHMC55W | Sharp | $ 165 | 5 | $ 825 | $ 248 |
| 16 | Micro System | TMCR5W | TEAC | $ 110 | 15 | $ 1,650 | $ 165 |
| 17 | | SHMNS20W | Sharp | $ 150 | 12 | $ 1,800 | $ 225 |
| 18 | Mini System | SHMNS180W | Sharp | $ 422 | | 54 | $ 633 |
| 19 | Mini System | SMNS40W | Sony | $ 583 | | 49 | $ 875 |
| 20 | Digital Radio | SRWDIG | Sony | $ 52 | 10 | $ 520 | $ 78 |
| 21 | | | | | Total Hardware Inventory | $ 15,318 | |

Sorted items

Function to calculate total

A spreadsheet can be used to:

- list, sort and filter data
- make calculations with functions
- link data from one sheet or file to another.

While all these tasks can be performed by hand on paper, it is much quicker to use a computerised spreadsheet because the formulae are automatically recalculated each time new data is entered or changed.



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# 7.2 Working with multiple worksheets

Microsoft Excel enables you to create several worksheets in one file. The data on these worksheets can be linked together through a formula. For example, daily orders entered on one sheet per day can be summarised in another sheet.

## Spreadsheets exercise 1

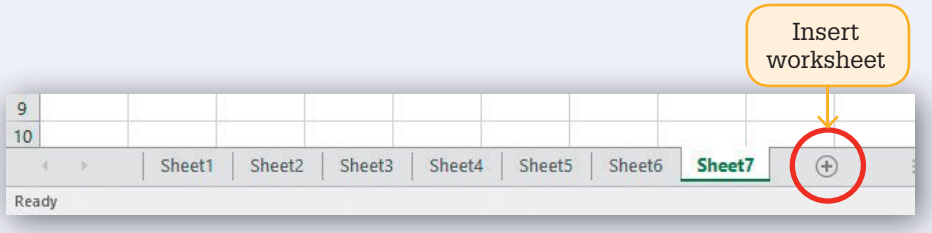
### *Reviewing spreadsheets I*

**Skills practised**
- New file
- Entering data
- Inserting worksheet
- Selecting a range of worksheets
- Entering formula
- Linking worksheets

1 Create a **NEW** spreadsheet file – known as a workbook in Microsoft Excel. You will need seven worksheets for this exercise. Microsoft Excel is sometimes set to start each new workbook file with only one or a few worksheets.

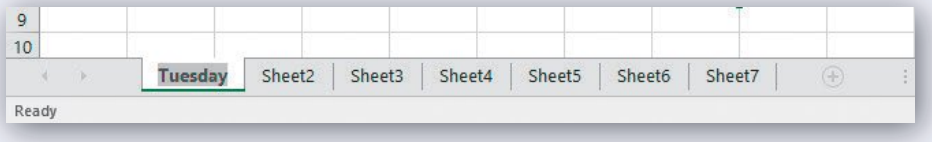
2 If you need to insert more worksheets, click on the **INSERT WORKSHEET** button to the right of the sheet tabs, repeat until you have seven worksheets in the file.

For Google Sheets, skip to step 7.

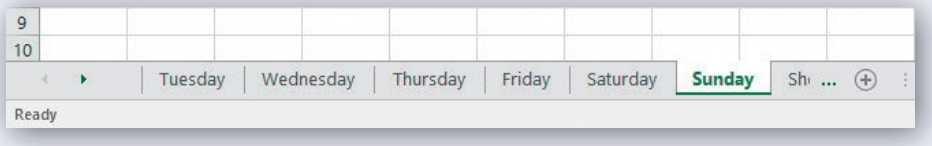



3 Double click on the name of the first worksheet so it is highlighted as shown below.

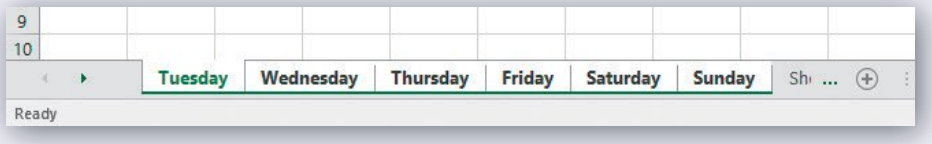
4 Type Tuesday then press <Enter>.




5 Repeat to rename each of the sheets for the days of the week – except Monday – when they are closed.




6 Click on the first worksheet, hold down the <Shift> key and click on the sixth worksheet so the first six worksheets are selected.



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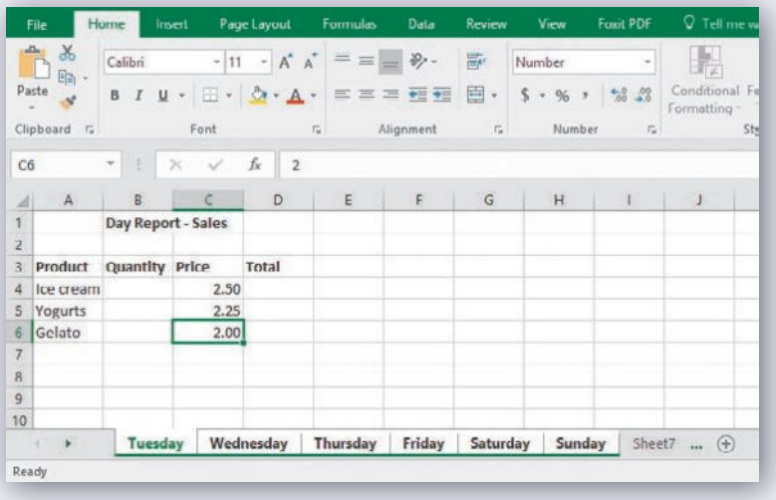
**7** Enter the following text and data, which will be entered on all worksheets because they are selected.

For Google Sheets, enter the data on the following page on the first sheet then click on the arrow and click on **DUPLICATE** six times. Click back on the first sheet and the arrow and click on **RENAME** then type the new worksheet name. Continue to rename all the sheets.



| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | Day Report - Sales | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | Product | Quantity | Price | Total | | | | | | |
| 4 | Ice cream | | 2.50 | | | | | | | |
| 5 | Yogurts | | 2.25 | | | | | | | |
| 6 | Gelato | | 2.00 | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday | Sheet7

Ready

**8** Click on the last worksheet to deselect all the sheets.

**9** Click on each worksheet and enter the following data in the Quantity column for each day's sales.

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | Day Report - Sales | | |
| 2 | | | | |
| 3 | Product | Quantity | Price | Total |
| 4 | Ice cream | 152 | 2.50 | |
| 5 | Yogurts | 198 | 2.25 | |
| 6 | Gelato | 215 | 2.00 | |
| 7 | | | | |

Tuesday | Wednesd

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | Day Report - Sales | | |
| 2 | | | | |
| 3 | Product | Quantity | Price | Total |
| 4 | Ice cream | 163 | 2.50 | |
| 5 | Yogurts | 204 | 2.25 | |
| 6 | Gelato | 201 | 2.00 | |
| 7 | | | | |

Wednesday | Thursday

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | Day Report - Sales | | |
| 2 | | | | |
| 3 | Product | Quantity | Price | Total |
| 4 | Ice cream | 234 | 2.50 | |
| 5 | Yogurts | 187 | 2.25 | |
| 6 | Gelato | 188 | 2.00 | |
| 7 | | | | |

Thursday | Friday | Satu

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | Day Report - Sales | | |
| 2 | | | | |
| 3 | Product | Quantity | Price | Total |
| 4 | Ice cream | 265 | 2.50 | |
| 5 | Yogurts | 206 | 2.25 | |
| 6 | Gelato | 95 | 2.00 | |
| 7 | | | | |

Thursday | Friday | Satu

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | Day Report - Sales | | |
| 2 | | | | |
| 3 | Product | Quantity | Price | Total |
| 4 | Ice cream | 425 | 2.50 | |
| 5 | Yogurts | 432 | 2.25 | |
| 6 | Gelato | 265 | 2.00 | |
| 7 | | | | |

Saturday | Sunday | She

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | Day Report - Sales | | |
| 2 | | | | |
| 3 | Product | Quantity | Price | Total |
| 4 | Ice cream | 589 | 2.50 | |
| 5 | Yogurts | 542 | 2.25 | |
| 6 | Gelato | 312 | 2.00 | |
| 7 | | | | |

Saturday | Sunday | She



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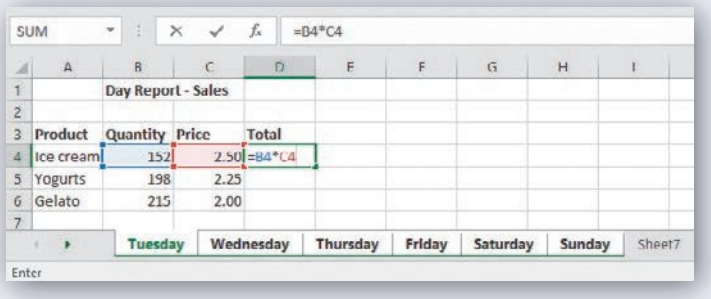
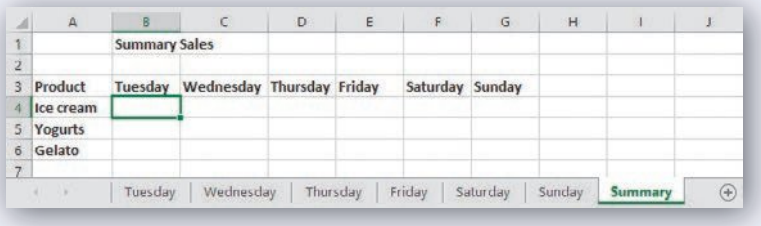
**10** Click on the first worksheet (Tuesday), hold down the <Shift> key and click on the sixth worksheet (Sunday) so the first six worksheets are selected.

For Google Sheets, you will have to enter the formula on each sheet separately.

**11** Enter a formula in the Total column to calculate the sales of each type of item for each day. The formula will be entered on each worksheet because they are all selected. This is a very quick way to enter formulas and data. It only works if the structure of the table is the same on each selected sheet.

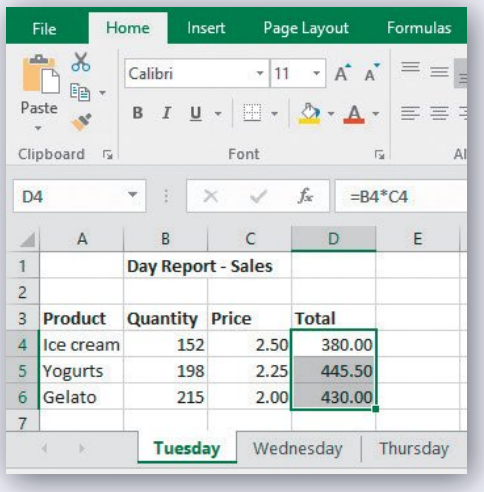



**12** Now to create a summary to calculate total sales for the week. Click on the seventh worksheet and name it 'Summary', then enter the following text to create a summary sheet.




**13** Now to add the sales from each day to create a summary figure for the week. Click back on the first sheet and highlight the **TOTAL** figures for the day then click on the **COPY** button on the Home tab.

For Google Sheets, click on **EDIT** then **COPY**.



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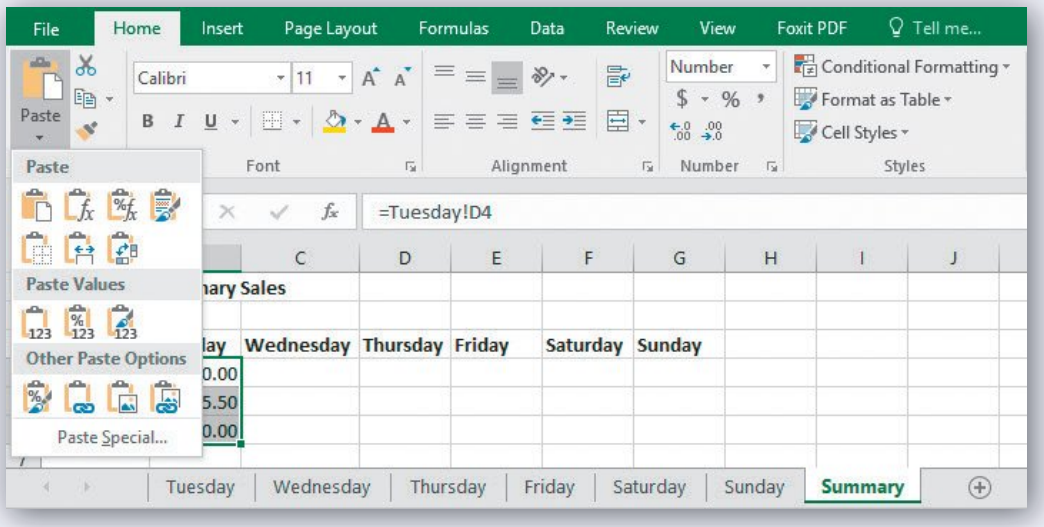
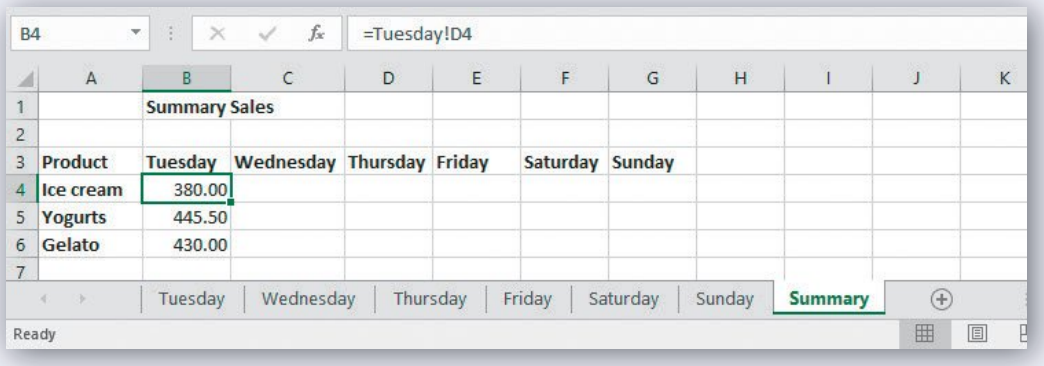
**14** Click on the 'Summary' worksheet and click on the cell B4 then click on the **PASTE** droplist button.

For Google Sheets, click on **PASTE** – you cannot link in Google Sheets.

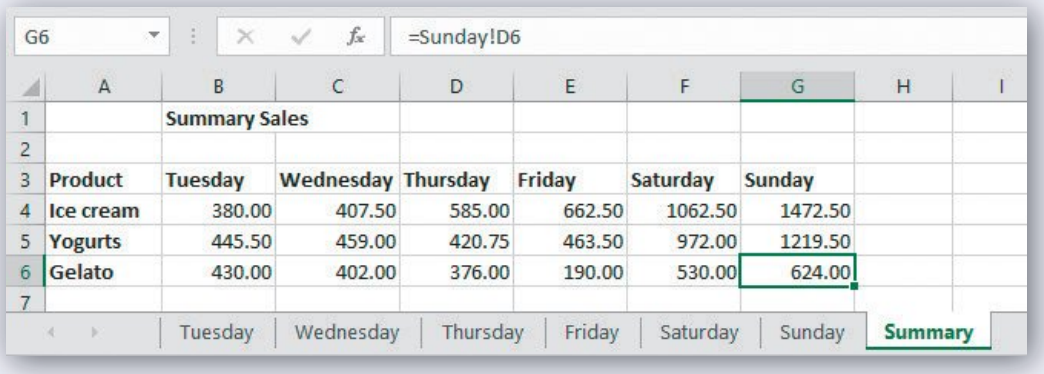
**15** Click on the **PASTE LINK** option. This will enter data from the 'Tuesday' sheet into the 'Summary' sheet. If any changes are made on the Tuesday sales they will also feed through to the summary.




**16** Click on the second sheet and repeat steps 13, 14 and 15, then repeat again for the third sheet and so on until all the days' figures are copied over. The results are shown below.

**17** Save the workbook with the name: Ice-cream sales.



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# Spreadsheets exercise 2

## *Reviewing spreadsheets 2*

**Skills practised**
- New file
- Entering data
- Entering formula
- Selecting a range of worksheets
- Linking worksheets

1 Create a **NEW** workbook. You will need four worksheets for this exercise.

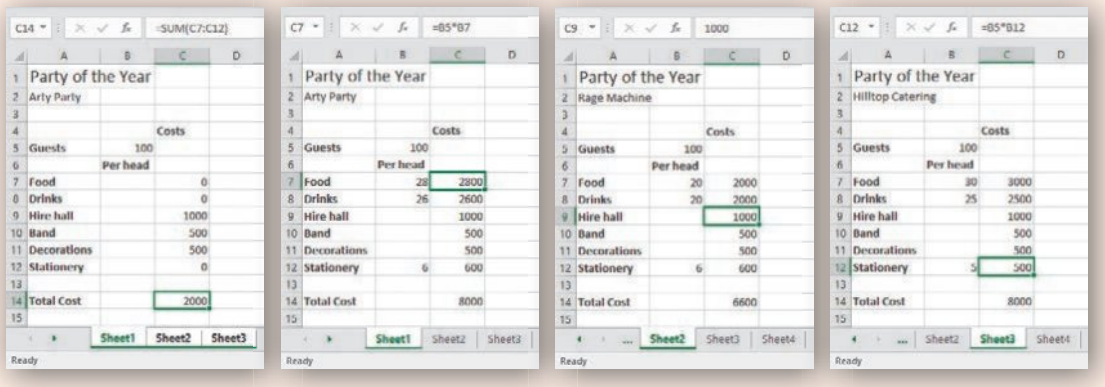
2 Click on the first worksheet then hold down the <Shift> key and click on the third sheet – this will select three sheets altogether.

For Google Sheets, skip to the next step.

3 Enter the following text, data and formulas to create the data outlines as shown below.

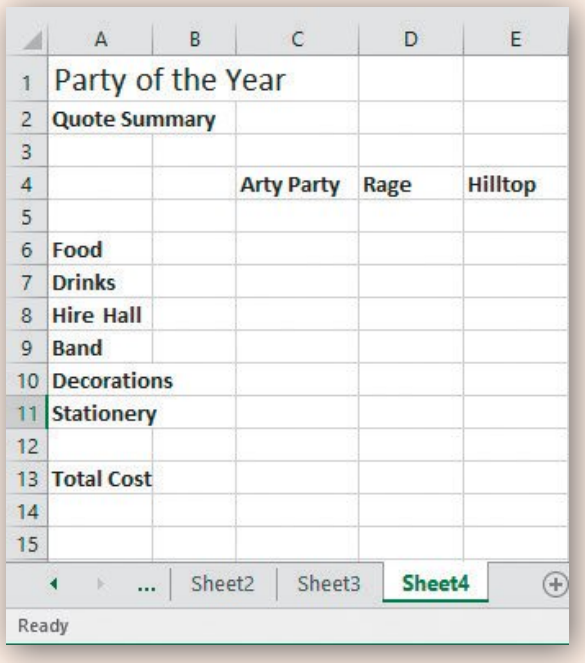
For Google Sheets, click on the Sheet arrow and click on **DUPLICATE** until you have four sheets.

4 Enter data into each of the sheets.




5 Click on the last sheet. The purpose of this sheet is to summarise all quotes for comparison.

For Google Sheets, edit the text to read as below.



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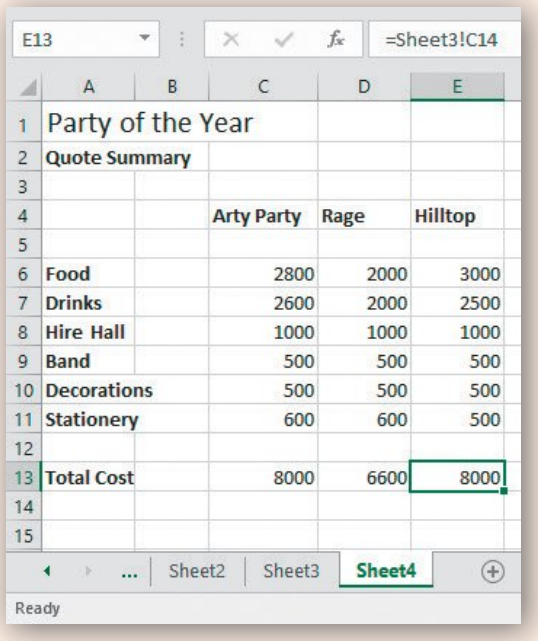
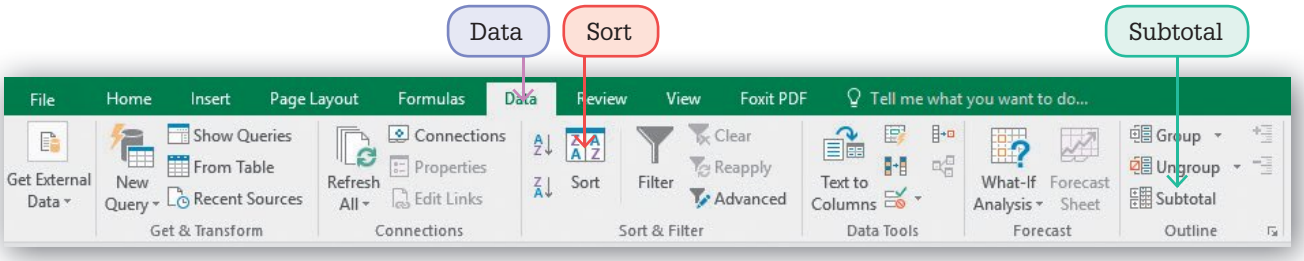
6 Use the **PASTE LINK** feature used in the previous exercise to copy the data from each quote to the summary sheet.






## 7.3 Working with lists – sorting

The Sort feature is very useful when working with spreadsheets. A list can be sorted numerically and alphabetically.




## Spreadsheets exercise 3

### *Sorting*

**Skills practised**
- New file
- Sorting data
- Saving a file

1 Access the Inventory workbook from the PIT2 Support Files.

2 Enter a formula to calculate the **VALUE** column (i.e. **COST** multiplied by **NO ON HAND**).

3 Enter a formula to calculate the retail price – it should be 50% more than the cost price (i.e. cost multiplied by 1.5).

4 Click on any cell in the Supplier column then click on the **SORT A TO Z** button on the **DATA** tab to sort the list by supplier.

For Google Sheets, click on **DATA** then **SORT A TO Z**.

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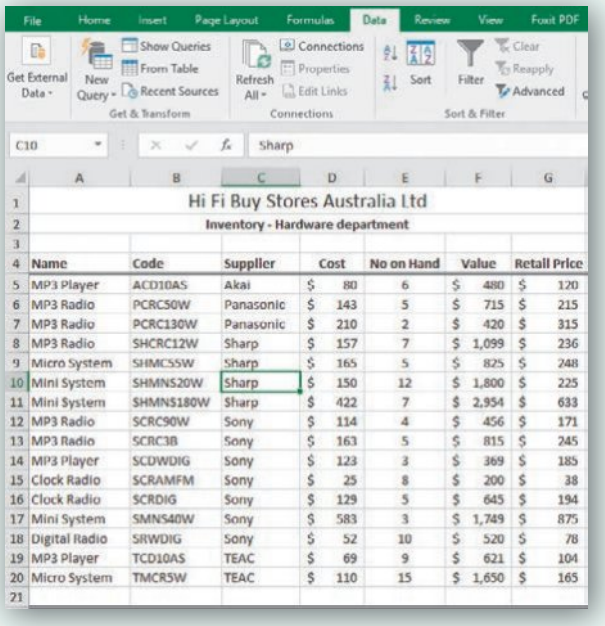


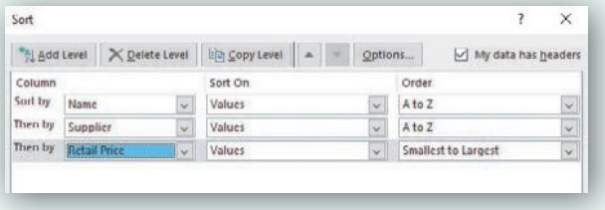
| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Hi Fi Buy Stores Australia Ltd | | | | | | |
| 2 | Inventory - Hardware department | | | | | | |
| 3 | | | | | | | |
| 4 | Name | Code | Supplier | Cost | No on Hand | Value | Retail Price |
| 5 | MP3 Player | ACD10AS | Akai | $ 80 | 6 | $ 480 | $ 120 |
| 6 | MP3 Radio | PCRC50W | Panasonic | $ 143 | 5 | $ 715 | $ 215 |
| 7 | MP3 Radio | PCRC130W | Panasonic | $ 210 | 2 | $ 420 | $ 315 |
| 8 | MP3 Radio | SHCRC12W | Sharp | $ 157 | 7 | $ 1,099 | $ 236 |
| 9 | Micro System | SHMC55W | Sharp | $ 165 | 5 | $ 825 | $ 248 |
| 10 | Mini System | SHMNS20W | Sharp | $ 150 | 12 | $ 1,800 | $ 225 |
| 11 | Mini System | SHMNS180W | Sharp | $ 422 | 7 | $ 2,954 | $ 633 |
| 12 | MP3 Radio | SCRC90W | Sony | $ 114 | 4 | $ 456 | $ 171 |
| 13 | MP3 Radio | SCRC3B | Sony | $ 163 | 5 | $ 815 | $ 245 |
| 14 | MP3 Player | SCDWDIG | Sony | $ 123 | 3 | $ 369 | $ 185 |
| 15 | Clock Radio | SCRAMFM | Sony | $ 25 | 8 | $ 200 | $ 38 |
| 16 | Clock Radio | SCRDIG | Sony | $ 129 | 5 | $ 645 | $ 194 |
| 17 | Mini System | SMNS40W | Sony | $ 583 | 3 | $ 1,749 | $ 875 |
| 18 | Digital Radio | SRWDIG | Sony | $ 52 | 10 | $ 520 | $ 78 |
| 19 | MP3 Player | TCD10AS | TEAC | $ 69 | 9 | $ 621 | $ 104 |
| 20 | Micro System | TMCR5W | TEAC | $ 110 | 15 | $ 1,650 | $ 165 |
| 21 | | | | | | | |

**5** Click on any cell in the **RETAIL PRICE** column then click on the **SORT ASCENDING** button to sort by retail price from lowest price to highest price.

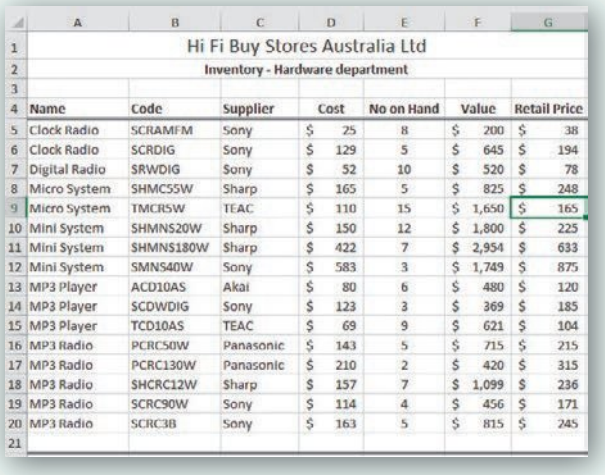
**6** Click on any cell in the table then click on **SORT** in the **DATA** ribbon and choose **NAME**. Google Sheets, does not have this feature – skip to step 10.

**7** Click on **ADD LEVEL** and click on **SUPPLIER**.

**8** Click on **ADD LEVEL** and click on **RETAIL PRICE** to sort by.



**9** Click on **OK** – your inventory list should appear the same as that shown below.



| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Hi Fi Buy Stores Australia Ltd | | | | | | |
| 2 | Inventory - Hardware department | | | | | | |
| 3 | | | | | | | |
| 4 | Name | Code | Supplier | Cost | No on Hand | Value | Retail Price |
| 5 | Clock Radio | SCRAMFM | Sony | $ 25 | 8 | $ 200 | $ 38 |
| 6 | Clock Radio | SCRDIG | Sony | $ 129 | 5 | $ 645 | $ 194 |
| 7 | Digital Radio | SRWDIG | Sony | $ 52 | 10 | $ 520 | $ 78 |
| 8 | Micro System | SHMC55W | Sharp | $ 165 | 5 | $ 825 | $ 248 |
| 9 | Micro System | TMCR5W | TEAC | $ 110 | 15 | $ 1,650 | $ 165 |
| 10 | Mini System | SHMNS20W | Sharp | $ 150 | 12 | $ 1,800 | $ 225 |
| 11 | Mini System | SHMNS180W | Sharp | $ 422 | 7 | $ 2,954 | $ 633 |
| 12 | Mini System | SMNS40W | Sony | $ 583 | 3 | $ 1,749 | $ 875 |
| 13 | MP3 Player | ACD10AS | Akai | $ 80 | 6 | $ 480 | $ 120 |
| 14 | MP3 Player | SCDWDIG | Sony | $ 123 | 3 | $ 369 | $ 185 |
| 15 | MP3 Player | TCD10AS | TEAC | $ 69 | 9 | $ 621 | $ 104 |
| 16 | MP3 Radio | PCRC50W | Panasonic | $ 143 | 5 | $ 715 | $ 215 |
| 17 | MP3 Radio | PCRC130W | Panasonic | $ 210 | 2 | $ 420 | $ 315 |
| 18 | MP3 Radio | SHCRC12W | Sharp | $ 157 | 7 | $ 1,099 | $ 236 |
| 19 | MP3 Radio | SCRC90W | Sony | $ 114 | 4 | $ 456 | $ 171 |
| 20 | MP3 Radio | SCRC3B | Sony | $ 163 | 5 | $ 815 | $ 245 |
| 21 | | | | | | | |

**10** Save the file and close.



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# Spreadsheets exercise 4

## *Spreadsheet lists*

**Skills practised**
- New file
- Entering text
- Sorting data
- Saving a file

1 Open the workbook Telephone sales from the PIT2 Support Files.
2 Sort the list by **SALES** – highest to lowest.
3 Sort the list by **SALESPERSON**.
4 Sort the list by **MONTH** then **SALESPERSON** then **PRODUCT**.
5 Leave the file open for the next exercise or **SAVE** and **CLOSE**.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | **Salesperson** | **Product** | **Units** | **Sales** | **Month** |
| 2 | Owen | Car Kit | 236 | 10580 | May |
| 3 | Owen | T13 Mobile | 530 | 105655 | May |
| 4 | Owen | T25 Mobile | 260 | 24650 | May |
| 5 | Phillips | Car Kit | 241 | 11950 | May |
| 6 | Phillips | T25 Mobile | 280 | 28500 | May |
| 7 | Richards | Car Kit | 220 | 8950 | May |
| 8 | Richards | T13 Mobile | 330 | 66255 | May |
| 9 | Richards | T25 Mobile | 350 | 34900 | May |
| 10 | Owen | T13 Mobile | 358 | 73900 | June |
| 11 | Owen | T25 Mobile | 443 | 46520 | June |
| 12 | Phillips | Car Kit | 461 | 22510 | June |
| 13 | Phillips | T13 Mobile | 501 | 109650 | June |
| 14 | Phillips | T25 Mobile | 535 | 54200 | June |
| 15 | Richards | Car Kit | 420 | 15890 | June |
| 16 | Richards | T13 Mobile | 469 | 91500 | June |
| 17 | Richards | T25 Mobile | 448 | 41680 | June |



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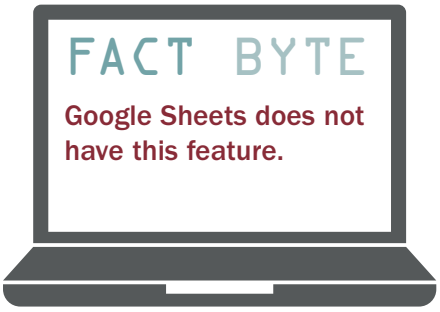
# 7.4 Using the subtotal

The subtotal feature can be used on a list to calculate subtotals of values for particular categories; for example, for each salesperson, or each product, or each month.

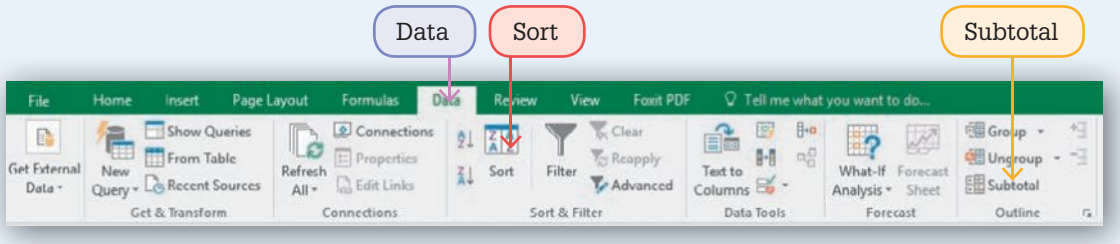



## Spreadsheets exercise 5

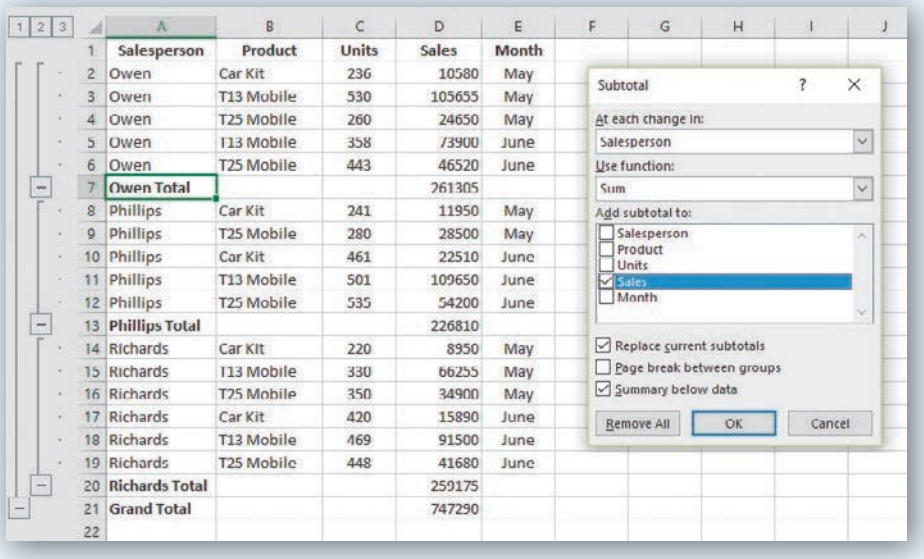
### *Working with lists*

**Skills practised**
- Sorting data
- Using subtotal functions
- Using the use function

1 Open or display the workbook file Telephone sales from the PIT2 Support Files.
2 Click anywhere within the Salesperson column.
3 Click on the **SORT ASCENDING** button on the **DATA** ribbon.
4 Click on the **SUBTOTAL** button on the **DATA** ribbon.




5 For the option **AT EACH CHANGE IN** choose **SALESPERSON**.
6 For the **USE FUNCTION** option choose **SUM**.
7 For the **ADD SUBTOTAL TO** option choose **SALES** and clear the tick from **MONTH**.
8 Check that **SUMMARY BELOW DATA** is selected.
9 Click on **OK**.




| | Salesperson | Product | Units | Sales | Month |
|---|---|---|---|---|---|
| 2 | Owen | Car Kit | 236 | 10580 | May |
| 3 | Owen | T13 Mobile | 530 | 105655 | May |
| 4 | Owen | T25 Mobile | 260 | 24650 | May |
| 5 | Owen | T13 Mobile | 358 | 73900 | June |
| 6 | Owen | T25 Mobile | 443 | 46520 | June |
| 7 | Owen Total | | | 261305 | |
| 8 | Phillips | Car Kit | 241 | 11950 | May |
| 9 | Phillips | T25 Mobile | 280 | 28500 | May |
| 10 | Phillips | Car Kit | 461 | 22510 | June |
| 11 | Phillips | T13 Mobile | 501 | 109650 | June |
| 12 | Phillips | T25 Mobile | 535 | 54200 | June |
| 13 | Phillips Total | | | 226810 | |
| 14 | Richards | Car Kit | 220 | 8950 | May |
| 15 | Richards | T13 Mobile | 330 | 66255 | May |
| 16 | Richards | T25 Mobile | 350 | 34900 | May |
| 17 | Richards | Car Kit | 420 | 15890 | June |
| 18 | Richards | T13 Mobile | 469 | 91500 | June |
| 19 | Richards | T25 Mobile | 448 | 41680 | June |
| 20 | Richards Total | | | 259175 | |
| 21 | Grand Total | | | 747290 | |
| 22 | | | | | |



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## The Outline feature

When the **SUBTOTAL** feature is used the **OUTLINE** feature is also invoked.

**1** Click on the 2 button at the top of the **OUTLINE** area.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Salesperson | Product | Units | Sales | Month |
| 7 | Owen Total | | | 261305 | |
| 13 | Phillips Total | | | 226810 | |
| 20 | Richards Total | | | 259175 | |
| 21 | Grand Total | | | 747290 | |
| 22 | | | | | |

**2** Click on the plus button next to Owen to display the details just for that salesperson.

**3** Click on the minus button next to the Owen Total to collapse it again.

**4** Repeat to open and collapse each of the other salespeople.

**5** Click on the 3 button to display all the details.

## Applying further subtotals

**1** Click somewhere within the list.

**2** Click on the **SUBTOTAL** button on the **DATA** ribbon.

**3** Choose **MONTH** for the **AT EACH CHANGE IN** option.

**4** Click on **SUM** for the **USE FUNCTION** option.

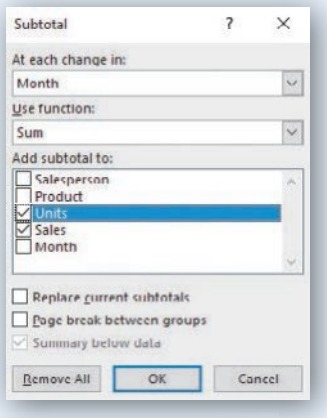
**5** Click on both **UNITS** and **SALES** for **ADD SUBTOTAL TO**.

**6** Click on **MONTH** to clear the tick.

**7** Clear the tick in the **REPLACE CURRENT SUBTOTALS** box so that the sales total for each salesperson will remain.

**8** Click **OK**. Now extra totals are included for units sold and sales for each salesperson each month.

**9** Click on the 3 button to display only the totals.




| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Salesperson | Product | Units | Sales | Month |
| 6 | | | 1026 | 140885 | May Total |
| 10 | | | 801 | 120420 | June Total |
| 11 | Owen Total | | | 261305 | |
| 15 | | | 521 | 40450 | May Total |
| 20 | | | 1497 | 186360 | June Total |
| 21 | Phillips Total | | | 226810 | |
| 26 | | | 900 | 110105 | May Total |
| 31 | | | 1337 | 149070 | June Total |
| 32 | Richards Total | | | 259175 | |
| 33 | | | | | Grand Total |
| 34 | | | 6082 | | Grand Total |
| 35 | Grand Total | | | 747290 | |
| 36 | | | | | |



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# 7.5 Filtering

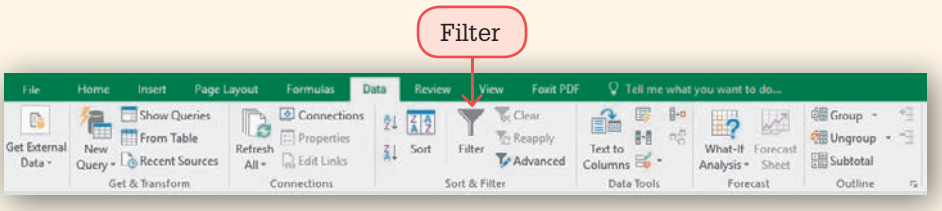
Filtering is a process of working with lists. Filtering can be used to display specific rows of information from a list; for example, top 10 sales, members with the same name, or specific records.

## Spreadsheets exercise 6

### *Filtering*

**Skills practised**
- Opening a file
- Applying a filter
- Renaming a filter

1 Open the Inventory workbook file the PIT2 Support Files.
2 Click on any cell in the list.
3 Click on the **FILTER** button on the **DATA** tab. The filter buttons appear at the top of each column in the list.




4 Click on the filter button at the right of the **NAME** cell.
5 Click on **SELECT ALL** to clear the tick – for Google Sheets, click on **CLEAR** – then click on **MP3 RADIO** and **OK**. Only those rows with this in the **NAME** column will be displayed. Notice that the filter button now has a small filter symbol on it to indicate that it is this column where the filter is applied.

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Hi Fi Buy Stores Australia Ltd | | | | | | |
| 2 | Inventory - Hardware department | | | | | | |
| 3 | | | | | | | |
| 4 | Name | Code | Supplier | Cost | No on Har | Value | Retail Pri |
| 7 | MP3 Radio | PCRC50W | Panasonic | $ 143 | 5 | $ 715 | $ 215 |
| 8 | MP3 Radio | PCRC130W | Panasonic | $ 210 | 2 | $ 420 | $ 315 |
| 9 | MP3 Radio | SHCRC12W | Sharp | $ 157 | 7 | $ 1,099 | $ 236 |
| 10 | MP3 Radio | SCRC90W | Sony | $ 114 | 4 | $ 456 | $ 171 |
| 11 | MP3 Radio | SCRC3B | Sony | $ 163 | 5 | $ 815 | $ 245 |

6 Click on the **FILTER** button for **NAME** again and click on **SELECT ALL** at the top of the list to display all records, then **OK**.
7 Click on the filter button for **SUPPLIER**.
8 Click on **SELECT ALL** to clear the tick.
For Google Sheets, click on **CLEAR**, then click on **PANASONIC** and **OK**.
9 Click on the filter button again and repeat the process with another supplier.
10 Repeat to click on each of the suppliers. Which supplier supplies the greatest variety of items?
11 Click on the **FILTER** button in the ribbon to turn the filters off.
For Google Sheets, click on **DATA** then **TURN OFF FILTER**.
12 Save and close the file.



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# 7.6 Functions

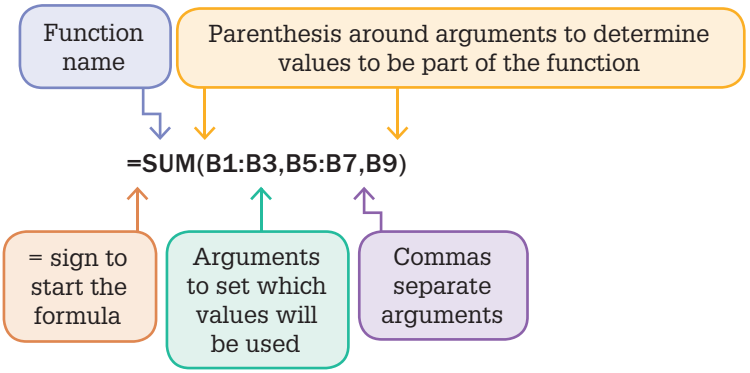
A function is a preset formula that can be used instead of entering a more cumbersome formula. A simple example is the frequently used SUM function. It is very useful when there is a long list of values to add. For example, instead of entering the formula use the SUM function:

**=B1+B2+B3+B4+B5+B6+B7+B8+B9 =SUM(B1:B9)**

The SUM function is a command that, in the example above, would add all the values of the cells from B1 to B9.

Most spreadsheet programs have a series of built-in functions that help us work with or analyse data quickly and easily. For example, we can find the average of a series of figures, or the maximum or minimum of these figures. Or we can determine an entry dependent on other results using the 'IF' function.

Each function uses a similar format called syntax. The formula =B1+B2+B3+B5 +B6+B7+B9 would be written as:





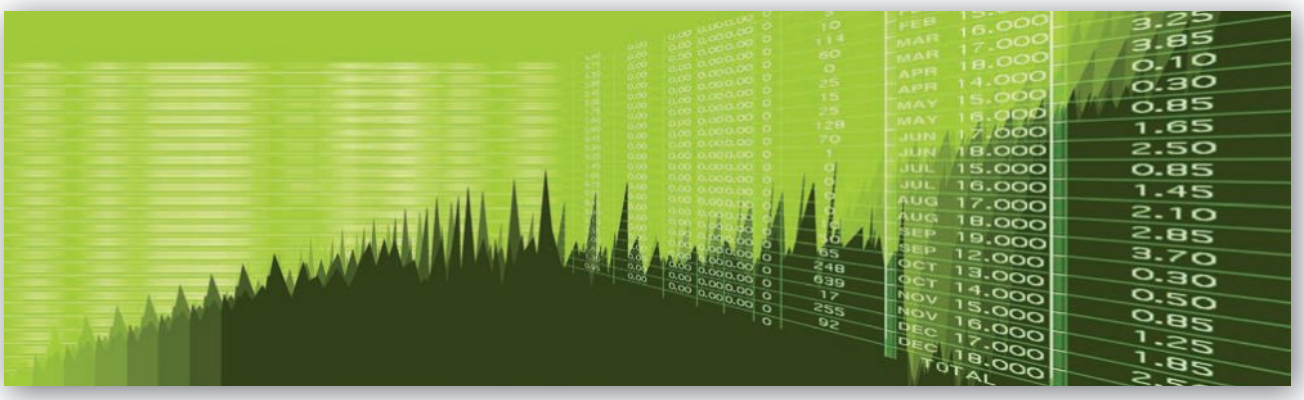

Arguments are often cell references; however, arguments can also be numbers, text, true or false, arrays, or error values as well. The argument can also be a formula or another function that returns a value.

