

1. **Problem Statement:** Create an abstract class Figure with following properties and functions:

Properties: double dim1;  
Methods: abstract void findArea();  
abstract void findPerimeter();

Create three subclasses Circle, Rectangle and Triangle that extends Figure class and define both the methods.

Write a program that will find the area and perimeter of 3 Figures and print the details for all.

#### 1.1 Source Code: file name – Shape.java

```
import java.util.Scanner;
abstract class Figure //creation of Abstract Class with provided information
in statement
{
    double dim1;
    double len,wid;
    abstract void findArea();
    abstract void findPerimeter();
}
class Circle extends Figure
{
    double cArea;
    double cPeri;

    void findArea() //Defining the abstract method
    {
        cArea=3.14*dim1*dim1;
        System.out.println("Area of the Circle - "+cArea);
    }
    void findPerimeter() //Defining the abstract method
    {
        cPeri=2*3.14*dim1;
        System.out.println("Perimeter of the Circle - "+cPeri);
    }
}
class Rectangle extends Figure
{
    double rArea;
    double rPeri;
    void findArea() //Defining the abstract method
    {
        rArea=len*wid;
        System.out.println("Area of the Rectangle - "+rArea);
    }
    void findPerimeter() //Defining the abstract method
    {
        rPeri=2*(len+wid);
        System.out.println("Perimeter of the Rectangle - "+rPeri);
    }
}
class Triangle extends Figure
```

```

{
    double tArea;
    double tPeri;
    void findArea()
    {
        tArea= (len*wid)/2; //Defining the abstract method
        System.out.println("Area of the Triangle - "+tArea);
    }
    void findPerimeter()
    {
        tPeri=dim1+len+wid; //Defining the abstract method
        System.out.println("Perimeter of the Triangle - "+tPeri);
    }
}
public class Shape
{
    public static void main(String[] args)
    {
        Figure f; //creating reference for Abstract class
        f=new Circle();
        Scanner sc=new Scanner(System.in);
        System.out.println("*** The Area and Perimeter of
Circle,Rectangle and Triangle ***");
        //providing input values for the variables of abstract class
        System.out.println("\nEnter radius of the Circle - ");
        f.dim1=sc.nextDouble();
        f.findArea(); //calling the abstract methods
        f.findPerimeter(); //calling the abstract methods
        f=new Rectangle();
        System.out.println("\nEnter length and width of the Rectangle -
");
        f.len=sc.nextDouble();
        f.wid=sc.nextDouble();
        f.findArea(); //calling the abstract methods
        f.findPerimeter(); //calling the abstract methods
        f=new Triangle();
        System.out.println("\nEnter the dimensions of the Triangle -");
        f.dim1=sc.nextDouble();
        f.len=sc.nextDouble();
        f.wid=sc.nextDouble();
        f.findArea(); //calling the abstract methods
        f.findPerimeter(); //calling the abstract methods
        sc.close();
    }
}

