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**Assignment No : 03**

**1) Exercise Objective(s):Package**

**Exercise:Create a package called shapes. Create some classes in the package representing some common geometric shapes like Square, Triangle, Circle and so on. Create a class called TestShapes and create objects for all the shapes and print corresponding messages. Execute the TestShapes class.**

**Answer: Square.java** package shapes; public class Square { void box() {

System.out.println("Square has 4 sides..");

} }

**Triangle.java** package shapes; public class Triangle {

void three() {

System.*out*.println("Triangle has 3 sides..");

} }

**Circle.java** package shapes; public class Circle {

public void round() {

System.out.println("Circle is round..");

}

}

**TestShapes.java package** shapes; **import** shapes.\*; **public** **class** TestShapes {

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

// **TODO** Auto-generated method stub Circle obj = **new** Circle(); obj.round();

Square obj1 = **new** Square(); obj1.box();

Triangle obj2 = **new** Triangle(); obj2.three();

}

}

**Output:**

**Circle is round..**

**Square has 4 sides..**

**Triangle has 3 sides..**

**2) Exercise Objective(s):Overloading**

**Exercise:Create a class called shape with the following methods**

1. **area**
2. **perimeter**

**Overload the area and perimeter method to calculate for both square and rectangle. Create a main class and invoke the area method to calculate the area of the square and rectangle. Also invoke the perimeter method to calculate the perimeter of the square and rectangle.**

**Answer: Main.class package** assignment.day3; **class** Shape {

// Overloaded method for area of square **public** **double** area(**double** side) { **return** side \* side; }

// Overloaded method for area of rectangle **public** **double** area(**double** length, **double** breadth) { **return** length \* breadth; }

// Overloaded method for perimeter of square **public** **double** perimeter(**double** side) { **return** 4 \* side; }

// Overloaded method for perimeter of rectangle **public** **double** perimeter(**double** length, **double** breadth) { **return** 2 \* (length + breadth); }

}

**public** **class** Main {

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

Shape shape = **new** Shape();

// Square

**double** squareSide = 5.0;

System.***out***.println("Area of square: " + shape.area(squareSide));

System.***out***.println("Perimeter of square: " + shape.perimeter(squareSide));

// Rectangle **double** rectangleLength = 6.0; **double** rectangleBreadth = 4.0;

System.***out***.println("Area of rectangle: " + shape.area(rectangleLength, rectangleBreadth));

System.***out***.println("Perimeter of rectangle: " + shape.perimeter(rectangleLength, rectangleBreadth));

}

}

**Output:**

**Area of square: 25.0**

**Perimeter of square: 20.0**

**Area of rectangle: 24.0**

**Perimeter of rectangle: 20.0**

**3) Exercise Objective(s):Overloading**

**Exercise:Create a class called Calculator which has 4 different methods add, diff, mul and div which accepts two numbers as parameters. Overload the methods such that the parameters can be of the following pattern.**

1. **Both are of int data type.**
2. **Both are of double data type.**
3. **First parameter is of int data type and second parameter is of double data type.**
4. **First parameter is of double data type and second parameter is of int data type.**

**Create an object to access these methods and invoke these methods with different type of numbers and display the result in the corresponding methods.**

**Answer: Main1.class package** assignment.day3;

**class** Calculator {

// Addition **public** **int** add(**int** a, **int** b) { **return** a + b;

}

**public** **double** add(**double** a, **double** b) { **return** a + b;

}

**public** **double** add(**int** a, **double** b) { **return** a + b;

}

**public** **double** add(**double** a, **int** b) { **return** a + b;

}

// Subtraction **public** **int** diff(**int** a, **int** b) { **return** a - b;

}

**public** **double** diff(**double** a, **double** b) {

**return** a - b;

}

**public** **double** diff(**int** a, **double** b) { **return** a - b;

}

**public** **double** diff(**double** a, **int** b) { **return** a - b;

}

// Multiplication **public** **int** mul(**int** a, **int** b) { **return** a \* b;

}

**public** **double** mul(**double** a, **double** b) { **return** a \* b;

}

**public** **double** mul(**int** a, **double** b) { **return** a \* b;

}

**public** **double** mul(**double** a, **int** b) { **return** a \* b;

}

// Division **public** **int** div(**int** a, **int** b) { **return** a / b;

