

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson BTEC Level 3
Nationals Extended
Certificate, Foundation
Diploma, Diploma,
Extended Diploma

Centre Number

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Learner Registration Number

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Friday 17 January 2020

Afternoon (Time: 2 hours)

Paper Reference **31768H**

Computing

Unit 1: Principles of Computer Science

You must have:

Information Booklet (enclosed)

Total Marks

--

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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

Please refer to Section 1 of the Information Booklet in order to answer Question 1.

1 A supplies company stores goods in a warehouse.

The items are not stored in a specific order. Section 1 of the Information Booklet shows the storage bays in the warehouse.

Figure 1 shows some example data that the system will store.

(a) Give **two** reasons why a string data type could be used for the item code.

(2)

1

2

(b) Identify the location of item 478591.

(3)

Bay:

.....

Shelf:

.....

Section:

.....

A section of pseudocode to find an item and print its location is given in Figure 2.

(c) Explain the purpose of lines 2 to 4 of the code.

(2)

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(d) Explain the purpose of the index variable in the pseudocode given in **Figure 2**.

(3)

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(e) Lines 9, 10, 11 of the pseudocode output the item's location.

Describe how string handling functions are used to output the item's location.

(3)

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.....

The company usually has more than one of each type of item in stock.

(f) The data in **Figure 1** is used to test the pseudocode in **Figure 2**.

Describe what would happen if **514832** was entered to locate an item.

(3)

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(g) It has been suggested that the FOR loop is replaced with a WHILE loop.

Explain **two** benefits of using a WHILE loop.

(4)

1

2

(Total for Question 1 = 20 marks)

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QUESTION 2 BEGINS ON THE NEXT PAGE.



Please refer to Section 2 of the Information Booklet in order to answer Question 2.

2 A teacher has created a program of mathematical games for her students.

The main menu is shown in **Figure 3** in Section 2 of the Information Booklet.

(a) Explain **one** reason why event-driven programming is suitable for creating the main menu.

(2)

.....

.....

.....

Part of the pseudocode for the 'Guess the number' game is given in **Figure 4**.

(b) Describe how the teacher could change the range used to generate the number the students have to guess.

(2)

.....

.....

.....

The code for the 'Guess the number' game does not perform as expected.

(c) Identify **two** lines of the pseudocode that contain errors and write the correct pseudocode.

(4)

Line number

.....

Correct pseudocode

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Line number

Correct pseudocode

Part of the pseudocode for the 'Number pattern' game is given in **Figure 5**.

(d) The logic of the pseudocode is tested using a 'dry run'.

Complete the shaded cells in the trace table to show how the variables would change if the pseudocode was run as program code.

(4)

line	start	counter	output
1			
2			4
3			
4	5		
5			5
		3	
4	8		
5			8
3		5	
4			
5			13
6			
7			end



(e) The teacher has developed the rules for the 'Addition' game.

- The game has 10 questions.
- The score starts at zero.
- The score increases by one for each correct answer.
- Two numbers are generated and then added together.
- The addition question is displayed.
- The student enters their answer.
- A message is output to the student telling them if their answer is correct or incorrect.
- At the end of the game their final score is displayed.

Draw a flowchart that meets the requirements of the rules of the game.

(8)



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[Empty answer box for Question 2]

(Total for Question 2 = 20 marks)



Please refer to Section 3 of the Information Booklet in order to answer Question 3.

3 A ticket machine at a bus station prints out a ticket when payment has been made.

The rules for the machine are given in **Figure 6** in Section 3 of the Information Booklet.

(a) A programmer stores the values of the coins to be used in an array:

```
coins = [10p, 20p, 50p, £1]
```

Explain **one** problem that would occur when trying to generate a total if this array was used in the code for the machine.

(2)

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(b) Describe how branches could be used in the code for the machine so that it meets the rules.

(4)

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(c) Develop an algorithm to meet the rules for the ticket machine.

Use pseudocode for your algorithm.

(8)

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(d) The rules of the ticket machine need to be modified so that it gives change if more than 50p is inserted.