```

## 1.2 Output:

\*\*\* The Area and Perimeter of Circle,Rectangle and Triangle \*\*\*

Enter radius of the Circle -

6

Area of the Circle - 113.03999999999999

Perimeter of the Circle - 37.68

Enter length and width of the Rectangle -

5

8

Area of the Rectangle - 40.0

Perimeter of the Rectangle - 26.0

Enter the dimensions of the Triangle -

7

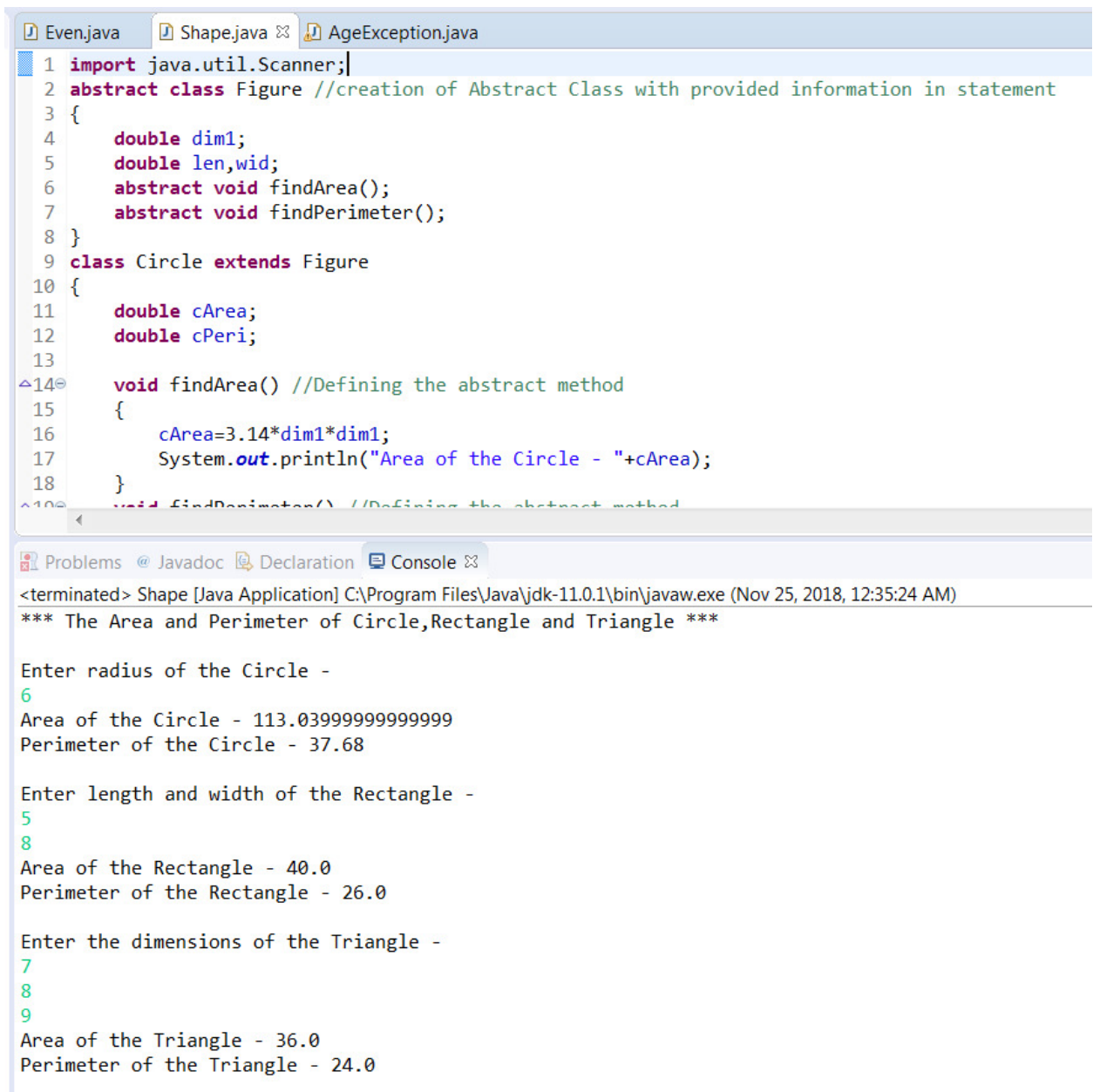
8

9

Area of the Triangle - 36.0

Perimeter of the Triangle - 24.0

### **1.3Output Screenshots:**



```
1 import java.util.Scanner;
2 abstract class Figure //creation of Abstract Class with provided information in statement
3 {
4     double dim1;
5     double len,wid;
6     abstract void findArea();
7     abstract void findPerimeter();
8 }
9 class Circle extends Figure
10 {
11     double cArea;
12     double cPeri;
13
14     void findArea() //Defining the abstract method
15     {
16         cArea=3.14*dim1*dim1;
17         System.out.println("Area of the Circle - "+cArea);
18     }
19     void findPerimeter() //Defining the abstract method
20     {
21         cPeri=2*3.14*dim1;
22         System.out.println("Perimeter of the Circle - "+cPeri);
23     }
24 }
25 class Rectangle extends Figure
26 {
27     double rArea;
28     double rPeri;
29
30     void findArea() //Defining the abstract method
31     {
32         rArea=len*wid;
33         System.out.println("Area of the Rectangle - "+rArea);
34     }
35     void findPerimeter() //Defining the abstract method
36     {
37         rPeri=2*(len+wid);
38         System.out.println("Perimeter of the Rectangle - "+rPeri);
39     }
40 }
41 class Triangle extends Figure
42 {
43     double tArea;
44     double tPeri;
45
46     void findArea() //Defining the abstract method
47     {
48         tArea=0.5*len*wid;
49         System.out.println("Area of the Triangle - "+tArea);
50     }
51     void findPerimeter() //Defining the abstract method
52     {
53         tPeri=len+wid+dim1;
54         System.out.println("Perimeter of the Triangle - "+tPeri);
55     }
56 }
