

*CS40961- JAVA PROGRAMMING*

## 7.1 Practice

1. Create a simple class Shape that will represent a 2-dimensional shape with line segments for edges. It should have the following instance variables: numSides (int), regular (boolean). Create at least two constructors and getter and setter methods.

```
package shapeclass;
```

```
public class Shape {
```

```
    // Instance variables
```

```
    private int numSides;
```

```
    private boolean regular;
```

```
    // Default constructor
```

```
    public Shape() {
```

```
        this.numSides = 0; // Default to 0 sides
```

```
        this.regular = false; // Default to irregular
```

```
    }
```

```
    // Parameterized constructor
```

```
    public Shape(int numSides, boolean regular) {
```

```
        this.numSides = numSides;
```

```
        this.regular = regular;
```

```
    }
```

```
    // Getter for numSides
```

```
public int getNumSides() {  
    return numSides;  
}  
  
// Setter for numSides  
public void setNumSides(int numSides) {  
    this.numSides = numSides;  
}  
  
// Getter for regular  
public boolean isRegular() {  
    return regular;  
}  
  
// Setter for regular  
public void setRegular(boolean regular) {  
    this.regular = regular;  
}  
  
// Example method to display the shape's properties  
public void displayShapeInfo() {  
    System.out.println("Number of sides: " + numSides);  
    System.out.println("Is regular: " + regular);  
}  
  
// Main method to test the class  
public static void main(String[] args) {
```

```
// Using default constructor
```

```
Shape shape1 = new Shape();
```

```
shape1.displayShapeInfo();
```

```
// Using parameterized constructor
```

```
Shape shape2 = new Shape(4, true);
```

```
shape2.displayShapeInfo();
```

```
// Modifying the shape using setters
```

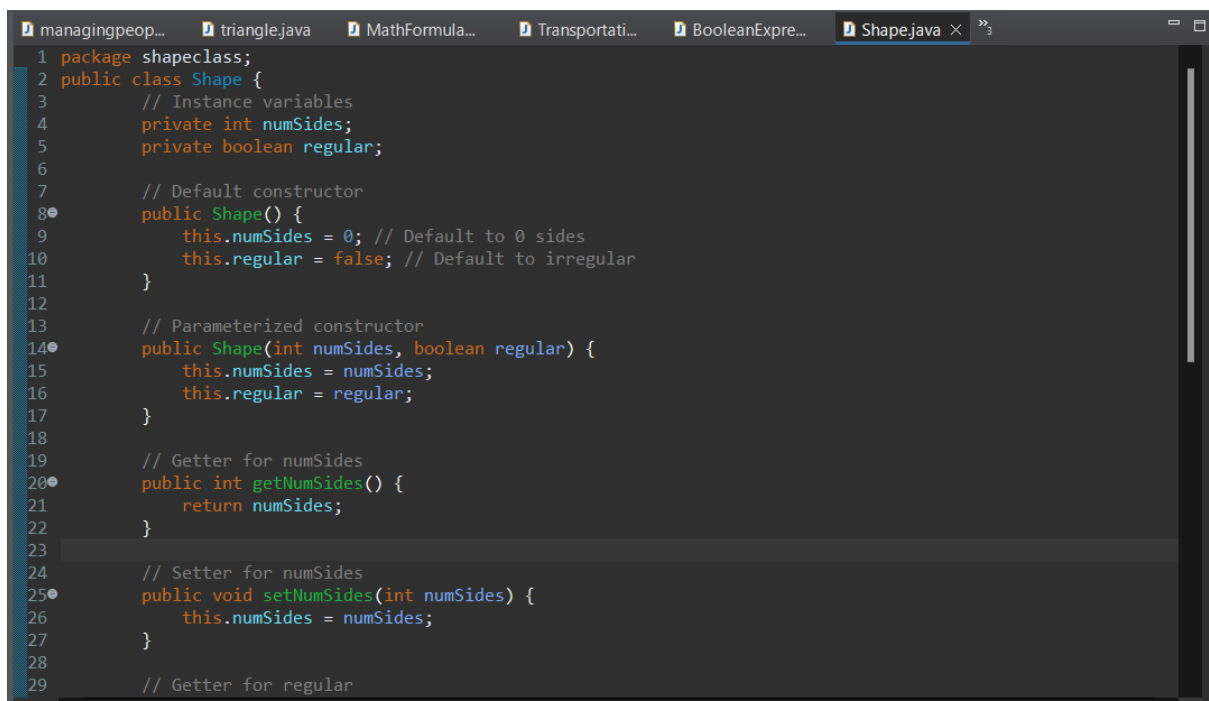
```
shape1.setNumSides(3);
```

```
shape1.setRegular(true);
```

```
shape1.displayShapeInfo();
```

```
}
```

```
}
```



```
managingpeop... triangle.java MathFormula... Transportati... BooleanExpre... Shape.java x
1 package shapeclass;
2 public class Shape {
3     // Instance variables
4     private int numSides;
5     private boolean regular;
6
7     // Default constructor
8     public Shape() {
9         this.numSides = 0; // Default to 0 sides
10        this.regular = false; // Default to irregular
11    }
12
13    // Parameterized constructor
14    public Shape(int numSides, boolean regular) {
15        this.numSides = numSides;
16        this.regular = regular;
17    }
18
19    // Getter for numSides
20    public int getNumSides() {
21        return numSides;
22    }
23
24    // Setter for numSides
25    public void setNumSides(int numSides) {
26        this.numSides = numSides;
27    }
28
29    // Getter for regular
```

```
<terminated> Shape [Java Application] C:\Use
Number of sides: 0
Is regular: false
Number of sides: 4
Is regular: true
Number of sides: 3
Is regular: true
```

