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Write your **student number** in the boxes above.

Letter

Applied Computing: Data Analytics

Question and Answer Book

VCE Examination – Wednesday 5 November 2025

- Reading time is **15 minutes**: 3.00 pm to 3.15 pm
- Writing time is **2 hours**: 3.15 pm to 5.15 pm

Approved materials

- One scientific calculator

Materials supplied

- Question and Answer Book of 28 pages
- Detachable Insert containing a case study for Section C in the centrefold
- Multiple-Choice Answer Sheet

Instructions

- Follow the instructions on your Multiple-Choice Answer Sheet.
- At the end of the examination, place your Multiple-Choice Answer Sheet inside the front cover of this book.

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

| Contents | pages |
|---|-------|
| Section A (20 questions, 20 marks) _____ | 2–7 |
| Section B (5 questions, 20 marks) _____ | 8–13 |
| Section C (14 questions, 60 marks) _____ | 14–27 |

Section A – Multiple-choice questions

Instructions

- Answer **all** questions in pencil on your Multiple-Choice Answer Sheet.
 - 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 type of data visualisation that is interactive with static or live data is

- A. a dashboard.
- B. an infographic.
- C. an interactive chart.
- D. a dynamic data visualisation.

Question 2

Landa is working on a large community-based project developing data visualisations for local and visiting bird watchers. She has set up a Gantt chart to monitor the project.

Which of the following is a suitable technique for recording the progress of the project?

- A. adjusting journals
- B. annotating mock-ups
- C. annotating the project plan
- D. adjusting the Gantt chart to reflect changes to the critical path

Question 3

A mood board is best described as a

- A. visual diagram that outlines a project's timeline.
- B. detailed written plan outlining how a project will look.
- C. collection of images, colours and text to communicate an idea.
- D. technical document that specifies the design decisions made about a project.

Question 4

Hetuwa is working on a dynamic data visualisation of the population of various cities across the globe. When testing one of the bar charts in the dynamic data visualisation, Hetuwa notices that some of the cities have significantly lower population values and some have higher values than he expected.

What technique should Hetuwa use to test whether the bar chart represents the data being visualised?

- A. Swap the x-axis data and the y-axis data.
- B. Reorganise the cities into alphabetical order.
- C. Adjust the chart's size to improve its balance and alignment.
- D. Check the data source to confirm the population data.

Question 5

Jasmine is a data analyst at a clothing company that specialises in seasonal fashion. She wants to create a pie chart as part of an infographic based on customer responses to a questionnaire.

After she collects her data, she notices some errors such as spelling mistakes and missing data.

What is the first thing Jasmine should do to ensure that her final chart is accurate?

- A. Cleanse the data.
- B. Code the data into categories.
- C. Count how many people gave each response.
- D. Select the data and use software tools to create a pie chart.

Question 6

Aria is researching how to regenerate nature to help protect Australia's wildlife. She finds some data that she thinks will be useful to create part of a dynamic data visualisation, and cites the following reference:

Regenerate nature by 2030: WWF-Australia: Regenerate nature by 2030.
WWF Australia. (n.d.). <https://wwf.org.au/about-us/regenerate-nature-by-2030/>

What is the best indicator of this source's authenticity?

- A. It is an Australian website.
- B. The article title specifically mentions regeneration.
- C. The 'https' in the internet address indicates that the website keeps its data secure.
- D. The website's domain is '.org.au'.

Question 7

Wei wants to create a dynamic data visualisation to educate students about the heat generated by different stars in the Milky Way.

To ensure the secondary data collected has a high level of integrity, Wei should

- A. observe the sky each night.
- B. track changes in downloaded data.
- C. query data stored in existing large repositories.
- D. use a programming language to locate the best primary sources.

Question 8

A large financial organisation upgrades its information security after experiencing a series of attempted breaches. To enhance the protection of its data and information, it develops new strategies to safeguard sensitive customer data.

