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| Area of Triangles and Rectangles | |
| **Updated** | **10.28.2018 2:13 PM** |

# **Problem Statement:**

Write a Java program for calculating the area of triangles and rectangles. The user is asked whether a triangle or rectangle is required, then prompted for the relevant dimensions, and the answer is displayed. Use the Wages program as a template. Note that the area of a rectangle is width \* height, and the area of a triangle is ½ base width \* height. Ensure your program works correctly for different user inputs.

# **Approach**

The User chooses either Rectangle of Triangle by entering 1 or 2 and the program tests for a valid entry and if incorrect requests the User re-enter 1 or 2. We then ask the user for width and height of the shape and again tests for valid input. Then if user had entered 1 calculate the area of a Rectangle else calculate area of Triangle, else fail gracefully.

# **Design**

Ask the User if they want to calculate the area of 1. a Rectangle or 2. a Triangle

WHILE

{

Check that the user has actually entered a real number and it is either 1 or 2

Input is not 1 or 2 re-ask the user to submit either 1 or 2

}

Ask the User what is the width of whatever shape they have chosen

WHILE

{

Check that the user has actually entered a real number and it contains only positive digits between 0 and 9. Input is not positive digits between 0 and 9 re-ask the user to submit width

}

Ask the User what is the height of whatever shape they have chosen

WHILE

{

Check that the user has actually entered a real number and it contains only positive digits between 0 and 9. Input is not positive digits between 0 and 9 re-ask the user to submit width

}

IF

The user has selected 1 then calculate area of Rectangle using the formula 'area = height \* width'

Print the area of Rectangle

ELSE IF

The user has selected 2 then calculate area of Triangle using the formula 'area = (height \* width)/2'

Print the area of Triangle

ELSE

Unexpected error occurs then fail gracefully

EXIT



# **Testing**

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Test** | **Expected Result** | **Actual Result** |
| 1 | Enter positive real numbers other than 1 or 2 in first dialogue box | Incorrect input: Please enter either 1 or 2 only | Incorrect input: Please enter either 1 or 2 only |
| 2 | Enter a letters into first dialogue box | Incorrect input: Please enter either 1 or 2 only | Incorrect input: Please enter either 1 or 2 only |
| 3 | Enter negative real numbers into first dialogue box | Incorrect input: Please enter either 1 or 2 only | Incorrect input: Please enter either 1 or 2 only |
| 4 | Enter nothing into the first dialogue box | Incorrect input: Please enter either 1 or 2 only | Incorrect input: Please enter either 1 or 2 only |
| 5 | Enter symbols into first dialogue box | Incorrect input: Please enter either 1 or 2 only | Incorrect input: Please enter either 1 or 2 only |
| 6 | Enter positive 1 or 2 numbers in first dialogues box | Accept numbers and show input width UX | Accept numbers and show input width UX |
| 7 | Enter a letters into width/height dialogue box | Incorrect input: Please enter number for width/height | Incorrect input: Please enter number for width/height |
| 8 | Enter negative real numbers into width/height dialogue box | Incorrect input: Please enter number for width/height | Incorrect input: Please enter number for width/height |
| 9 | Enter nothing into the width/height dialogue box | Incorrect input: Please enter number for width/height | Incorrect input: Please enter number for width/height |
| 10 | Enter symbols into width/height dialogue box | Incorrect input: Please enter number for width/height | Incorrect input: Please enter number for width/height |
| 11 | Enter positive numbers in width/height dialogues box | Accept numbers and show height or result UX | Accept numbers and show height or result UX |
| 12 | Test OK button | Accept Input | Accept Input |
| 13 | Test cancel button | Close UX and quit program | Close UX and quit program |
| 14 | Test close pop-up button | Close UX and quit program | Close UX and quit program |
| 15 | Check Triangle Area is correct | Area of Triangle is correct | Area of Triangle is correct |
| 16 | Check Rectangle Area is correct | Area of Rectangle is correct | Area of Rectangle is correct |
| 17 | Programme closes at end | Programme closes at end | Programme closes at end |

# **Source Code**

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| --- |
| /\* McMahonMichael\_Wk1\_MCT619  \* Assignment: Write a Java program for calculating the area of triangles and rectangles. The user is asked whether a triangle or rectangle is required,  \* then prompted for the relevant dimensions, and the answer is displayed. Use the Wages program as a template. Note that the area of a rectangle  \* is width x height, and the area of a triangle is ½ base width x height. Ensure your program works correctly for different user inputs.\*/  **import** javax.swing.JOptionPane; // Dialog box methods  **public** **class** CalculateAreaOfShape  {  **public** **static** **void** main(String[] args)  {  /\*Declare the whole number and string variables\*/  **double** shape, width, height, area;  String shapeStr, widthStr, heightStr;    /\* Get the user to choose which shape to calculate area of and check for incorrect input \*/  shapeStr = JOptionPane.*showInputDialog*(**null**, "\n Do you want to find the area of \n 1 . Rectangle \n 2 . Triangle \n\n Enter either 1 or 2 to choose: ");  **while**(shapeStr.isEmpty() || !shapeStr.matches("[1-2]") )  {  shapeStr = JOptionPane.*showInputDialog*(**null**, "\n Incorrect input \n Please enter either 1 or 2 only:",  "Error",  JOptionPane.***WARNING\_MESSAGE***);  }  shape = Double.*parseDouble*(shapeStr);    /\* Get width from user in string form, check for incorrect or empty input and when OK convert to float \*/  widthStr = JOptionPane.*showInputDialog*(**null**, "Enter shapes width:");  **while**(widthStr.isEmpty() || !widthStr.matches("^[0-9]\*$"))  {  widthStr = JOptionPane.*showInputDialog*(**null**, "\n Incorrect input \n Please enter a number for width:",  "Error",  JOptionPane.***WARNING\_MESSAGE***);  }  width = Double.*parseDouble*(widthStr);    /\* Get height from user in string form, check for incorrect or empty input and when OK convert to float \*/  heightStr = JOptionPane.*showInputDialog*(**null**, "Enter shapes height:");  **while**(heightStr.isEmpty() || !heightStr.matches("^[0-9]\*$"))  {  heightStr = JOptionPane.*showInputDialog*(**null**, "\n Incorrect input \n Please enter a number for height:",  "Error",  JOptionPane.***WARNING\_MESSAGE***);  }  height = Double.*parseDouble*(heightStr);    /\* If the user has select 1 then calculate area of Rectangle \*/  **if** (shape == 1) {  area = height \* width;  JOptionPane.*showMessageDialog*(**null**, "Area of Rectangle is: "+area);  }    /\* If the user has select 2 then calculate area of Triangle \*/  **else** **if** (shape == 2) {  area = (height \* width)/2;  JOptionPane.*showMessageDialog*(**null**, "Area of Triangle is: "+area);  }    /\* If some another error occurs then fail gracefully\*/  **else** {  JOptionPane.*showMessageDialog*(**null**, "Error: Unknown failure - please try again",  "Incorrect Input",  JOptionPane.***WARNING\_MESSAGE***);  }  System.*exit*(0); // Terminate program  }  } |

# **References:**

[1] Deitel, H. & Deitel, P. (2012). *Java How to Program* (9th ed.). Upper Saddle River, NJ: Prentice Hall.