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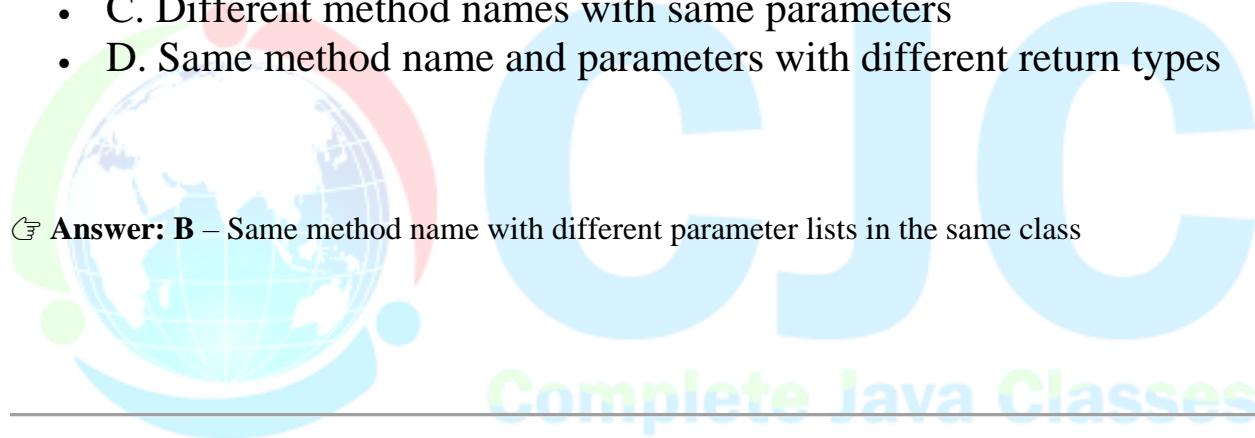
Assignment : Method Overloading (Compile-Time Polymorphism)

Part A: MCQs on Method Overloading

Q1. What is method overloading in Java?

- A. Same method name with same parameters in different classes
- B. Same method name with different parameter lists in the same class
- C. Different method names with same parameters
- D. Same method name and parameters with different return types

☞ **Answer:** B – Same method name with different parameter lists in the same class



Q2. Which of the following changes results in valid method overloading?

- A. Changing only return type
- B. Changing method name
- C. Changing number of parameters
- D. Changing access modifier only

☞ **Answer:** C – Changing number of parameters

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Q3. Method overloading is an example of:

- A. Runtime polymorphism
- B. Compile-time polymorphism
- C. Dynamic binding
- D. Method overriding

☞ **Answer:** B – Compile-time polymorphism

Q4. Which of the following method signatures are overloaded?

```
void display(int a)
void display(double a)
```

- A. Invalid (same signature)
- B. Valid overloading
- C. Causes runtime error
- D. Causes ambiguity

☞ **Answer:** B – Valid overloading



Q5. Can constructors be overloaded in Java?

- A. No, never
- B. Yes, like methods
- C. Only default constructors
- D. Only parameterized constructors

☞ **Answer:** B – Yes, like methods

Q6. Which rule is mandatory for method overloading?

- A. Same return type
- B. Same access modifier
- C. Same method name
- D. Same method body

☞ **Answer:** C – Same method name

Q7. What happens if two overloaded methods differ only by return type?

- A. Code compiles successfully
- B. JVM selects correct method
- C. Compile-time error
- D. Runtime exception

☞ **Answer:** C – Compile-time error

Q8. Which of the following is NOT used by the compiler to resolve overloading?

- A. Method name
- B. Number of parameters
- C. Data type of parameters
- D. Return type

☞ **Answer:** D – Return type

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Q9. Method overloading improves:

- A. Security
- B. Performance
- C. Code readability
- D. Memory usage

☞ **Answer:** C – Code readability

Q10. Which is a correct example of method overloading?

