```java
/*Write a program which has an abstract class Solid and implements cylinder, cone and
sphere by inheriting from solid to find surface area and volume.*/

import java.util.Scanner;
abstract class Solid
{
    float d1,d2;
    Solid(float r, float h)
    {
        d1=r;
        d2=h;
    }
    abstract void surface_area();
    abstract void volume();
}
class Cylinder extends Solid
{
    Cylinder(float r, float h)
    {
        super(r,h);
    }
    void surface_area()
    {
        double sa=2*3.14*d1*d2+2*3.14*d1*d1;
        System.out.println("the surface area of cylinder is:"+sa);
    }
    void volume()
    {
        double v=3.14*d1*d1*d2;
        System.out.println("the volume of cylinder is:"+v);
    }
}
class Cone extends Solid
{
    Cone(float r,float h)
    {
        super(r,h);
    }
    void surface_area()
    {
```

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    }
    void surface_area()
    {
        double sa=3.14*d1*(d1+Math.sqrt((d2*d2)+(d1*d1)));
        System.out.println("the surface area of cone is:"+sa);
    }
    void volume()
    {
        double v=3.14*d1*d1*(d2/3);
        System.out.println("the volume of cone is:"+v);
    }
}
class Sphere extends Solid
{
    Sphere(float r,float h)
    {
        super(r,h);
    }
    void surface_area()
    {
        double sa=4*3.14*d1*d1;
        System.out.println("the surface area of sphere is:"+sa);
    }
    void volume()
    {
        double v=(4/3)*3.14*d1*d1*d1;
        System.out.println("the volume of sphere is:"+v);
    }
}
class Main
{
    Run | Debug
    public static void main(String args[])
    {
        int ch,flag=0;
        Scanner ss=new Scanner(System.in);
        while(flag==0)
        {
        System.out.println("Enter the choice");
        System.out.println("1.CYLINDER\n2.CONE\n3.SPHERE");
```

```
        {
        System.out.println("Enter the choice");
        System.out.println("1.CYLINDER\n2.CONE\n3.SPHERE");
        ch=ss.nextInt();
            switch(ch)
            {
                case 1:
                System.out.println("Enter the radius and hieght of cylinder:");
                float x=ss.nextFloat();
                float y=ss.nextFloat();
                Cylinder cy=new Cylinder(x,y);
                cy.surface_area();
                cy.volume();
                break;
                case 2:
                System.out.println("Enter the radius and hieght of cone");
                float s=ss.nextFloat();
                float w=ss.nextFloat();
                Cone co=new Cone(s,w);
                co.surface_area();
                co.volume();
                break;
                case 3:
                System.out.println("Enter the radius of sphere:");
                float f=ss.nextFloat();
                Sphere sp=new Sphere(f,f);
                sp.surface_area();
                sp.volume();
                break;
                default:
                flag=1;
            }
        }
    }
}

```

```
C:\Users\akki\Desktop\PROJECT WORK>javac solid.java

C:\Users\akki\Desktop\PROJECT WORK>java Main
Enter the choice
1.CYLINDER
2.CONE
3.SPHERE
1
Enter the radius and hieght of cylinder:
4.5 15.6
the surface area of cylinder is:568.0260107803344
the volume of cylinder is:991.9260242557526
Enter the choice
1.CYLINDER
2.CONE
3.SPHERE
3
Enter the radius of sphere:
7
the surface area of sphere is:615.44
the volume of sphere is:1077.02
Enter the choice
1.CYLINDER
2.CONE
3.SPHERE
2
Enter the radius and hieght of cone
8 12.5
the surface area of cone is:573.7614506409544
the volume of cone is:837.3333013916016
Enter the choice
1.CYLINDER
2.CONE
3.SPHERE
4

C:\Users\akki\Desktop\PROJECT WORK>
```

```java
/*Develop a Java program to implement the hierarchy given below. Include atleast one
appropriate member in each of these classes. Set and display details in each of the class
and create objects of the leaf members in the hierarchy.*/
import java.util.Scanner;
class person
{
    Scanner ss=new Scanner(System.in);
    String name;
    void disp_person()
    {
        System.out.println("Enter the person name");
        name=ss.nextLine();
    }

}
class employee extends person
{
    int age;
    void disp_emp()
    {
        System.out.println("Enter the employee age");
        age=ss.nextInt();
    }