2. Identify the key parts of the Java Class below Put asterisks next to all the instance variables. Place a box around each

constructor. Circle the signature of methods other than the constructor method. Place triangles around the parameters.

Underline the return types of methods.

```
public class Animal {
```

```
int weight, height;
```

```
double speed;
```

```
Animal() {
```

```
weight = 50;
```

```
height = 4;
```

```
speed = 2; //miles per hour
```

```
}
```

```
Animal(int w, int h, int s) {
```

```
weight = w;
```

```
h = height;
```

```
speed = s
```

```
}
```

```
public double getTime(double miles) { //gets the number of hours to go these
```

```
miles
```

```
return miles/speed;
```

```
}  
public int getWeight() {  
    return weight;  
}  
public int getHeight() {  
    return height;  
}  
public double getSpeed() {  
    return speed;  
}  
}
```

JAVA CODE

```
package animal;  
  
public class Animal {  
    int age, legs;  
    double speed;  
  
    // Default constructor  
    public Animal() {  
        age = 5;  
        legs = 4;  
        speed = 10.0; // meters per second  
    }  
  
    // Parameterized constructor  
    public Animal(int a, int l, double s) {
```

```
    age = a;  
    legs = l;  
    speed = s;  
}
```

```
// Method to calculate distance  
public double calculateDistance(double time) {  
    return speed * time;  
}
```

```
// Getter for age  
public int getAge() {  
    return age;  
}
```

```
// Getter for legs  
public int getLegs() {  
    return legs;  
}
```

```
// Getter for speed  
public double getSpeed() {  
    return speed;  
}
```

```
// Main method to test the class  
public static void main(String[] args) {
```

```
// Creating an object using the default constructor
Animal animal1 = new Animal();
System.out.println("Animal1 Age: " + animal1.getAge());
System.out.println("Animal1 Legs " + animal1.getLegs());
System.out.println("Animal1 Speed: " + animal1.getSpeed() + " m/s");
System.out.println("Animal1 Distance in 5 seconds: " + animal1.calculateDistance(5) +
" meters");
```

```
// Creating an object using the parameterized constructor
Animal animal2 = new Animal(3, 2, 20.0);
System.out.println("\nAnimal2 Age: " + animal2.getAge());
System.out.println("Animal2 Legs " + animal2.getLegs());
System.out.println("Animal2 Speed: " + animal2.getSpeed() + " m/s");
System.out.println("Animal2 Distance in 5 seconds: " + animal2.calculateDistance(5)
+ " meters");
    }
}
```

```

1 package animal;
2 public class Animal {
3     int age, legs;
4     double speed;
5
6     // Default constructor
7     public Animal() {
8         age = 5;
9         legs = 4;
10        speed = 10.0; // meters per second
11    }
12
13    // Parameterized constructor
14    public Animal(int a, int l, double s) {
15        age = a;
16        legs = l;
17        speed = s;
18    }
19
20    // Method to calculate distance
21    public double calculateDistance(double time) {
22        return speed * time;
23    }
24
25    // Getter for age
26    public int getAge() {
27        return age;
28    }
29
30    // Getter for legs
31    public int getLegs() {
32        return legs;
33    }