- A. int sum(int a, int b) and double sum(int a, int b)
- B. void sum(int a) and void sum(int a, int b)
- C. void sum(int a) and int sum(int a)
- D. static void main() and static int main()

☞ **Answer:** B – void sum(int a) and void sum(int a, int b)

Complete Java Classes

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Part B: Problem Statements on Method Overloading (with Sample Input & Output)

Problem 1: Create a class Calculator with overloaded methods add().

Sample Input:

- add(10, 20)
- add(5, 10, 15)
- add(2.5, 3.5)

Sample Output:

- Sum = 30
- Sum = 30
- Sum = 6.0

```
class Calculator {  
    int add(int a, int b) {  
        return a + b;  
    }  
  
    int add(int a, int b, int c) {
```

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```
        return a + b + c;
    }

    double add(double a, double b) {
        return a + b;
    }
}
```

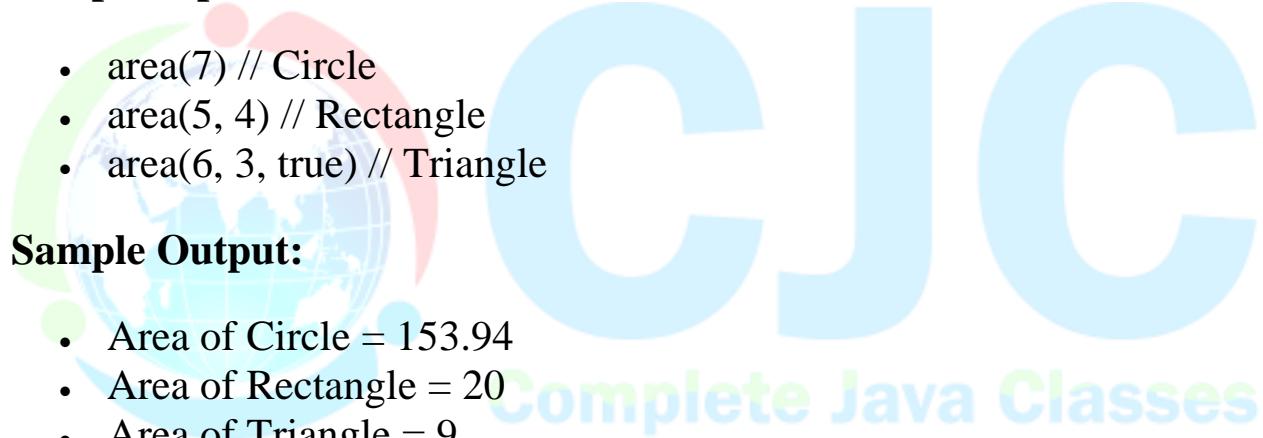
Problem 2: Create a class Shape with overloaded method area () .

Sample Input:

- area(7) // Circle
- area(5, 4) // Rectangle
- area(6, 3, true) // Triangle

Sample Output:

- Area of Circle = 153.94
- Area of Rectangle = 20
- Area of Triangle = 9



```
class Shape {
    double area(int r) {
        return 3.14 * r * r;
    }

    int area(int l, int b) {
        return l * b;
    }

    double area(int b, int h, boolean triangle) {
        return 0.5 * b * h;
    }
}
```

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Problem 3: Create a class Printer with overloaded method print().

Sample Input:

- print(100)
- print("Java")
- print(10, "Programs")

Sample Output:

- 100
- Java
- 10 Programs



```
class Printer {  
    void print(int a) {  
        System.out.println(a);  
    }  
  
    void print(String s) {  
        System.out.println(s);  
    }  
  
    void print(int a, String s) {  
        System.out.println(a + " " + s);  
    }  
}
```

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Problem 4: Create a class MathOperation with overloaded method multiply().

Sample Input:

- multiply(2, 3)
- multiply(2, 3, 4)
- multiply(2.5f, 4.0f)

Sample Output:

- Result = 6
- Result = 24
- Result = 10.0



