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

Monday 4 June 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 ▶

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

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

1 Arnold has a number of bouncy castles that customers can hire for special events such as birthday parties. He wants to create a website to advertise these bouncy castles and to take payments from customers.

Section 1 of the Information Booklet provides details about the website and its requirements.

Some of the website requirements can be seen in **Figure 1a**.

(a) Identify **two** inputs the website must accept from the user.

(2)

Input 1

.....

.....

Input 2

.....

.....

(b) Identify **two** processes the website code should perform.

(2)

Process 1

.....

.....

Process 2

.....

.....

Arnold wants to make sure customer details are entered before an order is processed.

Part of the algorithm is shown here. It is written in pseudocode.

```
BEGIN
status = FALSE
WHILE status = FALSE:
INPUT name
INPUT phoneNumber
IF name AND phoneNumber = TRUE:
status = TRUE
ENDIF
ENDWHILE
PRINT "Input Complete"
END
```

(c) Describe how Arnold could improve the readability of this algorithm.

(3)

(d) Explain why Arnold has used a **WHILE** loop instead of a **FOR** loop in his algorithm.

(3)

(e) Arnold is going to use the orders page to receive payment details.

State the protocol Arnold should use and explain why this is needed.

(4)

Protocol

.....

Explanation

.....

.....

.....

.....

.....

.....

.....

.....

(f) **Figure 1b** contains the text and formatting requirements for the 'Bouncy Castle Designs' page.

Figure 1c shows the HTML code for the page.

Identify **two** lines of the code that do not meet the formatting requirements and describe how the code can be corrected.

(6)

ONE

Line number

.....

Correction

.....

.....

.....

.....

TWO

Line number

.....

Correction

.....

.....

.....

.....

(Total for Question 1 = 20 marks)

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

2 Martha is a science student. She uses a program to record the temperature at 12:00pm every day over 4 weeks. The temperature is stored in degrees (Celsius) as a whole number. She uses a procedural language for this program.

(a) Martha uses an array to store the temperatures. The array is shown here.

10	**12**	**12**	**11**	**9**	**11**	**11**
16	**17**	**17**	**13**	**14**	**16**	**13**
12	**15**	**16**	**13**	**15**	**15**	**14**
19	**20**	**18**	**17**	**15**	**13**	**15**

Identify the output from the array if these print statements are used:

(2)

print(item[1][1])

.....

print(item[2][4])

.....

(b) Martha will use functions in her program.

Describe **two** features that may be specified when writing a function.

(4)

Feature 1

.....

.....

.....

.....

Feature 2

.....

.....

.....

.....

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(c) Martha would like to know how many days in the month had a temperature of 13 degrees.

Explain why Martha would use a count occurrences algorithm and not a linear search.

(4)

(d) Martha needs to find the average temperature each week.

The average is calculated by adding all temperatures recorded in a week and then dividing this value by 7.

Explain why Martha would use truncation.

(3)

Martha has written an algorithm using pseudocode for her program. This can be seen in **Figure 2** in Section 2 of the information booklet.

(e) Describe what the algorithm in **Figure 2** does.

(4)

(f) Describe **one** way that the algorithm in **Figure 2** could be improved.

(3)

(Total for Question 2 = 20 marks)

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

3 Edward owns a car maintenance business. He employs several mechanics. Edward wants a program to manage the arrangements when a car is booked in for repair. The program must also choose which mechanic to repair the car.

Section 3 of the Information Booklet provides details about the requirements of this program.

(a) Edward wants to make sure his staff enter the car registration plate in the correct format.

Develop an algorithm using pseudocode that meets the requirements shown in **Figure 3a** and **Figure 3b**.

(8)

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When a customer books their car into the garage, the program will allow the following details to be entered:

- customer name
- telephone number
- details of the problem.

(b) Common built-in functions that have been used in the program, and also the program code can be seen in **Figure 3c**.

Evaluate how effectively the code in Part A validates user input.

(8)

(c) In Part C of the program code, Edward has used the list data structure to store the types of fault a user might enter.

These faults are then compared against the user input to choose the right department for the car to be fixed.

Discuss different ways Edward's program could store and access the fault data.

(8)

(Total for Question 3 = 24 marks)

Please refer to the Information Booklet in order to answer Question 4.

4 Kisha is creating a computer game to sell. She will create the program code for level 1 first and then create extra levels later.

Figure 4a shows the screen design for level 1.

Figure 4b shows the game requirements.

(a) Produce example pseudocode statements to show how each Boolean Operator could be used in the game.

(6)

Boolean Operator – **AND**

Example Pseudocode

Boolean Operator – **OR**

Example Pseudocode

Boolean Operator – **NOT**

Example Pseudocode

(b) Discuss the reasons why Kisha may need to translate her program code into another programming language in the future.

(8)

(c) Analyse how the structure and features of object-orientated programming languages will benefit Kisha when she creates extra levels in her game.

(12)

(Total for Question 4 = 26 marks)

TOTAL FOR PAPER = 90 MARKS

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Computing

Unit 1: Principles of Computer Science

Monday 4 June 2018 – Morning
Information Booklet

Paper Reference
31768H

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 booklet will be marked.
- Do not return this Information Booklet with the question paper.