```

```

<terminated> Animal [Java Application] C:\Users\
Animal1 Age: 5
Animal1 Legs: 4
Animal1 Speed: 10.0 m/s
Animal1 Distance in 5 seconds: 50.0

Animal2 Age: 3
Animal2 Legs: 2
Animal2 Speed: 20.0 m/s
Animal2 Distance in 5 seconds: 100.0

```

3. Write code to create two instances of the Animal class template listed in problem #2. Be sure to use each of the two constructors provided. Then add Java code that will print the following: a. Animal #1 has a speed of \_\_, b. Animal #2 has a speed of \_\_. Be sure that the blanks are



automatically filled in with the actual speeds. Use the methods provided to access the speeds.

```
package animalspeed;
```

```
public class Animal {
```

```
    int age, legs;
```

```
    double speed;
```

```
    // Default constructor
```

```
    public Animal() {
```

```
        age = 5;
```

```
        legs = 4;
```

```
        speed = 10.0; // meters per second
```

```
    }
```

```
    // Parameterized constructor
```

```
    public Animal(int a, int l, double s) {
```

```
        age = a;
```

```
        legs = l;
```

```
        speed = s;
```

```
    }
```

```
    // Getter for speed
```

```
    public double getSpeed() {
```

```
        return speed;
```

```
    }
```

```
    public static void main(String[] args) {
```

```
        // Creating the first instance using the default constructor
```

```
Animal animal1 = new Animal();
```

```
// Creating the second instance using the parameterized constructor
```

```
Animal animal2 = new Animal(3, 2, 20.0);
```

```
// Printing the speeds of both animals
```

```
System.out.println("Animal #1 has a speed of " + animal1.getSpeed() + ".");
```

```
System.out.println("Animal #2 has a speed of " + animal2.getSpeed() + ".");
```

```
}
```

```
}
```

```
1 package animalspeed;
2 public class Animal {
3     int age, legs;
4     double speed;
5
6     // Default constructor
7     public Animal() {
8         age = 5;
9         legs = 4;
10        speed = 10.0; // meters per second
11    }
12
13    // Parameterized constructor
14    public Animal(int a, int l, double s) {
15        age = a;
16        legs = l;
17        speed = s;
18    }
19
20    // Getter for speed
21    public double getSpeed() {
22        return speed;
23    }
24
25    public static void main(String[] args) {
26        // Creating the first instance using the default constructor
27        Animal animal1 = new Animal();
```

Problems Javadoc Declaration Cons

<terminated> Animal (1) [Java Application] C:\Use

Animal #1 has a speed of 10.0.

Animal #2 has a speed of 20.0.

