insight

▶ innovative ▶ engaging ▶ evolving

YEAR 12 *Trial Exam Paper*

2021

APPLIED COMPUTING: SOFTWARE DEVELOPMENT

Written examination

Sample responses

This book presents:

➢ high-level sample responses
➢ mark allocations
➢ tips.

SECTION A – Multiple-choice questions

Question	Answer
1	*A*
2	*D*
3	*C*
4	*D*
5	*A*
6	*B*
7	*C*
8	*C*
9	*D*
10	*B*
11	*D*
12	*B*
13	*D*
14	*A*
15	*C*
16	*D*
17	*C*
18	*C*
19	*C*
20	*B*

SECTION A

Question 1

Answer: A

Explanatory notes

Only strings (option A) can represent alphabetical characters such as EV. Integers (option B) only represent whole numbers, Boolean variables (option C) can only represent true or false, and floating point numbers (option D) only represent decimal numbers.

Question 2

Answer: D

Explanatory notes

The program is copying the files which is part of backing up (option D). If the program was moving the files it would be archiving (option B). Disposing (option C) would be deletion of the files, while restoring (option A) would return the files from storage, not copy them to the network-attached storage (NAS).

Question 3

Answer: C

Explanatory notes

The employee has authenticated (option C) themselves with a physical object, the ID pass. Version control (option A) refers to saving versions of the program in order to allow rollback if problems occur. Password encryption (option D) would rely on a typed password, while software updates (option B) would be centralised and would not rely on an employee swiping their ID.

Question 4

Answer: D

Explanatory notes

A problem statement (option D) is a concise description of an issue to be addressed or a condition to be improved upon. Gantt charts (option A) show a timeline for the development of a project. Use case diagrams (option B) show the functional requirements. Data flow diagrams (option C) show the flow of data in a system.

Question 5

Answer: A

Explanatory notes

Note that all methods listed are appropriate to their chosen subject (you would interview the coach, survey the players etc.), so this question is asking about the subject/audience rather than the method of data gathering. As the players are not the target audience for the software, surveying them (option A) is not relevant for this solution. Options B, C and D involve the coach (intended audience).

SECTION A

Question 6

Answer: B

Explanatory notes

Records (option B) allow variables of multiple different data types to be kept together, such as a time variable for time and a string variable for position. Classes (option A) and functions (option C) are not data structures; they are processing features of programming languages. While a class could be used to represent the record in a programming language, classes also have other uses. As the time and position would most likely be different data types, a one-dimensional array (option D) could not hold this data.

Question 7

Answer: C

Explanatory notes

A desktop check or trace table would produce the following:

Iteration	'x'	'y'	'answer'
0 (before the loop)	0	5	
1	2	4	10
2	4 (option A)	3 (option B)	10
3	6	2	10 (option C)
4 (program **does not** loop as 'y = 2')			

After the third loop, the value of 'answer' is 10. Options A and B can be shown as incorrect by the trace table, and the program does not loop a fourth time, rendering option D incorrect.

Question 8

Answer: C

Explanatory notes

An existence check (option D) would make sure the user has typed in some data, a type check (option A) would ensure that the data is numeric and a range check (option C) would ensure that the values were limited to the range 0 to 100. Check digits (option B) are values located in data to verify that the information has been entered correctly. They are used in situations involving credit card numbers and bar codes and are not part of the VCE Study Design for Software Development.

Question 9

Answer: D

Explanatory notes

Phuong wants his game project to have portability, which is a non-functional requirement (option D). Technical requirements (option C) are the technical issues that must be considered to successfully complete a project. Usability constraints (option A) are factors that limit the actions that can be performed by the user, while economic constraints (option B) are factors such as the amount of time and budget available.

Question 10

Answer: B

Explanatory notes

All diagrams, such as context diagrams (option B), data flow diagrams and use case diagrams are placed in the appendices of the SRS. Purpose and audience (option D), user characteristics (option C) and scope (option A) are in the main body of the SRS.