Turn over ▶

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SECTION 1

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

Figure 1a shows information about the website Arnold requires.

- Arnold wants a page with the title 'Bouncy Castle Designs' that has information about different shapes and sizes of bouncy castles that people can order.
- He wants another page with the title 'Orders' that has a form that customers can use to enter their event date. The website should then display a list of bouncy castles that are available on that date.
- A customer should then be able to choose the bouncy castle design they want.
- Customers can choose a number of extras, such as safety mats and large outdoor speakers. If a customer chooses any extras the cost of the extras needs to be calculated.
- The subtotal is calculated based on the choice of bouncy castle and any extras chosen. VAT is then calculated based on the subtotal.
- The total cost of the order is calculated by adding the subtotal and the VAT.
- The total cost for an order should be displayed for the user.

Figure 1a

Figure 1b shows the text and formatting requirements for the 'Bouncy Castle Designs' page.

Text Content	Formatting Requirement
"Bouncy Castle Designs"	Emphasised
"Super Hero Castles"	Emphasised
• "12ft x 14ft" • "Suitable for all ages" • "£50.00 per day"	Bullet Pointed
"Slide Castle"	Emphasised
• "16ft x 15ft" • "Suitable for ages 3-11" • "£75.00 per day"	Bullet Pointed

Figure 1b

Figure 1c shows the HTML code for the 'Bouncy Castle Designs' page.

```
<body>
<p><strong>Bouncy Castle Designs</strong></p>
<p><strong>Super Hero Castles</strong></p>
<ul>
  <li>12ft x 14ft</li>
  <li>Suitable for all ages</li>
  <li>£50.00 per day</li>
</ul>
<p>Slide Castle</p>
<ul>
  <li>16ft x 15ft</li>
  <li>Suitable for ages 3 to 11 year olds</li>
</ul>
<p>£75.00 per day</p>
</body>
</html>
```

Figure 1c

SECTION 2

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

Figure 2 shows part of the pseudocode that will be used for the program.

```
BEGIN
1   temperatures[6][3] = [ ]
2   weeklyAverages [3] = [ ]
3   INPUT week
4   INPUT day
5   INPUT temp
6   INPUT reader
7   TempLog = openAppend ("TempLog.txt")
8   TempLog.writeLine("Week:"+(week)+"Day:"+(day)+"Temp:"+(temp)+"Reader:"
    +(reader)+"\n")
9   close TempLog.txt
10  temperatures.add(temp)
END
```

Figure 2

SECTION 3

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

Figure 3a shows the program requirements.

- Ask the user to input if the car has a current registration number.
- Ask the user to input the year the car was registered.
- If the car does **not** have a current registration number or if it was registered before 2001 then no rules apply.
- If the car does have a current registration number and was registered in 2001 or later then the rules in **Figure 3b** must be applied.
- If the registration number entered meets these rules, a message saying "Registration Completed" should be output.
- If the registration number entered does **not** meet these rules, the program should output a message saying "The following digits are incorrect" followed by the position number of each incorrect digit.

Figure 3a

Figure 3b shows the rules that should be followed when entering a current UK car registration number.

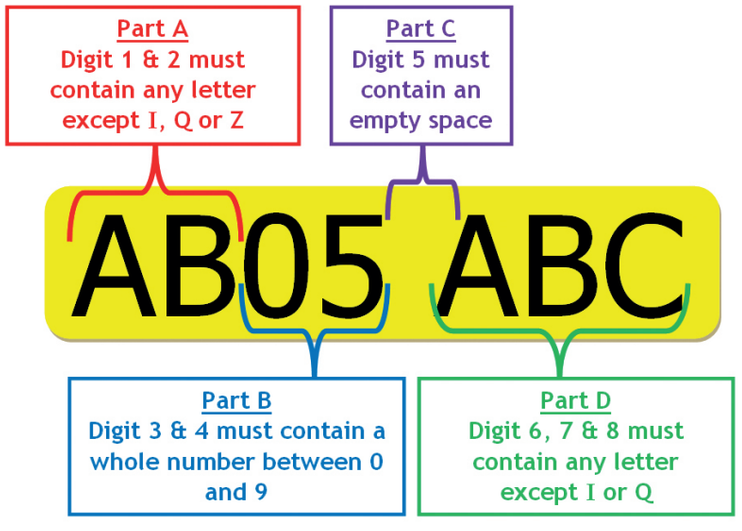

Figure 3b

Figure 3c shows part of the Python programing code used by Edward.