## Statistical functions

Statistical functions are probably the most commonly used functions. They are used to analyse data in ranges. For example, to find which month had the highest sales one would use the MAX function. The MIN function would be used to display the lowest sales.

In this section you will work with the following functions:

- SUM – adds together all values of cells in the range
- AVERAGE – calculates the average of all values in the range
- MAX – displays the maximum or largest value of the cells in the range
- MIN – displays the minimum or smallest value in the range of values.



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# Spreadsheets exercise 7

## *Functions*

**Skills practised**
- New file
- Entering data
- Entering functions

1 Create the following worksheet and call it Functions.

2 Click on B16 and type `=SUM(B3:B14)`

3 Click on B18 and type `=AVERAGE(B3:B14)`

4 Click on B19 and type `=MAX(B3:B14)`

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Sales Summary | | | | |
| 2 | | Minnie | Daisy | Helga | Total |
| 3 | Jan | 10 | 16 | 22 | |
| 4 | Feb | 18 | 18 | 18 | |
| 5 | Mar | 32 | 25 | 19 | |
| 6 | Apr | 31 | 24 | 20 | |
| 7 | May | 28 | 30 | 21 | |
| 8 | Jun | 23 | 32 | 22 | |
| 9 | Jul | 24 | 38 | 21 | |
| 10 | Aug | 28 | 36 | 20 | |
| 11 | Sep | 32 | 42 | 21 | |
| 12 | Oct | 38 | 25 | 22 | |
| 13 | Nov | 65 | 20 | 23 | |
| 14 | Dec | 12 | 15 | 24 | |
| 15 | | | | | |
| 16 | Total | | | | |
| 17 | | | | | |
| 18 | Average | | | | |
| 19 | Maximum | | | | |
| 20 | Minimum | | | | |

5 Click on B20 and type `=MIN(B3:B14)`

6 Find the sum (total), average, maximum and minimum of each department.

7 Check the results then save and close the file.

B18 =AVERAGE(B3:B14)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Sales Summary | | | | |
| 2 | | Minnie | Daisy | Helga | Total |
| 3 | Jan | 10 | 16 | 22 | 48 |
| 4 | Feb | 18 | 18 | 18 | 54 |
| 5 | Mar | 32 | 25 | 19 | 76 |
| 6 | Apr | 31 | 24 | 20 | 75 |
| 7 | May | 28 | 30 | 21 | 79 |
| 8 | Jun | 23 | 32 | 22 | 77 |
| 9 | Jul | 24 | 38 | 21 | 83 |
| 10 | Aug | 28 | 36 | 20 | 84 |
| 11 | Sep | 32 | 42 | 21 | 95 |
| 12 | Oct | 38 | 25 | 22 | 85 |
| 13 | Nov | 65 | 20 | 23 | 108 |
| 14 | Dec | 12 | 15 | 24 | 51 |
| 15 | | | | | |
| 16 | Total | 341 | 321 | 253 | 915 |
| 17 | | | | | |
| 18 | Average | 28.42 | 26.75 | 21.08 | 76.25 |
| 19 | Maximum | 65 | 42 | 24 | 108 |
| 20 | Minimum | 10 | 15 | 18 | 48 |
| 21 | | | | | |



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## Using functions on non-adjacent cells

In the next exercise you are going to add the sales for each salesperson to give the total sales. The expenses are also totalled.

# Spreadsheets exercise 8

### *Using functions*

**Skills practised**
- Sum function
- Max function

1 Open the workbook Split sales from the student files from the PIT2 Support Files.
2 Use the SUM function to find the total sales for the week for each salesperson as shown below in column H.
3 Now you will use a function to find the total sales and expenses each day. However, this time the cells in the function are not adjacent; for example, on Monday for total sales the values to be added are in cells C4, C10 and C16.
4 Click on cell C22 and type `=SUM(C4,C10,C16)`, which will sum just the values in those cells.
5 Repeat to find the total sales for each day.
6 Click on cell C23 and type `=SUM(C5:C7,C11:C13,C17:C19)`, which will sum just the values in those cell ranges.
7 Repeat to find the total sales for each day.
8 In ROW 24, use a function to find the maximum sales for each day of the week.
9 In ROW 25, use a function to find the minimum sales for each day of the week.
10 Save and close the file.



C23 =SUM(C5:C7,C11:C13,C17:C19)

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Chocolates Galore | | | | | | | |
| 2 | | | Monday | Tuesday | Wednesday | Thursday | Friday | Totals |
| 3 | Minnie | | | | | | | |
| 4 | Sales | | 1211 | 1212 | 1213 | 1214 | 1215 | 6065 |
| 5 | Expenses | Car | 500 | 510 | 520 | 530 | 540 | |
| 6 | | Telephone | 50 | 50 | 50 | 50 | 50 | |
| 7 | | Stationery | 20 | 20 | 20 | 20 | 20 | |
| 8 | | | | | | | | |
| 9 | Daisy | | | | | | | |
| 10 | Sales | | 1300 | 1450 | 1300 | 1250 | 1275 | 6575 |
| 11 | Expenses | Car | 600 | 550 | 625 | 600 | 450 | |
| 12 | | Telephone | 200 | 157 | 155 | 190 | 210 | |
| 13 | | Stationery | 35 | 30 | 35 | 30 | 35 | |
| 14 | | | | | | | | |
| 15 | Helga | | | | | | | |
| 16 | Sales | | 700 | 710 | 720 | 710 | 700 | 3540 |
| 17 | Expenses | Car | 100 | 110 | 120 | 110 | 100 | |
| 18 | | Telephone | 10 | 10 | 10 | 10 | 10 | |
| 19 | | Stationery | 5 | 10 | 15 | 20 | 25 | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |
| 22 | Totals | Sales | 3211 | 3372 | 3233 | 3174 | 3190 | 16180 |
| 23 | | Expenses | 1520 | 1447 | 1550 | 1560 | 1440 | 7517 |
| 24 | | Maximum | 1300 | 1450 | 1300 | 1250 | 1275 | |
| 25 | | Minimum | 700 | 710 | 720 | 710 | 700 | |

Please see the Interactive Textbook for additional content and Exercise 8a on the Date and Time functions.

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# 7.7 Logical functions

Logical functions depend on the values true and false. The value returned by a logical function can be a number, formula, action or reference, or the values true or false. However, the result depends on the initial logical test that results in true or false.

## The IF function

The IF function is powerful in that it provides a choice of entries to a cell conditional on the values of other cells in the spreadsheet. We start with a test, then a course of action if it is true or another if it is false; for example, 'If the temperature will be over 20, then don't take a coat out, otherwise take a coat'.

So the condition, or test, is 'is temperature over 20?' If the result is yes or true, the message 'don't take a coat' will appear. If the answer is no, the result is false, so the message 'take a coat' will appear.

In Excel this would be written as:

=IF(temperature > 20, 'don't take a coat', 'take a coat')

In general:

=IF(condition, value if true, value if false)

The condition in the IF statement often uses the following operators:

= equal to

≥ greater than or equal to

≤ less than or equal to

> greater than

< less than

Before we use this function, try determining the three components of the IF function for the following situation:

You have decided that if total profit from the concert you are organising is over $10,000 then you will throw a party for the helpers, otherwise a memo will simply be sent to all helpers thanking them for their efforts.

= IF (_____, _____, _____)



## Spreadsheets exercise 9

### *The IF function 1*

**Skills practised**
- New file
- Entering text
- Entering functions

In this sheet you are using the IF function to determine which bills have been paid. If the bill is paid then 'Nil' appears in the cell. If the bill is not paid then the value of the bill is entered into the cell.

1. Open the workbook Paid from the PIT2 Support Files. The IF function is used to test the contents of the Paid column. If a Y appears to indicate the invoice is paid then the text Nil is stored in the cell. However, if a Y does not appear then the contents of the Total column are stored in F2 to be included in the sum amount owed.
2. On paper, work out how the IF function should be entered.
3. Click on cell F2 and use the IF formula to display the appropriate message in the Balance column. For example =IF(E2="Y", "Nil",C2).
4. Repeat for the next few rows for practice, then copy down the column.

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5 Now to test your formula. Click in cell E7 and type Y – Nil should appear in the Balance column.

6 Save and close the file.

F2 =IF(E2="Y","Nil",C2)

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | Date | Invoice No | Total | Due Date | Paid | Balance |
| 2 | 15/06/2018 | 10235 | $ 32.95 | 31/07/2018 | Y | Nil |
| 3 | 27/07/2018 | 10562 | $156.80 | 31/08/2018 | Y | Nil |
| 4 | 8/08/2018 | 11589 | $ 28.90 | 30/09/2018 | Y | Nil |
| 5 | 15/09/2018 | 12689 | $ 68.00 | 31/10/2018 | Y | Nil |
| 6 | 17/09/2018 | 13740 | $156.90 | 31/10/2018 | N | $ 156.90 |
| 7 | 22/10/2018 | 14804 | $190.00 | 30/11/2018 | N | $ 190.00 |
| 8 | 29/10/2018 | 15867 | $220.00 | 30/11/2018 | N | $ 220.00 |
| 9 | 16/11/2018 | 16931 | $168.75 | 31/12/2018 | N | $ 168.75 |
| 10 | 25/11/2018 | 17994 | $ 18.30 | 31/12/2018 | N | $ 18.30 |
| 11 | 9/12/2018 | 19058 | $ 68.50 | 31/01/2019 | N | $ 68.50 |



# Spreadsheets exercise 10

## *The IF function 2*

**Skills practised**
- New file
- Entering text
- Entering functions

1 Open the file Internet charge. The first two hours of any session are free. In column L you will use an IF function to check the length of connection.

2 Click on K5 and type `=Hour(J5)` – this will convert the hour value in J5 into a numerical value that can be used in calculations.

3 Copy the formula down the column. The connection fee is free if less than 2 hours are used. If more than 2 hours are used then there is a cost.

K5 =HOUR(J5)

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Nearly Free Internet | | | | | | | | | | | |
| 2 | Limit Hours Free Internet | | | 2 | Fee Per Hour | | $ 1.20 | | Max fee | | $ 8.00 | |
| 3 | | | | | | | | | | | | |
| 4 | Date | | | Entry Time | | | | Exit Time | | Hours | | Fee |
| 5 | 11/11/2018 | 8 | 40 | 8:40 AM | | 13 | 40 | 1:40 PM | | 5:00 | 5 | |
| 6 | 12/11/2018 | 10 | 41 | 10:41 AM | | 12 | 15 | 12:15 PM | | 1:34 | 1 | |
| 7 | 13/11/2018 | 11 | 13 | 11:13 AM | | 12 | 30 | 12:30 PM | | 1:17 | 1 | |

4 Click on L5 and enter the formula `=IF(K5<2,"FREE","COST")`.

5 Click on L6 and repeat.

6 Copy the formula down the remainder of the column.

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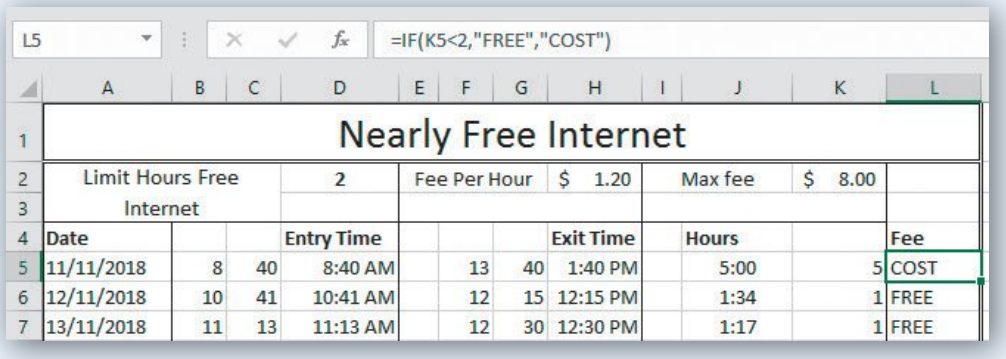


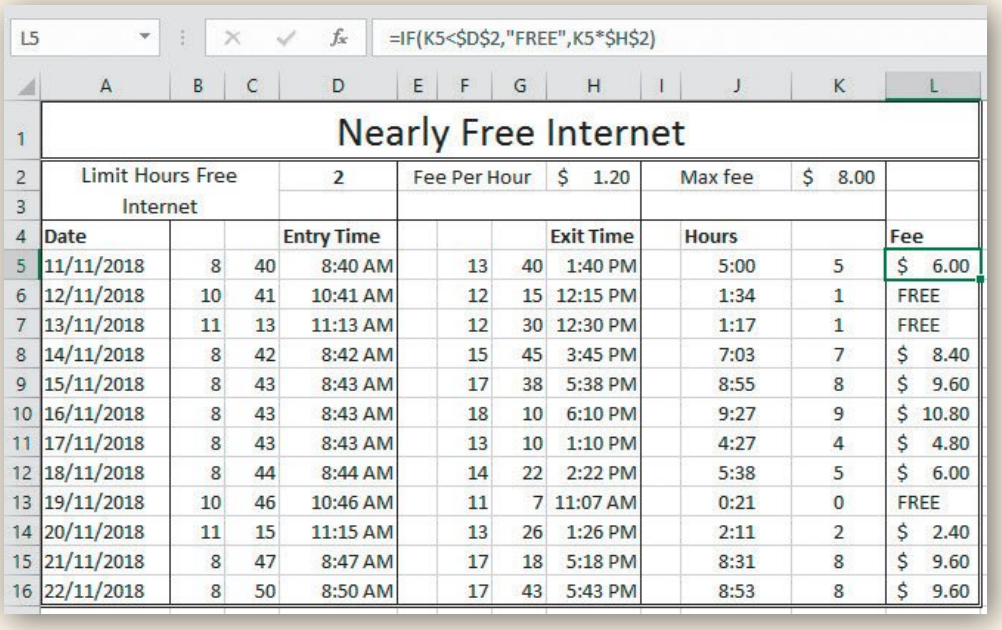

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Nearly Free Internet | | | | | | | | | | | |
| 2 | Limit Hours Free Internet | | | 2 | | Fee Per Hour | | $ 1.20 | | Max fee | $ 8.00 | |
| 3 | | | | | | | | | | | | |
| 4 | Date | | | Entry Time | | | | Exit Time | | Hours | | Fee |
| 5 | 11/11/2018 | 8 | 40 | 8:40 AM | | 13 | 40 | 1:40 PM | | 5:00 | 5 | COST |
| 6 | 12/11/2018 | 10 | 41 | 10:41 AM | | 12 | 15 | 12:15 PM | | 1:34 | 1 | FREE |
| 7 | 13/11/2018 | 11 | 13 | 11:13 AM | | 12 | 30 | 12:30 PM | | 1:17 | 1 | FREE |

# Spreadsheets exercise 11

## *The IF function 3*

**Skills practised**
- Editing formulas
- Copying formulas

1 In the Internet charge file click on cell L5 and edit the formula so it reads: =IF(K5<$D$2,"Free", K5*$H$2)
2 Click on cell L6 and edit the formula appropriately (just for practice).
3 Copy the formula down the rest of the column.




| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Nearly Free Internet | | | | | | | | | | | |
| 2 | Limit Hours Free Internet | | | 2 | | Fee Per Hour | | $ 1.20 | | Max fee | $ 8.00 | |
| 3 | | | | | | | | | | | | |
| 4 | Date | | | Entry Time | | | | Exit Time | | Hours | | Fee |
| 5 | 11/11/2018 | 8 | 40 | 8:40 AM | | 13 | 40 | 1:40 PM | | 5:00 | 5 | $ 6.00 |
| 6 | 12/11/2018 | 10 | 41 | 10:41 AM | | 12 | 15 | 12:15 PM | | 1:34 | 1 | FREE |
| 7 | 13/11/2018 | 11 | 13 | 11:13 AM | | 12 | 30 | 12:30 PM | | 1:17 | 1 | FREE |
| 8 | 14/11/2018 | 8 | 42 | 8:42 AM | | 15 | 45 | 3:45 PM | | 7:03 | 7 | $ 8.40 |
| 9 | 15/11/2018 | 8 | 43 | 8:43 AM | | 17 | 38 | 5:38 PM | | 8:55 | 8 | $ 9.60 |
| 10 | 16/11/2018 | 8 | 43 | 8:43 AM | | 18 | 10 | 6:10 PM | | 9:27 | 9 | $ 10.80 |
| 11 | 17/11/2018 | 8 | 43 | 8:43 AM | | 13 | 10 | 1:10 PM | | 4:27 | 4 | $ 4.80 |
| 12 | 18/11/2018 | 8 | 44 | 8:44 AM | | 14 | 22 | 2:22 PM | | 5:38 | 5 | $ 6.00 |
| 13 | 19/11/2018 | 10 | 46 | 10:46 AM | | 11 | 7 | 11:07 AM | | 0:21 | 0 | FREE |
| 14 | 20/11/2018 | 11 | 15 | 11:15 AM | | 13 | 26 | 1:26 PM | | 2:11 | 2 | $ 2.40 |
| 15 | 21/11/2018 | 8 | 47 | 8:47 AM | | 17 | 18 | 5:18 PM | | 8:31 | 8 | $ 9.60 |
| 16 | 22/11/2018 | 8 | 50 | 8:50 AM | | 17 | 43 | 5:43 PM | | 8:53 | 8 | $ 9.60 |

A formula can be the result of an IF statement. In the next exercise, instead of displaying cost, a formula is used to display the fee for connection, which is $1.20 for each hour after the first two hours.

The fee for connection per hour is stored in cell H2. The limit of hours for free connection is stored in cell D2. References should be made to these cells within the IF function rather than entering values directly into the formula.



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## Nesting IF functions

IF functions quite often involve nesting functions. A nested function is where one or more functions are used within a function.

In the next exercise you will adjust the formula that calculates the fee payable for internet connection. The connection fees have been altered so that connection for longer then 7 hours is still charged at $8. So if connection is less than 2 hours it is still free. If it is greater than 2 hours and is also greater than 7 hours then the fee is $8 (stored in cell K2). However, if it is less than 7 hours the fee is still $1.20 per hour.

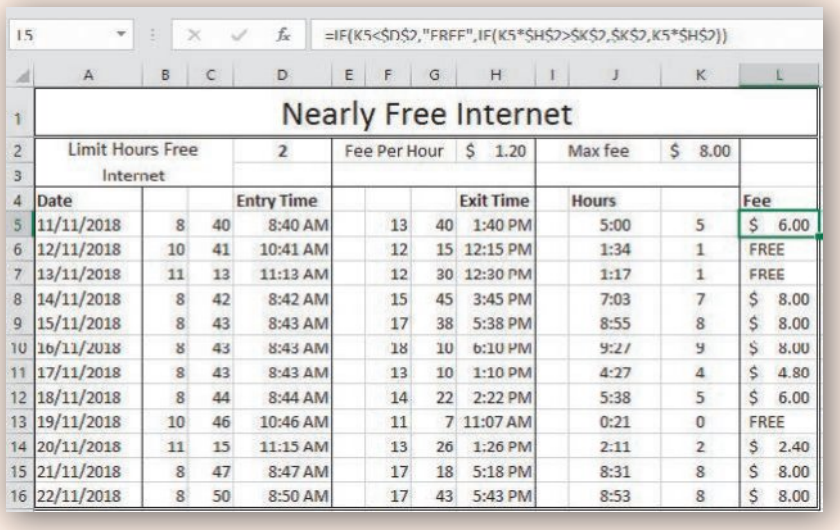


# Spreadsheets exercise 12

### *Nesting IF functions*

**Skills practised**
- New file
- Entering text
- Entering functions

1. In the Internet charge file click on cell L5.
2. In the formula bar, delete the false section K5*$H$2 and enter the nested function IF(K5*$H$2>$K$2, $K$2, K5*$H$2).
3. Repeat for the next few cells for practice then copy down the remainder of the column.




| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Nearly Free Internet | | | | | | | | | | | |
| 2 | Limit Hours Free Internet | | | 2 | | Fee Per Hour | | $ 1.20 | | Max fee | $ 8.00 | |
| 3 | | | | | | | | | | | | |
| 4 | Date | | | Entry Time | | | | Exit Time | | Hours | | Fee |
| 5 | 11/11/2018 | 8 | 40 | 8:40 AM | | 13 | 40 | 1:40 PM | | 5:00 | 5 | $ 6.00 |
| 6 | 12/11/2018 | 10 | 41 | 10:41 AM | | 12 | 15 | 12:15 PM | | 1:34 | 1 | FREE |
| 7 | 13/11/2018 | 11 | 13 | 11:13 AM | | 12 | 30 | 12:30 PM | | 1:17 | 1 | FREE |
| 8 | 14/11/2018 | 8 | 42 | 8:42 AM | | 15 | 45 | 3:45 PM | | 7:03 | 7 | $ 8.00 |
| 9 | 15/11/2018 | 8 | 43 | 8:43 AM | | 17 | 38 | 5:38 PM | | 8:55 | 8 | $ 8.00 |
| 10 | 16/11/2018 | 8 | 43 | 8:43 AM | | 18 | 10 | 6:10 PM | | 9:27 | 9 | $ 8.00 |
| 11 | 17/11/2018 | 8 | 43 | 8:43 AM | | 13 | 10 | 1:10 PM | | 4:27 | 4 | $ 4.80 |
| 12 | 18/11/2018 | 8 | 44 | 8:44 AM | | 14 | 22 | 2:22 PM | | 5:38 | 5 | $ 6.00 |
| 13 | 19/11/2018 | 10 | 46 | 10:46 AM | | 11 | 7 | 11:07 AM | | 0:21 | 0 | FREE |
| 14 | 20/11/2018 | 11 | 15 | 11:15 AM | | 13 | 26 | 1:26 PM | | 2:11 | 2 | $ 2.40 |
| 15 | 21/11/2018 | 8 | 47 | 8:47 AM | | 17 | 18 | 5:18 PM | | 8:31 | 8 | $ 8.00 |
| 16 | 22/11/2018 | 8 | 50 | 8:50 AM | | 17 | 43 | 5:43 PM | | 8:53 | 8 | $ 8.00 |

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# 7.8 The CHOOSE function

The CHOOSE function is used to choose a value from an ordered list given the position in the list. The CHOOSE function could be used to display the actual day rather than a number that represents the day.

The function is written as:

CHOOSE (index_num,value1,value2,...)

Where:

Index_num = a number between 1 and 29 or a formula which results in a number between 1 and 29.

If Index_num is 1, CHOOSE returns the first value in the list. If index_num is 2, CHOOSE returns value2; the second value in the list, and so on.

The value can be a numerical value, a piece of text, a formula or some other action, a cell reference or a range. So for the day of the week the formula could be written:

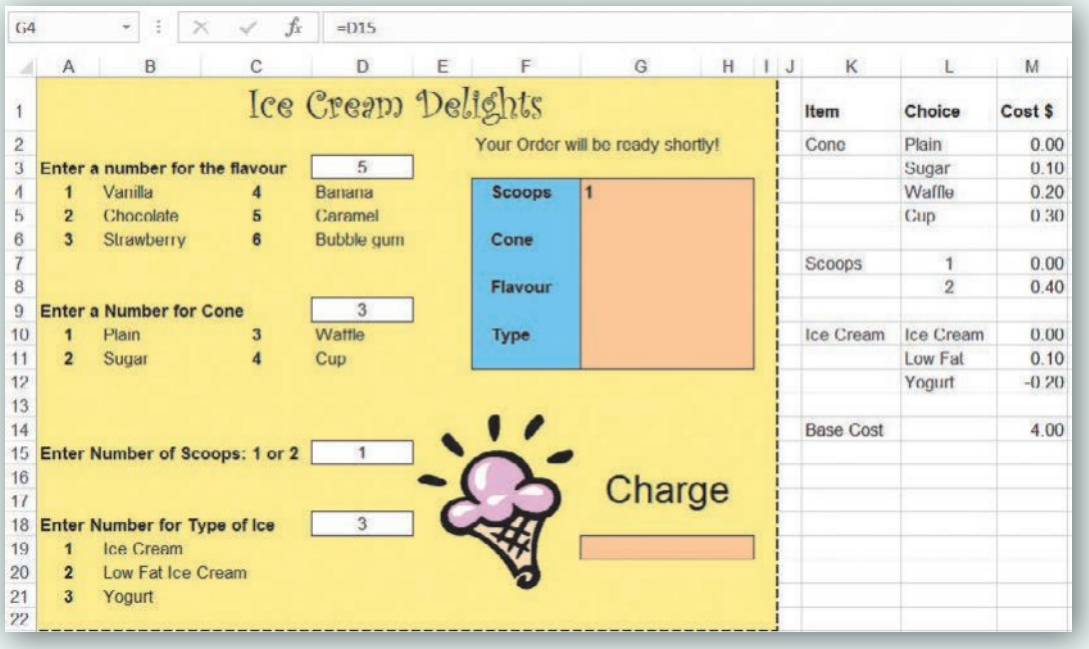
CHOOSE (3,Sunday,Monday,Tuesday,Wednesday,Thursday,Friday,Saturday), which would return Tuesday.

## Spreadsheets exercise 13

### *The CHOOSE function*

**Skills practised**
- New file
- Entering text
- Entering functions

**1** Have a go at creating the worksheet below. You will use the CHOOSE function to display the client's order and calculate the charge for the ice-cream. The aim of this exercise is for the user to enter a number for each element of the ice-cream. The choices will then be used to calculate the cost of the ice-cream.




**2** To start with you will use the CHOOSE function to display the customer's choice of flavour. Click on cell G8 of the CHOOSE worksheet created on the previous page.

**3** Type = CHOOSE(

**4** Click on D3 as this is where the Index_Number will be entered.

**5** Type a comma ( , ).



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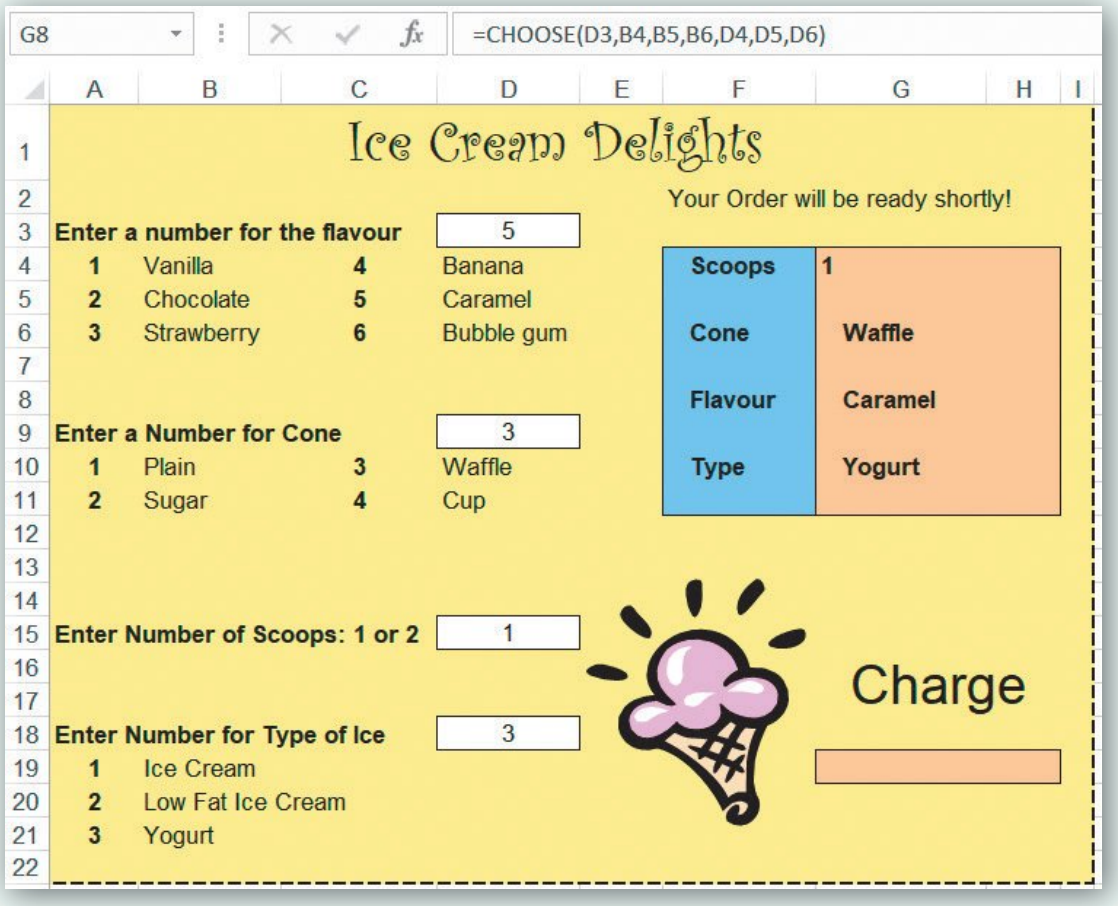
6 Click on B4 then press ( , ).

7 Click on B5 then press ( , ) and so on until all the possible choices are entered in the function as shown in the formula bar.

8 Type a ( ) ) and press <Enter> to set the formula. Caramel should appear in the G8 cell, if 5 is entered in D2.




9 Try entering other numbers in the cell D3 from 1 to 6 – the flavour displayed in G8 will also change.

Note: If you enter other numbers (e.g. 14), you will get error messages.

10 In cell G6 enter the CHOOSE function to display the choice of cone.

11 Repeat in cell G10 to display the type of ice-cream chosen.

12 Check that cell G4 will display the number of scoops entered as set up on the previous page.



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## Using the CHOOSE function within a formula

A formula can be created that calculates the cost of the ice-cream chosen. The costs associated with each item are listed to the side of the main worksheet area. The user does not need to know about this area. The formula will use the costs for each item based on choices made by the user.

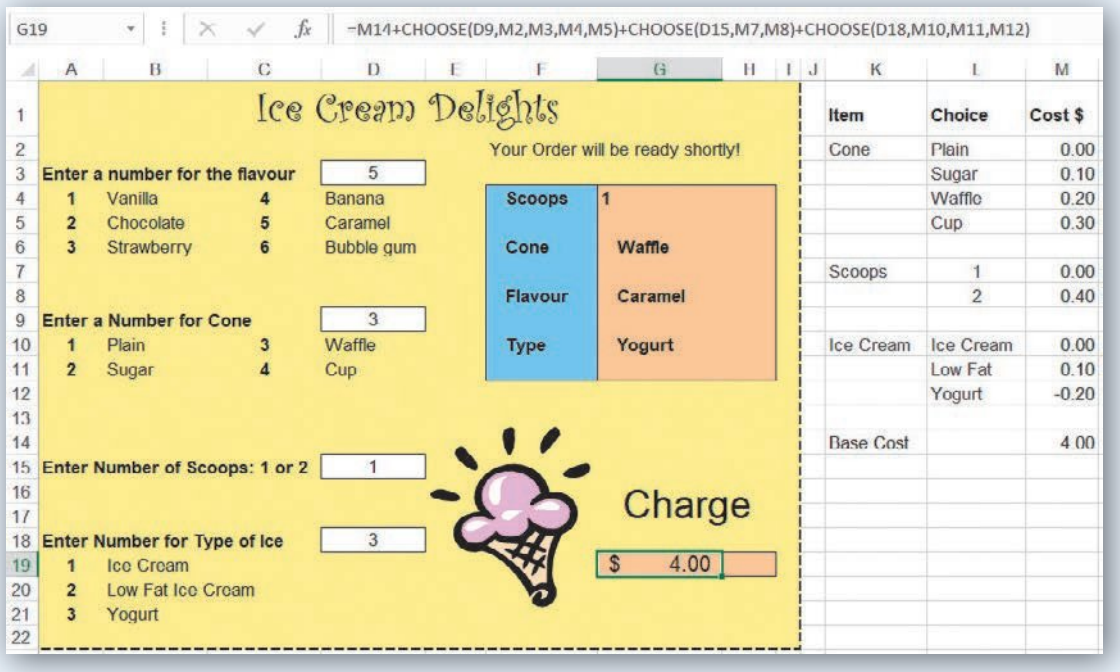
# Spreadsheets exercise 14

### *Using the CHOOSE function within a formula*

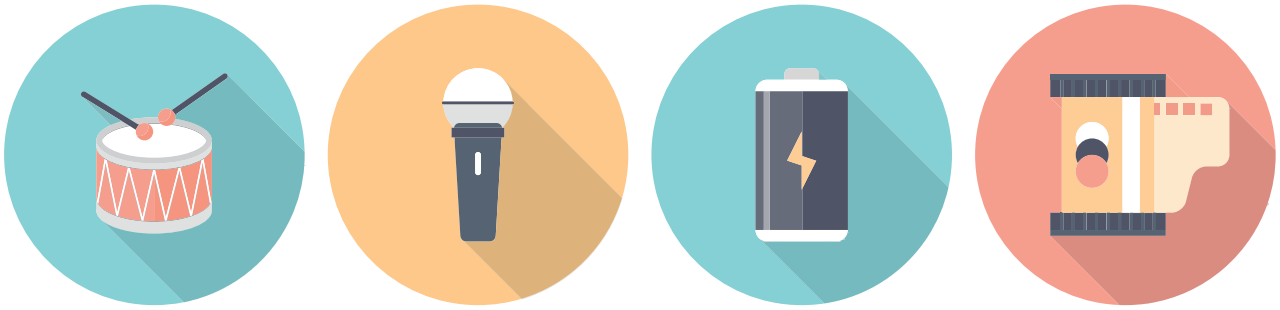
**Skills practised**
- New file
- Entering text
- Entering functions

**1** Enter the following formula in cell G19 to calculate cost depending on what is chosen. The base price of any ice-cream is $4, which is stored in cell M14, then additional costs are added, or if yogurt is used, subtracted:

```
=M14+CHOOSE(D9,M2,M3,M4,M5)+CHOOSE(D15,M7,M8)+
CHOOSE(D18,M10,M11,M12)
```




**2** Test the formula by entering choices in column D. Is the correct price being calculated in G19?





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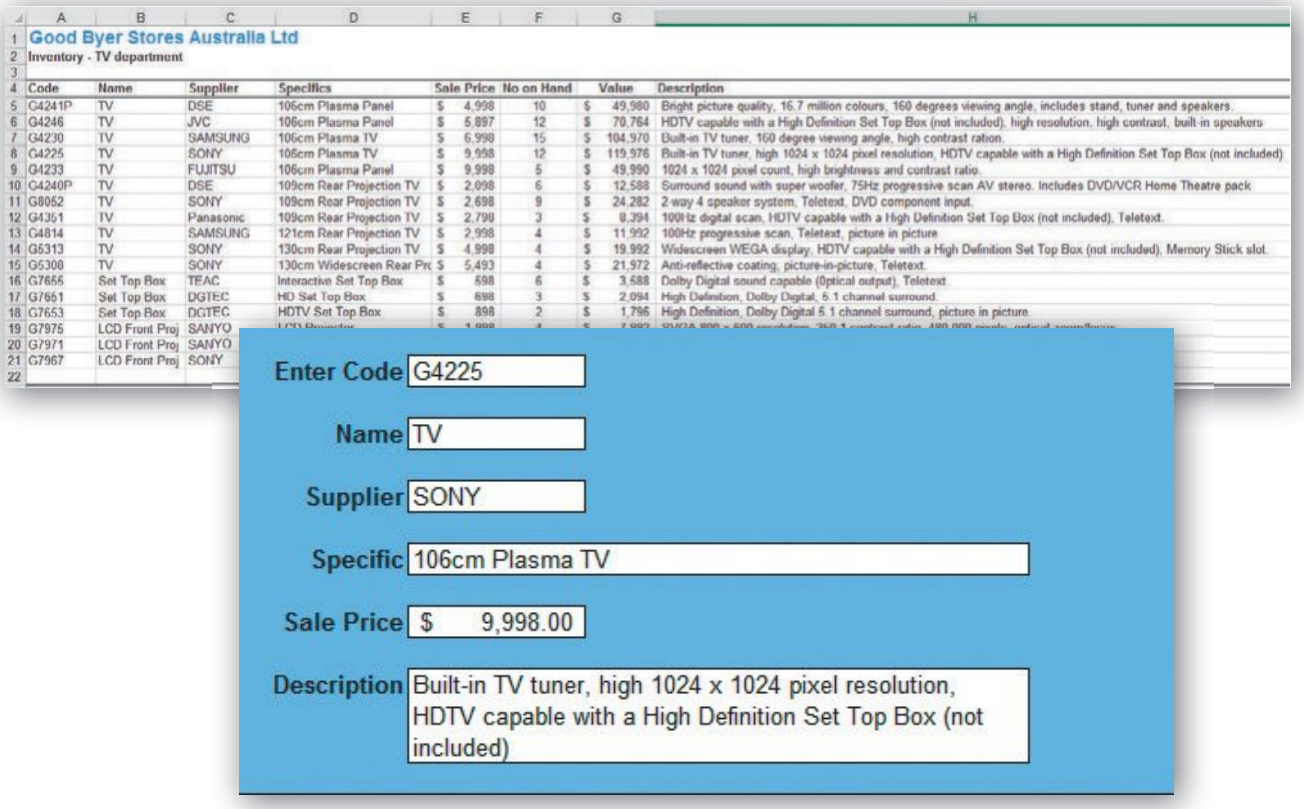
# 7.9 Lookup functions

## The VLOOKUP function

The VLOOKUP function is used when your data is arranged in columns. It enables you to select a piece of data based on a specific value.



| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Good Byer Stores Australia Ltd | | | | | | | |
| 2 | Inventory - TV department | | | | | | | |
| 3 | | | | | | | | |
| 4 | Code | Name | Supplier | Specifics | Sale Price | No on Hand | Value | Description |
| 5 | G4241P | TV | DSE | 106cm Plasma Panel | $ 4,998 | 10 | $ 49,980 | Bright picture quality, 16.7 million colours, 160 degrees viewing angle, includes stand, tuner and speakers. |
| 6 | G4246 | TV | JVC | 106cm Plasma Panel | $ 5,897 | 12 | $ 70,764 | HDTV capable with a High Definition Set Top Box (not included), high resolution, high contrast, built-in speakers |
| 7 | G4230 | TV | SAMSUNG | 106cm Plasma TV | $ 6,998 | 15 | $ 104,970 | Built-in TV tuner, 160 degree viewing angle, high contrast ration. |
| 8 | G4225 | TV | SONY | 106cm Plasma TV | $ 9,998 | 12 | $ 119,976 | Built-in TV tuner, high 1024 x 1024 pixel resolution, HDTV capable with a High Definition Set Top Box (not included) |
| 9 | G4233 | TV | FUJITSU | 106cm Plasma Panel | $ 9,998 | 5 | $ 49,990 | 1024 x 1024 pixel count, high brightness and contrast ratio. |
| 10 | G4240P | TV | DSE | 109cm Rear Projection TV | $ 2,098 | 6 | $ 12,588 | Surround sound with super woofer, 75Hz progressive scan AV stereo. Includes DVD/VCR Home Theatre pack |
| 11 | G8052 | TV | SONY | 109cm Rear Projection TV | $ 2,698 | 9 | $ 24,282 | 2 way 4 speaker system, Teletext, DVD component input. |
| 12 | G4351 | TV | Panasonic | 109cm Rear Projection TV | $ 2,798 | 3 | $ 8,394 | 100Hz digital scan, HDTV capable with a High Definition Set Top Box (not included), Teletext. |
| 13 | G4814 | TV | SAMSUNG | 121cm Rear Projection TV | $ 2,998 | 4 | $ 11,992 | 100Hz progressive scan, Teletext, picture in picture. |
| 14 | G5313 | TV | SONY | 130cm Rear Projection TV | $ 4,998 | 4 | $ 19,992 | Widescreen WEGA display, HDTV capable with a High Definition Set Top Box (not included), Memory Stick slot. |
| 15 | G5308 | TV | SONY | 130cm Widescreen Rear Prc | $ 5,493 | 4 | $ 21,972 | Anti-reflective coating, picture-in-picture, Teletext. |
| 16 | G7655 | Set Top Box | TEAC | Interactive Set Top Box | $ 598 | 6 | $ 3,588 | Dolby Digital sound capable (0ptical output), Teletext. |
| 17 | G7651 | Set Top Box | DGTEC | HD Set Top Box | $ 698 | 3 | $ 2,094 | High Definition, Dolby Digital, 5.1 channel surround. |
| 18 | G7653 | Set Top Box | DGTEC | HDTV Set Top Box | $ 898 | 2 | $ 1,796 | High Definition, Dolby Digital 5.1 channel surround, picture in picture. |
| 19 | G7975 | LCD Front Proj | SANYO | | | | | |
| 20 | G7971 | LCD Front Proj | SANYO | | | | | |
| 21 | G7967 | LCD Front Proj | SONY | | | | | |
| 22 | | | | | | | | |



The VLOOKUP function could be used with the data above to display information about a specific product from the product code. For example, if you were asked to look up the sale price of product code G5313, you would scan down the CODE column until you found the code and then scan across the row to the SALE PRICE column to find that data. The VLOOKUP function works in the same way. The function must be written in a specific format so that it works correctly:

**VLOOKUP(lookup_value,table_array,col_index_num,range_lookup)**

| | |
|---|---|
| Lookup_value | This is the cell reference where the code for the item you are interested in is initially entered. |
| Table_array | This is the cell range of the table. In the table above, it is A4:H21. |
| Col_index | This is the number of the column where the specific data will be found, so if you require Sale Price, then 5 will be entered here. If you require the Supplier, 3 will entered, and so on. |
| Range_lookup | This is used to determine if you require an exact match for the code. Use False if you do. |



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# Spreadsheets exercise 15

## *The VLOOKUP function*

**Skills practised**
- Open a file
- Entering a formula
- Use the VLOOKUP function
- Test formula
- Save file

1 Access the VLOOKUP file from the PIT2 Support Files.
2 Click on cell C27 and type `G4225`.
3 Click on cell C29 and enter the function to display the **SALE PRICE** given the value in C27 `=VLOOKUP(C27, A4:H21, 2, FALSE)`.
4 Use of the function to display **SUPPLIER**, **SPECIFIC**, **SALE PRICE** and **DESCRIPTION**.

| | |
|---|---|
| Enter Code | G4225 |
| Name | TV |
| Supplier | SONY |
| Specific | 106cm Plasma TV |
| Sale Price | $ 9,998.00 |
| Description | Built-in TV tuner, high 1024 x 1024 pixel resolution, HDTV capable with a High Definition Set Top Box (not included) |

*Test the result*

1 Click on cell C27 again and type another code such as `G7653`.
2 Check that all data displayed is accurately transferred from the table.
3 Try entering a code, say `B05`, and check the results. You should get an error message.
4 Save and close the VLOOKUP file.

A Please see the Interactive Textbook for additional content and Exercise 15a on the HLOOKUP function.



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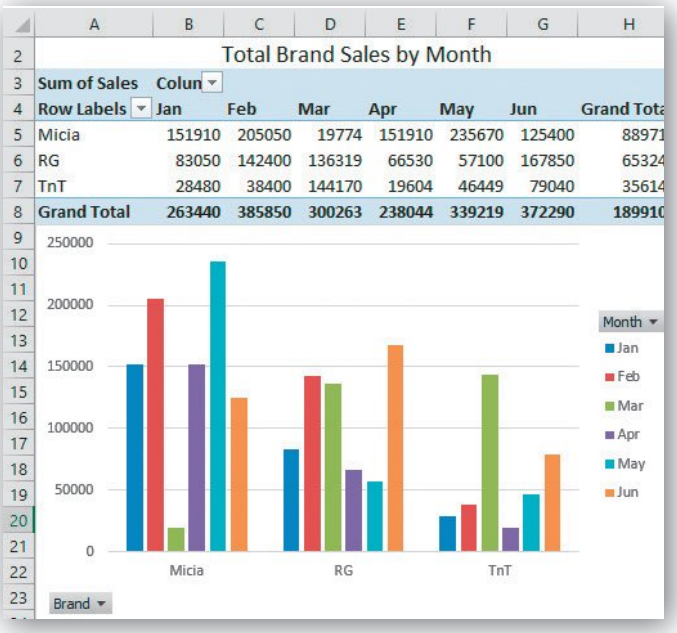
# 7.10 Pivot tables

Just wait until you can see what you can do with a pivot table! No more tedious summarising of endless worksheets and data, the pivot table does it all for you.

