OCR 2024 Predicted Paper 2
GCSE (9–1) Computer Science
J277/02 Computational thinking, algorithms and programming
Time allowed: 1 hour 30 minutes

Do not use a calculator

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space, use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer all the questions.

INFORMATION
- The total mark for this paper is **80**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has 14 pages.

ADVICE
- Read each question carefully before you start your answer.
- This is just a predicted paper based off previous years

SECTION A

1. (a) Tick one box in each row to identify whether the statement is an example of abstraction or decomposition.

Statement	Abstraction	Decomposition
Breaking down a complex problem into smaller, more manageable parts		
A web developer is designing a website. They create reusable components such as buttons and cards.		
Representing characters in the game as simple geometric shapes instead of detailed human models		

[3]

(b) State the value of 13 DIV 4

_____

[1]

(c) A programmer declares the following variables.

first = "The GCSE Computer Science Tutor"
second = "is the best"
State the output from the following lines of program code.

(i) print(first.substring(20,5)   _____[1]

(ii) print(first.length MOD second.length) _____[1]

(d) Read the following pseudocode algorithm:

```
01      procedure maths(number)
02        a = (number DIV 10) * 10
03        b = a + 10
04        If (number – a) >= (b – number) then
05            print(b)
06        else
07            print(a)
08        endif
09      endprocedure
```

(i)   State the output of maths(27)   _____[1]

(ii)   Identify one item in the program that could have been written as a constant
        _____[1]

(e) Functions and procedures are both examples of sub programs.

    Describe one difference between a function and a procedure, and explain why the
    code in part(d) uses a procedure.

    _____

    _____

    _____

    _____

                                                                    [2]

(f) Describe one difference between a global and a local variable

    _____

    _____

    _____

    _____

                                                                    [2]

2. A procedure takes as input a number between 1 and 100. It calculates and outputs the square of each number starting from 1, to the number input. The square of a number is the result of multiplying a number itself.

```
01 procedure squares()
02    do
03        number = integer(input("Enter a number between 1 and 100"))
04    until number >= 1 AND number <= 100
05    for x = 1 to number:
06        print(x * x)
07    next x
08 endprocedure
```

(a) State the name of the programming construct used twice.

_____[1]

(b) Two types of errors in a program are syntax and logic errors.

Identify two syntax errors in the pseudocode algorithm.

Error 1 line number_____

Corrected line_____

_____

Error 2 line number_____

Corrected line_____

_____

[4]

(c) The procedure needs to be tested.

For each type of test given in the table, identify two examples of test data that can be used to test the program.

Test Type	Test Data 1	Test Data 2
Normal		
Boundary		
Invalid		

[3]

3. Poppy would like to use a bubble sort to sort 250 000 numbers into order from lowest to highest.
   Currently the first 5 numbers before they have been sorted are:

| 195 584 | 167 147 | 158 187 | 160 125 | 184 236 |

(a) Show each stage of a bubble sort on the contents above.

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[4]

(b) Describe one difference between a bubble sort and a merge sort.

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[2]

(c) Once the numbers are in order, a binary search can be run on the data.
    Describe the steps a binary search will follow to look for a number in a sorted list.

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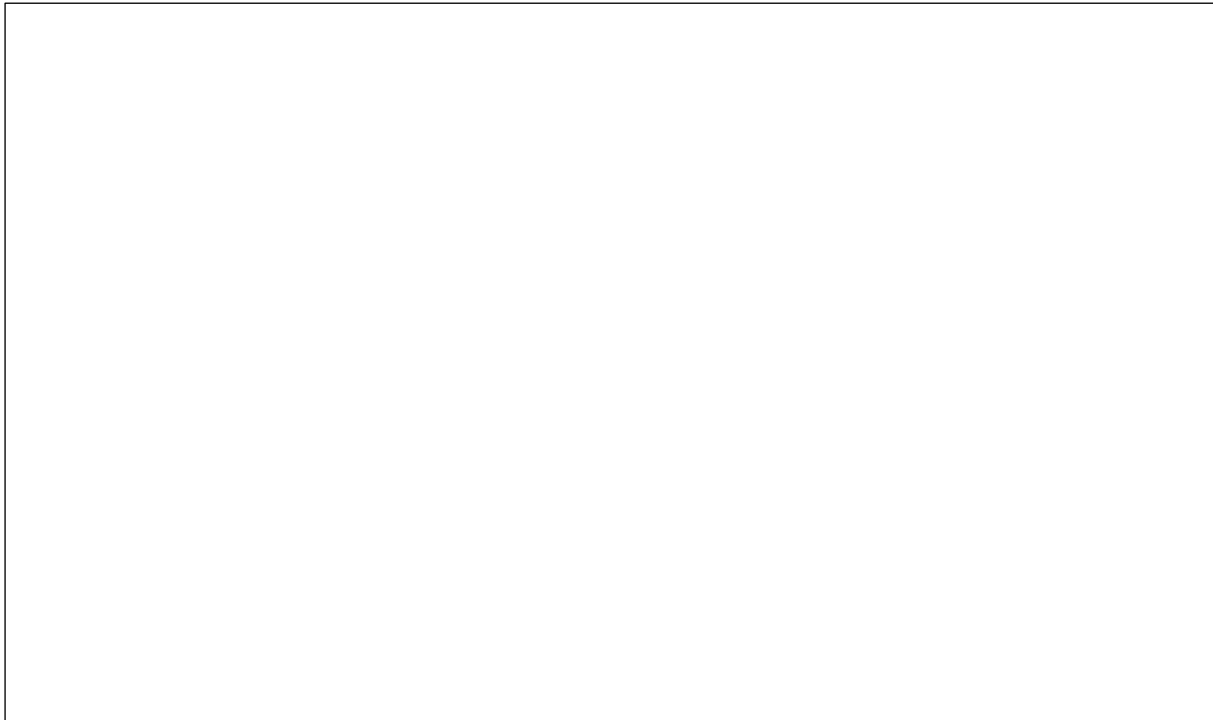
[4]

4. A fast-food restaurant offers half-price meals if the customer is a student or has a discount card. The offer is not valid on Tuesdays.
A computer system is used to identify whether the customer can have a half-price meal.
The table identifies the three inputs to the computer system:

Input	Value
A	Is a student
B	Has a discount card
C	The current day is Tuesday

(a) Draw the logic diagram for the computer system.

