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

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Learner Registration Number

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 Claire is a primary school teacher.

She wants a computer program to help her pupils with number skills.

Figure 1 in the Information Booklet shows an algorithm for part of the program.

(a) Identify **three** variables used in the algorithm.

(3)

Variable 1

.....

Variable 2

.....

Variable 3

.....

(b) Describe how branching is used in the algorithm.

(2)

.....

.....

.....

.....

(c) Describe how iteration is used in the algorithm.

(2)

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(d) Explain why MOD is used in the algorithm.

(2)

(e) Give **three** reasons why a data type validation check would be suitable for this algorithm.

(3)

1

2

3

Claire wants her educational program to have a section that helps the pupils with their times tables.

Figure 2 in the Information Booklet shows the algorithm Claire has developed.

(f) Explain **two** ways Claire can make the algorithm easier to read.

(4)

1

2

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(g) Describe what would happen if **11** was input as the variable "number".

(4)

(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.

Fernando owns a local gym. He wants to create a program that will lock and unlock the lockers in the changing rooms.

2 (a) Explain **two** benefits of using an event-driven programming language to develop the program.

(4)

Benefit 1

Benefit 2

(b) Describe how events and event handlers are used in event-driven programming.

(4)

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(c) Describe how a main loop function and a callback function are used within event-driven programming.

(4)

main loop function

callback function

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(d) Draw a flowchart for this program using the rules shown in **Figure 4** in the Information Booklet.

(8)

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(Total for Question 2 = 20 marks)

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

Bobby owns a carpet fitting company. He wants a program that will calculate the cost of carpet fitting jobs.

3 (a) Develop an algorithm for this program to meet the rules shown in **Figure 5** in the Information Booklet.

Write your answer using pseudocode.

(8)

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(b) The programmer has decided to develop the program using a procedural programming language.

Discuss the benefits and drawbacks of using a procedural language to develop this program.

(8)

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(c) Bobby wants his program to have some extra features. The original programmer is not available, so Bobby decides to use a new programmer.

The new programmer does not know the programming language that has been used. They intend to translate it into a different language.

Discuss the implications for the new programmer of translating the code into another programming language.

(8)

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(Total for Question 3 = 24 marks)

4 Susan is trying to be more active. She uses a program to record the number of steps she walks each day over a two-week period. The steps are stored as whole numbers in an array.

The array shows an example of this data.

[12547, 10332, 8889, 15473, 13991, 9434, 10876, 14219, 13877, 9468, 14629, 12223, 10473, 10017]

(a) Explain **two** benefits of using an array to store this data.

(4)

Benefit 1

Benefit 2

(b) Susan wants to sort the number of steps she walks each day into ascending order.

Analyse why an insertion sort may be more appropriate than a quick sort.

(10)

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(c) Susan wants a facility that shows her when she walked more than a certain number of steps during the two-week period.

Evaluate the ways this could be implemented in the program.

You should consider common searching algorithms and other standard algorithms.

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

(12)

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(Total for Question 4 = 26 marks)

TOTAL FOR PAPER = 90 MARKS

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Time 2 hours

Paper reference **31768H**

Computing

UNIT 1: Principles of Computer Science

Information Booklet

Do not return this Booklet with the question paper.

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.

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SECTION 1

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

Figure 1 shows an algorithm a primary school teacher is using to develop a program to help her class with number skills.

```
1   Procedure evenOddNumbers
2   totalNumbers = integer
3   number = integer
4   input totalNumbers
5   for i = 1 To totalNumbers
6           input number
7           if number MOD 2 = 0 Then
8                   output "This is an even number"
9           else
10                  output "This is an odd number"
11          end if
12  next i
13  End Procedure
```

Figure 1

Figure 2 shows Claire's times tables algorithm.

```
continue=integer
number=integer
i=integer
continue=1
i=1
while continue=1
Input number
while (i<=12)
Output i 'x' number = (i * number)
Increment i
End while
Output 'continue 1 yes or 2 no'
Input continue
End while
```

Figure 2

SECTION 2

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

A gym has lockers for its customers in the changing rooms. The lockers have a keypad with 12 buttons that are used to unlock and lock the door. Each locker displays a message to tell customers if it is locked or unlocked.

Figure 3 is a diagram of the keypad and display.

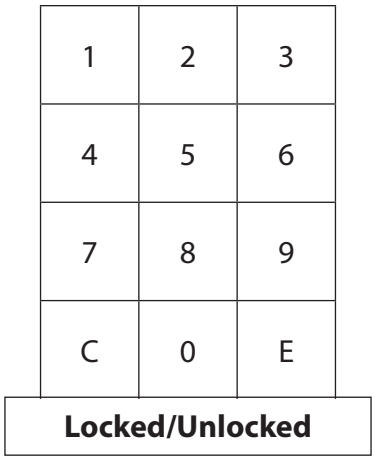


Figure 3

Each locker uses these rules when a customer uses it for the first time:

- The customer sets their own code
- The keypad is used to enter the code
- The code can only use the numbers 0 to 9
- The code must be four digits long
- Key 'C' deletes the last digit entered
- Key 'E' is used to lock the door
- The door must be closed before it can lock
- The message 'Locked' is displayed on the door.

Figure 4

SECTION 3

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

Figure 5 shows the rules the algorithm uses to work out the cost of carpet fitting jobs.

1. Enter the customer's name and address
2. Input the length metres of the carpet to be fitted
3. Input the width metres of the carpet to be fitted
4. The cost is calculated by:
   i. Charging £4.50 for each square metre of the carpet
   ii. Charging £10.00 extra for any carpet less than 10 square metres
5. These details are then output:
   i. Customer name and address
   ii. The total area of the carpet in square metres (length x width)
   iii. The total cost

Figure 5

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