T Level Technical Qualification in

Digital: Digital Production, Design and Development

Core Knowledge and Understanding

Topic test 2: Introduction to programming

Answer ALL questions. Write your answers in the spaces provided.

1 A programmer is creating a program to calculate exam grades.

Identify the most suitable data type for storing:

a. Candidate Name

b. Exam Mark

(2)

Candidate Name

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Exam Mark

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(Total for Question 1 = 2 marks)

2 A teacher is using a program to sort exam marks into order. The pseudocode for part of this program is shown in **Figure 1**.

```
1 SET marks TO [84,58,23,60]
2 SET counter TO 4
3 WHILE counter >1:
4    FOR sort in range(3):
5       IF marks [sort] > marks [sort+1] THEN
6          switch = marks [sort]
7          marks [sort] = marks [sort+1]
8          marks [sort+1] = switch
9       END IF
10    counter = counter -1
11 END WHILE
12 OUTPUT(marks)
```

Figure 1

To sort a new set of marks line 1 (in Figure 1) has been changed to [43,56,76,22,45,23].

(a) State **two** changes needed for the pseudocode (in Figure 1) to work.

(2)

1 ....

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2 ....

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(b) Describe how the while loop works in the program.

(3)

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Pearson

(c) The exam marks for a class are [16,92,84,68].

Complete the table to show the value of the variable 'switch' shown in Figure 1 for the first 3 iterations.

(3)

Iteration	Switch
1	
2	
3	

(Total for Question 2 = 8 marks)

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3 A software company is writing a program that will be used to process the results of a quiz.

Each team has a unique team name and scores are stored in descending alphabetical order of team name.

(a) Explain why it would not be possible to use a binary search to search by team score.

(2)

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(b) A programmer writes a binary search function which will search to find all teams who had the same score.

The function is shown in **Figure 2**.

```
 1 ▾ def binary_search(a, b, c, d):
 2 ▾     if c >= b:
 3           mid = (c + b) // 2
 4 ▾         if a[mid] == d:
 5               return mid
 6 ▾         elif a[mid] > d:
 7               return binary_search(a, b, mid - 1, d)
 8 ▾         else:
 9               return binary_search(a, mid + 1, c, d)
10 ▾     else:
11           return -1
```

Figure 2

(i) Write a line of Python code that calls this function. It must use an array called *mylist* with a lower bound of 0 and an upper bound of 10 that searches for the value 52 in the array and returns the position where 52 is found to a variable called result.

(4)

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(ii) Explain why the function in Figure 2 would not work as intended.

(3)

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(Total for Question 3 = 9 marks)

4   A cybersecurity company is developing a new encryption algorithm.

        This new algorithm will use prime numbers to encrypt data.

        A programmer writes a Python program to check if a selected number is prime or not.

        Explain **two** reasons why the company might not use the pre-written code for their program.

(4)

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2 ....

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(Total for Question 4 = 4 marks)

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5   Extensive testing is needed before new software is released.

Evaluate how companies could make use of both manual and automated testing methods.

(12)

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(Total for Question 5 = 12 marks)

TOTAL FOR PAPER: 35 MARKS