

Write your name here

Surname

Other names

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

Centre Number

--	--	--	--	--	--	--

Learner Registration Number

--	--	--	--	--	--	--	--	--	--

# Computing

## Unit 1: Principles of Computer Science

Friday 19 January 2018 – Morning

**Time: 2 hours**

Paper Reference

**31768H**

**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 ►

P51801RA

©2018 Pearson Education Ltd.

1/1/1/1/1/1/1/1/1/1



P 5 1 8 0 1 R A 0 1 2 0



Pearson

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

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

- 1 Oscar would like a program that will allow him to calculate how much his gas and electric energy bill will cost each week.

The rules that are used to calculate his energy bill can be seen in Section 1 of the Information Booklet.

- (a) Oscar has written an algorithm using pseudocode to calculate his energy bill. He wants some feedback on his algorithm.

**BEGIN**

**INPUT** GasUsed

**INPUT** ElectricDayUsed

**GasBill** =  $(\text{GasUsed} * 0.20) + (7 * 0.50)$

**ElectricBill** =  $(\text{ElectricDayUsed} * 0.35) + (\text{ElectricNightUsed} * 0.10)$

**TotalBill** = GasBill + ElectricBill

**OUTPUT** ElectricBill

**END**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Identify **four** reasons the algorithm will not work as expected.

(4)

Reason 1

.....  
.....

Reason 2

.....  
.....

Reason 3

.....  
.....

Reason 4

.....  
.....

(b) Explain why Oscar should declare the variable 'TotalBill' as a float data type instead of an integer.

(3)

.....  
.....  
.....  
.....  
.....  
.....



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) Identify the control structure of Oscar's pseudocode and describe how this would affect the way the code is executed.

(3)

Control structure

.....

Description

.....

.....

.....

.....

.....

(d) Oscar intends to use a data type validation check in the final program.

Explain why this check is suitable for Oscar's program.

(3)

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**BLANK PAGE**



Oscar's energy provider is offering a promotion that will mean he will not pay for gas on the day he uses the least number of units.

The requirements for an algorithm to find the least number of units are:

- Allow the user to enter:
  - the number of units used on day one
  - the number of units used on day two
- Compare the values for days one and two
- Store the lowest of the two values
- Allow the user to enter the number of units used for days three to seven
- Compare the values for days three to seven against the current lowest value as they are entered and store the lowest of the two values
- Output the lowest value when all values have been entered.

(e) Draw a **flowchart** that meets the requirements for the algorithm.

(7)



Continue your flowchart on the next page



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

[Empty answer area for Question 1]

(Total for Question 1 = 20 marks)



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

**2** Alison runs a bingo evening at a local village hall once a week. She has created programming code that generates and stores bingo numbers in an array using Visual Basic. The programming code must ensure that the numbers between 1 and 90 are only output once.

(a) Explain what is meant by the term 'statement' when creating program code.

(3)

.....

.....

.....

.....

.....

.....

(b) Alison has setup an array within the programming code.

The programming code can be seen in Section 2 of the Information Booklet.

Explain why Alison has defined 'previousNumbers' as a single dimensional array.

(3)

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA





This message is displayed when the programming code is run.

**Exception thrown 'System.IndexOutOfRangeException' in BingoCaller.exe**

- (c) Identify which line in the programming code contains an error and explain why this error has occurred.

(4)

Line of code

Explanation

- (d) Describe the purpose of the statement on line 7 of the programming code.

(2)

- (e) Describe the purpose of the code in lines 11 to 15 of the program.

(2)





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

**3** Siad manages a taxi company. He has a program that handles a large volume of bookings every day from customers. He would like to expand his program so that it will track the status of a booking.

The requirements and the design for the booking screen can be seen in Section 3 of the Information Booklet.

(a) Siad will expand his program using an event driven programming language.

Explain a benefit to Siad of using time driven features in his program.

(3)

.....

.....

.....

.....

.....

.....

.....

(b) Explain why a queue data structure should be used to store booking requests.

(3)

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



(c) **Figure 3b** shows the variables Siad plans to use when he writes the code for the program.

Discuss the implications of using the variables as defined in **Figure 3b**.

(10)

Area with horizontal dotted lines for writing the answer.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(d) Siad's taxi drivers are awarded performance points each month. The drivers' scores at the end of one month are shown in this list.

0	1	2	3	4	5	6	7	8
25	37	49	44	54	70	74	73	96

Siad uses a quick sort to put the scores into order.

He could use the **Leftmost/Rightmost Element** or the **Median of Three** method to choose a pivot.

Analyse how these methods of choosing a pivot would affect the performance of the sort.

(8)





Handwriting practice area with 20 horizontal dotted lines.

**(Total for Question 3 = 24 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA





(b) A selection of songs that Paul has stored and the rules that should be followed when generating a playlist, can be seen in Section 4 of the Information Booklet.

Develop an algorithm using pseudocode that meets the rules to generate a playlist.

(10)

Area with horizontal dotted lines for writing the algorithm.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA





DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) Paul would like to add a payment feature to his website to allow customers to pay for an event.

He wants to ensure his customers' data is secure.

Evaluate how this will affect Paul's choices when creating the code for the website.

(12)



Large rectangular area with horizontal dotted lines for writing.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 4 = 26 marks)

TOTAL FOR PAPER = 90 MARKS



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**BLANK PAGE**



P 5 1 8 0 1 R A 0 1 9 2 0

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**BLANK PAGE**

