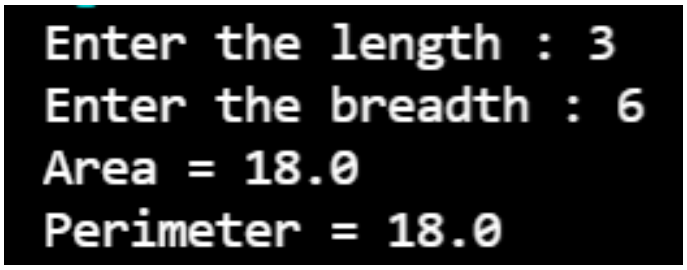
1. Write a program in Java to define a class Rectangle having data member: length and breadth; to calculate the area and perimeter of the rectangle. Use constructors and member functions to read, calculate and display.

Code:

```
import java.util.*;
class RECT1 {
   public static void main(String arg[]) {

      Scanner in = new Scanner(System.in);
      System.out.print("Enter the length : ");
      int length = in.nextInt();
      System.out.print("Enter the breadth : ");
      int breadth= in.nextInt();
      Rectangle rect = new Rectangle(length,breadth);
      System.out.println("Area = " + rect.getArea());
      System.out.println("Perimeter = " + rect.getPerimeter());

   }
}

class Rectangle {
   double length;
   double breadth;

   Rectangle(double length, double breadth) {
      this.length = length;
      this.breadth = breadth;
   }

   double getArea() {
      return length * breadth;
   }

   double getPerimeter() {
      return 2 * (length + breadth);
   }
}
```

Output:



2. Write a program which will overload the area () method and display the area of a circle, triangle and square as per user choice and user entered dimensions.

Code:

```
import java.io.*;
class area
{
void findarea(int b)
   {
     System.out.println( "\n Area of square with length " +b+ " is :" + b*b);
   }

void findarea(float a)
     {
      System.out.println( "\n Area of circle with  radius " +a+ " is :" + 22/7 * a*a);
     }

 void findarea(int a, int b, int c)
   {
      double temp = (a + b + c);
      double s= temp/2;
      double triarea = Math.sqrt(s*(s-a)*(s-b)*(s-c));
      System.out.println( "\n Area of triangle with length of sides  "+a+"," +b+ " and "
+c+" is : "+ triarea);
 }
public static void main(String p[]) throws IOException
 {
    area d = new area();
    BufferedReader Br = new BufferedReader(new InputStreamReader(System.in));
    System.out.print("\n Find area of \n 1 . Square \n 2 . Triangle \n 3 . Circle \n\
nSelect a choice : ");
    int choice =Integer.parseInt(Br.readLine());
  switch(choice)
  {
   case 1:
        System.out.print("\n Enter the length : ");
        int b=Integer.parseInt(Br.readLine());
        d.findarea(b);
        break;
   case 2:
       System.out.print("\n Enter the length of first side : ");
       int x =Integer.parseInt(Br.readLine());
       System.out.print("\n Enter the length of second side : ");
       int y=Integer.parseInt(Br.readLine());
       System.out.print("\n Enter the length of third side : ");
       int z =Integer.parseInt(Br.readLine());
       d.findarea(x,y,z);
       break;
   case 3:
       System.out.print("\n Enter the radius : ");
       float r =Float.parseFloat(Br.readLine());
       d.findarea(r);
```

```
                    break;
                default:
                    System.out.println("Invalid choice");
                }
            }
        }
```

Output:

```
 Find area of
 1 . Square
 2 . Triangle
 3 . Circle

Select a choice : 1

 Enter the length : 4

 Area of square with length 4 is :16
 Find area of
 1 . Square
 2 . Triangle
 3 . Circle

Select a choice : 2

 Enter the length of first side : 3

 Enter the length of second side : 4

 Enter the length of third side : 5

 Area of triangle with length of sides  3,4 and 5 is : 6.0
 Find area of
 1 . Square
 2 . Triangle
 3 . Circle

Select a choice : 3

 Enter the radius : 7

 Area of circle with  radius 7.0 is :147.0
```

3. A plastic manufacturer sells plastic in different shapes like 2D sheet and 3D box. The cost of sheet is Rs 40/ per square ft. and the cost of box is Rs 60/ per cubic ft. Implement it in Java to calculate the cost of plastic as per the dimensions given by the user where 3D inherits from 2D.