}
class student extends person
{
    int age;
    void disp_student()
    {
        System.out.println("Enter the student age");
        age=ss.nextInt();
    }

}
class teaching extends employee
{
    String  qualification;
    void disp_teach()
    {
```

```
38      String  qualification;
39      void disp_teach()
40      {
41          System.out.println("Enter the teaching staff qualification");
42          qualification=ss.next();
43      }
44  }
45  class non_teaching extends employee
46  {
47      String  qualification;
48      void disp_nonteach()
49      {
50          System.out.println("Enter the non teaching staff qualification");
51          qualification=ss.next();
52      }
53
54  }
55  class ug extends student
56  {
57      String dep;
58      void disp_ug()
59      {
60          System.out.println("Enter the ug department");
61          dep=ss.next();
62      }
63
64  }
65  class pg extends student
66  {
67      String dep;
68      void disp_pg()
69      {
70         System.out.println("Enter the pg department");
71         dep=ss.next();
72      }
73  }
74  class Main
75  {
        Run | Debug
76      public static void main(String args[])
```

```
72      }
73  }
74  class Main
75  {
        Run | Debug
76      public static void main(String args[])
77      {
78          int flag=0;
79          Scanner xx=new Scanner(System.in);
80          teaching t=new teaching();
81          non_teaching nt=new non_teaching();
82          ug u=new ug();
83          pg p=new pg();
84          while(flag==0)
85          {
86              System.out.println("\nEnter the choice\n1.TEACHING STAFF\n2.NON TEACHING STAFF\n3.UG STUDENT\n4.PG STUDENT");
87              int ch=xx.nextInt();
88              switch(ch)
89              {
90              case 1:
91              t.disp_person();
92              t.disp_emp();
93              t.disp_teach();
94              System.out.println("Name of the person : "+t.name);
95              System.out.println("Age of employee : "+t.age);
96              System.out.println("qualification of teaching staff: "+t.qualification);
97              break;
98              case 2:
99              nt.disp_person();
100             nt.disp_emp();
101             nt.disp_nonteach();
102             System.out.println("Name of the person : "+nt.name);
103             System.out.println("Age of employee : "+nt.age);
104             System.out.println("qualification of non teaching staff: "+nt.qualification);
105             break;
106             case 3:
107             u.disp_person();
108             u.disp_student();
109             u.disp_ug();
110             System.out.println("Name of the person : "+u.name);
```

```
            case 1:
            t.disp_person();
            t.disp_emp();
            t.disp_teach();
            System.out.println("Name of the person : "+t.name);
            System.out.println("Age of employee : "+t.age);
            System.out.println("qualification of teaching staff: "+t.qualification);
            break;
            case 2:
            nt.disp_person();
            nt.disp_emp();
            nt.disp_nonteach();
            System.out.println("Name of the person : "+nt.name);
            System.out.println("Age of employee : "+nt.age);
            System.out.println("qualification of non teaching staff: "+nt.qualification);
            break;
            case 3:
            u.disp_person();
            u.disp_student();
            u.disp_ug();
            System.out.println("Name of the person : "+u.name);
            System.out.println("age of student : "+u.age);
            System.out.println("department of ug student : "+u.dep);
            break;
            case 4:
            p.disp_person();
            p.disp_student();
            p.disp_pg();
            System.out.println("Name of the person : "+p.name);
            System.out.println("age of student : "+p.age);
            System.out.println("department of pg student : "+p.dep);
            break;
            default:
            flag=1;
            }
        }
    }
}
```

```
Enter the choice
1.TEACHING STAFF
2.NON TEACHING STAFF
3.UG STUDENT
4.PG STUDENT
2
Enter the person name
Ahaana Singh
Enter the employee age
35
Enter the non teaching staff qualification
M.Sc
Name of the person : Ahaana Singh
Age of employee : 35
qualification of non teaching staff: M.Sc

Enter the choice
1.TEACHING STAFF
2.NON TEACHING STAFF
3.UG STUDENT
4.PG STUDENT
3
Enter the person name
Geetika Jaiswal
Enter the student age
22
Enter the ug department
CS
Name of the person : Geetika Jaiswal
age of student : 22
department of ug student : CS

Enter the choice
1.TEACHING STAFF
2.NON TEACHING STAFF
3.UG STUDENT
4.PG STUDENT
6
```