

Digital Learning and Teaching  
Victoria

# DLTV Resource Kit

For use with the VCE Applied Computing 2020–2024 Study Design

## Applied Computing: Data Analytics

Units 3 and 4 Trial Examination for 2021

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**While this is a trial examination, teachers are still encouraged to make some modifications to it before use.**

STUDENT NAME \_\_\_\_\_

# Applied Computing: Data Analytics

## Trial Written Examination: 2021

Reading time: 15 minutes

Writing time: 120 minutes

### QUESTION AND ANSWER BOOK

#### Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	20	20	20
B	3	3	20
C	12	12	60
			Total 100

#### Allowed resources

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, an approved graphics calculator (memory cleared) and/or one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

#### Materials supplied

- Question and answer booklet of 19 pages
- Answer sheet for multiple choice questions
- Section C: Case study

#### Instructions

- Write your **student name** in the space provided above on this page.
- Write your **name** in the space provided on your answer sheet for multiple-choice questions
- All written responses must be English.

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

## Section A: Multiple choice

### 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.

No marks will be given if more than one answer is completed for any question.

*Choose the best response from the choices given*

#### Question 1

A disaster recovery plan should cover

- A. backing up, archiving, disposal and testing.
- B. backing up, evacuation, restoration and testing.
- C. backing up, restoration, dummy data and testing.
- D. backing up, dummy data, off-site storage and testing.

#### Question 2

Brandon works for an organisation which stores personal data belonging to customers. After 10 years of client inactivity, he is instructed to dispose these ex-clients' details.

Which of the following would be the most effective way of disposing of the data?

- A. dragging the files to the desktop trash icon
- B. removing the files to another location in case they are needed later
- C. right-clicking on the files, deleting them and then defragmenting the computer
- D. deleting the files and using specific software to rewrite over those sectors several times

#### Question 3

A suitable method for testing whether a database query performs as expected would be to

- A. enter random values and see what is returned.
- B. carefully select data and make a prediction as to what will be returned.
- C. carefully select data, predict the outcome and compare this with the actual result.
- D. create a testing table with columns for each piece of data, making sure that the results are correctly displayed and aligned.

#### Question 4

When locating a large data set for an original research project, it is best to check that the source is reputable and trustworthy. One way to do this would be to prioritise

- A data from a commercial organisation.
- B data from a trusted government resource.
- C data that has been vetted and but not verified.
- D data that has already been processed and been turned into charts.

#### Question 5

Which of the following are examples of input devices in a digital system?

- A. keyboard, mouse, touch screen, microphone
- B. firewall, microphone, monitor, keyboard, scanner
- C. mouse, printer, touch screen, speaker, microphone
- D. monitor, operating system, mouse, keyboard, flash drive

#### Question 6

When a targeted audience is known to have a variety of vision impairments, such as poor vision and colour-blindness, the most important design principle to keep in mind for creating dynamic data visualisations is

- A. alignment.
- B. image use.
- C. contrast.
- D. space.

#### Question 7

Andrejs is creating an infographic and is concerned about violating people's privacy when using data he collected, which includes photographs of people as they walked along a suburban footpath. They did not know they were being photographed. The project is for a non-government school SAC, and no money is being made from it.

The most likely legislative breach would fall under which law?

- A. *Privacy Act 1988*
- B. *Copyright Act 1968*
- C. *Health Records Act 2001 (Vic)*
- D. none of the above

#### Question 8

The best way to manipulate a database to display only a sporting club's current financial members is to

- A. create a table and generate a form.
- B. create a form and generate a query.
- C. create a report and generate a table.
- D. create a query and generate a report.

### Question 9

Emilia is completing some research and writing a report. When she quotes another researcher, she should include

- A. an in-text citation with reference.
- B. reference to the *Copyright Act 1968*.
- C. a footnote with the link to the online article.
- D. a list of the names associated with the research at the end of her report.

### Question 10

Louis is considering using cloud storage for his organisation. Which of the following statements best reflects the issues he needs to consider with cloud storage?

- A. data is stored in selected places and deleted from every location when desired
- B. data can only be accessed when there is an internet connection and is automatically backed up
- C. data is stored in potentially unknown physical locations and might not be fully removed when deleted
- D. data is stored in many different physical locations with regular backups and automatically archived

### Question 11

When designing a validation tool that describes how a database query should work, the best tool to use would be a

- A. mock-up.
- B. storyboard.
- C. data dictionary.
- D. layout diagram.

*Use the following information to answer Questions 12 and 13*

Panjeet is working on a group project, following a Gantt chart that was generated by another team member. Their employer informs them that due to a planned power outage, the team will not be able to work on data manipulation when they had planned to, and that part of the task will need to be delayed by one day. The final completion date, however, cannot be changed.

### Question 12

Panjeet can record this change on the Gantt chart by

- A. adding in an extra milestone.
- B. adjusting the task timeframe and annotating the chart.
- C. keeping a journal to reflect the changes in the project.
- D. making changes to the critical path to make it longer to reflect the changes.

**Question 13**

Panjeet is asked to complete an evaluation of the project plan. Which of the following criteria would be best to measure its effectiveness?

- A. ease of retrieval
- B. cost to generate
- C. speed of locating tasks
- D. completeness and readability

**Question 14**

Data integrity includes the characteristics of

- A. accuracy, authenticity, relevance and timeliness.
- B. correctness, reasonableness, timeliness and validation.
- C. authenticity, correctness, maintainability and relevance.
- D. reasonableness, relevance, correctness and completeness.

**Question 15**

When collecting weather data from a reputable website to create data visualisations, the most appropriate file type to download would be a

- A. PDF.
- B. CSV.
- C. NUM.
- D. DOCX.

**Question 16**

For a presentation to be considered gender inclusive, it should include

- A. the same number of mentions of males and females.
- B. colour choices that reflect the intended audience.
- C. gender-neutral pronouns.
- D. easy to read text.

**Question 17**

Once a dynamic data visualisation has been completed and presented to its intended audience, the creators seek feedback about how well it addresses the original needs.

What is this stage called?

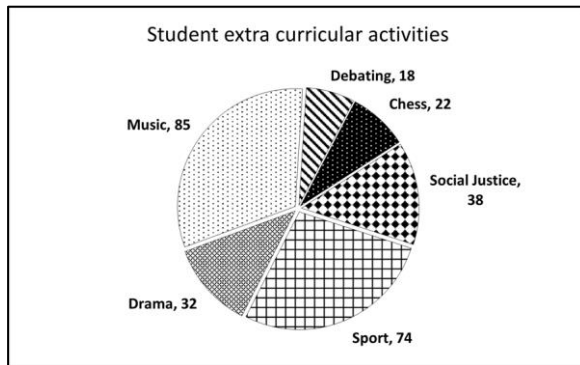
- A. testing
- B. evaluation
- C. validation
- D. user acceptance testing

### Question 18

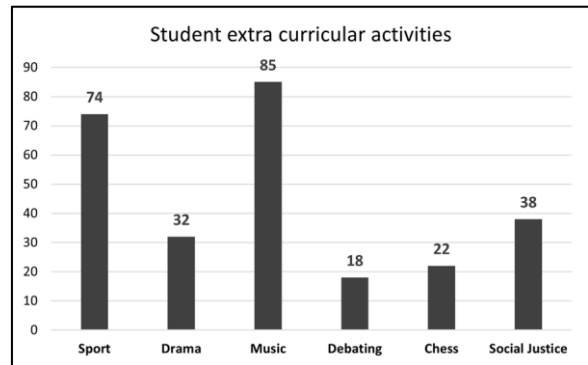
Why is it important for companies to track stock numbers (via stocktake and inventory management systems) and online orders, and maintain this data securely?

- A. To allow the company to make informed decisions based on data with integrity.
- B. So that data is always up to date and easily backed up.
- C. To create efficient communications with customers.
- D. To sell customer data to make more money.

### Question 19



Design A



Design B

Norma is trying to choose between two charts to include as part of her infographic. Which statement about efficiency and effectiveness is true of both designs?

