Solution to practice assessment for AS91075

Context and issue

Design a program to do the following:

For a kite building competition, a triangle has to be cut from a specified size of material. For any number of triangles, the user of the program keys in three lengths for the three sides of a triangle. Input is terminated with a length of -1 for the first side.

After the data for a triangle is entered, the user is given a menu of the following options for that triangle.

[P]: Perimeter of the triangle

[A]: Area of the triangle

The user selects an option by typing in a P or A, and the result of the option is displayed before the data for the next triangle is entered. The sides of the triangle are limited to a maximum of 100cm

*Hint*:

The perimeter of a triangle is the sum of the three sides

Use the following formula to determine the area of the triangle – calculated on the three sides.

Area =  where s = half the perimeter

Note: lengths entered for the three sides of a triangle are valid if the sum of any two sides is greater than the third side. For example, expected data for a triangle could be 30, 40 50.

**Input**

|  |  |  |
| --- | --- | --- |
| ***Variable name*** | ***Data type*** | ***How entered*** |
| length1 | float | User - keyboard |
| length2 | float | User – keyboard |
| length3 | float | User - keyboard |
| menuOption | character | User - keyboard |

**Output**

|  |  |  |
| --- | --- | --- |
| ***variableName*** | ***Format*** | ***When it happens*** |
| perimeter | Number – 2dp | On screen after menu choice |
| area | Number – 2dp | On screen after menu choice |

**Stored Data**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Type** | **Where it comes from** |
| halfPerimeter | float | Calculation for area |

**Constants**

SideLimit 🡨 100

**Calculations and Processing**

perimeter 🡨 length1 + length2 + length3

halfPerimeter 🡨 perimeter / 2

area 🡨 squareroot[halfperimeter \* (halfPerimeter – length1)\*(halfPerimeter –

length2)\*(halfperimeter – length3)]

if menuOPtion = “P” sufficient for achieved, as looking at expected data - could

calculate and display perimeter also be if…else for expected data

if menuOption = “A”

calculate and display area

*(if menuOPtion = “P” for merit and excellence as starting to take account calculate and display perimeter of “not normal data”*

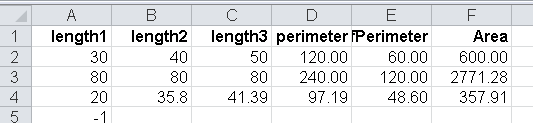
*else if menuOption = “A”*

*calculate and display area*

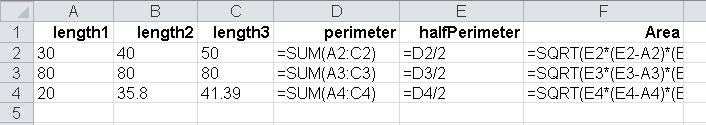
*else*

*display error message)*

**Test Data**



**Deskcheck**



**Plan Version 1**

#data entry loop

Enter length1 - type -1 to quit

Repeat until length1 = -1

Enter length2 and length3 #rest of input data

#processing

Enter length1 - type -1 to quit

#end program

**Plan Version 2**

#data entry loop and calculations

Enter length1 type -1 to quit

Repeat until length1 = -1

Enter length2 and length3 #rest of input data

#processing

Perimeter 🡨 length1 + length2 + length3

halfPerimeter 🡨 perimeter / 2

area 🡨 squareroot[halfperimeter \* (halfPerimeter – length1)(halfPerimeter –

length2)(halfperimeter – length3)]

Enter length1 - type -1 to quit

#end program

**Plan Version 3**

#data entry loop and calculations and input for menu options

Enter length1 - type -1 to quit

Repeat until length1 = -1

Enter length2 and length3 #rest of input data

#processing

Perimeter 🡨 length1 + length2 + length3

halfPerimeter 🡨 perimeter / 2

area 🡨 squareroot[halfperimeter \* (halfPerimeter – length1)(halfPerimeter –

length2)(halfperimeter – length3)]

# Display menu options

Enter menuOption from user (P or A)

if menuOption = “P”

display perimeter

if menuOption = “A”

display area

Enter length1 - type -1 to quit

#end program UP TO HERE FOR ACHIEVED

**Testing Table**

**Exceptional and boundary data Table**

|  |  |  |  |
| --- | --- | --- | --- |
| ***Test Data*** | ***What is being tested*** | ***Expected output*** | ***Actual Output*** |
| Length1 = -1 | No data entered | Message of no data |  |
| Length1 =100, length2 = 100, length3 = 100 | Boundary of side triangle = 100 | Perimeter = 300  Area = 4330.13 |  |
| All Length = 0 | Boundary of side triangle = 0 | Perimeter = 0  Area = 0 |  |
|  | | | |
| Up to here for merit - see version 4 of plan | | | |