Tip

- *This information is more clearly spelled out in the Advice for Teachers than in the Study Design. Any information in this document supplements the Study Design – it has officially come from VCAA so it is well worth reading it in preparation for the exam.*

Question 11

Answer: D

Explanatory notes

Both parts of the selected answer must be correct for this question. Brainstorming (option A) is a technique for generating design ideas, not expressing designs. Testing tables (option B) show testing, not design. Use case diagrams (option C) are analysis tools.

Question 12

Answer: B

Explanatory notes

Affordances are properties of objects that show the user which actions they can take, and must match the user's capabilities and past experiences. By greying out the buttons (option B), users know from past experience that they still have information to enter. Using smaller buttons (option A) or having fewer buttons (option C) would affect usability, not affordance, while having blue underlines that aren't links (option D) shows poor affordance.

Question 13

Answer: D

Explanatory notes

The *Privacy Act 1988* applies to government agencies, organisations contracted to the government, small businesses that provide a health service and private sector organisations with a turnover exceeding $3 million. The social media site (option A) is not based in Australia so is not subject to Australian law. The fish and chip shop (option B) is unlikely to turn over $3 million, and there is nothing to imply that the data is gathered inappropriately. Criminal investigations (option C) are an exception for use and disclosure. A large Australian supermarket chain would have a turnover well in excess of $3 million and therefore must protect its information from being hacked, according to the *Privacy Act 1988*.

Question 14

Answer: A

Explanatory notes

Lookup operations find and return the value that is bound to the given key. As the key given to lookup is 'Chun', the returned value will be Chemistry (option A). Option C is returning both the key and value, option B is returning the keys that match the value without returning the value itself, and option D is returning all keys that have the same value along with that value.

Question 15

Answer: C

Explanatory notes

Brianna is in the associative array so the 'not found' branch (options A and B) will not run. The return statement does not use the tutor's name in any way (rendering option D incorrect), only the 'newFaculty'.

Question 16

Answer: D

Explanatory notes

The algorithm shows sequence (instructions are completed in order) and selection (the 'IF' statement), rendering option A incorrect. There is no iteration or repetition in the algorithm, rendering options B and C incorrect

Question 17

Answer: C

Explanatory notes

Two possible ways to obtain this answer are:

- 900 megabytes multiplied by 8 equals 7200 megabits, then 7200 megabits divided by 25 megabits per second equals 288 seconds or 4 minutes and 48 seconds
- 25 megabits per second divided by 8 equals 3.125 megabytes per second. 900 megabytes divided by 3.125 megabytes per second equals 288 seconds or 4 minutes and 48 seconds.

Option A is most likely obtained by multiplying 25 by 8 instead of dividing or mixing up the units. Option B ignores the transformation from bits to bytes (divide by 8). Option D is a result of ignoring the transformation and using the wrong time unit (minutes).

Tip

- *This sort of question justifies taking a scientific calculator into the exam. You are assumed to have access to one and it saves you from having to divide (or multiply) by 8 (bits to bytes) or 1000 (kilobytes to megabytes, megabytes to gigabytes) in your head. When doing these calculations, assume overhead or lag is ignored unless explicitly stated otherwise. The question stem containing the words 'closest to' covers that fact.*

SECTION A

Question 18

Answer: C

Explanatory notes

Testing must test boundary values, which are 18.4 and 18.5 (underweight to healthy weight) and 24.9 and 25.0 (healthy weight to overweight). Option A does not test any of these values. Option B only tests 25.0; the others are to the nearest unit. Option D does not test 18.5.

Question 19

Answer: C

Explanatory notes

Effectiveness measures how well a solution functions, which includes accuracy (option C). Efficiency measures how much time, cost and effort is applied to achieve the desired results. Cost of file manipulation (option B), processing speed (option A) and hard drive space (option D) are all efficiency measures.

Question 20

Answer: B

Explanatory notes

Phishing uses emails and fraudulent websites to steal information. A worm (option A) is malware that replicates itself in order to spread to other computers. Cross-site scripting (option C) is when malicious scripts are inserted into trusted websites to compromise the user's interactions. A man-in-the-middle attack (option D) specifically relies on a malicious attacker inserting themselves into a communication between two parties and impersonating both parties to steal information.