```
class MathOperation {  
    int multiply(int a, int b) {  
        return a * b;  
    }  
  
    int multiply(int a, int b, int c) {  
        return a * b * c;  
    }  
  
    float multiply(float a, float b) {  
        return a * b;  
    }  
}
```

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}

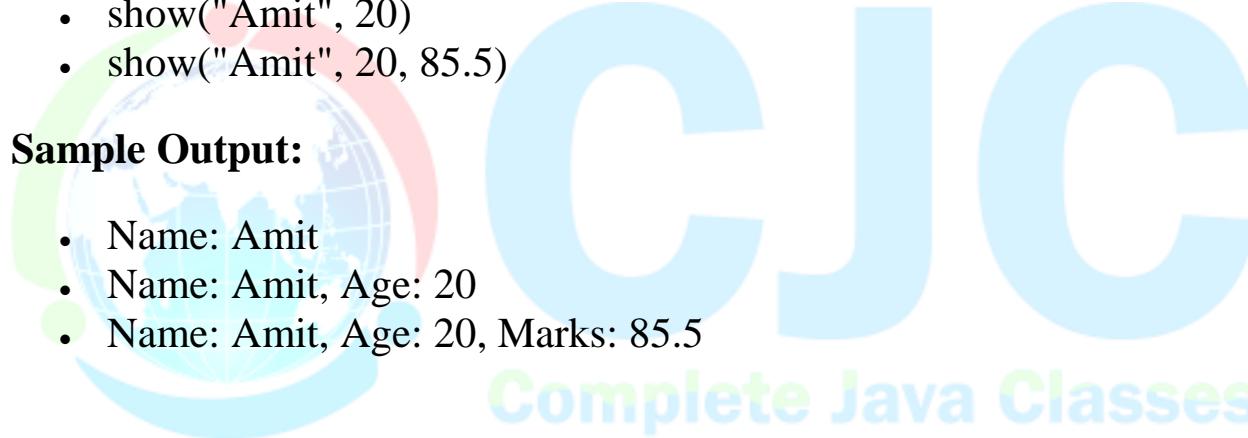
Problem 5: Create a class `Display` with overloaded method `show()`.

Sample Input:

- `show("Amit")`
- `show("Amit", 20)`
- `show("Amit", 20, 85.5)`

Sample Output:

- Name: Amit
- Name: Amit, Age: 20
- Name: Amit, Age: 20, Marks: 85.5



```
class Display {  
    void show(String name) {  
        System.out.println("Name: " + name);  
    }  
  
    void show(String name, int age) {  
        System.out.println("Name: " + name + ", Age: " + age);  
    }  
  
    void show(String name, int age, double marks) {  
        System.out.println("Name: " + name + ", Age: " + age + ", Marks: " + marks);  
    }  
}
```

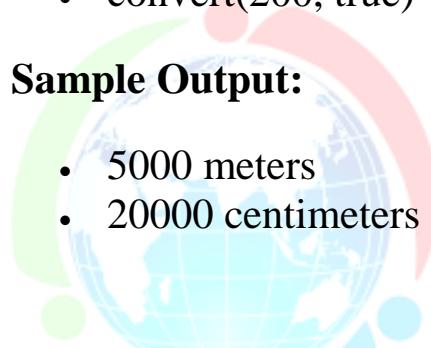
Problem 6: Create a class Converter with overloaded method convert () .

Sample Input:

- convert(5)
- convert(200, true)

Sample Output:

- 5000 meters
- 20000 centimeters



```
class Converter {  
    void convert(int km) {  
        System.out.println(km * 1000 + " meters");  
    }  
  
    void convert(int meters, boolean flag) {  
        System.out.println(meters * 100 + " centimeters");  
    }  
}
```

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Problem 7: Create a class Salary with overloaded method calculateSalary().

Sample Input:

- calculateSalary(20000)
- calculateSalary(20000, 5000)

Sample Output:

- Total Salary = 20000
- Total Salary = 25000



