

1. Код

```
#include <iostream>

#define PI 3.14159256

class Shape {
public:
    double x, y, z; //anchor point
    Shape();
    Shape(double, double, double);
    void printAnchor();
    void moveAnchor(double, double, double);
    virtual double voulume();
    virtual void scale(double);
};

class Sector :public Shape {
public:
    double radius;
    double angle; //cone angle (width) of sector
    double theta, phi; //inclination and azimuth angles of sector axis
    Sector();
    Sector(double, double, double, double, double, double, double);
    void printParameters();
    double volume();
    void scale(double);
    void reflect();
};

Shape::Shape() {
    x = 0;
    y = 0;
    z = 0;
}

Shape::Shape(double x_, double y_, double z_) {
    x = x_;
    y = y_;
    z = z_;
}

void Shape::printAnchor() {
    std::cout << "Anchor point is (" << x << ", " << y << ", " << z << ")\n";
}

void Shape::moveAnchor(double x_, double y_, double z_) {
    x = x_;
    y = y_;
    z = z_;
}

double Shape::voulume() {
    return 0;
}

void Shape::scale(double s) {
```

```

}

Sector::Sector() :Shape() {
    radius = 0;
    angle = 0;
    theta = 0;
    phi = 0;
}

Sector::Sector(double x_, double y_, double z_, double r_, double angle_, double theta_ =
0, double phi_ = 0) :Shape(x_, y_, z_) {
    radius = r_;
    angle = angle_;
    theta = theta_;
    phi = phi_;
}

void Sector::printParameters() {
    printAnchor();
    std::cout << "Radius is " << radius << "\n";
    std::cout << "Cone angle is " << angle << "\n";
    std::cout << "Sector axis inclination and azimuth angles are " << theta << ", " <<
phi << "\n\n";
}

double Sector::volume() {
    return (2. / 3.) * PI * pow(radius, 3) * (1 - cos(angle));
}

void Sector::scale(double s) {
    if (s < 1) {
        radius *= s;
    }
    else {
        std::cerr << "Scale factor should be <1\n\n";
    }
}

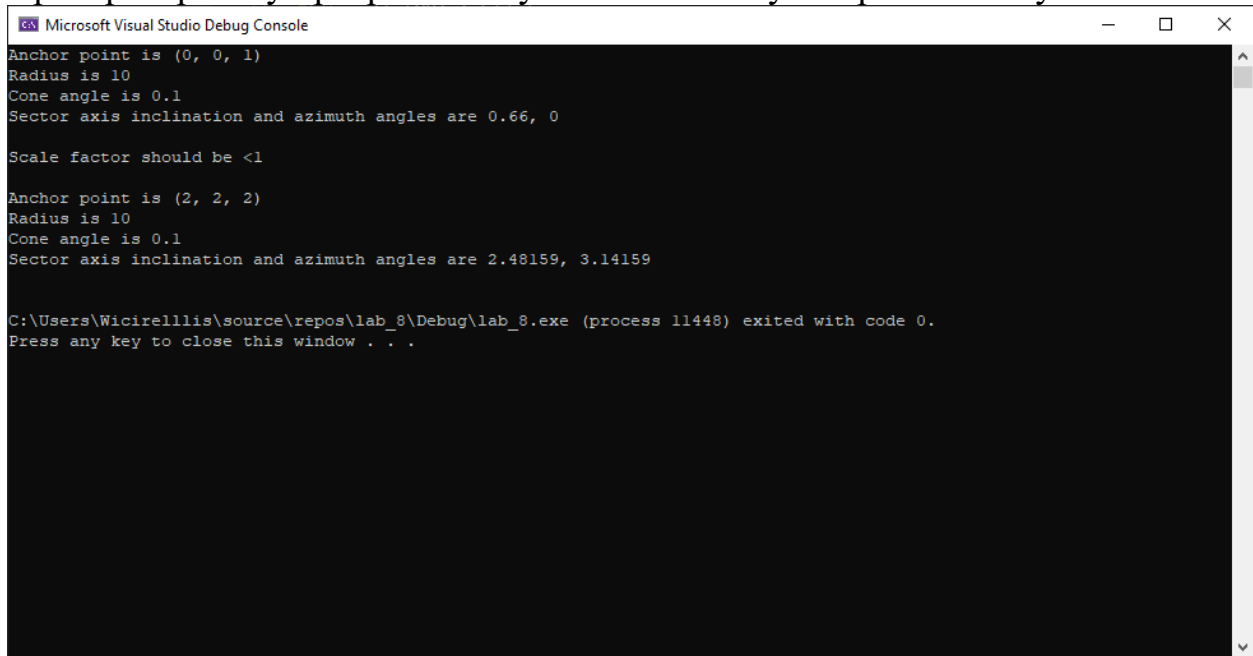
void Sector::reflect() {
    theta = PI - theta;
    if (phi < PI) {
        phi += PI;
    }
    else {
        phi -= PI;
    }
}

int main()
{
    Sector a{ 0.,0.,1.,10.,0.1, 0.66 };
    a.printParameters();
    a.moveAnchor(2, 2, 2);
    a.reflect();
    a.scale(1.3);
    a.printParameters();
    return 0;
}

```

2.