SECTION A

SECTION B – Short-answer questions

Question 1

Sample response
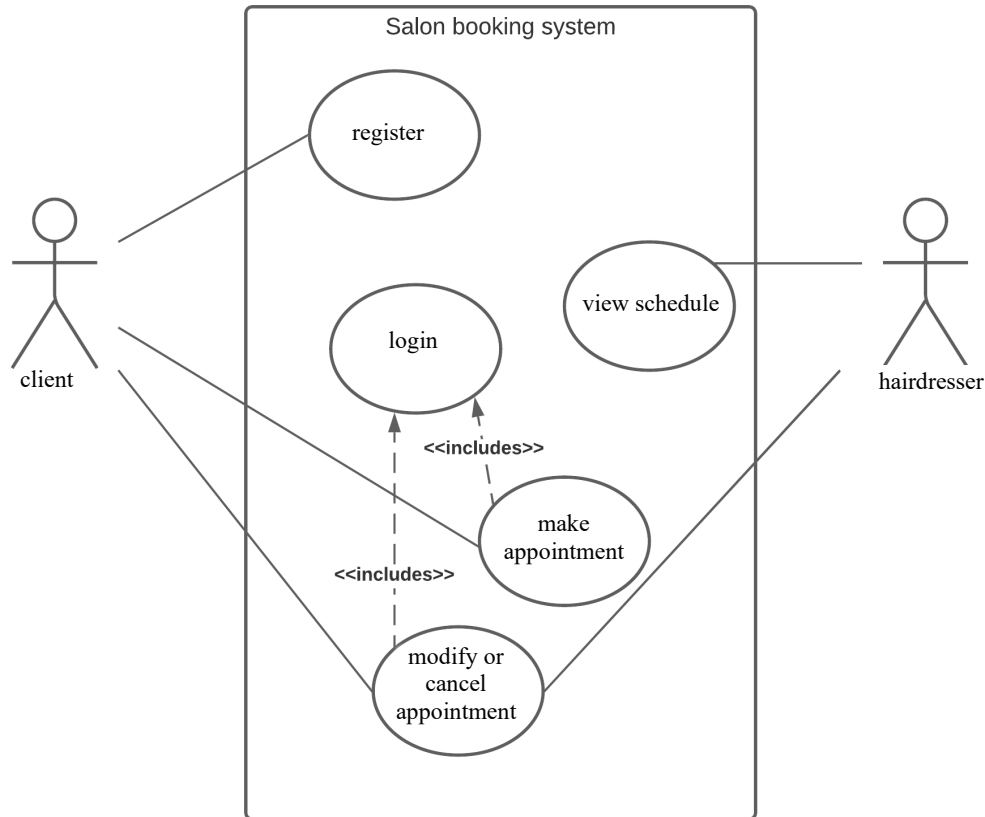
Mark allocation: 4 marks

- 1 mark for the association between the 'hairdresser' actor and the 'view schedule' use case

Note: If an arrowhead is drawn it must point toward the use case.

- 1 mark for both the association between 'client' and 'make appointment', and the <<includes>> arrow pointing from 'make appointment' to 'login'
- 1 mark for both the association between 'client' and 'modify or cancel appointment', and the <<includes>> arrow pointing from 'modify or cancel appointment' to 'login'
- 1 mark for the association between 'hairdresser' and 'modify or cancel appointment'

Tip

- *Many students look for associations that are not wrong, but don't really mean anything. For example, a client could log in and do nothing else, so an association could be drawn between 'client' and 'login', but this is a redundant situation and would not justify being awarded a mark. Make sure you are looking for the most meaningful associations from the question stem.*

Question 2a.