You can go from this list of data to this organised pivot table and pivot chart in seconds.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Telephone Plan Sales Summary | | | | |
| 2 | 6 months to June 2018 | | | | |
| 3 | | | | | |
| 4 | Salesperson | Brand | Units | Sales | Month |
| 5 | Roberts | Micia | 33 | 56255 | Jan |
| 6 | Oliver | Micia | 53 | 95655 | Jan |
| 7 | Roberts | RG | 35 | 34900 | Jan |
| 8 | Oliver | RG | 26 | 24650 | Jan |
| 9 | Manaco | RG | 28 | 23500 | Jan |
| 10 | Roberts | TnT | 22 | 8950 | Jan |
| 11 | Oliver | TnT | 23 | 10580 | Jan |
| 12 | Manaco | TnT | 24 | 8950 | Jan |
| 13 | Oliver | Micia | 35 | 33900 | Feb |
| 14 | Roberts | Micia | 46 | 91500 | Feb |
| 15 | Manaco | Micia | 50 | 79650 | Feb |
| 16 | Oliver | RG | 44 | 46520 | Feb |
| 17 | Roberts | RG | 44 | 41680 | Feb |
| 18 | Manaco | RG | 43 | 54200 | Feb |
| 19 | Roberts | TnT | 42 | 15890 | Feb |
| 20 | Manaco | TnT | 42 | 22510 | Feb |
| 21 | Oliver | Micia | 40 | 9120 | Mar |
| 22 | Manaco | Micia | 39 | 10654 | Mar |
| 23 | Oliver | RG | 38 | 8950 | Mar |
| 24 | Roberts | RG | 37 | 35869 | Mar |
| 25 | Manaco | RG | 36 | 91500 | Mar |
| 26 | Oliver | TnT | 35 | 97650 | Mar |
| 27 | Roberts | TnT | 34 | 46520 | Mar |
| 28 | Roberts | Micia | 50 | 56255 | Apr |
| 29 | Oliver | Micia | 44 | 95655 | Apr |
| 30 | Roberts | RG | 44 | 34900 | Apr |
| 31 | Oliver | RG | 43 | 22510 | Apr |
| 32 | Manaco | RG | 42 | 9120 | Apr |
| 33 | Roberts | TnT | 42 | 10654 | Apr |
| 34 | Oliver | TnT | 40 | 8950 | Apr |
| 35 | Manaco | TnT | 39 | 35869 | May |
| 36 | Oliver | Micia | 33 | 91500 | May |
| 37 | Roberts | Micia | 53 | 97650 | May |
| 38 | Manaco | Micia | 35 | 46520 | May |
| 39 | Oliver | RG | 38 | 24650 | May |
| 40 | Roberts | RG | 37 | 23500 | May |
| 41 | Manaco | RG | 36 | 8950 | May |
| 42 | Roberts | TnT | 35 | 10580 | May |
| 43 | Manaco | TnT | 34 | 8950 | Jun |
| 44 | Oliver | Micia | 26 | 33900 | Jun |
| 45 | Manaco | Micia | 28 | 91500 | Jun |
| 46 | Oliver | RG | 22 | 79650 | Jun |
| 47 | Roberts | RG | 23 | 46520 | Jun |
| 48 | Manaco | RG | 24 | 41680 | Jun |
| 49 | Oliver | TnT | 35 | 54200 | Jun |
| 50 | Roberts | TnT | 46 | 15890 | Jun |




A pivot table is most useful when data within some of the columns is out of a few values (e.g. the product is one of three machines, the salesperson is either Owens, Phillips or Richards). The pivot table can be summarised easily around these distinctive categories.

Pivot tables work best with lists of data where there is a clear list of records with obvious headings as in the list above. The headings of each column are used to organise the data into a summary.



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# Spreadsheets exercise 16

## *Create a pivot table*

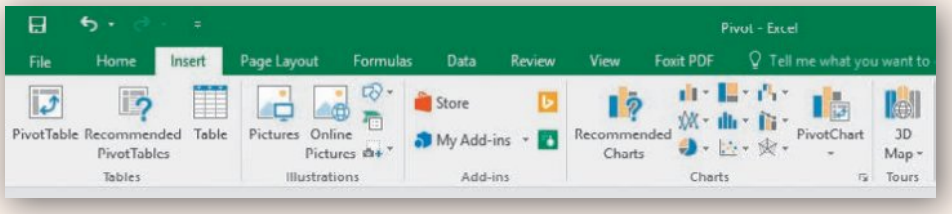
**Skills practised**
- Open a file
- Create a pivot table
- Modify a pivot table
- Save file

Now we will create our own pivot table.

1 Open the Pivot workbook from the PIT2 Support Files.

2 Select any cell in the list.

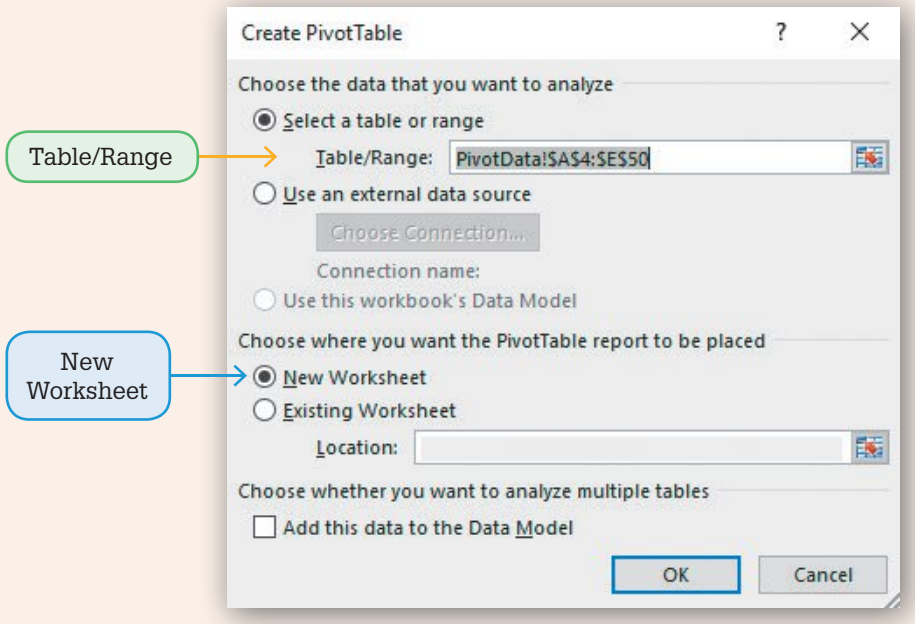
3 Click on the tab **INSERT** then the **PIVOT TABLE** button in the ribbon.
For Google Sheets, click on **DATA** then **PIVOT TABLE** and then skip to step 7.




4 Check that the whole list is selected and the correct cell range is in the Table/Range box.

5 Check that **NEW WORKSHEET** is selected so the new pivot table is put into a separate worksheet.

6 Click on **OK**.




The new worksheet will be displayed and the pivot table task pane is opened as shown on the following page. Notice that the task pane lists the fields from the original table. The lower part of the task pane is used to organise the structure of the pivot table. The pivot table task pane is only displayed while the active cell is within pivot table. The order you add fields to the structure determines the layout of the pivot table.

7 Click on the field **BRAND**, then **MONTH** – they will automatically be put in the **ROW LABELS** box.
For Google Sheets, click on **ADD FIELD** for **ROWS** and select **BRAND** only.



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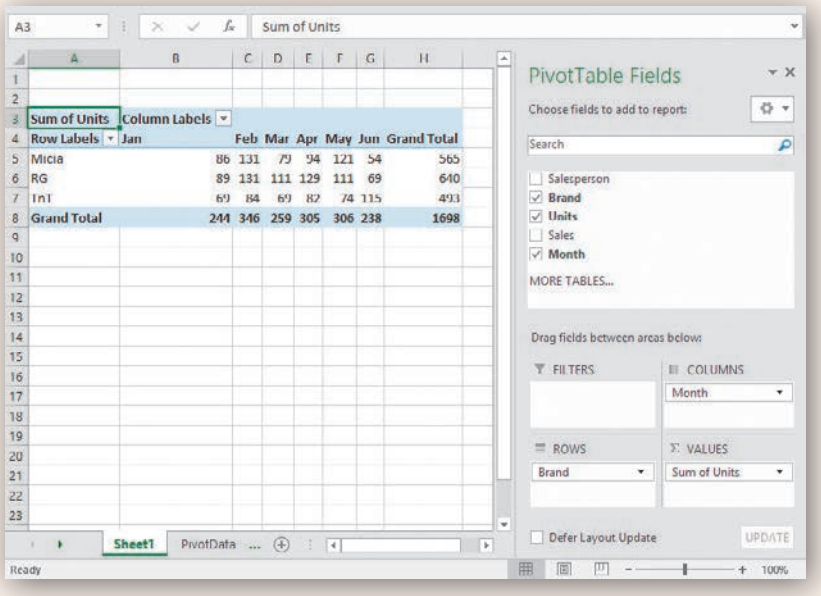
8 Click on the field **UNITS** – it will automatically be put into **SUM VALUES**.
For Google Sheets, click on **ADD FIELD** for **VALUES** and select **UNITS**.

9 Drag the **MONTH** field buttons over to the **COLUMN LABELS** box in the Task pane. For Google Sheets, click on **ADD FIELD** for **COLUMNS** and select **MONTH**. Your pivot table should appear as follows summarising the number of units sold for each product in each month.






# Spreadsheets exercise 17

## *Create a pivot table*

**Skills practised**
- Open a file
- Create a pivot table
- Modify a pivot table
- Save file

Now to create another pivot table that summarises the monthly dollar value of sales by each salesperson for each brand.

1 Select the Pivot data worksheet to move back to the list.

2 Click on any cell in the list.

3 Click on the tab **INSERT** then the **PIVOT TABLE** button in the ribbon.
For Google Sheets, click on **DATA** then **PIVOT TABLE** and skip to step 7.

4 Check that the whole list is selected and the correct cell range is in the Table/Range box.

5 Check that **NEW WORKSHEET** is selected so the new pivot table is put into a separate worksheet.

6 Click on **OK**.

7 Click on the fields in this order: **SALESPERSON**, **MONTH**, **BRAND** – they will automatically be put in the **ROW LABELS** box.
For Google Sheets, click on **ADD FIELD** for **ROWS** and select **SALESPERSON** and **MONTH** only.

8 Click on the field **SALES** – it will automatically be put into **SUM VALUES**.
For Google Sheets, click on **ADD FIELD** for **VALUES** and select **SALES**.

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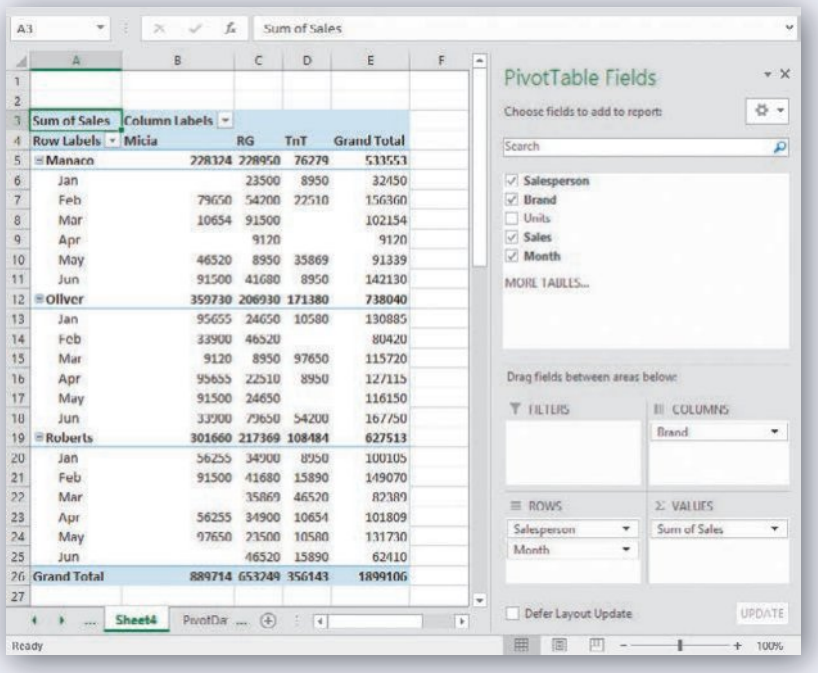
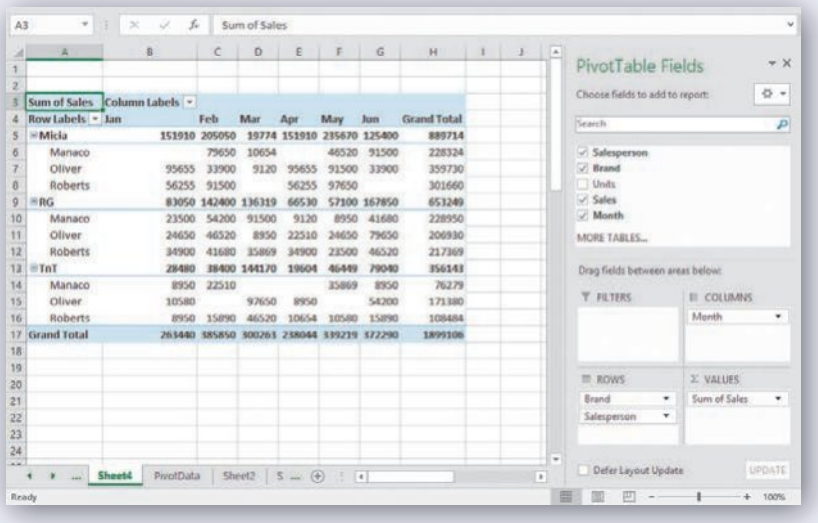
**9** Drag the **BRAND** field over to the **COLUMN LABELS** box.
For Google Sheets, click on **ADD FIELD** for **COLUMNS** and select **BRAND**. Your table should appear as below.




| Sum of Sales | Column Labels | | | |
|---|---|---|---|---|
| Row Labels | Micia | RG | TnT | Grand Total |
| Manaco | 228324 | 228950 | 76279 | 533553 |
| Jan | | 23500 | 8950 | 32450 |
| Feb | 79650 | 54200 | 22510 | 156360 |
| Mar | 10654 | 91500 | | 102154 |
| Apr | | 9120 | | 9120 |
| May | 46520 | 8950 | 35869 | 91339 |
| Jun | 91500 | 41680 | 8950 | 142130 |
| Oliver | 359730 | 206930 | 171380 | 738040 |
| Jan | 95655 | 24650 | 10580 | 130885 |
| Feb | 33900 | 46520 | | 80420 |
| Mar | 9120 | 8950 | 97650 | 115720 |
| Apr | 95655 | 22510 | 8950 | 127115 |
| May | 91500 | 24650 | | 116150 |
| Jun | 33900 | 79650 | 54200 | 167750 |
| Roberts | 301660 | 217369 | 108484 | 627513 |
| Jan | 56255 | 34900 | 8950 | 100105 |
| Feb | 91500 | 41680 | 15890 | 149070 |
| Mar | | 35869 | 46520 | 82389 |
| Apr | 56255 | 34900 | 10654 | 101809 |
| May | 97650 | 23500 | 10580 | 131730 |
| Jun | | 46520 | 15890 | 62410 |
| Grand Total | 889714 | 653249 | 356143 | 1899106 |

**10** Drag the label for **MONTH** to the **COLUMN LABELS** box.

**11** Drag the label for **BRAND** to appear before **SALESPERSON**. Now the data will be summarised by brand, then by salesperson for each month. Your pivot table should appear as follows.




| Sum of Sales | Column Labels | | | | | | |
|---|---|---|---|---|---|---|---|
| Row Labels | Jan | Feb | Mar | Apr | May | Jun | Grand Total |
| Micia | 151910 | 205050 | 19774 | 151910 | 235670 | 125400 | 889714 |
| Manaco | | 79650 | 10654 | | 46520 | 91500 | 228324 |
| Oliver | 95655 | 33900 | 9120 | 95655 | 91500 | 33900 | 359730 |
| Roberts | 56255 | 91500 | | 56255 | 97650 | | 301660 |
| RG | 83050 | 142400 | 136319 | 66530 | 57100 | 167850 | 653249 |
| Manaco | 23500 | 54200 | 91500 | 9120 | 8950 | 41680 | 228950 |
| Oliver | 24650 | 46520 | 8950 | 22510 | 24650 | 79650 | 206930 |
| Roberts | 34900 | 41680 | 35869 | 34900 | 23500 | 46520 | 217369 |
| TnT | 28480 | 38400 | 144170 | 19604 | 46449 | 79040 | 356143 |
| Manaco | 8950 | 22510 | | | 35869 | 8950 | 76279 |
| Oliver | 10580 | | 97650 | 8950 | | 54200 | 171380 |
| Roberts | 8950 | 15890 | 46520 | 10654 | 10580 | 15890 | 108484 |
| Grand Total | 263440 | 385850 | 300261 | 238044 | 339219 | 372290 | 1899106 |

**12** Save the file.

Please see the Interactive Textbook for an additional pivot chart challenge activity.



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# SPREADSHEETS PROJECT

Your sports master has a problem with tallying results for sporting events within the school, in particular, the athletics. The master would like to be able to tally the results of placegetters of each event. Point scores are 3 for 1st, 2 for 2nd and 1 for 3rd. After tallying results the master would then like to sort and summarise the results to produce the following information:

- scores for each gender age group by House
- overall scores for each category (i.e. track or field by House)
- overall scores for each House
- a listing of results for each House sorted in age group then gender
- a listing of first placegetters for selection into the interschool athletics team.

In solving this problem you should follow these stages.

## *Collecting the data*

Plan the columns that will be required in the results table to give the required information.

## *Defining the solution*

Design the table – in what order will you put the columns?

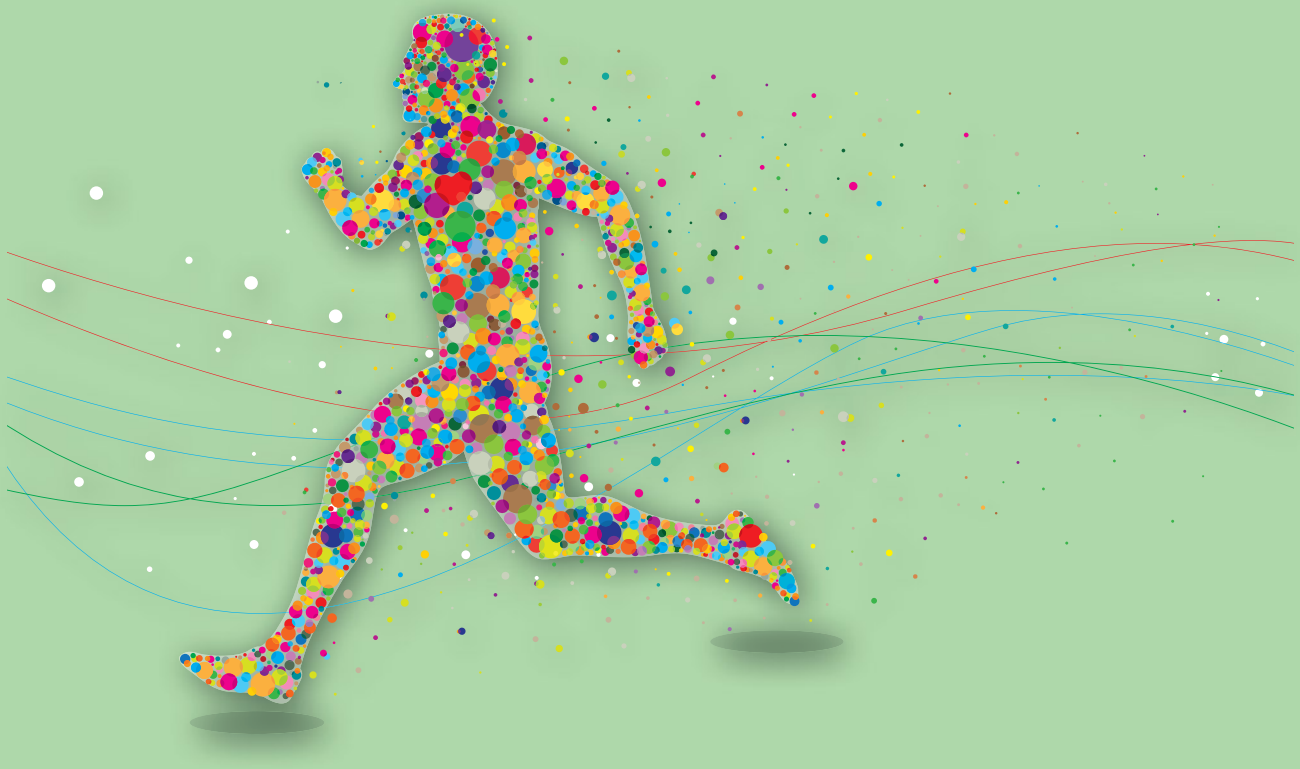
## *Implementing*

Enter the data, proofreading and editing as required. Sort and subtotal as necessary. Filter the tally to display appropriate listings.

## *Evaluating, collaborating and managing*

Evaluate the results of your listings. Are they conveying the information required? Could they be improved?





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# Module 8

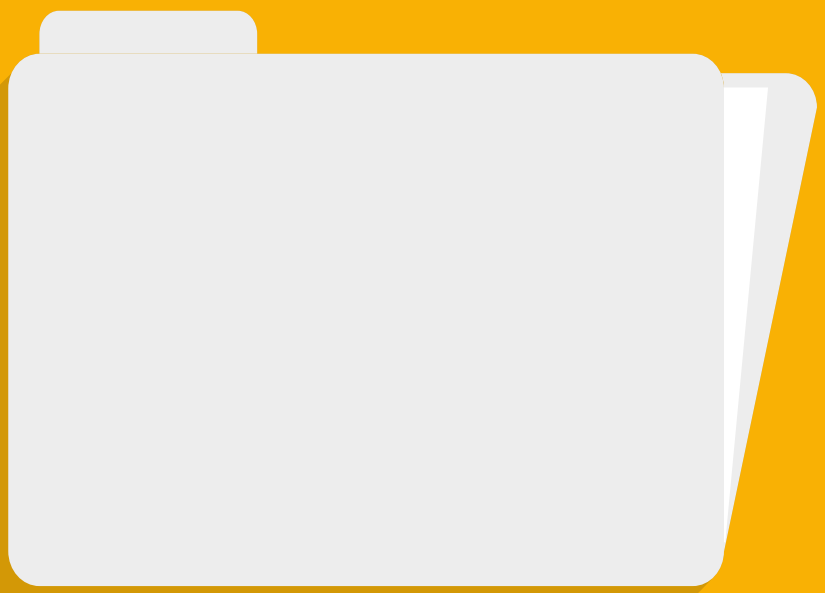
## DATABASES

Programs featured for exercises:

**Microsoft Access**
**FileMaker Pro**

Additional exercises available online for:

**Microsoft Access**
**FileMaker Pro**





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# Teacher information

## IT knowledge and skills covered in this module

- Reviewing database use
- Creating a database
- Calculations in databases
- Sorting records
- Finding and counting data items
- Creating a data entry screen

## Suggested further uses across the curriculum

- Economics and Business (for organising data). Gather relevant and reliable data and information from a range of digital, online and print sources (ACHES056).
- Mathematics (for a range of applications across the maths curriculum).
- Civics and Citizenship (organising information). Identify, gather and sort information and ideas from a range of sources and reference as appropriate (ACHCS096).

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Numeracy
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements (ACTDIP036)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)
- Evaluate critically how student solutions and existing information systems and policies take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)





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# 8.1 Reviewing databases

## What is data?

Data is simply a collection of characters (that is, letters, numbers and symbols), which, on their own, have no particular meaning. For example, the letters:

**Thissentencemakesnosense**

don't make much sense. They are just a series of letters. The numbers:

**10052003**

are just a series of numbers.

## What is information?

When you do something to data – that is, process it – you convert it into information. Information is something that can be communicated and understood. For example, if we add spaces to the text above:

**This sentence makes no sense.**

we can understand what it means. If we add slashes to the numbers:

**10/05/2003**

we can recognise this as a date, possibly a birth date.

# 8.2 What is a database?



When data about a particular topic is stored it is said to be a database. A database program allows the data to be processed into information, something that can be communicated and understood.

Some databases that we use in everyday life are telephone books, dictionaries, atlases, bus timetables and so on. These can be online or in printed form.

## Database terms

There are some important database terms that you will learn as you work through this topic.

### Fields

Data within a database is usually divided into categories or sections called fields. The fields that the telephone book is divided into are:

**Surname, Initials, Street Number, Street Name, Suburb, Telephone Number**

These fields can vary in length, depending on how much data (characters) needs to be placed into them. For example, an Initials field does not need as much space as a Surname field. Fields can be set to different types depending on the data they need to contain. For example, fields that will contain names are set to **text fields**, fields that will contain numbers are set to **number fields**.

### Records

One complete set of fields is termed a record. For example, each subscriber's details in the phone book are a record. There are over 1 000 000 records in the Melbourne telephone book.

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## Files

A complete set of records is called a file. The phone book is divided into two files: white pages and yellow pages. The following diagram shows the different sections of an address file.

| First name | Surname | Address | Phone number |
|---|---|---|---|
| Scott | Halligan | 112 Peal Drive, Belmont | 53421864 |
| Rachael | Pictor | 22 Kent Road, Highton | 53431023 |

Field names

Records

# 8.3 Creating a database

Two of the common database programs are Microsoft Access and FileMaker Pro. When you create a database the **field names** are entered followed by the **field type** that each field will contain, and, for some databases, the **field width** needs to be set.

The **field type** indicates the type of data that will be entered into the field. Examples of field types include: **text**, **number**, **date** and **calculation**. The field width sets how many letters or numbers will be allowed in that field.

In this case, a database will be created for Joe's Pizza Palaces, which are a chain of pizza cafes owned by Joe Palomari. Each cafe has a manager, cooks, waiting staff and home delivery drivers. The database will allow Joe to maintain his employees' details.

## Databases exercise 1

To revise databases from Book 1, a table will be created, some data entered and edited then a report will be produced.

**Skills practised**
- Creating a database
- Adding fields
- Field types
- Field widths
- Entering records
- Editing data
- Creating reports

### *Creating the database structure*

1 Start your database program and select a **NEW (DESKTOP) DATABASE**.

2 Call the file Pizza Palace, set the location to your storage folder and select **CREATE** or **SAVE**.

Note: Database programs usually save the data automatically as you enter it, so you need to save the file first before entering the data.

3 You can start entering data and field names directly as you did in Book 1, but as databases become more detailed it is normal to enter the field name and field types in a separate section before entering the data.

4 In Microsoft Access close the provided table, open the **CREATE** tab in the ribbon and select **TABLE DESIGN**.

In FileMaker Pro display the **FILE** menu, highlight **MANAGE** and select **DATABASE**.



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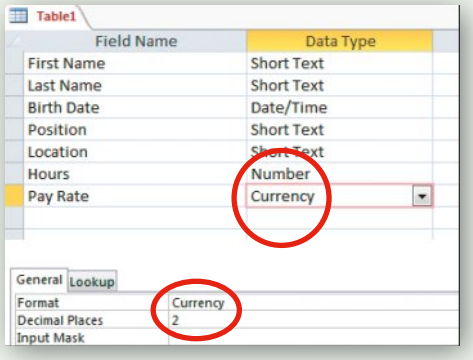
5 Enter the following fields and field types. There is no need to enter a Description or Comment.

| Field name | Field type |
|---|---|
| First Name | Short text or text |
| Last Name | Short text or text |
| Birth Date | Date and time or date |
| Position | Short text or text |
| Location | Short text or text |
| Hours | Number |
| Pay Rate | Currency or number |

6 In FileMaker Pro select **OK** to complete the table.

7 In Microsoft Access set the **DECIMAL** places for the **PAY RATE** field to 2 in the **FIELD PROPERTIES** pane below the field names so that the currency values are displayed with 2 decimal places.




8 In Microsoft Access tables must be saved individually. Click on the **SAVE** icon in the **QUICK ACCESS TOOLBAR** at the top of the screen, call the table Employees and select **OK**. Then select **YES** to the **PRIMARY KEY** warning.

9 In Microsoft Access set the **VIEW** icon to **DATASHEET** view so that data can be entered.



## *Entering the data*

Enter the following data into the fields, pressing the TAB key after each entry. In some versions of FileMaker Pro, the + icon needs to be clicked to add each new record.

| | | | | | |
|---|---|---|---|---|---|
| Michael Kenny | 10/5/65 | Manager | Richmond | 40 | $18.00 |
| Tony Bertoli | 4/8/85 | Cook | Essendon | 36 | $15.00 |
| Andrew Conrads | 12/1/90 | Cook | Keilor | 38 | $15.00 |
| Melinda Horten | 28/10/89 | Waiter | Richmond | 30 | $12.50 |
| Mario Costa | 17/9/85 | Waiter | Keilor | 35 | $12.50 |
| Sharon Jessop | 1/5/88 | Delivery | Richmond | 35 | $10.00 |
| Anthony Hall | 29/4/80 | Delivery | Essendon | 35 | $10.00 |
| Rita Bertoli | 6/5/82 | Manager | Essendon | 40 | $18.00 |
| Maree Tizard | 18/11/75 | Cook | Keilor | 30 | $15.00 |
| Kevin Browne | 14/12/87 | Cook | Essendon | 35 | $15.00 |
| Stuart Thompson | 5/3/89 | Waiter | Essendon | 25 | $12.50 |
| Paula Demenico | 12/8/90 | Waiter | Richmond | 35 | $12.50 |
| David Barrett | 2/4/80 | Manager | Keilor | 40 | $18.00 |
| Gail Norris | 10/12/91 | Delivery | Keilor | 30 | $10.00 |
| Robert Stojanovski | 13/3/88 | Delivery | Essendon | 35 | $10.00 |
| Alana Morrison | 7/6/91 | Cook | Richmond | 36 | $15.00 |

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## Creating a report

A report needs to be created to display the data efficiently. If you have forgotten how to create a report, refer to Exercise 5 in the Databases module of Book 1.

1 In Microsoft Access, click on the **REPORT** icon in the **CREATE** tab of the ribbon and save the report under an appropriate name.
2 In FileMaker Pro set the screen to **LAYOUT MODE** then select **NEW LAYOUT/ REPORT** from the **LAYOUTS** menu, select **LIST VIEW**, give the report a name and select **NEXT**.
3 Set the report to list all the fields (except the ID field in Microsoft Access). Add the title 'Joe's Pizza Palaces', the subheading 'Employee details' and include the current date.
4 Adjust the field widths so that the data is displayed neatly.
5 In FileMaker Pro, format the **PAY RATE** field to be set to **CURRENCY** with two decimal places.

## Editing the database

1 Two new employees have been hired. Return to the **EMPLOYEES** table and add the following records to the database:

| | | | | | |
|---|---|---|---|---|---|
| Allison McGowan | 8/10/69 | Delivery | Richmond | 35 | $10.00 |
| Peter Van Elden | 19/8/88 | Cook | Richmond | 36 | $15.00 |

2 Sharon Jessop has resigned from the company. Delete her from the database.
3 The following changes need to be made to the database:
   > Maree Tizard's hours to 25.
   > Robert Stojanovski has moved to the Keilor cafe.
   > The delivery employees have been granted a pay rise to $11.




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# 8.4 Calculations in databases

Calculations can be carried out within database programs. Both FileMaker Pro and Microsoft Access provide calculation field types for this purpose; however, in Microsoft Access it is more usual to do calculations within Queries. Queries are linked to tables and they provide more detailed searching and sorting options.

## Databases exercise 2

### *Calculations within a database*

**Skills practised**
- Calculations
- Calculation fields
- Creating a query

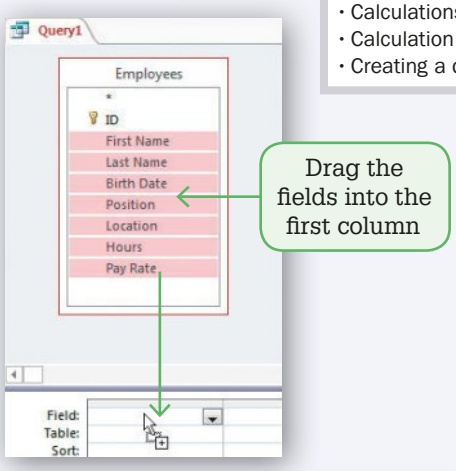
To illustrate doing calculations within a database, a calculation of the total pay for each employee at Joe's Pizza Palaces can be included.

1 In Microsoft Access:

**a** Open the **CREATE** tab of the ribbon and select the **QUERY DESIGN** icon.

**b** Click on **ADD** at the base of the **SHOW TABLE** dialogue box to add the **EMPLOYEES** table to the query then close the **SHOW TABLE** dialogue box.

**c** Select all the fields in the table except the ID field and drag them to the first column of cells at the base of the Query window.




**d** Click in the **FIELD** cell to the right of **PAY RATE** and enter the formula:

Pay: [Hours] * [Pay Rate]

| Field: | First Name | Last Name | Birth Date | Position | Location | Hours | Pay Rate | Pay: [Hours]*[Pay Rate] |
|---|---|---|---|---|---|---|---|---|
| Table: | Employees | Employees | Employees | Employees | Employees | Employees | Employees | |
| Sort: | | | | | | | | |
| Show: | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Criteria: | | | | | | | | |

**e** As with tables, queries must be saved. Click on the **SAVE** icon in the **QUICK ACCESS TOOLBAR** and call the query 'Employee pay query'.

**f** Click on the **RUN** icon in the ribbon to see the data and the calculation is applied to each employee.

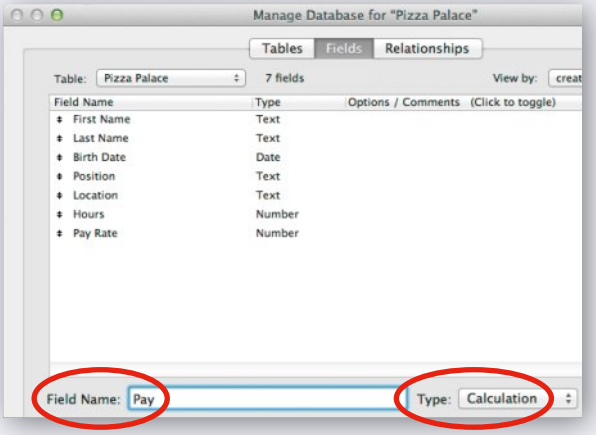
Note: The Query and Table are linked so, if you change data in the query, it will also be changed in the table. To return to a query design, click on the **VIEW** icon in the ribbon.

2 In FileMaker Pro:

**a** Display the **FILE** menu, highlight **MANAGE** and select **DATABASE**.

**b** Enter the **FIELD NAME** 'Pay' and set the **TYPE** box to **CALCULATION**.

**c** Click on **CREATE** and the **SPECIFY CALCULATION** dialogue box will be opened.



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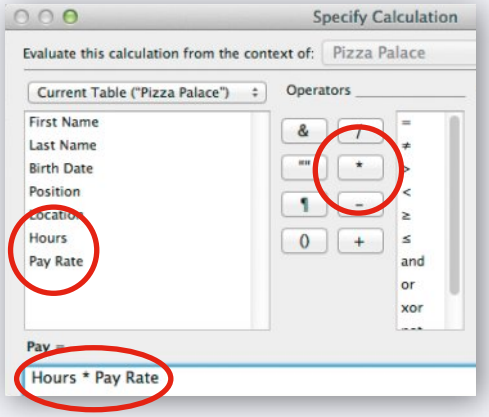
**d** Double click on the **HOURS** field to add it to the calculation, click on the * box then double click on the **PAY RATE** field.

**e** Select **OK** to return to the field list then select **OK** again to return to the data. The total should be displayed for each employee.

Note: You could modify the report from the previous exercise to include the **PAY** field or create a new report.




## 8.5 Sorting records

Sorting is the process of arranging records into a particular order. You are able to arrange records into alphabetical, numerical or chronological (date) orders.

You can sort data on one field only or on multiple fields. For example, you could list the Pizza Palace database in location order and within each location list the employees in alphabetical order by the names.

# Databases exercise 3

### *Single field sorting*

**Skills practised**
- One field sort
- Multiple fields sort
- Sort ascending
- Sort descending

Sorting can be quickly carried out on single fields.

**1** In Microsoft Access open the **EMPLOYEE PAY QUERY** and:

**a** Click in a **LOCATION** value then click on the **ASCENDING** icon in the Home tab of the ribbon and all the records are rearranged so that they are in **LOCATION** order.

**b** Click on a **PAY** value then click on the **DESCENDING** icon in the Home tab of the ribbon and all the records are rearranged so that the highest incomes are listed first down to the lowest incomes.

**c** Click on the **REMOVE SORT** icon in the ribbon to return the records to their original order.

**2** In FileMaker Pro:

**a** Click on the **LOCATION** field label at the top of the table and the records are rearranged so that they are displayed alphabetically in location order.

**b** Click on the **PAY** heading and all the records are rearranged so that the lowest incomes are listed first down to the highest incomes.

**c** Click on the **PAY** heading again and all the records are rearranged in descending order.

**d** Click on the **SORT** icon in the Toolbar, select **UNSORT** in the **SORT RECORDS** dialogue box and select **OK** to return the records to their original order.



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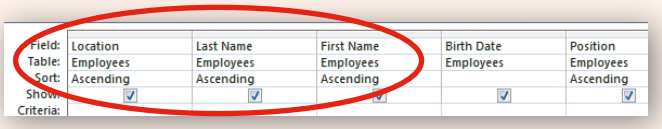
## *Multiple field sorting*

More complex sorting can be carried out on multiple fields. To illustrate this the data will be sorted into **LOCATION** alphabetical order, within each location the **LAST NAMES** will be sorted into alphabetical order and, if any last names are the same, the **FIRST NAMES** will be sorted into alphabetical order.

**1** In Microsoft Access a query can be rearranged to permanently display a sort order. To do this the columns are moved in the query so that the first field to be sorted is at the left, followed by the next field to be sorted, etc.

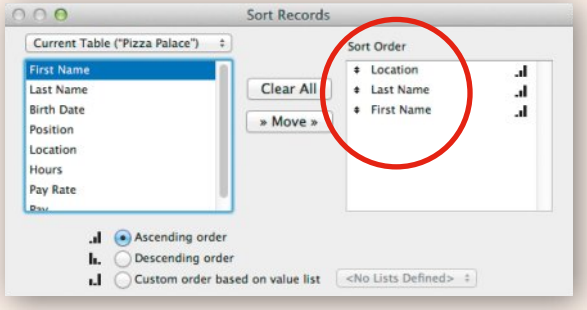
- **a** Click on the **VIEW** icon in the ribbon to open the **QUERY DESIGN** view.
- **b** Click on the bar above the **LOCATION** field then drag the column by the bar to the left of **FIRST NAME**.
- **c** Click on the bar above the **LAST NAME** field then drag the column by the bar to the left of **FIRST NAME**.
- **d** Set the **SORT** box for **LOCATION**, **LAST NAME** and **FIRST NAME** to **ASCENDING**.



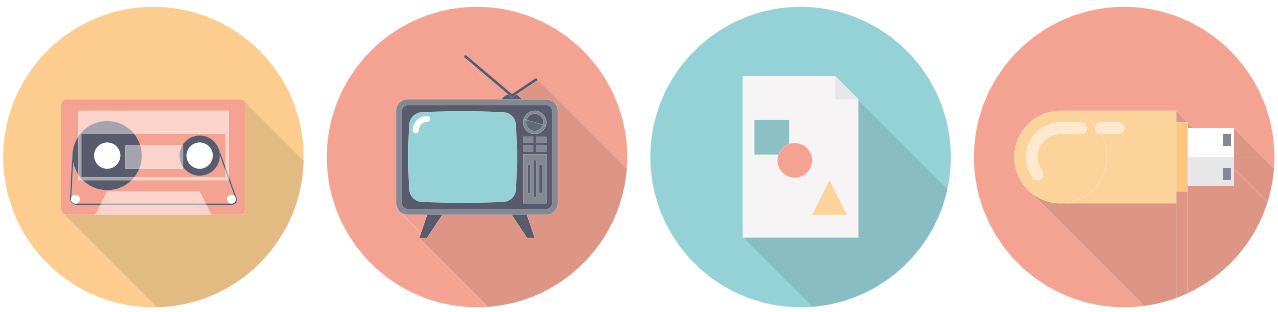

- **e** Run the Query and the records should be grouped with the **LOCATIONS** together and within each location the names in alphabetical order.
- **f** If you don't want a query altered, you can duplicate then make the sort changes to the duplicate, or you can create a new query.

**2** In FileMaker Pro:

- **a** Click on the **SORT** icon in the Toolbar.
- **b** Click on the **CLEAR ALL** button to clear any fields from the **SORT ORDER** frame.
- **c** Move the **LOCATION**, **LAST NAME** and **FIRST NAME** fields into the **SORT ORDER** frame.
- **d** If necessary a field can be selected in the **SORT ORDER** frame and its order changed to **DESCENDING**. In this case the default **ASCENDING ORDER** is applied to all the fields.
- **e** Click on the **SORT** button and the records should be grouped with the **LOCATIONS** together and within each location the names in alphabetical order.





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# 8.6 Finding data

Databases allow you to display just part of the data. For example, a school may wish to just display details for the girls, or all the students who travel to school by bus, or those students who speak a language other than English.

You can search on just one request or entry, which is called a single selection search, or you can search on multiple requests or entries, which is called a multiple selection search.

## Databases exercise 4

**Skills practised**
- Single data searches
- Multiple data searches

### *Single selection searches*

Let's display just the Richmond employees.

1 In Microsoft Access:
   - **a** Open the **EMPLOYEE PAY QUERY**, click in one of the **RICHMOND** values then click on the **SELECTION** icon in the ribbon and select **EQUALS** "**RICHMOND**".
   - **b** Just the Richmond employees are found and the number found is displayed in the Status Bar at the base of the screen.
   - **c** Click on the **TOGGLE FILTER** icon in the ribbon to return all the records to the list.

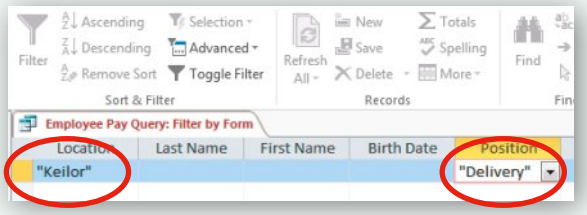
2 In FileMaker Pro:
   - **a** Click on the **FIND** button in the Toolbar (or press `<Ctrl+F>` or `<Command+F>`).
   - **b** Enter `Richmond` in the box under **LOCATION** and click on the **PERFORM FIND** button in the Toolbar (or press `<Return>` or `<Enter>`).
   - **c** Just the Richmond employees are found and the number found is displayed in the Toolbar.
   - **d** Click on the **SHOW ALL** button in the Toolbar to return all the records to the list.

   Note: It is always a good practice to return all the records to the list before you carry out new searches.

### *Multiple selection searches*

Searches can be made on more than one piece of data. For example, in the Pizza Palace database, Joe might want to know how many Delivery staff work at the Keilor shop or how many Cooks work over 35 hours a week.

1 In Microsoft Access:
   - **a** Open the **EMPLOYEE PAY QUERY** then click on the **ADVANCED** icon in the ribbon and select **FILTER BY FORM**.
   - **b** Enter `Keilor` under **LOCATION** and `Delivery` under **POSITION**.
   - **c** Click on the **TOGGLE FILTER** icon in the ribbon to show the employees. Two should be found.




   - **d** Click on the **ADVANCED** icon again and select **CLEAR FILTER** to return all the records to the list.
   - **e** You can also do a search in the Query Design when you want to keep the search. You can duplicate the current query or create a new one. By doing this you could have a query for the Richmond employees, another for the Keilor employees, etc. In this case we will use the current query.
   - **f** Click on the **VIEW** icon in the ribbon to open the **QUERY DESIGN**.



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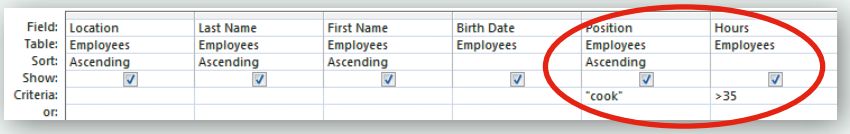
**g** In the **CRITERIA** row enter `Cook` in the **POSITION** cell and `>35` in the **HOURS** cell.




**h** Run the query and four cooks should be found.

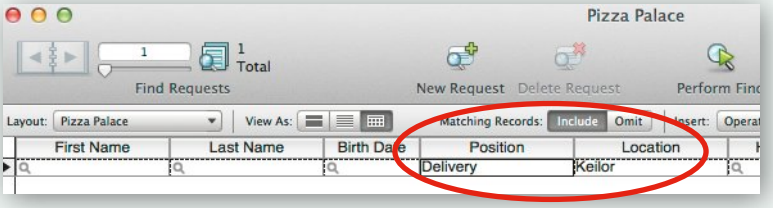
**i** Return to the **QUERY DESIGN**, remove the entries in the **CRITERIA** row and run the query to return all the records to the list.

