Chapter 5 – Finding Area program

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**Instructions**:

NOTE: I do the flow a little differently in my program. The resulting output will match the sample output.

1. Create a menu function called from main that will present the user with the following menu.  
   This program will find the area of a shape for you.  
   1. Rectangle  
   2. Triangle  
   3. Square  
   4. Circle  
   5. Quit
2. Call a validation function from the main function to validate user input, use awhile loop to validate data. Return the validated number to the main function.
3. Depending on the number selected, ask the user for the appropriate measurements to calculate the area of the specified shape (see the sample output) (Ask the user in the menu and pass the values to the called function)
4. Call the appropriate function, pass the required values to the function
5. Return the area to the main function and print it on screen from the main function
6. The menu should re-display until the user selects quit. Use a while loop in the main method with a flag to accomplish this.
7. Create a global variable for pi and use it when calculating the area of a circle.

**Data: (organized by functions)**

Functions:

* Main(): starts the program, displays the menu. Will loop until user enter’s a valid option (1,2,3,4,5). Will also continue asking the user for an area choice until they choose 5. Quit. Once a valid selection is made, routeTo() function is called which will display the correct area questions.
  + Variables, user input
    - Selection: String, represents the user’s selection of area
* displayMenu(): displays the menu containing the 4 different area functions and the quit option. Returns the user’s selection.
  + Variable:
    - Options: array containing the 4 areas and “Quit” options
  + User input
    - Selection: String containing the user’s menu choice
* ValidateSelection(): If the user’s selection matches one of these valid choices, it will return true (the user's selection is valid)
  + Variables
    - Valid\_choices: array containing the valid menu options
  + User input
    - Selection: user’s menu selection
* validatePositive(): Confirms the number the user entered is positive. It will not allow negative or 0 as a measurement. Returns a valid measurement.
* RouteTo(): Takes in the user’s selection and sends them to the appropriate area function.
  + Variable:
    - Selection: user’s selection from main()
  + No user input
* areaOfRectange(), areaOfTriangle(), areaOfSquare(), areaOfCircle(): The four different area functions that can be called. After getting the measurements, it will display the area.
  + Variables and user input
    - Length, width for rectangle
    - Length for square
    - Base, height for triangle
    - Radius for circle

**Processing**:

1. Run main(), which displays the displayMenu() function within a while loop. This will continue looping until the user selects 5.
2. Validate the user’s menu selection.
   1. If their selection is not valid, tell them it’s invalid and display the menu again.
   2. If their selection is valid, call routeTo() function
3. The routeTo function, based on the user’s selection, will call the appropriate area function.
4. Within routeTo()
   1. If selection is 1 -> call areaOfRectangle() function
   2. If selection is 2 -> call areaOfTriangle function
   3. If selection is 3 -> call areaOfSquare function
   4. If selection is 4 -> call areaOfCircle
   5. Otherwise, inform the user something went wrong. Send them back to the menu.
5. Each area function will ask for their respective measurements, discussed in the data section.
6. Display the area to the user.
7. Return to the main() function, display the menu, and start again.

**Output**:

* Displays the menu and asks for the user’s selection.
* Appropriate questions for measurements are presented
* Display the area to the user
* Display the menu again

**Example Output:**

This program will find the area of a shape for you.

1. Rectangle

2. Triangle

3. Square

4. Circle

5. Quit

Please enter the number of your selection: 0

This is not a valid number.

This program will find the area of a shape for you.

1. Rectangle

2. Triangle

3. Square

4. Circle

5. Quit

Please enter the number of your selection: 4

Enter the radius of the circle in cm: 3

The area of the circle is 28.27 square cm.

This program will find the area of a shape for you.

1. Rectangle

2. Triangle

3. Square

4. Circle

5. Quit

Please enter the number of your selection: 5

Thank you for playing