

COMP2396B Tutorial 5

Answer

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

Question:

What is the output of the program?

It has no compile-time or run-time error.

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

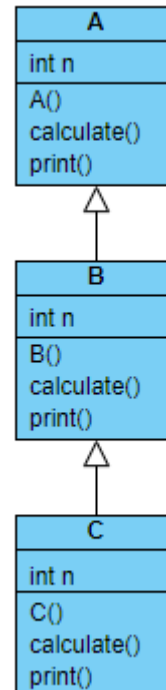
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

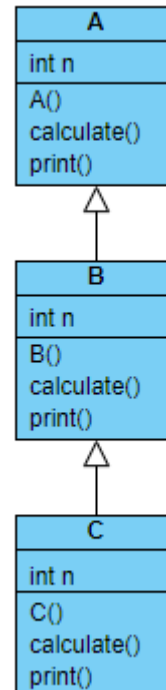
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

A n = 0

ints are initialized by 0

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

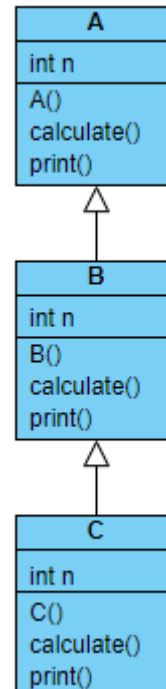
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

| | |
|---|-------|
| A | n = 0 |
|---|-------|

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

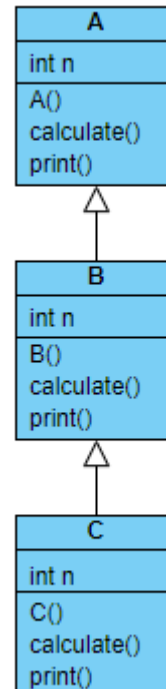
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

A n = 0 -> 1

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

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    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

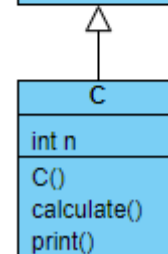
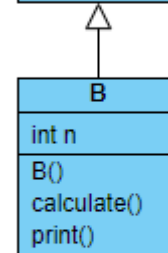
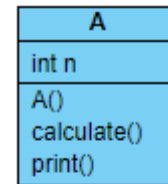
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        → x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

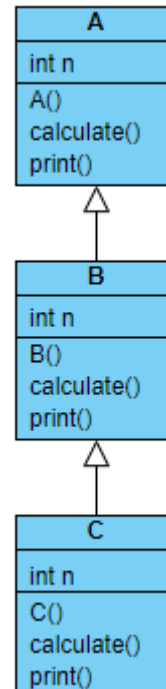
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public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();
        B x2 = new B();
        x2.print();
        C x3 = new C();
        x3.print();
    }
}

```

x1 – class A obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|




```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

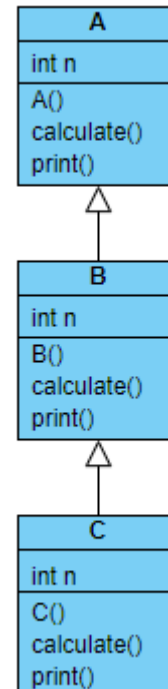
class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();
        B x2 = new B();
        x2.print();
        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();
        B x2 = new B();
        x2.print();
        C x3 = new C();
        x3.print();
    }
}

```

```

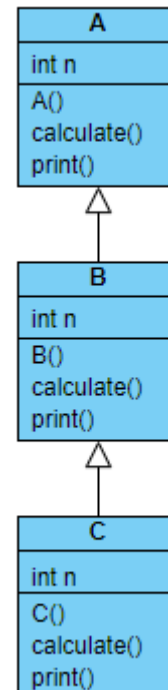
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
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```

class C extends B {
    int n;
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        super.print();
        System.out.println("In C: " + this.n);
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}

```



x1 – class A obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

```

class A {
    int n;
    public A() {
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    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