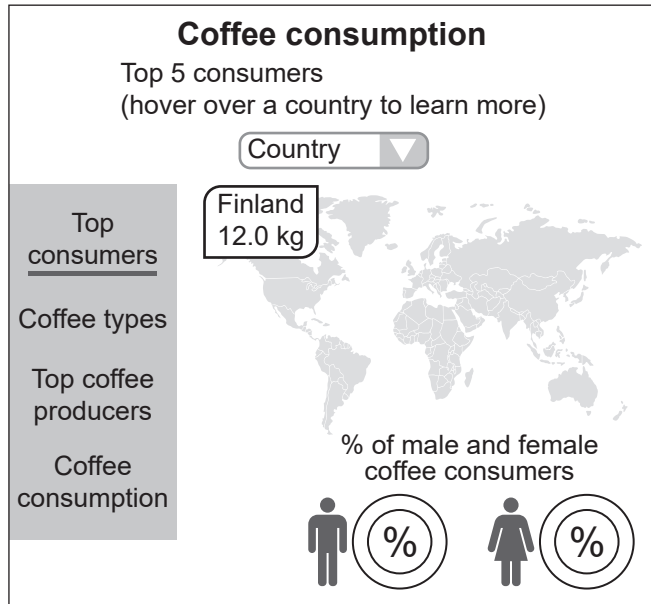
Which of the following is an emerging trend in cyber security that would help the organisation in this situation?

- A. using passwords
- B. installing firewalls to monitor data
- C. using artificial intelligence to protect data
- D. using encryption for all data stored and in transit

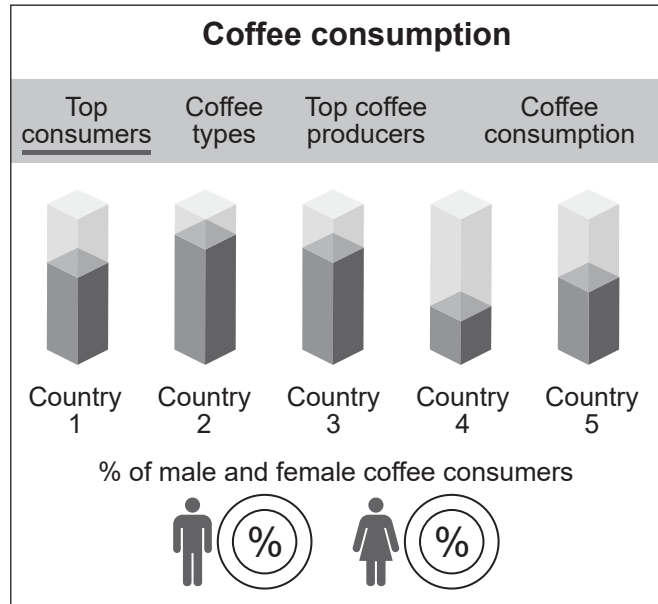
Use the following information to answer Questions 9 and 10.

Tia has just completed two mock-up designs for a dashboard on coffee consumption. The evaluation criterion she is using to decide which of the two designs to develop further is

‘Interactivity: The dashboard allows the user to explore data interactively.’



Design A



Design B

Question 9

Which of the following statements is correct based on the mock-up designs provided?

- A. Design A is more interactive because it includes features such as filters and hover effects.
- B. Design A is more interactive because it does not show too much information at once.
- C. Design B is more interactive because it separates content neatly, helping users to focus.
- D. Design B is more interactive because tabs allow users to undo filter changes easily.

Question 10

A user accidentally applies a country filter that hides all data.

What feature should the dashboard include to improve error tolerance?

- A. a loading spinner
- B. a reset filter button
- C. a download/save option
- D. an alert message explaining that no data is available

Question 11

Kim is developing a project plan for a team of nine colleagues who must work on some tasks simultaneously.

The best way for Kim to find out how long the project should take is to determine the

- A. milestones.
- B. critical path.
- C. time allocation.
- D. sequencing of tasks.

