Victorian Curriculum
and Assessment Authority

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

Letter

STUDENT NUMBER

COMPUTING: INFORMATICS
Written examination

Wednesday 6 June 2018

Reading time: 2.00 pm to 2.15 pm (15 minutes)
Writing time: 2.15 pm to 4.15 pm (2 hours)

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	9	9	30
C	11	11	50
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.
- No calculator is allowed in this examination.

Materials supplied
- Question and answer book of 28 pages
- Detachable insert containing a case study for Section C in the centrefold
- Answer sheet for multiple-choice questions

Instructions
- Detach the insert from the centre of this book during reading time.
- Write your **student number** in the space provided above on this page.
- Check that your **name** and **student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.
- All written responses must be in English.

At the end of the examination
- Place the answer sheet for multiple-choice questions inside the front cover of this book.
- You may keep the detached insert.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A – Multiple-choice questions

> ### Instructions for Section A
>
> Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.
>
> Choose the response that is **correct** or that **best answers** the question.
>
> A correct answer scores 1; an incorrect answer scores 0.
>
> Marks will **not** be deducted for incorrect answers.
>
> No marks will be given if more than one answer is completed for any question.

Question 1

A data type check and a range check are **best** described as

A. testing techniques.

B. file management techniques.

C. manual validation techniques.

D. electronic validation techniques.

Question 2

A customer, Fei Sun, phones a business to inquire about the delivery date for a chair she had ordered. She gives the operator her name, the order number (01467), the date of the order (30 April 2018) and the product type.

Which filename will allow for the most efficient retrieval of the correct file?

A. 01467_FeiSun.docx

B. FeiSun_Chair_01467.docx

C. FeiSun_Chair_30_April_2018.docx

D. 30_April_2018_01467_FeiSun.docx

Question 3

Two examples of quantitative data are

A. a journal article and shoe sizes.

B. social media comments and videos.

C. interview transcripts and daily temperatures.

D. the average age of friends and the daily price of petrol.

Question 4

In a database table, a field **must** be set to a numeric data type if

A. it is a key field.

B. it is to store a person's age.

C. the data stored in it is to be used in a calculation.

D. the field is to be used to sort the records in the table.

Use the following information to answer Questions 5 and 6.

A relational database containing information about authors has the following linked tables. The database allows each author to have more than one book and each book to have more than one author.

Table: Authors

AuthorID	FamilyName	GivenName	Initials	Nationality

Table: Books

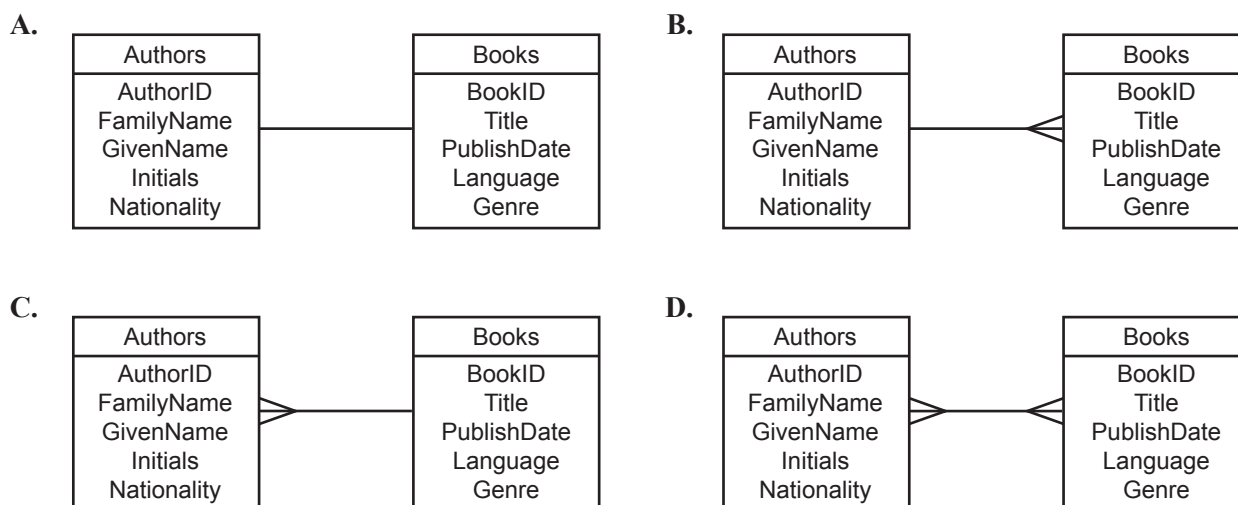| BookID	AuthorID	Title	PublishDate	Language	Genre

Question 5

In the Books table, what kind of field is AuthorID?

A. a super key field

B. a foreign key field

C. a primary key field

D. a candidate key field

Question 6

Which entity-relationship (ER) diagram **best** represents this database?

A.

Authors
AuthorID
FamilyName
GivenName
Initials
Nationality

Books
BookID
Title
PublishDate
Language
Genre

B.

Authors
AuthorID
FamilyName
GivenName
Initials
Nationality

Books
BookID
Title
PublishDate
Language
Genre

C.

