MODULE M PROGRAMMING · M5

Arithmetic operators, including MOD, DIV and exponentiation

Original practice questions · 21 marks · ~25 minutes · Cambridge 0478 syllabus 8.1.4(f), 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 **21 marks**. All algorithms on this sheet are written in pseudocode. Write your own algorithms in pseudocode. No calculator.

1

Total: 4 marks

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

Statement	Value of Result
`Result ← MOD(23, 4)`	
`Result ← DIV(23, 4)`	
`Result ← 2 ^ 5`	
`Result ← 15 / 4`	

2

Total: 4 marks

A car ferry parks cars in lanes. Each lane holds 9 cars. The lanes are filled one at a time. The integer variable `Cars` stores the number of cars waiting to board.

(a) Write a pseudocode statement that stores in `FullLanes` the number of lanes that will be completely full. **[1]**

(b) Write a pseudocode statement that stores in `LastLane` the number of cars in the lane that is only partly full. **[1]**

(c) State the values stored in `FullLanes` and `LastLane` when `Cars` is 58. **[2]**

FullLanes .....

LastLane .....

3 **Total: 5 marks**

A ticket office uses this algorithm to carry out a quick check on a ticket number before it is accepted. `Number`, `Digit` and `Total` are integers.

```
01 INPUT Number
02 Total ← 0
03 WHILE Number > 0 DO
04     Digit ← MOD(Number, 10)
05     Total ← Total + Digit
06     Number ← DIV(Number, 10)
07 ENDWHILE
08 IF MOD(Total, 3) = 0
09   THEN
10     OUTPUT "Accepted"
11   ELSE
12     OUTPUT "Rejected"
13 ENDIF
```

(a) Complete the trace table for the algorithm using this input data: **[4]**

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Number	Digit	Total	OUTPUT

(b) State the output of the algorithm when the input is **76**. **[1]**

4 **Total: 3 marks**

A dance competition has three judges. A programmer writes this statement to find the mean of their three scores.

```
Mean ← Score1 + Score2 + Score3 / 3
```

(a) The scores are `Score1` = 6, `Score2` = 9 and `Score3` = 12. State the value that the statement assigns to `Mean`. **[1]**

(b) Explain why the statement does not calculate the mean correctly. **[1]**

(c) Rewrite the statement so that it calculates the mean correctly. **[1]**

5 **Total: 5 marks**

A warehouse sends each parcel to one of two loading bays. Parcels with an even parcel number go to bay A.

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

- input 10 parcel numbers, one at a time (each parcel number is a whole number)
- use `MOD` to decide whether each parcel number is even
- count how many of the parcel numbers are even
- output the count, with a suitable message, after all 10 parcel numbers have been input.

You do not need to declare any variables.

Total for this worksheet: 21 marks