Question 12

Oscar is the owner of a hotel in the south-eastern suburbs of Melbourne. As part of his end-of-financial-year reporting, he is analysing data for the hotel's stakeholders. He has limited time to complete the report and is keen to use the spreadsheet software's inbuilt functions.

Cell A4 contains July's income and cell B4 contains July's total expenses.

| | A | B | C | |
|---|---------------|-----------------|---------------|--|
| 1 | July | | | |
| 2 | Income | Expenses | Profit | |
| 4 | \$5,822.00 | \$3,291.00 | | |

Which of the following is an example of a function or formula Oscar could use in cell C4 to quickly calculate the amount of monthly profit?

- A. =IF(A4>B4, "Profit", "Loss") to determine whether the hotel made a profit or loss
- B. =AVERAGE(A4:B4) to find the average of revenue and expenses
- C. =SUM(A4:B4) to add all income and expenses together
- D. =A4-B4 to subtract total expenses from total income

Question 13

The Australian Taxation Office collects and stores information about Australian citizens each financial year, including names, contact details and financial data. To comply with legislation, it must ensure data is collected lawfully, securely stored and only used for its intended purpose.

Which of the following legislation includes these requirements?

- A. *Privacy Act 1988*
- B. *Cyber Security Act 2024*
- C. *Health Records Act 2001*
- D. *Privacy and Data Protection Act 2014*

Question 14

Which characteristics of data types and data structures are relevant to manipulating collected data?

- A. the rules governing how data is input, transformed and presented for analysis
- B. the format and organisation of data affecting how it is stored, accessed and processed
- C. the naming conventions of elements follow set protocols such as avoiding the insertion of spaces
- D. the relationship between different data elements and how they are linked for efficient usage

Question 15

Seema, a Data Analytics student, has collected and analysed data for her research project. She needs to design and develop an infographic that presents her findings.

One technique to ensure the information presented is easily understood is to

- A. add animation and transition.
- B. add charts for every data table.
- C. organise the hierarchy of information.
- D. use bright colours to attract readers.

Question 16

The organisers of a tenpin bowling tournament are using a live leaderboard to display player rankings and scores in real time during the event. Data from each game is entered as players complete their turns, and the leaderboard is updated to reflect the latest results. The scores are checked after each round to make sure that they are within a reasonable range, and the players' names are compared to their tournament registration forms and photo ID to ensure that they are spelled correctly.

The best way to describe this treatment of input data is

- A. validation of both scores and names.
- B. verification of both scores and names.
- C. verification of scores and validation of names.
- D. validation of scores and verification of names.

Question 17

When acknowledging sources for a project, Wesley uses APA referencing.

APA is an abbreviation for

- A. Australian Psychological Association.
- B. American Psychological Association.
- C. Australian Publishing Authority.
- D. American Publishing Authority.

Question 18

A business analyst is designing an interactive sales dashboard for stakeholders.

Which set of design principles should be adopted to influence the dashboard's appearance and functionality?

- A. alignment, space, usability, interactivity
- B. repetition, balance, contrast, navigation
- C. interactivity, usability, navigation, repetition
- D. space, text and table formatting, colour, navigation

Question 19

Tran is a network manager responsible for the security of the data and information on an organisation's network.

A nearby lightning strike caused a power failure for three days, and the organisation's uninterruptable power supply (UPS) unit did not have enough power to complete a full backup of the organisation's server.

This threat is best categorised as

- A. malicious.
- B. accidental.
- C. deliberate.
- D. events-based.

Question 20

Voight works in an office building for a large bank that has developed a disaster recovery plan.

In the case of an actual emergency such as a fire, the first stage to be implemented should be

- A. backing up.
- B. evacuation.
- C. restoration.
- D. testing.

Section B – Short-answer questions

Instructions

- Answer **all** questions in the spaces provided.
- Write your responses in English.

Question 1 (2 marks)

Sam has been researching the use of digital tools by high school students, and his report will reference secondary sources.