**Exceptional, boundary and invalid data**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Test Data*** | ***What is being tested*** | | | ***Expected output*** | | ***Actual Output*** |
| Lengths close to the range of 0 - 100 | | Boundary range of limits | See testdata below | |  | |
|  | | | | | | |
| Lengths outside the range 0 - 100 | | Invalid data for length of sides of triangle | Error message and request for more data  *Note will have to modify if length entered is -1, as this stops the loop* | |  | |
| Lengths that don’t satisfy triangle criteria of two sides added greater than third side | | Invalid triangle data | See testdata in above table | |  | |
| Menu option that is not P or A | | Invalid Data for menu Option | Error message and request for correct data | |  | |
| Needed for excellence - see versions 5 and 6 | | | | | | |

**Plan Version 4**

#data entry loop and calculations and input for menu options

#and code for exceptional inputs

Flag 🡨 0

Enter length1 - type -1 to quit

Repeat until length1 = -1

Enter length2 and length3 #rest of input data

#processing

Flag 🡨 1

Perimeter 🡨 length1 + length2 + length3

halfPerimeter 🡨 perimeter / 2

area 🡨 squareroot[halfperimeter \* (halfPerimeter – length1)(halfPerimeter –

length2)(halfperimeter – length3)]

# Display menu options

Enter menuOption from user (P or A)

if menuOption = “P”

display perimeter

if menuOption = “A”

display area

Enter length1 - type -1 to quit

If flag = 0

Display no data entered

#end program UP TO HERE FOR MERIT - with testing table

**Plan Version 5**

#data entry loop and calculations and input for menu options

#and code for exceptional, boundary and invalid inputs

#and adding in validation check for triangle

Flag 🡨 0

Enter length1 - type -1 to quit

#code to check for valid lengths - also note value to stop data entry

Repeat until length = -1 or (length1 >= 0 and length1 <= 100)

Error message

Enter length 1 - type -1 to quit

Repeat until length1 = -1

#rest of input data

Enter length2

#code to check valid data entry - note don’t need the -1 for this length

Repeat until (length2 >= 0 and length2 <= 100)

Error message

Enter length2

and length3

Repeat until (length3 >= 0 and length3 <= 100)

Error message

Enter length3

**#code to check for valid triangle data**

If (length1 > (length2 + length3) AND length2 > (length1 + length3) AND (length3 > (length1 + length2)

#processing is now possible

Flag 🡨 1

Perimeter 🡨 length1 + length2 + length3

halfPerimeter 🡨 perimeter / 2

area 🡨 squareroot[halfperimeter \* (halfPerimeter – length1)(halfPerimeter –

length2)(halfperimeter – length3)]

# Display menu options

Enter menuOption from user (P or A)

if menuOption = “P”

display perimeter

if menuOption = “A”

display area

Else

Display error message

#start data entry again

Enter length1 - type -1 to quit

#remember to check for this data entry for validity as well

Repeat until length = -1 or (length1 >= 0 and length1 <= 100)

Error message

Enter length 1 - type -1 to quit

If flag = 0

Display no data entered

#end program

THIS WILL GIVE EXCELLENCE = PLUS TESTING TABLE

**Plan Version 6**

#data entry loop and calculations and input for menu options

#and code for exceptional, boundary and invalid inputs

#and adding in validation check for triangle

#making program more robust and flexible

Flag 🡨 0

Enter length1 - type -1 to quit

#code to check for valid lengths - also note value to stop data entry

Repeat until length = -1 or (length1 >= 0 and length1 <= 100)

Error message

Enter length 1 - type -1 to quit

Repeat until length1 = -1

#rest of input data

Enter length2

#code to check valid data entry - note don’t need the -1 for this length

Repeat until (length2 >= 0 and length2 <= 100)

Error message

Enter length2

and length3

Repeat until (length3 >= 0 and length3 <= 100)

Error message

Enter length3

**#code to check for valid triangle data**

If (length1 > (length2 + length3) AND length2 > (length1 + length3) AND (length3 > (length1 + length2)

#processing is now possible

Flag 🡨 1

Perimeter 🡨 length1 + length2 + length3

halfPerimeter 🡨 perimeter / 2

area 🡨 squareroot[halfperimeter \* (halfPerimeter – length1)(halfPerimeter –

length2)(halfperimeter – length3)]

# Display menu options

#making program more robust and flexible

#giving user the choice of running the options

# more than once on same triangle data

choice 🡨 N

repeat until choice = N

Enter menuOption from user (P or A )

#check for valid data entry

Repeat until menuOption = P or menuOption = A

Error message

Enter menuOption from user (P or A)

if menuOption = “P”

display perimeter

if menuOption = “A”

display area

Ask user if want to see menu again? (Y/N) and assign to choice

Else

Display error message

#start data entry again

Enter length1 - type -1 to quit

#remember to check for this data entry for validity as well

Repeat until length = -1 or (length1 >= 0 and length1 <= 100)

Error message

Enter length 1 - type -1 to quit

If flag = 0

Display no data entered

#end program

**Code for version 6 gives additional opportunity for excellence**