Sample response

Variable name	Data type	Description
desiredTemp	floating point number	the desired temperature of the water, set by the user from the values 80.0, 85.0, 90.0, 95.0, 99.9
currentTemp	floating point number	the current temperature of the water as measured by the internal temperature sensor, accurate to 0.1 degrees, e.g. 72.5
timer	integer	the internal timer of the kettle, counting in seconds
kettleInContact	boolean	indicates whether or not the kettle is in contact with the base unit

Mark allocation: 4 marks

- 1 mark for each answer (up to 4 marks)

Tip

- *It's important that you check how data types are named in the Study Design and use that specific terminology in your answers. For example, write 'floating point' or 'floating point number' rather than the shortened 'float'. Similarly, data types such as 'double', 'single' and 'decimal', while often used to refer to numeric data types, are not included in the Study Design and therefore should not be used as answers in the exam.*

SECTION B

Question 2b.

Sample response

```
Begin
    desiredTemp ← input value from console
    currentTemp ← input value from sensor
    timer ← 0
    While kettleInContact = true And timer < 600
        timer ← timer + 1
        currentTemp ← input value from sensor
        If currentTemp < desiredTemp Then
            Power(ON)
        Else
            Power(OFF)
        End If
    End While
    Power(OFF)
End
```

Mark allocation: 5 marks

- 1 mark for 'timer ← 0'

Note: The mark is only awarded if an assignment arrow is used. No mark will be awarded for 'timer = 0' with an equal sign, as in pseudocode, the equal sign represents a comparison, not an assignment.

- 1 mark for 'timer < 600'
- 3 marks for the 'If-Then-Else' statement:
  - ➢ 1 mark for 'If-Then-Else-End If' and a suitable condition, i.e. 'currentTemp < desiredTemp' or equivalent
  - ➢ 1 mark for correct results based on the condition, i.e. turning the power on when the temperature is too low and off when the temperature is equal to the desired temperature or too high
  - ➢ 1 mark for correct indentation of the branches

Tip

- *Many students use the code of their programming language in pseudocode questions, such as 'ElIf' from Python. This should be avoided as it is not in keeping with the purpose of pseudocode. Ensure that you are using generic pseudocode.*

SECTION B

Question 3

Sample response

Using the suggested word EMU:

Binary search will always check the middle of the list first (FOX) and eliminate every element on the 'wrong' side (FOX and every word above FOX). It will then go to the middle of the remaining list (CAR) and repeat the process (eliminating APE, BUN, CAR). CAT and DOG remain.

If the binary search algorithm is written to use the lower/floor value, both CAT and DOG must be eliminated separately, taking four iterations. If the binary search algorithm uses the higher/ceiling value, DOG and CAT are eliminated at the same step (as CAT < DOG and DOG < EMU), leaving an empty list in three iterations.

This means that Jacinta is correct.

Mark allocation: 2 marks

- 1 mark for tracing the binary search through FOX, CAR and DOG to find three iterations
- 1 mark for stating that Jacinta is correct

SECTION B

Question 4a.

Sample response

Scott's naming convention uses shorter names and will be more efficient to type. Scott's naming convention also uses descriptors at the start of the entity name, such as str for string and tbl for table, that describe the entity's data type or structure.

Mark allocation: 2 marks

- 1 mark for each reasonable advantage (up to 2 marks)

Question 4b.

Sample response

Stephen's naming convention uses longer names and will be more readable by humans.

Mark allocation: 1 mark

- 1 mark for explaining one advantage

Question 4c.

Sample response

As there will be a third programmer in the team, it is better to use the more human-readable and clear naming convention to avoid mistakes and miscommunication. Therefore, Stephen's convention would be better in this case.

OR

Scott's conventions are preferable for a new programmer, even with the shorter names, as they are consistent across every aspect of the software. This will make the naming convention faster to learn.

Mark allocation: 2 marks

- 1 mark for selecting a naming convention and explaining its advantage
- 1 mark for justifying the naming convention in relation to a new programmer

Note: Simply stating 'I would choose Stephen's' is not enough to warrant the mark.

SECTION B

SECTION C – Case study

Question 1

Sample response

to provide lesson video content that is what the student ordered

<div align="center">**OR**</div>

to provide the correct multiple-choice quiz that matches the lesson outline

<div align="center">**OR**</div>

to provide the correct homework task that matches the lesson outline

Mark allocation: 1 mark

- 1 mark for a correct goal

Note: Goals must be related to the information system aspect and lesson delivery. Organisational goals are not awarded any marks. Goals related to payment for lessons (e.g. using PayPal) will also be not be awarded marks as they are not specifically about lesson delivery.