Code:

```
import java.io.*;
class Two
{
   int l,b;
   double area,cost;
   public void Details() throws IOException
   {
      InputStreamReader is = new InputStreamReader(System.in);
      BufferedReader in = new BufferedReader(is);
      System.out.println("Enter the length of the 2D sheet: ");
      l = Integer.parseInt(in.readLine());
      System.out.println("Enter the bredth of the 2D sheet: ");
      b = Integer.parseInt(in.readLine());
   }
   public void disp()
   {
      area = l*b;
      cost = 40*area;
      System.out.println("The Area: "+area+ "  ||  The Cost of the Sheet: Rs "+cost);
   }
}

class Three extends Two
{
   int h;
   public void Details() throws IOException
   {
      InputStreamReader is = new InputStreamReader(System.in);
      BufferedReader in = new BufferedReader(is);
      System.out.println(" 2D Sheets can be converted into 3D Boxes just by giving a
dimension ");
      System.out.println("Enter the height for the making of the 3D box: ");
      h = Integer.parseInt(in.readLine());
   }
   public void disp()
   {
      System.out.println("The Volume: "+(l*b*h)+ " cube-feet");
      System.out.println("The Cost of the Box: Rs "+(60*l*b*h));
   }
   public void getMsg() throws IOException
   {
      super.Details();
      Details();
   }
   public void prtMsg()
   {
```

```
            super.disp();
            disp();
        }
    }

    class Plastic
    {
        public static void main(String[] args) throws IOException
        {
            Three obj = new Three();
            obj.getMsg();
            obj.prtMsg();
        }
    }
```

Output:

```
Enter the length of the 2D sheet:
45
Enter the bredth of the 2D sheet:
60
 2D Sheets can be converted into 3D Boxes just by giving a dimension
Enter the height for the making of the 3D box:
5
The Area: 2700.0  ||  The Cost of the Sheet: Rs 108000.0
The Volume: 13500 cube-feet
The Cost of the Box: Rs 810000
```

4. Write a program in java to define a class Shape which has data member “area” and a member function showArea(). Derive two classes Circle and Rectangle from Shape class. Add appropriate data members and member functions to calculate and display the area of Circle and Rectangle.

Code:

```
abstract class Shape {
   double area;

   abstract public void showArea();
}
public class Circle extends Shape {
   int r;

   Circle(int x) {
      super();
      r = x;
   }

   public void showArea() {
      area = Math.PI * r * r;
      System.out.println("Area of circle: " + area);
   }

   public static void main(String args[]) {
      Circle ob = new Circle(5);
      ob.showArea();
   }
}
public class Rect extends Shape {
   int l, b;

   Rect(int x, int y) {
      super();
      l = x;
      b = y;
   }

   public void showArea() {
      area = l * b;
      System.out.println("Area of rectangle: " + area);
   }

   public static void main(String args[]) {
      Rect ob = new Rect(7, 8);
      ob.showArea();
   }
}
```

Output:

```
Area of circle: 28.274333882308138
Area of rectangle: 128.0
```

5. Write a program in java using inheritance to show how to call the base class parameterized constructors from the derived class using super. Consider the base class is “Shape2D” for rectangle and define subclass “Shape3D” for cube.

Code:

```
public class Shape2D {
   int l, b;

   Shape2D(int x, int y) {
      l = x;
      b = y;
   }

   void display() {
      System.out.println("Area is: " + (l * b));
   }
}
public class Shape3D extends Shape2D {
   int h;

   Shape3D(int x, int y, int z) {
      super(x, y);
      h = z;
   }

   void display() {
      super.display();
      System.out.println("Volume is: " + (l * b * h));
   }

   public static void main(String args[]) {
      Shape3D ob = new Shape3D(2, 4, 6);
      ob.display();
   }
}
```

Output: