

CIS 230 – Spring 2006
Homework #9
Due Wednesday, April 19, 2006 at 10:00 AM

Submit your files using the submission tool on the qs-server:
/class-files/gilden/230submit

Files to Submit:

- all of your .h files for your classes
- all of your .cpp files for your classes
- your .cpp file that contains main()
- all of your .h files for your free functions
- all of your .cpp files for your free functions

Assignment:

Create a class called 'Shape' that has methods to **return** the perimeter and area. Each of which **calls** methods to **calculate** the perimeter and area (no perimeter or area data are kept). The functions to calculate the perimeter and area should be **virtual**.

Create three direct descendant classes of Shape:

- Circle: radius
- Triangle: 3 sides
- Rectangle: length & width

Create a direct descendant of rectangle:

- Square: 1 side

Each of these classes should have the appropriate methods to **calculate** the perimeter and area, as well as constructor method(s), and methods to store the data members.

Create a main() to perform the following tasks:

- State the program purpose
- Ask the user what shape they want to use
- Input the answer
- Ask the user the appropriate data for that shape
- Input the answer
- Use the appropriate class methods to store the data.
- Report (cout) the shape that is being used
- Invoke the print_area() (free) function
- Invoke the print_perimeter() (free) function

Create a print_area() function that:

- Is a "free" or "normal" function
- Accepts a 'Shape' object
- Gets the area from the class method return_area()
- Reports (couts) the area of the shape

Create a `print_perimeter()` function that:

- Is a “free” or “normal” function
- Accepts a ‘Shape’ object
- Gets the perimeter from the class method `return_perimeter()`
- Reports (couts) the perimeter of the shape

Calculating the Area of a Triangle:

Recall that the Area of a triangle can be calculated using Heron’s Formula:

$$s = \frac{(a + b + c)}{2}$$
$$A = \sqrt{s(s - a)(s - b)(s - c)}$$

(Note: when calculating “s” $a+b+c$ should look familiar (i.e., you already have a function that performs that calculation, it is `calc_perimeter()`)

Remember:

All functions, including main, must be documented to explain their purpose using the coding standard. Document a class member function right before the function definition.

You must use meaningful variable/function names.