Question 2a.

Sample response

Waterfall: It is sequentially structured and provides a clear plan of the entire project from start to finish. This would increase compatibility between the forums and the chat spaces with the rest of the LangLearnPlus program.

Agile: It is an iterative model and allows rapid cycles of development, allowing features to be fully programmed and tested independently. The forums and chat spaces could be completed in different cycles.

Mark allocation: 2 marks

- 1 mark for a correct advantage for each model in relation to the case study (up to 2 marks)

Note: Reference must be made to waterfall being a logical progression or sequence and agile being an iterative/cyclic model.

Question 2b.

Sample response

By using the waterfall model, LangLearnPlus would increase compatibility between the various components of the project. The forums and chat spaces would be designed, developed, tested and implemented at the same time.

OR

By using the agile model, LangLearnPlus would complete individual components within a shorter timeframe and respond to feedback more rapidly. The forums could be fully developed first and serve as a guide for the development of the chat spaces.

Mark allocation: 2 marks

- 1 mark for providing a reason for choosing a particular model that describes the advantage of the model for LangLearnPlus
- 1 mark for providing a reason that relates specifically to chat spaces and forums

    Note: Simply choosing a model would receive zero marks.

Question 3a.

Sample response

Task no.	Task	Duration	Dependencies	1	2	3	4	5	6	7	8	9
								Days				
1	Develop SRS	1		▮								
2	Design homework database	2	1		▮	▮						
3	Design screen formats	1	1		▮							
4	Write evaluation criteria	1	2, 3				▮					
5	Write homework module	2	4					▮	▮			
6	Test homework module	1	5							▮		
7	Implement homework module in desktop program	1	6								▮	
8	Implement homework module in app	1	6								▮	
9	Train teachers	1	7, 8									▮
10	Completed and working homework module	0	9									♦

The box for 'Implement homework module in desktop program' must be shaded in for week 8.

Note: As Task 7 is dependent on Task 6, and Task 9 is dependent on Task 7, there are no alternative spaces that could be shaded.

Mark allocation: 1 mark

- 1 mark for the correct box shaded in

Tips

- *Many students miss questions when there are no lines to fill in – they don't register that a question has been asked and miss relatively easy marks. You must look for every question prompt as indicated by question numbers, letters and dot points.*
- *Many Gantt charts feature dependency arrows to show the dependencies from task to task, but in recent exams the VCAA exam Section C Gantt charts did not have any arrows on them. If you are given a dependency list, you can (and should) draw in your own dependency arrows if you have time.*

SECTION C

Question 3b.

Sample response

Event	Effect on the critical path of the project
Design screen formats is delayed by one week.	This will have no impact on critical path (Task 4 depends on both Task 2 and 3).
Implement homework module in app is delayed by one week.	Task 9 will be delayed by one week, leading to the entire project being delayed by one week as Task 9 is on the critical path.

Mark allocation: 2 marks

- 1 mark for each correct response with a specific reference to the critical path that was specified in the prompt (up to 2 marks)

Note: While the 'no impact' answer does not need to be justified to obtain the mark, it is a good idea to add in the justification if possible (that Task 4 depends on both Tasks 2 and 3).

Tip
- *Many students refer to concepts such as 'slack' and 'float' in project management. These terms are not in the VCE Study Design. It is important that you refer to the effect on the critical path (which is in the Study Design and the stem of the question).*

Question 4a.

Sample response

Teachers' statement: functional requirement

Students' statement: constraint

Note: The teachers' statement is a functional requirement because it specifically states what the solution must do. The students' statement could be described as a constraint (specifically a technical constraint) or a technical requirement. Either answer would be accepted.

Mark allocation: 2 marks

- 1 mark for each correct section (up to 2 marks)

Question 4b.