- A. They are both quick to interpret with good clarity.
- B. They both communicate their message in an attractive manner.
- C. They both make use of high contrast, improving their accuracy.
- D. They both make good use of space and text to improve design balance.

### Question 20

Cate is preparing to collect data as part of a research task. Her friend Ben tells her that she should use a Boolean data type where possible. What is one benefit of using a Boolean data type?

- A. users can validate responses
- B. users can select multiple options
- C. they take up very little storage space
- D. they can be programmed to accept any reasonable responses

**END OF SECTION A**

## Section B: Short-answer questions

### Instructions for Section B

Answer all questions in the spaces provided.

#### Question 1 (7 marks)

Rachel works for her local council and is currently creating presentations to show how traffic flow impacts on businesses. She wants to create a data visualisation to show how peak hours create a gridlock, which in turn impacts on street parking and prevents businesses from attracting customers at those times.

- a. Identify a suitable type of data visualisation that could be used. 1 mark

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- b. State the primary purpose of this data visualisation. 1 mark

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When Rachel starts to collect data, she discovers that somebody else had already collected some data that suited her needs. She found it in an old spreadsheet file stored on the computer that she was given to use by the council when she first started working there four years ago.

- c. Explain why there might be some authenticity problems with the data in this file. 2 marks

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- d. Complete the following table by writing **three** criteria that Rachel could apply to check the integrity of the data in the file she found. 3 marks

Data integrity factor	Suggested criterion
Accuracy	
Correctness	
Timeliness	



**Question 2** (9 marks)

Robert has determined research question focusing on the distribution of rainfall in Victoria over the past five years. He will acquire the daily rainfall statistics from local government area websites and the Bureau of Meteorology.

- a. The data he collects must be processed in a way which makes it attractive to the user. Identify whether this requirement is functional or non-functional. 1 mark

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- b. Identify one constraint and explain why Robert must incorporate it into his research. 2 marks

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- c. Explain how Robert could transform his collected raw data into a dynamic data visualisation. 3 marks

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- d. Robert has questions about the data he has collected from a variety of sources. He consults with his friend Blaze who suggests that while the data had clearly been validated, it may not have been verified.

Compare the terms data validation and data verification. 3 marks

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**Question 3** (4 marks)

Sam is considering how to set up a network in a new legal support office. The space is above a café, which offers free Wi-Fi to its customers. The café has indicated that it would be happy for Sam's work to use the café's existing Wi-Fi.

Complete the following table by stating **one** advantage and **one** disadvantage for a wired and a wireless network. Provide completely different statements for each network.

	<b>Advantage</b>	<b>Disadvantage</b>
<b>Wired</b>		
<b>Wireless</b>		

**END OF SECTION B**

## Section C: Case study

### Instructions for Section C

You will be provided with the case study for Section C in a separate document.

Use the case study 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)

Ming suggests to Rosie that they should plan their project properly to ensure that the project is finished in time to recruit as many students into a sporting program as possible. They come up with a list of tasks that need to be completed, as shown below.

Task no.	Task name	Task duration	Dependencies
1	Write research question	1 day	
2	Write survey questions	3 days	Task 1
3	Survey available online	7 days	Task 2
4	Research online for related data	4 days	
5	Design data visualisations	2 days	Task 2
6	Cleanse all data	2 days	Tasks 3, 4, 5
7	Manipulate data	2 days	Task 6
8	Create interactive charts	3 days	Task 7
9	Test data visualisations	2 days	Tasks 7, 8
10	Present data visualisations	0 days	Task 9

Create a Gantt chart to represent the task list above.

	Day																					
Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						

**Question 2** (3 marks)

- a. List **one** reason why the school wants to acquire data about student attitudes to sport participation. 1 mark

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- b. Write a suitable research question that could be used for this project. 2 marks

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**Question 3** (3 marks)

The staff members are discussing the best method for collecting data from the student population. They are considering an alternative data collection method to an online survey, which is to interview students, randomly selecting them from classes.

Suggest the most appropriate data collection method and justify your choice.