4. Write a class Student. It should have the following instance variables for the name, credits, grade point average (GPA), and quality Points. Create a constructor method. Create two other methods as follows: a. A method that will return the current grade point average which will be the quality points divided by the credits. b. A method that will take in the credits for a class or semester along with the quality points. It should update the credits, the quality points, and the GPA

```
package student;

public class Student {

    // Instance variables

    private String name;

    private int credits;

    private double gpa;

    private double qualityPoints;


    // Constructor

    public Student(String name, int credits, double qualityPoints) {

        this.name = name;

        this.credits = credits;

        this.qualityPoints = qualityPoints;

        this.gpa = calculateGPA();

    }


    // Method to calculate the GPA

    public double calculateGPA() {

        if (credits == 0) {

            return 0.0; // To avoid division by zero

        }

        return qualityPoints / credits;

    }

}
```

```
}
```

```
// Method to update credits, quality points, and GPA
```

```
public void updateRecord(int newCredits, double newQualityPoints) {  
    credits += newCredits;  
    qualityPoints += newQualityPoints;  
    gpa = calculateGPA(); // Recalculate GPA after updating  
}
```

```
// Method to return the current GPA
```

```
public double getGPA() {  
    return gpa;  
}
```

```
// Getter methods for other instance variables (optional)
```

```
public String getName() {  
    return name;  
}
```

```
public int getCredits() {  
    return credits;  
}
```

```
public double getQualityPoints() {  
    return qualityPoints;  
}
```

```
// Main method to test the class
public static void main(String[] args) {
    // Create a Student object
    Student student = new Student("John Doe", 30, 120.0);

    // Print initial GPA
    System.out.println("Initial GPA: " + student.getGPA());

    // Update the student's record with new credits and quality points
    student.updateRecord(15, 45.0);

    // Print updated GPA
    System.out.println("Updated GPA: " + student.getGPA());
}
}
```

```

1 package student;
2 public class Student {
3     // Instance variables
4     private String name;
5     private int credits;
6     private double gpa;
7     private double qualityPoints;
8
9     // Constructor
10    public Student(String name, int credits, double qualityPoints) {
11        this.name = name;
12        this.credits = credits;
13        this.qualityPoints = qualityPoints;
14        this.gpa = calculateGPA();
15    }
16
17    // Method to calculate the GPA
18    public double calculateGPA() {
19        if (credits == 0) {
20            return 0.0; // To avoid division by zero
21        }
22        return qualityPoints / credits;
23    }
24
25    // Method to update credits, quality points, and GPA
26    public void updateRecord(int newCredits, double newQualityPoints) {
27        credits += newCredits;
28        qualityPoints += newQualityPoints;
29        gpa = calculateGPA(); // Recalculate GPA after updating
30    }
31
32    // Method to return the current GPA
33    public double getGPA() {
34        return gpa;
35    }
36
37    // Getter methods for other instance variables (optional)
38    public String getName() {

```

```

<terminated> Student [Java Application] C:\Us
Initial GPA: 4.0
Updated GPA: 3.6666666666666665

```

5. Using the class you created in #4, create three instances of the Student Class from the table below

Name	Credits	Quality Points
Mary Jones	14	46
John Stiner	60	173
Ari Samala	31	69

```
package studentgpa;
```

```

public class Student {

    // Instance variables

    private String name;

    private int credits;

    private double gpa;

```

```
private double qualityPoints;
```

```
// Constructor
```

```
public Student(String name, int credits, double qualityPoints) {  
    this.name = name;  
    this.credits = credits;  
    this.qualityPoints = qualityPoints;  
    this.gpa = calculateGPA();  
}
```

```
// Method to calculate the GPA
```

```
public double calculateGPA() {  
    if (credits == 0) {  
        return 0.0; // To avoid division by zero  
    }  
    return qualityPoints / credits;  
}
```

```
// Method to update credits, quality points, and GPA
```

```
public void updateRecord(int newCredits, double newQualityPoints) {  
    credits += newCredits;  
    qualityPoints += newQualityPoints;  
    gpa = calculateGPA(); // Recalculate GPA after updating  
}
```

```
// Method to return the current GPA
```

```
public double getGPA() {
```

```

        return gpa;
    }

    // Getter methods for other instance variables
    public String getName() {
        return name;
    }

    public int getCredits() {
        return credits;
    }

    public double getQualityPoints() {
        return qualityPoints;
    }

    // Main method to test the class
    public static void main(String[] args) {
        // Create three instances of the Student class
        Student student1 = new Student("Mary Jones", 14, 46.0);
        Student student2 = new Student("John Stiner", 60, 173.0);
        Student student3 = new Student("Ari Samala", 31, 69.0);

        // Print the details of each student
        System.out.println(student1.getName() + " has a GPA of " + student1.getGPA());
        System.out.println(student2.getName() + " has a GPA of " + student2.getGPA());
        System.out.println(student3.getName() + " has a GPA of " + student3.getGPA());
    }
}