Authors
AuthorID
FamilyName
GivenName
Initials
Nationality

Books
BookID
Title
PublishDate
Language
Genre

D.

Authors
AuthorID
FamilyName
GivenName
Initials
Nationality

Books
BookID
Title
PublishDate
Language
Genre

Question 7

A web-based user interface has been designed to allow users to search for authors and books. The designer used a drop-down list for the Genre field. Users can select either from the list with a mouse or type letters. As letters are entered, the list shortens to match the letters already entered. Users are not allowed to enter anything that is not on the list.

Based on this description, which two design principles has the designer followed?

A. repetition and usability

B. validation and flexibility

C. ease of use and robustness

D. navigation and error tolerance

Question 8

An increase in the use of portable storage devices, together with a decrease in the checking of authorisation credentials, is most likely to

A.   increase the threat to stored data and increase the security of data.

B.   decrease the threat to stored data and decrease the security of data.

C.   increase the threat to stored data and increase the accessibility of stored data.

D.   decrease the threat to stored data and decrease the accessibility of stored data.

Question 9

If a research organisation aims to strengthen the integrity of data used to support a hypothesis, it would have to

A.   use only quantitative data.

B.   collect its data only from primary sources.

C.   apply criteria to check the accessibility of the data.

D.   check if the age of the data is relevant to the scope of the hypothesis.

Question 10

Which one of the following statements **best** describes why secondary data sources should be referenced?

A.   Your own work can be acknowledged.

B.   The work of others can be easily located.

C.   The work of others can be acknowledged and easily located.

D.   Your own work can be distinguished from the work of others.

Question 11

Which of the following are examples of physical security controls?

A.   Secure Sockets Layer, access restrictions based on username

B.   biometric locks on doors, document shredding

C.   bars on windows, encryption

D.   firewalls, key locks on doors

Question 12

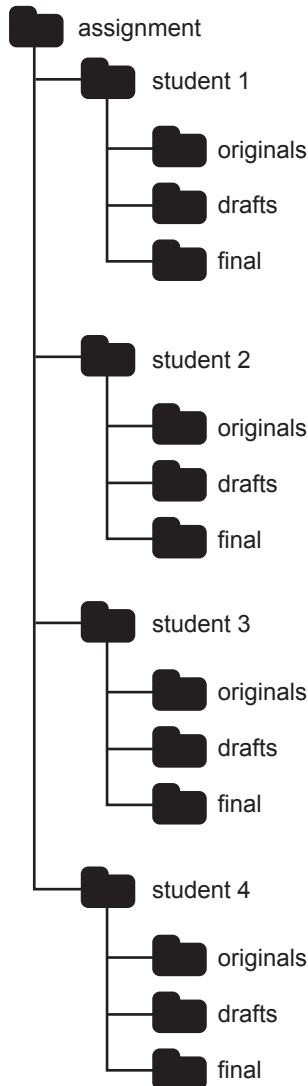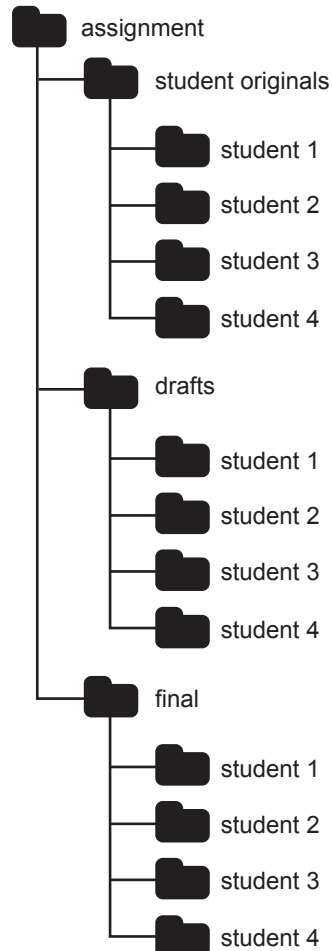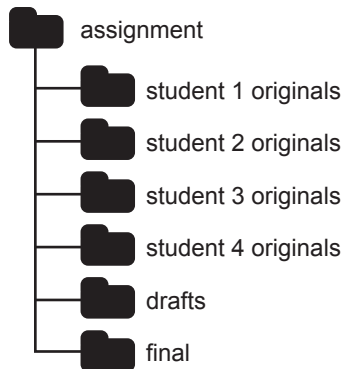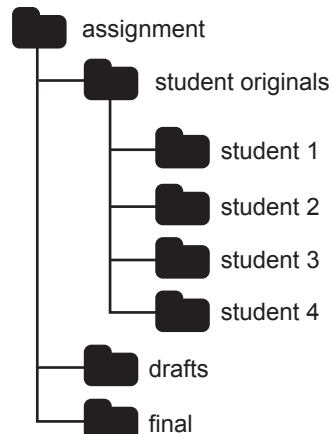The characteristics of an effective multimodal online solution (MMOS) include

A.   completeness, attractiveness and timeliness.

B.   completeness, relevance and functionality.

C.   maintainability, attractiveness and speed.

D.   security, clarity and cost.

Question 13

Thom is the leader of a group of students who have been given an assignment. The group must create an MMOS. Each group member must develop original website content and then the group will work together to create a final MMOS that integrates each member's original website content.