```
class Salary {  
    int calculateSalary(int basic) {  
        return basic;  
    }  
  
    int calculateSalary(int basic, int bonus) {  
        return basic + bonus;  
    }  
}
```

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Problem 8: Create a class AreaCalculator with overloaded method calculate().

Sample Input:

- calculate(4)
- calculate(5, 6)

Sample Output:

- Area of Square = 16
- Area of Rectangle = 30

```
class AreaCalculator {  
    int calculate(int side) {  
        return side * side;  
    }  
  
    int calculate(int l, int b) {  
        return l * b;  
    }  
}
```

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Problem 9: Create a class Message with overloaded method send () .

Sample Input:

- send("Hello")
- send("Meeting Today", "High")

Sample Output:

- Message Sent: Hello
- Message Sent: Meeting Today | Priority: High

```
class Message {  
    void send(String msg) {  
        System.out.println("Message Sent: " + msg);  
    }  
  
    void send(String msg, String priority) {  
        System.out.println("Message Sent: " + msg + " | Priority: " + priority);  
    }  
}
```

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Problem 10: Create a class Result with overloaded method grade().

Sample Input:

- grade(85)
- grade(85, 90)

Sample Output:

- Grade: A
- Grade: A (Attendance Eligible)

```
class Result {  
    void grade(int marks) {  
        System.out.println("Grade: A");  
    }  
  
    void grade(int marks, int attendance) {  
        System.out.println("Grade: A (Attendance Eligible)");  
    }  
}
```

Part C: Problem Statements on Constructor Overloading (with Sample Input & Output)

Problem 1: Student class with multiple constructors.

Sample Input:

- new Student()
- new Student("Rahul")
- new Student("Rahul", 101)

Sample Output:

- Student Created
- Name: Rahul
- Name: Rahul, Roll No: 101

```
class Student {  
    Student() {  
        System.out.println("Student Created");  
    }  
  
    Student(String name) {  
        System.out.println("Name: " + name);  
    }  
  
    Student(String name, int roll) {  
        System.out.println("Name: " + name + ", Roll No: " + roll);  
    }  
}
```

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Problem 2: Employee class with overloaded constructors.

Sample Input:

- new Employee(1)
- new Employee(1, "Neha")
- new Employee(1, "Neha", 45000)

Sample Output:

- ID: 1
- ID: 1, Name: Neha
- ID: 1, Name: Neha, Salary: 45000

```
class Employee {  
    Employee(int id) {  
        System.out.println("ID: " + id);  
    }  
  
    Employee(int id, String name) {  
        System.out.println("ID: " + id + ", Name: " + name);  
    }  
  
    Employee(int id, String name, int salary) {  
        System.out.println("ID: " + id + ", Name: " + name + ", Salary: " + salary);  
    }  
}
```

Problem 3: Book class constructor overloading.

Sample Input:

- new Book("Java Basics")
- new Book("Java Basics", "James")
- new Book("Java Basics", "James", 499)

Sample Output:

- Title: Java Basics
- Title: Java Basics, Author: James
- Title: Java Basics, Author: James, Price: 499

```
class Book {  
    Book(String title) {  
        System.out.println("Title: " + title);  
    }  
  
    Book(String title, String author) {  
        System.out.println("Title: " + title + ", Author: " + author);  
    }  
  
    Book(String title, String author, int price) {  
        System.out.println("Title: " + title + ", Author: " + author + ", Price: " +  
price);  
    }  
}
```

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Problem 4: Rectangle class with overloaded constructors.

Sample Input:

- new Rectangle()
- new Rectangle(5, 10)

Sample Output:

- Area = 0
- Area = 50

```
class Rectangle {  
    Rectangle() {  
        System.out.println("Area = 0");  
    }  
  
    Rectangle(int l, int b) {  
        System.out.println("Area = " + (l * b));  
    }  
}
```

Problem 5: Circle class constructor overloading.

Sample Input:

- new Circle()
- new Circle(7)

Sample Output:

- Radius = 0
- Area = 153.94