```



}

}

```
1 package studentgpa;
2 public class Student {
3     // Instance variables
4     private String name;
5     private int credits;
6     private double gpa;
7     private double qualityPoints;
8
9     // Constructor
10    public Student(String name, int credits, double qualityPoints) {
11        this.name = name;
12        this.credits = credits;
13        this.qualityPoints = qualityPoints;
14        this.gpa = calculateGPA();
15    }
16
17    // Method to calculate the GPA
18    public double calculateGPA() {
19        if (credits == 0) {
20            return 0.0; // To avoid division by zero
21        }
22        return qualityPoints / credits;
23    }
24
25    // Method to update credits, quality points, and GPA
26    public void updateRecord(int newCredits, double newQualityPoints) {
27        credits += newCredits;
28        qualityPoints += newQualityPoints;
29        gpa = calculateGPA(); // Recalculate GPA after updating
30    }
31
32    // Method to return the current GPA
33    public double getGPA() {
34        return gpa;
35    }
36
37    // Getter methods for other instance variables
38    public String getName() {
```

```
<terminated> Student (1) [Java Application] C:\Users\
Mary Jones has a GPA of 3.28571428571428
John Stiner has a GPA of 2.88333333333333
Ari Samala has a GPA of 2.22580645161290
```

6. Using the instance variables created in #5, add 13 credits and 52 quality points to the student “Ari Samala”.

```
package gpa;
```

```

public class Student {
    // Instance variables
    private String name;
    private int credits;
    private double gpa;
    private double qualityPoints;

    // Constructor
    public Student(String name, int credits, double qualityPoints) {
        this.name = name;
        this.credits = credits;
        this.qualityPoints = qualityPoints;
        this.gpa = calculateGPA();
    }

    // Method to calculate the GPA
    public double calculateGPA() {
        if (credits == 0) {
            return 0.0; // To avoid division by zero
        }
        return qualityPoints / credits;
    }

    // Method to update credits, quality points, and GPA
    public void updateRecord(int newCredits, double newQualityPoints) {
        credits += newCredits;
        qualityPoints += newQualityPoints;
    }
}

```

```
        gpa = calculateGPA(); // Recalculate GPA after updating
    }
```

```
// Method to return the current GPA
```

```
public double getGPA() {
    return gpa;
}
```

```
// Getter methods for other instance variables
```

```
public String getName() {
    return name;
}
```

```
public int getCredits() {
    return credits;
}
```

```
public double getQualityPoints() {
    return qualityPoints;
}
```

```
// Main method to test the class
```

```
public static void main(String[] args) {
    // Create three instances of the Student class
    Student student1 = new Student("Mary Jones", 14, 46.0);
    Student student2 = new Student("John Stiner", 60, 173.0);
    Student student3 = new Student("Ari Samala", 31, 69.0);
}
```

```
// Print the initial GPA of Ari Samala
```

```
System.out.println("Initial GPA of " + student3.getName() + ": " + student3.getGPA());
```

```
// Add 13 credits and 52 quality points to Ari Samala's record
```

```
student3.updateRecord(13, 52.0);
```

```
// Print the updated GPA of Ari Samala
```

```
System.out.println("Updated GPA of " + student3.getName() + ": " + student3.getGPA());
```

```
}
```

```
}
```

```

1 package gpa;
2 public class Student {
3     // Instance variables
4     private String name;
5     private int credits;
6     private double gpa;
7     private double qualityPoints;
8
9     // Constructor
10    public Student(String name, int credits, double qualityPoints) {
11        this.name = name;
12        this.credits = credits;
13        this.qualityPoints = qualityPoints;
14        this.gpa = calculateGPA();
15    }
16
17    // Method to calculate the GPA
18    public double calculateGPA() {
19        if (credits == 0) {
20            return 0.0; // To avoid division by zero
21        }
22        return qualityPoints / credits;
23    }
24
25    // Method to update credits, quality points, and GPA
26    public void updateRecord(int newCredits, double newQualityPoints) {
27        credits += newCredits;
28        qualityPoints += newQualityPoints;
29        gpa = calculateGPA(); // Recalculate GPA after updating
30    }
31
32    // Method to return the current GPA
33    public double getGPA() {
34        return gpa;
35    }
36
37    // Getter methods for other instance variables
38    public String getName() {