Identify and describe how Sam should refer to quotations from these sources within the body of the report.

Question 2 (2 marks)

VeggiesPlus is a large organisation that sells farm-fresh produce from a chain of retail outlets. The organisation has invested a lot of time planning how it wants to grow in the future. Part of this process is documenting goals and objectives.

In the table below, identify whether each statement is a goal or an objective.

| | Goal or objective |
|--|-------------------|
| 1. To provide the best and freshest food to Victorians | |
| 2. All complaints are resolved within 48 hours | |

Question 3 (4 marks)

Winter has heard that backing up data is very important but is unsure what some of the terminology means. She understands what a full backup is, but not other backup types.

Complete the table below by describing each backup type and its storage space requirements and backup/restoration times. A sample response is provided in the first row.

| Backup type | Description | Storage space requirement and backup/restoration time |
|--------------------|-------------------------------------|--|
| full | <i>A complete copy of all data.</i> | <i>Takes up a lot of storage space and is slow.</i> |
| incremental | | |
| differential | | |

Question 4 (6 marks)

Hamish and Diana have been assigned a project to develop an infographic that they will present on Monday 1 December. They have listed the tasks that must be completed, along with the durations, dependencies and any limitations that affect the milestones.

1. Conducting an analysis including solution requirements, constraints and scope will take two days.
2. Generating design ideas will take two days and will be dependent on the analysis.
3. Determining the evaluation criteria will take one day and will be dependent on the analysis and design ideas.
4. Generating detailed designs will take four days to complete and will be dependent on the evaluation criteria.
5. Developing the infographic will take six days and will be dependent on the detailed designs.
6. Testing the infographic will take three days and will be dependent on developing the infographics.
7. Completing the project by 28 November will be dependent on the testing.

Hamish and Diana will not be working on weekends or a public holiday on 17 November.

Using the information provided above, complete the Gantt chart on page 11.

Question 5 (6 marks)

Below are two tables from Ziggy's Office Supplies database.

tblCustomer

| CustomerID | CustomerName | Email | CustomerType |
|------------|--------------|-------------------------|--------------|
| 1 | Bob Smith | rsmith@qurbaani.com | Corporate |
| 2 | Sara Black | sara.b@heliumbiz.com | Retail |
| 3 | Pang Jones | pj@pangcorp.org | Corporate |
| 4 | Liz Kristy | hello@fashionempire.com | Retail |