**2** In FileMaker Pro:

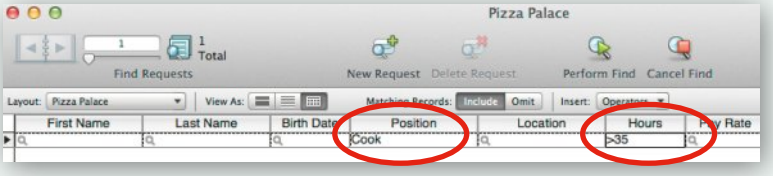
**a** Click on the **FIND** button in the Toolbar (or press `<Ctrl+F>` or `<Command+F>`).

**b** Enter `Delivery` under **POSITION** and `Keilor` under **LOCATION**.

**c** Click on the **PERFORM FIND** button in the Toolbar (or press `<Return>` or `<Enter>`) and two employees should be found.




**d** Press `<Ctrl+F>` or `<Command+F>` to perform another search. Enter `Cook` in the **POSITION** box and `>35` in the **HOURS** box.




**e** Press `<Return>` or `<Enter>` and four employees should be found.

**f** Click on the **SHOW ALL** button in the Toolbar to return all the records to the list.



## 8.7 Counting data items

The Search command of a database allows you to quickly count the number of items that meet a search request.

### Databases exercise 5

#### *Counting data items*

**Skills practised**
- Counting data items
- Single data searches
- Multiple data searches
- Sort ascending
- Sort descending

**1** Use either a single selection search or a multiple selection search to answer the following questions. You should not need to manually count any items to find the answers to these questions:

**a** How many employees are there at the Keilor cafe?

**b** How many cooks are employed?

**c** How many employees earn less than $550 per week?

**d** How many employees were born before 1/1/90?

**e** How many employees work over 35 hours per week?

**f** How many employees at the Essendon cafe work less than 35 hours per week?

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**g** How many delivery workers earn more than $400 per week?

**h** How many employees at the Richmond cafe were born before 1/1/90?

**2** If you need to find out who earns the most money or who is the oldest employee a sort is the easiest way to do it. Use a Sort request to answer the following questions:

**a** Who earns the most income?

**b** Who works the least hours per week?

**c** Who is the oldest employee?

**d** Who is the youngest employee?

## 8.8 Creating a data entry screen

Companies usually like to show all the data they are dealing with on the one screen. Professional-looking screen layouts can be created to make the data entry process easier. Fields can be moved, graphics, shading and lines can be added and so on.

Also, you can set fields to just display specific values in a popup list or through the use of check boxes or radio buttons. The easier the data entry process is made, the less chance there is of incorrect data being entered. Data entry screens are not usually printed.

## Databases exercise 6

### *Creating a data entry screen*

**Skills practised**
- Forms and layouts
- Inserting fields
- Inserting rectangles
- Inserting images
- Formatting items
- Entering data

The following data entry screen for Joe's Pizza Palaces needs to be created. There are simplified steps below or more detailed steps in the PIT2 Support Files. Locate the sample Pizza image in the PIT2 Support Files or you can find your own image.


**1** For Microsoft Access:

**a** Open the **CREATE** tab in the ribbon and select **FORM DESIGN** to start a new form.

**b** Drag the bottom right corner of the grid so that the grid fills the whole screen.

**c** Click on the **PROPERTY SHEET** icon in the **DESIGN** tab of the ribbon to open the **PROPERTY SHEET** pane.



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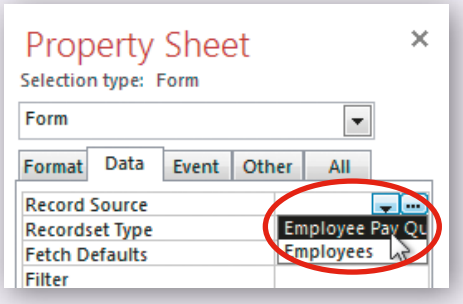
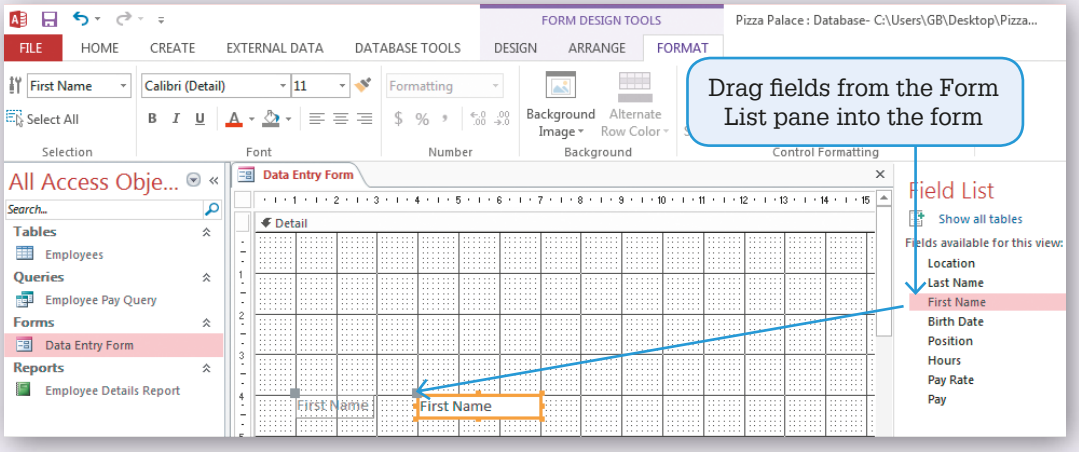
**d** Open the **DATA** tab in the **PROPERTY SHEET** pane and set the **RECORD SOURCE** box to the **EMPLOYEE PAY QUERY**. This links the form to data in the database. You can link the form to the query or the table, but the query shows the **PAY** calculation.




**e** Click on the **FORMAT** tab in the **PROPERTY SHEET** pane and set the **GRID X** and **GRID Y** values to 4 to create a more accurate grid.

**f** Click on the **SAVE** icon in the **QUICK ACCESS TOOLBAR** and save the form as **DATA ENTRY FORM**.




**g** Click on the **ADD EXISTING FIELDS** icon in the **DESIGN** tab of the ribbon and drag fields one by one from the **FIELDS** pane to the positions shown in the diagram at the start of the exercise.

**h** Use the **RECTANGLE** control from the **DESIGN** tab to add rectangles around the field boxes, shade the rectangles and send them behind the field boxes (**ARRANGE** tab).

**i** Add an image and labels at the top of the form using the controls in the **DESIGN** tab. Format the labels and fields.

**j** Save the form and set the view to **FORM VIEW**. If you need to return to the form design to make adjustments, select **FORM DESIGN** from the **VIEW** tab.

**2** For FileMaker Pro:

**a** Set the screen to **LAYOUT MODE** by pressing `<Ctrl+L>` or `<Command+L>`.

**b** Display the **LAYOUTS** menu, select **NEW LAYOUTS/REPORT**, call the layout 'Data entry', select **BLANK LAYOUT** and click on **FINISH**.

**c** Delete the **HEADER** and **FOOTER** parts from the layout by selecting each tab and pressing the **DELETE** key, then drag the **BODY** part down so that it fills the whole screen.

**d** Use the **VIEW** menu to turn on **GRAPHICS RULERS**, **TEXT RULER** and **RULER LINES**.



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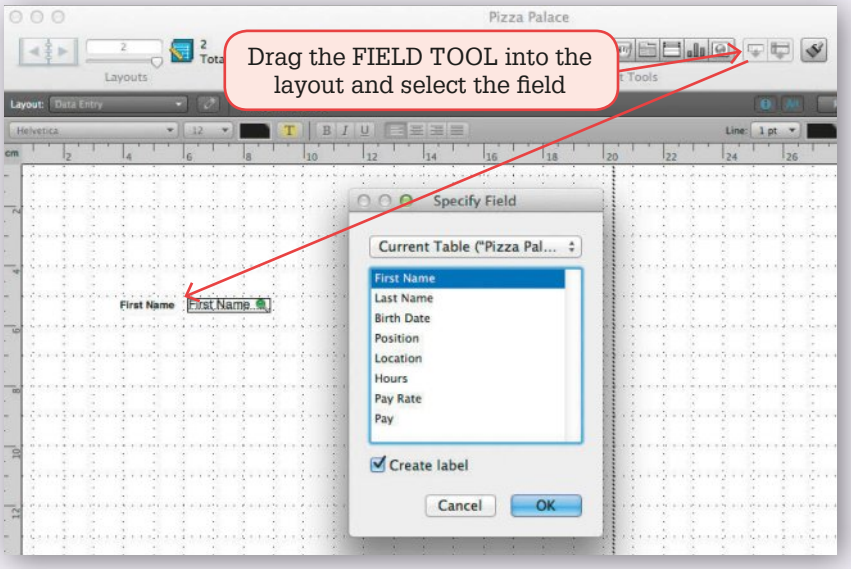
**e** Click on the **FIELD TOOL** box in the **LAYOUT TOOLS** and drag the box to the left of the layout.

**f** In the provided field list click on **FIRST NAME** and select **OK** to insert the field.




**g** Drag the **FIELD TOOL** to the positions shown in the diagram at the start of the exercise to insert the rest of the fields.

**h** Use the **RECTANGLE TOOL** from the **LAYOUT TOOLS** to add rectangles around the field boxes, shade the rectangles using the **FORMATTING BAR** and send the rectangles behind the field boxes (**ARRANGE** menu).

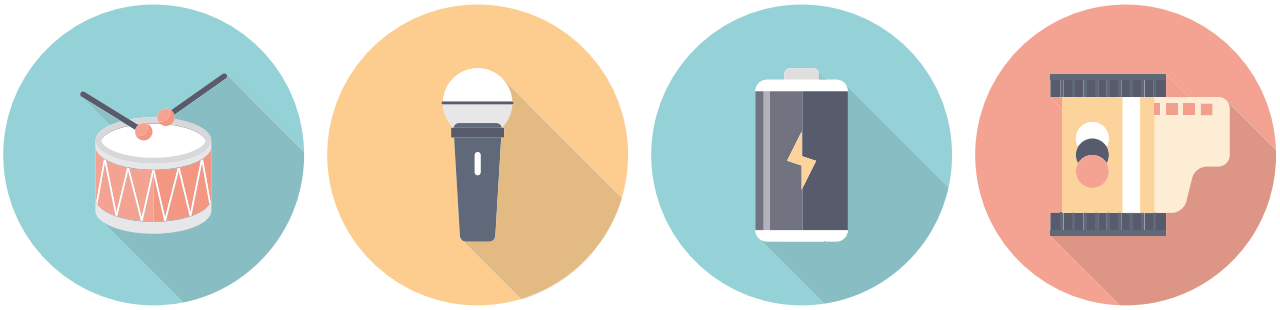
**i** Use the **INSERT** menu – **PICTURE** to add a pizza image to the top of the layout then use the **TEXT TOOL** from the **LAYOUT TOOLS** to add headings. Format the labels and fields.

**j** Press <Ctrl+B> or <Command+B> to return to **BROWSE MODE**. If you need to return to the layout to make adjustments, <Ctrl+L> or <Command+L> can be pressed.

**3** Use your data entry screen to enter the following records:

| | | | | | |
|---|---|---|---|---|---|
| Andrea Mason | 30/5/88 | Cook | Richmond | 25 | $15.00 |
| Keith Gilchrist | 14/3/91 | Delivery | Essendon | 30 | $11.00 |

Please see the Interactive Textbook for additional instructions for this exercise suitable for Microsoft Access and FileMaker Pro.





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DATABASES PROJECT

# Eastwick Football Club

You are to assist the president of the Eastwick Football Club – the only football team in the country town of Eastwick (population 1755). Until now, he has managed the members' (players and officials) details manually. It has become too time-consuming because many members have left the town recently, so the president has decided to computerise the details. You have been called in to help out!

A database with the following fields is required to record details about each member: First name, Last name, Address, Phone number, First joined, Club position, Payment per week, Membership paid, and Games played. After the data is entered, three reports are needed:

- A data entry screen showing all the fields so that member details can be updated. Print this for one record only if your teacher requires you to.
- A Column report showing First name, Last name, Address, Phone number, Position and First joined. This should be sorted in alphabetical order and then printed.
- A Column report showing First name, Last name, Payment per week, Membership paid and Games played. Print two copies of this report:
  - one listing unpaid memberships
  - another showing how many players have played over 150 games (and hence become automatic life members of the club).

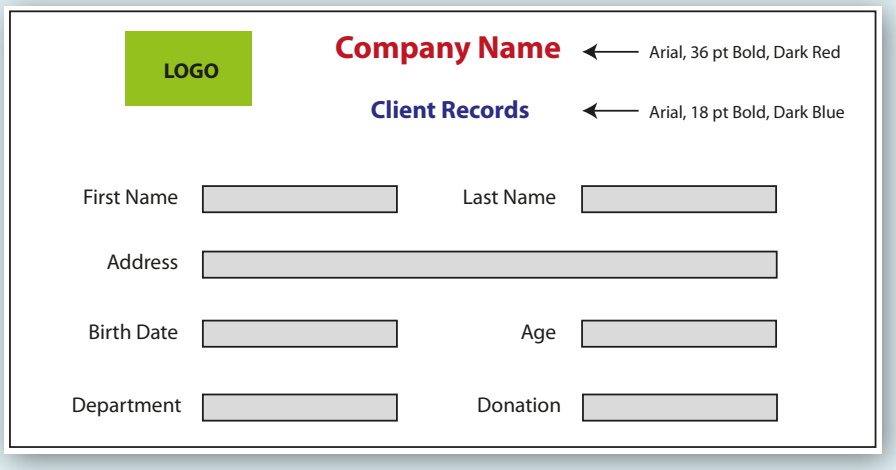


## Collecting the data

Plan the field types that will be required and the different types of reports that will be needed. Create a field list diagram as shown in Exercise 1. The data for the club is at the end of this project.

## Defining the solution

Draw thumbnail sketches of the data entry screen and the different reports that you will create. Include the headings and subheadings that will be required, the fonts and sizes that you intend to use, the width of the columns or fields, how the report will be sorted and any graphics that will used, etc. The following are examples of a data entry screen and a report.

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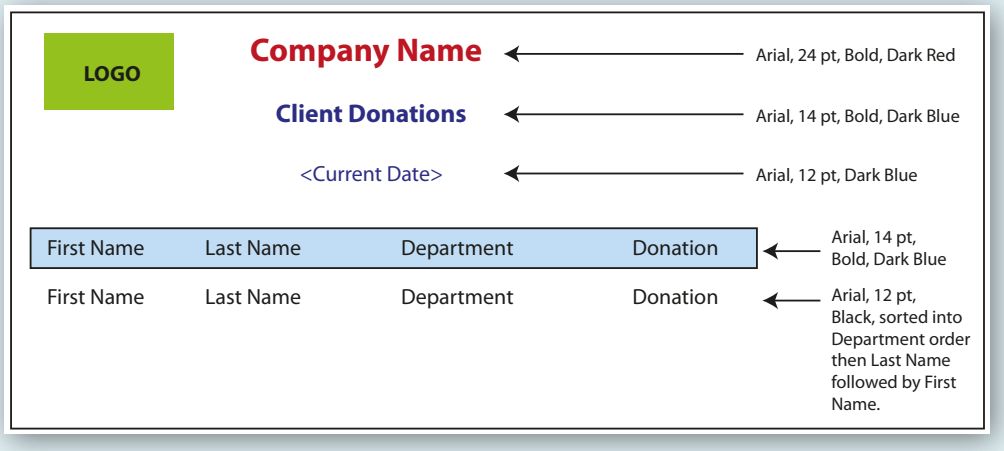


## *Implementing*

Enter the fields and create the data entry screen. Enter the data shown below. Print the data entry screen for one record only. Create the necessary reports, sort them into the required order, carry out the required searches and print copies of the reports.

## *Evaluating, collaborating and managing*

1 What are the advantages in having the members' details on computer rather than manually recorded details?

2 How will the database make the operation of the Eastwick Football Club more:

**a** efficient?

**b** effective?



## Project data: Eastwick Football Club

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Paul Harrison | 45 Main Street Eastwick 5557 | 0858 125368 | 1988 | Treasurer | – | Yes | 197 |
| Andrea Hall | 306 Longley Court Eastwick 5557 | 0858 521236 | 2004 | Trainer | $50 | Yes | 0 |
| Barry Martinez | 6 Watson Street Westwick 5558 | 0858 623125 | 1976 | Coach | – | No | 366 |
| Laurie Stone | 23 Hillview Road Southwick 5556 | 0858 521756 | 2013 | Player | $100 | Yes | 62 |
| Ron Knowles | 96 Rose Road Westwick 5558 | 0855 855275 | 1990 | Supporter | – | Yes | 0 |
| Peter Collins | 51 Rovers Lane Northwick 5555 | 0858 963584 | 2009 | Player | $80 | No | 173 |
| Rex Peters | 75 Yallop Street Eastwick 5557 | 0858 714598 | 2014 | Player | – | No | 68 |
| Harry Alum | 2 Jacobs Court Eastwick 5557 | 0858 458615 | 2011 | Player | $150 | Yes | 70 |
| Paula Killop | 11 Williams Road Southwick 5556 | 0885 428694 | 1991 | Supporter | – | No | 0 |
| Ozzie Giles | 60 South Street Eastwick 5557 | 0858 652536 | 2008 | Player | – | Yes | 295 |

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# Module 9

## WEBPAGE AUTHORING

Program featured for exercises:

**Adobe Dreamweaver CC**

Alternative exercises available online for:

**Adobe Dreamweaver CS6**



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# Teacher information

## IT knowledge and skills covered in this module

- Introducing webpage authoring
- Design considerations and creating a site
- Inserting text and graphics
- Using tables and templates
- Setting links and creating forms
- Adaptive and responsive webpages

## Suggested further uses across the curriculum

- English (for presenting information). Use a range of software, including word processing programs, confidently, flexibly and imaginatively to create, edit and publish texts, considering the identified purpose and the characteristics of the user (ACELY1748, ACELY1776).
- History (for presenting information). Select and use a range of communication forms (oral, graphic, written) and digital technologies (ACHHS193).
- Geography (for communicating information). Present findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies as appropriate (ACHGS079).

## Alignment with the Australian Curriculum



### ICT Capability elements covered

- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Literacy
- Numeracy
- Critical and creative thinking
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements (ACTDIP036)
- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)
- Create interactive solutions for sharing ideas and information online, taking into account safety, social contexts and legal responsibilities (ACTDIP043)


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# 9.1 Webpage authoring

Webpages can be created in three different ways. **HTML (hypertext markup language)** editors allow you to enter the HTML code directly. **Web-authoring software** such as Adobe Dreamweaver builds the HTML code for you. Content management systems, such as WordPress, allow you to develop a website based on provided templates.

To introduce you to webpage creation, a fixed website will be created using Adobe Dreamweaver's provided tools. If you wish to pursue webpage creation in more detail, the next step is to learn how to lay out pages using HTML commands and Cascading Style Sheets (CSS). These allow you to create sites that adjust to different devices and different screen sizes.

**HTML (hypertext markup language)**
One of the first coding systems (or languages) designed to be used for webpage files so that an internet browser can efficiently display a page and elements for that page such as text, links and media in the intended position. There are newer versions of this language and alternative markup languages.

**web-authoring software**
A computer program designed to assist in the creation of webpages. Simple web-authoring software may take a form of a basic text editor, or may contain more advanced features that allow for editing the content and layout of a web page.

# 9.2 Design considerations

When creating an internet site there are some design considerations that should be kept in the back of your mind. These include:



- Always try to ensure that text in your webpage is easy to read. If you use a dark background, set the text to a light colour. If you use a light background, set the text to a dark colour.
- Try to break the site up into separate linked pages rather than one page that scrolls.
- Fonts are usually grouped into 'families' of similar looking fonts. It is advisable not to use fonts from more than two different font families.

## Types of graphics

There are three main types of graphics used in webpages:

- GIF (Graphic Interface Format), which is popular for short, looped animations.
- JPEG (Joint Photographic Experts Group), which is a high resolution format, but the graphic information is compressed and has to be loaded then expanded, which takes longer. Use the JPEG format for photographs and graphics that require a high degree of colour definition. Images in this format have a filled background.
- PNG (Portable Network Graphics), which is a similar format to JPEG, but it provides the advantage that the backgrounds of these images can be transparent.

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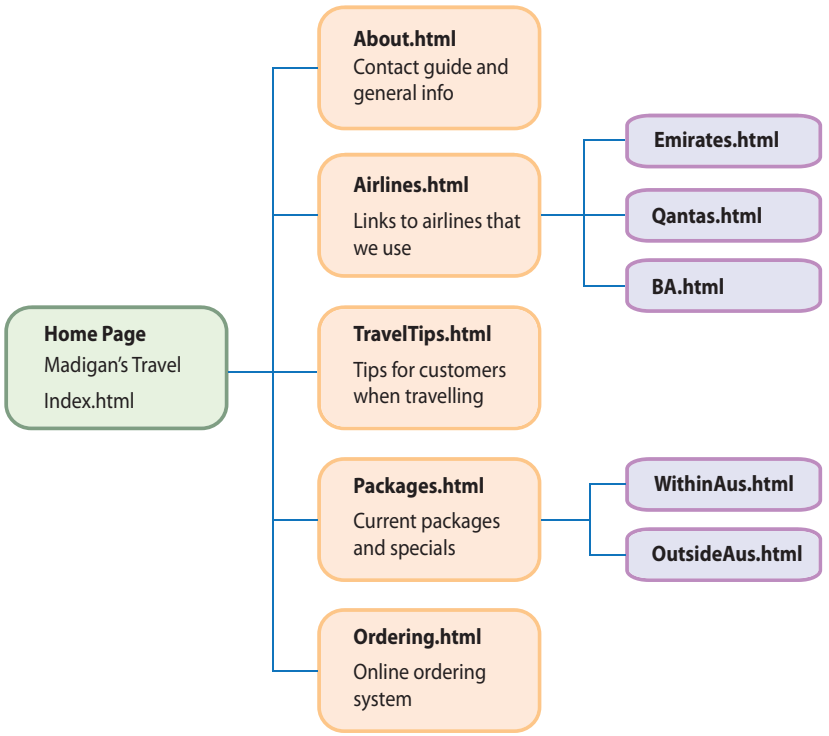
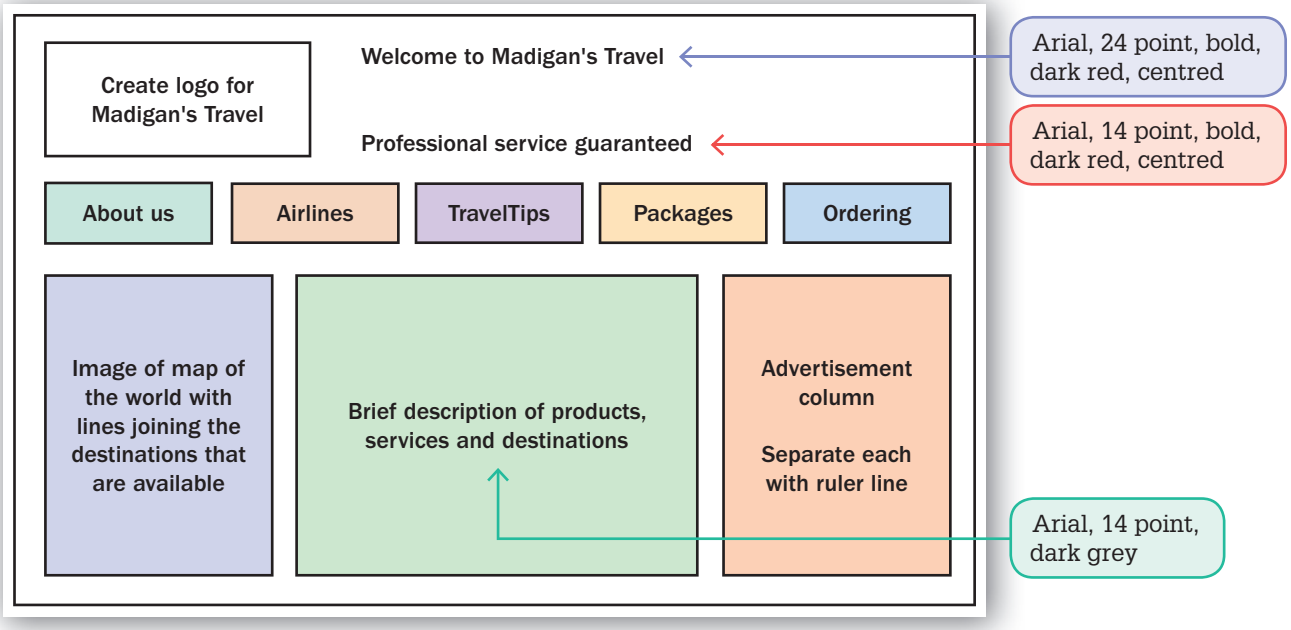
## Planning the navigation

When creating an internet site it is important to plan the site carefully. It is much more efficient to break the site up into separate pages and link those pages, rather than providing the site in one page that the user scrolls through.

In particular, you should plan how the user will navigate from page to page. Some things to do are:

- Work out how the home page can load quickly.
- Work out where you want the person to be able to go from the home page. Draw a structure diagram. The diagram to the right provides an example.
- Decide how the navigation will be provided. Will both text and graphics be provided to allow the user to move from page to page?
- Draw layout or mock-up diagrams for the different pages. If you plan to use a template, a diagram for that should also be provided. The following diagram provides a sample of a layout diagram for a home or opening page.



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# 9.3 Creating a site

When starting a website, some prior setup work is required. A folder needs to be created to store all the site files and the program directed to this file. Usually a CSS (Cascading Style Sheet) file is also created to store all the formatting and layout details.

For these exercises a simplified website will be created for a business called Movie Magic, which allows movies to be purchased either on DVD, downloaded or streamed from their website.

## Webpage authoring exercise 1

### *Setting up a site*

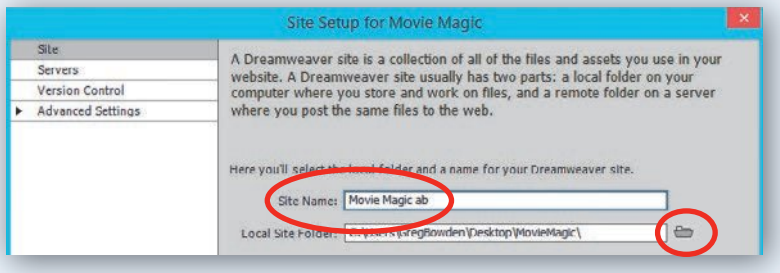
**Skills practised**
- Creating a site
- Page title
- Saving a page

1 Create a folder in your storage folder called MovieMagic (with no spaces). This folder will be used to store all the files, images and templates for the website.

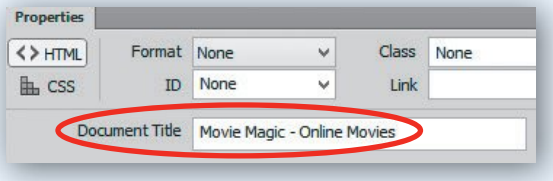
2 Load Adobe Dreamweaver and create a **NEW HTML DOCUMENT**. If the **FRAMEWORK** option is visible, it should be set to **NONE**.

3 Display the **SITE** menu and select **NEW SITE.**

4 Set the **SITE NAME** to Movie Magic followed by your initials and set the **LOCAL SITE FOLDER** to your MovieMagic folder, then select **SAVE**.




5 In the Properties panel set the **DOCUMENT TITLE** box to Movie Magic – Online Movies. This will appear at the top of the page when the page is opened in a browser.




Note: If the Properties panel is not open, use the **WINDOW** menu to open it and move the panel to the base of the screen.

6 Click back in the work page and save the page as: home.html.

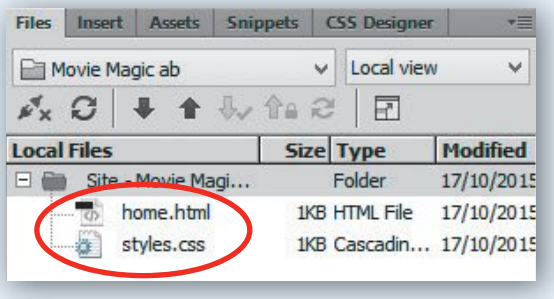
7 A second page is required to store the formatting details for the site. This is much more efficient than formatting each page individually and ensures that the formatting is consistent throughout the whole site.

8 Display the **FILE** menu and select **NEW**.

9 Select **CSS** in the **DOCUMENT TYPE** frame and select **CREATE**.

10 Save the file as styles.css.

11 You should have two files, which have tabs at the top of the screen and are displayed in the **FILES** panel at the right.



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# 9.4 Inserting text and graphics

A simple home page will be created to demonstrate how to enter and format text and images.

## Webpage authoring exercise 2

### Skills practised

- Entering text
- Formatting text
- Using a CSS style
- Inserting an image
- Page background
- Horizontal rules

### *Entering text*

1 Open the home.html page and set the view at the top of the screen to **DESIGN** or **LIVE**.

2 Press <Enter> or <Return> to leave a blank line and enter the text shown at the right, pressing <Enter> or <Return> after each line.

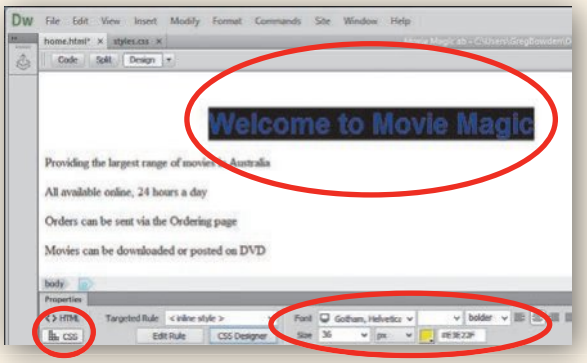
3 You can spell check the text.


### *Formatting the text*

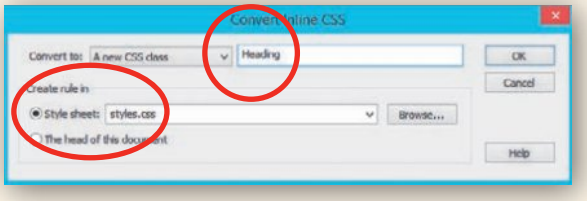
Each paragraph can be formatted individually, but it is much more efficient to create a series of styles, called CSS styles, which will be recorded in the styles.css file.

1 Highlight the first line of text and, in the Properties panel, turn on the **CSS** button and set the **FONT** to **GOTHAM**, the **FONT-WEIGHT** to **BOLDER**, the **SIZE** to **36 px**, the **COLOUR** to **YELLOW** and the **ALIGNMENT** to **CENTRE**.

2 Display the **TOOLS** menu, highlight **CSS** and select **CONVERT INLINE CSS TO RULE**.




3 Call the style Heading and use the **BROWSE** button to set the **STYLE SHEET** box to your styles.css file, then select **OK**.




4 Highlight the next line of text and, in the Properties panel, turn on the **CSS** button and set the **FONT** to **CAMBRIA**, the **FONT-WEIGHT** to **BOLD**, the **SIZE** to **18 px**, the **COLOUR** to **PALE BLUE** and the **ALIGNMENT** to **CENTRE**.



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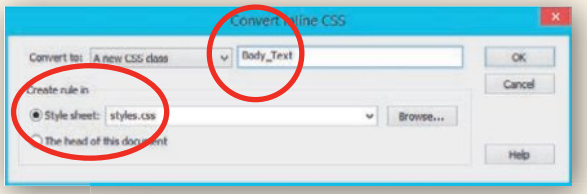
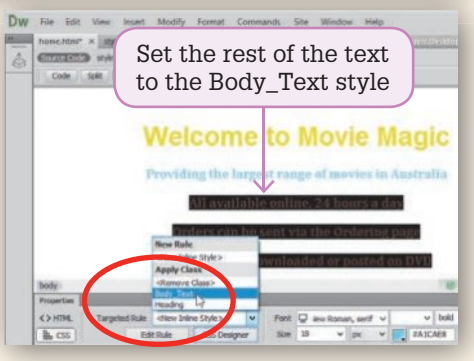
5 Display the **TOOLS** menu, highlight **CSS** and select **CONVERT INLINE CSS TO RULE**.

6 Call the style: Body_Text and check that the **STYLE SHEET** box is set to your styles.css file, then select **OK**.




7 Highlight the last three lines of text and set the **TARGETED RULE** box in the Properties panel to the **BODY_TEXT** style.




## Adding a background colour to the page

A background colour can be applied to the page.

1 In the Properties panel, click on the **PAGE PROPERTIES** button.

2 Click on the **BACKGROUND COLOUR** box, select a **DARK BLUE** or **DARK TEAL** and press <Enter> or <Return>.

3 Select **OK** to return to the page.

## Inserting an image

An image will be added below the text. This image is in the PIT2 Support Files.

1 Click on the blank line after the last text then display the **INSERT** menu and select **IMAGE**.

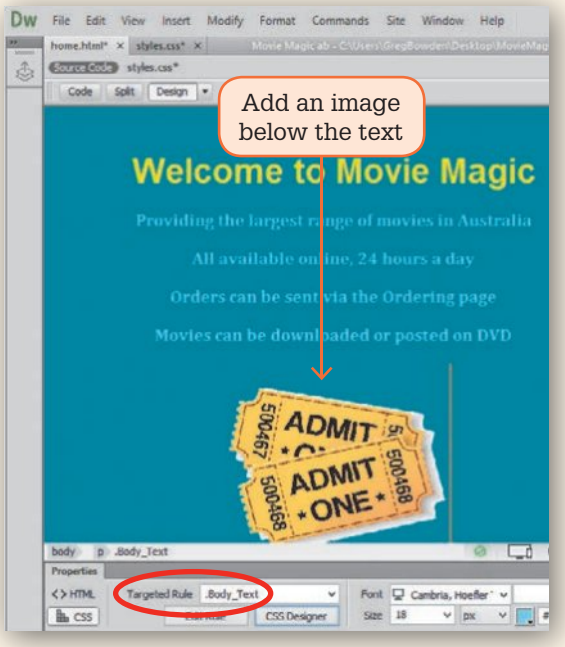
2 In the PIT2 Support Files, open the Webpages folder and open the Ticket image.

3 When asked to copy the file to your site's **ROOT FOLDER**, select **YES.**

4 Create a **NEW FOLDER** called Images. Open the folder and select **SAVE** to store the image in that folder.

5 You can use the bottom right handle of the image to adjust its size. Holding down the **SHIFT** key will maintain the proportions of the image.

6 The **BODY_TEXT** style can be used to centre the image. Click to the right of the image and set the **TARGETED RULE** box in the Properties panel to **BODY_TEXT**.



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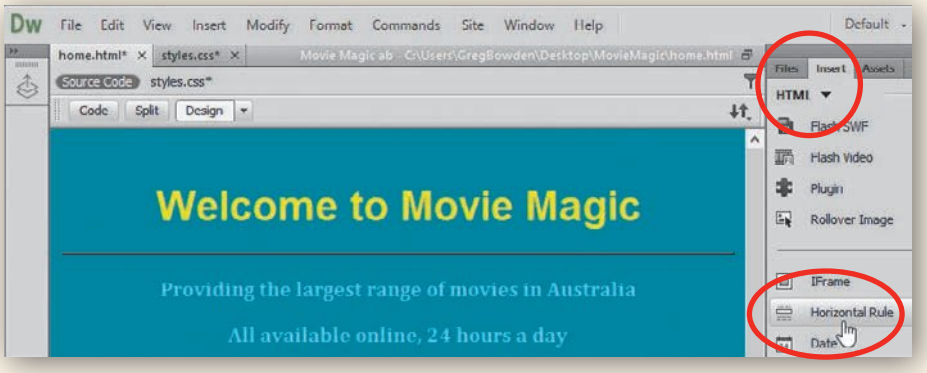
### *Adding a line to separate the heading*

A horizontal line can be added to the page to separate the heading from the text.

1 Click at the beginning of the second line of text.

2 Open the **INSERT** tab in the **PANEL GROUP** at the right of the screen and, in the **HTML** section, scroll down and click on the **HORIZONTAL RULE** option.




Note: The Properties panel can be used to format the line.

3 Select **SAVE ALL** from the **FILE** menu to save both the Home and Styles pages.

4 You can click on the **REAL-TIME PREVIEW** icon in the **STATUS BAR** at the base of the page and select a browser to see how the page looks.

## 9.5 Using tables

When you need to align text and/or graphics on a page, the Table feature is an easy way to achieve this. In a more detailed website CSS Styles would be used to align the text and images.



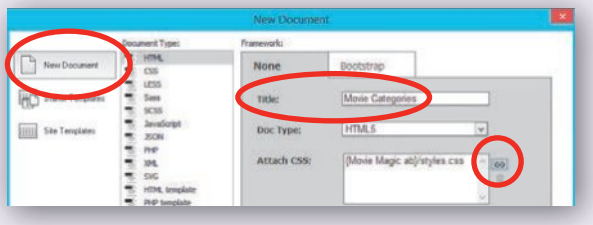
## Webpage authoring exercise 3

### *Starting a new page*

**Skills practised**
- Inserting a table
- Table properties
- Inserting an image
- Inserting text
- Page background
- Horizontal rules

1 Open your Movie Magic site and select **NEW** from the **FILE** menu.

2 Select **HTML** in the **DOCUMENT TYPE** frame and set the **TITLE** box to Movie Categories.




3 Click on the **ATTACH STYLE SHEET** button, browse to your styles.css file and select **OK** to add the styles.css file to the Attach CSS frame. This will link the styles to the new page.

4 Select **CREATE** to start the page and save it as: categories.html.

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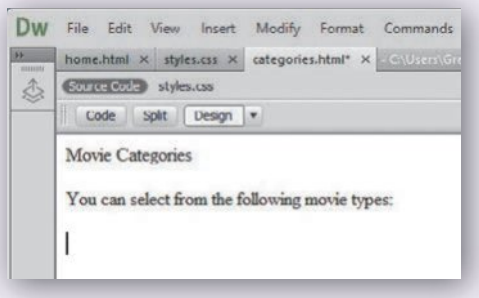
## Adding the title text

Some text will be needed above the table.

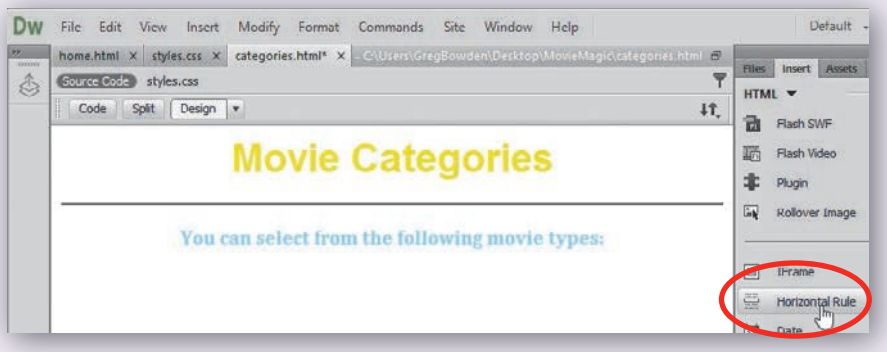



1 Enter the text shown in the diagram to the right, pressing <Enter> or <Return> after each line.

2 Highlight **MOVIE CATEGORIES** and select the **HEADING** style from the **TARGETED RULE** box in the **CSS** section of the Properties panel to format it.

3 Format the sentence to the **BODY_TEXT** style.

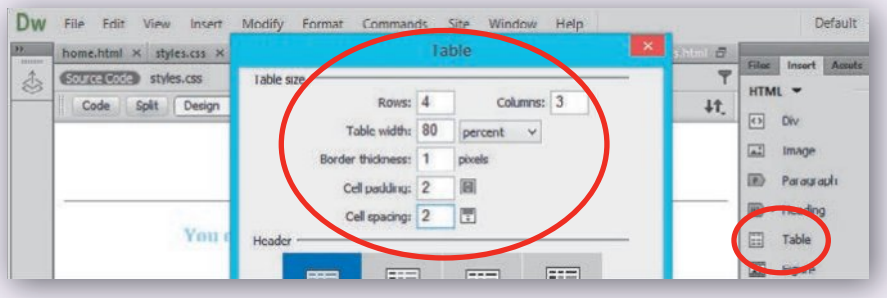
4 Click at the beginning of the second line and insert a **HORIZONTAL RULE** to separate it from the heading.




## Inserting the table

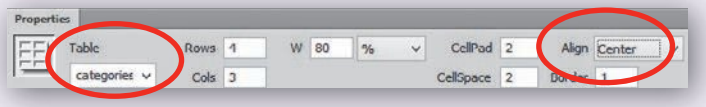
1 Click on the blank line below the sentence and click on the **TABLE** icon in the **INSERT** tab of the **PANEL GROUP.**

2 Set the table to have the values indicated in the diagram to the right.




Note: Setting the **TABLE WIDTH** to **80 PERCENT** means that the table will fill 80% of the screen no matter how large or small the screen is.

3 In the Properties panel set the **TABLE** name to **CATEGORIES** and the **ALIGN** box to **CENTRE** so that the table is centred on the page.



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## Inserting graphics

Images can be inserted into table cells. These images have been prepared for you.

1 Click in the top left cell and click on the **IMAGE** icon in the **INSERT** tab of the **PANEL GROUP**.

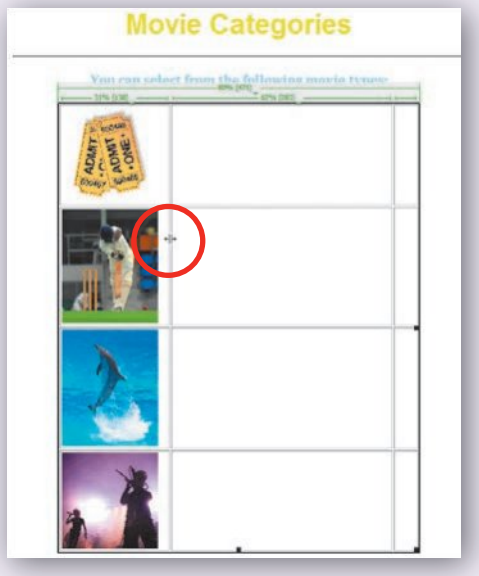
2 Open the Webpages folder of the PIT2 Support Files and open the Movies image.

3 Select **YES** to the **ROOT FOLDER** warning, open your Images folder and select **SAVE**.

4 Repeat the last 3 steps to insert the **SPORTS**, **DOCOS** and **MUSIC** images in the next three cells of column one.

5 Drag the right border of the first column to the right of the images.

Note: The bottom right handle of an image can be used to resize it when needed or you can enter the required **WIDTH** and **HEIGHT** values in the W and H boxes in the Properties panel.




## Adding text to the table

Text will be added to the rest of the table and two CSS styles will be created so that the text can be formatted.

1 Click in the top cell of column two and enter: `Movies <Enter>`

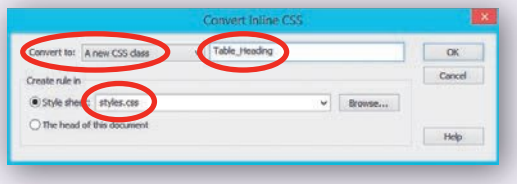
`All current releases along with a wide range of classics. <Enter>`

2 Highlight **MOVIES** and use the Properties panel to set it to **CAMBRIA**, **BOLD**, 24 px and **PALE BLUE**.

3 Display the **TOOLS** menu, highlight **CSS** and select **CONVERT INLINE CSS TO RULE**.

4 Set the **CONVERT TO** box to **A NEW CSS CLASS**, the style name to Table_Heading, check that styles.css is selected in the **CREATE RULE IN** section and select **OK**.

Note: You need to set the **CONVERT TO** box to **A NEW CSS CLASS** as this is the type of CSS style that is used to format text.




5 Highlight the sentence and use the Properties panel to set it to **CAMBRIA**, **BOLD**, 16 px and **PALE BLUE**.

6 Display the **TOOLS** menu, highlight **CSS** and select **CONVERT INLINE CSS TO RULE**.

7 Set the **CONVERT TO** box to **A NEW CSS CLASS**, style name to Table_Text, check that styles.css is selected in the **CREATE RULE IN** section and select **OK**.