```

```

<terminated> Student (2) [Java Application] C:\Users\
Initial GPA of Ari Samala: 2.2258064516
Updated GPA of Ari Samala: 2.75

```

7. Using the Card class from the slides and test the program to make sure it works. Add a second randomCard. Code is

included below

```
public class Card{
```

```
String suit,name;
```

```
int points;
```

```
Card(int n1, int n2){
```

```

    suit = getSuit(n1);
    name = getName(n2);
    points = getPoints(name);
}

public String toString(){
    return "The " + name + " of " + suit;
}

public String getName(int i){
    if(i = 1) return "Ace";
    if(i = 2) return "Two";
    if(i = 3) return "Three";
    if(i = 4) return "Four";
    if(i = 5) return "Five";
    if(i = 6) return "Six";
    if(i = 7) return "Seven";
    if(i = 8) return "Eight";
    if(i = 9) return "Nine";
    if(i = 10) return "Ten";
    if(i = 11) return "Jack";

```

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```

    if(i = 12) return "Queen";
    if(i = 13) return "King";
    return "error";
}

public int getPoints(String n){

```

```
if(n = "Jack" || n = "Queen" || n = "King" || n = "Ten")
```

```
    return 10;
```

```
if(n = "Two")
```

```
    return 2;
```

```
if(n = "Three")
```

```
    return 3;
```

```
if(n = "Four")
```

```
    return 4;
```

```
if(n = "Five")
```

```
    return 5;
```

```
if(n = "Six")
```

```
    return 6;
```

```
if(n = "Seven")
```

```
    return 7;
```

```
if(n = "Eight")
```

```
    return 8;
```

```
if(n = "Nne")
```

```
    return 9;
```

```
if(n = "Ace")
```

```
    return 1;
```

```
return -1;
```

```
}
```

```
public String getSuit(int i){
```

```
    if(i = 1) return "Diamonds";
```

```
    if(i = 2) return "Clubs";
```

```
    if(i = 3) return "Spades";
```

```
    if(i = 4) return "Hearts";
```

```

return "error";
}
}

public class Main {
    public static void main(String args[]){
        int suitNumber = (int)(Math.random()*4.0+1);
        int faceNumber = (int)(Math.random()*13.0+1);
        Card newCard = new Card(suitNumber,faceNumber);
        System.out.println(newCard);
    }
}

```

#### JAVA CODE

```

package card;

public class Card {
    String suit, name;
    int points;

    // Constructor
    public Card(int suitNumber, int faceNumber) {
        suit = getSuit(suitNumber);
        name = getName(faceNumber);
        points = getPoints(name);
    }

    // Method to get the string representation of the card
    @Override

```



```
public String toString() {  
    return "The " + name + " of " + suit;  
}
```

// Method to get the name of the card based on face number

```
private String getName(int i) {  
    switch (i) {  
        case 1: return "Ace";  
        case 2: return "Two";  
        case 3: return "Three";  
        case 4: return "Four";  
        case 5: return "Five";  
        case 6: return "Six";  
        case 7: return "Seven";  
        case 8: return "Eight";  
        case 9: return "Nine";  
        case 10: return "Ten";  
        case 11: return "Jack";  
        case 12: return "Queen";  
        case 13: return "King";  
        default: return "error";  
    }  
}
```

// Method to get the points of the card based on name