The students will be assessed on their original website content as well as the group's final MMOS. These files must be uploaded to the teacher's website. Thom is responsible for uploading all of the students' original website content and the group's final solution, and he would like to do this as efficiently as possible.

Which one of the following folder structures would **best** meet Thom's needs?

A.
- assignment
  - student 1
    - originals
    - drafts
    - final
  - student 2
    - originals
    - drafts
    - final
  - student 3
    - originals
    - drafts
    - final
  - student 4
    - originals
    - drafts
    - final

B.
- assignment
  - student originals
    - student 1
    - student 2
    - student 3
    - student 4
  - drafts
    - student 1
    - student 2
    - student 3
    - student 4
  - final
    - student 1
    - student 2
    - student 3
    - student 4

C.
- assignment
  - student 1 originals
  - student 2 originals
  - student 3 originals
  - student 4 originals
  - drafts
  - final

D.
- assignment
  - student originals
    - student 1
    - student 2
    - student 3
    - student 4
  - drafts
  - final

Question 14

A technique that could be classified as an efficiency measure when developing an MMOS is

- **A.**   using a spellchecker to review the accuracy of the information.
- **B.**   applying a style sheet to increase the speed of processing.
- **C.**   testing readability for users with a visual impairment.
- **D.**   checking the date of the data to ensure it is relevant.

Question 15

What is one difference between testing a solution and evaluating a solution?

- **A.**   Testing happens after a solution is used and evaluating happens during its development.
- **B.**   Testing happens during the development of a solution and evaluating happens after it has been used.
- **C.**   Testing happens after a solution is designed and evaluating happens during the development of a solution.
- **D.**   Testing happens during the development of a solution and evaluating happens once a design has been fully detailed.

Question 16

Which one of the following statements **best** describes two main purposes of using an alt tag on a web page?

- **A.**   Alt tags are used to describe an image and to provide information if there are loading difficulties.
- **B.**   Alt tags are used to provide alternative name tags in images and alternative text.
- **C.**   Alt tags are used to increase the size of images and text.
- **D.**   Alt tags are used to tag people and places.

Question 17

Rebecca runs a business that makes invitation cards for weddings. She uses external hard drives to store the files, but is considering using cloud computing for storage instead.

Which one of the following is a criterion that can be used to evaluate the effectiveness of cloud computing for storage?

- **A.**   Is cloud computing more secure than external hard drives?
- **B.**   Is it cheaper to use cloud computing than external hard drives?
- **C.**   Is it quicker to manage files using cloud computing or using external hard drives?
- **D.**   Is it faster to upload files to the cloud rather than saving them to an external hard drive?

Question 18

Kim receives the following unsolicited email.

> Your first annual BTC report is ready and your funds are ready for withdrawal. Please review and if there is anything wrong or missing, let us know and we will contact you shortly.
>
> Username: Kim
>
> Account name: HN12LBI
>
> Annual Balance: 1.2 bitcoins
>
> At this point you can decide whether to take that amount out or leave it in the system and potentially increase your total capital.
>
> PROCEED WITH YOUR PROFILE:
> http://t.email.finance-confirmationservice-a.com/c/?t=0b60700-1ab-as-qz-25f8w
>
> BitCur Solutions
> Email: Info@bitcur.com

This email is an example of

A.   a cookie.
B.   phishing.
C.   spyware.
D.   adware.

Question 19

Cameras equipped with facial recognition technology were used for the first time at a major sporting event.

Facial recognition technology is an example of a

A.   logical security control.
B.   software security control.
C.   biometric security control.
D.   procedural security control.

Question 20

A system administrator needs to ensure that user passwords help maintain the security of the network.

Security would be strengthened if staff

A.   changed their passwords once a month.
B.   created passwords with fewer than eight characters.
C.   provided the system administrator with their password.
D.   stored all passwords in a central database on the network.

END OF SECTION A
TURN OVER

DO NOT WRITE IN THIS AREA

SECTION B – Short-answer questions

<div style="border:1px solid">

Instructions for Section B

Answer **all** questions in the spaces provided.

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Question 1 (2 marks)

Explain how qualitative data can be coded to support manipulation. Provide an example to illustrate your answer.

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Question 2 (4 marks)

Melinda is a web developer and the owner of a small web design business. She is concerned about the security of client data as the business grows. Melinda's husband, Billy, is a professional photographer and he has many of the same clients as Melinda. Currently, Melinda and Billy work on standalone computers and save their data to external hard drives. They also have individual internet and email access through a broadband connection.

Melinda and Billy have advertised for an administrative assistant to undertake tasks such as answering the phone, responding to email queries and maintaining client records.

a. Suggest and describe **one** software security control that Melinda and Billy can employ to protect their data.   2 marks

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b. Melinda and Billy will need to purchase another computer for the administrative assistant.

