2.2 Programming Fundamentals: Test Pack

OCR J277 · Calculators not allowed · about 25 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 This question is about data types used in programming.

(a) Which data type would be most appropriate to store the answer to the question 'Is the number even?' **(1)**

- ☐ A) Integer
- ☐ B) Boolean
- ☐ C) String
- ☐ D) Real

(b) State the most appropriate data type for each value: (i) the number of pets a person owns (ii) the price of a chocolate bar, £2.35 (iii) a student's exam grade letter, for example 'A' (iv) whether a password entered is correct **(4)**

(c) A programmer stores a UK postcode, for example 'SW1A 1AA', using a Real data type. Explain why this is not appropriate and state a more suitable data type. **(2)**

(Total for Question 1 is 7 marks)

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2 A cafe offers a discount: a student spending more than £15 gets 20% off; a student spending £15 or less gets 10% off; a non-student gets no discount.

Write an algorithm, using nested IF statements in pseudocode, that inputs a Boolean isStudent and a Real spend, then outputs the discount percentage that applies (0, 10 or 20).

(Total for Question 2 is 4 marks)

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3 A school records the test scores, out of 100, of 8 students in a computer science class.

Write an algorithm, using pseudocode, that:
- uses a loop to input 8 scores, validating each one so it must be between 0 and 100 inclusive before it is accepted
- stores each valid score in an array called scores
- calculates and outputs the average (mean) score
- outputs 'Well done, class!' if the average is 60 or above, otherwise outputs 'More revision needed'

Your algorithm should make use of iteration, selection and an array.

(Total for Question 3 is 10 marks)

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Mark scheme · 2.2 Programming Fundamentals: Test Pack

Question 1

(a) B selected (Boolean) cao **B1**

(a) Answer: B

(b) (i) Integer **B1**

(b) (ii) Real (accept float) oe **B1**

(b) (iii) Character **B1**

(b) (iv) Boolean **B1**

(b) Answer: (i) Integer (ii) Real (iii) Character (iv) Boolean

(c) reason: a postcode contains letters and spaces / is not used in a calculation, so it cannot be stored as a number oe **B1**

(c) correct alternative type stated: String **B1**

(c) Answer: A postcode is not purely numeric and is never used in arithmetic, so it should be stored as a String.

Question 2

outer IF tests isStudent **M1**

nested IF inside correctly tests spend > 15 and outputs 20 **M1**

correct ELSE branch (student, spend ≤ 15) outputs 10 **M1**

correct final ELSE branch (not a student) outputs 0; any correct logic, ignore minor syntax **M1**

Answer:

```
INPUT isStudent
INPUT spend
IF isStudent == True THEN
  IF spend > 15 THEN
    OUTPUT 20
  ELSE
    OUTPUT 10
  ENDIF
ELSE
  OUTPUT 0
ENDIF
```

Question 3

array scores correctly declared to hold 8 elements **M1**

total variable initialised to 0 before the main loop **M1**

an outer FOR loop correctly repeats 8 times (once per student) **M1**

a score is input inside the loop **M1**

a validation loop (WHILE) correctly re-tests the score against both 0 and 100 **M1**

an error message is output and the score re-input inside the validation loop **M1**

the valid score is stored in the correct array element, e.g. scores[i] **M1**

each score is added to total, and average is correctly calculated as total / 8 after the main loop **M1**

an IF statement correctly compares average to 60 **M1**

correct outputs matched to each branch: 'Well done, class!' if average ≥ 60, else 'More revision needed'; any correct logic, ignore minor syntax, up to 10 marks total **M1**

Answer:

```
DECLARE scores : ARRAY[0:7] OF INTEGER
total = 0
FOR i = 0 TO 7
  INPUT mark
  WHILE mark < 0 OR mark > 100
    OUTPUT "Invalid, enter again"
    INPUT mark
  ENDWHILE
  scores[i] = mark
  total = total + scores[i]
NEXT i
average = total / 8
OUTPUT average
IF average >= 60 THEN
  OUTPUT "Well done, class!"
ELSE
  OUTPUT "More revision needed"
ENDIF
```


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