



**GCSE**

**3500U10-1**

**FRIDAY, 19 MAY 2023 – AFTERNOON**

**COMPUTER SCIENCE**

**Unit 1: Understanding Computer Science**

**1 hour 45 minutes plus your additional time allowance**

**Surname** \_\_\_\_\_

**First name(s)** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** 0 \_\_\_\_\_

**For Examiner's use only**

| <b>Question</b> | <b>Maximum Mark</b> | <b>Mark Awarded</b> |
|-----------------|---------------------|---------------------|
| <b>1.</b>       | <b>9</b>            |                     |
| <b>2.</b>       | <b>8</b>            |                     |
| <b>3.</b>       | <b>8</b>            |                     |
| <b>4.</b>       | <b>16</b>           |                     |
| <b>5.</b>       | <b>4</b>            |                     |
| <b>6.</b>       | <b>9</b>            |                     |
| <b>7.</b>       | <b>12</b>           |                     |
| <b>8.</b>       | <b>4</b>            |                     |
| <b>9.</b>       | <b>8</b>            |                     |
| <b>10.</b>      | <b>12</b>           |                     |
| <b>11</b>       | <b>10</b>           |                     |
| <b>Total</b>    | <b>100</b>          |                     |

**INSTRUCTIONS TO CANDIDATES**

**Use black ink, black ball-point pen or your usual method.**

**Write your name, centre number and candidate number in the spaces provided on the front cover.**

**Answer ALL questions.**

**Write your answers in the spaces provided in this booklet.**

**If you run out of space, use the continuation page(s) at the back of the booklet, taking care to number the question(s) correctly.**

**INFORMATION FOR CANDIDATES**

**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 total number of marks is 100.**

**Some questions will require you to draw on your knowledge from multiple areas of your course of study.**

**(Turn over)**

Answer ALL questions.

1 (a) Tick (✓) the correct box to show if each statement about CPUs is TRUE or FALSE. [4 marks]

| STATEMENT  | TRUE | FALSE |
|--|------|-------|
| A dual-core CPU will always process instructions twice as fast as a single-core CPU.       |      |       |
| The ALU can perform comparisons on data e.g. an IF statement in a high-level language.     |      |       |
| Overclocking is the process of setting a processor to run slower than its original design. |      |       |
| Cache memory has a slower disk access speed than RAM.                                      |      |       |

(Turn over)







**2 (b) Ahmed's new computer will come with 4 GB of RAM as standard, but he is able to upgrade this to 8 GB. Give TWO benefits of upgrading the RAM to 8 GB. [2 marks]**

**BENEFIT 1**

---

---

---

---

---

---

---

---

---

---

**2 (b) BENEFIT 2**

---

---

---

---

---

---

---

---

---

---

**2 (c) Name TWO input and TWO output devices that Ahmed may wish to consider purchasing with his new computer. [4 marks]**

**INPUT DEVICE 1:**

---

**INPUT DEVICE 2:**

---

**OUTPUT DEVICE 1:**

---

**OUTPUT DEVICE 2:**

---

| <i>P</i> | <i>Q</i> | <i>P. Q</i> | $\bar{P}$ | <i>Z</i> |
|----------|----------|-------------|-----------|----------|
|          |          |             |           |          |
|          |          |             |           |          |
|          |          |             |           |          |
|          |          |             |           |          |





| <b>DESCRIPTION</b>   | <b>HTTP</b>              | <b>FTP</b>               | <b>IMAP</b>              | <b>SMTP</b>              |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>A protocol that can be used when copying a file from one location to another via a network.</b> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>The protocol that can be used to transfer multimedia web pages over the internet.</b>           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>An email protocol that stores email messages on a mail server.</b>                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

4 (a) Tick (✓) the box for each protocol that matches the description opposite. [3 marks]

(b) TCP and IP are two protocols that combine to allow communication between computer systems on a network.

(i) State the role of both the TCP and IP protocols in network communication. [2 marks]

**TCP**

---

---

---

---

---

---

---

---

---

---

4 (b) (i)

IP

---

---

---

---

---

---

---

---

---

---

4 (b) (ii)

One item of information found in a TCP/IP packet is the Destination Address.

