ASSIGNMENT NO:- 06

**PROGRAM:**

**#include <iostream>**

**#include <cmath>**

**using namespace std;**

**class Shape {**

**public:**

**virtual double area() const = 0;**

**};**

**class Circle : public Shape {**

**private:**

**double radius;**

**public:**

**Circle(double r) : radius(r) {}**

**double area() const override {**

**return M\_PI \* radius \* radius;**

**}**

**};**

**class Triangle : public Shape {**

**private:**

**double side1, side2, side3;**

**public:**

**Triangle(double s1, double s2, double s3) : side1(s1), side2(s2),**

**side3(s3) {}**

**double area() const override {**

**double s = (side1 + side2 + side3) / 2;**

**return sqrt(s \* (s - side1) \* (s - side2) \* (s - side3));**

**}**

**};**

**class Square : public Shape {**

**private:**

**double side;**

**public:**

**Square(double s) : side(s) {}**

**double area() const override {**

**return side \* side;**

**}**

**};**

**class Polygon : public Shape {**

**protected:**

**int sides;**

**double sideLength;**

**public:**

**Polygon(int s, double length) : sides(s), sideLength(length) {}**

**double area() const override {**

**return (sides \* sideLength \* sideLength) / (4 \* tan(M\_PI / sides));**

**}**

**};**

**class Octagon : public Polygon {**

**public:**

**Octagon(double sideLength) : Polygon(8, sideLength) {}**

**};**

**int main() {**

**double radius, side1, side2, side3, squareSide, polygonSide,**

**octagonSide;**

**cout << "Enter the radius of the circle: ";**

**cin >> radius;**

**cout << "Enter the three side lengths of the triangle: ";**

**cin >> side1 >> side2 >> side3;**

**cout << "Enter the side length of the square: ";**

**cin >> squareSide;**

**cout << "Enter the number of sides for the polygon: ";**

**cin >> polygonSide;**

**cout << "Enter the side length of the octagon: ";**

**cin >> octagonSide;**

**Circle circle(radius);**

**Triangle triangle(side1, side2, side3);**

**Square square(squareSide);**

**Polygon polygon(polygonSide, 4.0);**

**Octagon octagon(octagonSide);**

**cout << "Circle Area: " << circle.area() << endl;**

**cout << "Triangle Area: " << triangle.area() << endl;**

**cout << "Square Area: " << square.area() << endl;**

**cout << "Polygon Area: " << polygon.area() << endl;**

**cout << "Octagon Area: " << octagon.area() << endl;**

**return 0;**

**}**

**OUTPUT:**