```

<terminated> Shape [Java Application] C:\Program Files\Java\jdk-11.0.1\bin\javaw.exe (Nov 25, 2018, 12:35:24 AM)

\*\*\* The Area and Perimeter of Circle,Rectangle and Triangle \*\*\*

Enter radius of the Circle -  
6  
Area of the Circle - 113.03999999999999  
Perimeter of the Circle - 37.68

Enter length and width of the Rectangle -  
5  
8  
Area of the Rectangle - 40.0  
Perimeter of the Rectangle - 26.0

Enter the dimensions of the Triangle -  
7  
8  
9  
Area of the Triangle - 36.0  
Perimeter of the Triangle - 24.0

**2. Problem Statement:** Declare an integer array of size 10. Initialize using for loop with 1 to 10, and print all even numbers from an array.

### 2.1 Source Code: File Name – Even.Java

```
import java.util.Scanner;
class Even
{
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        int arr[] = new int[10];
        for (int i = 0; i < arr.length; i++)
        {
            arr[i] = i + 1;
        }
        for (int i = 0; i < arr.length; i++)
        {
            if (arr[i] % 2 == 0)
            {
                System.out.print(arr[i] + " ");
            }
        }
    }
}
```

```

    {
        int[] num; // Declaring Array for the numbers
        Scanner sc=new Scanner(System.in);
        num = new int[10]; // providing array size as per the statement
        System.out.println("*** Print Even Numbers ***");
        for(int i=0;i<num.length;i++)//loop for taking the values into
array
        {
            System.out.println("Enter the number");
            num[i]=sc.nextInt();
        }
        System.out.println("The numbers entered are - ");

        for (int i=0;i<num.length;i++)//loop for printing the array
        {
            System.out.print(+num[i]+",");
        }
        System.out.println("\nThe Even numbers are - ");
        for (int i=0;i<num.length;i++)//loop for checking the EVEN
numbers
        {
            if((num[i]%2)==0)
            {
                System.out.print(+num[i]+",");
            }
        }
        sc.close();
    }
}