Проверим работу программы. Кусок в мейне служит ровно этому.

A screenshot of the Microsoft Visual Studio Debug Console window. The window has a title bar with the text "Microsoft Visual Studio Debug Console" and standard window controls (minimize, maximize, close). The console area is black with white text. The output shows two sets of data for a program. The first set shows an anchor point at (0, 0, 1), a radius of 10, a cone angle of 0.1, and sector axis inclination and azimuth angles of 0.66 and 0. The second set shows an anchor point at (2, 2, 2), a radius of 10, a cone angle of 0.1, and sector axis inclination and azimuth angles of 2.48159 and 3.14159. At the bottom, it states that the process "C:\Users\Wicirelllis\source\repos\lab_8\Debug\lab_8.exe (process 11448)" exited with code 0 and prompts the user to press any key to close the window.

```
Microsoft Visual Studio Debug Console

Anchor point is (0, 0, 1)
Radius is 10
Cone angle is 0.1
Sector axis inclination and azimuth angles are 0.66, 0

Scale factor should be <1

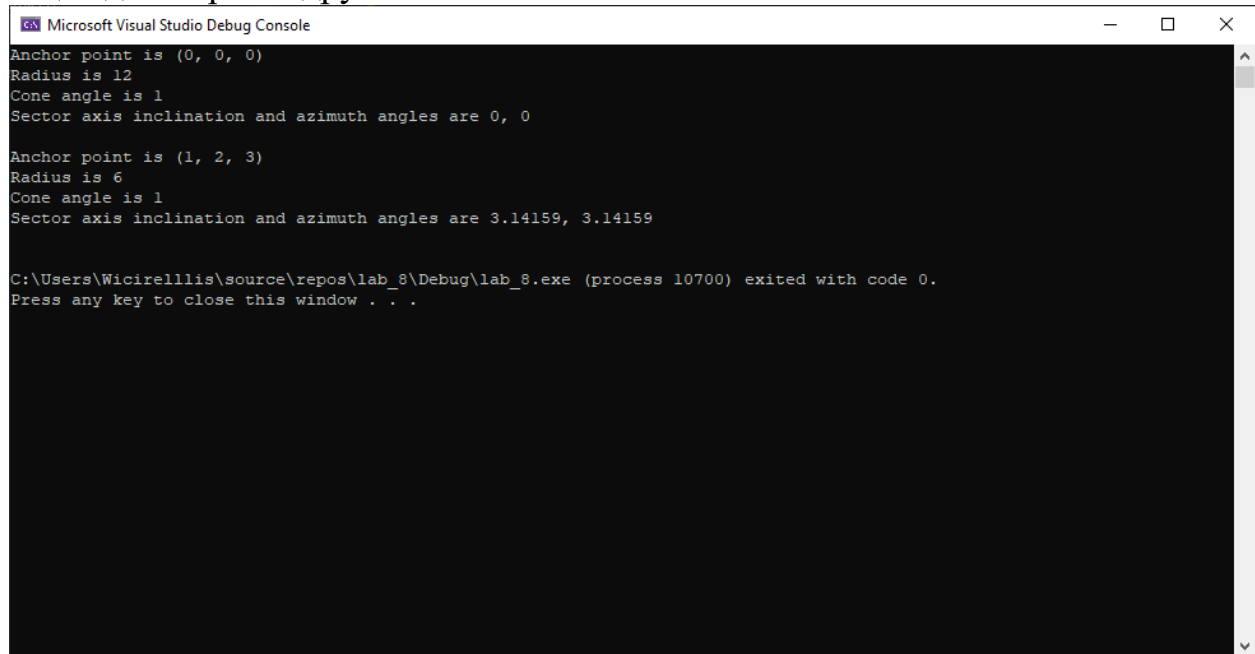
Anchor point is (2, 2, 2)
Radius is 10
Cone angle is 0.1
Sector axis inclination and azimuth angles are 2.48159, 3.14159

C:\Users\Wicirelllis\source\repos\lab_8\Debug\lab_8.exe (process 11448) exited with code 0.
Press any key to close this window . . .
```

Работает (по крайней мере на таких данных) верно.

3.

Еще один скрин с другими числами.

A screenshot of the Microsoft Visual Studio Debug Console window. The window has a title bar with the text "Microsoft Visual Studio Debug Console" and standard window controls (minimize, maximize, close). The console area is black with white text. The output shows two sets of data for a sector, followed by a message that the program has exited.

```
Microsoft Visual Studio Debug Console

Anchor point is (0, 0, 0)
Radius is 12
Cone angle is 1
Sector axis inclination and azimuth angles are 0, 0

Anchor point is (1, 2, 3)
Radius is 6
Cone angle is 1
Sector axis inclination and azimuth angles are 3.14159, 3.14159

C:\Users\Wicirellis\source\repos\lab_8\Debug\lab_8.exe (process 10700) exited with code 0.
Press any key to close this window . . .
```

4. Вопросы

1) Что такое виртуальная функция? Зачем она нужна?

Виртуальные функции можно переопределять в классах-наследниках.

2) К каким данным базового класса имеет доступ порожденный класс?

К `public` и `protected` полям\методам. Доступа к `private` нет.