**Interface Inheritance**

1. Write a program to represent geometric shapes and some operations that can be performed on them. The idea here is that shapes in higher dimensions inherit data from lower dimensional shapes. For example a cube is a three dimensional square. A sphere is a three dimensional circle and a glome is a four dimensional circle. A cylinder is another kind of three dimensional circle. The circle, sphere, cylinder, and glome all share the attribute radius. The square and cube share the attribute side length. There are various ways to use inheritance to relate these shapes but please follow the inheritance described in the table below. All shapes inherit getName() from the superclass Shape.

Specification:

Your program will consist of the following classes: **Shape, Circle, Square, Cube,**

**Sphere, Cylinder,** and **Glome** and two interfaces **Area** and **Volume.**

Your classes may **only** have the class variable specified in the table below and the methods defined in the two interfaces Area and Volume. You will implement the methods specified in the Area and Volume interfaces and have them return the appropriate value for each shape. Class Shape will have a single public method called getName that returns a string.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class** | **Class Variable** | **Constructor** | **Extends** | **Implements** |
| Shape | String name | Shape() |  |  |
| Circle | double radius | Circle( double r, String n ) | Shape | Area |
| Square | double side | Square( double s, String n ) | Shape | Area |
| Cylinder | double height | Cylinder(double h, double r, String n ) | Circle | Volume |
| Sphere | None | Sphere( double r, String n ) | Circle | Volume |
| Cube | None | Cube( double s, String n ) | Square | Volume |
| Glome | None | Glome( double r, String n ) | Sphere | Volume |

Note: the volume of a glome is 0.5(π2)r4 where r is the radius.

2. Define an interface “Operations” which has method area(), volume(). Define a constant PI having value 3.14. Create class a Cylinder( with member variable height) which implements this interface. Create one object and calculate area and volume. Add Required Constructors.

3. Write a program that illustrates interface inheritance. Interface **P** is extended by **P1** and **P2**. Interface **P12** inherits from both **P1** and **P2**.Each interface declares one constant and one method. Class **Q** implements **P12**. Instantiate **Q** and invoke each of its methods. Each method displays one of the constants.