MODULE M PROGRAMMING · M26

Library routines and random numbers

Original practice questions · 22 marks · ~25 minutes · Cambridge 0478 syllabus 8.1.7

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **22 marks**. All algorithms on this sheet are written in pseudocode. Write your own algorithms in pseudocode. `RANDOM()` returns a random number between 0 and 1 inclusive. No calculator.

1

Total: 2 marks

(a) Describe what is meant by a **library routine**. **[2]**

2

Total: 4 marks

(a) Complete the table to show the value assigned to `Answer` by each pseudocode statement. **[4]**

Statement	Value of Answer
`Answer ← ROUND(3.14159, 2)`	
`Answer ← ROUND(18.96, 0)`	
`Answer ← DIV(47, 6)`	
`Answer ← MOD(47, 6)`	

3 **Total: 5 marks**

(a) A board-game program uses this statement.

```
Move ← ROUND(RANDOM() * 4, 0) + 3
```

State the smallest and the largest value that could be stored in `Move`. **[1]**

Smallest .....

Largest .....

(b) A raffle program needs a random whole number from 1 to 50 inclusive. **[2]**
Write a pseudocode statement that stores this number in `Ticket`.

(c) A science simulation uses this statement.

```
Reading ← ROUND(RANDOM() * 10, 1)
```

Describe the values that could be stored in `Reading`. **[2]**

4 **Total: 6 marks**

A delivery company tests its warehouse plan with a simulation. The algorithm models the number of parcels that arrive in each of four hours. Parcels are packed into crates that each hold 12 parcels.

```
01 Total ← 0
02 FOR Hour ← 1 TO 4
03     Parcels ← ROUND(RANDOM() * 20, 0) + 10
04     Total ← Total + Parcels
05     IF Parcels > 25
06       THEN
07         OUTPUT "Busy hour ", Hour
08     ENDIF
09 NEXT Hour
10 OUTPUT DIV(Total, 12), " full crates and ", MOD(Total, 12), " parcels left over"
```

(a) Complete the trace table for the algorithm. When the algorithm is run, `RANDOM()` returns these values in order: **[4]**

0.42, 0.87, 0.06, 0.73

Hour	Parcels	Total	OUTPUT
		0	

(b) State the smallest and the largest value that line 03 could store in `Parcels`. **[1]**

(c) Explain why `ROUND` is used in line 03. **[1]**

5 **Total: 5 marks**

A garden centre runs a prize draw. Every ticket has a whole number from 1 to 500.

(a) Write an algorithm using pseudocode to: **[5]**

- generate a random whole number from 1 to 500 inclusive and store it in `WinningNumber`
- input a customer's ticket number
- repeat the input until the ticket number is between 1 and 500 inclusive
- output "Winner" if the ticket number matches `WinningNumber`, otherwise output a suitable message that includes the winning number.

You do not need to declare any variables.

Total for this worksheet: 22 marks