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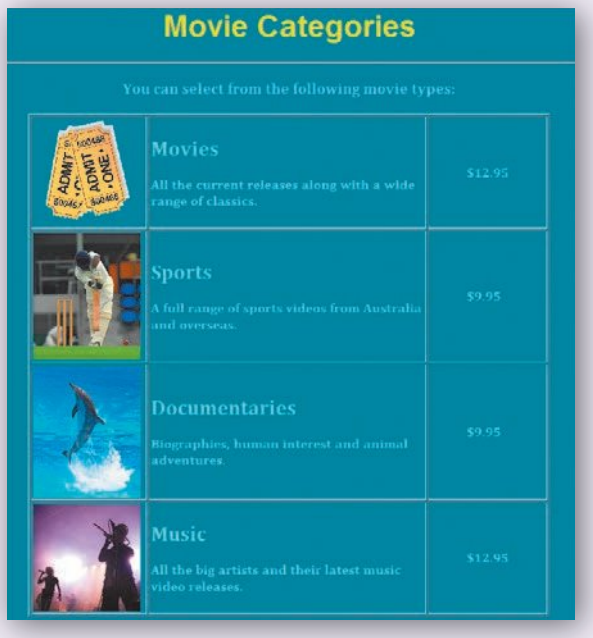
8 Click in the top right cell, enter $12.95 and format it to the Table_Text style from the **TARGETED RULE** box in the Properties panel.

9 Enter the text for the rest of the table and format it to the Table_Heading and Table_Text styles.

10 Use the borders of the table to adjust the column widths.

11 Use the **PAGE PROPERTIES** button in the Properties panel to set a **DARK BLUE** or **DARK TEAL** background to the page.

12 You can click at the beginning of each price and click on the **BLOCKQUOTE** icon in the HTML section of the Properties panel to indent the text.



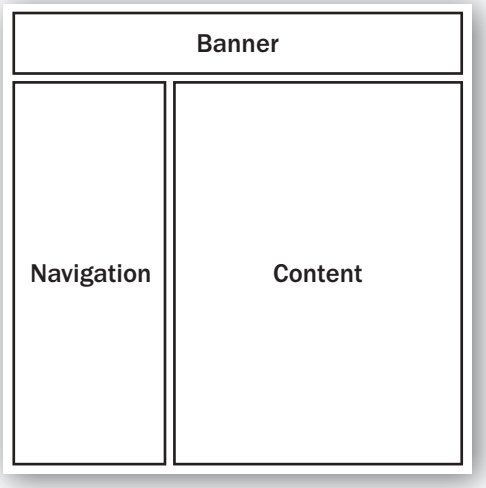

## 9.6 Using templates



When setting up a webpage you usually have sections of the page that are the same on each page. This includes a banner and navigation sections. An efficient way to do this is to enter these sections into a page and save that page as a template, which is then used to set up all the other pages in the site.

When changes are needed to the banner or navigation, those changes are just made to the template page and the changes are then automatically updated in all pages that were created from the template.

When creating templates for more detailed websites, HTML code is entered to divide a page into sections. The code is call DIV tags. To simplify things in this case, a table will be used to create a template that has banner, navigation and content sections as shown in the diagram.

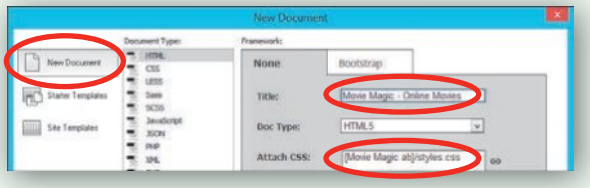



## Webpage authoring exercise 4

### *Creating a template page*

1 Open your Movie Magic site and select **NEW** from the **FILE** menu.

2 Select HTML in the **DOCUMENT TYPE** frame then set the **TITLE** box to Movie Magic – Online Movies, check that the **ATTACH CSS** box is set to the styles.css file and select **CREATE**.




**Skills practised**
- Using tables
- Using templates
- Inserting images
- Inserting text
- Editable regions

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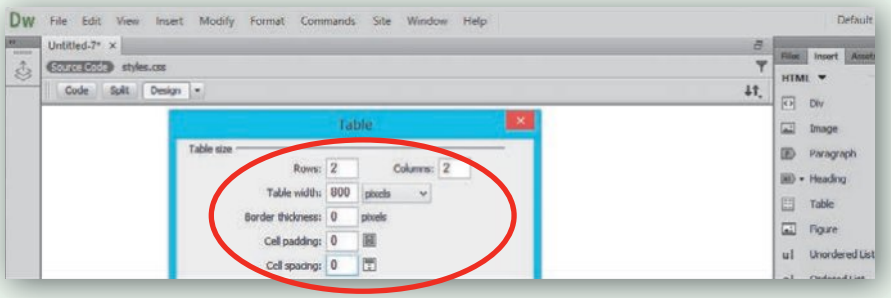
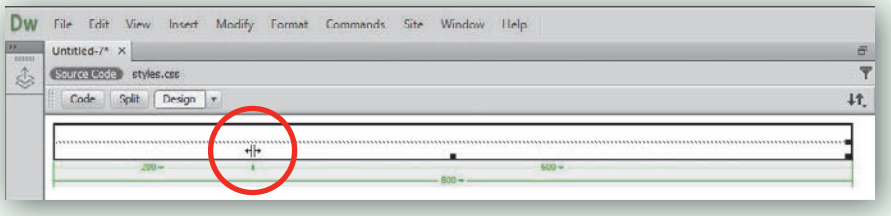
3 Insert a table with the values shown in the diagram.




4 Highlight the top row cells by dragging across them then display the **EDIT** menu, highlight **TABLE** and select **MERGE CELLS** so that there is just one cell across the top of the table.

5 Drag the right border of the first cell in the second row to the left so that the width of the cell is about 200 px.

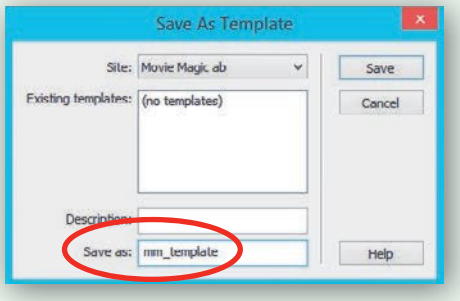


## Saving the page as a template

The program needs to know that the page is a template so that other pages can use it.

1 Display the **FILE** menu and select **SAVE AS TEMPLATE**.

2 Call the file mm_template.dwt and select **SAVE**.




## Completing the template

A simple logo has been prepared for you, which will be inserted in the **BANNER** cell and some navigation text will be entered in the lower left cell.

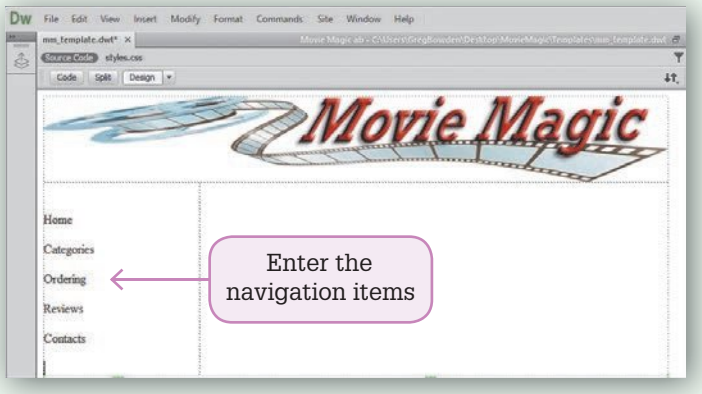
1 Click in the top cell and select the **IMAGE** icon in the **INSERT** tab of the **PANEL GROUP**.

2 Open the **LOGO** image from the Webpages folder of the PIT2 Support Files.

3 Select **YES** to the **ROOT FOLDER** warning, open your Images folder and save the image.

4 Click in the lower left cell and in the Properties panel set the **VERT** box to **TOP** so that the text starts at the top of the cell.

5 Press <Enter> or <Return> to leave a blank line and enter the text shown in the diagram.



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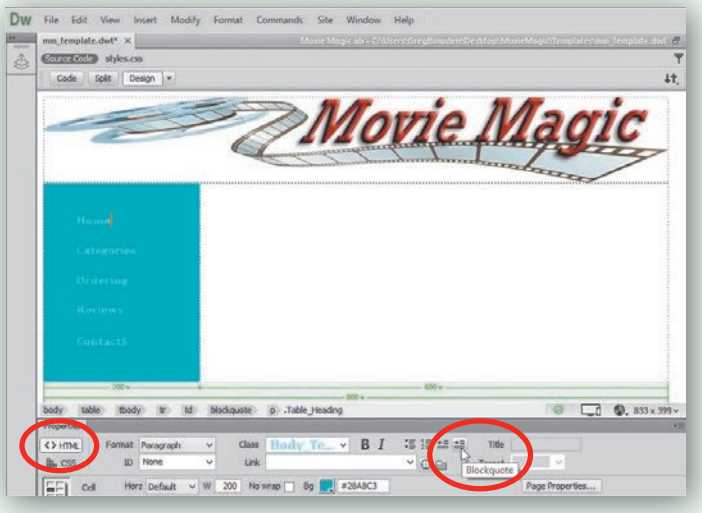
6 Highlight all the words and use the **TARGETED RULE** box in the CSS section of the Properties panel to format them to the **BODY_TEXT** style.

7 Open the **HTML** section of the Properties panel, click on the **BLOCKQUOTE** icon to indent the words and set the BG box to a medium blue or teal to add a background to the cell.

8 Click in the bottom right cell and set its **VERT** box to **TOP** and its background colour to a dark blue or dark teal.

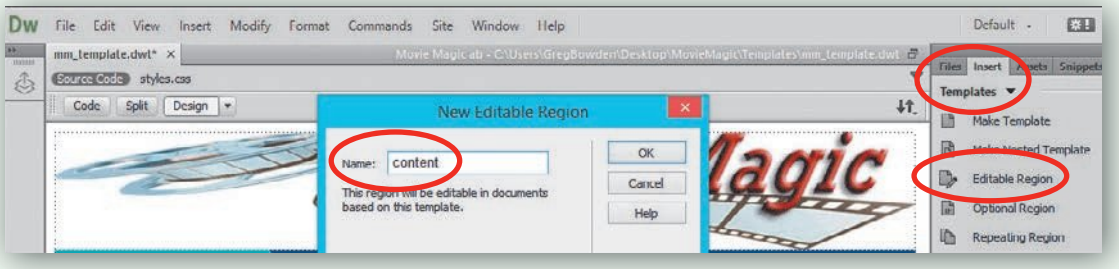



## *Setting the editable region*

When you apply a template to another page you need to be able to make some changes to part of the page, otherwise every page would simply be identical. In this case the banner graphic and text need to be the same on every page, but the lower right (or largest) cell should have different content on every page. So we need to set the **CONTENT** cell to be an **EDITABLE REGION**.

1 With the cursor in the lower right cell, set the Insert panel to **TEMPLATES** and click on the **EDITABLE REGION** button.

2 Call the region content and select **OK**.




3 Select **SAVE ALL** from the **FILE** menu to save all the documents.



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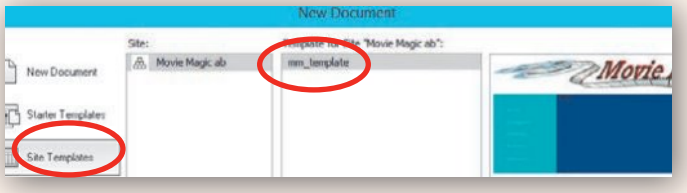
# Webpage authoring exercise 5

## *Creating pages from the template*

**Skills practised**
- Using templates
- Copying content
- Pasting content

The two pages that you have already created need to be set to the template. To do this, new pages will be created and the text and tables from the previous pages copied into the new pages.

1 Display the **FILE** menu and select **NEW**.




2 Select **SITE TEMPLATES** and your site's template should be displayed. Select **CREATE** to start the new page.

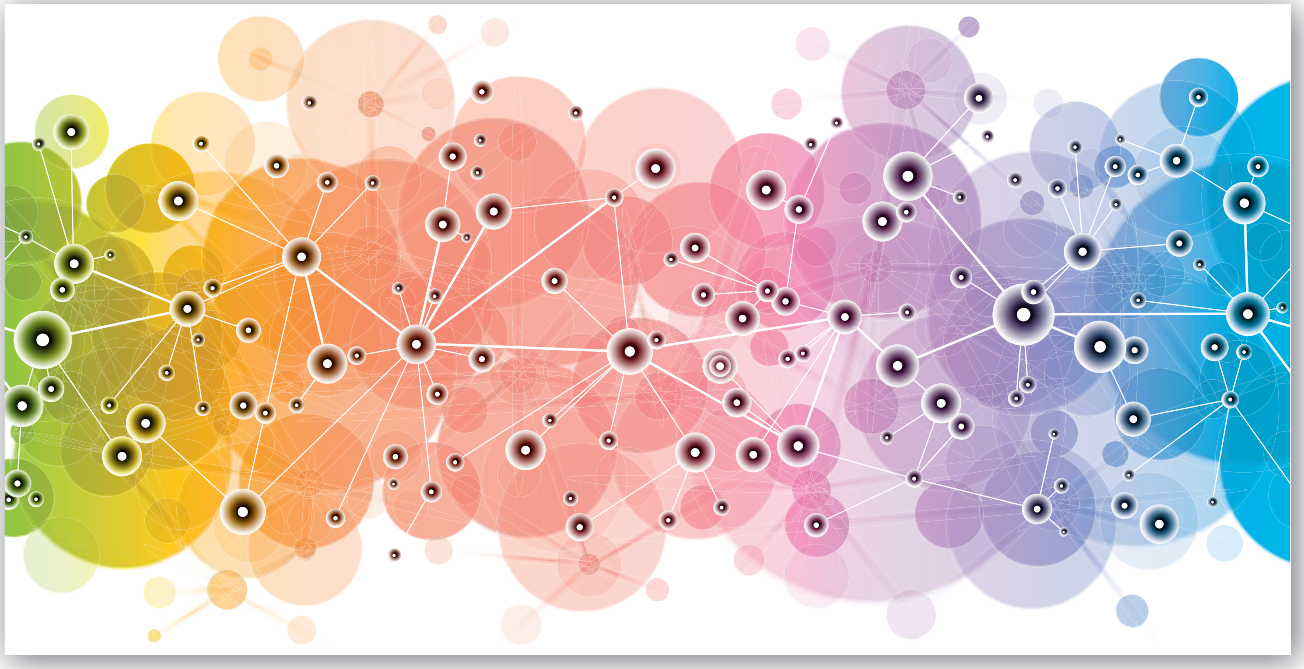
3 Open the home.html page, select all its contents (<Ctrl+A> or <Command+A>) and copy them (<Ctrl+C> or <Command+C>).

4 Open the new page, highlight the **CONTENT** label in the lower right cell and **PASTE** the content in (<Ctrl+V> or <Command+V>).

Note: The image may not display properly until you save the page.


5 Use the **FILE** menu to save the page as index.html.

Note: This will be the opening page for the website. Most internet service providers (ISPs) require the opening page to be called index.





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6 Create another new page from the template.

7 Open the categories.html page, copy all the contents then open the new page, highlight the content label in the lower right cell and paste the content in.

8 Save the page as categories2.html.

Note: The home.html and categories.html pages can be deleted from your Movie Site folder using the **FILES** panel in the **PANEL GROUP**.




# Webpage authoring exercise 6

Some more pages are needed from the template: one to show the company's contact details and a second to show some movie reviews. An ordering page will be created in a later exercise.

**Skills practised**
- Using templates
- Inserting text
- Formatting text
- Using tables

## *Creating the contacts page*

1 Create a **NEW** page from the template.

2 Highlight the **CONTENT** label in the lower right cell, press `<Enter>` or `<Return>` to leave a blank line and enter the details shown in the diagram.

3 A four-row, three-column table with a width of 400 px, no border, cell padding or cell spacing can be used for the address section. The first column can be left blank and the column widths adjusted.

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4 Format the heading to the Heading style and the rest of the text to the Table_ Heading and Table_Text styles (or you can create some styles of your own to format the text).


5 Each line can be indented using the **BLOCKQUOTE** icon in the Properties panel.

6 Save the page as contacts.html.

## *Creating the movie reviews page*

1 Create a **NEW** page from the template.

2 Highlight the **CONTENT** label in the lower right cell, press `<Enter>` or `<Return>` to leave a blank line and enter the heading `Movie reviews`.

3 Enter a review of a movie you have recently seen and format its text appropriately. If you cannot think of anything to review, the sample in the diagram on the next page can be entered.



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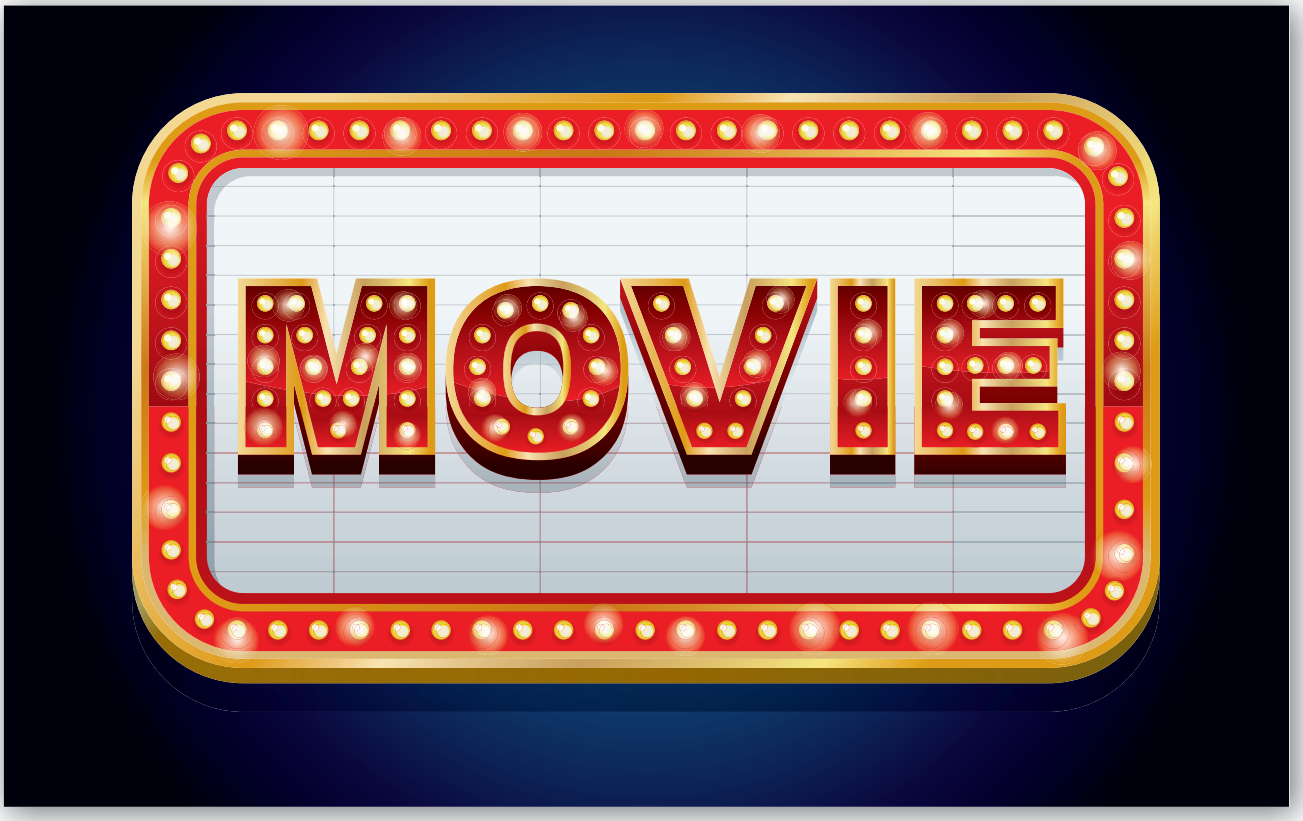
**4** Save the page as reviews.html.

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# 9.7 Setting links

We want to be able to click on each of the text lines in the Navigation cell and for the appropriate page to be displayed. These links need to be set in the template page. Links can also be set to other websites including social media sites such as Facebook and Twitter.

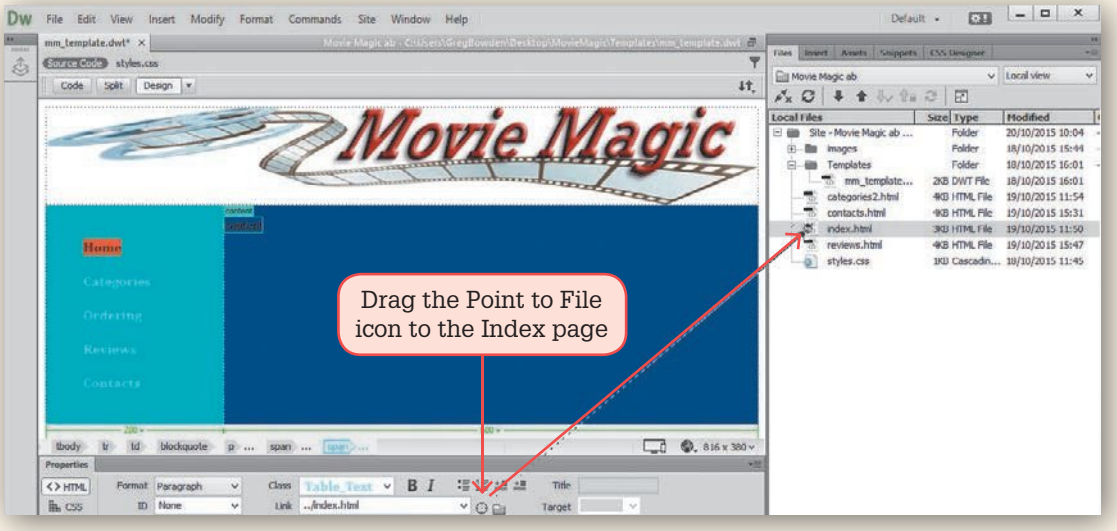
## Webpage authoring exercise 7

### *Linking on text*

**Skills practised**
- Linking text
- Linking images
- Email links

1 Open mm_template.dwt. It is in the Templates folder in the **FILES** panel within the **PANEL GROUP**.

2 Highlight the word 'home' in the Navigation cell and, in the **HTML** section of the Properties panel, drag the **POINT TO FILE** icon at the right of the **LINK** box to the index.html file in the **FILES** panel.



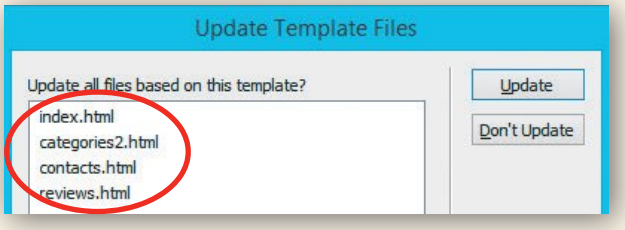

3 Dreamweaver will probably underline the word 'home', and change the colour, to indicate that it is linked.

4 Highlight the word 'Categories' and set it to link the categories.html page.

5 Link the word 'Reviews' to the reviews.html page and the word 'Contacts' to the contacts.html page.

Note: If the colour of the link text is too dark for the background, you can reset the text to the Table_Text style or you can also use the Properties panel to change the background colour of the left cell so the text can be seen clearly.

6 Save the template and the pages that are linked to the template will be displayed. Click on **UPDATE** to update the pages followed by **CLOSE** once the update is complete.




7 Open the index.html page and preview it in a browser by clicking on the **REAL-TIME PREVIEW** icon in the **STATUS BAR**. Check that the links work correctly then close the browser.



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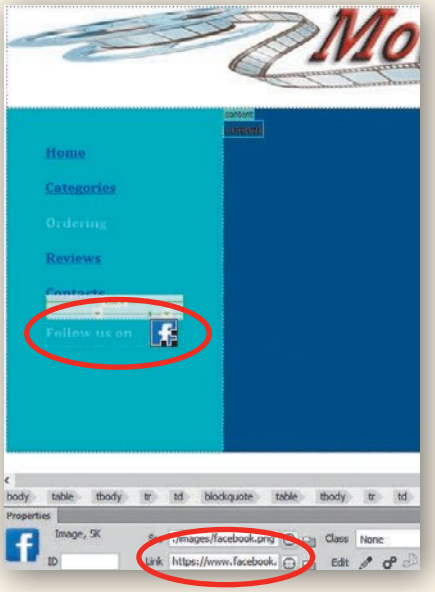
## Linking on images

To illustrate linking on images, a link to Facebook will be added.




1. Open the mm_template.dwt file, click just to the right of the **CONTACTS** link and press `<Enter>` or `<Return>` to move the cursor to a new line.
2. Insert a one-row, two-column table with a width of 150 px, no border, cell padding or cell spacing.
3. Widen the left cell, enter `Follow us on` in it and format the text to the Table_Text style.
4. Click in the right cell and insert the Facebook image from the Webpages folder of the PIT2 Support Files.
5. Click on the Facebook image and in the Properties panel, click in the **LINK** box and enter `https//:www.facebook.com`.

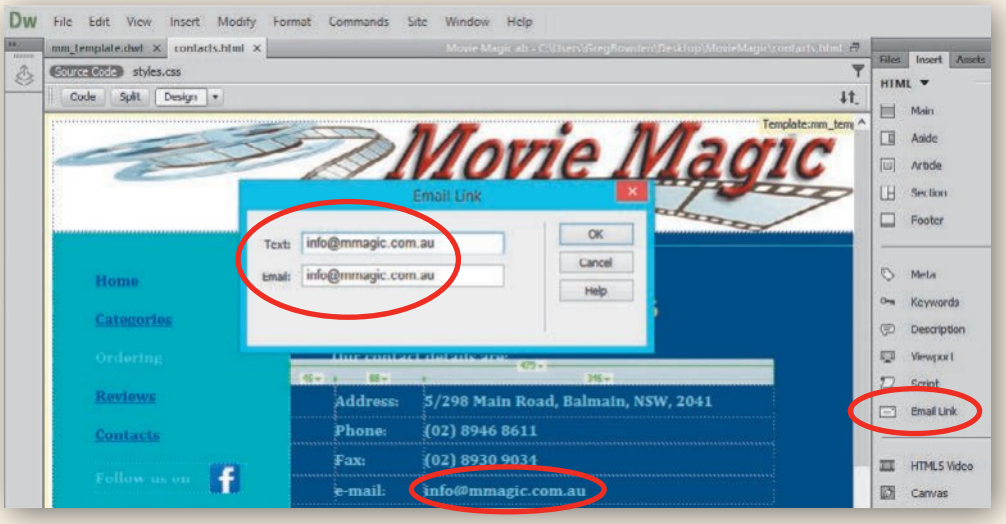
   Note: You can insert a link to your own Facebook account if you have one. A Twitter icon can be inserted next to the Facebook icon if you wish to.
6. Save the template, update the page linked to it and test the Facebook link by previewing the **INDEX** page in a browser.



## Email links

Links can be set on email addresses to make it easier for users to send emails.

1. Open the contacts.html page, highlight the email address and click on the **EMAIL LINK** icon in the HTML section of the **INSERT** tab in the **PANEL GROUP**.
2. You can change the email text or address; for example, you might like to enter your own email address in the email box so that you can check that the link works, then select **OK**.




3. You can reset the email address to the Table_Text style so that it is easier to see over the background.
4. Save and preview the page to check that the link works.

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# 9.8 Creating forms

The ability for someone to collect information or purchase items over the internet is a standard feature on many websites. One way to do this is to set up a form. Creating an interactive form for the web is a two-part process. First you lay out the form's objects (called fields) and then you link the objects to a common gateway interface (CGI) script, which has to be done in consultation with your web host or using your website's Content Management System (CMS).

## Webpage authoring exercise 8

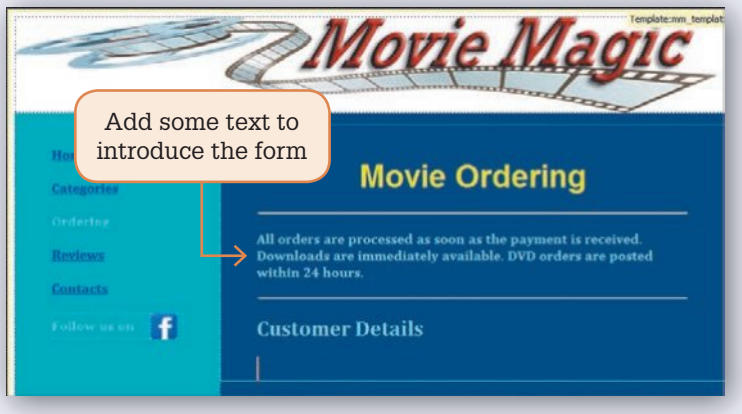
### *Setting up the form page*

**Skills practised**
- Creating a form
- Text fields
- Email fields
- Popup lists
- Field properties

1 Create a new page from the mm_template.dwt page.

2 Highlight the **CONTENT** label in the lower right cell, press `<Enter>` or `<Return>` to leave a blank line and enter the text shown in the diagram.

3 Format the heading to the Heading style, the paragraph to the Table_ Text style and the Customer Details heading to the Table_ Heading style.




4 Use the **BLOCKQUOTE** icon to indent the text and add horizontal rules if you wish to.

5 Save the page as orders.html.



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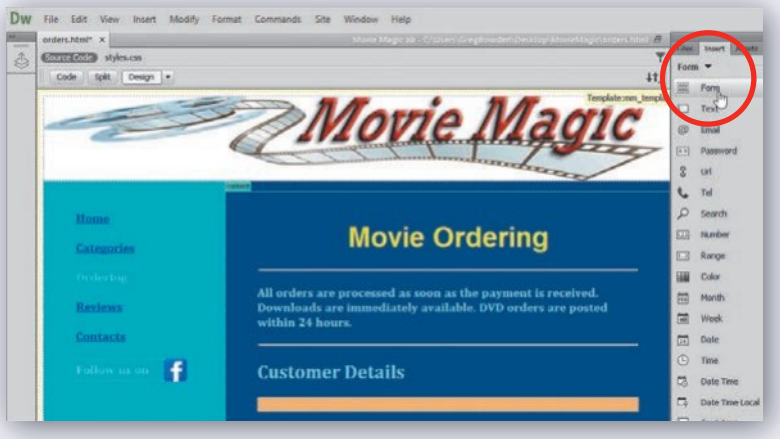
## Inserting a form tag

When creating a form you must tell the program that a form will be asking for information from the user. To do this, all the details within a form MUST be contained within an area called a Form tag, so whenever you enter fields you must first insert a Form tag.

1 Click to the right of the **CUSTOMER DETAILS** heading, press <Enter> or <Return> to move the cursor to the next line and open the **FORM** section of the **INSERT** tab.

2 Select the **FORM** icon to insert the **FORM TAG**.

3 Click inside the **FORM TAG** frame, which is a dotted red frame and press <Enter> or <Return> a few times to increase the size of the tag frame. This will ensure that you don't accidentally click outside the tag frame as you complete the rest of the form.






## Inserting text fields

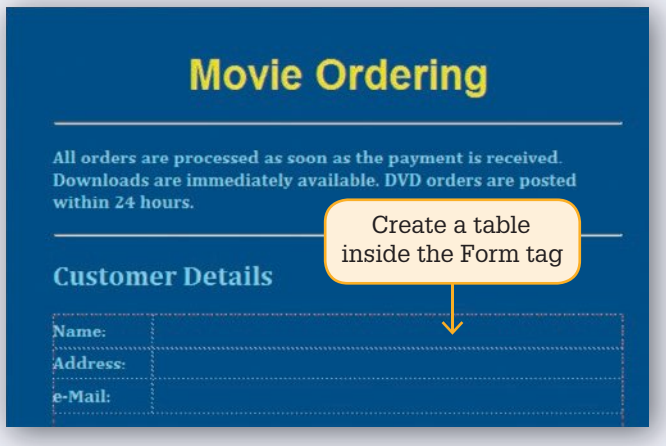
A variety of different fields can be used in forms to collect data from users. These include text fields, lists or menus, radio buttons or check boxes. The fields are found in the **FORM** section of the Insert panel. **TEXT FIELDS** allow the user to enter text such as names and addresses. You specify how wide the text field will be.

1 Click on the top line of the **FORM TAG** and open the **HTML** section of the Insert panel.

2 Use the **TABLE** icon to insert a three-row, two-column table with a 500 px width and no cell border, cell padding or cell spacing.

3 Enter the labels shown in the first column of the table and format them to the Table_Text style.

4 Use the table borders to increase the height of each row and decrease the width of the first column to just enclose the headings.




Note: You could create a new CSS style that right-aligns the labels if you wanted to.

5 Click in the cell next to the **NAME** label, open the **FORM** section of the **INSERT** tab and click on the **TEXT** icon to insert a text field.

6 The field has its own label included, which is not needed in this case, so highlight the label and delete it.

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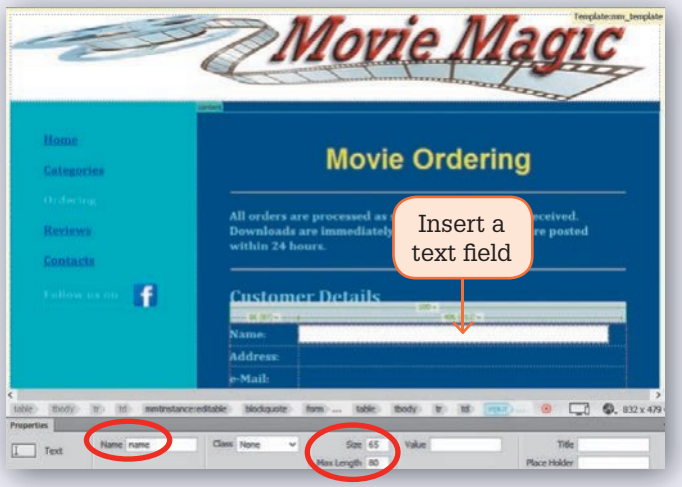
7 Click on the text field and, in the Properties panel, set the **NAME** box to **NAME**, the **SIZE** box to 65 characters and the **MAX** box to 80.




Note: Setting the **MAX** box to a higher value than the **SIZE** box allows for unusually long entries to be entered. You could set the field box to a CSS style using the **CLASS** box, but fields have a white background, so it is not needed in this case.

8 Repeat steps 5 to 7 to insert a **TEXT** field named 'address' next to the **ADDRESS** label and an **EMAIL** field named 'email' next to the **EMAIL** label.

Note: Email fields are text fields that check that an email address structure has been entered that includes a @ symbol.

9 Save the page, preview it in a browser and check that entries can be entered into the field boxes. If you can't, the fields are probably outside the **FORM TAG**.

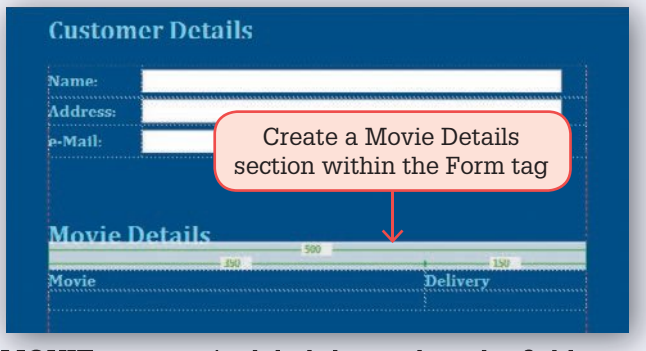
## *Popup field lists*

Popup field lists provide options for the user to select from. This restricts the user to set options and reduces the chance of incorrect entries being submitted. You can also use radio buttons and check boxes for this purpose.

1 Click on the blank line below the table, but check that this is still inside the dotted red **FORM TAG** and press `<Enter>` or `<Return>`.

2 Enter the heading `Movie details` and format it to the Table_Heading style.

3 Click on the blank line below the heading and insert a two-row, two-column table with a 500 px width and no cell border, cell padding or cell spacing.




4 Enter the labels shown in the first column of the table and format them to the Table_Text style.

5 Increase the width of the first column to 350 px.

6 Insert a **TEXT** field in the cell under **MOVIE**, remove its label then select the field and, in the Properties panel, set the **NAME** box to **MOVIE**, and **SIZE** box to 50 and the **MAX** box to 60.

7 Click in the cell under **DELIVERY** and insert a **SELECT** field.



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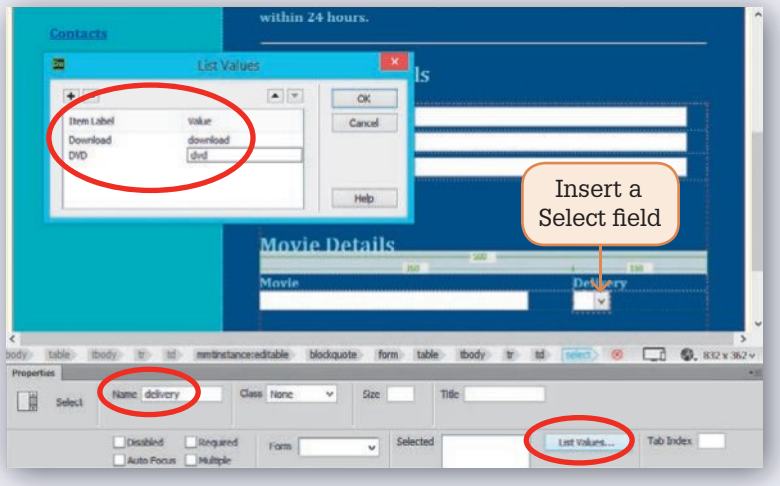
8 Remove the field's label and, in the Properties panel, set the **NAME** box to **DELIVERY** and click on the **LIST VALUES** button.

9 Enter the **ITEM LABEL** and **VALUE** items shown in this diagram.

Note: The **ITEM LABEL** is the label displayed in the popup list. The **VALUE** is the data value that is sent to the owner of the website when the form is submitted. The **ITEM LABEL** and **VALUE** do not have to be the same.




10 In the Properties panel click on **DOWNLOAD** in the **SELECTED** box so that is the first value displayed in the popup list.

Note: You could add more rows and fields to the tables so that more movies could be ordered at the one time.

11 Save the page, preview it in a browser and check that entries can be selected from the popup list.



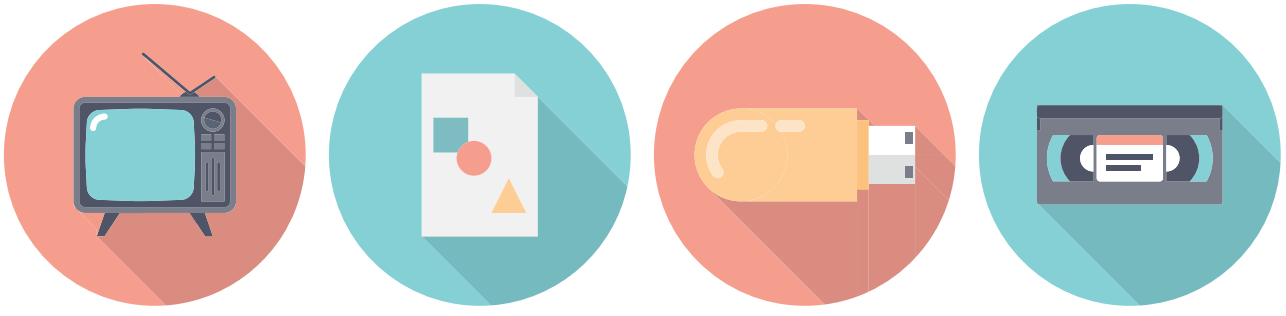
## Submit and reset buttons

Users can be given the option to **SUBMIT** the entries of the form or **RESET** the values so the form is blank.

1 Click on the blank line below the last table, but check that this is still inside the dotted red **FORM TAG** and press `<Enter>` or `<Return>`.

2 Click on the **SUBMIT BUTTON** icon in the **FORM** section of the Insert panel to insert a **SUBMIT** button.

3 Click on the **RESET BUTTON** icon in the **FORM** section of the Insert panel to insert a **RESET** button.

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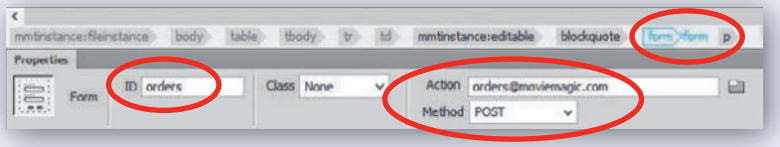
### *Setting the form properties*

To complete the form it should be named and information about how the form is to be sent to the owner selected.

1 In the **STATUS BAR** click on the **FORM** tag to select the whole form.

2 In the Properties panel set the **ID** to **ORDERS**, in the **ACTION** box enter an email address such as `orders@moviemagic.com` and leave the **METHOD** box as **POST**.




3 Save the page, preview it in a browser and check that the form works. The **SUBMIT** button will not operate as you have not been able to set up a CGI script with an internet host, but the **RESET** button should clear the form.

Note: You could insert a **TEXT AREA** field if you want users to enter detailed comments.

4 Open the mm_template.dwt file and set the 'Ordering' text to link to the orders.html page, the 'Update' to files that are set to the template. There are now five pages.

## 9.9 More detailed page layouts

As a website becomes larger, one set of navigation buttons is not sufficient. A second navigation system can be included underneath the banner. Some buttons for the navigation row have been prepared for you.



## Webpage authoring exercise 9

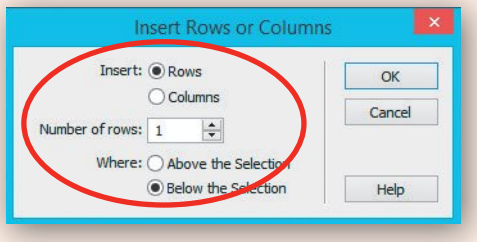
### *Adding a second navigation system*

**Skills practised**
- Adjusting templates
- Inserting table rows
- Inserting images

1 Open the mm_template.dwt file and click in the **BANNER** cell.

2 Display the **EDIT** menu, highlight **TABLE** and select **INSERT ROWS AND COLUMNS**.

3 Leave 1 **ROW** and **BELOW THE SELECTION** selected and click on **OK** to insert a row below the banner.




4 Select the **IMAGE** icon from the **HTML** section of the **INSERT** tab.

5 Access the Webpages folder of the PIT2 Support Files, open the Buttons folder and open the **MOVIES** button.

6 Select **YES** to the Root folder warning, open your Images folder and save the image.

Note: You could create a Buttons folder with your Images folder to store the buttons.

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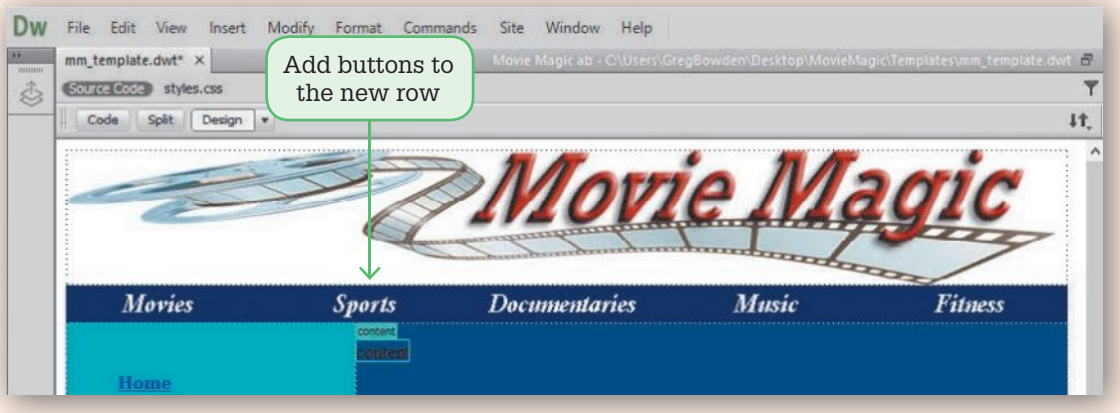
7 Repeat steps 4 to 6 to insert the **SPORTS**, **DOCOS**, **MUSIC** and **FITNESS** images.




8 You might like to create some pages for these movie types and link the buttons to those pages.

9 Save the template and update the pages linked to it.

10 Open the index.html file and preview it in a browser.

## 9.10 Adaptive and responsive webpages



If you wish to start creating more detailed sites you will need to learn how to create webpage layouts that respond to different screen sizes. These are termed responsive and adaptive layouts. A responsive layout will adjust to any screen size that a user opens the site on and it usually requires more detailed setting up. An adaptive layout adjusts to predetermined screen sizes; for example, for a desktop screen, a tablet screen and a mobile phone screen.

### Webpage authoring exercise 10

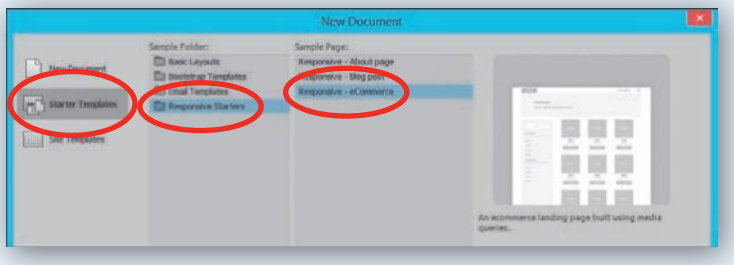
*Adaptive and responsive webpages*

**Skills practised**
- Responsive layouts
- Adjusting screen sizes

Dreamweaver provides some sample templates that use a responsive layout.