Analyse the patterns, problems and processes a programmer would need to consider to develop a solution.

(10)

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(Total for Question 3 = 24 marks)



(b) Discuss what a programmer would need to consider when developing a program that meets the requirements listed in **Figure 7**.

You should consider inputs, processes and outputs in your response.

(8)

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(c) The program uses data structures to store information and produce printed appointments lists for the driving instructors.

Evaluate the use of records, sets, lists and arrays to achieve this.

You should use examples appropriate to the scenario to support your evaluation.

(12)

Area with horizontal dotted lines for writing the evaluation.

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(Total for Question 4 = 26 marks)

TOTAL FOR PAPER = 90 MARKS





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Pearson BTEC Level 3 Nationals Extended Certificate
Foundation Diploma, Diploma, Extended Diploma

Friday 17 January 2020

Paper Reference **31768H**

Computing

Unit 1: Principles of Computer Science

Information Booklet

Instructions

- You will need the information in this booklet to answer some questions.
- Read the information carefully.
- You must **not** write your answers in this booklet.
- Only your answers given on the question paper will be marked.
- Do not return this Information Booklet with the question paper.

Turn over ►

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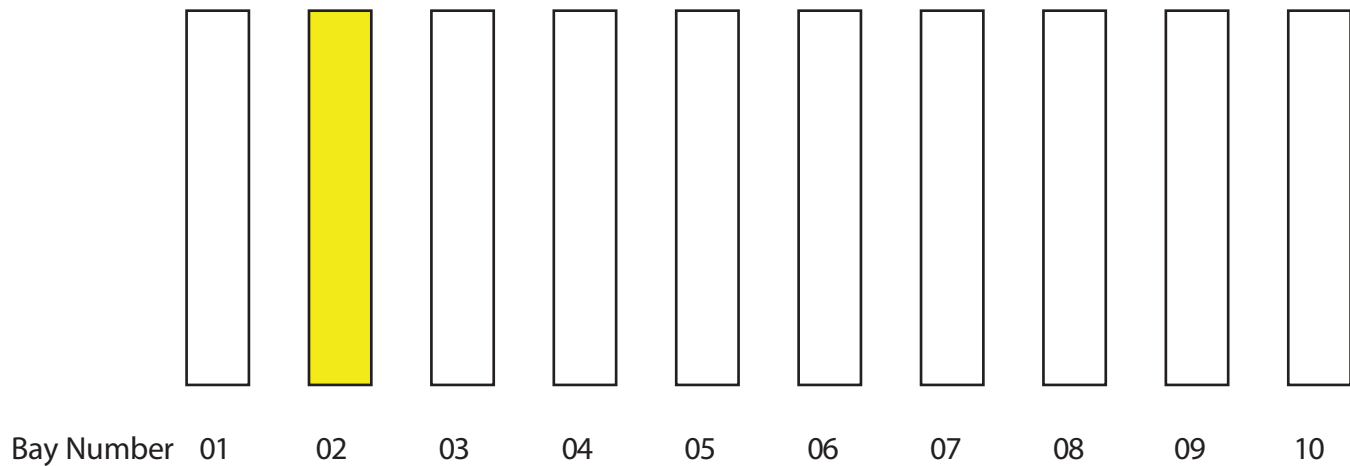

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SECTION 1

The information in this section should be used to answer Question 1.

The warehouse has 10 bays. Each bay has 10 shelves divided into 10 sections.

This diagram shows the arrangement of the bays.



This diagram shows the sections of a bay.

Section	01	02	03	04	05	06	07	08	09	10
Shelf 01										
02										
03										
04										
05										
06										
07										
08										
09										
10										

Each location is given a six digit code. The code is made by combining bay number, shelf number and section number.

The code for the highlighted location would be 020905.

Items of stock have a six digit code for each type of item; there could be several of each item in stock at any time.

Figure 1 shows some example data that the system will store. Any empty location has an item code of 0.