Name THREE other items found in a TCP/IP packet. [3 marks]

ITEM 1:

---

ITEM 2:

---

ITEM 3:

---

4 (c) Give ONE advantage and ONE disadvantage of circuit switching. [2 marks]

**ADVANTAGE**

---

---

---

---

---

---

---

---

---

---

**4 (c) DISADVANTAGE**

---

---

---

---

---

---

---

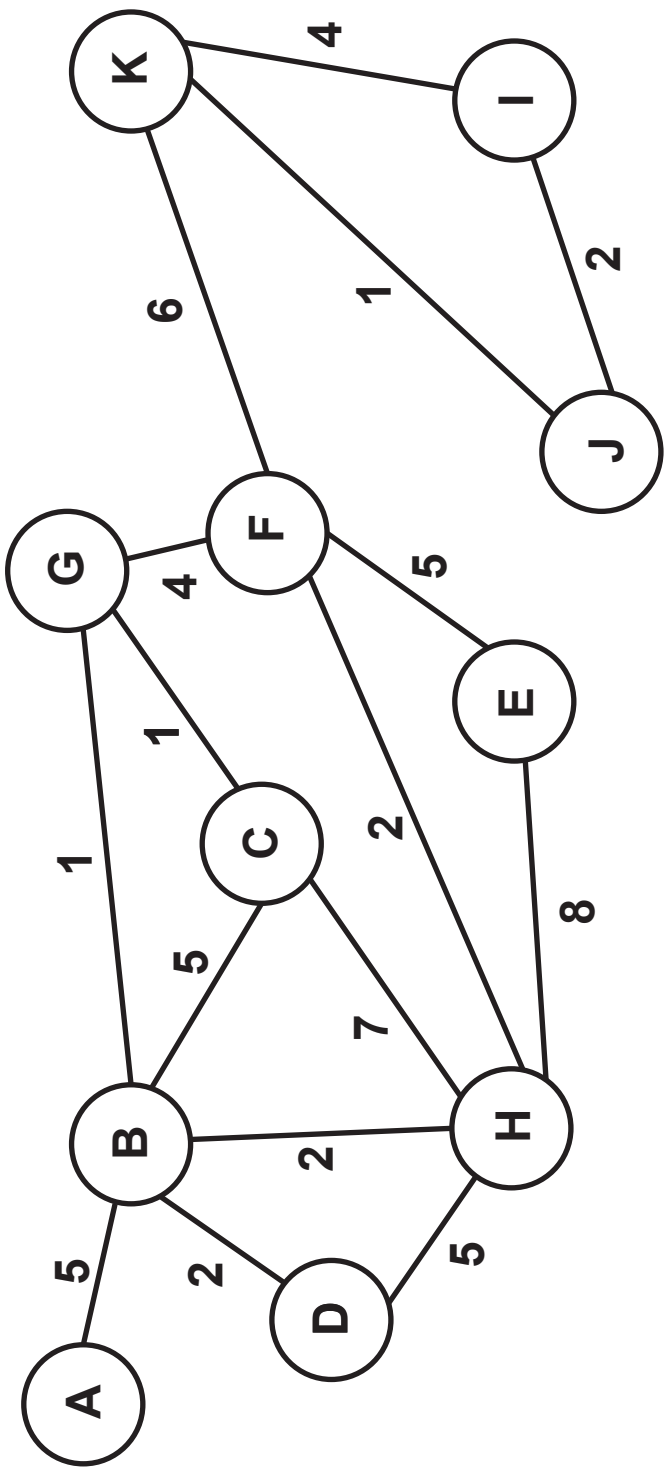
---

---

---







5. The diagram opposite shows the routing cost between each node for data transmitted on a certain network.

Complete the following table, indicating the lowest cost routes between each origin and destination.

The first row has been completed for you.

