**Dear Students**

**Now you have 2 different solutions of prerelease material, already uploaded on the blog, Now the answers of all the possible questions are also written here, just after the space given for the answer.**

**1 (a)** All variables, constants and other identifiers should have meaningful names.

**(i)** Declare suitable arrays and their purpose.

Array 1 ...............................................................................................................................

Purpose .............................................................................................................................

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Array 2 ...............................................................................................................................

Purpose .............................................................................................................................

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DECLARE CowID(HerdSize) : Integer

Purpose: To store the Cow ID

DECLARE CowTotal(HerdSize) : Single

Purpose: To store the total milk produced by each cow

DECLARE CountLowDays(HerdSize) : Single

Purpose: To store the number of days when each cow is producing lesser than 12 litres.

**(ii)** Name **one** variable and **one** constant you used for **Task 1** and state the purpose of each

one. Give the value that would be assigned to each one and explain what it is used for.

Variable .............................................................................................................................

Data type ...........................................................................................................................

Value ...............................................................................................................................

Purpose .............................................................................................................................

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Constant ............................................................................................................................

Data type ...........................................................................................................................

Value ...............................................................................................................................

Purpose .............................................................................................................................

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Variable : DayTotal

Data type : Single

Value : 12.5, 8, 14.23

Purpose: To store the total of morning and evening yield for each cow

Constant : Herdsize

Data type: Integer

Value: 10, 100, 50, 1000

Purpose: To store the size of the herd, which is fixed.

**(b)** Write an algorithm to complete **Task 1**, using **either** pseudocode, programming statements

or a flowchart.

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**Pseudocode**

//Declaration of Identifiers for task 1

CONSTANT HerdSize 100

DECLARE CowID(HerdSize), CowNo, TempCowNo, DayNo : Integer

DECLARE DayYield1, DayYield2 : Single

//Declaration of Identifiers for Task 2

DECLARE CowTotal(HerdSize), DayTotal : Single

//Declaration of Identifiers for Task 3

DECLARE CountLowDays(HerdSize) : Single

//Task 1: Record the Cow ID

FOR CowNo 1 TO HerdSize

PRINT "Cow No. : " , CowNo

PRINT "Enter 3 digit cow ID : "

INPUT CowID(CowNo)

//Validation of Cow ID using range check

WHILE CowID(CowNo) < 100 Or CowID(CowNo) > 999 DO

PRINT "Error: Enter Cow ID in 3 digits : "

INPUT CowID(CowNo)

END WHILE

//To check uniqueness of Cow ID

For TempCowNo = 1 To (CowNo - 1)

While CowID(CowNo) = CowID(TempCowNo)

PRINT "ID already used. Enter a unique ID : "

INPUT CowID(CowNo)

End While

Next TempCowNo

Next CowNo

//Task 1: Record the Yield

FOR CowNo 1 TO HerdSize

PRINT "Enter yield for cow ID " , CowID(CowNo)

CowTotal(CowNo) = 0

CountLowDays(CowNo) = 0

//Data entry of cow yield

FOR DayNo 1 TO 7

PRINT "Day No. : " , DayNo

PRINT "Enter yield of 1st milking in litres : "

INPUT DayYield1

DayYield1 Math.Round(DayYield1, 1)

PRINT "Enter yield of 2nd milking in litres : "

INPUT DayYield2

DayYield2 Math.Round(DayYield2, 1)

//For Task 1 and 2 both: calculating day total and cow total ( Required for task 2 as well)

DayTotal DayYield1 + DayYield2

CowTotal(CowNo) CowTotal(CowNo) + DayTotal

NEXT DayNo

NEXT CowNo

(ii) Comment on the efficiency of your design for **Task1**.

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**Efficiency of Algorithm**

* Use of **CONSTANT** to hold fixed value of herd size
* Use of ARRAY to store identity code of cows
* Uses **IF** statement to print appropriate error message when validation fails
* Uses **nested FOR** statements to input milk yield for all cows for a week

**(c)** Give **two** different validation checks you could have used for data entry in **Task 1**. For each

check explain why it could be used and provide a set of data for testing.

Validation check 1 .....................................................................................................................

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Reason for choice .....................................................................................................................

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Set of test data .........................................................................................................................

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Validation check 2 .....................................................................................................................

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Reason for choice .....................................................................................................................

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Set of test data .........................................................................................................................

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**Validation:**

1) To accept only 3 digit CowId and to reject all others:

CowID(CowNo) = Console.ReadLine

'Validation of Cow ID using range check

While CowID(CowNo) < 100 Or CowID(CowNo) > 999

Console.Write("Error: Enter Cow ID in 3 digits : ")

CowID(CowNo) = Console.ReadLine

End While

Set of test data : 123, 258,654(Acceptable) 12, 2586, 75, 2659 (Rejected)

2) To check uniqueness of Cow ID

For TempCowNo = 1 To (CowNo - 1)

While CowID(CowNo) = CowID(TempCowNo)

Console.Write("ID already used. Enter a unique ID : ")

CowID(CowNo) = Console.ReadLine

End While

Next

Set of test data : 123, 258,654(Acceptable) 654, 654 (Rejected)

**(d)** Explain how your program checks and display the total weekly volume of milk for

the herd to the nearest whole litre and the average yield per cow in a week to the nearest whole litre. (**Task 2**). Any programming statements used must be fully explained.