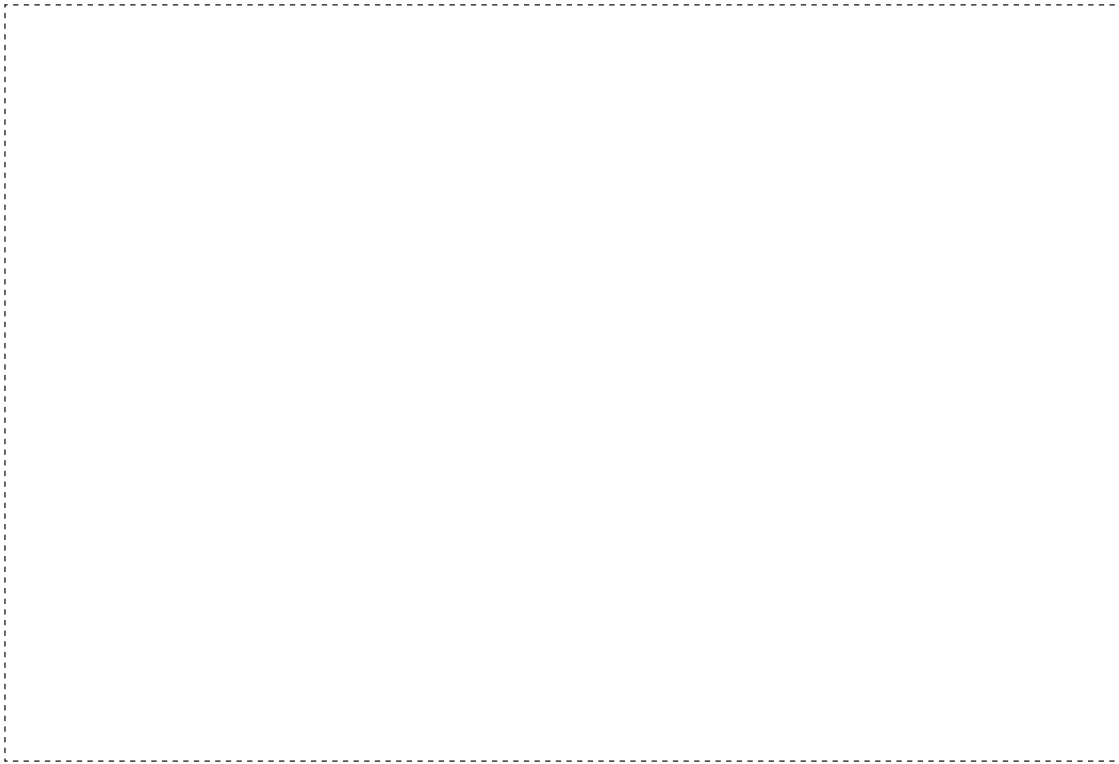
tblOrders

| OrderID | CustomerID | ProductName | OrderDate | TotalPrice |
|---------|------------|-----------------|------------|------------|
| 101 | 1 | Printer Paper | 01-01-2025 | \$150 |
| 102 | 2 | Ink Cartridges | 02-01-2025 | \$150 |
| 103 | 1 | Office Chairs | 04-01-2025 | \$225 |
| 104 | 4 | Desk Organisers | 10-01-2025 | \$140 |

- a. Name the SQL function that Ziggy could use to retrieve a list of customer names and the products they have ordered. This function must ensure that only customers with matching orders are included in the result. 1 mark

- b. Explain why this function is recommended. 1 mark

- c. Use the headings CustomerName, ProductName and TotalPrice to create a table in the box below that provides a sample query result for the SQL function named in **part a**. 4 marks



Do not write in this area.

Section C – Case study

Instructions

- 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.
 - Write your responses in English.
-

Question 1 (2 marks)

Filip is aware that a lot of research must be completed before developing the infographics. To help him, he needs to write a research question.

Identify and describe **one** feature of a good research question.

Question 2 (2 marks)

Inara has been determining the requirements of the infographics. She has found it easy to write the functional requirements, but she found the non-functional requirements more difficult.

List two non-functional requirements for the infographics.

Non-functional requirement 1 _____

Non-functional requirement 2 _____

Question 3 (7 marks)

Inara and Filip have considered the type of data they will need and where this data can be found. They expect that:

- government websites will provide university enrolment numbers
- universities will have data about the popularity of courses, types of courses and careers, as well as pathways towards them
- professional associations will have members who can provide data for the number of years in their careers, job satisfaction, and pay and working conditions
- the Australian Bureau of Statistics will have statistics about careers.

Most of the data that Inara and Filip will collect will be secondary data. However, they will also need some good primary data, which they will source from professional associations.

- a. Suggest the most efficient method for collecting primary data from the members of professional associations. Justify your response.

3 marks

- b. Explain **two** ways in which Inara and Filip could ensure that this data is collected ethically. 4 marks

Question 4 (5 marks)

As schools are registering their students for the infographics, Inara develops the following tables for the relational database management system (RDBMS). A sample record is included in each table.

tblSchoolDetails

| SchoolID PK | SchoolName | SchoolAddress | SchoolSuburb | SchoolPostcode |
|----------------|------------------------------|---------------|--------------|----------------|
| 123456 | Robinsford Secondary College | 123 Main Rd | Robinsford | 3014 |

tblStudentDetails

This table contains one record with 11 fields.

| StudentID PK | GivenName | FamilyName | Email | | | |
|-----------------|-----------|------------|-----------------------------|--|--|--|
| 98765432 | Sam | Nguyen | 98765432@schools.vic.edu.au | | | |

| Address | Suburb | Postcode | SchoolID FK | DateOfBirth | PhoneNum | Class |
|---------------|------------|----------|----------------|-------------|--------------|-------|
| 12 Station St | Robinsford | 3014 | 123456 | 1/11/2008 | 1234 567 890 | 11A |

a. Complete the following table with the missing field properties.