1

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();
        B x2 = new B();
        x2.print();
        C x3 = new C();
        x3.print();
    }
}

```

```

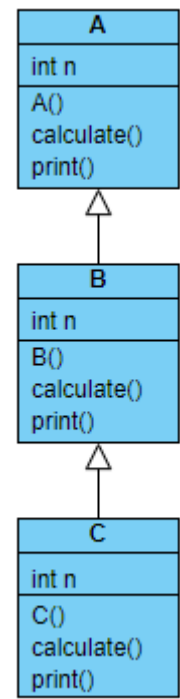
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();
        B x2 = new B();
        x2.print();
        C x3 = new C();
        x3.print();
    }
}

```

4

```

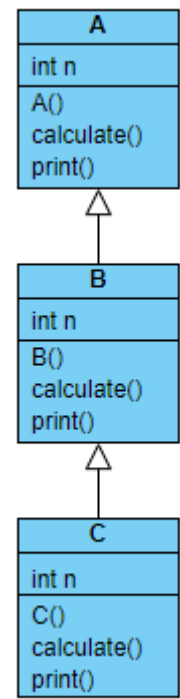
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

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    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

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    int n;
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        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

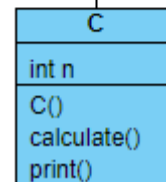
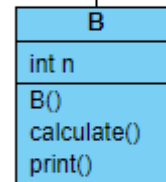
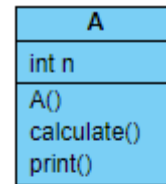
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|-------|
| A | n = 0 |
|---|-------|

| | |
|---|-------|
| B | n = 0 |
|---|-------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

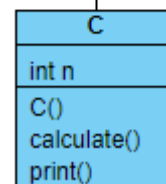
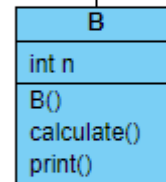
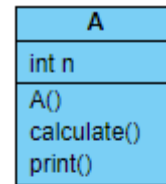
```

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    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|-------|
| A | n = 0 |
|---|-------|

| | |
|---|-------|
| B | n = 0 |
|---|-------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

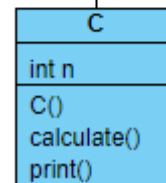
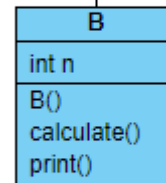
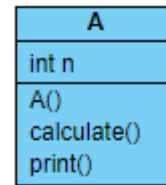
```

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    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|-------|
| A | n = 0 |
|---|-------|

| | |
|---|-------|
| B | n = 0 |
|---|-------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

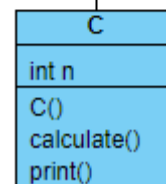
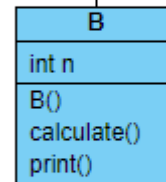
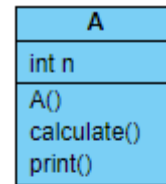
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------|
| B | n = 0 |
|---|-------|

In A: 4

Program output


```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

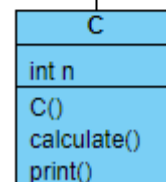
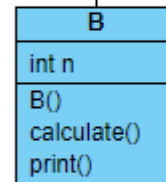
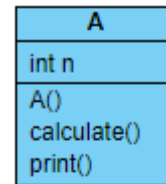
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------------|
| B | n = 0 -> 10 |
|---|-------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

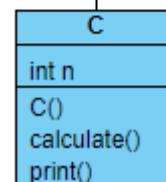
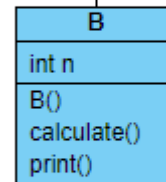
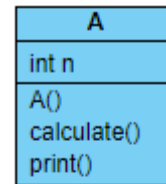
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------------|
| B | n = 0 -> 10 |
|---|-------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

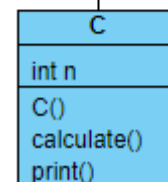
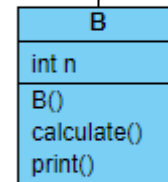
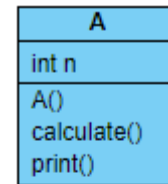
        C x3 = new C();
        x3.print();
    }
}

```

Which print() is called?