1 Close all the open files then display the **FILE** menu and select **NEW**.

2 Click on the **STARTER TEMPLATES** option, select **RESPONSIVE STARTERS** and select **ECOMMERCE**.




3 Select **CREATE**, save the page in your MovieMagic folder under the file name layout.html and **COPY** the dependent files when asked.

4 Turn on **LIVE** view, adjust the width of the screen using the bar at the right and notice how the page elements change as the screen width changes.

5 You could adjust the layout of the page and save it as a template so that other pages could be created from it.

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# WEBPAGE AUTHORING PROJECT

## Garden Gnomes

Murray is the proprietor of Garden Gnomes, which is a Brisbane-based company specialising in professional gardening services to households in the eastern suburbs. Murray has five employees: his secretary Natalie, who books customers and prepares bills, and four gardeners who do the gardening activities such as mowing lawns, removing weeds and repairing gardens, etc.

Murray is concerned about the decline in business recently and is worried that some of his gardeners will need to be laid off. He is currently listed on a number of local business websites, but believes that if he has his own website as well, more people will learn about the quality of the services that he offers. This website will also allow customers to book gardeners online.

Murray has decided to employ you to create the website for him. The site will require a page describing the organisation, pages describing the types of services offered, prices, associate companies and a booking form.

### Collecting the data

Plan the pages needed in the site, the links and navigation system you are going to use and the buttons, backgrounds and graphics that will be required. The data required in the website is displayed at the end of this project and can be downloaded from the Interactive Textbook or the Cambridge University Press website.

### Defining the solution

Draw a structure chart for your site showing how the pages will be linked and then draw thumbnail sketches for each page. Refer to the diagrams at the start of this module.

### Implementing

Use your webpage authoring skills to produce the website.

### Evaluating, collaborating and managing

1 Ask other people to use your site and give you feedback on how effective it is. Describe what was said and the changes you made to your site because of their comments.

2 How will your solution make the ongoing operation of Garden Gnomes more:

- **a** efficient?
- **b** effective?

### Project data: Garden Gnomes

For all your Brisbane gardening needs

Lawn mowing

Landscaping

Tree trimming

Available 7 days a week 8:00 am to 6:00 pm

201 High Street, Clayfield QLD 4011

Phone: (07) 9396 4521

Fax: (07) 9390 3724

Email: Murray@ggnomes.com.au




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## Description of tasks

### Lawn mowing

No job is too big or too small. Motorised lawn mowers are used for large jobs so that they are completed quickly. All grass clippings are removed and taken away at the end of the job. Jobs can be completed with 24 hours' notice. If the customer is not completely satisfied with the job, we will return and complete the job to the customer's satisfaction.

### Landscaping

Our gardeners have detailed landscaping training and can design and complete any landscaping requirements that you may have. Please call Murray for a detailed quote.

### Tree trimming

Tree trimming can be carried out on trees under 3 metres in height. If you require trimming of large trees, call Murray for a detailed quote. We can also arrange for tree and stump removal if required.

### Prices

Weekdays:

| | |
|---|---|
| Lawn mowing, normal | $20.00 |
| Lawn mowing, large block | $50.00 |
| Rubbish collection (per bag) | $5.00 |
| Landscaping (per hour) | $15.00 |
| Tree trimming | $30.00 |

Weekends:

| | |
|---|---|
| Lawn mowing, normal | $30.00 |
| Lawn mowing, large block | $60.00 |
| Rubbish collection (per bag) | $8.00 |
| Landscaping (per hour) | $18.00 |
| Tree trimming | $40.00 |



### Associate companies

We have contracts with associate companies to carry out repairs that we are unable to do:

Brisbane Roofs – for all your roof repair needs

Windows Galore – window repairs and replacements

John Drip – Plumber

Paul Wise & Associates – Builders

Ernie Spark – Electrician

### Garden Gnomes booking

Please complete the following form:

Task required

Date required

Time required

Name

Surname

Address

Email

Method of payment (Credit Card, Cheque, Direct Debit)

Submit and reset buttons

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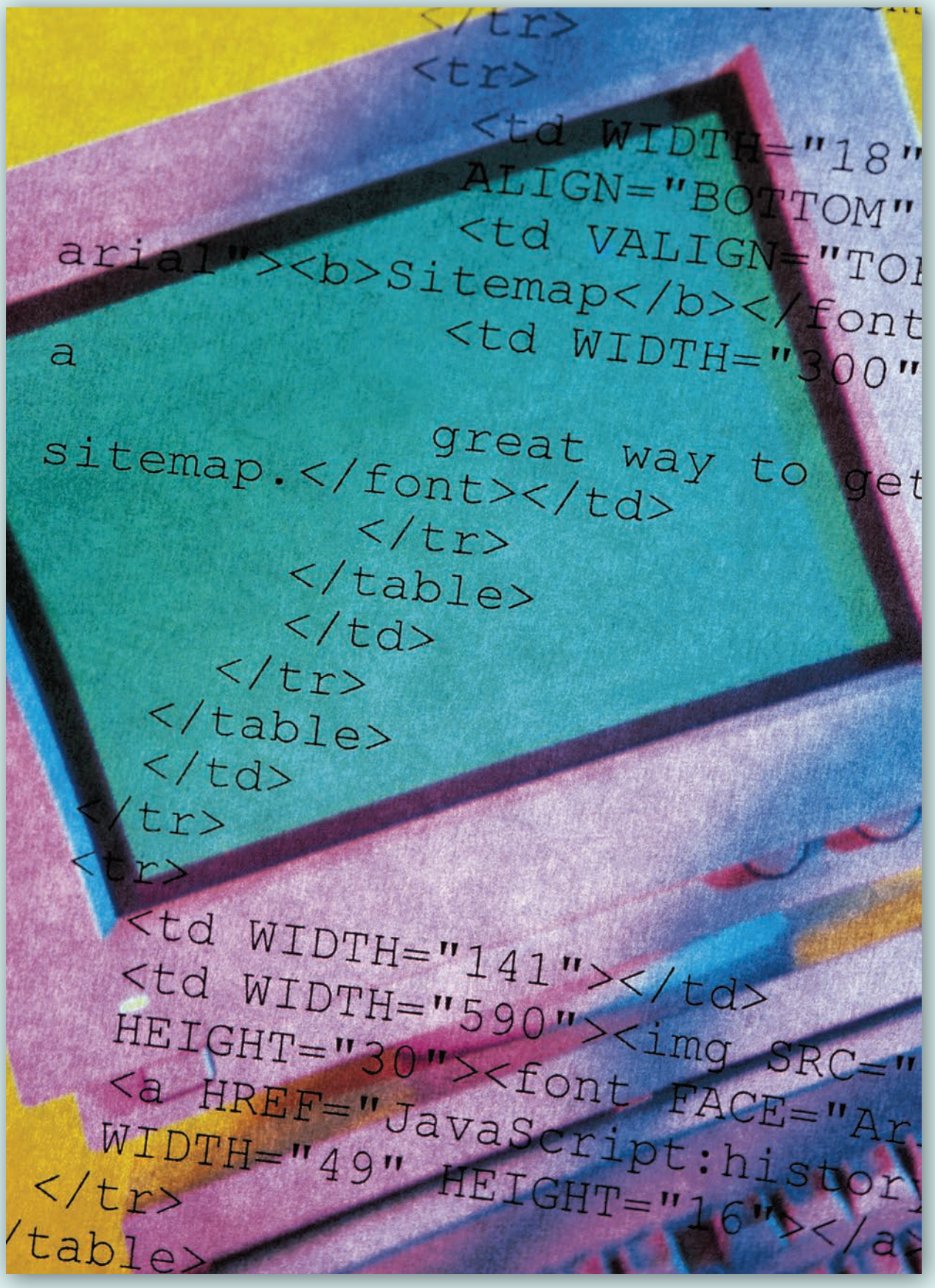




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# Module 10

## DESKTOP PUBLISHING

Program featured for exercises:

**Adobe InDesign**

Additional Exercise 4 online for:

**Adobe InDesign**



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# Teacher information

## IT knowledge and skills covered in this module

- Introducing desktop publishing
- Planning publications
- Creating a flyer
- Creating greeting cards
- Creating hotel and restaurant menus
- Creating newsletters

## Suggested further uses across the curriculum

- English (for presenting information). Use a range of software, including word processing programs, confidently, flexibly and imaginatively to create, edit and publish texts, considering the identified purpose and the characteristics of the user (ACELY1748, ACELY1776).
- History (for presenting information). Select and use a range of communication forms (oral, graphic, written) and digital technologies (ACHHS193).
- Geography (for communicating information). Present findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies as appropriate (ACHGS079).

## Alignment with the Australian Curriculum



### ICT Capability elements covered

- Creating with ICT
- Communicating with ICT
  - collaborate, share and exchange
  - understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Literacy
- Critical and creative thinking
- Personal and social capability

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)
- Evaluate critically how student solutions and existing information systems and policies, take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)
- Create interactive solutions for sharing ideas and information online, taking into account safety, social contexts and legal responsibilities (ACTDIP043)
- Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)



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# 10.1 What is desktop publishing?

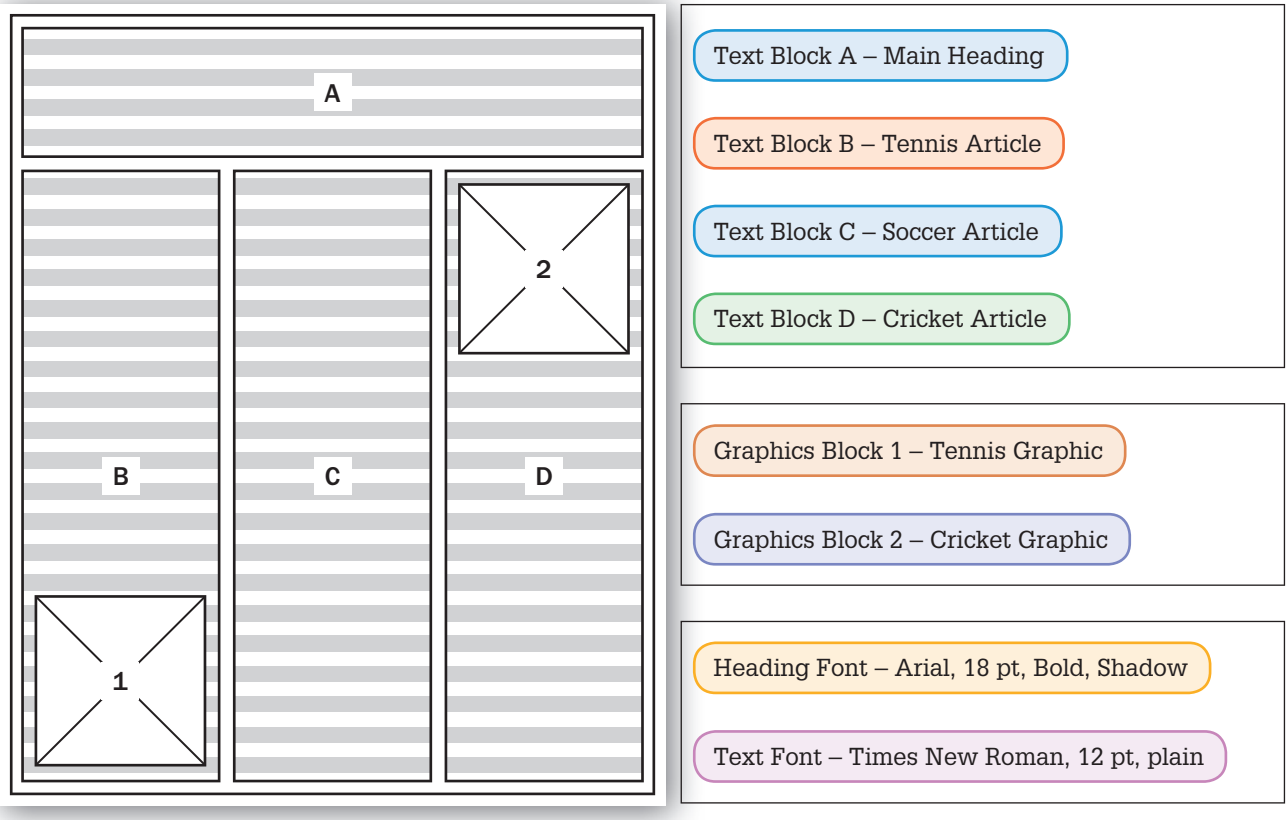
Desktop publishing is the process of combining text and graphics on a computer screen to produce entire publications. It allows you to accurately lay out each page of the publication. For example, daily newspapers are produced using desktop publishing programs. They can also be used to produce a range of other print publications such as greeting cards, restaurant menus, advertisements, pamphlets, books and catalogues, as well as detailed online multimedia productions that combine video and animations.

## When to use a desktop publishing program

Desktop publishing is basically an advanced form of word processing. Advanced word processing programs such as Microsoft Word are useful programs when simple desktop publishing activities are required. However, when more complex and detailed publishing is required, a specific page layout program is needed. Programs such as QuarkXPress and Adobe InDesign are used by professional publishing companies. In these exercises Adobe InDesign will be used.

## Planning publications

When you start a publication, careful planning is required. A sketch called a **thumbnail sketch** is drawn on paper. This is where you decide where to place the text and graphics on the page, what fonts are going to be used, what articles and graphics are going to be entered. The following diagram is a sample thumbnail sketch for a sports newsletter. Text boxes are represented by horizontal lines and graphics boxes with crossing diagonal lines.



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## Design suggestions

Good design can be a personal thing. What is good design for one person may be considered to be poor design for someone else. However, following a few general design suggestions can help you create universally accepted, well-designed publications.

- ‘Keep it simple, stupid’ (KISS). Don’t try to cram too much information into any one area. White space or empty areas can enhance the appearance of a document. A document with too much text becomes uninteresting and difficult to read. Simple, clear publications get the message across much more effectively.
- Don’t use too many fonts. Two or perhaps three different fonts are the maximum that should be used. Try to use the same font and style for each article. Usually serif fonts such as Times, Times New Roman, Palatino and Century Schoolbook are preferred for articles as they are easier to read. Try to keep the same font and style for all the headings. Consistent use of fonts and styles throughout a publication is advisable.
- Always take care to align all sections of the page. This means that tops and sides of adjacent text and graphics should be level with one another.
- If you are using columns in newsletters, three columns should be used so that there are no more than 40 characters across each column. Text in columns looks better full justified.
- Minimise the use of uppercase letters.

## Publishing steps

Basically, four steps should always be followed in any publishing process.

1. Create a thumbnail sketch of the page layout on paper.
2. Create the page layout.
3. Enter the text and graphics.
4. Finally, print a draft copy, make any necessary changes, reprint and check before final printing.

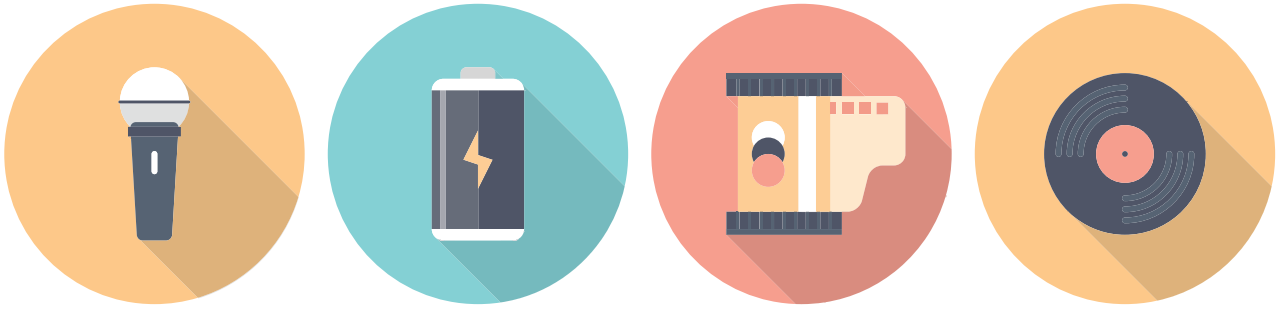


# 10.2 Creating a flyer

Flyers are advertisements or announcements. They can be very effective if you keep the design simple so that the message stands out. Flyers can announce:

- events, such as social outings, meetings and news
- promotional events or special offers
- a new business venture
- a new product or service.

Flyers usually include more, or simply larger, graphics than other publications. So you will need to spend some time working with the graphics in the creation of your flyer. With any form of desktop publishing, careful preparation can save you hours of work.



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Cambridge University Press

# Desktop publishing exercise 1

In this exercise, the following flyer for a guest house will be created.

## Example

### Skills practised

- Entering text
- Formatting text
- Placing images
- Resizing images
- Adding rectangles
- Fill and stroke
- Arranging objects

UNDER NEW MANAGEMENT

Fawlty's Guest House

Towers Retreat, Anglesea

A quiet and peaceful retreat for your business conference, intimate holiday or getaway weekend. Excellent staff, friendly proprietor and tastefully decorated rooms. A full-time chef is employed to provide gourmet meals at affordable prices. Numerous sporting facilities are close by including tennis courts, beach, fishing dock and eighteen hole golf course.

For information and rates, call 03 52359014



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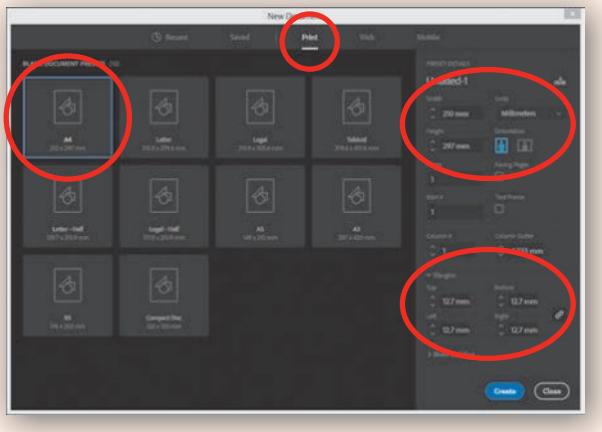
## Starting a new document

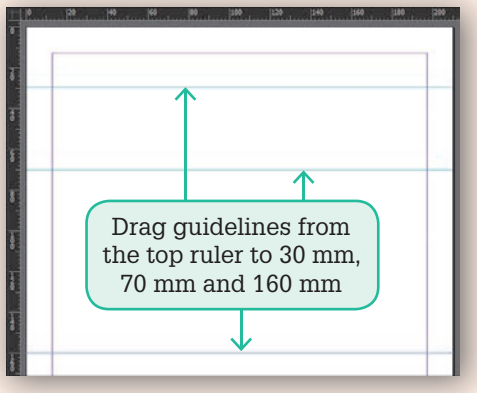
When you start a publication, the page dimensions are inserted.



1 Load Adobe InDesign and click on the **NEW** button in the Welcome screen.
2 In the **NEW DOCUMENT** dialogue box select the **PRINT** category and select the **A4** preset.
3 Check that the **UNITS** are set to **MILLIMETRES**, turn off **FACING PAGES** and leave the **MARGINS** at their default settings (12.7 mm). These settings can be changed when needed.
4 Select **CREATE** to start the document.

## Laying out the page

Guidelines can be added to the page to make the placement of text and graphics easier. These guidelines do not print and they can be moved at any time using the Selection Tool.



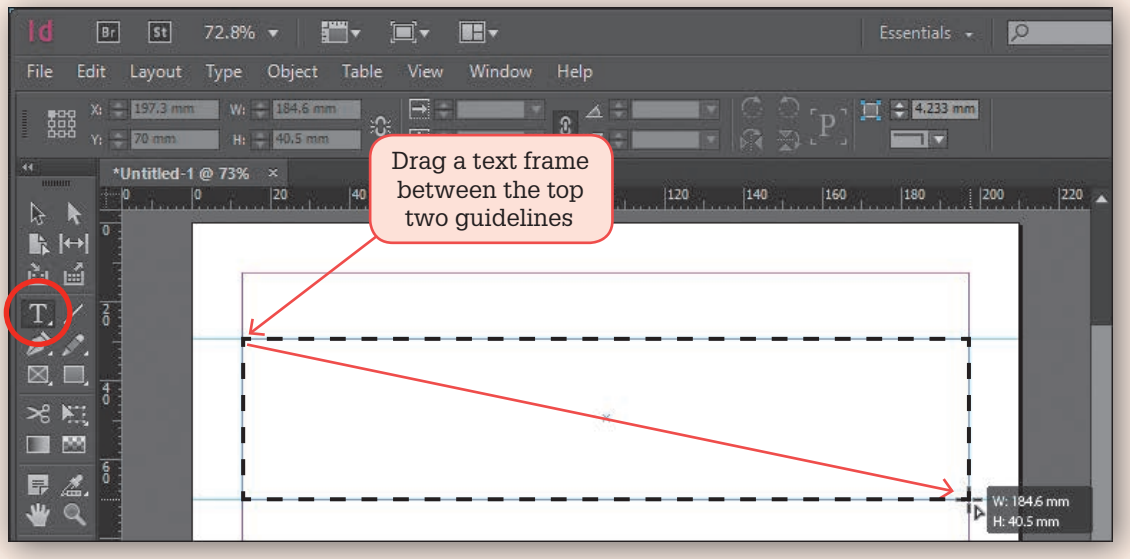

1 Move the Pointer into the top Ruler and drag a guideline down to 30 mm in the left Ruler.

   Note: A popup box displays the position of the guideline as you drag it.
2 Drag two more guidelines down to 70 mm and 160 mm.

## Entering the main heading

The main heading will be a text frame inside a rectangle.

1 Select the **TYPE TOOL** from the Tools panel at the left of the screen and drag a frame from the top left of the first guideline to the bottom right of the second guideline.



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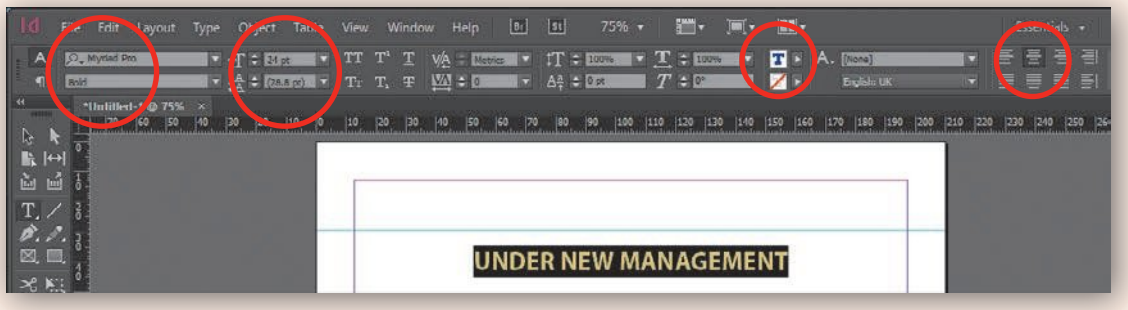
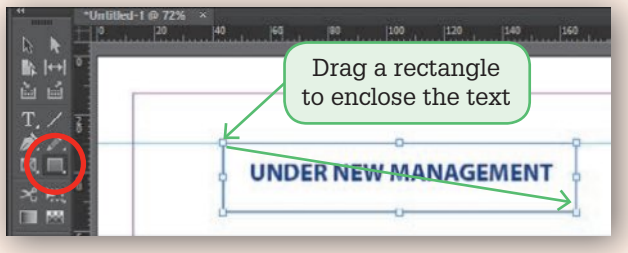
2 Press <Enter> or <Return> to leave a blank line and enter `Under new management` and press <Enter> or <Return>.

3 Highlight the text and, in the **CONTROL** panel at the top of the screen, set the **FONT** to **MYRIAD PRO**, the **SIZE** to 24 pt, the **STYLE** to **BOLD**, the **TEXT COLOUR** to **DARK BLUE** and click on the **ALIGN CENTRE** icon.

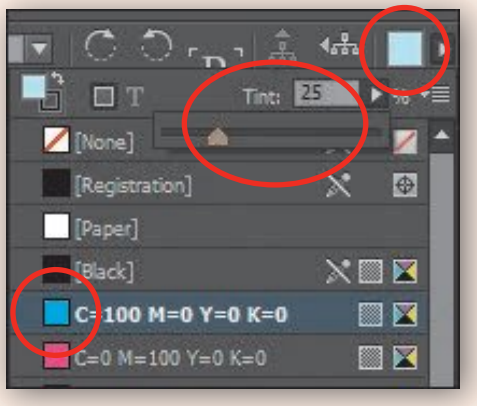



Note: The **CONTROL** panel has two sections, **CHARACTER** and **PARAGRAPH**. You swap between the two sections by clicking on the A or ¶ buttons at the left of the panel.

4 Select the **RECTANGLE TOOL** from the Tools panel and drag a rectangle around the text from the top guideline and starting at about 40 mm in the top Ruler.

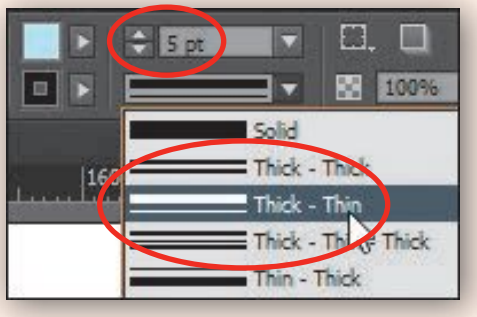



5 In the **CONTROL** panel click on the arrow next to the **FILL COLOUR** box and set the colour to **CYAN** and the **TINT** slider to 25%.




6 In the **CONTROL** panel click on the arrow next to the **LINE WEIGHT** box and set it to 5 pt, then click on the arrow next to the **LINE TYPE** box and set it to **THICK THIN**. This will set the border of the rectangle to have two lines, one thick and one thin.

7 Display the **OBJECT** menu, highlight **ARRANGE** and select **SEND TO BACK** so that the rectangle is behind the text frame.



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## *Inserting a graphic*

A graphic will be added below the heading. Guidelines can be added to ensure that the graphic is centred under the heading.

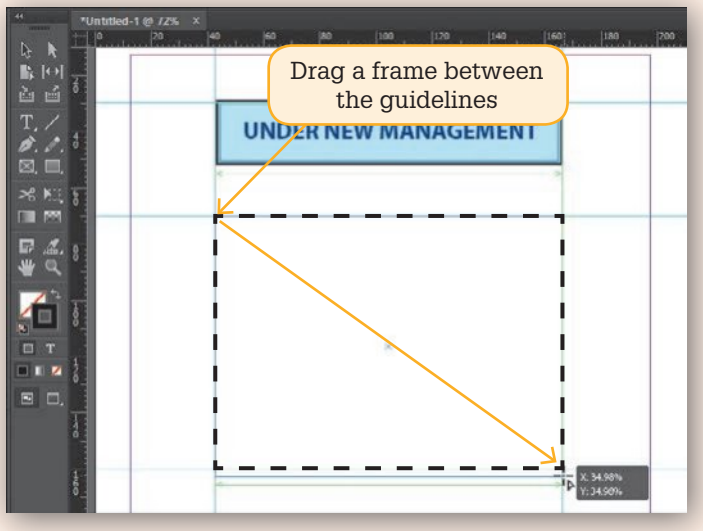
1 Select the **SELECTION TOOL** from the Tools panel and click on the canvas to deselect the rectangle.

2 Drag two guidelines from the left ruler to the left and right edges of the rectangle.

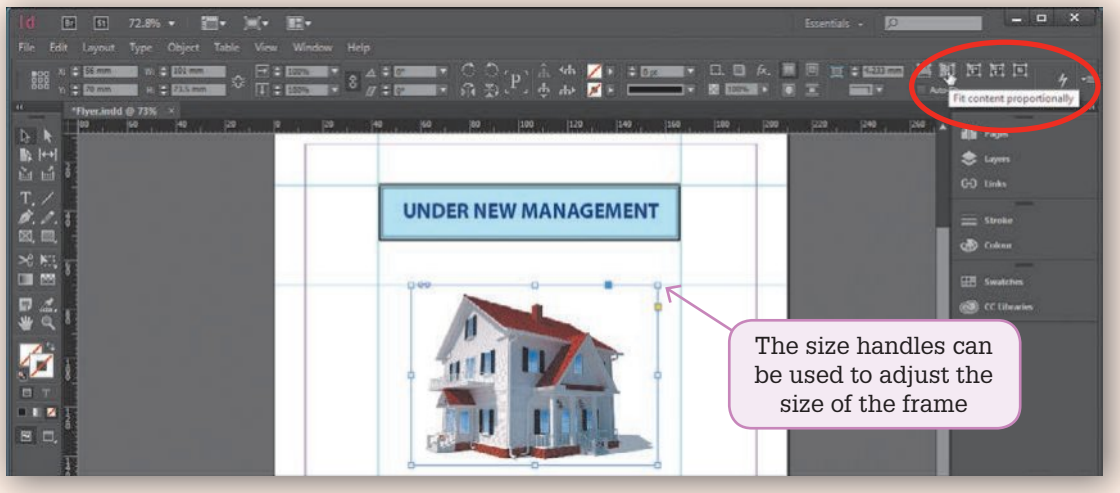
3 Display the **FILE** menu and select **PLACE**. Access the PIT2 Support Files, open the Desktop Publishing folder followed by the Exercise 1 folder and open the House file.

4 Drag a frame between the guides below the heading and the image will be resized to fit within the frame.

5 Use the handles around the image to reduce the size of the frame a little.




6 Use the **FIT CONTENT PROPORTIONALLY** icon in the **CONTROL** panel to resize the image within the resized frame.




Note: If you are using a smaller screen, the **OBJECT** menu, **FITTING** – **FIT CONTENT PROPORTIONALLY** can be used to display the image within the frame.



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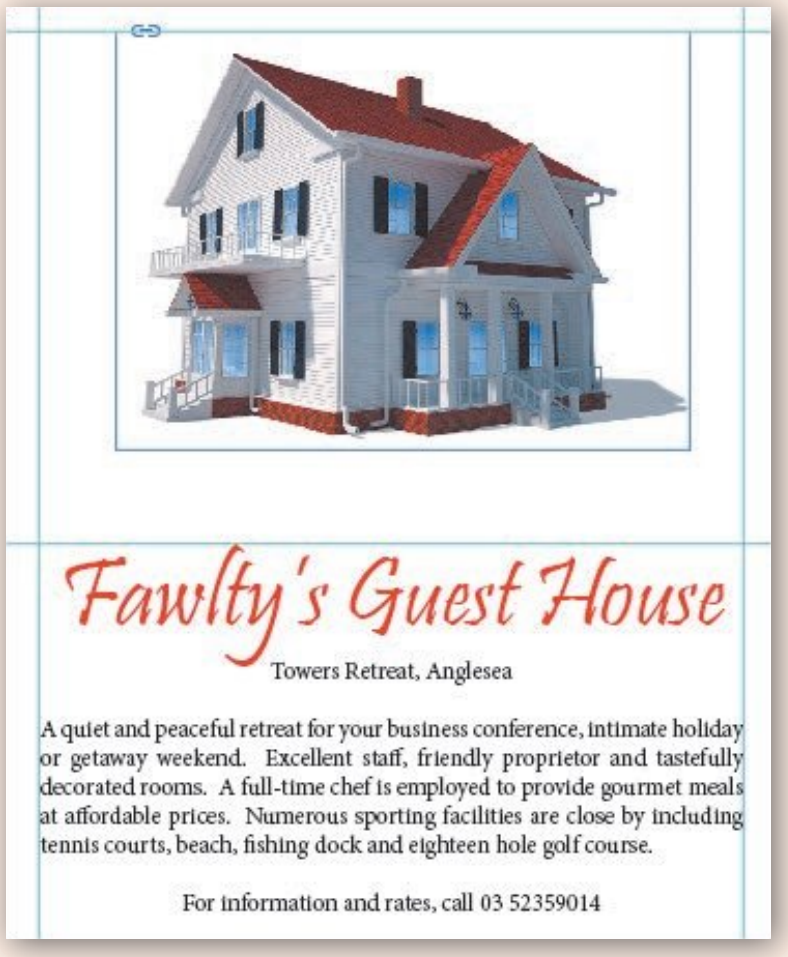
### *Adding some text*

Some text can be added below the image.

1 Select the **TYPE TOOL** from the Tools panel and drag a frame from the guideline below the image to the bottom of the page.

2 Enter the text shown in the diagram below without any formatting.




3 Highlight the first line and change the **FONT** to a script font, increase the **FONT SIZE** and select a **TEXT COLOUR**.

4 Highlight the first two lines and click on the **ALIGN CENTRE** icon in the **CONTROL** panel to centre them.

5 Highlight the rest of the text, set its **FONT** to **MINION PRO**, 12 pt and click on the **JUSTIFY WITH LAST LINE ALIGNED LEFT** icon in the **CONTROL** panel.

6 Highlight just the last line and **CENTRE** the text.



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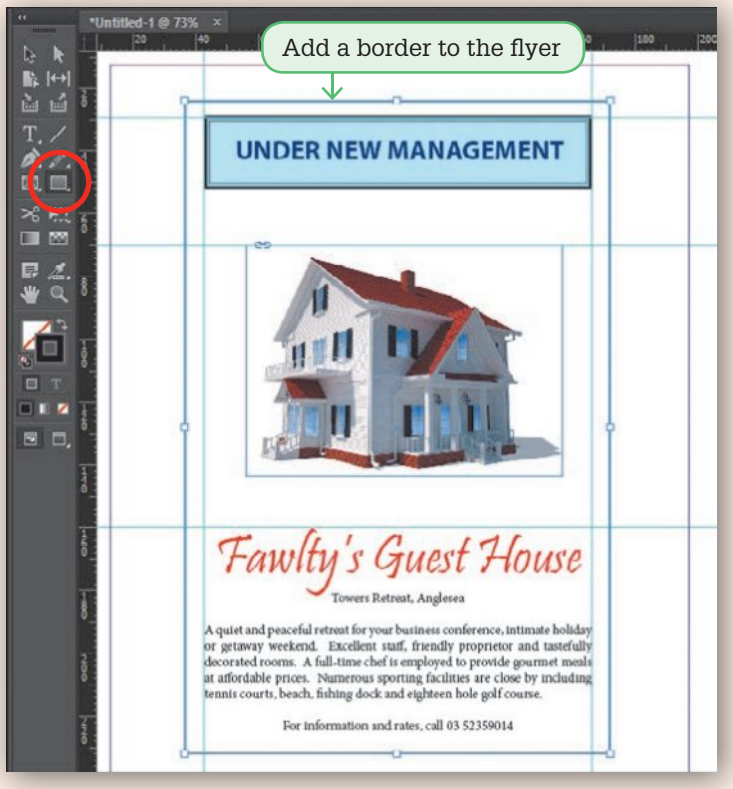
### *Adding a border*

To complete the flyer a border will be added around the outside of it.

1 Select the **RECTANGLE TOOL** and drag a rectangle around the flyer components.
2 Display the **OBJECT** menu, highlight **ARRANGE** and select **SEND TO BACK** to send the rectangle behind the other components of the flyer.
3 Check over the flyer and save it in your storage folder as: Flyer.
4 Print a copy of the flyer or share your work electronically.



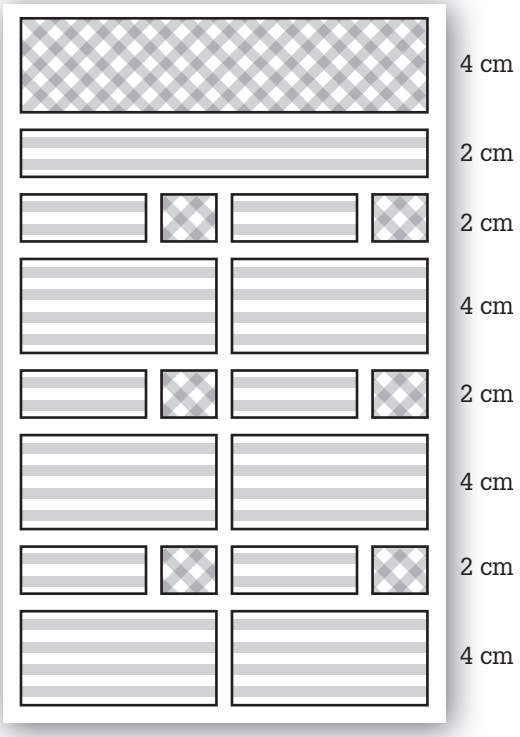



## 10.3 Creating hotel and restaurant menus

Many hotels or restaurants like to change their menus weekly or even daily. By using a desktop publishing program to create the menu, the process is made much easier.

Desktop publishing programs usually provide **frames** to store either text or graphics and it can be a more efficient way of creating a publication. The advantage of using frames is that they can be a variety of different shapes. For example, you can place text in a circular frame. Frames can also be used as placeholders where a new graphic or story can be entered into a set area of the page. Frames are used in publications where the structure needs to stay the same, but the content is updated from time to time. Frames act in a very similar way to text blocks and placed graphics. You can set borders or shading, flow text from one frame to another, adjust the size of graphics within the frame, etc.

In this case you will create a menu for the restaurant that is part of Fawlty's Guest House. It is shown on the next page. The publication is a little more detailed than the previous ones. This will give you a chance to practise using a more complicated page structure. The thumbnail sketch is provided to the right. The measurements show an estimate of the height required for each section.

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# Example

## FAWLTY'S GUEST HOUSE

### Appetisers

**Spinach Ricotta Potatoes:** Large baked potatoes filled with cheese and spinach sauce
$2.75

**Honey Scallops:** Cooked to perfection in a honey sauce.
$2.50

### Sandwiches

**Your Choicest Smoked Salmon**: Topped with onion rings and capers.
$5.95

**Rare Roast Beef**: With home made horseradish on dark rye.
$7.50

### Soups

**Curried Pumpkin**: Traditional pumpkin with a hint of curry

**Asparagus Cream**: Made from fresh asparagus topped with cream and chives

Cup: $2.25 Bowl: $3.50

### Beverages

**Soft Drinks**: Homemade lemonade, Diet Pepsi, pure sweetened mineral water.

**Coffee, Milk, Tea**: Fresh percolated coffee, iced tea, strawberry skim milkshakes.

$1.80

### Salads

**Chicken and Pasta**: Tender chunks of chicken combined with fettucine.
$6.85

**Marinated Salmon and Avocado**: Avocado stuffed with salmon
$7.35

### Sweets

**Chocolate Baskets**: Dark chocolate baskets filled with marinated fruits of the season.
$2.25

**Strawberry Crepes**: A creamy strawberry-filled delight with a touch of Grand Marnier.
$3.15



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# Desktop publishing exercise 2

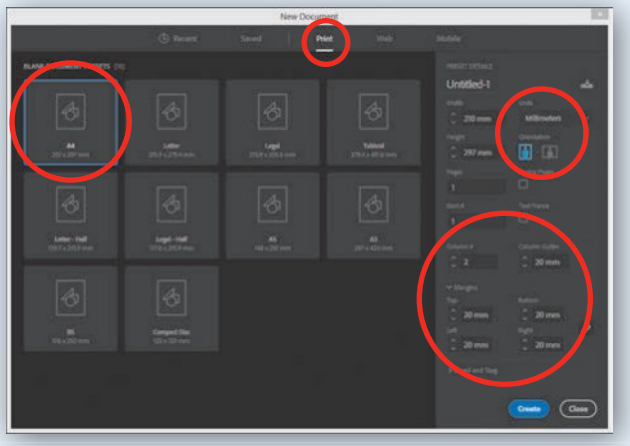
## *Laying out the page*

A two-column page will again be used in this case so that guidelines are inserted through the vertical centre of the page.

**Skills practised**
- Adding gridlines
- Setting columns
- Using frames
- Inserting content
- Wrapping text

1 Start a **NEW** document and, in the **PRINT** category of the **NEW DOCUMENT** dialogue box, select the **A4** preset and set the **UNITS** to **MILLIMETRES**.

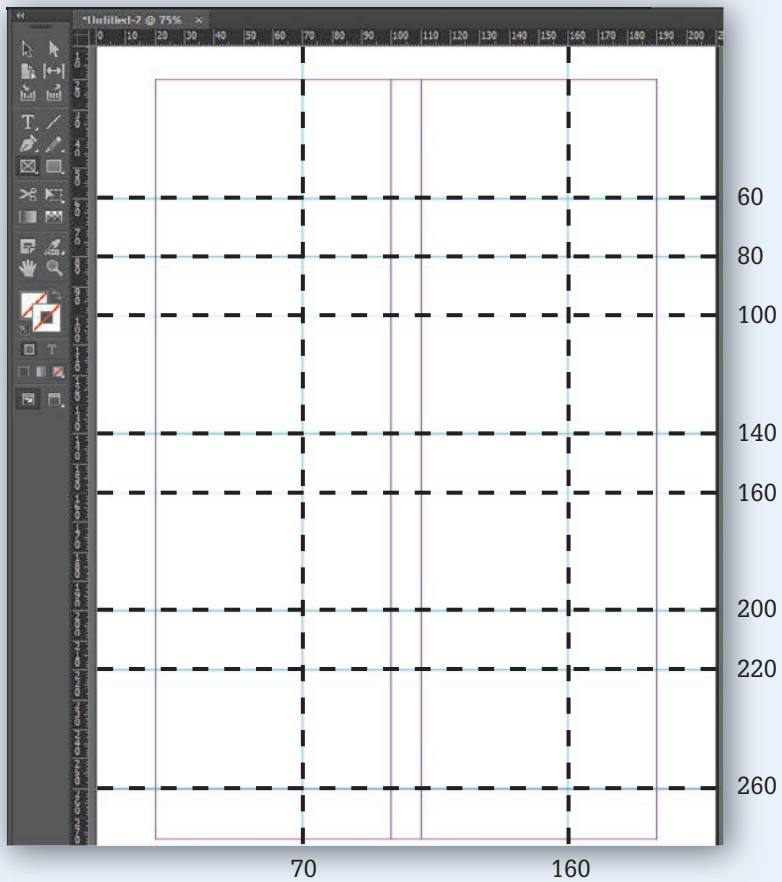
2 Turn off **FACING PAGES** and set the **COLUMNS** to 2 with a 20 mm **GUTTER**. In the **MARGINS** section set the four margins to 20 mm and select **CREATE**.



3 Horizontal guidelines will be added for each section of the menu. Refer to the thumbnail sketch on the previous page when you are doing this to identify where they are being placed.

4 Drag guidelines from the top Ruler to 60 mm, 80 mm, 100 mm, 140 mm, 160 mm, 200 mm, 220 mm and 260 mm.

5 Drag two vertical guidelines from the left Ruler to 70 mm and 160 mm. This will allow images to be inserted next to the menu item names.



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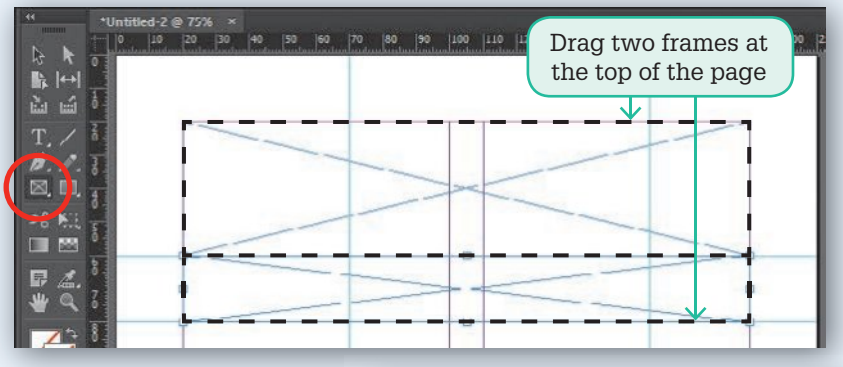
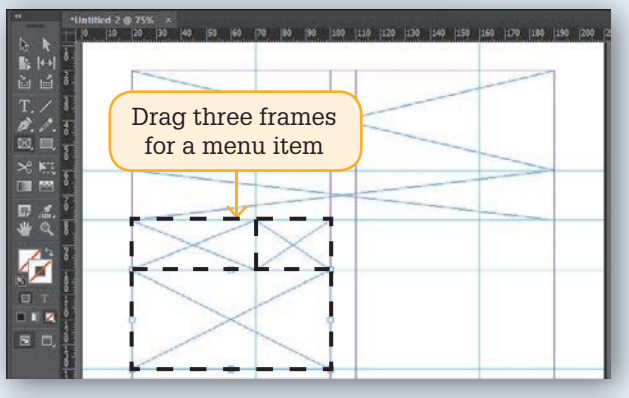
## *Inserting the frames*

Frames will be used to set the placeholders of the page.

1 Select the **RECTANGLE FRAME TOOL** from the Tools panel and drag two frames across the page between the first two horizontal guidelines. These will contain an image and the restaurant's name.

