GCSE to A-Level

Baseline Assessment

1 hour

50 Marks

Part 1

Computer Systems

1. Zoe wants to use her computer for gaming, but is finding that some games run very slowly. Her friend suggests that she might want to upgrade her hard drive to a solid state drive.

    a.   Give two reasons why a solid state drive is a suitable choice for a gaming PC.

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……[2]

    b.   Explain two other ways Zoe can upgrade the hardware of the system to improve the performance of her computer.

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……… [6]

Zoe also wants to play multiplayer games via the Internet, however she finds that her connection is very slow in her room.

    c.   Explain two ways that Zoe might be able to increase the speed of her connection so that her online gaming experience is better

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……… [6]

2.

"Access to online resources is a vital part of life, especially education, therefore Internet access should be free for all UK citizens."

Discuss how far you agree with this statement, including the points of view of different stakeholders, and any technological issues.

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……… [9]

3.

Complete the truth table for the following expression:

A OR (B AND C) [4]

A	B	C	B OR C	A AND (B OR C)

Draw a circuit to represent the expression [2]

4.

Calculate the following:

a. 17 MOD 4

…………………………………………………..[1]

b. 17 DIV 4

…………………………………………………..[1]

c. 0011 0101 + 0100 1101

……..[2]

5. Convert the number 240 into hexadecimal

……..[2]

Part 2

Algorithmic thinking

6. You have three bowls with the following capacities:

- 8 litres
- 5 litres
- 3 litres

The 8 litre bowl is full of water. These are all the resources you have and the bowls are not marked in any way.

How can you divide the water into two lots of exactly four litres? (i.e. 4 litres in one bowl and 4 litres in another)

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…… [3]

7. You are given the following list of prices, stored in an array called Prices.

3.24	4.80	5.60	7.99	2.99	8.50	4.99	5.10

a. Write an algorithm to calculate the average price of all the items over £5

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…… [6]

b. Explain two tests that you would need to carry out to ensure that the algorithm was working correctly.

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…… [4]

8. A function is defined as follows:

```
function sequence(n)
   while n != 1:
      output n
      if n MOD 2 == 0 then
         n = n DIV 2
      else
         n = 3*n + 1
      end if
   end while
   output n
```

Write down the output from calling sequence(3)

………

…… [2]

Answers

1.

a. 1 mark per reason given, e.g.

- Very high capacity for storing large game files
- Fast access speeds to reduce game loading times

b.

Up to three marks per reason, 1 for upgrade and up to two for explanation of performance increase, e.g.

- Increase clock speed
  - To allow more instructions to be executed every second
  - So that games will be able to run faster
- Increase the number of processing cores
  - To allow more instructions to be executed at the same time
  - Which may improve the performance of games with complex graphics
- Increase the amount of RAM
  - To reduce the need to use virtual memory on the hard drive
  - Which is slower to access than the RAM
- Add a dedicated GPU
  - Which is optimised for processing graphics
  - Improving run-time and reducing the load on the main processor

Ignore reference to storage, as this is covered in part a.

c.

Up to three marks per reason, 1 for upgrade and up to two for explanation of performance increase, e.g.

- Use an Ethernet/cabled connection to the router
  - To increase transfer speeds
- Add a signal repeater
  - To increase the signal strength in her room
- Upgrade the home Internet connection to fibre optic
  - Which has faster transfer speeds than copper cables
- Buy a second internet connection
  - To reduce sharing of the bandwidth
- Change to a different wireless frequency
  - To reduce interference from other devices

2.

Use banded mark scheme (repeated on last page of mark scheme)

- Top band must consider both points for and against the statement
- Top band must include both technological and social issues
- Top band must have a reasoned conclusion, based on the arguments presented by the student

Issues to be considered might include

- Considerations of who will carry the costs of free internet
- Discussion of where revenue will come from, e.g. advertising, and the knock-on effect on consumers
- Benefits of free internet, such as access to educational resources
- Costs of devices
- Discussion of whether it will solve problem – will people with more money still pay for better/faster access?
- Discussion of whether Internet access is a right or a luxury
- Free access already available in some libraries/schools

3.

A	B	C	B OR C	A AND (B OR C)
1	1	1	1	1
1	1	0	1	1
1	0	1	1	1
1	0	0	0	0
0	1	1	1	0
0	1	0	1	0
0	0	1	1	0
0	0	0	0	0

4.

a. 3

b. 4

c. 1000 0010 1 mark per nibble

5. 1 mark per nibble

F0

6.

Action	8L	5L	3L
Start	8	0	0
Pour 8 → 5	3	5	0
Pour 5 → 3	3	2	3
Pour 3 → 8	6	2	0
Pour 5 → 3	6	0	2
Pour 8 → 5	1	5	2
Pour 5 → 3	1	4	3
Pour 3 → 8	4	4	0

4 marks as follows:

- 1 mark for making 2L
- 1 mark for fully working solution
- 1 mark for optimal solution, i.e. no wasted steps/backtracking/repeated states
- 1 mark for clarity of solution – is it well presented and easy to follow?

7.

a.

total = 0

count = 0

for each item in prices do

  if item > 5 then

    total = total + item

    count = count + 1

average = total / count

output average

- 1 mark for correctly initialising variables
- 1 mark for correct loop to go through the whole list
- 1 mark for correct if statement
- 1 mark for correct addition of item and counter
- 1 mark for correct average
- 1 mark for final output

b.

- Test with a list of known prices with a known answer (normal data) to check the the output from the calculation is correct
- Test with prices 4.99, 5.00 and 5.01 (boundary data) to check that the if statement works correctly

Ignore references to validating inputs, as the list of prices is already provided.

You can award a mark for testing that the algorithm skips/rejects invalid prices in the array, as long as there is no reference to user input.

8.

3, 10, 5, 16, 8, 4, 2, 1

1 mark for 3, 10, 5

1 mark for 16, 8, 4, 2, 1

High (thorough) 7 – 9 marks	Precision in the use of question terminology. Knowledge shown is consistent and well-developed. Clear appreciation of the question from a range of different perspectives making extensive use of acquired knowledge and understanding.	Knowledge and understanding shown is consistently applied to context enabling a logical and sustained argument to develop. Examples used enhance rather than detract from response.	Concerted effort is made to consider all aspects of a system / problem or weigh up both sides to an argument before forming an overall conclusion. Judgements made are based on appropriate and concise arguments that have been developed in response resulting in them being both supported and realistic.
Middle (reasonable) 4 – 6 marks	Awareness of the meaning of the terms in the question. Knowledge is sound and effectively demonstrated. Demands of question understood although at times opportunities to make use of acquired knowledge and understanding not always taken.	Knowledge and understanding applied to context. Whilst clear evidence that an argument builds and develops through response there are times when opportunities are missed to use an example or relate an aspect of knowledge or understanding to the context provided.	There is a reasonable attempt to reach a conclusion considering aspects of a system / problem or weighing up both sides of an argument. However the impact of the conclusion is often lessened by a lack of supported judgements which accompany it. This inability to build on and develop lines of argument as developed in the response can detract from the overall quality of the response.
Low (basic) 1 – 3 marks	Confusion and inability to deconstruct terminology as used in the question. Knowledge partial and superficial. Focus on question narrow and often one-dimensional.	Inability to apply knowledge and understanding in any sustained way to context resulting in tenuous and unsupported statements being made. Examples if used are for the most part irrelevant and unsubstantiated.	Little or no attempt to prioritise or weigh up factors during course of answer. Conclusion is often dislocated from response and any judgements lack substance due in part to the basic level of argument that has been demonstrated throughout response.