Part A

Common built-in functions that are used to meet the validation rules include:

- **.isdigit( )** – This will return true if characters in a string are numbers
- **.capitalize()** – This will return a copy of a string with its first letter capitalised
- **.replace()** – This will replace a character in a string with another character.

```
1  def name():
2      invalidName = True
3      while invalidName:
4          name = input ("Enter customer name").capitalize( )
5          global name
6          if len(name)<2:
7              print ("The customer name is not correct, please try again")
8          else:
9              invalidName = False
10             break
11
12 def telephone():
13     invalidtelephone = True
14     while invalidtelephone:
15         telephone = input ("Enter customer telephone number").replace(" ","")
16         global telephone
17         if not telephone.isdigit( ) :
18             print ("The telephone number is not correct, please try again")
19         elif len(telephone)<6 or len(telephone)>11:
20             print ("The telephone number is not correct, please try again")
21         else:
22             invalidtelephone = False
23             break
```

Part B

```
26 print("Welcome to this car fault logging program")
27 print ("I need to ask some questions about the customer and their vehicle")
28 name()
29 telephone()
30 print ("Thank you, now I need to find out about the problem")
```

Part C

```
33 bodywork = ["paint","spray","scratches","dent"]
34 electrics = ["power", "battery","fuse","windows","lights"]
35 engine = ["oil light","overheating","fumes"]
36
37 problem = input ("Now tell me what the fault is in a couple of words")
38
39 if any(word in problem for word in bodywork):
40     department = "bodywork"
41 elif any(word in problem for word in electrics):
42     department ="electrics"
43 elif any(word in problem for word in engine):
44     department = "engine"
45 else:
46     department = "other"
47
48 print ("This needs to be fixed by the ",department,"department")
```

Figure 3c

SECTION 4

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

Figure 4a shows the screen design for level 1 of the computer game.

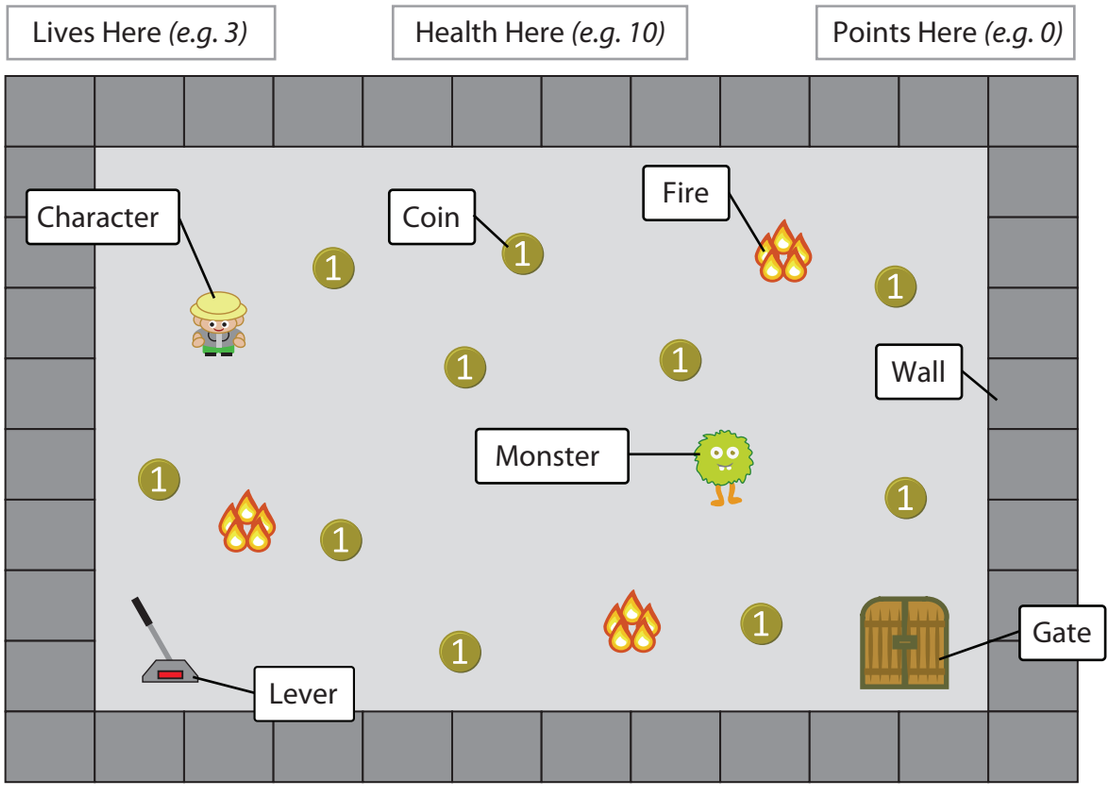

Figure 4a

Game requirements

Figure 4b shows the requirements for level 1 of the computer game.

- At the start of the game:
  - lives is set to 3
  - health is set to 10
  - lever is switched off.
- The health is decreased by 1 every 10 seconds. When the health reaches 0 a life will be lost.
- If the player loses all of their lives, a game over message will be displayed.
- The character moves at a speed of 4 when the arrow keys are pressed.
- The monster will chase the character at a speed of 2.
- End of level criteria:
  - all 10 coins collected
  - lever switched on
  - character touches gate.
- When the Character touches the:
  - monster – 5 will be deducted from the health
  - lever – lever will be switched on
  - fire – 5 will be deducted from the health
  - wall – Character will stop moving
  - coin – user will be given 1 point and the coin will disappear
  - gate – user will progress onto the next level when end of level criteria are met.

Figure 4b

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