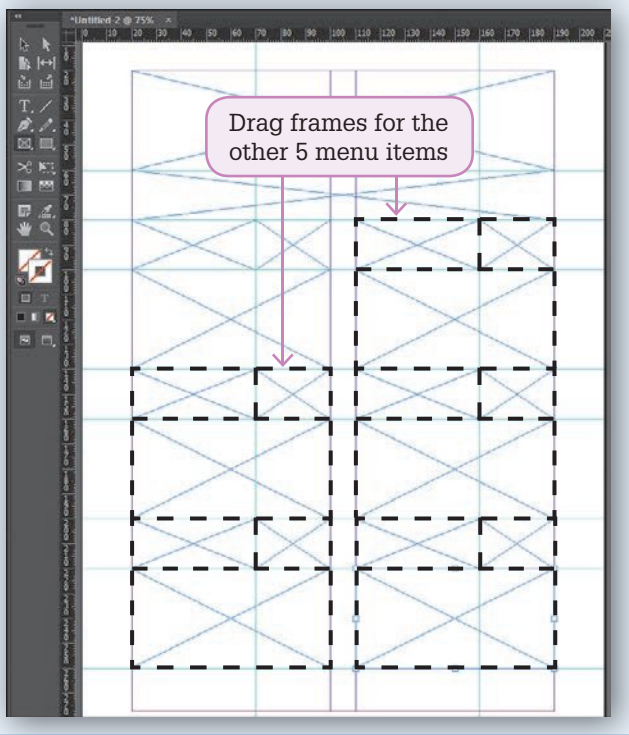



2 Drag three frames across the top left guidelines under the previous frames. These will contain the menu item heading, an image and the menu item content.




3 Repeat step two to add frames for the other five menu items.

4 Save the layout in your storage folder as: Restaurant menu.



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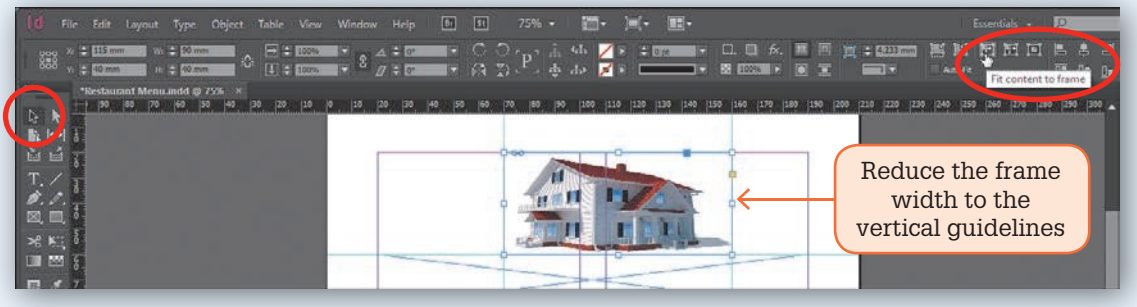
## *Completing the heading section*

The Heading section will consist of an image of the guest house and its name.

1 Select the **SELECTION TOOL** and select the top frame.

2 Display the **FILE** menu, select **PLACE**, access the PIT2 Support Files, open the Exercise 2 folder of the Desktop Publishing folder and open the **HOUSE** image.

3 Reduce the width of the frame to the two vertical guidelines and click on the **FIT CONTENT TO FRAME** icon in the **CONTROL** panel to stretch the image a little to the size of the frame.




Note: You can adjust the size of frame when creating a layout if your original layout does not suit the content you are entering.

4 Select the **TYPE TOOL**, click in the second frame and enter: `FAWLTY'S GUEST HOUSE`.

5 Highlight the text and, in the **CONTROL** panel, set the **FONT** to **MYRIAD PRO**, the **STYLE** to **BOLD**, the **SIZE** to 24 pt, the **FILL COLOUR** to **RED** and the **ALIGNMENT** to **CENTRE**.


6 Display the **OBJECT** menu, highlight **TEXT FRAME OPTIONS** and, in the **VERTICAL JUSTIFICATION** section, set the **ALIGN** box to **CENTRE** and select **OK** to vertically centre the text in the frame.



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## Completing the first menu item

The first menu item will consist of a heading in the top left frame, an image in the frame to the right of it and content in the frame below it.

1 Click the **TYPE TOOL** in the left frame under the heading and enter `Appetisers`.

2 Highlight the text and set the font to Myriad Pro, the style to Bold Italic, the size to 20 pt and the Fill Colour to Blue.

3 Display the Object menu and select **TEXT FRAME OPTIONS**. Set all the **INSET SPACING** boxes to 3 mm, the **VERTICAL JUSTIFICATION** to centre and select **OK**.


4 Select the **SELECTION TOOL**, select the frame next to the Appetisers heading and select **PLACE** from the **FILE** menu.

5 Access the PIT2 Support Files, open the Exercise 2 folder within the Desktop Publishing folder and open the Appetisers image.

6 Click on the **FIT CONTENT PROPORTIONALLY** icon on the **CONTROL** panel to display the image within the frame.

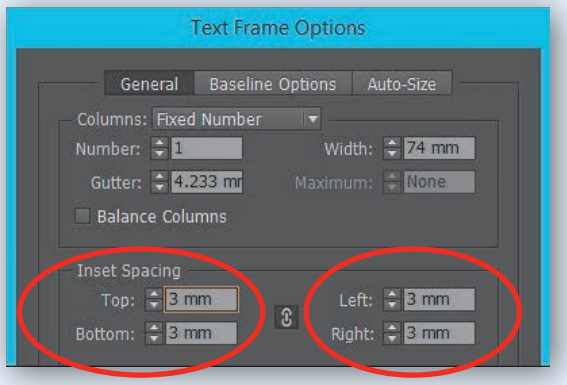

7 Click on the frame below the Appetisers heading and select **PLACE** from the **FILE** menu.

8 Access the PIT2 Support Files, open the Exercise 2 folder within the Desktop Publishing folder and open the Appetisers text.

9 Select 'Spinach Ricotta Potatoes' and change the style to bold and 12 pt.

10 Select 'Honey Scallops' and change the style to bold and 12 pt.

11 Display the Object menu and select **TEXT FRAME OPTIONS**. Set all the **INSET SPACING** boxes to 3 mm and select **OK** so that space is added around the outside of the text.



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### *Completing the other menu items*

1 Carry out the previous steps to complete the other menu items referring to the sample diagram on page 204. You will need to enter the menu item heading then place the image and content from the PIT2 Support Files (Desktop Publishing – Exercise 2 folder).

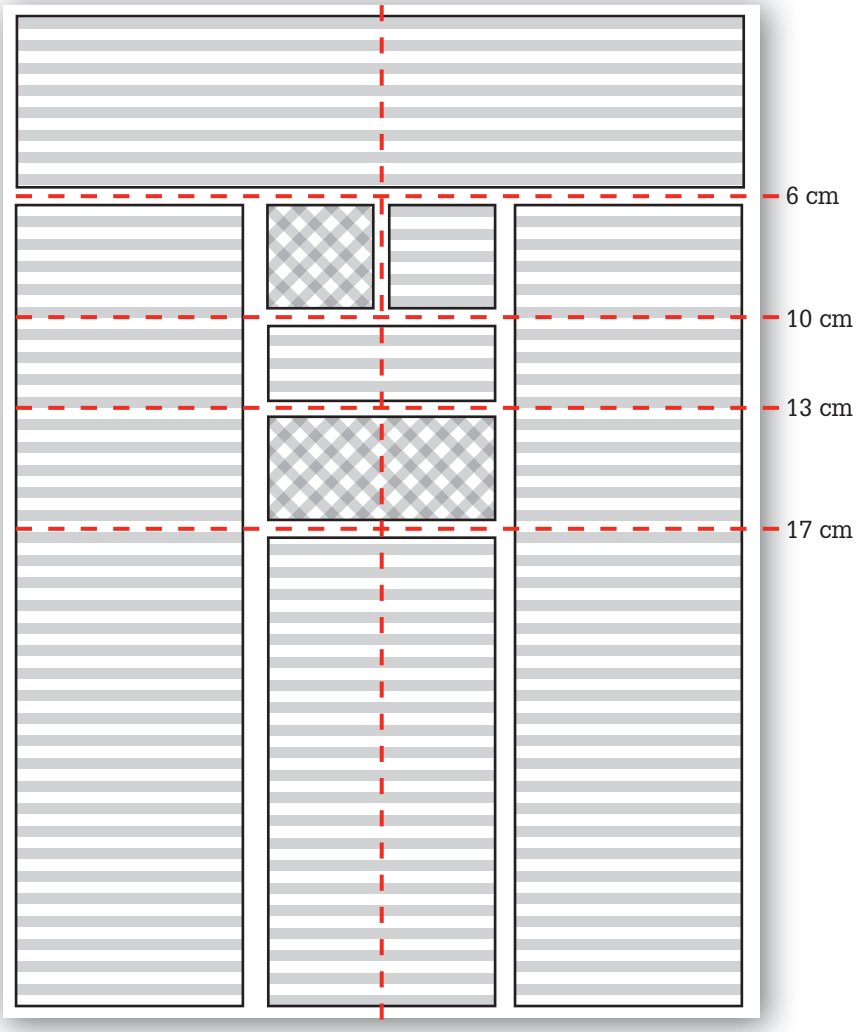
2 Use the **RECTANGLE TOOL** to place a rectangle around the outside of the menu and use the **OBJECT** menu, **ARRANGE – SEND TO BACK** to move the rectangle behind the other components of the menu.

3 Resave the document, check over it and print a copy.

## 10.4 Creating newsletters

Newsletters are one or more pages about a particular topic or organisation. Text in newsletters is usually placed in columns (for example, three columns) and graphics are inserted to add interest to the page. A masthead at the top of the first page is provided to show the newsletter title and publication details such as date or issue number. In this exercise you will create the newsletter shown on the following page.

A possible thumbnail sketch for the publication is:



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## Example

# TWO WHEELERS

## NEWS FROM VICTORIAN CYCLING

24 Baxter Road, Malvern — April, 2018

### ANNUAL TOUR

OUR annual weekend bike tour is rapidly approaching. Keep the weekend of 20 and 21 May free as we want as many members as possible to make the tour. This year we will trek to the Western District.

The trip will start from Melbourne at 9am on Saturday 21 May at the club rooms. We will travel over the West Gate Bridge through Geelong and down to Warrnambool where we will spend the first night. The beautiful west coast district is a must to see, although sometimes the hills and wind can make it a less than perfect experience. Staying over night at Warrnambool can be enjoyable with plenty of night life, but be careful not to overtire yourselves.

The Sunday involves a track to Hamilton, through Ballarat and back to Melbourne. The overall distance travelled is around 400 km, an exciting outing for those prepared for some steep hills and a good long distance ride.

The total cost for the tour is $150 per rider. This covers the hotel in Warrnambool, the renting of the support vehicles and the supply of meals. Please pay the club secretary as soon as possible so that we can make the necessary bookings, finalise the exact number of participants and inform the authorities of the details of the tour.

*The best place to save weight on a bike is in the wheels.*

### MEMBERSHIP DUES

This year's club membership is now due and $30 should be paid to the club treasurer.

*The Oppy*

### The Sir Hubert Opperman Award

A hero to all true bikers, Sir Hubert Opperman is remembered with an annual Award for best new cyclist. This will be presented at our annual Dinner Dance and Presentation Night to be held at the Malvern Civic Centre on 12 Oct. 2018.

Tickets are now on sale and available from the club secretary. It's sure to be a great night and a sought after award so get your tickets early to avoid disappointment. We hope all members will be able to attend.

### PLANNING YOUR TRAINING

A sound training program is essential for success in our sport. When stepping up your training routine in preparation for a race you may wish to know when you have reached your maximum conditioning. You can find this out by logging your resting pulse for a month. After that time you should reach a low point. Once this occurs you are most likely at your peak physical conditioning.

It is also important to practise maximising your momentum. As you approach a hill, maximise your speed as you approach the bottom of the grade. Doing this you will notice your speed cutting off more slowly.

The team coaches are always on hand to help you with your individual training program. Don't hesitate to ask for advice.

*REMEMBER:*

*The Club Professional is available to help you with your training program*



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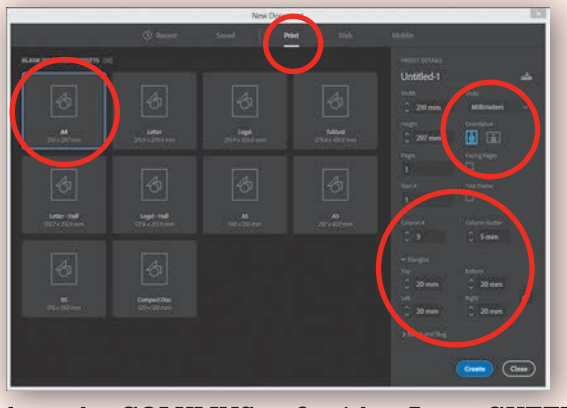
# Desktop publishing exercise 3

## Setting guidelines

**Skills practised**
- Adding gridlines
- Setting columns
- Inserting frames
- Inserting content
- Frame effects
- Wrapping text

A three-column page will be required in this case and a guideline will be inserted through the vertical centre of the page.



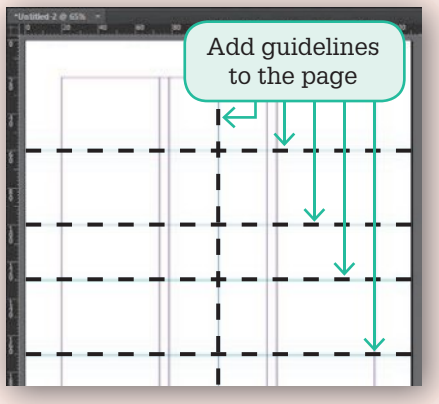
1 Start a **NEW** document and, in the **PRINT** category of the **NEW DOCUMENT** dialogue box, select the **A4** preset and set the **UNITS** to **MILLIMETRES**.

2 Turn off **FACING PAGES** and set the **COLUMNS** to 3 with a 5 mm **GUTTER**. In the **MARGINS** section set the four margins to 20 mm and select **CREATE**.

3 Horizontal guidelines will be added for each section of the newsletter. Refer to the thumbnail sketch at the start of the exercise when you are doing this to identify where they are being placed.

4 Drag guidelines from the top Ruler to 60 mm, 100 mm, 130 mm and 170 mm.

5 Drag a vertical guideline from the left Ruler to 105 mm in the top Ruler. This will show the vertical centre of the page.



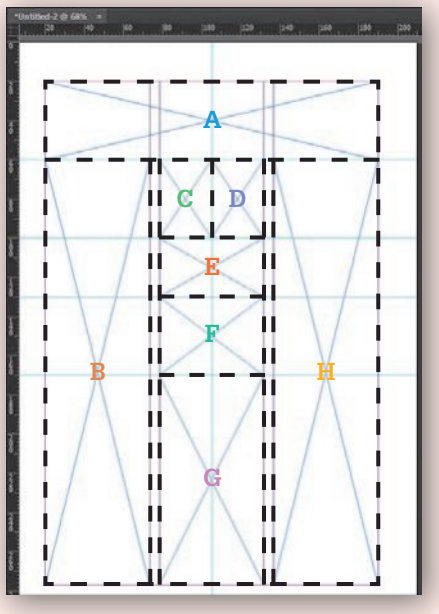

## Inserting the frames

Frames will be used to set the placeholders of the page.

1 Select the **RECTANGLE FRAME TOOL** from the Tools panel and drag eight frames to the positions labelled in the diagram.

> **Frame A:** a frame across the top of the page.
> **Frame B:** a frame down the left column.
> **Frame C:** a small frame in the centre column under frame A.
> **Frame D:** a small frame next to frame C.
> **Frame E:** a small frame under the last two frames.
> **Frame F:** a small frame under frame E.
> **Frame G:** a frame down the rest of the centre column.
> **Frame H:** a frame down the right column.

Note: A further frame will be added to column three later for an image to be inserted.




2 Save the page layout in your storage folder as: Newsletter.



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## Completing the masthead

1 Select the **TYPE TOOL**, click in the top and enter:

```
TWO WHEELERS <enter>
NEWS FROM VICTORIAN CYCLING <enter>
24 Baxter Road, Malvern, Vic. 3144 <tab> April, 2018
```

2 Format the first line to **MINION PRO**, **BOLD**, **48 pt**, **DARK BLUE** and **CENTRE**.

3 Format the second line to **MINION PRO**, **BOLD**, **23 pt** and **CENTRE**.

4 Highlight the first two lines and, in the **PARAGRAPH** section of the **CONTROL** panel, set the **SPACE AFTER** box to 3 mm to add space after each line.


5 Highlight the third line then display the **TYPE** menu and select **TABS**. Click on the **POSITION PANEL ABOVE TEXT FRAME** to add the **TABS** panel above the text frame.

6 Click on the **RIGHT TAB** box and click a right tab at about 165 mm to move the date to the right of the frame, then close the **TABS** panel.

Note: There must be room above the text frame for the **TABS** panel to be placed above the text frame.


7 Use **TEXT FRAME OPTIONS** from the **OBJECT** menu to set the **VERTICAL JUSTIFICATION** of the frame to **CENTRE**.

8 Select the **RECTANGLE TOOL** and drag a rectangle around the first two lines of the heading.

9 Set the **FILL COLOUR** to **CYAN** with 15% **TINT** and the **STROKE COLOUR** to **DARK BLUE**.

10 Display the **OBJECT** menu, highlight **ARRANGE** and select **SEND TO BACK** to send the rectangle behind the text.




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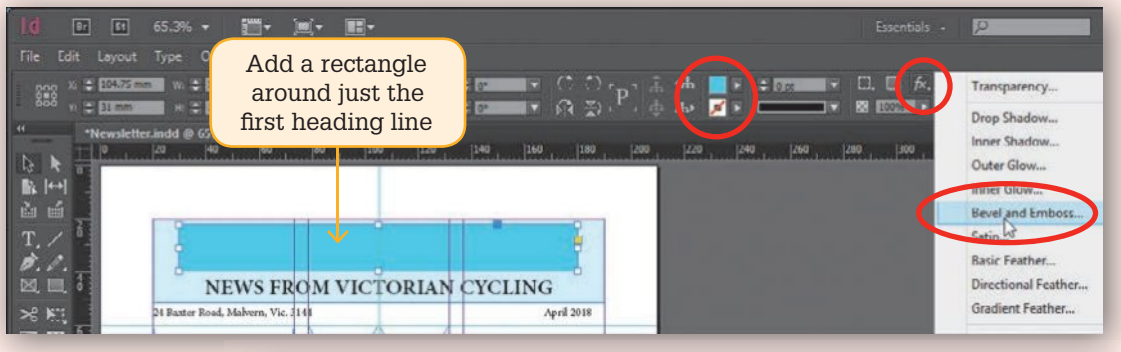
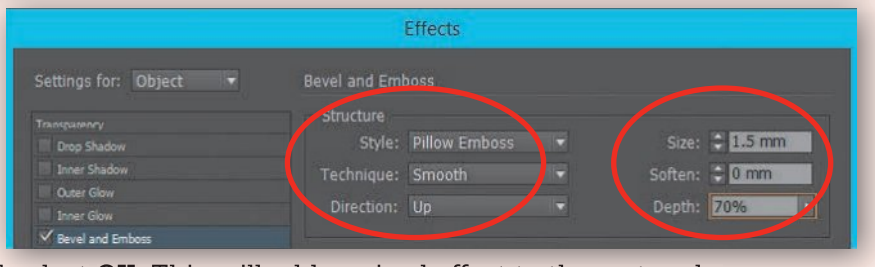
**11** Drag another rectangle slightly in from the sides of the previous rectangle around just the first line.

**12** Set the **FILL COLOUR** to **CYAN** with a 50% **TINT**, the **STROKE COLOUR** to **NONE** then click on the **EFFECTS** button in the **CONTROL** panel and select **BEVEL AND EMBOSS**.




**13** Set the **STYLE** to **PILLOW EMBOSS**, the **TECHNIQUE** to **SMOOTH**, the **DIRECTION** to **UP**, the **SIZE** to 1.5 mm, the **DEPTH** to 70% and select **OK**. This will add a raised effect to the rectangle.




**14** Display the **OBJECT** menu, highlight **ARRANGE** and select **SEND TO BACK** to send the rectangle behind the text.

**15** The first rectangle now needs to be sent behind the second. Select the **SELECTION TOOL**, hold down the <Ctrl> or <Command> key and click on the first rectangle until it is selected, then display the **OBJECT** menu, highlight **ARRANGE** and select **SEND TO BACK**.

Note: The <Ctrl> or <Command> key is depressed when you need to select objects that are behind other objects.

## *Completing the left column*

The left column will contain an article about the annual cycling tour. The text has been entered for you.

**1** Select the **TYPE TOOL**, click in the left frame (frame B) then display the **FILE** menu and select **PLACE**.

**2** Access the PIT2 Support Files, open the Desktop Publishing folder followed by the Exercise 3 folder and open the Annual Tour Text file.



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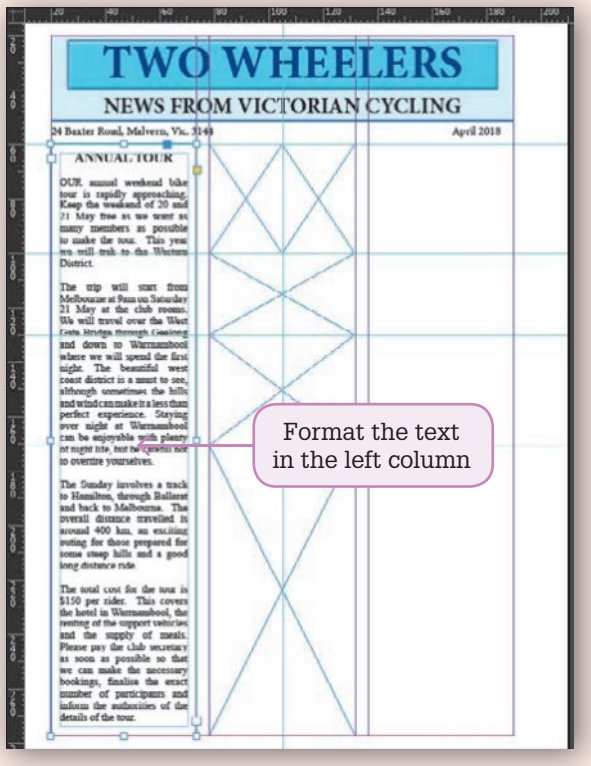
3 Press <Ctrl+A> or <Command+A> to select all the text and, in the Character section of the Control panel, set the Font Size to 11 pt and the Alignment to **JUSTIFY WITH LAST LINE ALIGNED LEFT**.

4 Highlight the heading and set the font size to 14 pt, bold and centre.

5 Display the Object menu and select **TEXT FRAME OPTIONS**. Set all the **SPACING INSETS** to 3 mm and select **OK**. This will space around the edges of the text.

6 Select the **SELECTION TOOL** and the frame should be selected. In the **CONTROL** panel set the **STROKE WEIGHT** to 1 pt to add a border to the frame.






## Completing the centre column

1 Select the top left frame (frame C) of the centre column and press <Ctrl+D> or <Command+D> to select the **PLACE** command.

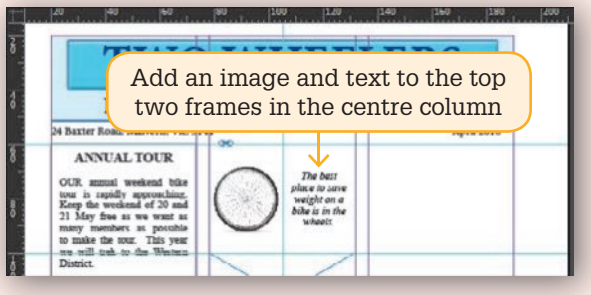
2 Access the PIT2 Support Files, open the Desktop Publishing folder followed by the Exercise 3 folder and open the Wheel image.

3 Click on the **FIT CONTENT PROPORTIONALLY** button in the Control panel to fit the image within the frame.

4 Select the top right frame (frame D) and place the Wheel Text file from the PIT2 Support Files (refer to point 2).

5 Use the **TYPE TOOL** to highlight the text and set it to 11 pt, italic and centre.

6 Use **TEXT FRAME OPTIONS** from the **ARRANGE** menu to set all the **SPACING INSETS** to 3 mm and the **VERTICAL ALIGNMENT** to centre.




7 Click in the frame below the last two (frame E) and place the Membership Text from the PIT2 Support Files (refer to point 2).

8 Highlight all the text and set the font size to 11 pt and centre.

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9 Highlight just the heading and set it to 12 pt and bold.

10 Use the **TEXT FRAME OPTIONS** to set all the **SPACING INSETS** to 3 mm and the **VERTICAL JUSTIFICATION** to **CENTRE**.

11 Select the **SELECTION TOOL** and set the **FILL COLOUR** to **CYAN** with a 15% **TINT**, the **STROKE COLOUR** to **DARK BLUE**, then click on the **YELLOW** box at the right of the frame and drag the **YELLOW** handles to create 3 mm rounded corners for the frame.

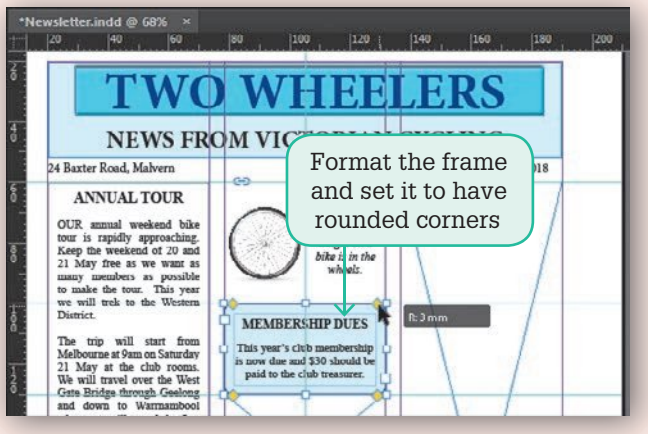
12 Click in the frame below the last frame (frame F), place the Oppy image from the PIT2 Support Files and click on the **FIT CONTENT PROPORTIONALLY** button in the Control panel to fit the image in the frame.

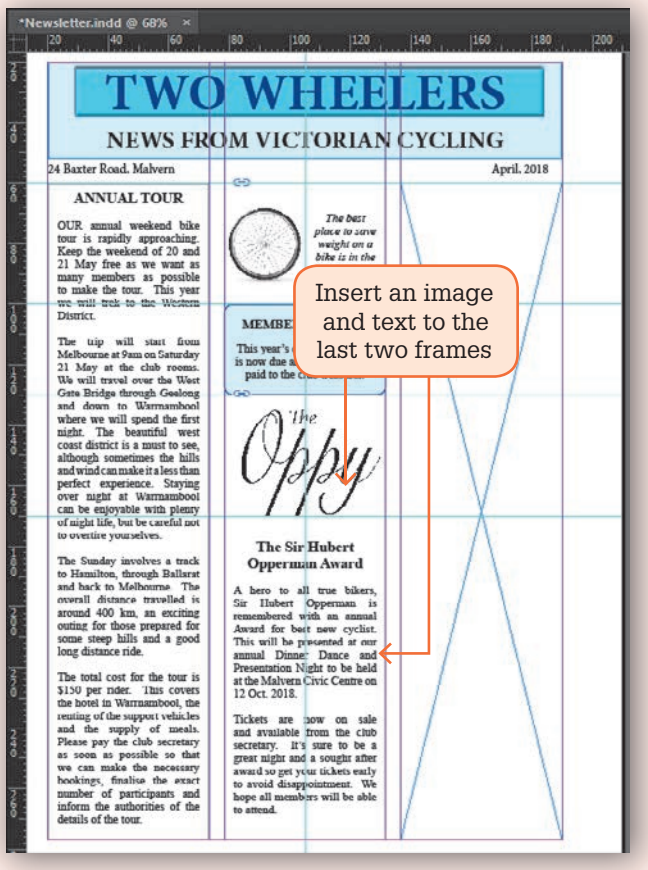
13 Click in the last frame in the centre column and place the Oppy Text file from the PIT2 Support Files.

14 Select all the text and format it to 11 pt and **JUSTIFY WITH LAST LINE ALIGNED LEFT**.

15 Format the two heading lines to 14 pt **BOLD** and **CENTRE**.

16 Use the **TEXT FRAME OPTIONS** to set all the **SPACING INSETS** to 3 mm and the **VERTICAL JUSTIFICATION** to **CENTRE**.




## Completing the third column

1 Click in the frame in the third column (frame H) and place the **TRAINING PROGRAM TEXT**.

2 Select all the text and set it to 11 pt and **JUSTIFY WITH LAST LINE LEFT ALIGNED**.

3 Format the heading to 14 pt, **BOLD** and **CENTRE**.



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4 Use the **TEXT FRAME OPTIONS** to set all the **SPACING INSETS** to 3 mm.

5 Select the **RECTANGLE FRAME TOOL** and drag a 30 mm high frame across the column under the heading.

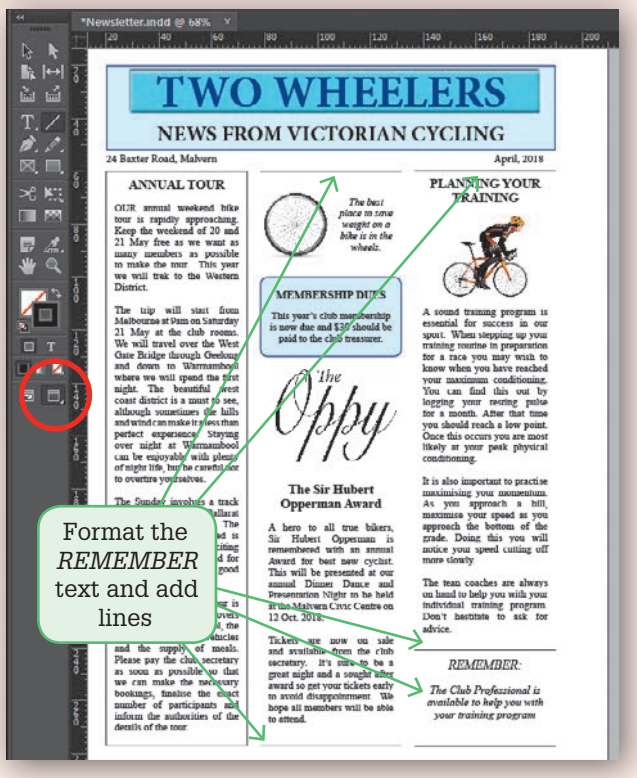
6 Place the **TRAINING** image into the frame, set it to **FIT CONTENT PROPORTIONALLY** then click on the **JUMP OBJECT** button in the **CONTROL** panel to set the text wrap to above and below the image.


7 Use the **TYPE TOOL** to highlight the last paragraph and heading and format it to 12 pt, **ITALIC** and **CENTRE**, then highlight the **REMEMBER** heading and format it to 14 pt.

8 To complete the newsletter some lines will be added. Select the **LINE TOOL** and add horizontal lines across the top and bottom of columns two and three, and above the Remember heading.

9 Turn on the **PREVIEW** button at the base of the Control panel and make any adjustments to the newsletter. For example, the Oppy image can be moved down a little, the tab for the date moved to the right a little and the article at the base of column two can be moved down a little so that the text along the base of the newsletter is level.

10 Print a copy of the newsletter or share your work electronically.






## 10.5 Creating greeting cards

Please see the Interactive Textbook for additional instructions on creating greeting cards in InDesign.

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# DESKTOP PUBLISHING PROJECT

## NewSound

NewSound is a local company set up to professionally manage local bands and singers. It has a number of clients (bands and singers) and it tries to keep them in regular work. This involves finding performance venues, advertising and booking gigs, and keeping accounts.

Bookings have been steadily falling and the artists are starting to complain about the lack of work. Linda, the manager, has decided that more people need to know about her clients and she needs a better way of advertising their talents. She has employed you to produce professional advertising materials that can be posted to the local pubs and clubs, previous clients and anyone who contacts the company. You will need to include a banner (masthead) showing the company name, the articles highlighting its four main performers and a section showing contact details for the company.

The data required is shown on the next page and it is available in the PIT2 Support Files in the Project folder within the Desktop Publishing folder. The file is a Microsoft Word file called NewSound Data and contains data that can be copied and pasted into your desktop publishing program.

### Collecting the data

Collect any images you intend to use in your publication and work out what sort of masthead or logo you will create for the company.

### Defining the solution

Draw a thumbnail sketch on paper of the publication you are going to create. Include on the sketch how many columns you are going to use, where guidelines will be needed, where frames will be placed and what fonts and styles will be used.

### Implementing

Use the publishing program to produce your design.

### Evaluating, collaborating and managing

1. Ask other people to look at your design and give you feedback on how effective it is. Describe what was said and the changes you made to your design because of their comments.
2. What other changes did you make from your original design?
3. What are the advantages of producing a design using a publishing program?



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# Project data: NewSound

Finest local bands and singers

Available for pubs, clubs, weddings, parties, 7 days a week

## Location Information

45 Hilton Street, Brisbane, 4000
Phone: 0468 5099 9007
Fax: 0466 7825 1183
Email: Paula@NewSound.com.au

## Performers

### Rockin' Robert

Robert has been performing in the local area for 25 years. He specialises in '50s and '60s music, which has proved to be very popular at wedding receptions or concept functions run by sports clubs.

Robert has his own band consisting of a lead guitarist, a drummer and a bass player. Robert supports them on piano and harmonica. He covers most of the well-known artists of the era, including Bill Haley and the Comets, Little Richard, The Beatles, The Rolling Stones, Elvis Presley and Bob Dylan.

Robert charges $150 per hour and is available any night of the week in the Brisbane area. For areas outside Brisbane, he is only available at weekends and a $200 travel charge applies.



### Detonator

A heavy metal band to really get your function rocking. Five guys who play hard and play loud. Ideal for school socials, rave nights or New Year's Eve parties.

Detonator have been performing together for five years and have built up a local following in Queensland. Regular sessions at Brisbane hotels have been well supported. They cut their first CD last year, published through Mushroom Records.

Detonator charge $2000 per gig plus expenses and are available to perform anywhere in Australia.

### Buck Kingsley

A 35-year old country singer who won the Tamworth New Country Performer of the Year award in 2005. Buck has been performing professionally since 1992 with a combination of his own songs and covers of the current country music stars including Garth Brooks, John Williamson and Keith Urban.

Buck is hoping to negotiate a deal with a record company and performing regularly can only help this.

Buck usually performs solo, backing himself on guitar. However, if needed, he can call upon other musicians to back him. He is available most nights of the week and charges $200 per hour.

### Newport Convention

A folk and country music combo. Newport Convention consists of three family members who were born and raised in Newport in Melbourne. They perform a mixture of folk and country music that can best be characterised as intelligent country music.

Paula is the lead singer, Roger is the songwriter and acoustic guitarist and helps with backing vocals. Andrea helps out on piano and violin. Apart from their own music, they perform songs from Mary Chapin Carpenter, Shawn Colvin and Nanci Griffith.

Newport Convention performs regularly at folk festivals at Port Fairy and Coffs Harbour. They are available for hotels, club functions and social functions such as weddings. They charge $200 per hour.

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# Module 11

## ALGORITHMS AND PROGRAMMING

Program featured for exercises:

**Python**



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# Teacher information

## IT knowledge and skills covered in this module

- Algorithms
- Algorithmic thinking
- Branching
- Computer programming
- Coding
- Programming games in Scratch and Python

## Suggested further uses across the curriculum

- Mathematics (for a range of applications across the maths curriculum). Design and implement mathematical algorithms using a simple general purpose programming language (VCMNA254) and use algorithms and related testing procedures to identify and correct errors (VCMNA282).

## Alignment with the Australian Curriculum

### ICT Capability elements covered

- Investigating with ICT
  - > define and plan information searches
- Creating with ICT
- Communicating with ICT
  - > collaborate, share and exchange
  - > understand computer mediated communications
- Managing and operating ICT

### Other general capabilities covered

- Numeracy
- Critical and creative thinking

### Digital Technologies curriculum content in this module

#### Processes and production skills

- Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)
- Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)
- Design algorithms represented diagrammatically and in structured English and validate algorithms and programs through tracing and test cases (ACTDIP040)
- Implement modular programs, applying selected algorithms and data structures including using an object-oriented programming language (ACTDIP041)
- Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)





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# 11.1 Computational thinking

An **algorithm** is a sequence of steps that, when followed, leads to the solution of a problem. It has a defined set of inputs and delivers an output. Each step in the algorithm leads to another step or completes the algorithm.

Through this module, you will explore the purposes of algorithms as well as think about the design, analysis and implementation of your own algorithms.

**algorithm**
Step-by-step procedures required to solve a problem. An algorithm may be described in many ways. Flowcharts are often useful in visualising an algorithm.

## Finding solutions to problems


How do people work through complex real-world problems in a systematic way? For example, thousands of apps are available now for smartphones and other digital devices. The detail and extent of functions and features varies enormously. The cost of apps and programs depends on how many people will use them and how much work goes into creating them. But where does the work all start? It begins with the recognition of a problem or requirement. For example, a simple and often used app is the Weather app on a smartphone. The requirement – what is the weather forecast for today for a specific location. The solution – an algorithm that lists the steps to get the desired result – display the weather forecast for today for the location specified.

Algorithms help people, such as app developers or computer programmers, decompose or break down a complex problem into smaller, more manageable tasks.

For example, the following algorithm for a weather app is written in point form:

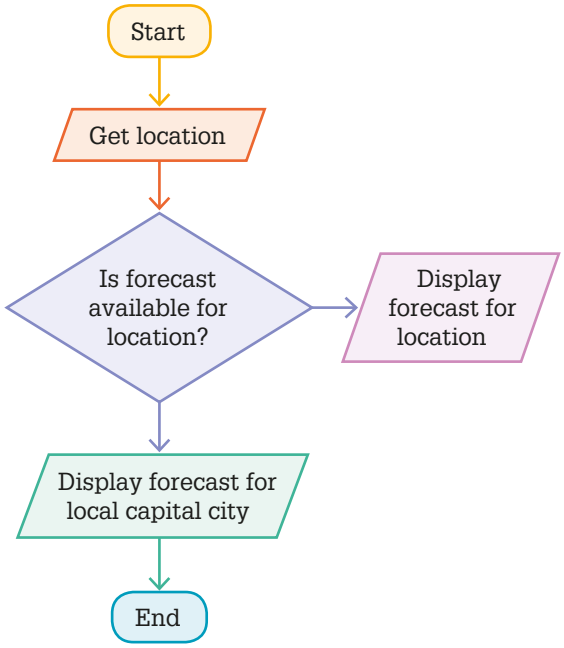
1. What is the location for the weather forecast?
2. Get forecast for that location.
3. Display weather forecast for location, otherwise display local capital city.

This gives us a very simple algorithm.

To work towards creating the program that will solve the problem of how to display a weather app on a smartphone, the app developer or computer programmer will often create a flowchart to visualise the algorithm.

In the flowchart opposite, the diamond shape is a DECISION that creates **branching**. Branching results when a choice is made between one or more actions depending on the data provided and other conditions.

From this diagram a **structured English** version can be written that a coder will use to write the code for the software, using language such as conditional **IF statements**.




**branching**
Making a decision between one of two or more actions depending on sets of conditions and the data provided.

**structured English**
The use of the English language to describe the steps of an algorithm in clear, unambiguous statements that can be read from start to finish.



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**IF statement**
A conditional decision statement used to control the flow of a program.

Keywords such as START, END, IF, UNTIL, ELSE and THEN are used to provide a type of language (also known as syntax) to assist in identifying the logical steps to describe the algorithm.

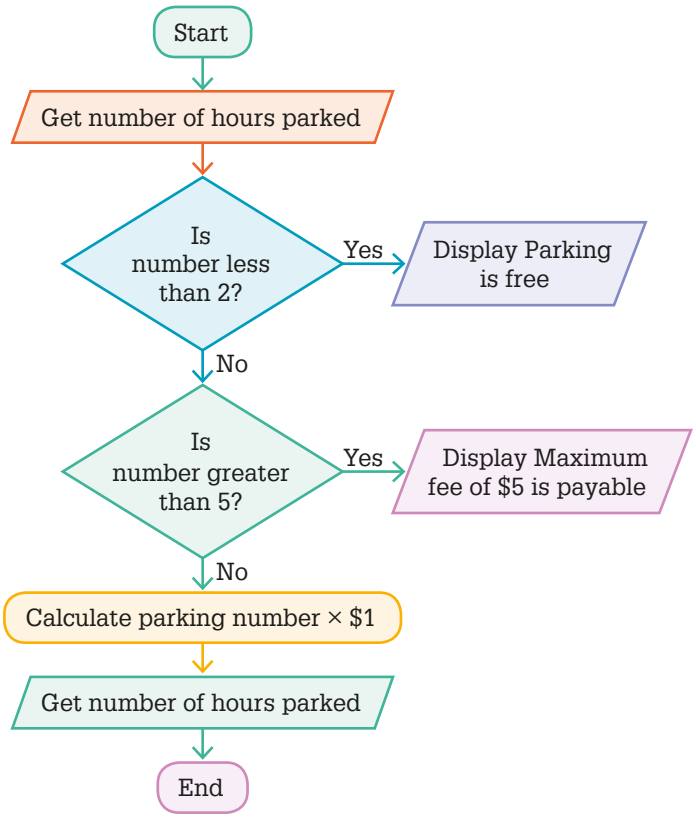
Using structured English, the above flowchart would look like this:

```
START
Get location
IF forecast is available for location
    THEN
    Get forecast for location and display
    ELSE
          Get forecast for local capital city and display
ENDIF
END
```

Working out and displaying the charge for parking is another example of a simple algorithm.

1. What is the number of hours a customer has parked in the parking lot?
2. If the number is less than 2, parking is free.
3. If the parking is more than 5, the maximum fee of $5 is to be charged.
4. If the number is more than 2 hours and less than 5, the fee is $1 times the number of hours.

The flowchart would look like this:



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The structured English would look like this:

```
START
Get number of hours parked
IF number less than 2
    THEN
          Display "Parking charge is "Free""
    ELSE
          IF number greater than 5
                THEN
                      Display "Maximum Parking fee of $5 is payable"
    ELSE
                Calculate parking fee result
                By multiplying number by $1
                Display the parking fee payable
          ENDIF
    ENDIF
END
```

Once an algorithm has been written in steps or drawn on a flowchart it must be tested (through a process known as **desk checking**) to ensure it is working as expected. You should work through the algorithm with various input data to check this. The data should include both expected and unexpected values. For example, work through the flowchart with data where hours parked are the number 0, 1, 2, 3, 4, 6 or 10.



**desk checking**
A method used by a human to check the logic of a computer program's algorithm to reduce the likelihood of errors occurring. This may be done on paper, using a diagram, or mentally trying a sample of typical inputs to see what the outputs would be. For example, to desk check a branching statement {IF age >65 THEN 'retire' ELSE 'keep working'}, the values for age of 64, 65 and 66 could be tried to show that 64 and 65 would result in 'keep working' and 66 in 'retire' so that it could be decided if the statement worked as intended.

## Algorithms and programming exercise 1

### *Spreadsheets and testing algorithms*

**Skills practised**
- Understanding algorithms
- Applying algorithmic thinking

Numerical methods using tables, spreadsheets, graphs and other algorithms can be used to solve a range of mathematical equations and to compute other values. For example, a spreadsheet is a calculating program that can be used to implement simple addition algorithms. However, an algorithm like the car parking example can also be used to determine an appropriate formula to solve a problem using a spreadsheet application.

For example, see the exercises in Module 7: Spreadsheets that determine the charge for internet usage. Exercises 10 and 11 use the IF function, which, like an IF statement in an algorithm, give us a range of outputs depending on the various inputs.

To test yourself, write out the algorithm for calculating the internet charge per hour in simple numbered steps. Use the input data provided in Exercise 12, Module 7.

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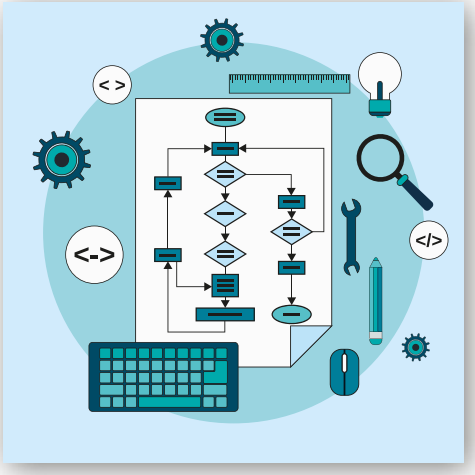
## Algorithms outside the classroom

When you think about it, **algorithmic logic** surrounds us. For instance, anyone that has followed the steps of a recipe or used navigation software has used an algorithm.

**algorithmic logic**
A logic behind breaking down computing problems and information systems into step-by-step processes in order to solve problems or achieve specified outcomes. It involves sequencing and abstraction and leads to algorithmic statements.