Sample response

The scope describes the boundaries of the solution – what will be addressed by the solution and what won't. For the homework module, the scope documents what the homework module will do, the functions it performs and how it will operate with the rest of the LangLearnPlus program.

Mark allocation: 2 marks

- 1 mark for describing the purpose of the scope in generic terms
- 1 mark for linking the generic description back to the specific situation of the homework module

SECTION C

Question 5a.

Sample response

Name	Classification
Assess homework	process
Student records	data store

Mark allocation: 2 marks

- 1 mark for each (up to 2 marks)

Question 5b.

Sample response

A: Student

B: Marked quiz

Mark allocation: 2 marks

- 1 mark for each (up to 2 marks)

Note: The phrase 'Marked quiz' must match exactly as it was provided in the data flow diagram included in the case study.

Question 6

Sample response

Teachers: By using interviews, Virat can elaborate on questions asked about the chat spaces and forums, and obtain in-depth responses. As there are only four teachers and they are all in the same location, it should not be too difficult to gain this information.

Students: By using surveys, Virat can gain an overall picture of what the body of students want from the chat spaces and forums in the most efficient manner. The large number of students makes other data-gathering techniques non-viable and individual student opinions are less important than the general feel of the student body.

Mark allocation: 4 marks

- 1 mark for stating each technique (up to 2 marks)
- 1 mark for providing an appropriate justification in the context of the case study (i.e. the chat spaces and forums are mentioned) (up to 2 marks)

Note: As the forums and chat spaces have not been created yet, observation and reports are not the most suitable answers and will not be awarded marks.

Question 7a.

Sample response

Modified design 1: This design has larger buttons with icons. Students will find it easier to press the correct button on the smaller phone screen with a larger click area and an icon that identifies the purpose of the button. This increases the usability of the app.

Modified design 2: This design has more options on the screen. This will allow students to access sections of the program such as homework and forums with only one click, thus making modified design 2 more efficient.

Mark allocation: 2 marks

- 1 mark for each appropriate advantage with reference to the students (up to 2 marks)

Question 7b.

Sample response

Modified design selected: 1

Justification: By having large icons, Design A's screen is easier for students who have weaker hand-eye coordination or English skills to navigate. Design B's text-only buttons are smaller and harder to select.

OR

Modified design selected: 2

Justification: This design has more options on the screen, meaning students can access parts of the app such as 'Homework' quicker. Design A only offers four options and will have to contain submenus, which will require more clicking and slow students down.

Mark allocation: 2 marks

- 1 mark for providing a valid reason for selecting the chosen design
- 1 mark for explaining that the other design does not satisfy the reason provided for selecting the chosen design

SECTION C

Question 8a.

Sample response

CSV is more appropriate because it requires less bytes of data storage than XML. For CSV, the data is separated only by commas, whereas XML must use text tags to separate the data into fields and includes the prolog data.

Mark allocation: 3 marks

- 1 mark for choosing CSV
- 1 mark for providing a reason why CSV is more appropriate that relates to data storage (such as taking less space)
- 1 mark for providing a matching counterpoint about XML (such as the tags take more space)

Question 8b.

Sample response

XML is more appropriate because the tags store information about the structure of the file, which makes sharing the data between different programs more consistent. CSV only stores the data itself and is more easily misinterpreted, especially if the data is shared between programs.

Mark allocation: 3 marks

- 1 mark for choosing XML
- 1 mark for providing a reason that XML is more appropriate that relates to interoperability (such as tags providing a defined structure)
- 1 mark for providing a matching counterpoint about CSV (such as lack of structure)

Tip

- *Make sure that for any question that asks you to 'select the preferred of A and B, and justify your response', you refer to both your preferred option and the other option. For both parts of this question, make sure you mention both CSV and XML in your responses, and state something similar to 'one has this desirable feature, the other has this other less desirable feature'.*

SECTION C

Question 9a.