2 marks

| Field name | Data type | Field size |
|------------|-----------|------------|
| StudentID | | |
| Class | | |

b. Filip notes that the primary key and the foreign key are indicated within the **tblSchoolDetails** and **tblStudentDetails** tables. Inara does not understand why this has been documented.

Using an appropriate example from the case study, explain how primary key and foreign key fields create relationships between tables in the RDBMS.

3 marks

Question 5 (4 marks)

The data that Inara and Filip want to use in their infographic includes charts displaying statistics such as the years when the data was collected, the names of universities and the total number of students enrolled in related subjects. Table 1 in the case study is an example of data for enrolments related to Science, Technology, Engineering and Mathematics (STEM) subjects.

- a. For the 2020 enrolment data, complete the input-process-output (IPO) chart for the output that needs to be calculated.

3 marks

| Input | Process | Output |
|-------|---------|--------|
| | | |

- b. Identify the spreadsheet function used to complete the process step in the IPO chart.

1 mark

Question 6 (6 marks)

Wren is a graphic designer hired to develop the infographics. After consulting with Inara and Filip, Wren has decided to develop the infographics as a series so their structure will be consistent across all of the careers.

After the data has been collected, Wren needs to develop a mock-up for one career to visualise how the infographics will look. Wren wants to make sure that the design principles of space, alignment and balance are well applied.

- a. On the grid provided on page 19, sketch a partial mock-up design for the first infographic.

3 marks

The infographic is to be divided into three sections: top, middle and bottom.
The mock-up must include the following features:

Top section

- title 'STEM Careers' and indicate the position for a short introduction explaining the purpose of the infographic

Middle section

- spaces for charts comparing starting salaries for STEM graduates, STEM workers without qualifications and non-STEM graduates. Each chart should have a small area near it for a description of that chart

Bottom section

- indicate the positions for key text and a short paragraph explaining the benefits of a STEM career

- b. Annotate your mock-up to explain how the design principles of space, alignment and balance are applied.

3 marks

Question 7 (4 marks)

As Filip starts to look at spreadsheet data for the university enrolments from 2018–2022, he notices some validation issues.

- a. Explain what validation is and when it occurs.

1 mark

- b. In the table below, identify the validation checks that should be performed on the data in Table 1 in the case study.

3 marks

| Cell reference | Validation check |
|----------------|------------------|
| B5 | |
| E4 | |
| F10 | |

Question 8 (7 marks)

Examine the data presented in Table 1 in the case study.

Inara can tell that there are problems with the data, and determines that the process to fix this issue is cleansing.

- a. Using an example, explain why the data in Table 1 needs to be cleansed. 2 marks

- b. Describe a process that would allow the data to be cleansed properly. 2 marks

- c. Describe how Inara and Filip could quickly calculate the average enrolments for all universities for each of the years. 3 marks