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**Question 4** (13 marks)

- a. Rosie starts to think about how they will manipulate the data. Datasets 1 and 2 (Tables 1 and 2 in the case study) are sample responses from two questions that were asked of students.
- Identify which dataset would be easier to present as a chart. Explain why it would be an easier process. 2 marks

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- b.** Explain how the data in Dataset 2 (Table 2) would need to be manipulated before it could be used in a data visualisation. 3 marks

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- c.** Ming points out that the data needs to be de-identified so that student responses can be separate from their personal or identifiable details, such as name, postcode, gender or birthdate.

Normalise the data in Table 3 to make it compliant to third normal form. 5 marks

- d. Explain how a database tool could be applied to ensure that the DoB (Date of Birth) field in Table 3 and part c of this question will only accept birth dates for students aged between 10 and 19. 3 marks

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**Question 5** (5 marks)

- a. Ming and Rosie will create an infographic to display an interpretation of the data. Rosie thinks it would be good to have several design ideas from which to choose. Describe **one** technique for generating these ideas. 2 marks

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- b. Identify **one** graphic representation typically used to display the interpretation of data in an infographic. Explain why Ming should use this representation to enhance the presentation of the data in Dataset 2 (Table 2). 3 marks

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**Question 6** (2 marks)

Alex, a friend of Ming's and Rosie's, is worried about the integrity of the data collected and has some questions, such as whether there was anything in place to prevent students from completing the survey multiple times or sharing with people outside the school. The others are not very concerned.

Outline **two** effects on their data if the data integrity were diminished in any way.

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**Question 7** (6 marks)

It is suggested that the team's files on the school's system be backed up and archived. Explain why it is important that the school backs up and archives its files.

Backs up files

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Archives files

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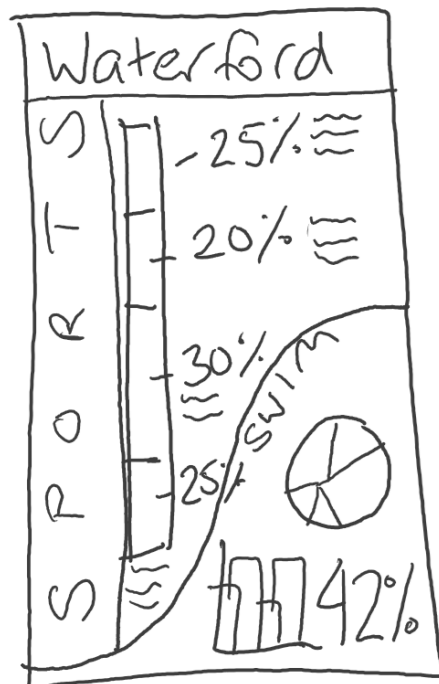
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**Question 8** (9 marks)

Rosie produces two designs for the infographic, which will be presented to the school council, as shown below.



Design A



Design B

- a. Identify **one** convention that has been followed in Design A and explain how it is used to improve readability. 3 marks

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- b.** Identify **one** characteristic of efficiency and **one** characteristic of effectiveness in Design B.  
Explain how each is an improvement over Design A. 4 marks

Efficiency:

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Effectiveness:

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- c.** Ming and Alex want to make sure that the infographic is directed at the correct target audience.  
Identify **one** characteristic of their target audience and explain what they could do with their infographic to ensure that it educates this group appropriately. 2 marks

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**Question 9** (3 marks)

Describe how Rosie could use a software tool to create the infographic.

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**Question 10** (3 marks)

Describe a technique that could test if a dynamic aspect of an interactive chart in an infographic works correctly.

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**Question 11** (6 marks)

- a. Identify the key legislation that affects how the school must handle and store the data it collects. 1 mark

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- b. The local swimming pool, where the past swimming sports have been held, has asked the school for the contact details for past students (not current students). If the pool forwards this data to one of its key suppliers, namely, a swimwear business, then Waterford High School is promised vouchers to acquire new sporting equipment.

Explain the ethical issue around Waterford High School staff giving permission to share this data. 2 marks

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- c. Outline a strategy that could be used to resolve the ethical issue raised in the previous response. 3 marks

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**Question 12** (4 marks)

Alex is concerned about threats to the stored data.

