Client.java

```java
//create instances of Rectangle
Rectangle r1 = new Rectangle(); //with the default constructor
Rectangle r2 = new Rectangle(5,8); //with one of the specified constructor
Rectangle r3 = new Rectangle(5); //with one of the specified constructor
Rectangle r4 = new Rectangle(); //with the default constructor
r1.setColor("Black"); //set color for the instance r1

r4.setColor("White"); //set color for the instance r4
r4.setHeight(23); //set a new height to r4
r4.setWidth(7); //set a new width to r4

System.out.println("#r1\n" + r1 + "\n"); //print
System.out.println("#r2\n" + r2 + "\n"); //print
System.out.println("#r3\n" + r3 + "\n"); //print
System.out.println("#r4\n" + r4 + "\n"); //print
```

```
#r1
Width: 15.0
Height: 30.0
Area: 450.0
Color: Black

#r2
Width: 8.0
Height: 5.0
Area: 40.0

#r3
Width: 5.0
Height: 5.0
Area: 25.0

#r4
Width: 7.0
Height: 23.0
Area: 161.0
Color: White
```

```java
//create instances of Circle
Circle c1 = new Circle(); //with the default constructor
Circle c2 = new Circle(7); //with the specified constructor
Circle c3 = new Circle(7); //with the specified constructor

c1.setColor("Red"); //set color for the instance c1
c3.setRadious(9); //set a new radious for the instance c3

System.out.println("#c1\n" + c1 + "\n"); //print
System.out.println("#c2\n" + c2 + "\n"); //print
System.out.println("#c3\n" + c3 + "\n"); //print
```

```
#c1
Radious: 10
Area: 314.0
Color: Red

#c2
Radious: 7
Area: 153.86

#c3
Radious: 9
Area: 254.34
```

```java
// Arrays can be initialized with the existing instance above
// Or, it can be initialized as a new one.
System.out.println("-----------------Rectanhgle Arrays------------------");

//create 1D array instances of Rectangle
Rectangle[] arrayR = new Rectangle[5];

//any instance that is rooting for Rectangle can be a value
arrayR[0] = r3; //assign r3 to the selected index of the array
arrayR[1] = r2; //assign r2 to the selected index of the array
arrayR[3] = r1; //assign r1 to the selected index of the array
arrayR[4] = new Rectangle(2, 2); //assign a new height & width to the selected index of the array
for (int i=0; i<arrayR.length; i++) {
    System.out.println("#Rectangle " + (i+1) + "\n" + arrayR[i] + "\n"); //print
}

System.out.println("-----------------Circle Arrays------------------");
//create 1D array instances of Circle
Circle[] arrayC = new Circle[4];

//any instance that is rooting for Circle can be a value
arrayC[0] = c1; //assign c1 to the selected index of the array
arrayC[1] = c3; //assign c3 to the selected index of the array
arrayC[3] = c2; //assign c2 to the selected index of the array
for (int i=0; i<arrayC.length; i++) {
    System.out.println("#Circle " + (i+1) + "\n" + arrayC[i] + "\n"); //print
}

System.out.println("-----------------Shape Arrays------------------");
//create 1D array instances of Shape
Shape[] arrayS = new Shape[4];


/* The abstract class Shape is the super class of
 * both Rectangle and Circle.
 * That means, any existing instances of either one of the Rectangle and Circle,
 * or from both can be assigned as the value of the instances of the Shape
 *
 * still possible to instantiate Shape, Rectangle or Circle
 */
arrayS[0] = r1;
arrayS[1] = r2;
arrayS[2] = c1;

for (int i=0; i<arrayS.length; i++) {

    if (i < 3) {
        System.out.println("#Shape " + (i+1) + "\n" + arrayS[i] + "\n"); //print
    }else {
        //3rd index of the array
        arrayS[i] = new Circle(99);
        System.out.println("#Shape " + (i+1) + "\n" + arrayS[i] + "\n"); //print

    }

}
```

```
----------------Rectanhgle Arrays------------------
#Rectangle 1
Width: 5.0
Height: 5.0
Area: 25.0

#Rectangle 2
Width: 8.0
Height: 5.0
Area: 40.0

#Rectangle 3
null

#Rectangle 4
Width: 15.0
Height: 30.0
Area: 450.0
Color: Black

#Rectangle 5
Width: 2.0
Height: 2.0
Area: 4.0
```

```
----------------Circle Arrays------------------
#Circle 1
Radious: 10
Area: 314.0
Color: Red

#Circle 2
Radious: 9
Area: 254.34

#Circle 3
null

#Circle 4
Radious: 7
Area: 153.86
```

```
----------------Shape Arrays------------------
#Shape 1
Width: 15.0
Height: 30.0
Area: 450.0
Color: Black

#Shape 2
Width: 8.0
Height: 5.0
Area: 40.0

#Shape 3
Radious: 10
Area: 314.0
Color: Red

#Shape 4
Radious: 99
Area: 30775.14
```