Outline two reasons why Melinda should network the three computers.   2 marks

Reason 1 _____

_____

Reason 2 _____

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Question 3 (4 marks)

Data about movies and movie stars is to be stored in a database. The data about movies will include the movie's title, the director's name and the release date. The data about movie stars will include the actor's name and the titles of the movies in which they have starred.

Describe how the tables in a relational database management system would be structured to store all the data.

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Question 4 (3 marks)

Chart 1

**Full-time employees in computer system design
and related services (annual average)**

Chart 2

**Full-time employees in computer system design
and related services (annual average)**
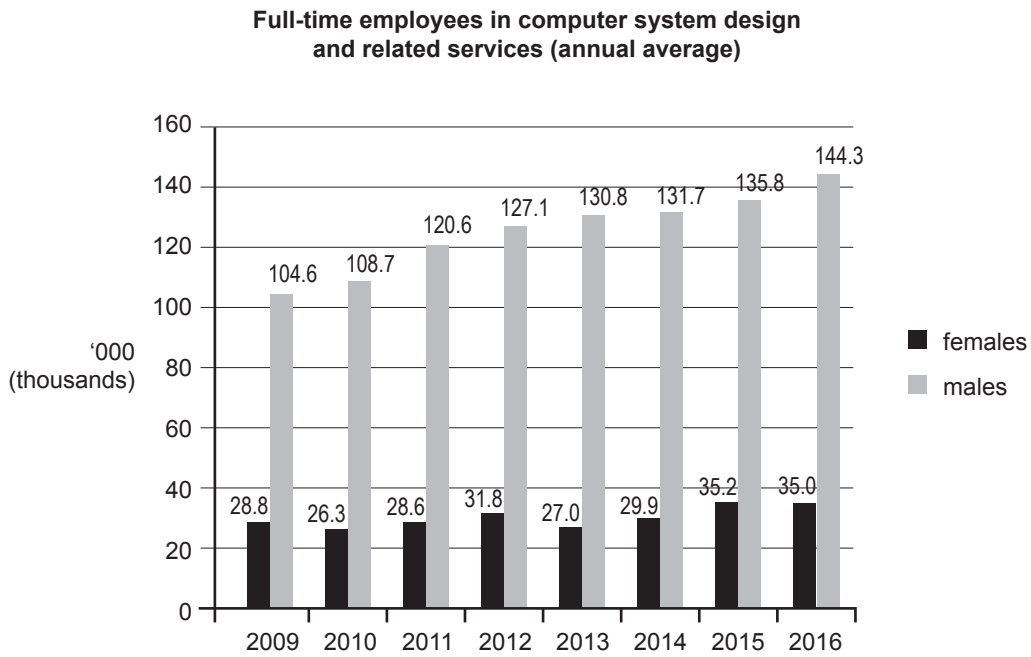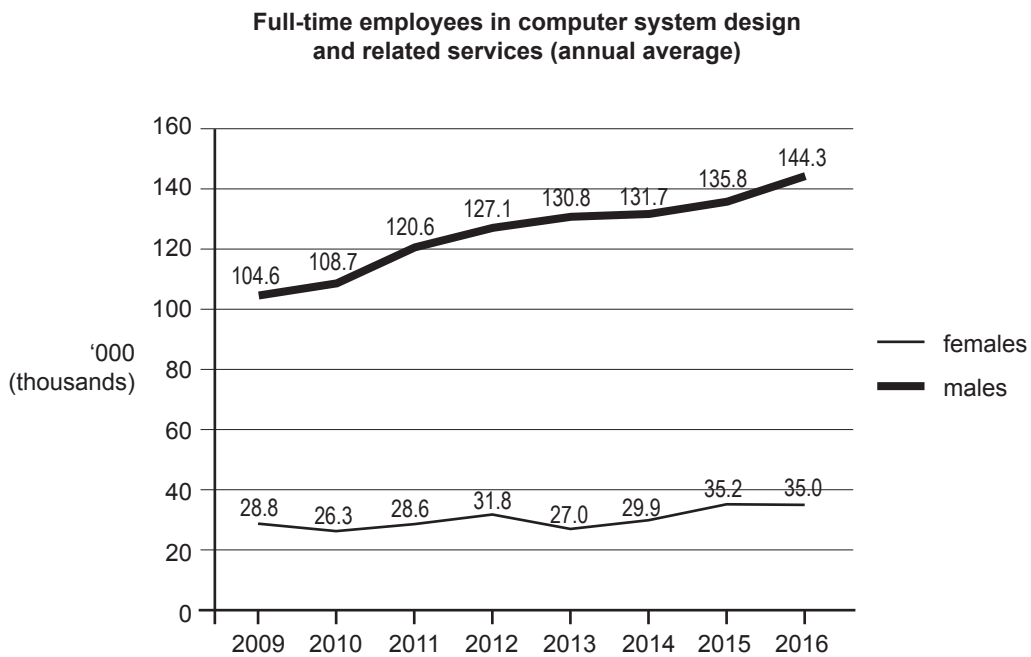
Data: Australian Bureau of Statistics (ABS) website, 'Employed persons by industry group of
main job (ANZSIC), Sex, State and Territory, November 1984 onwards',
cat. no. 6291.0.55.003 – EQ06, <www.abs.gov.au>

a. Examine Chart 1. In what year was the proportion of females the greatest?   1 mark

_____

b. Examine Chart 2, which contains the same data as Chart 1 but presented as a different type of graph. Which chart would you select to compare the employment trends of males with females for the period 2009–2016? Provide two reasons for your selection.   2 marks

Tick (✓) one box.

