



Solution Pathway

NOTE: This task is sold on condition that it is NOT placed on any school network or social media site (such as Facebook, Wikispaces etc.) at any time.

NOT FOR PRIVATE TUTOR USE.

Below are sample answers. Please consider the merit of alternative responses.

SECTION A – Multiple-choice questions

Question	Answer	Comments
1.	A	Surveys would involve completing some type of questionnaire and does not imply speaking directly to the respondents (although that could be the case). As she is “speaking” to them, interview is the preferred answer.
2.	A	This is a goal as it is a general statement, whereas an objective would be more specific and measurable. While it may assist in meeting a broader organisational goal of improved security, it relates specifically to the system (in this case the network).
3.	D	SRS is an analysis tool. Its contents form the basis for design work, but do not contain designs.
4.	D	All are included. First two lines are sequence, as are the last two lines of the while-loop; the While loop is an iteration; the if-elseif-else-endif is a selection.
5.	B	IS NOT NULL detects if there has been any input
6.	B	The appearance of the solution is non-functional. All the other options are functional.
7.	A	That is the purpose of a data dictionary.
8.	B	Slack time used in a project does not affect the final timeline.
9.	B	Ordinal arrays typically begin at 0, unless otherwise stated.
10.	A	This is the only technical constraint. Cost is an economic constraint, team colours is a non-functional requirement, Working with children check would be outside the scope of the solution.
11.	C	P2P allows all devices to be clients and servers.

12.	<i>B</i>	Binary search is the best option for large, sorted data. Linear would be too slow.
13.	<i>C</i>	This is the only tool shown that focuses on how the solution would look.
14.	<i>B</i>	Recursive functions call themselves. The study design uses the Quick Sort algorithm, so students should be familiar with this structure.
15.	<i>A</i>	A feature of XML is the self-describing nature, via the use of tags and data type definitions. The element tags make the data easily readable by humans. However, this adds extra text to the data, causing increased file sizes.
16.	<i>C</i>	Virtual Private Networks encrypt data at each of the tunnels through a public network. While 802.11ac does allow for encrypted connections, this only operates in the limited area of a WiFi network.
17.	<i>B</i>	Unlike beta testing, UAC sets out the tasks for the user to complete.
18.	<i>C</i>	Selection sort shifts the smallest elements to the smallest place in the array. Each pass would move one element, if required.
19.	<i>B</i>	Boundary testing suggests under, on, over each boundary, with one test between successive boundaries.
20.	<i>D</i>	Solution requirements, such as calculation accuracy would need to be evaluated. This may involve program adjustments – but the evaluation needs to take place first.

SECTION B – Short-answer questions

Question 1 (2 marks)

- a. *Dependents*
- b. *Milestones*

Question 2 (2 marks)

In a Use Case Diagram the oval shape represents the actual use case – i.e. how the user interacts with the system. Whereas, in a Data Flow Diagram, the circle represents a process – i.e. how the data will be transformed by the system.

Question 3 (1 mark)

The name should be meaningful and meet basic programming naming rules. There are many possible answers, but there should only be letters, numbers, underscores or dashes and the name should begin with a letter. (While a function can begin with an underscore in most languages, these are typically reserved for private methods of classes.) An example might be `calc_maintenance_cost()` or `calcMonthlyCost()`.

Question 4 (3 marks)

In order to be awarded 3 marks, students should describe an advantage **and** a disadvantage of each type of sort, **and** give their recommendation.

A sample high-level answer:

Selection sort is easier to code, but takes a long time to run with a large data set. A quick sort is more complex to implement, but takes much less time to run with a large data set. Because there is a large number of songs to sort, I recommend the quick sort.

Question 5 (2 marks)

```
If in_stock[key] < value * serves Then  
    required[key] ← value*serves - in_stock[key]
```

Question 6 (6 marks)

Software controls include username/passwords, access logs, audit trails and TLS/SSL among others.

The explanation of a test should be feasible and accurate. For example, reviewing access logs to determine which members of staff accessed the compromised data within the suspected time frame. Comparing that list with other information gathered to find relationships.

Physical controls include locks, doors, swipe cards, biometrics as well as back-up procedures, shredding documents, among others.

Again, the test should be feasible and accurate. For example, reviewing the procedures in place for disposing of material no longer required – both electronic and physical. This would include asking staff if they actually follow the procedures and determining if a new strategy such as secure recycling disposal is required.

Answers don't need to focus on catching the culprit, just reviewing their current security practices.

Question 7 (4 marks)

A – *Customer name*

B – *Display details*

C – *Customer File*

D – *Attendance flag*

There may be some variation in the names provided, as long as they convey the correct meaning.

