



GCSE

3500U10-1

WEDNESDAY, 15 MAY 2024 – 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

Question	Maximum Mark	Mark Awarded
1.	4	
2.	8	
3.	8	
4.	8	
5.	6	
6.	6	
7.	6	
8.	12	
9.	10	
10.	10	
11.	10	
12.	12	
Total	100	

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

STATEMENT	TRUE	FALSE
The Control Unit (CU) decodes the program instruction in the Current Instruction Register (CIR).		
The Program Counter (PC) holds the address in main memory that is currently being read.		
RISC CPUs run at lower clock speeds than CISC CPUs.		
The slower the clock speed, the more power is generally required.		

(Turn over)

DESCRIPTION	HARDWARE			
	HUB	ROUTER	SWITCH	BRIDGE
Joins together two networks that use the same base protocols.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Copies all packets of data to all devices on the network.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stores the addresses of computers on the network and transfers data between devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Analyses each data packet and sends it to the computer it was intended for.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Computer networks are constructed using specialised hardware.

(a) Tick (✓) the boxes to match the hardware with the correct description on the table opposite.

[4 marks]

(b) Identify FOUR different types of computer network. [4 marks]

(i) _____

(ii) _____

(iii) _____

(iv) _____

(Turn over)

3. Compilation is a process for converting high level programs into machine code.

(a) Using the terms given complete the sentences opposite about the stages of compilation.

SYMBOL

LEXICAL

CODE

TRANSLATION

OPTIMISATION

ASSEMBLY

SEMANTIC

SYNTAX

3 (a) (i)

**During _____
analysis keywords and identifiers are replaced by
tokens. [1 mark]**

**(ii) During _____
analysis variables are checked to ensure they are
the correct data type. [1 mark]**

**(iii) A _____
table is created to hold the addresses of variables
and subroutines. [1 mark]**

**(iv) Code _____
may be employed to make the program more
efficient. [1 mark]**

(Turn over)

- 3 (b) This pseudo code is part of a payroll system. The system calculates the net pay by subtracting deductions from the gross pay. The pseudo code includes errors. Identify TWO errors in the code. State each error type and correction needed.

[4 marks]

```
def CalcPay():  
  
    Gross = input  
    Tax = (Gross * 0.20)  
    NatIns = (Gross * 0.10)  
    Pension = (Gross * 0.10)  
    Deducts = tax + NatIns + Pension  
    NetPay = Gross + Deducts
```

3 (b) (i)

TYPE OF ERROR: _____

CORRECTION: _____

(ii) **TYPE OF ERROR:** _____

CORRECTION: _____

(Turn over)

8. Programmers use Boolean logic to create code that can make decisions about data. It is a form of algebra that follows laws for simplifying expressions.

KEY: $+$ = *OR* \cdot = *AND* \oplus = *XOR* $'$ = *NOT*

- (a) Apply the distributive law to complete the expressions. [2 marks]

(i) $(A \cdot B) + C =$ _____

(ii) $(A + B) \cdot C =$ _____

- (b) Apply the absorption law to complete the expressions. [2 marks]

(i) $A \cdot (A + B) =$ _____

(ii) $A + A \cdot B =$ _____

8 (d) Complete the truth table. [4 marks]

P	Q	$P \cdot Q$	$P + (P \cdot Q)$
0	0		
0	1		
1	0		
1	1		

(Turn over)

9. Parkwood Vale Motors wants to store details of the cars it has in stock in a database, as shown. The first two fields have been set as Strings, with validation checks as specified.