☐ Chart 1   **or**   ☐ Chart 2

Reason 1 _____

_____

_____

Reason 2 _____

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_____

Question 5 (3 marks)

When framing a reasonable hypothesis, there needs to be a prediction and at least two variables.

Explain the relationship between a prediction and the variables. Provide an example to illustrate your answer.

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Question 6 (5 marks)

a. Explain how a design idea is different from the preferred design of a solution. Provide an example to illustrate your answer. 3 marks

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b. Describe **two** techniques for generating design ideas for a multimodal online solution (MMOS). 2 marks

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_____

Question 7 (2 marks)

An MMOS has been created to communicate accurate information about types of food that help build muscle in young children.

State **one** criterion that could be used to help evaluate the effectiveness of this MMOS. Provide a reason for this criterion.

_____

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_____

_____

Question 8 (2 marks)
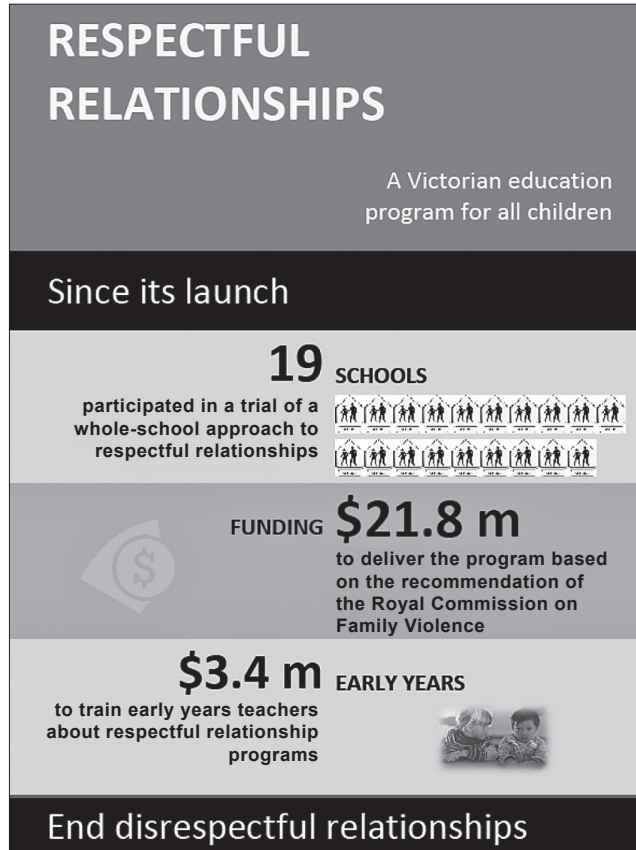
Data: State Government of Victoria, Australia © 2017

Annotate the infographic above to show where **one** design principle has been applied. Justify your annotation.

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Question 9 (5 marks)

Tim, the owner of a new toy library, is setting up a website that will allow visitors to the site to find out about the toy library and will allow members to reserve toys for borrowing. The diagram below shows the user flow for the website.
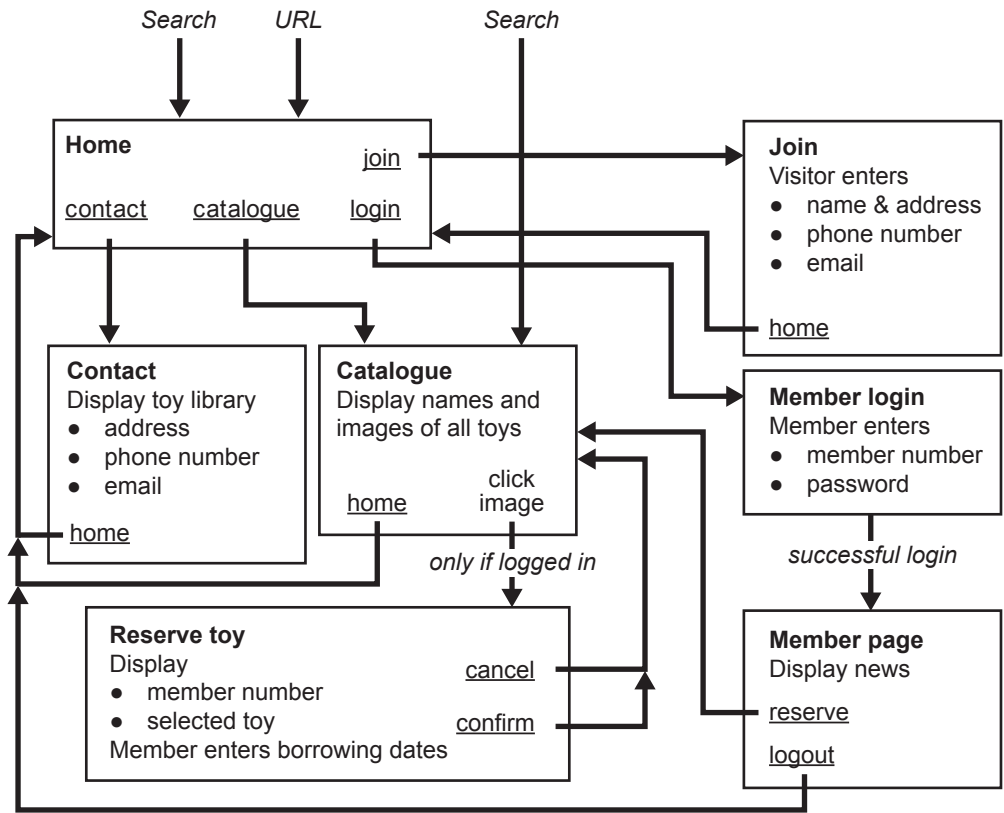
a. List the set of actions a member must take to reserve a toy if they land on the website's home page.   2 marks

