

## Pearson BTEC Level 3 Nationals

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Surname

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# Computing

## Unit 1: Principles of Computer Science

Extended Certificate / Foundation Diploma / Diploma / Extended Diploma in Computing  
Diplomas in Computing for Creative Industries, Computer Science, Computer Systems and Network Support, Business Information Systems

Sample assessment material for first teaching September 2016

**Time: 2 hours**

Total



marks

**You must have:**

Information Booklet (enclosed)

### 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 grey boxes – *use this as a guide as to how much time to spend on each question.*
- Additional information and stimulus material needed to answer the questions can be found in the Information Booklet.
- You may use a calculator.

### 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.

Paper reference  
31768  
S52559A



Turn over ►

**PEARSON**

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

TurfWorld is a company that sells garden turf. It receives a lot of phone calls from customers asking it to calculate the total cost of an order. It has decided to create a simple program that will do this.

The screen design and client requirements for the new program can be seen in Section 1 of the Information Booklet.

- 1 (a) Identify **two key** processes needed in the program to calculate the cost of an order.

2 marks

1 .....

2 .....

- (b) State **three** pieces of additional information a programmer would need to create the algorithm for this program.

3 marks

1 .....

2 .....

3 .....

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(c) Identify **one** variable that could be used within the programming code and explain what data type it should be declared as.

3 marks

Variable name:

.....

Data type:

.....

.....

.....

(d) The programmer will use built in functions when creating the program.

Describe how the functions INPUT and ROUND would be used in the program.

4 marks

INPUT

.....

.....

.....

.....

ROUND

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.....

.....



The programmer has chosen to use data type and range check as validation techniques within the program.

- (e) Explain why a WHILE loop would be used for validation rather than an IF statement.

3 marks

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- (f) Explain why a range check will be used in the program.

3 marks

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When the user clicks on the calculate button the following actions take place:

- the program checks that the length and width have been entered
- if so, a function called 'calculate' is run
- if not, an error message will be displayed.

(g) Draw a flow chart that shows the logic for these actions.

4 marks

Total for Question 1 = 22 marks



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

PrinterFix is a company that specialises in fixing broken printers. It has set up a program that will ask its customer how many problems they have and then the program will make suggestions on how to fix their problem(s).

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

2 (a) The programming code uses a variable called 'problems.'

A user enters the following data.

**3, YES, YES, NO, YES**

Assuming that the programming code works correctly, show the value the variable 'problems' would hold after each item of data is entered.

You are advised to show your working.

4 marks

Data	Problems Value
3	3 (Variable Inputted)
YES	
YES	
NO	
YES	



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The programmer has created a function called 'solved'. It is shown in part D of the code.

(b) Explain **two** reasons why programmers use functions in their code.

4 marks

Reason 1

.....

.....

.....

.....

Reason 2

.....

.....

.....

.....



(c) Explain why the function in part D needs to be defined before it is called.

4 marks

Handwriting practice area for question (c) consisting of a large rectangular box with horizontal dotted lines.

(d) Explain why the 'global' command is used with the variable 'problems' in part D.

3 marks

Handwriting practice area for question (d) consisting of a large rectangular box with horizontal dotted lines.





The code **if problems >=0:** in part E produces the following error when it is run as shown in Section 2 of the Information Booklet.

**TypeError: unsupported operand type(s) for -: 'str' and 'int'**

(e) Explain why the programmer would received this error message.

3 marks

.....

.....

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.....

.....

(f) Explain why a conditional control structure has been used within the programming code.

3 marks

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Total for Question 2 = 21 marks



A school teacher uses a program to track the performance of students in a class by logging their test scores.

- 3 When students sit a test, if they achieve less than their target grade then they must take the test again.

The teacher has written some pseudocode to show the logic for how this decision is made.

```
BEGIN
ELSE score >= target:
    status = ("Resit Needed")
ELSE:
    status = ("Resit Not Needed")
print (staus)
END
```

- (a) Identify **three** errors in this pseudocode.

3 marks

Error 1

.....

.....

Error 2

.....

.....

Error 3

.....

.....



The last seven test scores for each student are kept in a two-dimensional array called 'Results'.

**Results**

	0	1	2	3	4	5	6
0	93	65	81	62	36	94	45
1	41	78	98	36	85	36	24
2	27	54	42	88	61	25	71
3	36	54	28	74	42	91	35

(b) Explain why this type of array has been used to store this data.

3 marks

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The teacher wants to sort the scores into ascending order.

- (c) Demonstrate how an insertion sort can be used to achieve this for the first student.

6 marks

Original Data	93	65	81	62	36	94	45
Insertion A							
Insertion B							
Insertion C							
Insertion D							
Insertion E							
Final Sorted Data							

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A quick sort could also have been used to sort this data.

- (d) Analyse why an insertion sort may have been chosen to sort the data rather than a quick sort.

8 marks

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Total for Question 3 = 20 marks

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

A local veterinary surgery uses a program to organise and manage its business.

- 4 The computer program is used to calculate the amount of medicine an animal should be given. When the animal's weight is entered a search is used to find the amount of medication needed. This is shown in the table below.

1 kg	3 kg	5 kg	7 kg	11 kg	13 kg	17 kg	19 kg	23 kg	29 kg	31 kg	37 kg	41 kg	43 kg	47 kg	53 kg	59 kg
0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5

- (a) Demonstrate the use of a binary search when finding the amount of medication for an animal that weighs 53 kg.

6 marks

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The veterinary surgery has created a new website using HTML. This can be seen in Section 3 in the information booklet.

- (b) Identify **one** line of the HTML code that will cause the content to be displayed incorrectly and explain why the problem exists.

3 marks

Line of code
.....
Problem
.....
.....
.....
.....





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- (c) The veterinary surgery would like to allow customers to view previous treatments that their animal has received from its website.

Discuss why HTML is not suitable for this purpose.

6 marks

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(d) Customers with more than one animal sometimes need multiple appointments on the same day. The veterinary surgery has a program that finds available appointments that are together on a given day.

The programming code can be seen in Section 4 of the information booklet. The surgery is thinking about adding additional features to the program.

Evaluate how well the programming code could be developed further and maintained by a different programmer.

12 marks

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Total for Question 4 = 27 marks

**END OF EXAM**

**TOTAL FOR PAPER = 90 MARKS**



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