As we know, computers are a major part of our lives, and are used to run many different types of objects in the real world, which we really take for granted. Algorithms are the basic building blocks of the computer programs that run these machines and devices. Some real-world examples of algorithms at work include:

## Example
### *Autopilot algorithms*

Most modern passenger aircraft today are fitted with autopilot systems that allow the aircraft to fly safely without direct input from the pilot. Such systems rely on computer programs to help implement an algorithm, which is designed to accept a range of inputs and deliver outputs, resulting in actions that steer the aircraft safely.

Inputs for such an algorithm might include the air speed, direction or tilt angle. The outputs might relate to engine thrust, flap angle or rudder changes. While looking at the wing on a passenger aircraft during flight you may have noticed the constant movement of a relatively small flap called an aileron. Under the control of an autopilot algorithm, this flap will continuously make changes to its angle, which adjusts the tilt of the aircraft. A constant feed of information into the algorithm will allow the program to update the output and change the aileron's angle accordingly.

Without an efficient algorithm designed using mathematics and computer code, autopilot systems would not be the essential aeronautical tool that is in widespread use today.



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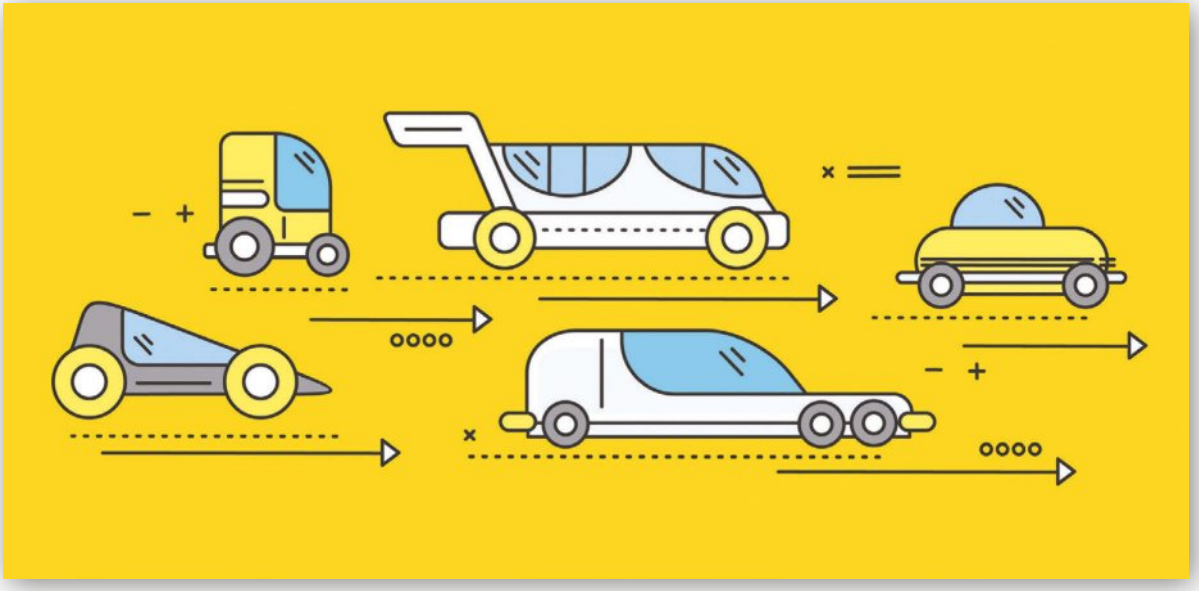
# Example
## *Driverless cars*



The vast majority of accidents in motor vehicles are due to driver error, which is one of the reasons why companies such as Google are experimenting with driverless cars. Such vehicles are currently being tested in a number of countries. The vehicles map their current position and use a range of sensors to determine the moving and stationary objects in the immediate area. This information is the input for computer-based algorithms that make predictions and test scenarios at a rapid rate. The efficiency of the computer code is critical in the running of the systems, which is why skilled programmers and mathematicians are responsible for their design. If the system detects a pedestrian, for example, the code needs to take into account the probability that this person could cross the road in front of the car. The software must choose the safest possible route at the safest speed.

Driverless cars have the potential to reduce road fatalities and increase the level of efficiency on our road networks. Parking would become less problematic, with a driverless car dropping you off at work and travelling to a remote parking spot somewhere else, before returning later in the day to pick you up.



# Algorithms and programming exercise 2

## *Class discussion*

Discuss the two examples of algorithms used in important real-world applications. With so much at stake in both scenarios, can you predict the sorts of problems that would occur if the algorithms were not perfect?

**Skills practised**
- Understanding algorithms
- Applying algorithmic thinking

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# Algorithms and programming exercise 3

## *Algorithms and flowcharts with a loop – convert to structured English*

**Skills practised**
- Understanding algorithms
- Converting algorithms into structured English

A librarian wants to print out the current loans for a particular student. This will involve a search through all records of currently borrowed books. The algorithm below displays a loop as each book is checked for if it is borrowed by this student. It also includes a check if there are any more books to check – or an end point to the loop. Examine the algorithm and flowchart below. Fill in the missing text in the structured English box.

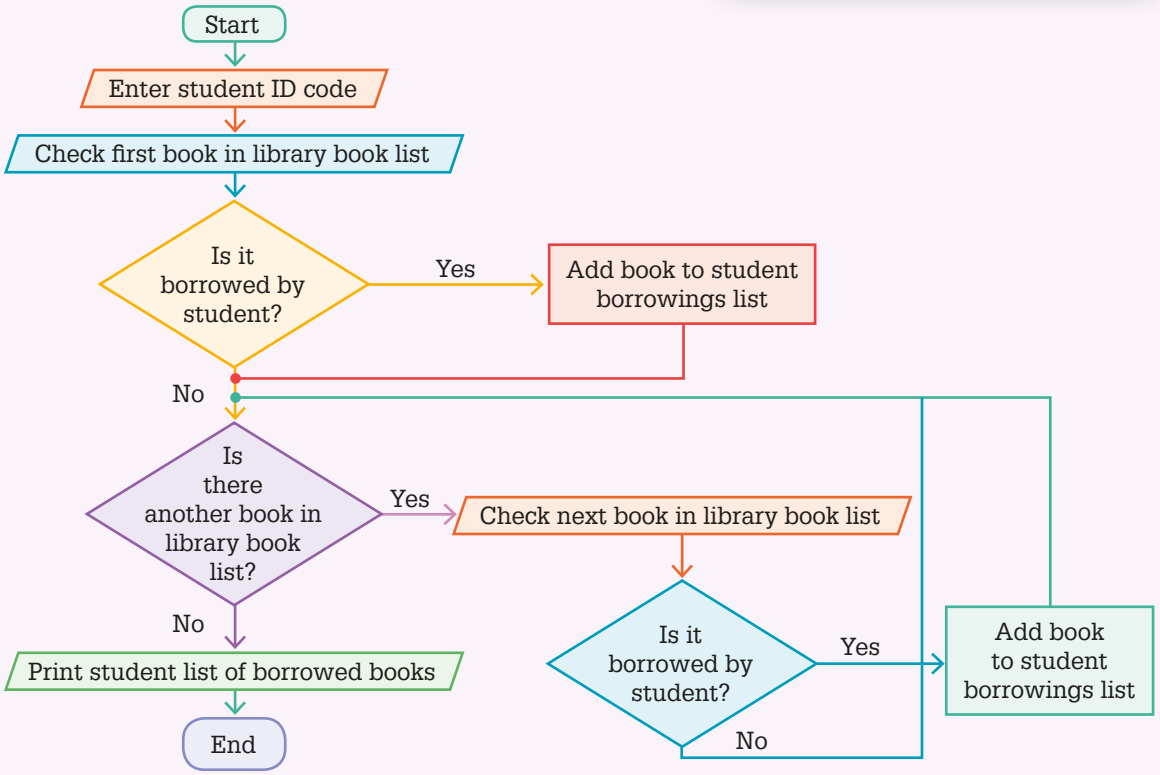
> The librarian keys in the student's ID code.

> A search is made for the code in book records.

> A list of books borrowed by that student is printed.

1 Enter student ID code.
2 Check the first book in library book list to see if it is borrowed.
3 If it is borrowed, is it borrowed by this student?
4 If yes, add the book to the student list.
5 If no, look at the next book.
6 Continue while there are books to check.
7 When finished checking all books, print the student list of borrowed books.

```
START
GET _ _ _ _ _ _ _ _ _ _ _ _
GET borrower ID code of
first book in library
book list
IF  _ _ _ _ _ _ _ _ _ _ _ _
     THEN _ _ _ _ _ _ _ _ _
END IF
WHILE _ _ _ _ _ _ _ _ _ _ _
     THEN GET _ _ _ _ _ _
     IF _ _ _ _ _ _ _ _ _ _
          THEN _ _ _ _ _
END WHILE
PRINT student list of
borrowed books
END
```



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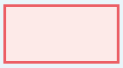
## Flowchart symbols

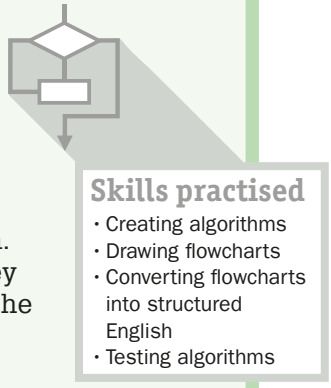
Flowcharts for algorithms can get very complex. You may have already noticed the different shapes and when they are used.

| Shape | Name | Description |
|---|---|---|
|  | Terminal | Can be a circle, oval or rounded rectangles, start or end or similar phrase or a phrase that signals the start or end of a process. |
|  | Flow line | An arrow coming from symbol and ending at another symbol represents that control passes to the symbol the arrow points to. |
|  | Input/Output | Represented as a parallelogram. Involves receiving data or displaying processed data. |
|  | Decision | Usually a Yes/No or True/False test. Two arrows come out of this shape that should be labelled. One for Yes/True, the other for No/False. Usually down and to the right. |
|  | Process | Represented as rectangles. This shape is used to show that something is performed, e.g. 'Add 1 to X', 'Save changes', 'Replace identified part'. |
|  | On-page connector | Generally represented with a circle to indicate where multiple control flows converge to a single exit flow. Mostly used to represent a loop, particularly after a decision. If two cross over but have no connection, a small semicircle is used to indicate that no connection is intended. |



Tip: You can easily draw flowcharts using shape tools in Microsoft Word or Google Drawings. Refer back to Book 1, Module 4: Drawing tools, Exercises 1–2 if you need a refresher.

## Algorithms and programming exercise 4

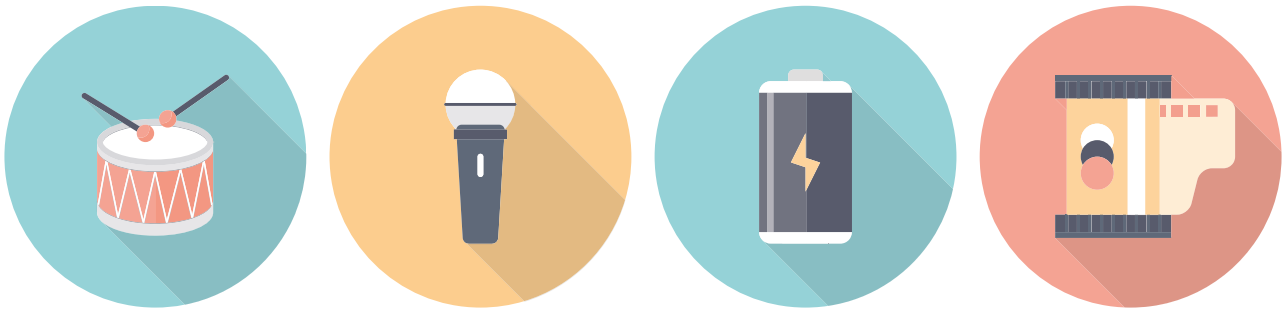


### *Algorithms, flowcharts and structured English*

**Skills practised**

- Creating algorithms
- Drawing flowcharts
- Converting flowcharts into structured English
- Testing algorithms

Write an algorithm and draw a corresponding flowchart that works for the following procedure. Convert your flowchart into structured English. Remember to test your results and work through them to make sure they work. Use various scenarios. For example, suppose for the example on the previous page that the library only has one book – strange but possible. Suppose the student had no books borrowed – what will happen then? Should some steps have been added to the flowchart or algorithm?



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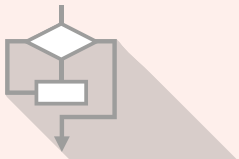
## Algorithms and programming exercise 5



### *Algorithms, flowcharts and structured English*

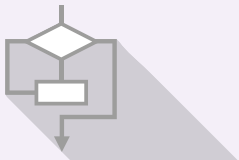
**Skills practised**
- Creating algorithms
- Drawing flowcharts
- Converting flowcharts into structured English
- Testing algorithms

Write an algorithm and draw a corresponding flowchart that works for each of the following procedures. Convert your flowcharts into structured English. Remember to test your results and work through them to make sure they work.

A salesperson is checking the expiry date of a credit card to be used to pay for a purchase.

> The salesperson enters the date of expiry of the credit card.
> The expiry date on the card is compared to today's date.
> The result is displayed on the cash register screen.

## Algorithms and programming exercise 6



### *Algorithms, flowcharts and structured English*

**Skills practised**
- Creating algorithms
- Drawing flowcharts
- Converting flowcharts into structured English
- Testing algorithms

Write an algorithm and draw a corresponding flowchart that works for the following procedure. Convert your flowchart into structured English. Remember to test your results and work through them to make sure they work. Use various scenarios.

A fee for internet data usage is to be calculated and charged to the customer. So the amount of gigabytes used by the customer needs to be accessed. If less than 8 GB are used then there is no extra charge. If between 8 and 25 GB are used, the charge is an extra $2 per GB. If more than 25 GB are used then the charge is $5 per GB.

Once the fee is determined, the charge is added to the customer's account for the month.



# 11.2 Types of algorithms

For software programmers, working with algorithms and flowcharts takes place in the early stage of creating a program. This is known as **design thinking**. One good thing is that algorithms can be written in what is known as **pseudocode**, which allows a programmer to easily transfer the algorithm into their preferred programming language. Finding good and interesting algorithms allows programmers to write quality programs.

**design thinking**
Use of strategies for understanding design problems and opportunities, visualising and generating creative and innovative ideas, and analysing and evaluating those ideas that best meet the criteria for success and planning.

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There are many different types of algorithms used for a variety of important functions.

Q. How can we perform online banking transactions safely?

A. Encryption algorithms that allow the secure transmission of data.

Q. How do applications like Google Maps know how to get us from one location to another?

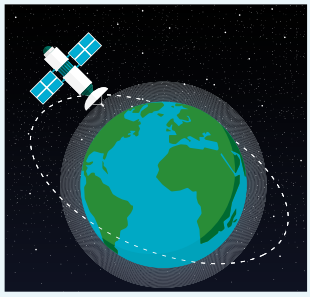
A. Route finding algorithms that program the most efficient way to get from point A to point B.

Q. How do we stream video online through services like YouTube?

A. Compression algorithms.

Q. How do satellites know how to perform tasks?

A. Optimisation and scheduling algorithms.

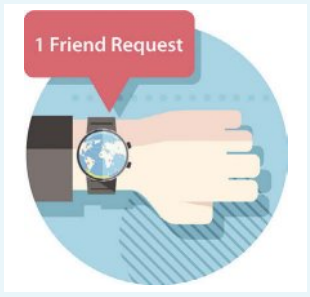


Q. How do filmmakers and game designers create digital characters?

A. Rendering algorithms.

Q. How do search engines and social media applications know how to suggest content a user might like?

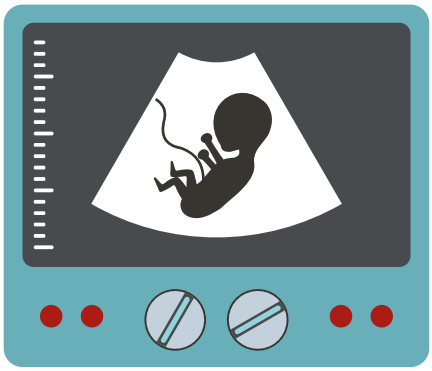
A. Link analysis algorithms that try to create relationships between different pieces of information online.






## FACT BYTE

**Compression algorithms play a key role in our world today, by squeezing large audio and image files into portable packages (e.g. MP3s and JPEGs). Without this technology, medical imaging, for example, wouldn't exist. Ultrasound machines couldn't turn raw data into pictures that enable doctors to see inside our bodies to check the development of babies in the womb, diagnose and treat broken bones and more.**



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# 11.3 Computer programming and coding

For digital systems, the creation of actual software requires **coding** in a programming language suitable for the system it is to be used on. However, computers run on binary code – written in 1s and 0s – which is very difficult for humans to work with.

But just as people can understand different languages, computers can understand different languages (like Python, C#, C++, Perl, Visual Basic, Java, JavaScript, Ruby and PHP, among others), which translate our instructions into binary.

Without coding, we wouldn't have websites to use, digital games to play, or special effects in the movies and shows that we watch. Though learning detailed coding is outside the scope of this book, through the use of algorithmic logic you can still create a digital solution to a problem.

**coding**
The process of writing computer software code.

There are lots of areas on the internet where you can experience basic coding. Try the following websites:

- Code.org: This site has a combination of free and fee courses. Look up the Hour of Code for some fun with coding.
- Codeacademy: This site has many lessons on how to code for free. You just have to sign up with an email and a password.
- Khan Academy: This site has some useful resources on coding in a range of programming languages.
- GameMaker Studio: This is a free program available for download where you can make your own games using an easy-to-use drag and drop interface!



# 11.4 Introducing Python


In Book 1, Scratch gave us an engaging introduction to how computer programs are coded. In this book, we will next look at the program Python, which is available free of charge to download. We recommend using Python 3.

Python is a programming language that is suitable for inexperienced people to use to create their own computer programs. It is what is known as an **object-oriented programming language (OOP)**. For our purposes, Python is a good introduction to programming, and will allow us to code different instructions, and eventually make a small game.

**object-oriented programming language (OOP)**
A programming language, where objects represent a combination of data (the attributes of an object) and actions that can be performed on or with those data (the methods of the object). An example might be a declaration of a 'car', which has attributes that describe its physical nature (such as the number of doors, its colour, the size of the engine) and the actions it can perform (such as accelerating, braking and turning).

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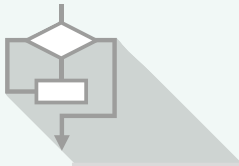
# 11.5 Simple coding in Python

Learning to code is literally like learning a new language (learning to construct sentences, etc.). In the following exercise, you will learn how to code a simple multiple-choice game in Python, with the aim of giving a general introduction to the syntax (specific language) and functionality of Python. For further activities and tips visit the Python site, where we recommend the Beginner's Guide to Python.

Next, we will make a simple quiz in Python, which you can use to challenge your classmates.

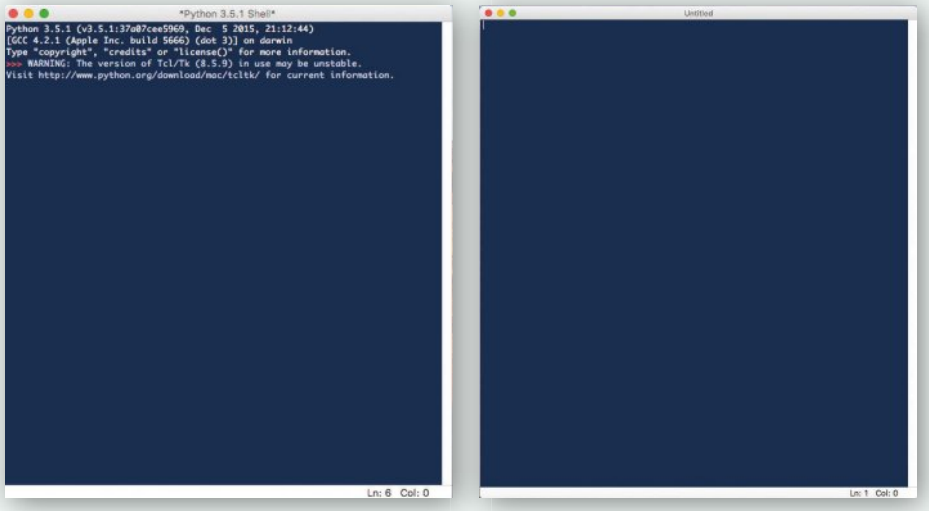
## Algorithms and programming exercise 7



### *Using Python to create a quiz*

**Skills practised**
- Creating a Python project
- Navigating the Python Shell
- Python syntax

1. Make sure you download the appropriate version of Python 3.5.1 for your system.
2. Open up the program, which should look like this:




3. Next, open a new file. You should have two windows now, one is called the Python Shell and the other is the untitled new document. The Shell is where you will eventually run the programs you write in Python. The currently untitled new document is where you write your code.
4. Save your file.
5. Let's start by writing a very simple quiz program that asks the player a question, then if they input the correct answer they are rewarded with 100 smiley faces!
6. Enter the following text:

```
print("In Python, what word must you type before any text a user sees?")
answer = input()

if answer == "print":
        print(" :) " * 100)

print("Thank you for playing!")
```



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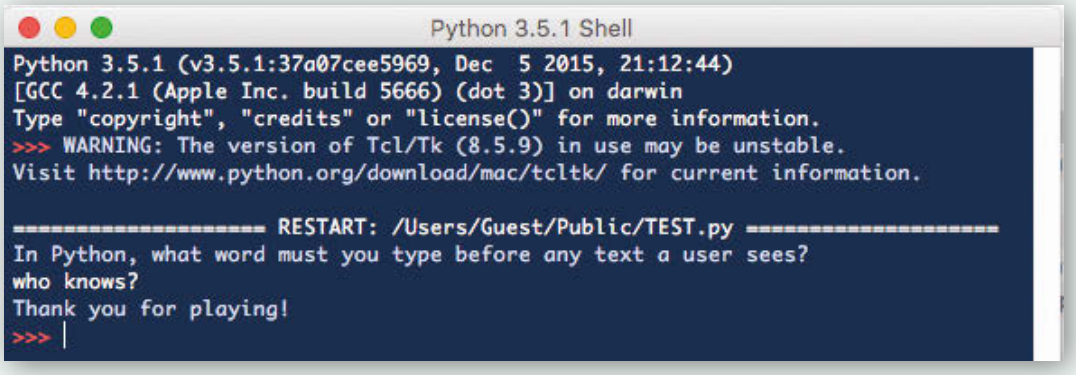
7 Be sure to add the colon : to the end of the line

if answer == "print":

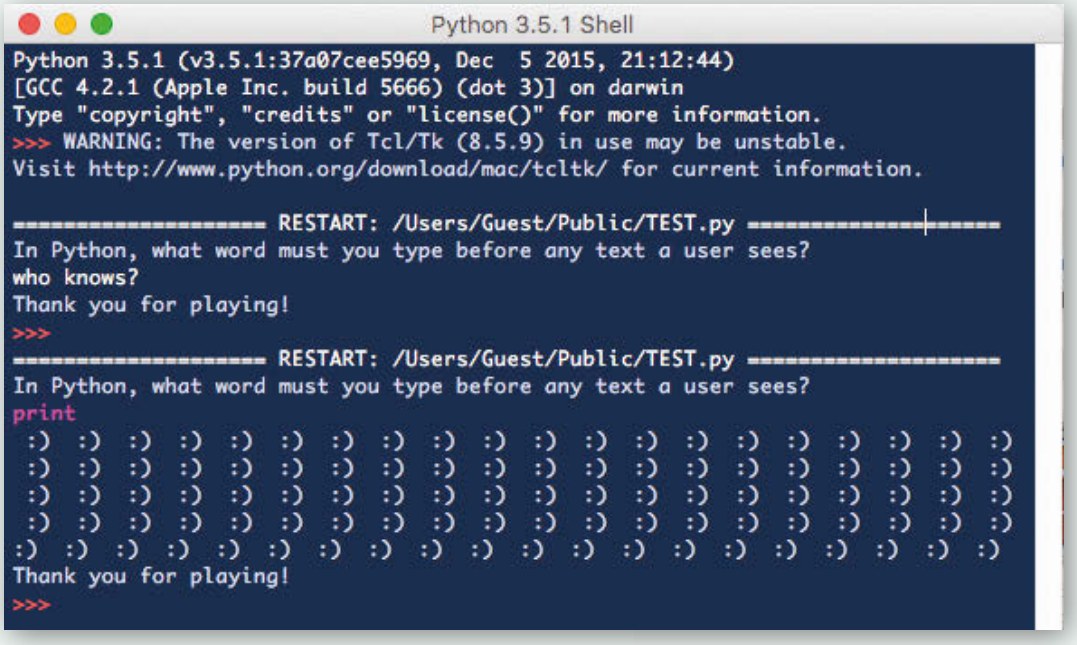
And also indent the line below it (move it to the right) with spaces or the tab button.

8 Save your file, then hit F5 to run your program in the Python Shell. Tip: Whenever you want to run your program, remember to first save your file.

9 Test your program. What happens when you get the answer right? What happens when you get it wrong?




The indented code (that prints the smiley faces) only runs if the answer is correct. But "Thank you for playing!" always appears, whether your answer is right or wrong. Can you guess why that is?




Python uses two equals signs == to check if two things are the same. This is because one equals sign = is used to store something in a VARIABLE [for example, answer = input()].

The program currently prints smiley faces if the player gets the question right, but doesn't print anything to tell them they got the answer wrong. You can add an ELSE statement to print sad faces if the user inputs anything other than the correct answer.



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1 Enter the following text:

```
print("In Python, what word must you type before any text a user sees?")
answer = input()


if answer == "print":
        print(" :) " * 100)
else:
        print(" :( " * 100)

print("Thank you for playing!")
```

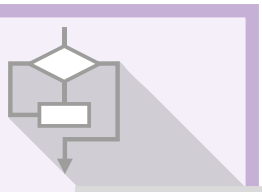
2 Try out this updated code. What happens when you enter the right answer now in the Python Shell?

3 What happens when you enter anything else?

4 Challenge: Use what you've learnt so far to create your own quiz. You can choose any topic you like, but ensure your quiz uses IF and ELSE statements to let the player know how they're doing.



# Algorithms and programming exercise 8



## *Testing code in Python*

**Skills practised**
- Creating a Python project
- Navigating the Python Shell

It's always a good idea to test your programs to make sure that they work properly.

1 When you tested your quiz, you may have noticed that it is possible to get sad faces even when you input a correct answer, like in this example below where the player has accidentally pressed CAPS LOCK:

```
========== RESTART: /Users/Guest/Public/TEST.py ==========
In Python, what word must you type before any text a user sees?
PRINT
 :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :(
 :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :(
 :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :(
 :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :(
 :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :( :(
Thank you for playing!
>>>
```

So why is this? Well, this happens because Python is very strict when it compares the player's answer to the correct answer. To Python, "P" isn't the same as "p", and so if the player uses any capital letters in their answer, Python thinks the answer's wrong. Test this out in your own game to see what happens.

2 To fix this problem, you need to convert the player's input to lowercase, so there are no capital letters in their answer. Make this following change to your code where the player inputs their answer:

answer = input() .lower()

```
print("In Python, what word must you type before any text a user sees?")
answer = input() .lower()
```

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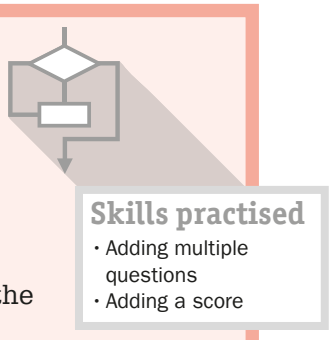
Now test your quiz again. Have you fixed the problem? Try testing these examples to see what happens:

```
>>>
========== RESTART: /Users/Guest/Public/TEST.py ==========
In Python, what word must you type before any text a user sees?
PRINT
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
Thank you for playing!
>>>
========== RESTART: /Users/Guest/Public/TEST.py ==========
In Python, what word must you type before any text a user sees?
pRInt
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
 :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)  :)
Thank you for playing!
>>>
```

# Algorithms and programming exercise 9



## *Creating a multiple-choice quiz in Python*

**Skills practised**
- Adding multiple questions
- Adding a score

So far you've used IF and ELSE to let the player know if they got the answer right or wrong. But how could we create a multiple-choice quiz, where the user could see one of four different messages depending on the answers they input? You can use an ELIF statement to do this.

**1** Enter the following text:

```
print('''
Q1 - In Python, what word must you type before any text a user sees?
a  - variable
b  - text
c  - print
''')
answer = input() .lower()

if answer == "a":
        print(" No - variable is a box used to store data :( ")
elif answer == "b":
        print(" No - text is a type of data :( ")
elif answer == "c":
        print(" Correct!!  :) ")
else:
        print("You didn't choose a, b or c :( ")
```

ELIF is short for "else if". So in the program above, the player sees one of four messages, depending on what they entered for their answer.



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2 Test this new question four times, so that you see each of the different messages. It should look like this:

```
========== RESTART: /Users/Guest/Public/TEST.py ==========

Q1 - In Python, what word must you type before any text a user sees?
a  - variable
b  - text
c  - print

a
 No - variable is a box used to store data :(
>>>
========== RESTART: /Users/Guest/Public/TEST.py ==========

Q1 - In Python, what word must you type before any text a user sees?
a  - variable
b  - text
c  - print

b
 No - text is a type of data :(
>>>
========== RESTART: /Users/Guest/Public/TEST.py ==========

Q1 - In Python, what word must you type before any text a user sees?
a  - variable
b  - text
c  - print

c
 Correct!!  :)
>>>
========== RESTART: /Users/Guest/Public/TEST.py ==========

Q1 - In Python, what word must you type before any text a user sees?
a  - variable
b  - text
c  - print

f
You didn't choose a, b or c :(
>>>
```

3 Challenge: Multiple-choice quiz – Test yourself by adding a few more multiple-choice questions to your quiz program. Once you have finished making your quiz, swap yours with a classmate! How did they do? Did they enjoy it? Was it too easy or too hard?

4 Challenge: Keeping score – can you use a SCORE VARIABLE in your quiz program to keep track of the player's score? This is how the VARIABLE could be used:

> At the start of the program, set the SCORE to 0.

> Whenever a question is answered correctly, add 1 to the player's score. (score = score + 1)

> PRINT the player's score at the end of the quiz.



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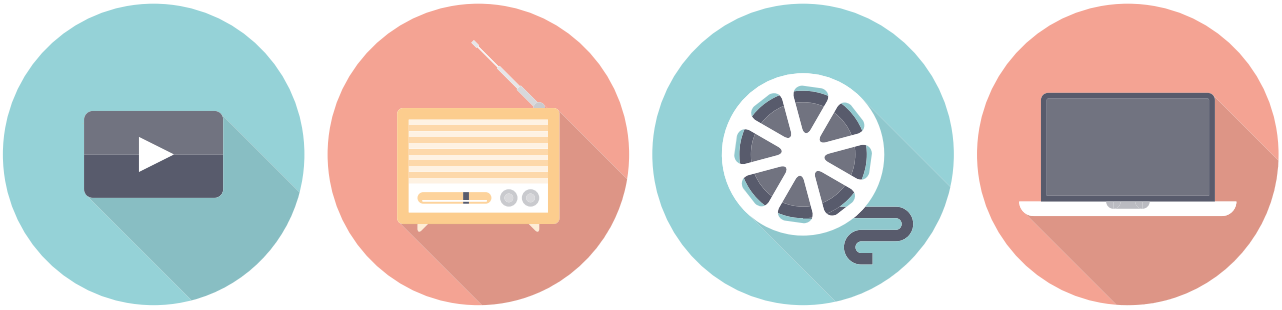
Your code should look like this:

TEST.py - /Users/Guest/Public/TEST.py (3.5.1)

```
score = 0

print('''
Q1 - In Python, what word must you type before any text a user sees?
a  - variable
b  - text
c  - print
''')
answer = input() .lower()

if answer == "a":
        print(" No - variable is a box used to store data :( ")
elif answer == "b":
        print(" No - text is a type of data :( ")
elif answer == "c":
        print(" Correct!!  :) ")
else:
        print("You didn't choose a, b or c :( ")

if answer == "c":
        score +=1

print('''
Q2 - In Australia, which city has the highest annual rainfall?
a  - Sydney
b  - Darwin
c  - Hobart
''')
answer = input() .lower()

if answer == "a":
        print(" No - Sydney is second :( ")
elif answer == "b":
        print(" Correct!! :) ")
elif answer == "c":
        print(" Sorry - Hobart is not even close :( ")
else:
        print("You didn't choose a, b or c :( ")

if answer == "b":
        score +=1
        print("Score =", score)
```

Ln: 23 Col: 0





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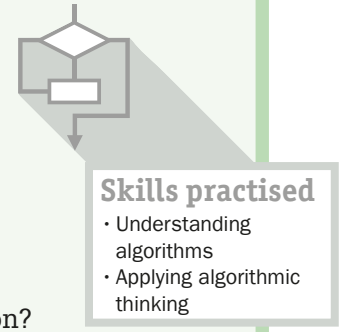
And your program should look like this:

```
========== RESTART: /Users/Guest/Public/TEST.py ==========

Q1 - In Python, what word must you type before any text a user sees?
a  - variable
b  - text
c  - print

c
 Correct!!  :)

Q2 - In Australia, which city has the highest annual rainfall?
a  - Sydney
b  - Darwin
c  - Hobart

b
 Correct!! :)
Score = 2
>>>
```

5 Challenge: Can you print a personalised message to the player at the end of the game? For example, make Python say "congratulations" if they got all of the questions right. Or else say "try again" if they got any wrong. (You'll need to use your SCORE VARIABLE to decide which message to print!)



## Algorithms and programming exercise 10



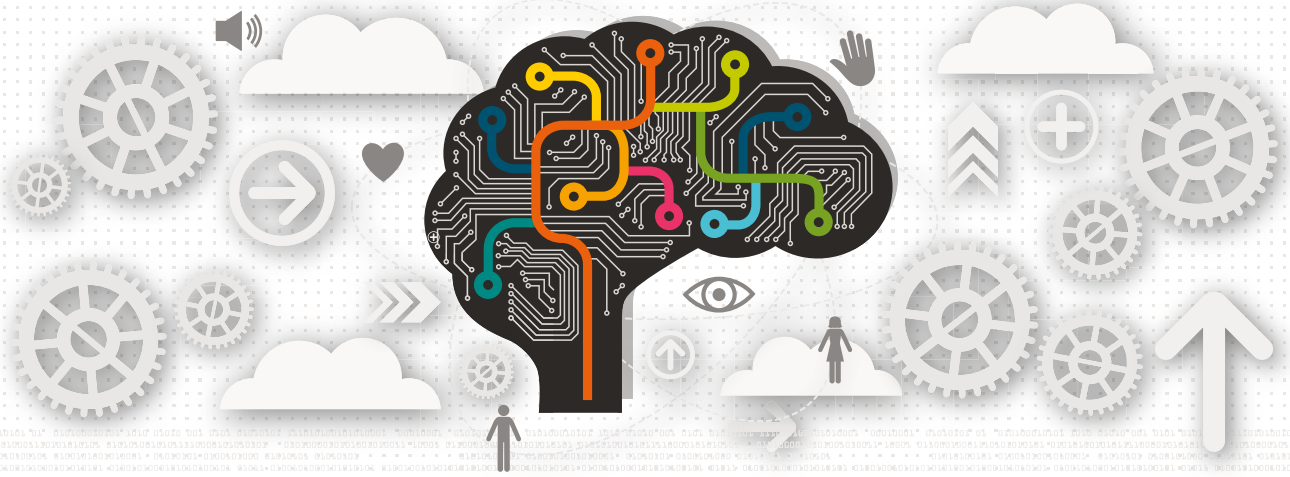
**Skills practised**
- Understanding algorithms
- Applying algorithmic thinking

### *Class discussion*

As a class, discuss the following questions:

1 How is Python an example of how computer programs run using coding?

2 In what way does algorithmic thinking influence how you use Python?



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# ALGORITHMS AND PROGRAMMING PROJECT

## Designing and implementing an ordering system for a business

The local ice-cream store needs a new ordering system to improve customer service by streamlining the ordering process. It is also required to make it easier for staff so they will not have to calculate price based on the various choices available to customers. The customer will know before they have finalised the order if they can afford to pay for the order or not.

At present, the customer selects what to put the ice-cream in: a cone type, plain or waffle, or a cup. The customer also chooses how many scoops – if more than one scoop they can choose to either have two scoops of one flavour – or each scoop a different flavour. There are currently eight flavours to choose from.

The management are hoping to have a system developed where customers enter their order at stations where the price is calculated – this order is then sent to the staff at the counters who fill it and complete the sale with the customer.

### *Collecting the data*

Who should be consulted in creating a solution? What data do you have? What else do you need? If you don't have the data available you can determine what it is most likely to be and use that, e.g. prices.

### *Defining the solution*

Write out an algorithm that outlines the solution to the ordering process. Break the problem into chunks. Based on the solution you design, what kind of hardware and software will you require? What will be the role and function of each?

### *Implementing*

- Create a flowchart that represents the algorithm.
- Write out your flowchart in structured English.
- How does your solution fit with the steps in the information processing cycle (mentioned in Module 1)?


### *Evaluating, collaborating and managing*

1. Look at the result of your work. Has it worked as you had planned? Can you improve it in any way?
2. Ask your friends and classmates to look at your design and provide you with feedback. How robust is your solution – will the solution work if the number of flavours is increased? What if there is a change in cones, etc.?



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# Glossary

### algorithm
Step-by-step procedures required to solve a problem. An algorithm may be described in many ways. Flowcharts are often useful in visualising an algorithm.

### algorithmic logic
A logic behind breaking down computing problems and information systems into step-by-step processes in order to solve problems or achieve specified outcomes. It involves sequencing and abstraction and leads to algorithmic statements.

### app
A software application with a very specific or narrow purpose designed to run on mobile devices (such as smartphones or tablets) through a web browser or on a personal computer. The feature set of an app is limited when compared with a full-featured desktop application for a similar purpose. For example, a photo editing app has a smaller set of features than an industry-standard photographic suite.



### ASCII (American Standard Code for Information Interchange)
An early numeric code, later extended, used to represent 128 specific characters, including 0–9 and a–z, in computer systems. For example, capital A is represented by the binary code 0100 0001.

### binary
A use of two states or permissible values to represent data, such as ON and OFF positions of a light switch or transistors in a computer silicon chip that can be in either the electrical state of ON or OFF. Binary data are typically represented as a series of single digits referred to as binary digits (or bits) due to each taking on the value of either 0 or 1.

### branching
Making a decision between one of two or more actions depending on sets of conditions and the data provided.

### Cloud computing
Distributing computing over a network where storage of files, processing of data and/or access to software occurs automatically on interconnected server computers to which the user's device is connected. Typically, people use the term to refer to accessing files and software over the internet. For example, photo files may be stored in the Cloud from a smartphone to be accessed later from a different location; where they are actually stored can be anywhere in the world on a server computer used by the Cloud service.

### codec
A piece of software that encodes or decodes digital audio-visual material, usually to allow it to be stored or transmitted in a compressed format. For example, the MP3 format compresses audio data and requires an MP3 codec (usually available by default in audio programs) to be read and played by a computer. Codecs can be downloaded or purchased and installed as plug-ins to most applications to extend the media capabilities of software.

### coding
The process of writing computer software code.

### copyright
The legal right to control all use of an original work, such as a book, play, movie, or piece of music, for a particular period of time.

### data
May include characters (for example, alphabetic letters, numbers and symbols), images, sounds and/or instructions that can be manipulated, stored and communicated by digital systems.

### database
A collection of data organised by records and fields that can be easily stored, accessed, managed and updated. Each discrete piece of data to be stored is represented by a field (for example, song title, song artist or bank account number, date of transaction); and values in the fields that are associated with an entity (for example, a song, a bank transaction) are a record. Interaction with a database usually takes place through a user interface designed specifically for the structure and use of the data stored in it.

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### decompose
Separate a complex problem into parts to allow a problem to be more easily understood.

### design thinking
Use of strategies for understanding design problems and opportunities, visualising and generating creative and innovative ideas, and analysing and evaluating those ideas that best meet the criteria for success and planning.

### desk checking
A method used by a human to check the logic of a computer program's algorithm to reduce the likelihood of errors occurring. This may be done on paper, using a diagram, or mentally trying a sample of typical inputs to see what the outputs would be. For example, to desk check a branching statement {IF age >65 THEN 'retire' ELSE 'keep working'}, the values for age of 64, 65 and 66 could be tried to show that 64 and 65 would result in 'keep working' and 66 in 'retire' so that it could be decided if the statement worked as intended.

### digital citizenship
An acceptance and upholding of the norms of appropriate, responsible behaviour with regard to the use of digital technologies. This involves using digital technologies effectively and not misusing them to disadvantage others. Digital citizenship includes appropriate online etiquette, literacy in how digital technologies work and how to use them, an understanding of ethics and related law, knowing how to stay safe online, and advice on related health and safety issues such as predators and the permanence of data.

### digital footprint
A total set of data left behind by a person using a digital system. A person's digital footprint includes all information actively provided by that person such as interactions on social networks (for example, comments, photographs), online purchases, website logons, emails and instant messages. It also includes passive information such as logs of software installed and used on a computer, metadata associated with files, a user's IP address, a device being used to access a webpage, and a user's browsing history stored as cookies or by internet service providers.

### digital piracy
The act of illegally copying a computer program, music, a film, etc. and selling it.

### digital system
Digital hardware and software components (internal and external) used to transform data into a digital solution. When digital systems are connected, they form a network. For example:

- A smartphone is a digital system that has software (apps, an operating system), input components (e.g. touch screen, keyboard, camera and microphone), output components (e.g. screen and speakers), memory components (e.g. silicon chips, solid state drives), communication components (e.g. SIM card, wifi, bluetooth or mobile network antennas), and a processor made up of one or more silicon chips.
- A desktop computer with specific software and hardware components for dairy farming. The computer is connected via cables to milking equipment and via wifi to sensors that read tags on the cows. Through these hardware components the software records how much milk each cow provides. Such systems can also algorithmically control attaching milking equipment to each cow, providing feed and opening gates.

### ecommerce
The electronic (e) selling of a product or service online or through other electronic means, with an online mechanism for payment. Examples include online shopping sites and travel websites where hotel accommodation and airline tickets can be purchased.

### ethical
Moral principles – also known as right or wrong behaviour.

### ethical protocols
Generally accepted 'rules' or behaviours when undertaking research and collecting and using information from primary and secondary sources; for example, confidentiality, informed consent, citation and integrity of data.



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### general-purpose programming languages

Programming languages in common use designed to solve a wide range of problems. They include procedural, functional and object-oriented programming languages, including scripting and/or dynamically typed languages. Examples of general-purpose programming languages include C#, C++, Java, JavaScript, Python, Ruby and Visual Basic. They do not include declarative programming languages such as Prolog or structured query language (SQL), or languages designed for solving domain-specific problems or for pedagogical reasons.

### HTML (hypertext markup language)

One of the first coding systems (or languages) designed to be used for webpage files so that an internet browser can efficiently display a page and elements for that page such as text, links and media in the intended position. There are newer versions of this language and alternative markup languages.

### IF statement

A conditional decision statement used to control the flow of a program.



### intellectual property

A legal concept that refers to creations of a mind for which exclusive rights are recognised. Common types of intellectual property include copyright, trademarks, patents, designs and plant breeder's rights.

### malware

Malicious software designed to interfere with the regular operation of a computer system. Often used to gain access to other people's computers or to gather sensitive information, it is usually hidden in other software to avoid user detection. Examples can include viruses, Trojan horses, key loggers and spyware. Anti-malware software is often relied on to help users detect and remove malware from their computers.

### multimedia

The use of digital technologies to present combinations of text, graphics, video, animation and/or sound in an integrated way. Where there is facility for a user to interact with multimedia, the term 'interactive multimedia' may be used. Examples include interactive games, media-rich websites, electronic books (ebooks) and animated short films.

### object-oriented programming language (OOP)

A programming language, where objects represent a combination of data (the attributes of an object) and actions that can be performed on or with those data (the methods of the object). An example might be a declaration of a 'car', which has attributes that describe its physical nature (such as the number of doors, its colour, the size of the engine) and the actions it can perform (such as accelerating, braking and turning).

### plagiarism

A serious type of copying where someone claims that another's work is their own.

### social sustainability

Practices that maintain quality of life for people, societies and cultures in a changing world for a long period of time, ensuring health and wellbeing without disproportionate costs or side effects.

### structured English

The use of the English language to describe the steps of an algorithm in clear, unambiguous statements that can be read from start to finish.

### web-authoring software

A computer program designed to assist in the creation of webpages. Simple web-authoring software may take a form of a basic text editor, or may contain more advanced features that allow for editing the content and layout of a webpage.

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