```
class Circle {  
    Circle() {  
        System.out.println("Radius = 0");  
    }  
  
    Circle(int r) {  
        System.out.println("Area = " + (3.14 * r * r));  
    }  
}
```

Problem 6: Car class constructor overloading.

Sample Input:

- new Car("Toyota")
- new Car("Toyota", "Innova")
- new Car("Toyota", "Innova", 2500000)

Sample Output:

- Brand: Toyota
- Brand: Toyota, Model: Innova
- Brand: Toyota, Model: Innova, Price: 2500000

```
class Car {  
    Car(String brand) {  
        System.out.println("Brand: " + brand);  
    }  
  
    Car(String brand, String model) {  
        System.out.println("Brand: " + brand + ", Model: " + model);  
    }  
  
    Car(String brand, String model, int price) {  
        System.out.println("Brand: " + brand + ", Model: " + model + ", Price: " +  
price);  
    }  
}
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Problem 7: BankAccount class constructor overloading.

Sample Input:

- new BankAccount(12345)
- new BankAccount(12345, "Ravi")
- new BankAccount(12345, "Ravi", 50000)

Sample Output:

- Account No: 12345
- Account No: 12345, Name: Ravi
- Account No: 12345, Name: Ravi, Balance: 50000

```
class BankAccount {  
    BankAccount(int accNo) {  
        System.out.println("Account No: " + accNo);  
    }  
  
    BankAccount(int accNo, String name) {  
        System.out.println("Account No: " + accNo + ", Name: " + name);  
    }  
  
    BankAccount(int accNo, String name, int balance) {  
        System.out.println("Account No: " + accNo + ", Name: " + name + ", Balance: "  
+ balance);  
    }  
}
```

Problem 8: Laptop class constructor overloading.

Sample Input:

- new Laptop("Dell")
- new Laptop("Dell", 8)
- new Laptop("Dell", 8, 60000)

Sample Output:

- Brand: Dell
- Brand: Dell, RAM: 8GB
- Brand: Dell, RAM: 8GB, Price: 60000



```
class Laptop {  
    Laptop(String brand) {  
        System.out.println("Brand: " + brand);  
    }  
  
    Laptop(String brand, int ram) {  
        System.out.println("Brand: " + brand + ", RAM: " + ram + "GB");  
    }  
  
    Laptop(String brand, int ram, int price) {  
        System.out.println("Brand: " + brand + ", RAM: " + ram + "GB, Price: " +  
price);  
    }  
}
```

Problem 9: Product class constructor overloading.

Sample Input:

- new Product("Pen")
- new Product("Pen", 10)
- new Product("Pen", 10, 100)

Sample Output:

- Product: Pen
- Product: Pen, Quantity: 10
- Product: Pen, Quantity: 10, Price: 100

```
class Product {  
    Product(String name) {  
        System.out.println("Product: " + name);  
    }  
  
    Product(String name, int qty) {  
        System.out.println("Product: " + name + ", Quantity: " + qty);  
    }  
  
    Product(String name, int qty, int price) {  
        System.out.println("Product: " + name + ", Quantity: " + qty + ", Price: " +  
price);  
    }  
}
```

Problem 10: Person class constructor overloading.

Sample Input:

- new Person("Anita")
- new Person("Anita", 22)
- new Person("Anita", 22, "Pune")

Sample Output:

- Name: Anita
- Name: Anita, Age: 22
- Name: Anita, Age: 22, Address: Pune

```
class Person {  
    Person(String name) {  
        System.out.println("Name: " + name);  
    }  
  
    Person(String name, int age) {  
        System.out.println("Name: " + name + ", Age: " + age);  
    }  
  
    Person(String name, int age, String address) {  
        System.out.println("Name: " + name + ", Age: " + age + ", Address: " +  
address);  
    }  
}
```

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