SECTION C – Case Study**Question 1** (8 marks)

Task	Duration (days)	Person(s) Responsible	Days						
			5	10	15	20	25	30	35
Data Collection	3	Simon	■	↓					
Solution Requirements	2	Simon	■	↓					
End Analysis	0		◆	↓					
Review SRS	2	Jono		■	↓				
Design software	8	Simon/Jono		■	■	■	↓		
End Design	0				◆	↓			
Write software	14	Jono				■	■	■	■
Create artwork	5	Sarah		■	■	■	■	■	↓
Integrate artwork into software	1	Jono						■	↓
Configure web host and install app	3	Jono							■
Test and update program	2	Jono/Simon							■
End Development	0								◆

- a. 1 mark for all durations correctly listed.
- b. 1 mark for all resources correctly listed. The case study states Simon will be involved in designing the software and will participate in the testing.
- c. 6 marks
 - i. 1 mark for the 3 milestones correctly represented with a diamond.
 - ii. 1 mark for the 3 milestones in the correct place.
 - iii. 1 mark for the dependency arrows correct.
 - iv. 1 mark for slack element correctly placed (can be anywhere from Day 10 to Day 29, as long as it starts after “End Analysis” and finishes before “Integrate artwork”).
 - v. 1 mark for all durations correctly drawn.
 - vi. 1 mark for finishing the project at 35 days.

Question 2 (1 mark)

Scope of solution.

Accept scope or determining the scope.

Question 3 (3 marks)

A – *Administrator/owner*

B – *Log In*

C – *Create account*

Do not accept Simon as the Administrator. It should be a role, not a person.

Question 4 (3 marks)

Students should suggest a method that indicates Simon's ready access to potential clients. Interviews and focus groups are the most obvious choices. Justifications include access to the clients and being able to ask follow-up questions. Students may also include why another option would not be as good.

1 mark for suitable technique and 2 marks for justification.

Question 5 (4 marks)

- a. Criteria could focus on effectiveness, such as:
- Does the design allow the user to use the software easily?*
 - Is the purpose of the elements clear?*
- Or they could focus on efficiency, such as:
- Can the user log in quickly?*
 - Will the design allow the solution to be completed on time?*

1 mark for each appropriate criteria.

- b. Students could recommend either choice provided they use the criteria they stated in part a. and their argument is coherent. A student selecting the first option might focus on the clarity of the elements and the familiarity of the labels. A student selecting the second option might focus on the visual appeal, the simplicity of the layout, the ease of pressing large buttons that are "thumb" shaped on a phone or the consistency of the icons.

Marks allocated for appropriate reason and referring to the criteria.

Question 6 (9 marks)**begin**

{order_calculation}

input number_of_modules, number_of_weeks, mates_rates

{cost_per_week}

*If number_of_weeks > 8 then**cost_per_week ← 400**else**cost_per_week ← 440**endif*

{number_of_connectors}

Number_of_connectors ← number_of_modules - 1

{scaffold_cost}

scaffold_cost ← ((number_of_modules * cost_per_week) +
(number_connectors * 40)) * number_of_weeks

{delivery_cost}

delivery_cost ← 200

*if mates_rates = true then**delivery_cost ← 100**endif***output** scaffold_cost, delivery_cost**end**

1 mark for indenting correct throughout the algorithm.

1 mark for the correct use of first selection statement, including if, then, else, endif.

1 mark for correct allocation of cost_per_week based on number of weeks.

1 mark for the correct calculation of the number_of_connectors.

2 marks for the correct allocation of scaffold cost.

2 marks for the delivery_cost (1 mark for each option)

1 mark for the correct use of second selection, including if, then, endif.

There are other equivalent ways of expressing the same processing. Teachers should use their discretion in allocating marks for the student's attempt.

Question 7 (6 marks)

a. 2 marks

Item testing	Inputs	Expected result
discount of cost_per_week depending on number_of_weeks	number_of_weeks = 8 number_of_modules = 3 mates_rates = true	scaffold_cost = $(3*440 + 2*40)*8$ = $1400*8$ = 12000 delivery_cost = 100
	number_of_weeks = 9 number_of_modules = 3 mates_rates = true	scaffold_cost = $(3*400 + 2*40)*9$ = $1280*9$ = 11520 delivery_cost = 100

b. 4 marks

The clear other variable to test is mates_rates. Students are not required to calculate the final answer, merely explain why they have chosen that item. Although, no doubt, some will. It is important that only that variable is different between their two data input sets.

1 mark – selecting delivery cost as the test.

1 mark – selecting appropriate data, and only changing mates_rates between the two.

2 marks for explaining how their data tests that element.

