

WJEC Eduqas style

WJEC Eduqas GCSE (9–1) Computer Science

Component 1: Understanding Computer Science – Practice Paper

C500U10-1 · Practice paper

Time allowed: 1 hour 45 minutes

Candidate name	
Centre number	
Candidate number	

Materials

- Black ink or black ball-point pen. Do not use gel pen or correction fluid.
- You may use a pencil for graphs and diagrams only.
- You must not use a calculator.

Instructions

- Write your name, centre number and candidate number in the spaces at the top of this page.
- Answer all questions.
- Write your answers in the spaces provided in this booklet.
- If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

Information

- The total number of marks available is 100.
- The number of marks is given in brackets at the end of each question or part-question.
- You are reminded of the need for good English and orderly, clear presentation in your answers.
- The use of calculators is not permitted in this examination.
- Some questions may require you to draw on knowledge and understanding from different areas of the specification.

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Answer all questions.

You are advised to spend about 1 minute per mark.

1

(a) State the number of nibbles in a byte.

[1]

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(b) Place the following units in order of size, starting with the largest.

kilobyte bit terabyte nibble megabyte byte

[1]

(c) Which of the following is the most suitable unit for describing the total storage capacity of a large data centre?

[1]

Tick (✓) one box.

A	Kilobyte	
B	Megabyte	
C	Gigabyte	
D	Petabyte	

2

(a) Describe the purpose of each of the following registers in the CPU.

(i) Memory address register (MAR)

[1]

(ii) Memory data register (MDR)

[1]

(iii) Accumulator

[1]

(b) Describe how increasing the number of cores in a CPU can improve the performance of a computer.

[3]

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(c) Give two differences between RAM and ROM.

[2]

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3 A logic circuit has three inputs, A, B and C, and one output, Q. Inputs A and B are the inputs to an OR gate. Input C passes through a NOT gate. The output of the OR gate and the output of the NOT gate are the inputs to an AND gate, whose output is Q.

In this question, $\bar{A}$ means NOT A, A.B means A AND B, and A + B means A OR B.

(a) Write the Boolean expression for Q.

[2]

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(b) Complete the truth table for the logic circuit.

[4]

A	B	C	Q
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

4 In this question, $\bar{A}$ means NOT A, A.B means A AND B, and A + B means A OR B.

You must show your working. Do not use truth tables.

(a) Simplify the Boolean expression $(A + B).(A + \bar{B})$

[2]

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(b) Simplify the Boolean expression $A.B.C + A.B.\bar{C} + \bar{A}.B$ **[4]**

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5

(a) Describe one advantage and one disadvantage of a client–server network compared with a peer-to-peer network. **[2]**

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(b) State the purpose of each of the following.

(i) Network interface card (NIC) **[1]**

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(ii) IP address **[1]**

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(iii) MAC address **[1]**

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(c) Complete the table to show the name of each OSI layer. **[2]**

Layer number	OSI layer name
2	

Layer number	OSI layer name
4	
5	
6	

6 An online company sells concert tickets. Its web server stores customer accounts and order histories.

(a) Describe how a distributed denial-of-service (DDoS) attack could affect the company's website.

[3]

(b) Describe two ways the company could reduce the risk of its own employees causing a data breach.

[4]

7

(a) Convert the 8-bit binary number 11110010 to hexadecimal. Show your working.

[2]

(b) Convert the hexadecimal number 7B to denary.

[1]

(c) Carry out the binary addition $01101101 + 00100111$. Show your working. **[2]**

(d) The binary number 10110100 is logically shifted two places to the right.

(i) Give the result of the shift. **[1]**

(ii) Describe the effect of this shift on the denary value of the number. **[1]**

.....
(e) Represent the denary number -37 in 8-bit two's complement binary. **[2]**

8

(a) State the number of bits used to store each character in extended ASCII. **[1]**

(b) The character 'A' has the ASCII code 65. Explain how this allows a computer to sort a list of names into alphabetical order. **[2]**

(c) A bitmap image is 64 pixels wide and 32 pixels high, with a colour depth of 8 bits.

Calculate the file size in bytes. Show your working. **[2]**

(d) Describe one situation in which lossless compression must be used rather than lossy compression. [2]

9 A two-dimensional array called points stores the points scored by three teams in a quiz league over four weeks. The first index is the team and the second index is the week. Indices start at 0.

	Week 0	Week 1	Week 2	Week 3
Team 0	14	22	9	31
Team 1	27	6	18	40
Team 2	11	35	24	3

(a) State the value stored in points[1, 3]. [1]

(b) State the total of all the values stored in the array for Week 1 (where the second index is 1). [1]

(c) Explain why a two-dimensional array is more suitable than twelve separate variables for storing this data. [2]

(d) Describe the difference between a record and a field. [2]

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10

(a) Describe how an operating system allows several programs to appear to run at the same time on a single-core processor. **[3]**

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(b) State two types of user interface that an operating system may provide. **[2]**

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(c) Describe the purpose of anti-malware software. **[2]**

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11

(a) Give two reasons why a programmer might choose to write a program in a low-level language rather than a high-level language. **[2]**

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(b) Describe the role of a compiler. **[2]**

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(c) A program should output "Adult ticket" for anyone aged 18 or over. It contains the line

if age > 18 then output "Adult ticket"

When the program is tested with an age of 18, nothing is output.

(i) Identify the type of error.

[1]

(ii) Explain why a compiler would not detect this error, and give the corrected line.

[2]

12 The following algorithm, written in pseudo-code, works with a positive whole number. MOD gives the remainder after integer division. DIV gives the whole-number result of integer division.

```
1 input number
2 set total = 0
3 set digits = 0
4 while number > 0
5     set total = total + (number MOD 10)
6     set number = number DIV 10
7     set digits = digits + 1
8 end while
9 output total
10 output digits
```

(a) Complete the trace table for the algorithm when the input is 4073. The first row shows the values after the first pass of the loop. Then state the two values that are output.

[4]

number	total	digits
407	3	1

(b) State what is output when the input is -52, and suggest how the algorithm could be improved to deal with this.

[1]

(c) Write an algorithm, using pseudo-code, that:

- allows a user to input the number of cars entering a car park in each of 10 hours
- calculates and outputs the total number of cars
- finds and outputs the highest number of cars in any one hour.

[6]

13

(a) The list 29, 14, 36, 5, 21 is to be sorted into ascending order using a bubble sort. Show the list after the first pass and after the second pass.

[2]

(b) A binary search is used to find the value 60 in this sorted list.

4 9 13 18 26 31 37 44 52 60 68

Show the stages of the binary search.

[3]

[2]

[9]

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END OF QUESTIONS