[4 marks]

| ORIGIN | DESTINATION | LOWEST COST | ROUTE     |
|--------|-------------|-------------|-----------|
| G      | D           | 3           | G > B > D |
| A      | K           |             |           |
| J      | C           |             |           |

6 (a) Convert the following:

(i)  $89_{10}$  into binary. [1 mark]

---

---

---

---

---

---

---

---

---

---

6 (a) (ii)

$01111011_2$  into hexadecimal. [1 mark]

---

---

---

---

---

---

---

---

---

---

6 (a) (iii)

$\text{FB}_{16}$  into denary. [1 mark]

---

---

---

---

---

---

---

---

---

---





7. Parkwood Vale Groceries wants to store details of the products it sells in a database.

(a) Complete the table using:

- TWO DIFFERENT data types (do not use String) [2 marks]
- TWO DIFFERENT methods of validation (do not use Format or Presence check). [2 marks]

| FIELD NAME   | DATA TYPE | EXAMPLE DATA | VALIDATION CHECK |
|--------------|-----------|--------------|------------------|
| Product ID   | String    | FR01234      | Format check     |
| Product name | String    | Cucumber     | Presence check   |
|              |           |              |                  |
|              |           |              |                  |

(Turn over)





7 (b) (ii)

Demonstrate how  $10101010_2$  would be encrypted by Parkwood Vale Groceries' system and then decrypted using the XOR encryption method. The key used is  $11110000_2$ . [4 marks]

**ENCRYPTION**

---

---

---

---

---

---

---

---

---

---

7 (b) (ii)

**DECRYPTION**

---

---

---

---

---

---

---

---

---

---

**(Turn over)**

8. **Integrated Development Environments (IDE)** provide programmers with various tools that are needed to develop computer programs.

**Complete the sentences opposite about the different tools available to a programmer.**

**USE ONLY THE TERMS GIVEN BELOW.**

**EDITOR**

**LINKER**

**BREAK POINT**

**MEMORY INSPECTOR**

**DEBUGGER**

**VARIABLE WATCH**

**TRACE**

**LOADER**

- 8 (a) A \_\_\_\_\_ is a program which loads previously compiled code into memory. [1 mark]
- (b) \_\_\_\_\_ is a facility which displays the order in which the lines of a program are executed, and possibly the values of variables as the program is being run. [1 mark]
- (c) \_\_\_\_\_ interrupts a program on a specific line of code, allowing the programmer to compare the values of variables against expected values. [1 mark]
- (d) \_\_\_\_\_ is a facility which will display the contents of a section of storage. [1 mark]

```
1  Start areaProc
2  area is real
3  pi is real
4  radius is real
5
6  set pi = 3.14
7
8  output "Please enter the radius"
9  input radius
10 area = pi * radius - radius
11 ouptut "The area = ", area
12
13 End areaProc
```

9. Opposite a program written using a high-level programming language is intended to calculate the area of a circle ( $A = \pi r^2$ ). The program contains errors.
- (a) Identify the errors and suggest a suitable change to this code to address each error.
- (i) Syntax error. [2 marks]

**ERROR:** \_\_\_\_\_

---

---

---

**CHANGE:** \_\_\_\_\_

---

---

---

9 (a) (ii)

Logical error. [2 marks]

**ERROR:** \_\_\_\_\_

---

---

---

**CHANGE:** \_\_\_\_\_

---

---

---

9 (b) Give TWO benefits to programmers of using a high-level programming language. [2 marks]

**BENEFIT 1**

---

---

---

---

---

---

---

**BENEFIT 2**

---

---

---

---

---

---

---

9 (c) Name TWO stages of the compilation process.

[2 marks]

NAME 1

---

---

NAME 2

---

---

**10. Computer systems are vital to many business operations, but they are liable to attacks targeted at accessing confidential data.**

**(a) Give TWO principles of the Computer Misuse Act which help businesses protect their data.**

**[2 marks]**

**PRINCIPLE 1**

---

---

---

---

---

---

---

---

---

---

10 (a)

**PRINCIPLE 2**

---

---

---

---

---

---

---

---

---

---

**(Turn over)**

10 (b)

**Describe THREE different types of targeted attack against confidential data. [6 marks]**

**ATTACK TYPE 1**

---

---

---

---

---

---

---

---

---

---

10 (b)

**ATTACK TYPE 2**

---

---

---

---

---

---

---

---

---

---

**(Turn over)**

10 (b)

**ATTACK TYPE 3**

---

---

---

---

---

---

---

---

---

---

10 (c)

**Describe TWO methods of identifying vulnerabilities. [4 marks]**

**METHOD 1**

---

---

---

---

---

---

---

---

---

---

10 (c)

**METHOD 2**

---

---

---

---

---

---

---

---

---

---

**(Turn over)**













---

---

---

---

---

---

---

**END OF PAPER**

**(Turn over)**