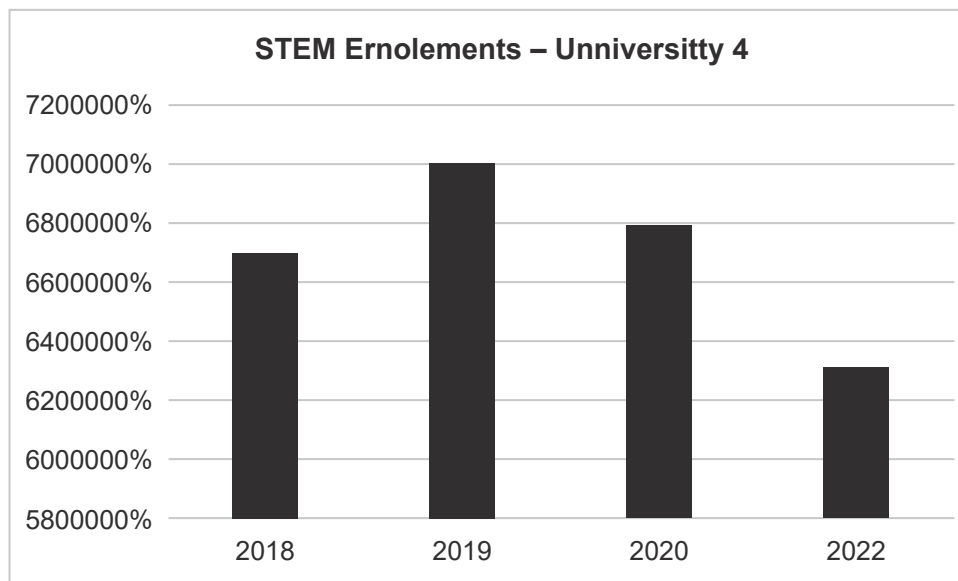
Question 9 (4 marks)

Inara is investigating student enrolments at individual universities. She selects the cleansed data in the table below.

| Institution | 2018 | 2019 | 2020 | 2021 | 2022 |
|--------------|--------|--------|--------|--------|--------|
| University 4 | 67,017 | 70,049 | 67,951 | 67,726 | 63,081 |

Source: Adapted from 'Student load pivot table 2022',
Australian Government Department of Education, <www.education.gov.au>

She then creates the following chart.



Inara asks Wren to test the chart.

Complete the testing table for Wren below.

| Test no. | Item tested | Expected result | Actual result |
|-----------------|---|------------------------|----------------------|
| 1 | chart title | | |
| 2 | axis labels | | |
| 3 | x-axis data accuracy/ representation | | |
| 4 | y-axis data accuracy/ representation | | |

Do not write in this area.

Question 10 (4 marks)

After completing testing of the STEM careers infographic, Wren and Filip want to evaluate it against the following evaluation criterion developed during the design stage:

‘Infographics should be eye-catching and interesting.’

Outline an evaluation strategy that could be used to measure this criterion.

Question 11 (3 marks)

Filip receives notifications from many students who are suddenly receiving a large number of unwanted emails, text messages and phone calls. He quickly realises that the student data, including passwords, may have been accessed by unauthorised users.

- a. Identify which type of incident has taken place. 1 mark

- b. Name the legislation that applies to the incident identified in **part a**. 1 mark

- c. Describe the actions that will need to be taken as outlined in the legislation named in **part b**. 1 mark

Question 12 (4 marks)

Inara discovers that some students' personal details have been altered due to the incident identified in Question 11.

Define data accuracy and provide **three** consequences of diminished data integrity for the organisation.

Question 13 (4 marks)

Filip is concerned about their organisation's disaster recovery plan after the incident identified in Question 11. Filip and Inara back up their organisation's files regularly but have never tested the plan.

- a.** Explain why testing the disaster recovery plan is important. 1 mark

- b.** Outline a strategy to ensure that all files have been successfully restored. 3 marks

Question 14 (4 marks)

As a result of the incident in Question 11, it was discovered that the passwords were readable by unauthorised users.

As such, students will need to create new passwords. These new passwords will now be hashed.

Filip is not sure how the hashing of passwords works, so Inara gives him the following activity.

- Using only lower-case letters of the alphabet, divide the position of each letter in the table below by 5.
- The remainder is the hashed value.
- The letter is stored in that hashed position.
- The corresponding values of the letters *a*, *b*, *c* and *d* are not divided by 5. The values are stored in the same hashed position.
- Numbers follow the same process, so the number 7 would be in the hashed position of 2 because that is the remainder.