_____

_____

_____

b. A visitor to the website who is not a member can join the toy library.

State what data protection should be placed on the 'Join' page. Explain why this protection is needed.   3 marks

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END OF SECTION B

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SECTION C – Case study

Instructions for Section C
Please remove the insert from the centre of this book during reading time.
Use the case study provided in the insert to answer the questions in this section. Answers must apply to the case study.
Answer **all** questions in the spaces provided.

Question 1 (3 marks)

Goodnight Sleep Solutions (GSS) wants to use an online survey to collect some personal data from potential individual customers. Currently its only customers are medical centres.

Indra has been offered the following incentive from a medical supplier: the medical supplier will give a discount to GSS if GSS achieves a certain amount of sales from individual customers. To increase sales, Indra is considering offering an introductory discount on purchases to encourage individual customers to participate in GSS's survey.

Discuss the ethical dilemmas faced by Indra in these circumstances.

Question 2 (6 marks)

Indra has hired Roberto, a marketing professional, to determine what needs to be changed in the product descriptions in the catalogue to make them more appropriate for individual customers.

Describe a strategy Roberto could use to collect data from existing employees and clients, what data could be collected, and how this data could be used to determine the most effective changes to the product descriptions.

The strategy needs to identify:

- the sources of data
- the technique used to collect the data from each source
- what data could be collected from each source and how it could be useful in creating more effective product descriptions.

Question 3 (5 marks)

When a medical centre puts in an order on the GSS website, the data is placed in a database that has a single table named 'Order', as shown in the example below. The changes planned by Indra require the database to be normalised before it can be used in the new system.

Order								
orderDate	username	firstName	lastName	productID	productName	quantity	unitPrice	totalPrice
31/12/2017	ramik	Rami	Kanaan	CPA0034	CPAP Mask	1	$95.00	$95.00
				CPC0022	Mask Cleaner	2	$15.00	$30.00
6/01/2018	donnabec	Donna	Beckinsdale	RME0016	ReMed Battery	1	$69.95	$69.95
				RME0001	ReMed AirSense Machine	1	$1 760.00	$1 760.00
9/01/2018	donnabec	Donna	Beckinsdale	NSE0044	Nightshift ReTimer Sensor	2	$19.95	$39.90

Normalise the database so that it is in third normal form (3NF). In the space below, show the normalised database. Clearly name each table and its fields.

CONTINUES OVER PAGE

Question 4 (5 marks)

The GSS website and database will need to be modified to allow individual customers to place orders. Indra would like the modified system to collect the following information:

- full name, including title (such as Mr, Ms, Mx), first name and last name
- email address
- address(es)
- phone number
- sleep-related medical condition

a. Identify and justify the most appropriate data type to store a phone number.　　　2 marks

b. The current database stores medical centre data as represented using Chen notation in the following entity-relationship (ER) diagram.
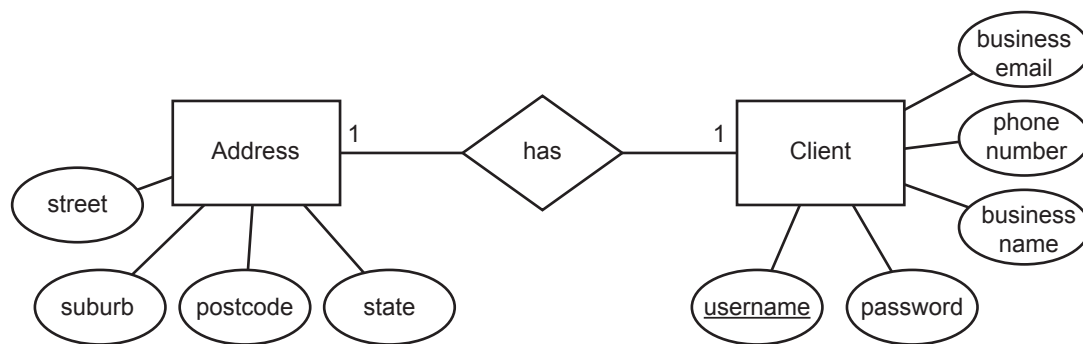
Draw a new ER diagram that best represents how medical centre data and individual customer data should be stored in the modified database, with minimal redundancy.   3 marks