```

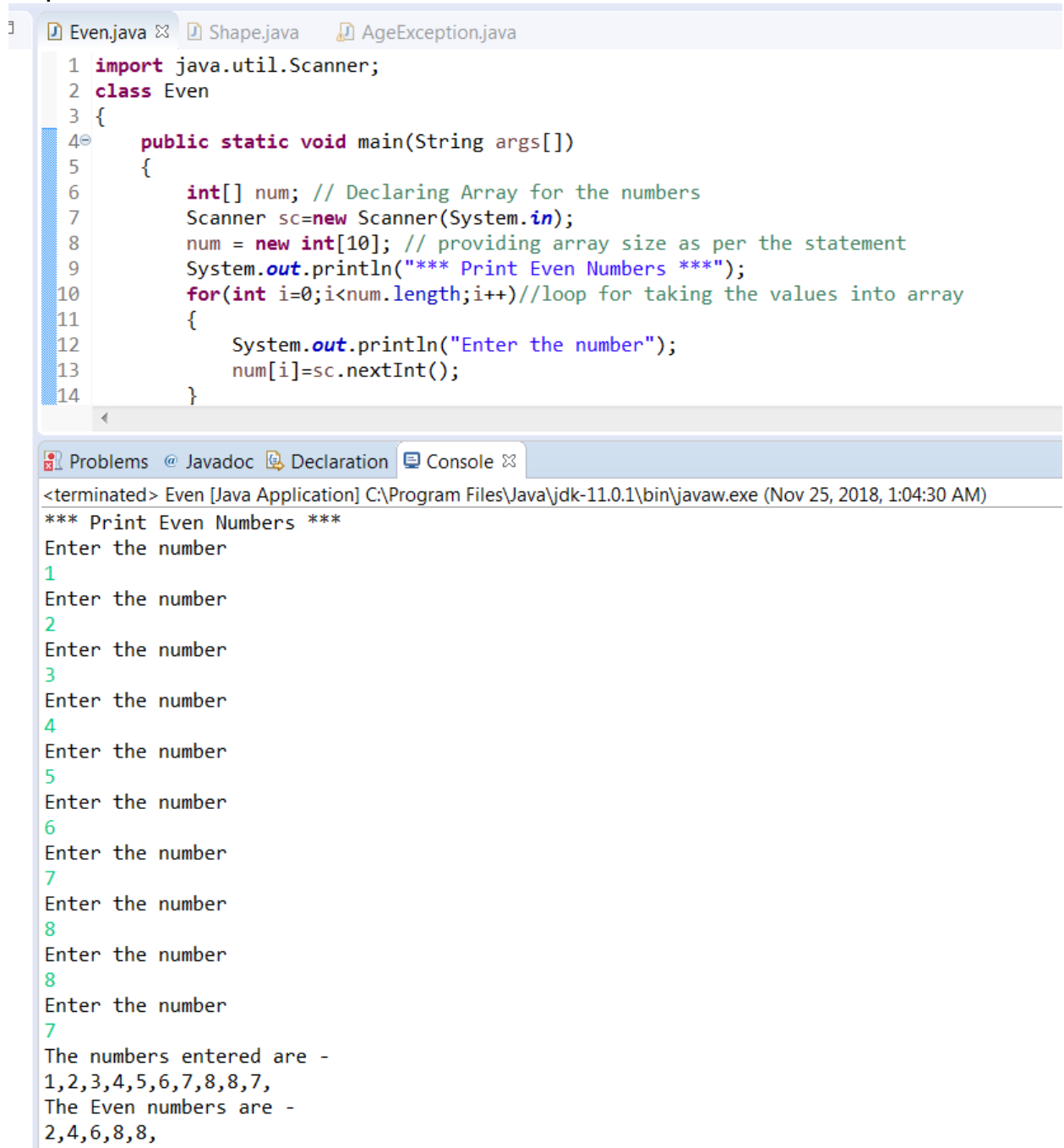
## 2.2 Output:

```

*** Print Even Numbers ***
Enter the number
1
Enter the number
2
Enter the number
3
Enter the number
4
Enter the number
5
Enter the number
6
Enter the number
7
Enter the number
8
Enter the number
8
Enter the number
7
The numbers entered are -
1,2,3,4,5,6,7,8,8,7,
The Even numbers are -
2,4,6,8,8,