Letters and corresponding values

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|
| a | b | c | d | e | f | g | h | i | j | k | l | m |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |

| | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| n | o | p | q | r | s | t | u | v | w | x | y | z |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |

For example, the letter *m* has the corresponding value of 13. Dividing 13 by 5 gives a remainder of 3, so the letter *m* would be stored in the hashed position 3. If another letter produced the same remainder, it would be stored in the same hashed position, after the *m*.

- a. Complete the following table to show how the hashed version of the password 'apple89' is generated. The first letter has already been hashed.

3 marks

| Hashed position | |
|-----------------|---|
| 0 | |
| 1 | a |
| 2 | |
| 3 | |
| 4 | |

- b. Deduce the hashed password of 'apple89'.

1 mark

Do not write in this area.

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Applied Computing: Data Analytics

Insert for Section C

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

Promoting careers in schools

Inara and Filip are careers specialists employed by a not-for-profit organisation that works with the Victorian state government to support careers education. Their work involves promoting careers to students from Years 10 to 12. Both Inara and Filip are aware that they cannot physically visit all the schools. They are also aware that a lot of outdated careers information is provided to students.

Better support of careers in schools

Inara and Filip have discussed their concerns with the state government, and have been awarded a five-year grant to research career trends in Victoria. This involves collecting data from universities, professional associations, Australian government departments and the Australian Bureau of Statistics to develop infographics that will inform students about as many careers as possible. Each infographic will be in a highly usable, easy-to-read format. The grant will also allow them to add staff to their organisation.

Schools will be required to register their Year 10–12 students, who will receive emails with new infographics as they are published.

The following registration details will be required:

- Student family name
- Student given name
- Student ID
- Student email
- Student address
- Student suburb
- Student postcode
- Student date of birth
- Student phone number
- Student current class
- School ID
- School name
- School address
- School suburb
- School postcode

Inara and Filip initially intended to share the infographics via email, but they were concerned that many students would not open them, especially if the emails ended up in junk mail folders. Instead they decided that students would receive a weekly email alert directing them to a secure server that stores all of the published infographics. To access these, students would log in using their student email address and a self-selected password.

Viewing or downloading files would be made faster due to small file sizes. Publishing them as PDFs would ensure their accessibility regardless of the device used to access them.

Data collection

Inara and Filip are focusing on data for Victorian students enrolled in tertiary courses related to Science, Technology, Engineering and Mathematics (STEM) subjects for the years 2018–2022.

Table 1 shows STEM enrolment data for several Victorian universities.

Table 1

| | A | B | C | D | E | F |
|----|-------------------|--------|--------|--------|-----------|--------|
| 1 | Institution | 2018 | 2019 | 2020 | 2021 | 2022 |
| 2 | University 1 | 41,584 | 43,405 | 43.907 | 41,722 | 37,495 |
| 3 | University 2 | 11,940 | 13,494 | 11.817 | 9,215 | 8,679 |
| 4 | University 3 | 29,551 | 29,039 | 27.433 | -25967.84 | 24,164 |
| 5 | University 4 | | 70,049 | 67.951 | 67,726 | 63,081 |
| 6 | University 5 | 23,735 | 25,921 | 24.402 | 19,472 | 16,183 |
| 7 | University 6 | 51,656 | 53,965 | 52.523 | 53,766 | 51,777 |
| 8 | University 7 | 26,883 | 26,963 | 26.675 | 26244s | 25,993 |
| 9 | University 8 | 52,619 | 54,537 | 52.191 | 54,038 | 52,807 |
| 10 | University 9 | 724 | 660 | 657 | 627 | w |
| 11 | University 10 | 20,158 | 21,240 | 21.162 | 20,137 | 20,616 |
| 12 | total enrolments: | | | | | |

Source: Adapted from 'Student load pivot table 2022', Australian Government Department of Education, <www.education.gov.au>