Question 5 (8 marks)

Indra has started drawing a rough mock-up of the sign-up page for new individual customers. She must still add features that allow the customers to:

- enter their full name and title
- enter their email address, their phone number and up to three shipping addresses
- select or enter their medical condition
- submit their information to create an account.

a. Complete the mock-up below so that it shows the features needed to meet the requirements above, taking into account the appearance of the page. Annotate the mock-up to show the purpose of each feature. 5 marks

b. Once the sign-up page for new individual customers has been created, it will be linked to the modified database. Indra needs to test that the sign-up page functions as intended.

Recommend a set of testing techniques that Indra should perform to check that a customer's phone number has been correctly entered into the modified database.   3 marks

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_____

_____

_____

_____

Question 6 (4 marks)

Explain why Indra does or does not need to comply with each of the following legal Acts when implementing the changes to the GSS system.

Health Records Act 2001 _____

_____

_____

Privacy and Data Protection Act 2014 _____

_____

_____

Question 7 (3 marks)

In order to help GSS build its customer database, Indra has legally obtained customer data from MedCo, a medical supply company that went out of business a year ago. The data provides extensive information about individuals with medical conditions in many small towns around Australia, including all of their ordering history through MedCo.

When Indra mentioned to Cerie what she had done, Cerie voiced her concerns about the integrity of the data Indra had obtained.

Identify one characteristic of data integrity and explain why Cerie might be concerned about it in relation to the data received from MedCo.

Characteristic _____

Explanation _____

_____

_____

_____

Question 8 (4 marks)

When planning the project to create the modified database and website, Indra had worked out that it should take 23 days to complete. She also found that she would only need to hire one computing professional to complete the project in this time.

The Gantt chart that Indra completed to help with this planning is shown on page 4 of the insert.

Unfortunately, there has been a delay in getting the project started, so now it must be completed in no more than 18 days.

a. Given that all the tasks must still be carried out and cannot be completed in a shorter period of time, suggest what Indra can do to shorten the overall duration of the project. 1 mark

_____

_____

b. Show how the Gantt chart must be changed to accommodate the suggestion in **part a.** Show time allocations, dependencies and milestones. 3 marks

	Task	Day																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A	Design layout of new web pages and user flow.																									
B	Build and link new web pages.																									
C	Test links.																									
D	Design new database.																									
E	Build tables and queries for new database.																									
F	Test queries.																									
G	Move data from old database to new database.																									
H	Link new website to new database.																									
I	Test data flow between website and database.																									
J	Upload website to server.																									
K	Test online.																									
L	Go live.																									

Key   time allocation ▢   milestone ▲   dependency ⟿

TURN OVER

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Question 9 (4 marks)

Recent storms have caused water damage in the warehouse. Although Indra did not lose any data, she is worried that if worse storms or other types of natural disasters occur, then she might lose data.

Using the current information management practices at GSS, outline **two** components that Indra should include in her disaster recovery plan.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Question 10 (4 marks)

Indra has asked her friend Michael to conduct an audit of her information management practices at GSS. She is concerned that she has not put in place the most suitable security controls for protecting her data from unauthorised access and loss.

a. Outline two weaknesses that currently exist in the information management practices at GSS.   2 marks

Weakness 1 _____

_____

Weakness 2 _____

_____

b. Outline two possible improvements to the information management practices at GSS.   2 marks

Improvement 1 _____

_____

Improvement 2 _____

_____

Question 11 (4 marks)

As part of her website and database modifications, Indra is considering moving her entire web server and database system into a cloud computing solution hosted by a third party.

Explain one advantage or one disadvantage this will have for Indra's business in relation to the storage and disposal of data and information.

• Storage

Tick (✓) one box.

☐ advantage **or** ☐ disadvantage

Explanation _____

_____

_____

• Disposal

Tick (✓) one box.

☐ advantage **or** ☐ disadvantage

Explanation _____

_____

_____

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case study

Please remove from the centre of this book during reading time.

Goodnight Sleep Solutions

Goodnight Sleep Solutions (GSS) is a Victorian business selling sleep-related medical products to hundreds of medical centres around Australia. Its owner, Indra, has a single warehouse from which she distributes her medical products. Her business has an annual turnover of $1 million.

Aside from Indra, GSS currently has four employees: a product specialist, a sales representative and two warehouse workers.

Currently, all of GSS's clients are medical centres. The sales representative, Cerie, travels around Australia visiting medical centres in order to convince them to stock GSS's products. When a medical centre signs up for the first time, Cerie logs in to an administration sales system on the GSS website and creates a new entry for the medical centre, giving the medical centre a unique username and password. Staff at the medical centre can then order GSS's products via the website when they need them.