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**Pseudocode**

//Input of daily yield to calculate the total weekly volume (consider cow ID is already input)

FOR CowNo 1 TO HerdSize

PRINT "Enter yield for cow ID " , CowID(CowNo)

CowTotal(CowNo) = 0

CountLowDays(CowNo) = 0

//Data entry of cow yield

FOR DayNo 1 TO 7

PRINT "Day No. : " , DayNo

PRINT "Enter yield of 1st milking in litres : "

INPUT DayYield1

DayYield1 Math.Round(DayYield1, 1)

PRINT "Enter yield of 2nd milking in litres : "

INPUT DayYield2

DayYield2 Math.Round(DayYield2, 1)

//For Task 2: calculating day total and cow total

DayTotal DayYield1 + DayYield2

CowTotal(CowNo) CowTotal(CowNo) + DayTotal

NEXT DayNo

NEXT CowNo

//calculating total weekly volume and average yield per cow in week

DECLARE HerdTotal, CowAverage[HerdSize]: Single

HerdTotal 0

For CowNo 1 To HerdSize

CowAverage[CowNo] CowTotal[CowNo] / 7

CowAverage(CowNo) = Math.Round(CowAverage(CowNo))

HerdTotal = HerdTotal + CowTotal(CowNo)

Next CowNo

HerdTotal = Math.Round(HerdTotal)

PRINT "Total weekly volume of herd in litres : " , HerdTotal

//Display average yield per cow in the week

PRINT "Display output:"

For CowNo = 1 To HerdSize

PRINT "Cow ID : " , CowID[CowNo]

PRINT "Average yield : " , CowAverage[CowNo]

Next CowNo

(ii) Comment on the efficiency of your design for **Task2**.

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**Efficiency of Algorithm**

* Use of **CONSTANT** to hold fixed value of herd size
* Use of ARRAY to store identity code of cows
* Uses **IF** statement to print appropriate error message when validation fails
* Uses **nested FOR** statements to input milk yield for all cows for a week
* Use of INT built-in function to perform round up and round down of fractional value

**(e) i.** Write an algorithm to complete **Task 3**, using **either** pseudocode, programming statements **or** a flowchart.

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**Pseudocode**

//From Task 1: Record the daily Yield, to calculate cow low production days

FOR CowNo 1 TO HerdSize

PRINT "Enter yield for cow ID " , CowID(CowNo)

CowTotal(CowNo) = 0

CountLowDays(CowNo) = 0

//Data entry of cow yield

FOR DayNo 1 TO 7

PRINT "Day No. : " , DayNo

PRINT "Enter yield of 1st milking in litres : "

INPUT DayYield1

DayYield1 Math.Round(DayYield1, 1)

PRINT "Enter yield of 2nd milking in litres : "

INPUT DayYield2

DayYield2 Math.Round(DayYield2, 1)

//Specially For Task 3: Recording days for the cow producing low volume

DayTotal DayYield1 + DayYield2

IF DayTotal < 12 THEN

CountLowDays(CowNo) CountLowDays(CowNo) + 1

END IF

NEXT DayNo

NEXT CowNo

'Identify the most productive cow

DECLARE BestCowID : Integer

DECLARE BestCowYield : Single

BestCowYield 0

For CowNo 1 To HerdSize

If CowTotal(CowNo) > BestCowYield Then

BestCowYield CowTotal(CowNo)

BestCowID CowID(CowNo)

End If

Next

PRINT "ID of the most productive cow : " , BestCowID

PRINT "Weekly Yield of the most productive cow : " , BestCowYield)

'Identify the cows producing low volume of milk

PRINT "List of cows producing low volume of milk : "

For CowNo 1 To HerdSize

If CountLowDays(CowNo) >= 4 Then

PRINT "Low Volume Cow ID : " , CowID(CowNo)

End If

Next CowNo

(ii) Comment on the efficiency of your design for **Task3**.

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Any one from:

– Uses least possible instructions

– uses results from task 1 and Task 2

(iii) How does your program work when there is more than one cow produce the most milk? Explain using your method given in task3.

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comment on which cow(s) ID will be output

e.g. The first cow with the highest production will be output

(f) What changes will you make if the yield has to be recorded for the whole month.

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FOR DayNo 1 TO 7

Will be

FOR DayNo 1 TO 30

And

CowAverage[CowNo] CowTotal[CowNo] / 7

Will be

CowAverage[CowNo] CowTotal[CowNo] / 30