}

**public** **double** div(**double** a, **double** b) {

**return** a / b;

}

**public** **double** div(**int** a, **double** b) { **return** a / b;

}

**public** **double** div(**double** a, **int** b) { **return** a / b;

}

}

**public** **class** Main1 {

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

Calculator calculator = **new** Calculator();

// Testing add method

System.***out***.println("Addition:");

System.***out***.println("int + int: " + calculator.add(5, 3));

System.***out***.println("double + double: " + calculator.add(5.5, 3.2));

System.***out***.println("int + double: " + calculator.add(5, 3.2)); System.***out***.println("double + int: " + calculator.add(5.5, 3));

// Testing diff method

System.***out***.println("\nSubtraction:");

System.***out***.println("int - int: " + calculator.diff(5, 3));

System.***out***.println("double - double: " + calculator.diff(5.5, 3.2));

System.***out***.println("int - double: " + calculator.diff(5, 3.2));

System.***out***.println("double - int: " + calculator.diff(5.5, 3));

// Testing mul method

System.***out***.println("\nMultiplication:");

System.***out***.println("int \* int: " + calculator.mul(5, 3));

System.***out***.println("double \* double: " + calculator.mul(5.5, 3.2));

System.***out***.println("int \* double: " + calculator.mul(5, 3.2));

System.***out***.println("double \* int: " + calculator.mul(5.5, 3));

// Testing div method

System.***out***.println("\nDivision:");

System.***out***.println("int / int: " + calculator.div(6, 3));

System.***out***.println("double / double: " + calculator.div(5.5, 3.2));

System.***out***.println("int / double: " + calculator.div(6, 3.2));

System.***out***.println("double / int: " + calculator.div(5.5, 3));

}

}

**Output: Addition:**

**int + int: 8**

**double + double: 8.7 int + double: 8.2 double + int: 8.5**

**Subtraction:**

**int - int: 2**

**double - double: 2.3 int - double: 1.7999999999999998 double - int: 2.5**

**Multiplication: int \* int: 15 double \* double: 17.6**

**int \* double: 16.0 double \* int: 16.5 Division:**

**int / int: 2**

**double / double: 1.71875 int / double: 1.875 double / int: 1.8333333333333333**

**4) Exercise Objective(s):The concept of inheritance**

**Exercise:Create a class called Vehicle. Create subclasses like Truck, Bus, Car etc. Add common methods in the base class and specific methods in the corresponding class. Create a class called Road and create objects for the Truck, Car, Bus etc and display the appropriate message. Road.java package** assignment.day3;

//Base class **class** Vehicle { **public** **void** startEngine() {

System.***out***.println("Engine started.");

}

**public** **void** stopEngine() {

System.***out***.println("Engine stopped.");

}

**public** **void** drive() {

System.***out***.println("Vehicle is moving.");

}

}

//Subclass Truck **class** Truck **extends** Vehicle { **public** **void** loadCargo() {

System.***out***.println("Cargo loaded into truck.");

}

}

//Subclass Bus **class** Bus **extends** Vehicle { **public** **void** boardPassengers() {

System.***out***.println("Passengers boarded on bus.");

}

}

//Subclass Car **class** Car **extends** Vehicle { **public** **void** playMusic() {

System.***out***.println("Music is playing in the car.");

}

}

//Road class **public** **class** Road { **public** **static** **void** main(String[] args) {

// Creating objects for Truck, Bus, and Car

Truck truck = **new** Truck();

Bus bus = **new** Bus();

Car car = **new** Car();

// Displaying messages for Truck System.***out***.println("Truck:"); truck.startEngine(); truck.loadCargo(); truck.drive(); truck.stopEngine();

System.***out***.println();

// Displaying messages for Bus System.***out***.println("Bus:"); bus.startEngine(); bus.boardPassengers(); bus.drive(); bus.stopEngine();

System.***out***.println();

// Displaying messages for Car System.***out***.println("Car:"); car.startEngine(); car.playMusic(); car.drive(); car.stopEngine();

}

}

**Output:**

**Truck:**

**Engine started.**

**Cargo loaded into truck.**

**Vehicle is moving.**

**Engine stopped.**

**Bus:**

**Engine started.**

**Passengers boarded on bus.**

**Vehicle is moving.**

**Engine stopped.**

**Car:**

**Engine started.**

**Music is playing in the car.**

**Vehicle is moving.**

**Engine stopped.**