The product specialist, Frank, has a medical degree in sleep conditions. Frank is responsible for selecting the products that GSS sells. He uses current medical research to select the new technologies and products to add to the GSS product database. As the primary users of the current website are medical professionals, Frank's descriptions of the products are brief and contain a lot of technical medical language.

The issue

GSS has not increased its sales in the last 12 months and Indra is concerned that she has maximised her sales to medical centres around Australia. She would like to expand her business by selling to the general public.

Currently, the GSS website contains a full product catalogue that anyone visiting the website can view. Orders can only be placed by approved medical centres that have been provided access by Cerie.

Indra would like to modify the website to allow any visitor to request a username and password so the visitor can order products. Individuals requesting access would provide their contact and personal details, including the medical condition for which they are purchasing products. An individual customer would be able to ship to multiple addresses.

Indra would also like to update the product catalogue to have less technical medical language and more accessible information for the general public.

Goodnight Sleep Solutions's information system

The networked information system in the warehouse and out in the field consists of:

• a web server, which contains the website
• a product and order database server connected to the website
• two laptop computers, used by Cerie and Frank
• two tablet computers, used by the warehouse workers to track and update orders and inventory
• a desktop computer with a connected printer, used by Indra in the warehouse office.

A representation of the networked system and its features is shown in the following diagram.
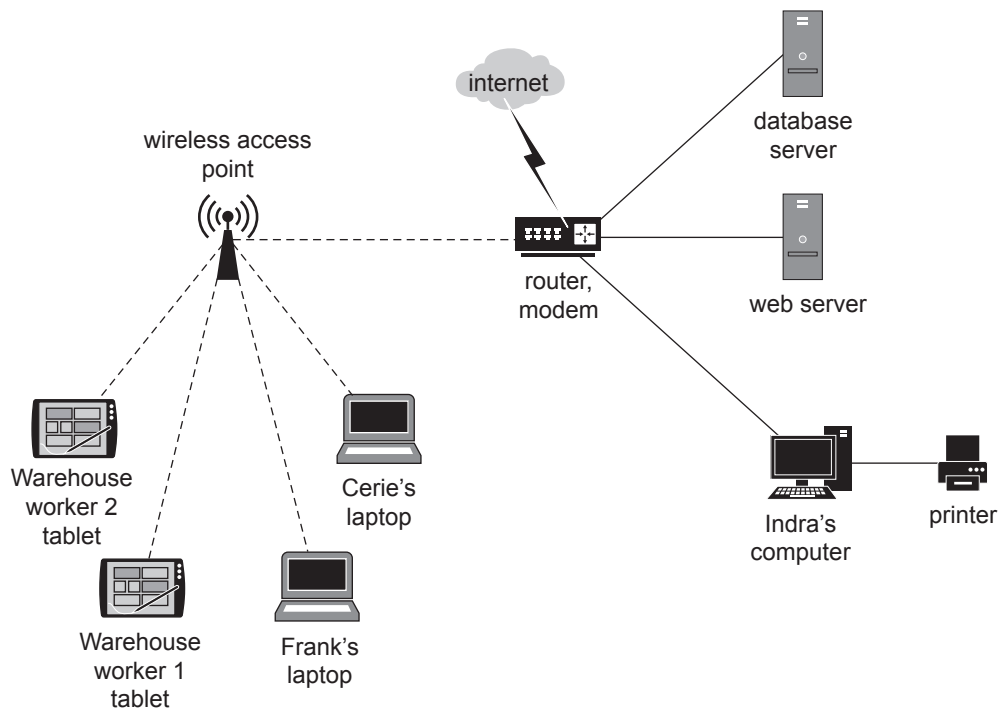
Goodnight Sleep Solutions's information management practices

Backup

At the end of each month, Indra brings a 1 TB external hard drive from home and connects it to the web server and then the database server. She deletes the previous month's backup from the hard drive and then copies the entire file system to the hard drive as the new backup. The external hard drive is then brought home and placed in a locked cabinet.

Disposal

When a request to delete data is sent to the database server, the system changes an 'active' Boolean field to 'False'. When files are deleted from the web server, they are deleted using the operating system's delete functionality.

Security controls

- The warehouse has an alarm system on all external doors. A third-party security company responds to door alarms within 20 minutes. All windows and doors have locks.
- Laptops have usernames and passwords. The usernames and passwords for the laptops were created by Indra and given to Cerie and Frank when they started working at the business.
- Warehouse workers must log in using generic login details: warehouse123 is the username and password.
- All computing systems have antivirus software installed, which is updated once a month.

Original Gantt chart for the project, completed by Indra

	Task	Day																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A	Design layout of new web pages and user flow.																									
B	Build and link new web pages.																									
C	Test links.																									
D	Design new database.																									
E	Build tables and queries for new database.																									
F	Test queries.																									
G	Move data from old database to new database.																									
H	Link new website to new database.																									
I	Test data flow between website and database.																									
J	Upload website to server.																									
K	Test online.																									
L	Go live.																									

Key   time allocation ▬   milestone ▲   dependency ⟿⟱