Ans:

The **most specific version**.
The calling obj is of class B. The print() in B is overriding the print() in A. The **most specific version** is the one in B.



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------------|
| B | n = 0 -> 10 |
|---|-------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

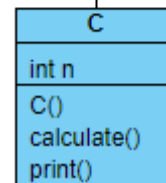
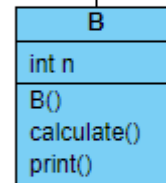
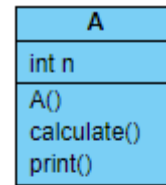
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------------|
| B | n = 0 -> 10 |
|---|-------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

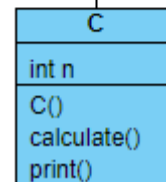
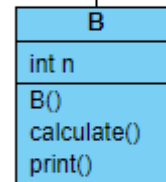
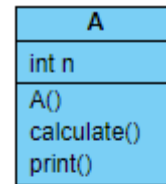
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------------|
| B | n = 0 -> 10 |
|---|-------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In

```

```

}

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

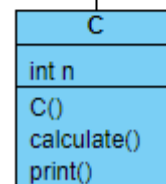
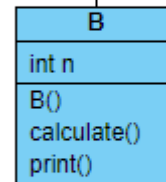
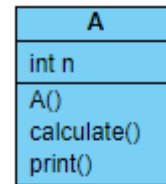
public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

The calling obj is of class B. The most specific version of the calculate() is the one in B.



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------------|
| B | n = 0 -> 10 |
|---|-------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

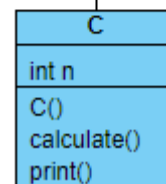
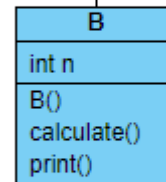
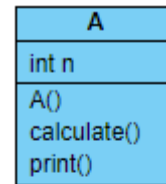
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------|
| A | n = 0 -> 1 |
|---|------------|

| | |
|---|-------------|
| B | n = 0 -> 10 |
|---|-------------|

In A: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In

```

```

    }
}
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

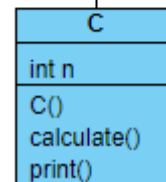
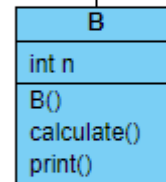
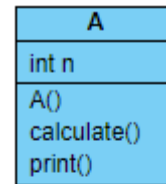
public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

This statement is in the scope of B, super refer to the parent class, i.e., A. Therefore, super.n refer to the n in A, i.e., 1.



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

In A: 4

Program output


```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

x1 – class A obj

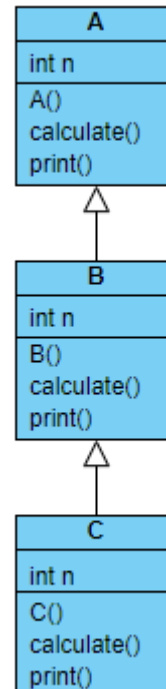
| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

In A: 4
In B: 4

Program output



```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

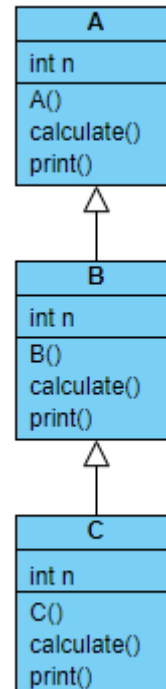
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|-------|
| A | n = 0 |
| B | n = 0 |
| C | n = 0 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

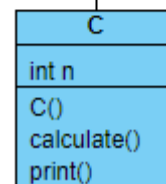
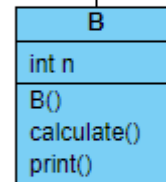
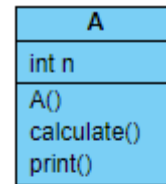
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|-------|
| A | n = 0 |
| B | n = 0 |
| C | n = 0 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