For example:

Item testing	Inputs	Explanation
<i>delivery_cost from mates_rates flag</i>	number_of_weeks = 7 number_of_modules = 3 mates_rates = true	<i>The mates_rates flag should be tested to ensure that when true, the delivery cost is set to 100 and when false the delivery cost is set to 200. By keeping the other inputs the same, the only difference should be with the delivery charge.</i>
	number_of_weeks = 7 number_of_modules = 3 mates_rates = false	

Question 8 (6 marks)

a. The purpose is to ensure the input and output systems are using the same standards for better compatibility.

The prolog tells the receiving system the version of XML and the character encoding that has been used to create the file. This ensures that the receiving system will use the same standards for better compatibility.

1 mark for the correct purpose and one mark for why it is important.

- b. Attributes are within an xml element tag. Examples are type="billTo", type="mobile" and type="business" for the address and phone_number elements.

c.

Element	Data type
street	<i>string or (text)</i>
mates_rates_member	<i>Boolean</i>
postcode	<i>string (or text)</i>

Question 9 (3 marks)

Control: HTTPS.

S stands for secure and refers to using an asymmetric encryption key to encrypt data transferred between the server and the browser. When sent from the client to the server. The user is alerted to the security of the page by the padlock icon used by the browser. Once data is received by the server, it uses a private key to decrypt the data. This means that anyone intercepting the data stream would not be able to read the contents.

Students could also refer to TLS or SSL which are the protocols used to actually complete the encryption and decryption. They could also refer to firewall software, but would need to be explicit that they are not talking about a physical firewall (i.e. hardware). The question refers to communication with the web server, therefore responses focussing on username/password or UAC would not be accepted.

1 mark for identifying a suitable control.

2 marks for explaining how it works. There should be at least 2 clear, correct points made.

Question 10 (3 marks)

Students should refer to the Spam Act 2003. In order to meet his legal obligations he should ensure users give consent during the sign up process, ensure that any messages sent clearly identify the SSS software and allow them to opt out of the program. Perhaps a warning message could be included in the software asking if they meant to click the ad.

They could also refer to the Privacy Act 1988 and APPs. If Simon opts in to comply with the Act, in order to meet his legal obligations he should tell customers that their information will be shared with financial partners if they click on the ad. Students MUST include that he needs to opt for their response to be correct.

1 mark for identifying the legislation.

2 marks for 2 points for meeting his obligations – these focus on transparency.

Question 11 (3 marks)

2 marks for describing an offsite or online strategy – multiple steps.

1 mark for explaining that he will be able to restore the data if required.

A sample high-level answer:

Simon should use a cloud-based incremental backup strategy. Once a week the whole data set is backed up and every night only the changes for that day are backed up. This will keep his data safe as he will be able to restore it should his computer crash or he accidentally deletes or changes his data.

There is no need for students to name the strategy, just describe it. However, if they do name it, their description must be accurate.

Question 12 (7 marks)a. *Evaluation*

b.

Criteria	Functional or Non-functional	Efficiency or Effectiveness
1. Are customers able to create a new order within 3 minutes?	<i>non-functional</i>	<i>efficiency</i>
2. Is it easy to click elements on the screen without accidentally clicking the wrong one?	<i>non-functional</i>	<i>effectiveness</i>
3. Are orders calculated accurately?	<i>functional</i>	<i>effectiveness</i>
4. Is data entered by users secure from unwanted interference?	<i>non-functional</i>	<i>effectiveness</i>

Allocate 1 mark for each correct row in the table. Do not award half marks.

c. There are many appropriate answers to this question.

As this is evaluation, answers should not focus on directly collecting new data from the system as this may be testing. For example “*Check calculation of orders with a calculator*” or “*Time customers making orders with a stop watch*”.

Instead, students should focus on data such as system logs, error reports or customer complaints

In order to be awarded 2 marks, students must provide multiple steps in the strategy.

To evaluate if orders are calculated accurately, review customer complaints to see if anyone has said their order was calculated incorrectly. If not, it is likely this is correct, if yes, identify the source of the complaint and attempt to recreate it.

Question 13 (4 marks)

- a. There are many reasons plans can change. In order to be awarded marks, students must refer to this specific case. Reasons should be feasible.

Perhaps Jono was injured and therefore unable to work on the software for a period of time, causing the timeline to change.

Perhaps they were able to complete the system design in only a week, meaning they could begin other tasks earlier.

1 mark each for two valid reasons.

- b. *Updating/Annotating Gantt chart. By comparing the before and after charts Simon could see which tasks of the project he estimated incorrectly and why these changed. He would be able to estimate them better next time.*

OR

Keeping a work log or a log of changes. By reviewing the log, Simon could see which tasks took the most amount of time or required changing. He would be better placed to anticipate these problems next time.

1 mark for the method.

1 mark for the explanation which must be specific for Simon.