```
private int getPoints(String n) {  
    switch (n) {
```

```
        case "Jack":
        case "Queen":
        case "King":
        case "Ten": return 10;
        case "Two": return 2;
        case "Three": return 3;
        case "Four": return 4;
        case "Five": return 5;
        case "Six": return 6;
        case "Seven": return 7;
        case "Eight": return 8;
        case "Nine": return 9;
        case "Ace": return 1;
        default: return -1;
    }
}
```

// Method to get the suit of the card based on suit number

```
private String getSuit(int i) {
    switch (i) {
        case 1: return "Diamonds";
        case 2: return "Clubs";
        case 3: return "Spades";
        case 4: return "Hearts";
        default: return "error";
    }
}
```

```
}
```

```
package card;
```

```
public class Main {
```

```
    public static void main(String[] args) {
```

```
        // Generate random suit and face numbers
```

```
        int suitNumber1 = (int) (Math.random() * 4) + 1; // Values between 1 and 4
```

```
        int faceNumber1 = (int) (Math.random() * 13) + 1; // Values between 1 and 13
```

```
        int suitNumber2 = (int) (Math.random() * 4) + 1; // Values between 1 and 4
```

```
        int faceNumber2 = (int) (Math.random() * 13) + 1; // Values between 1 and 13
```

```
        // Create two random Card instances
```

```
        Card card1 = new Card(suitNumber1, faceNumber1);
```

```
        Card card2 = new Card(suitNumber2, faceNumber2);
```

```
        // Print the details of both cards
```

```
        System.out.println(card1);
```

```
        System.out.println(card2);
```

```
    }
```

```
}
```

```

1 package card;
2 public class Card {
3     String suit, name;
4     int points;
5
6     // Constructor
7     public Card(int suitNumber, int faceNumber) {
8         suit = getSuit(suitNumber);
9         name = getName(faceNumber);
10        points = getPoints(name);
11    }
12
13    // Method to get the string representation of the card
14    @Override
15    public String toString() {
16        return "The " + name + " of " + suit;
17    }
18
19    // Method to get the name of the card based on face number
20    private String getName(int i) {
21        switch (i) {
22            case 1: return "Ace";
23            case 2: return "Two";
24            case 3: return "Three";
25            case 4: return "Four";
26            case 5: return "Five";
27            case 6: return "Six";
28            case 7: return "Seven";
29            case 8: return "Eight";
30            case 9: return "Nine";
31            case 10: return "Ten";
32            case 11: return "Jack";
33            case 12: return "Queen";
34            case 13: return "King";
35            default: return "error";
36        }
37    }
38

```

```

1 package card;
2
3 public class Main {
4     public static void main(String[] args) {
5         // Generate random suit and face numbers
6         int suitNumber1 = (int) (Math.random() * 4) + 1; // Values between 1 and 4
7         int faceNumber1 = (int) (Math.random() * 13) + 1; // Values between 1 and 13
8         int suitNumber2 = (int) (Math.random() * 4) + 1; // Values between 1 and 4
9         int faceNumber2 = (int) (Math.random() * 13) + 1; // Values between 1 and 13
10
11        // Create two random Card instances
12        Card card1 = new Card(suitNumber1, faceNumber1);
13        Card card2 = new Card(suitNumber2, faceNumber2);
14
15        // Print the details of both cards
16        System.out.println(card1);
17        System.out.println(card2);
18    }
19 }

```

```
<terminated> Main [Java Application] C:\Users  
The Queen of Spades  
The Five of Clubs
```

9. Add code to the Main class in exercise #7 to the following: a. Display the total point value for the two random cards. b. Ask the user if they would like another card. If they say yes display the new card and the points for all 3 cards in their "Hand". c. Loop to allow the user to continue to add cards to the hand until the number of points goes over 21 or the user decides not to add any more cards or the total number of cards is 5.

#### JAVA CODE