Index	Location	Item code
0	010101	929194
1	010102	929186
2	010103	514832
3	010104	550015
4	010105	0
5	010106	0
6	010107	458961
7	010108	478591
8	010109	0
9	010110	514832
10	010111	514832

Figure 1

Figure 2 shows part of the pseudocode for the system.

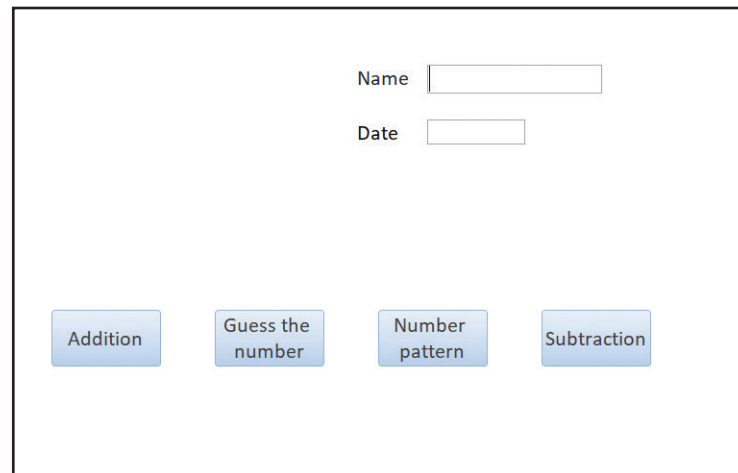
```
1  INPUT item required
2  WHILE LENGTH of item required is 0
3    INPUT item required
4  END WHILE
5  FOR index = 0 to 999
6    IF item code (index) = item required
7      item location = location (index)
8      OUTPUT ("item Found")
9      OUTPUT ("Bay", item location[0:2])
10     OUTPUT ("Shelf", item location[2:4])
11     OUTPUT ("Section", item location[4:6])
12   END IF
13 END FOR
```

Figure 2

SECTION 2

The information in this section should be used to answer Question 2.

Figure 3 shows the main menu screen for the program.



The screenshot shows a main menu screen with two input fields at the top: "Name" and "Date". Below these are four buttons: "Addition", "Guess the number", "Number pattern", and "Subtraction".

Figure 3

Figure 4 shows part of the pseudocode for the 'Guess the number' game.

```
1 target = RANDOM(1,100)
2 FOR try = 1 to 5
3     INPUT (guess)
4     IF guess < target
5         OUTPUT "Too high try again"
6     ELSEIF guess > target
7         OUTPUT "Too low try again"
8     ELSE
9         OUTPUT "Well done you guessed the number"
10    END IF
11 END FOR
```

Figure 4

Figure 5 shows part of the pseudocode for the 'Number pattern' game.

```
1 start=4
2 OUTPUT (start)
3 FOR counter = 1 to 6 STEP 2
4     start=start+counter
5     OUTPUT(start)
6 END FOR
7 OUTPUT("end")
```

Figure 5

SECTION 3

The information in this section should be used to answer Question 3.

Figure 6 shows the rules for using a ticket machine at a bus station.

- All tickets cost 50p.
- If more than 50p is inserted no change is given.
- Only 10p, 20p, 50p and £1 coins can be used.
- Any number of coins can be used.
- The user presses a button when they finish inserting coins.
- A ticket is printed showing the date and the amount paid.

Money inserted	Button pressed	Ticket printed
FALSE	FALSE	NO
FALSE	TRUE	NO
TRUE	FALSE	NO
TRUE	TRUE	YES

Figure 6

SECTION 4

The information in this section should be used to answer Question 4.

Figure 7 shows a list of requirements produced by the owner of a driving school.

- Reduce the number of missed appointments.
- Produce a list of daily appointments for each instructor.
- Offer clients a choice of cars with manual or automatic transmission.
- Clients must take their driving test within two years of passing the theory test.
- Instructors need clients' details.
- Instructors need to know where to pick up clients for each lesson.
- Lessons are 1 hour, but a test appointment is 3 hours.

Figure 7



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