[3]

(b) Complete the truth table for the logic system P = NOT (A OR B)

A	B	P
0	0	1

[2]

5. Sally will make use of an integrated Development Environment (IDE) to create her program code.

   (a) Describe two features that are commonly found in IDEs that will help sally write her program code.

   1 _____

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   _____

   _____

   2 _____

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   _____

   [4]

   (b) A snippet of Sally's code is shown below.

   ```
   a = input("Enter a number")
   b = input("Enter a number")
   c = input("Enter a number")
   d = input("Enter a number")
   e = input("Enter a number")
   f = (a + b + c + d + e)
   print(f)
   ```

   Give two ways that the maintainability of this program could be improved.

   1 _____

   _____

   2 _____

   _____

   [2]

(c) Complete the description of programming languages and translators by writing the correct term from the box in each space.

Continues	crashes	debugging	error	executable
High-level	interpreter	language	low-level	many
No one	stops with	without		

Sally writes her program in a .... language. This needs to be translated into assembly or machine code before it can be executed. This is done using a translator.

One type of translator is an interpreter. This converts one line of code and then executes it, before moving to the next line. It .... when an error is found, and when corrected continues running from the same position. This translator is helpful when debugging code.

A second type of translator is a compiler. This converts all of the code and produces an error report. The code will not run until there are .... errors. The .... file produced can be run .... the compiler.

[5]

(d) Write an algorithm to play this game.
- the player is asked 3 addition questions
- each question asks the player to add together two random whole numbers between 1 and 10 inclusive
- if the player gets the correct answer, 1 is added to their score
- at the end of the game their score is displayed.

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[6]

SECTION B
We advise you to spend at least 40 minutes on this section.
Some questions require you to respond using either the OCR Exam Reference Language or a high-level programming language you have studied. These are clearly shown.

6. GCST FC is a football club that uses an advanced analytics system to enhance team performance and strategy planning. This system collects and processes data from various sources, including player tracking devices, match footage, and training sessions. The data is used to make strategic decisions, improve player performance, and gain competitive advantages.

The system stores the following data:

Data Stored	Variable Identifier	Example Data
Player's name	PlayerName	Mohamed Salah
Position played in the match	PlayerPosition	Striker
Number of goals scored	GoalsScored	2
Number of assists	Assists	1
Total Distance run in the match in km	DistanceRunKM	10.5
Player's performance rating (out of 10)	PerformanceRating	8.5
Weather the team won the match	MatchWon	True

(a) State the most appropriate data type for the following fields:

GoalsScored   _____

DistanceRunKM   _____

MatchWon   _____

[3]

(b) The football club has an algorithm that decides whether a player is the "Man of the Match" by checking the data stored in the following three variables:
- GoalsScored
- Assists
- PerformanceRating

The system will consider highlighting the player if they scored at least 1 goal or made at least 1 assist, and have a performance rating of 8 or above. When the system identifies such a player, it calls the pre-written procedure HighlightPlayer()

Write a program that checks the data in the variables and calls HighlightPlayer() when appropriate.

You must use either:
- OCR Exam Reference Language, or
- A high-level programming language that you have studied.

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[4]

(c) Describe the difference between a for loop and a while loop.

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[4]

(d) GCST Football Team need to identify the total number of goals the players have scored on their rival teams. The players are stored in a database table called playerstats. The current contents of playerstats is shown:

Rank	Player	Team	Nationality	Goals
1	Erling Haaland	Man City	Norway	18
2	Ollie Watkins	Aston Villa	England	16
3	Mohamed Salah	Liverpool	Egypt	15
9	Phil Foden	Man City	England	11
11	Darwin Nunez	Liverpool	Uruguay	10

Write an SQL statement to display the Players that have scored more than 10 goals.

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[3]

(e) A program written in a high-level language is used to access the data from the database. This program has a procedure, SavePlayers(), that stores the data to an external text file.

The procedure SavePlayers():
• takes the string of data to be stored to the text file as a parameter
• takes the filename of the text file as a parameter
• stores the string of data to the text file.

Write the procedure SavePlayers()
You must use either:
• OCR Exam Reference Language, or
• A high-level programming language that you have studied.

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[6]

(f) The data from the database table playerstats is imported into the program written in a high-level programming language. The program stores the data in a two-dimensional (2D) string array with the identifier arrayPlayers.

Rank	Player	Team	Nationality	Goals
1	Erling Haaland	Man City	Norway	18
2	Ollie Watkins	Aston Villa	England	16
3	Mohamed Salah	Liverpool	Egypt	15
9	Phil Foden	Man City	England	11
11	Darwin Nunez	Liverpool	Uruguay	10

In this table, the value of *playerstats* [1, 1] contains "Ollie Watkins"

Write a program that:
- asks the user to input a Team Name.
- totals the number of goals scored by the team inputted
- outputs the calculated total in an appropriate message including the Team name, for example: Man City scored 29 goals this season!

You must use either:
- OCR Exam Reference Language, or
- A high-level programming language that you have studied.

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[6]

END OF PAPER