Sample response

Test	Expected result	Actual result
avgMCScore = 69.9 hwTasksCompleted = 7	overallGrade ← "NC"	overallGrade ← "NC" should fail and does
avgMCScore = 69.9 hwTasksCompleted = 8 below on MC, equal on homework	overallGrade ← "C"	overallGrade ← "NC" should pass but doesn't
avgMCScore = 70.0 hwTasksCompleted = 7 equal on MC, below on homework	overallGrade ← "C"	overallGrade ← "NC" should pass but doesn't
avgMCScore = 70.0 hwTasksCompleted = 8 equal on MC, equal on homework	overallGrade ← "C"	overallGrade ← "NC" should pass but doesn't
avgMCScore = 70.1 hwTasksCompleted = 8 above on MC, equal on homework	overallGrade ← "C"	overallGrade ← "C" only one that passes

Mark allocation: 4 marks

- 1 mark for a test that is lower than the multiple-choice requirement and equal to the homework requirement
- 1 mark for a test that is equal to the multiple-choice requirement and lower than the homework requirement
- 1 mark for a test that is equal to the multiple-choice requirement and equal to the homework requirement
- 1 mark for a test that is higher than the multiple-choice requirement and equal to the homework requirement

Question 9b.

Sample response

If avgMCScore <= 70.0 **Or** hwTasksCompleted < 8 **Then**

Mark allocation: 1 mark

- 1 mark for writing the line exactly

Note: No marks should be awarded for providing the line number (e.g. 'line 4') or if the line of pseudocode does not match exactly (e.g. leaving off the 'Then'). As there is only one line that has been identified in the question stem, students who change the pseudocode (e.g. changing the 'If' statement to determine a 'C' instead of a 'NC') will not be awarded marks even if they produce a correct result.

Question 9c.

Sample response

If avgMCScore < 70.0 **And** hwTasksCompleted < 8 **Then**

Mark allocation: 2 marks

- 1 mark for changing '<=' to '<'
- 1 mark for changing 'Or' to 'And'

Note: This line must be the same line identified in **part b.** Changing other parts of the pseudocode will not be awarded marks even if they produce a correct result.

Question 10a.

Sample response

three swaps

Mark allocation: 1 mark

- 1 mark for three swaps (the digit '3' is acceptable, as is the word 'three')

Note: It does not matter if the selection sort swaps the largest element to the 'big' end or the smallest to the 'little' end, as both ways produce three swaps.

Question 10b.

Sample response

The data is not sorted by 'avgMCscore' so unless the data is sorted beforehand, a binary search is not guaranteed to find all records. Sorting the data will take extra processing time, and this may result in a slower search than a linear search. A linear search is guaranteed to check all records whether the data is sorted or not and the processing time is negligible considering the small amount of data.

Mark allocation: 2 marks

- 1 mark for stating that a linear search does not rely on sorted data
- 1 mark for stating that a binary search relies on the data being sorted by the field/variable being searched

Tip

- *As with questions that involve 'compare A and B' (such as **Question 8**), ensure you refer to both your preferred option and the other option. In this case, make sure you include a comparison between the two, such as 'a binary search does this' (and state the problems), 'while a linear search does this' (and state how it avoids the problem).*

Question 11

Sample response

Ease of use: Stephanie is the least comfortable of the four with technology, so she can test that the module is easy to use and functions according to what is expected. Stephanie can find elements that are not intuitive or that rely on prior knowledge.

Accessibility: Doug's poor eyesight can be used to test that the screen design is clear enough to be visible to students who may also have vision problems.

Flexibility: Yuki can test that the module will work quickly and match her pace of data entry, while a less comfortable staff member like Stephanie or Doug will test that the module can receive slower instructions without timing out or creating other problems.

Mark allocation: 3 marks

- 1 mark for each answer that references the teachers' specific attributes (up to 3 marks)

Note: Discussions of the following topics would not be considered good answers: age (the vast majority of users would be school-age teens, and none of the teachers fit that demographic); language difficulties (teachers in VCE school systems would be considered to have advanced language skills, even if English is not their first language).

Question 12a.

Sample response

The relevant legislation is the *Copyright Act 1968*.

Mark allocation: 1 mark

- 1 mark for identifying *The Copyright Act 1968*

Note: This should be written exactly with the correct name followed by the correct year. '1968 Copyright Act', for example, should not be awarded the mark.