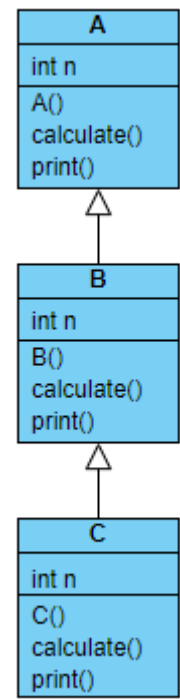
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



| x1 – class A obj | |
|------------------|-----------------|
| A | n = 0 -> 1 -> 4 |

| x2 – class B obj | |
|------------------|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

| x3 – class C obj | |
|------------------|-------|
| A | n = 0 |
| B | n = 0 |
| C | n = 0 |

```

In A: 4
In B: 4

```

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

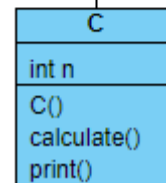
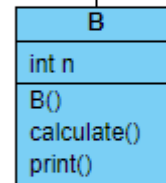
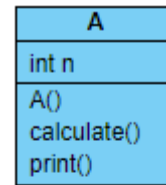
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|-------|
| A | n = 0 |
| B | n = 0 |
| C | n = 0 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

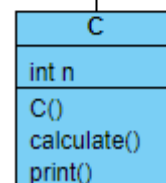
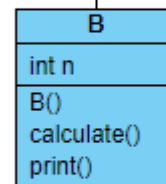
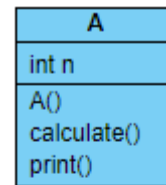
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|------------|
| A | n = 0 -> 1 |
| B | n = 0 |
| C | n = 0 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

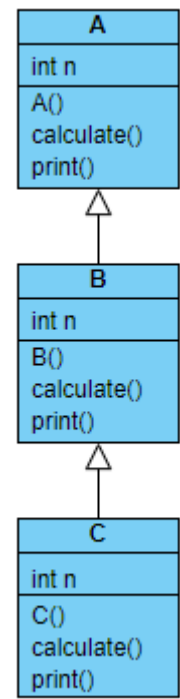
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



| x1 – class A obj | |
|------------------|-----------------|
| A | n = 0 -> 1 -> 4 |

| x2 – class B obj | |
|------------------|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

| x3 – class C obj | |
|------------------|-------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

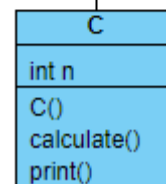
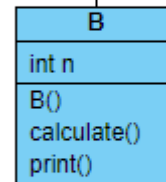
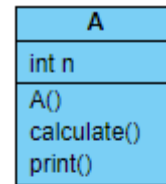
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output


```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

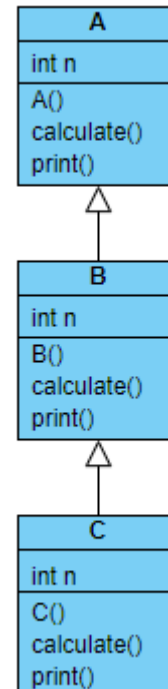
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

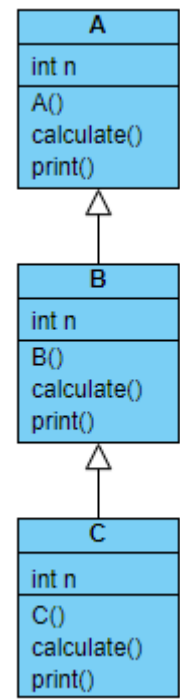
public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

The most specific version of print() is in class C



| x1 – class A obj | |
|------------------|-----------------|
| A | n = 0 -> 1 -> 4 |

| x2 – class B obj | |
|------------------|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

| x3 – class C obj | |
|------------------|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

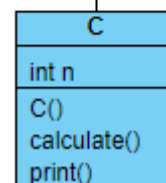
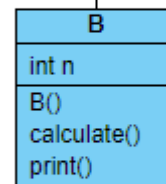
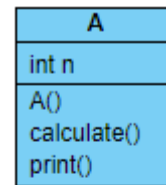
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

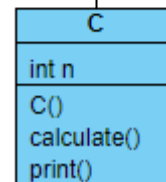
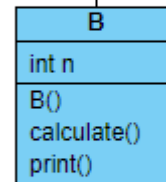
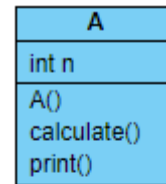
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

