MODULE M PROGRAMMING · M23

Functions and return values

Original practice questions · 22 marks · ~25 minutes · Cambridge 0478 syllabus 8.1.6(a), 8.1.6(b)

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**. Write all algorithms and statements in pseudocode. All data on this sheet is made up.

1

Total: 3 marks

(a) Tick (✓) **one** box in each row to show whether each statement applies to a function, a procedure, or both. **[3]**

Statement	Function	Procedure	Both
It is run using the keyword CALL, as a complete statement.			
Its header states the data type of the value that is sent back.			
It is defined once and can be used many times in a program.			

2 **Total: 4 marks**

A print shop charges 5 cents for every page it prints. Its ordering program uses this function to work out the cost, in cents, of a print job.

```
01 FUNCTION PrintCost(Pages : INTEGER, Copies : INTEGER) RETURNS INTEGER
02     DECLARE TotalPages : INTEGER
03     TotalPages ← Pages * Copies
04     RETURN TotalPages * 5
05 ENDFUNCTION
```

(a) State the data type of the value returned by the function. **[1]**

(b) State the value returned by `PrintCost(3, 4)` **[1]**

(c) A customer orders two print jobs: **[2]**

- a 2-page leaflet, 5 copies
- a 4-page booklet, 3 copies.

Write **one** pseudocode statement that uses the function `PrintCost` to store the total cost of both jobs in the variable `OrderTotal`

3 **Total: 5 marks**

A warehouse packs items into boxes. Each box holds up to 8 items. This function works out how many boxes an order needs.

```
01 FUNCTION BoxesNeeded(Items : INTEGER) RETURNS INTEGER
02     DECLARE Boxes : INTEGER
03     Boxes ← DIV(Items, 8)
04     IF MOD(Items, 8) <> 0
05       THEN
06         Boxes ← Boxes + 1
07     ENDIF
08     RETURN Boxes
09 ENDFUNCTION
```

(a) Complete the table to show the value returned by each function call. **[3]**

Function call	Value returned
BoxesNeeded(16)	
BoxesNeeded(17)	
BoxesNeeded(5)	

The main program uses the function like this:

```
10 DECLARE Orders : INTEGER
11 INPUT Orders
12 IF BoxesNeeded(Orders) > 2
13   THEN
14     OUTPUT "Use a trolley"
15   ELSE
16     OUTPUT "Carry by hand"
17 ENDIF
```

(b) State what the algorithm outputs when the input is: **[2]**

20 .....

16 .....

4 **Total: 4 marks**

A water-quality sensor takes three whole-number readings. The algorithm below should:

- use the function `MeanReading` to **return** the mean of three readings; the mean may not be a whole number
- store the mean of the readings 4, 9 and 8 in the variable `Result`, then output it.

The algorithm contains **three** errors.

```
01 FUNCTION MeanReading(First : INTEGER, Second : INTEGER, Third : INTEGER) RETURNS INTEGER
02     DECLARE Mean : REAL
03     Mean ← (First + Second + Third) / 3
04     OUTPUT Mean
05 ENDFUNCTION
06 DECLARE Result : REAL
07 CALL MeanReading(4, 9, 8)
08 OUTPUT "Mean reading is ", Result
```

(a) Identify the line number of each error and suggest a correction. **[3]**

Error 1 Line number ..... Correction

Error 2 Line number ..... Correction

Error 3 Line number ..... Correction

(b) The errors are corrected. State the output from the algorithm. **[1]**

5 **Total: 6 marks**

A hotel heating system checks whether a room is at a comfortable temperature. A temperature, in °C, is comfortable if it is from 18.0 to 24.0 inclusive. Temperatures are real numbers, such as 21.5

(a) Write an algorithm using pseudocode to: **[6]**

- define a function `IsComfortable` that has a temperature as its parameter and returns `TRUE` if the temperature is comfortable, or `FALSE` if it is not
- input a room temperature
- use the function `IsComfortable` to output `"Comfortable"` or `"Adjust heating"` for the temperature input.

You do not need to declare any variables in the main algorithm.

Total for this worksheet: 22 marks