```
package card;  
  
import java.util.ArrayList;  
import java.util.Scanner;  
  
public class Main1 {  
  
    public static void main(String[] args) {  
  
        Scanner scanner = new Scanner(System.in);  
  
        ArrayList<Card> hand = new ArrayList<>();  
  
        int totalPoints = 0;  
  
        final int MAX_CARDS = 5;  
  
  
        // Add two random cards to the hand  
        for (int i = 0; i < 2; i++) {  
  
            int suitNumber = (int) (Math.random() * 4) + 1; // Values between 1 and 4  
            int faceNumber = (int) (Math.random() * 13) + 1; // Values between 1 and 13  
            Card card = new Card(suitNumber, faceNumber);  
            hand.add(card);  
            totalPoints += card.points;
```

```
}
```

```
// Display the initial hand
```

```
System.out.println("Initial hand");
```

```
displayHand(hand);
```

```
System.out.println("Total points: " + totalPoints);
```

```
// Loop to add more cards until the conditions are met
```

```
while (totalPoints <= 21 && hand.size() < MAX_CARDS) {
```

```
    System.out.println("Would you like another card? (yes/no)");
```

```
    String response = scanner.nextLine();
```

```
    if (response.equalsIgnoreCase("yes")) {
```

```
        int suitNumber = (int) (Math.random() * 4) + 1; // Values between 1 and 4
```

```
        int faceNumber = (int) (Math.random() * 13) + 1; // Values between 1 and 13
```

```
        Card card = new Card(suitNumber, faceNumber);
```

```
        hand.add(card);
```

```
        totalPoints += card.points;
```

```
// Display the updated hand
```

```
System.out.println("New card");
```

```
System.out.println(card);
```

```
System.out.println("Updated hand");
```

```
displayHand(hand);
```

```
System.out.println("Total points: " + totalPoints);
```

```
if (totalPoints > 21) {
```

```
        System.out.println("You have gone over 21 points!");
        break;
    }
} else {
    break;
}
}
```


```
// Close the scanner
scanner.close();
}
```

```
// Method to display all cards in the hand
private static void displayHand(ArrayList<Card> hand) {
    for (Card card : hand) {
        System.out.println(card);
    }
}
}
```

```

1 package card;
2 import java.util.ArrayList;
3 import java.util.Scanner;
4 public class Main1 {
5     public static void main(String[] args) {
6         Scanner scanner = new Scanner(System.in);
7         ArrayList<Card> hand = new ArrayList<>();
8         int totalPoints = 0;
9         final int MAX_CARDS = 5;
10
11         // Add two random cards to the hand
12         for (int i = 0; i < 2; i++) {
13             int suitNumber = (int) (Math.random() * 4) + 1; // Values between 1 and 4
14             int faceNumber = (int) (Math.random() * 13) + 1; // Values between 1 and 13
15             Card card = new Card(suitNumber, faceNumber);
16             hand.add(card);
17             totalPoints += card.points;
18         }
19
20         // Display the initial hand
21         System.out.println("Initial hand:");
22         displayHand(hand);
23         System.out.println("Total points: " + totalPoints);
24
25         // Loop to add more cards until the conditions are met
26         while (totalPoints <= 21 && hand.size() < MAX_CARDS) {
27             System.out.println("Would you like another card? (yes/no)");
28             String response = scanner.nextLine();
29
30             if (response.equalsIgnoreCase("yes")) {
31                 int suitNumber = (int) (Math.random() * 4) + 1; // Values between 1 and 4
32                 int faceNumber = (int) (Math.random() * 13) + 1; // Values between 1 and 13
33                 Card card = new Card(suitNumber, faceNumber);
34                 hand.add(card);
35                 totalPoints += card.points;
36
37                 // Display the updated hand
38                 System.out.println("New card:");

```


Main1 [Java Application] C:\Users\
Initial hand:
The Three of Clubs
The Jack of Diamonds
Total points: 13
Would you like another ca