Question 12b.

Sample response

Christos was employed by the school when he wrote this curriculum, so the owner of the curriculum would be the school, not Christos, if he wrote the curriculum during the school day. If this is the case, by using the curriculum without the original school's knowledge or consent, LangLearnPlus would be breaching the school's copyright.

Christos is also offering LangLearnPlus the entire curriculum. This would not be considered use for a reasonable purpose, such as review or research, and LangLearnPlus would therefore not be able to claim fair use.

Mark allocation: 3 marks

- 1 mark for discussing the issue of ownership of the curriculum
- 1 mark for discussing the lack of consent from the original school
- 1 mark for identifying an appropriate feature of the *Copyright Act 1968*, such as fair use or the financial impact on the original author

SECTION C

Question 12c.

Sample response

Christos' USB could contain malware. If the USB is plugged in and any malicious software is allowed to run, it could open back doors in the network, destroy documents or reroute users to phishing sites.

Mark allocation: 2 marks

- 1 mark for recognising the USB flash drive and its possible payloads as a security risk
- 1 mark for explaining possible circumstances that could occur if the USB flash drive was plugged in

Question 13a.

Sample response

An SQL injection works by manipulating inputs into form fields using batch SQL statements, or SQL statements that always succeed. One example is 'or 1 = 1', which will ignore the password check and log the outsider into the application, most likely as an administrator.

Note: Another example is to run an SQL injection to insert a new user into the user table with its own ID and password so they effectively create a back door into the system.

Mark allocation: 2 marks

- 1 mark for explaining how an SQL injection can occur

Note: Providing an exact example of SQL (such as 'or 1 = 1' or 'or True') is not necessary. However, this will demonstrate an understanding of SQL commands that always succeed, so is recommended.

- 1 mark for recognising that this will bypass the intended login process and log in the malicious outsider

Question 13b.

Sample response

If an outsider can log in as an administrator, they can delete, alter or steal information from the system. This could lead to them changing student grades, stealing personal information such as email addresses, or deleting student accounts completely.

An attack like this could tarnish LangLearnPlus's reputation, which could result in it losing customers.

Mark allocation: 2 marks

- 1 mark for each potential risk (up to 2 marks)

Note: The risks must be substantially different to be awarded a second mark; a student who writes 'they could lose their lesson data' and 'they could lose their credit card info' would only be awarded one mark as the basic principle (loss of data) is the same in each case.

SECTION C

Question 13c.

Sample response

User inputs for the username and password should be validated so that SQL commands cannot be entered. Using a program to read the input username and password and check for SQL commands will stop dangerous SQL inputs from allowing outsiders to bypass the username or password check.

Mark allocation: 3 marks

- 1 mark for suggesting the validation of the username and password
- 1 mark for explaining how validation would work (checking for SQL commands)
- 1 mark for the end result (stopping the outsider from bypassing login)

Note: Making suggestions that do not refer specifically to SQL injections, such as hashing the passwords, should not be awarded marks.

Question 14

Sample response

Risk 1: loss of files and data

Risk management strategy 1: Backing up of files and data. Rather than backing up the program on her laptop, Jodie should use an online cloud storage provider. This would ensure that the backup is not lost if her laptop is stolen or damaged, and would still allow her access to work on the program offsite.

Risk 2: hacker accessing files and data

Risk management strategy 2: Securing files and data. While LangLearnPlus has alarms and lockable gates, a thief who manages to bypass these measures has access to all of the LangLearnPlus files and data. By encrypting the data stored, any stolen data would be unreadable and therefore useless to anyone who could not decrypt the data. Using file permissions to restrict access to particular users can also stop unauthorised access.

Mark allocation: 4 marks

- 1 mark for naming and recommending each strategy (up to 2 marks)
- 1 mark for explaining how each recommended strategy minimises the risk (up to 2 marks)

Note: The strategies must be related to both the specified risk and the case study – generic answers should not be awarded marks. Similarly, identifying features from the case study that already work well (such as the fire suppression system) should not be awarded marks.

END OF SAMPLE RESPONSES