Inheritance

🎯 **Direct Challenges**

1. Create a base class Animal and a derived class Dog

```
public class Animal {
    void sound() {
        System.out.println("Animal makes a sound");
    }
}

public class Dog extends Animal {
    void bark() {
        System.out.println("Dog barks");
    }
}

public class Main {
    public static void main(String[] args) {
        Dog d = new Dog();
        d.sound();  // from parent
        d.bark();   // from child
    }
}
```

Output:

```
Animal makes a sound
Dog barks
```

2. Use super keyword to access parent class constructor

```
public class Animal {
    Animal() {
        System.out.println("Animal constructor called");
    }
}

public class Dog extends Animal {
    Dog() {
        super();  // calls parent constructor
        System.out.println("Dog constructor called");
    }
}

public class Main {
    public static void main(String[] args) {
        Dog d = new Dog();
    }
}
```

Output:

```
Animal constructor called
Dog constructor called
```

3. Override a method from parent class in child class

```
public class Animal {
    void sound() {
        System.out.println("Animal makes a sound");
    }
```

```
}

public class Dog extends Animal {
    @Override
    void sound() {
        System.out.println("Dog barks");
    }
}

public class Main {
    public static void main(String[] args) {
        Animal a = new Dog();  // polymorphism
        a.sound();  // overridden method
    }
}
```

Output:

```
Dog barks
```

🧩 **Scenario-Based Challenges**

1. Build a class Vehicle and extend it to Truck, Car, and Bike

```
public class Vehicle {
    void start() {
        System.out.println("Vehicle started");
    }
}

class Truck extends Vehicle {
```

```
    void load() {
        System.out.println("Truck is loading goods");
    }
}

class Car extends Vehicle {
    void drive() {
        System.out.println("Car is driving");
    }
}

class Bike extends Vehicle {
    void ride() {
        System.out.println("Bike is riding");
    }
}

public class Main {
    public static void main(String[] args) {
        Truck t = new Truck();
        t.start();
        t.load();

        Car c = new Car();
        c.start();
        c.drive();

        Bike b = new Bike();
```

```
        b.start();
        b.ride();
    }
}
```

Output:

```
Vehicle started
Truck is loading goods
Vehicle started
Car is driving
Vehicle started
Bike is riding
```

2. Create a class Shape with area method and extend it for Circle, Rectangle

```
public class Shape {
    void area() {
        System.out.println("Calculating area...");
    }
}

class Circle extends Shape {
    double radius;

    Circle(double r) {
        radius = r;
    }

    @Override
    void area() {
```

```
        double result = 3.14 * radius * radius;
        System.out.println("Area of Circle: " + result);
    }
}

class Rectangle extends Shape {
    int length, width;

    Rectangle(int l, int w) {
        length = l;
        width = w;
    }

    @Override
    void area() {
        int result = length * width;
        System.out.println("Area of Rectangle: " + result);
    }
}

public class Main {
    public static void main(String[] args) {
        Circle c = new Circle(5);
        c.area();

        Rectangle r = new Rectangle(4, 6);
        r.area();
    }
```

}

Output:

Area of Circle: 78.5

Area of Rectangle: 24