```

## 2.3 Output Screenshots:



The screenshot displays an IDE with three tabs: Even.java, Shape.java, and AgeException.java. The Even.java tab is active, showing the following code:

```
1 import java.util.Scanner;
2 class Even
3 {
4     public static void main(String args[])
5     {
6         int[] num; // Declaring Array for the numbers
7         Scanner sc=new Scanner(System.in);
8         num = new int[10]; // providing array size as per the statement
9         System.out.println("*** Print Even Numbers ***");
10        for(int i=0;i<num.length;i++)//loop for taking the values into array
11        {
12            System.out.println("Enter the number");
13            num[i]=sc.nextInt();
14        }
```

Below the code editor, the Console tab is active, showing the program's execution output:

```
<terminated> Even [Java Application] C:\Program Files\Java\jdk-11.0.1\bin\javaw.exe (Nov 25, 2018, 1:04:30 AM)
*** Print Even Numbers ***
Enter the number
1
Enter the number
2
Enter the number
3
Enter the number
4
Enter the number
5
Enter the number
6
Enter the number
7
Enter the number
8
Enter the number
8
Enter the number
7
The numbers entered are -
1,2,3,4,5,6,7,8,8,7,
The Even numbers are -
2,4,6,8,8,
```

3. **Problem Statement:** Write a program to generate a user-defined exception called NegativeAgeException if the user inputs negative value for age.

### 3.1 Source Code: File Name – AgeException.java

```
import java.util.Scanner;

@SuppressWarnings("serial")
class NegativeAgeException extends Exception//Inheriting the Super class
Exception
{
```

```

        NegativeAgeException(String a)
        {
            System.out.println(a);
        }
    }
    public class AgeException
    {
        //if user inputs a negative value for age then user defined exception
        should be thrown
        @SuppressWarnings("resource")
        public static void main(String[] args)
        {
            Scanner sc=new Scanner(System.in);
            System.out.println("Enter your age");
            int age=sc.nextInt(); //user inputs the age

            try //try block used for validating the age
            {
                if(age<0)
                    //here a user defined "NegativeAgeException"
                    exception is created, it means a class.
                    //that means it acts as a subclass
                    throw new NegativeAgeException("Entered age is
Invalid");
                else
                    System.out.println("Entered age is "+age);
            }
            catch(Exception e) //on failure of the condition the exception is
            caught
            {
                System.out.println("Age of a person cannot be less than
0");
            }
            sc.close();
        }
    }

```

### 3.2 Output:

```

Enter your age
-26
Entered age is Invalid
Age of a person cannot be less than 0

```

### 3.3 Output Screenshots:

```
Even.java Shape.java AgeException.java x
1 import java.util.Scanner;
2
3 @SuppressWarnings("serial")
4 class NegativeAgeException extends Exception//Inheriting the Super class Exception
5 {
6     NegativeAgeException(String a)
7     {
8         System.out.println(a);
9     }
10 }
11 public class AgeException
12 {
13     //if user inputs a negative value for age then user defined exception should be thrown
14     @SuppressWarnings("resource")
15     public static void main(String[] args)
16     {
17         Scanner sc=new Scanner(System.in);
18         System.out.println("Enter your age");
19         int age=sc.nextInt(); //user inputs the age
20
21         try //try block used for validating the age
22         {
23             if(age<0)
24                 //here a user defined "NegativeAgeException" exception is created, it means a class.
25                 //that means it acts as a subclass
26                 throw new NegativeAgeException("Entered age is Invalid");
27             else
28                 System.out.println("Entered age is "+age);
29         }
30         catch(Exception e) //on failure of the condition the exception is caught
31         {
32
33         }
34     }
35 }
```

Problems @ Javadoc Declaration Console x

<terminated> AgeException [Java Application] C:\Program Files\Java\jdk-11.0.1\bin\javaw.exe (Nov 25, 2018, 1:11:01 AM)

Enter your age  
-26  
Entered age is Invalid  
Age of a person cannot be less than 0

**\*\*END OF DOCUMENT\*\***