**Assignment\_Constructor\_Methods**

**Assignment 1: Function Overloading**

// Assignment 1: Function Overloading

class Calculator {

// 1) Method to add two numbers

int calculate(int a, int b) {

return a + b;

}

// 2) Method to calculate area of circle

int calculate(double radius) {

return (int)(Math.PI \* radius \* radius);

}

// 3) Method to calculate area of rectangle

int calculate(int length, double breadth) {

return (int)(length \* breadth);

}

// 4) Method to calculate area of square

int calculate(float side) {

return (int)(side \* side);

}

public static void main(String[] args) {

Calculator c = new Calculator();

System.out.println("Addition of 10 and 20: " + c.calculate(10, 20));

System.out.println("Area of circle (radius 5): " + c.calculate(5.0));

System.out.println("Area of rectangle (40, 20.5): " + c.calculate(40, 20.5));

System.out.println("Area of square (10): " + c.calculate(10.0f));

}

}

**Assignment 2: Constructors + Methods**

// Assignment 2: Constructors + Methods

class Shape {

double area;

// 1) Default constructor

Shape() {

System.out.println("Default Constructor Called");

}

// 2) Constructor for square

Shape(int side) {

area = side \* side;

}

// 3) Constructor for rectangle

Shape(int length, int breadth) {

area = length \* breadth;

}

// 4) Constructor for circle

Shape(double radius) {

area = Math.PI \* radius \* radius;

}

// Method to display square area

void displaySquare() {

System.out.println("Area of Square: " + area);

}

// Method to display rectangle area

void displayRectangle() {

System.out.println("Area of Rectangle: " + area);

}

// Method to display circle area

void displayCircle() {

System.out.println("Area of Circle: " + area);

}

// Method overloading → Area of rhombus

double calculate(double d1, double d2) {

return (d1 \* d2) / 2;

}

// Method overloading → Area of triangle

double calculate(int base, int height) {

return 0.5 \* base \* height;

}

public static void main(String[] args) {

Shape square = new Shape(5);

square.displaySquare();

Shape rectangle = new Shape(4, 6);

rectangle.displayRectangle();

Shape circle = new Shape(3.5);

circle.displayCircle();

Shape s = new Shape();

System.out.println("Area of Rhombus: " + s.calculate(4.0, 6.0));

System.out.println("Area of Triangle: " + s.calculate(5, 10));

}

}

**Assignment 3: Student Class**

// Assignment 3: Student Class

class Student {

String name;

int age;

char section;

char gender;

int subject1, subject2, subject3;

int total;

double percentage;

Student(String name, int age, char section, char gender, int subject1, int subject2, int subject3) {

this.name = name;

this.age = age;

this.section = section;

this.gender = gender;

this.subject1 = subject1;

this.subject2 = subject2;

this.subject3 = subject3;

calculateResult();

}

Student(String name, int age, char section, char gender, int subject2, int subject3) {

this(name, age, section, gender, 0, subject2, subject3);

}

void calculateResult() {

total = subject1 + subject2 + subject3;

percentage = total / 3.0;

}

void display() {

System.out.println("Name: " + name + ", Age: " + age + ", Section: " + section + ", Gender: " + gender);

System.out.println("Marks: " + subject1 + ", " + subject2 + ", " + subject3);

System.out.println("Total: " + total + ", Percentage: " + percentage + "%");

System.out.println("------------------------------------");

}

public static void main(String[] args) {

Student s1 = new Student("Ahaan", 18, 'A', 'M', 80, 90, 85);

Student s2 = new Student("Vridhaan", 19, 'B', 'F', 70, 75);

Student s3 = new Student("Diya", 20, 'A', 'M', 65, 60);

Student s4 = new Student("Siya", 18, 'C', 'F', 95, 88, 92);

s1.display();

s2.display();

s3.display();

s4.display();

}

}

**Assignment 4: Abstract Class**

// Assignment 4: Abstract Class

abstract class Marks {

abstract double getPercentage();

}

// Student A (3 subjects)

class A extends Marks {

int sub1, sub2, sub3;

A(int s1, int s2, int s3) {

sub1 = s1;

sub2 = s2;

sub3 = s3;

}

@Override

double getPercentage() {

return (sub1 + sub2 + sub3) / 3.0;

}

}

// Student B (4 subjects)

class B extends Marks {

int sub1, sub2, sub3, sub4;

B(int s1, int s2, int s3, int s4) {

sub1 = s1;

sub2 = s2;

sub3 = s3;

sub4 = s4;

}

@Override

double getPercentage() {

return (sub1 + sub2 + sub3 + sub4) / 4.0;

}

}

class Test {

public static void main(String[] args) {

A studentA = new A(80, 90, 85);

B studentB = new B(75, 80, 70, 90);

System.out.println("Percentage of Student A: " + studentA.getPercentage() + "%");

System.out.println("Percentage of Student B: " + studentB.getPercentage() + "%");

}

}