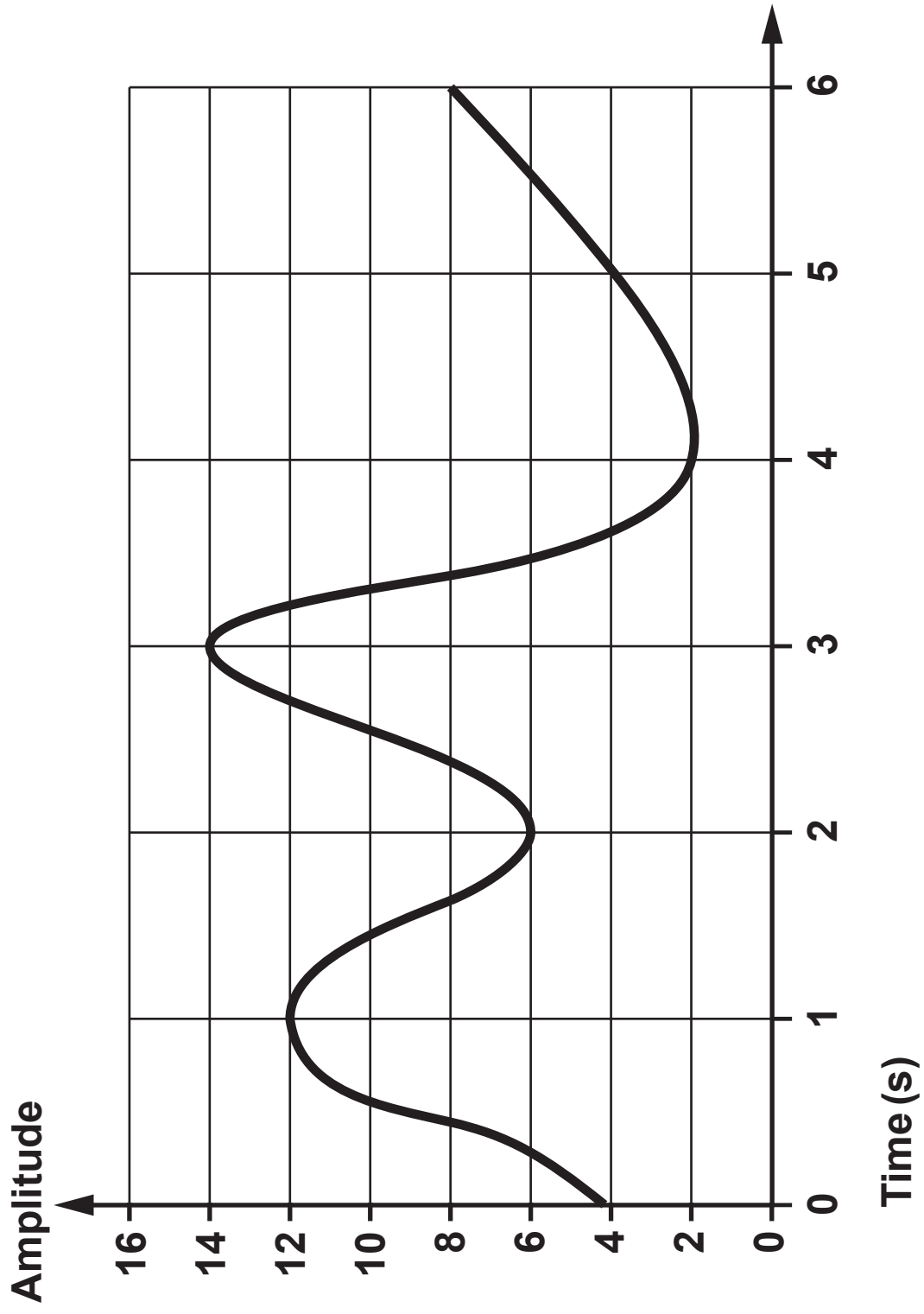
(a) Complete the table to include:

(i) TWO other data types. [2 marks]

(ii) TWO other methods of validation. [2 marks]

FIELD NAME	DATA TYPE	EXAMPLE DATA	VALIDATION CHECK
Car ID	String	E23TES	Format check
Manufacturer	String	Tesla	Presence check
Range Miles		305	
Model (X, Y, 3 or Z)		X	

(Turn over)



11. The chart opposite is a representation of a simple sound wave. The wave is sampled every second and the amplitude is stored as a 4-bit binary number.
- (a) Complete the table to show how the wave would be represented in binary. [5 marks]

Time	1	2	3	4	5	6
Amplitude	12					
Binary	1100					

11 (b) (i)

State the number of bits required to store the binary data from the completed table. [1 mark]

11 (b) (ii)

Convert your answer from (b) (i) to bytes. [1 mark]

11 (c) (i)

Calculate the number of bytes required to store the data for the wave if four samples per second are taken. [1 mark]
