GCSE
COMPUTER SCIENCE

Paper 1 Additional Questions

These questions focus primarily on topics that were not covered by specimen assessment materials which accompany the new GCSE Computer Science specification (8520). It is hoped that teachers will find these additional questions to be a particularly useful resource to enable them to understand the nature of questions for topics not already covered by the specimen assessment materials.

This document contains additional questions; it is not intended to be treated as a complete paper. The questions do not provide balance coverage of the specification or the assessment objectives in the same way that a fully live paper would do.

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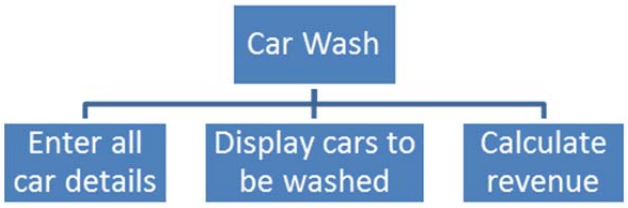
Answer **all** questions in the spaces provided.

0 1 . 1 What is an algorithm?

[2 marks]

2

0 2 A developer has decomposed a problem to calculate the income from a school car wash into three sub-problems.



0 2 . 1 The developer is taking the structured approach to developing the solution to this problem. He wants to implement each sub-problem as a subroutine. Each subroutine will have its own interface. State **three** properties of a subroutine interface.

[3 marks]

0 2 . 2 State **two** benefits of developing solutions using the structured approach.

[2 marks]

5

0 3 A developer is using the structured approach to developing a solution and wants to write a subroutine to solve one of the sub-problems. This subroutine should have the following interface:

- The subroutine is called `find_minimum`
- The subroutine takes an array (of integers) as a parameter
- The subroutine returns the smallest value in the parameter array.

Using pseudo-code or a flowchart, write a subroutine that solves this sub-problem. The subroutine must have the correct interface.

[7 marks]

7

0 4 A developer is developing a program for a client. The developer is given the following instructions.

"Many of my friends ask me to walk their dogs for them. All of these friends pay me to do this and the amount I get paid depends on how long I walk their dogs for. If they have more than one dog then I don't charge the owner any extra. I like to walk the dogs in the afternoon when the weather is normally best because I often get colds. I need you to help me keep track of how much money I'm owed – fortunately for me all of my friends have different first names so it's really easy to tell them apart. I charge £10 for every 30 minutes of the walk (and I always round this up so 47 minutes would be two half-hour charges or £20)."

0 4 . 1 The developer needs to remove all of the unnecessary detail from the client's request. Shade the correct lozenge that states this process.

[1 mark]

Abstraction	⬭
Conversion	⬭
Decomposition	⬭
Validation	⬭

0 4 . 2 The developer has decided that the following two points are the only important details from the client's request:

- The charge is based on time and not how many dogs are walked.
- The charge is £10 every 30 minutes.

State **two** other relevant details that thedeveloper has missed.

[2 marks]

_____

_____

_____

_____

_____

3

0 5 An algorithm is shown below:

```
SUBROUTINE subr(xs, ys)
   result ← 0
   FOR i ← 1 TO LEN(xs)
      result ← result + 1
   ENDFOR
   FOR i ← 1 TO LEN(ys)
      result ← result + 1
   ENDFOR
   RETURN result
ENDSUBROUTINE
```

0 5 . 1 Describe this algorithm in terms of its inputs and output.

[3 marks]

0 5 . 2 What is the purpose of this algorithm?

[2 marks]

0 5 . 3 `result` is a local variable within this algorithm. What is a local variable in a subroutine?

[1 mark]

Turn over for the next question

0 5 . 4 Another developer looks at this algorithm and states that they could implement the whole algorithm in one line between the `SUBROUTINE` and `ENDSUBROUTINE` lines, without using any loops.

```
SUBROUTINE subr(xs, ys)
   LEN(xs)+ LEN(ys)
ENDSUBROUTINE
```

State the mistake that the developer has made.

[1 mark]

0 5 . 5 Explain why the algorithm for answer **5.4** is more efficient than the original algorithm.

[2 marks]

9

0 6 A programmer wants to implement a search algorithm to be used with small arrays. **Figure 1** shows an example array.

Figure 1

```
[4, 6, 8, 12, 15, 16, 21]
```

0 6 . 1 Using **Figure 1**, explain how linear search would search for the integer `15`.

[4 marks]

0 6 . 2 What property of the example array in **Figure 1** means the programmer could use a binary search algorithm?

[1 mark]

0 6 . 3 The programmer knows that a binary search algorithm is more efficient than a linear search algorithm. Explain why the efficiency of these two algorithms is not an important factor when choosing what algorithm to implement for the array in Figure 1.

[2 marks]

7

0 7 . 1 Fill in the blank arrays to show the steps involved in applying the bubble sort algorithm to this array `[3, 5, 1, 4, 2]`. You need only show the missing steps where a change is applied to the array:

3	5	1	4	2
1	2	3	4	5

5

[5 marks]

Turn over for the next question

0 8 . 1 What does this Boolean expression evaluate to?

```
(A AND B) NOT OR C
```

[1 mark]

Evaluates to	**Shade the correct lozenge**
True	⬭
False	⬭
Nothing, it contains an error	⬭

0 8 . 2 What does this arithmetic expression evaluate to?

```
12 MOD 5
```

[1 mark]

Evaluates to	**Shade the correct lozenge**
1	⬭
2	⬭
5	⬭
Nothing, it contains an error	⬭

0 8 . 3 What does this expression evaluate to?

```
(5 DIV 2) > (5 MOD 2)
```

[1 mark]

Evaluates to	**Shade the correct lozenge**
1	⬭
2	⬭
True	⬭
False	⬭
Nothing, it contains an error	⬭

3

END OF QUESTIONS