Give an example of an accidental threat that might impact the security of the survey data and explain what could be done to protect it.

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**END OF QUESTION AND ANSWER BOOK**

**2021 DLTV Trial Examination**  
**Applied Computing: Data Analytics**

Student Name: \_\_\_\_\_

Multiple Choice Answer Sheet for Section A

**Shade** the appropriate box using pencil.

1 A  B  C  D

2 A  B  C  D

3 A  B  C  D

4 A  B  C  D

5 A  B  C  D

6 A  B  C  D

7 A  B  C  D

8 A  B  C  D

9 A  B  C  D

10 A  B  C  D

11 A  B  C  D

12 A  B  C  D

13 A  B  C  D

14 A  B  C  D

15 A  B  C  D

16 A  B  C  D

17 A  B  C  D

18 A  B  C  D

19 A  B  C  D

20 A  B  C  D

### **Insert for Section C: Case study (Trial Examination 2021)**

Rosie is a sports teacher at Waterford High School, a government school located in central Victoria. She has noticed that the participation rate at the swimming and athletics carnivals has been decreasing over the last 5 years or so. She wants to inspire more students to participate in carnivals in order to:

- build school spirit
- encourage healthy lifestyles
- improve fitness, and
- promote student friendship and competition.

Her colleague, Ming, suggests that she should formulate a research question to discover why students are reluctant to take part in the events. This way the school could formulate an approach to target the students who are disengaged.

They work together to create an online survey, to be completed at the end of the school year, which requires students providing some personal information (age, date of birth, residential postcode, gender) as well as responding to the following questions:

1. What year level are you currently in?
2. How many swimming carnivals have you attended?
3. How many athletics days have you attended?
4. Rate your enjoyment of your last sporting carnival from 1 (hated it) to 6 (loved it).
5. Did you participate in any swimming events this year?
6. Did you participate in any athletics events this year?
7. Why do you think students avoid taking part in sports?
8. What do you suggest might improve participation rates?

The plan is to use the data collected, do some research into other existing research published online, create some data visualisations and present them at this year's December school council meeting, together with some suggestions as to how to improve student participation rates.

When the survey is eventually completed, the teachers are delighted to see that they had over 500 responses from students, but realise that not all of the data is immediately usable in its current state.

*(Data on following page.)*

**Table 1:** Dataset 1 – Sample responses to question 4: Rate your enjoyment of your last sporting carnival from 1 (hated it) to 6 (loved it).

ResponseID	1	2	3	4	5	6
24601			✓			
24602		✓				
24603	✓					
24604					✓	
24605	✓					
24606			✓			
24607				✓		

**Table 2:** Dataset 2 – Sample responses to question 7: Why do you think students avoid taking part in sports?

ResponseID	Answer
24601	<i>They're boring</i>
24602	<i>Students don't have much school spirit and don't really care if their house team wins or not.</i>
24603	<i>Not enough novelty sport</i>
24604	<i>If the students don't see any personal benefit, they won't even try, even to just participate or to have a good time. They would rather do nothing and be bored than get up and exercise.</i>
24605	<i>It's pointless and boring</i>
24606	<i>The canteen lines are always too long</i>
24607	<i>Maybe they're bored and lazy? Dunno.</i>

**Table 3:** Data dictionary for personal information gathered

Field name	Data type	Description	Sample data
ResponseID	Integer	Unique ID	24601
FullName	Text	Student full name	Hayley Kelsett
DoB	Date	Date of birth	2/9/2007
Age	Integer	Student age	14
YearLevel	Integer	Q1 - Year level	8
Gender	Text	Gender	Female
Postcode	Text	Residential postcode	3088
NumSwim	Integer	Q2 – Number of swim days attended	2
NumAths	Integer	Q3 – Number of athletics days attended	1
Rating	Integer	Q4 – Enjoyment level	3
SwimParticipation	Boolean	Q5 –Swim event participation	0
AthsParticipation	Boolean	Q6 – Athletics event participation	0
Avoid	Text	Q7 – Why students avoid	They're boring
Improve	Text	Q8 – Suggestions to improve participation	There should be prizes and better canteen food with shorter lines