



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Digital Technology

Unit 4

Digital Development
Concepts



[GDG41]

GDG41

Assessment

TIME

1 hour 30 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 120.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question 7.



1 (a) Select the statement that is true about data validation:

- A Data validation involves entering data twice to check for errors.
- B Data validation ensures that data entered is complete and falls within specified boundaries.
- C Data validation can eliminate erroneous data completely.
- D Data validation aims to increase the amount of erroneous data accepted by the program.

Answer _____ [1]

(b) Select the statement that is true about programming paradigms:

- A Object-oriented programming uses objects and methods whereas procedural programming uses classes and top-down design.
- B Object-oriented programming uses classes and methods whereas procedural programming uses procedures and objects.
- C Object-oriented programming uses classes and objects whereas procedural programming uses methods and inheritance.
- D Object-oriented programming uses classes and inheritance whereas procedural programming uses procedures and top-down design.

Answer _____ [1]

(c) Complete the truth table below.

A	B	C = A OR B	D = NOT(B AND C)
0	0	0	[1]
0	1	1	[1]
1	0	1	[1]
1	1	1	[1]



(d) Match the key terms in the list below with the correct definition.
(Not all words will be used.)

Decomposition **Computational Thinking** **Pattern Recognition**
Abstraction **Flowchart**

Definition	Key term
Observing key characteristics and trends in the data being considered	[1]
Removing specific details from a problem which are not required to solve it	[1]
Breaking large complex problems into smaller problems	[1]

(e) Select the statement which correctly describes a dry run.

- A** A dry run is a diagram of the logic of a program and the user goes through the solution step by step.
- B** A dry run is a paper-based list of the program code.
- C** A dry run is a paper-based exercise and the programmer goes through the solution step by step.
- D** A dry run is carried out by the user to test the program.

Answer _____ [1]

[Turn over



2 Program source code can be created in a software development environment.

(a) What is a software development environment?

[2]

Program source code must be translated before being executed.

(b) (i) Why must program source code be translated?

[1]

(ii) Describe what happens during the translation process.

[3]

The software development environment can help detect errors.

(c) In the table below, circle the error type which matches the error description.

Error Description	Error Type		
A keyword has been spelt incorrectly	Syntax	Execution	Logic [1]
A calculation includes a division by zero	Syntax	Execution	Logic [1]
An incorrect result is output from a program	Syntax	Execution	Logic [1]





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[Turn over



24GDG4105

- 3 A program is required to grade game players, based on their high score, as outlined in the table below.

High Score	Grade
>10000	X
5000 – 10000 inclusive	M
3000 – 4999 inclusive	L
<3000	N

(X=Expert, M=Middle, L=Lower and N=Novice)

- (a) (i) Suggest the most suitable data type for the following variables to be used in the program.

Variable	Data Type
highScore	[1]
grade	[1]



- 4 Sam is writing a program to store and process a collection of temperature readings taken over a period of seven days. The data is as follows:

23.9	22.8	20.7	19.0	18.3	22.7	25.0
------	------	------	------	------	------	------

He wants to store these data items in an array or list called *temperatures*.

- (a) (i) Suggest an appropriate data type for *temperatures*.

_____ [1]

- (ii) Describe how a single value stored in *temperatures* could be accessed.

_____ [2]

- (iii) Explain **one** advantage of using an array or list, to store the temperatures, instead of seven individual variables.

_____ [2]



(b) Sam will create a solution to the problem using a flowchart.

Label each of the following flowchart symbols using the words provided in the list below.

START/END

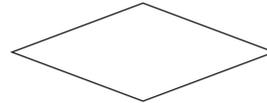
INPUT/OUTPUT

PROCESS

DECISION



(i) _____



(ii) _____



(iii) _____



(iv) _____

[4]



(c) Sam wants to find the average temperature recorded during the seven days. Draw the flowchart, showing how the average temperature would be calculated and output.

Use the following information:

- The seven values have already been input to *temperatures*
- The flowchart must contain a loop to read through the seven values in *temperatures*
- A variable called *total* should be used to store the sum of the temperatures
- A variable called *average* should be used to store the average temperature calculated

[9]



5 Linear and binary searches can be carried out on data.

(a) In the table below, state whether each statement about search algorithms is **true** or **false**.

Statement	True/False
When searching through large amounts of data the binary search algorithm is less efficient than the linear search algorithm	[1]
The binary search algorithm requires data to be sorted	[1]
The binary search algorithm examines all data items in a list until the target value is found or until there are no more data items to examine	[1]
The binary search algorithm starts by finding the mid-location in a list of data items	[1]

(b) Programming languages provide functions for file handling.

Describe **two** functions commonly used for file handling.

1. _____

 2. _____

- [4]





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[Turn over



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- 6 (a)** Convert the denary number 41 to a binary number.
(Working out must be clearly shown.)

Answer _____ [2]

- (b)** Convert the binary number 11111011 to a denary number.
(Working out must be clearly shown.)

Answer _____ [3]



(c) Convert the binary number 01011010 to a hexadecimal number.
(Working out must be clearly shown.)

Answer _____ [3]

(d) Convert the denary number 52 to a hexadecimal number.
(Working out must be clearly shown.)

Answer _____ [3]

[Turn over

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(e) (i) Explain the term overflow as related to number representation in computer systems.

[2]

(ii) Add the following bytes together. Circle any overflow in the result.

$$\begin{array}{r} 1 \quad 1 \quad 1 \quad 0 \quad 0 \quad 0 \quad 1 \quad 1 \\ + \quad 0 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \\ \hline \end{array}$$

[3]

(f) Complete the following paragraph about character representation using the words and numbers provided. (Not all words and numbers will be used)

64 **128** **256** **ASCII** **BINARY** **UNICODE**

The 7-bit ASCII table could represent _____ characters whilst the

8-bit ASCII table could represent _____ characters.

The _____ character set is a subset of the _____

character set.

[4]



8 A program to manage a heating system provides the following input screen.

ThermoHeat System

Input four letter System Code: **GHJK**

Input required temperature (18–24°C): **22**

Use quick heat? **Y**

(a) (i) Suggest an appropriate data type to store input from the question “Use quick heat?”.

_____ [1]

(ii) State why you have chosen the data type in (a)(i) above.

_____ [1]

(iii) What type of validation check will ensure that the temperature entered is between 18°C and 24°C?

_____ [1]



9 (a) What do developers mean by taking an iterative approach to testing?

[2]

(b) Explain the following approaches to testing.

(i) Unit Testing

[2]

(ii) System Testing

[2]

(iii) Integration Testing

[2]

(c) Identify **two** types of test data a developer should use when testing a coded solution to a problem.

1. _____

2. _____

[2]



10 John is leading a project team involved in creating a new software package. He knows that evaluation is an important part of developing any system.

(a) What is the purpose of evaluation when developing a new system?

[2]

(b) Explain why John should evaluate the software application continuously during development.

[2]

(c) (i) State **one** way in which John can ensure that the solution meets the original design criteria.

[1]

(ii) Describe how John can ensure that the solution is a robust solution.

[2]

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Question Number	Marks
1	
2	
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10	

Total Marks	
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Examiner Number

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