C++ Circe's Circle Calculator OOP

Time required: 120 minutes

- Comment each line of code as shown in the tutorials and other code examples.

- Follow all directions carefully and accurately.

- Think of the directions as minimum requirements.

Requirements

Circe is an enchantress and a minor goddess of magic in ancient Greek mythology and religion. She loves circles! She would like you to create a circle calculator in Java for her to use whenever she takes a break from being a goddess.

She wants to test your programming ability. She wants a version of her favorite program in OOP. She wants it with a separate OOP class and header file. You will have 3 files when complete. Circes can be a bit demanding.

This program will ask the user to enter the radius of a circle. Calculate and display the circle's diameter, area, and circumference.

1. Create a C++ program named **circle_calculator_oop.cpp**

2. Create a C++ header file named **circle.h**

3. Create a C++ class file named **circle.cpp**

4. Create the following methods.

setRadius() – Set the incoming radius value entered by user as a private member variable.

getDiameter() - Calculate diameter. Return value as double.
formula: d = 2r, where r = radius

getArea() - Calculate area. Return value as double.
formula: $A = \pi r^2$, where r = radius

getCircumference() - Calculate circumference. Return value as double.
formula: $C = \pi r^2$, where r = radius

Allow user to choose to quit or run the program again.

You will want a private member variable for each of the variables needed.

Convert Math Formula to C++ Code

The following is an example of how to convert math formulas to C++ code.

```cpp
// C++ does not have a built in constant for PI
// Declare PI as a constant in the header file
const double PI = 3.14159265358979323846;


# Diameter of a circle: d = 2r
diameter = 2.0 * radius;


# Area of a circle: a = πr2
area = PI * (radius * radius);


# Circumference of a circle: c = 2πr
circumference = (2.0 * PI) * radius;
```

TODO Outline of Program

You can use the following TODO outline to get started with your program.

```cpp
/**
 * Filename: CircleCalculatorOOP.cpp
 * Written by:
 * Written on:
 * Purpose: C++ OOP program to calculate
 * the diameter, area, and circumference of a circle
 */
#include <iostream>
// Include for thousands formatting
#include <locale.h>

int main(){
    // Set the locale for thousands separator
    setlocale(LC_ALL, "");

    // TODO: Create class file and header file

    // TODO: setRadius() Get user input for radius as double

    // TODO: getDiameter() Calculate diameter of circle
    // formula: d = 2r, where r = radius

    // TODO: getArea() Calculate area of circle
    // formula: a = πr2, where r = radius

    // TODO: Calculate circumference of circle
    // TODO: getCircumference() formula: c = 2πr, where r = radius

    // TODO: Display results
    // Use printf to format float to 2 decimal places
    // Use apostrophe ' to show comma , as a 1,000's separator
    // Use printf to format numbers %'.2f\n

// Call all methods from the main program
```

Example run:

```
------------------------------------------------------
|          Circe's Circle Calculator in C++           |
|  Calculate the area and circumference of a Circle   |
------------------------------------------------------
 Enter radius: 12
     Diameter: 24.00
         Area: 452.39
Circumference: 75.40

Do you want to calculate another circle? (y/n): y
 Enter radius: 15.6
     Diameter: 31.20
         Area: 764.54
Circumference: 98.02

Do you want to calculate another circle? (y/n): |
```

Assignment Submission

1. Attach the program files.

2. Attach screenshots showing the successful operation of the program.

3. Submit in Blackboard.