```

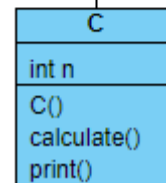
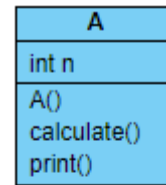
class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```



This statement is in the scope of C, super refer to the parent class, i.e., B. Therefore, super.print() refer to the print() in B.

x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

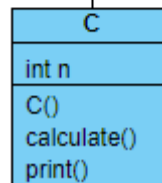
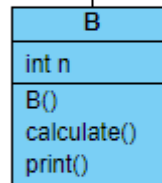
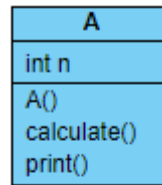
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

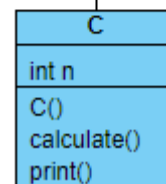
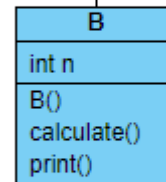
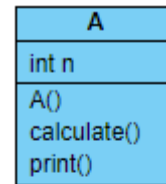
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

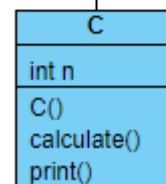
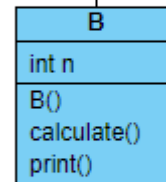
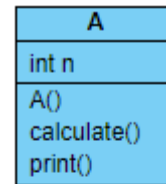
        C x3 = new C();
        x3.print();
    }
}

```

Which calculate() to be called?

Ans:

The most specific version.



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output


```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

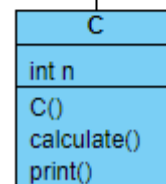
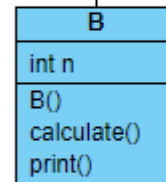
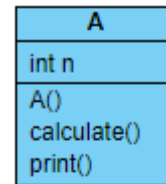
```

public class Main {
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        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|--------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

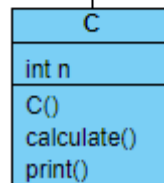
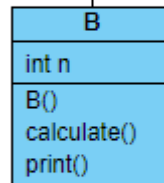
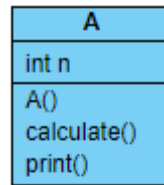
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|---------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 -> 400 |

In A: 4
In B: 4

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

```

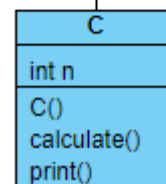
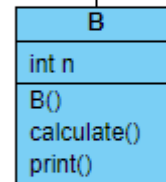
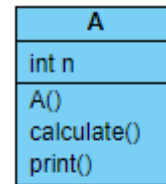
public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```

10



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|---------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 -> 400 |

In A: 4
In B: 4
In B: 10

Program output

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

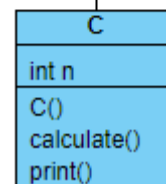
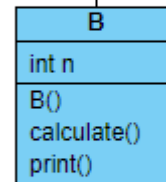
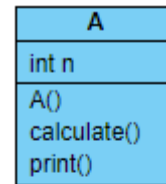
```

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        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|---------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 -> 400 |

In A: 4
In B: 4
In B: 10
In C: 400

Program output

400

```

class A {
    int n;
    public A() {
        this.n = 1;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        calculate();
        System.out.println("In A: " + this.n);
    }
}

```

```

class B extends A {
    int n;
    public B() {
        this.n = 10;
    }
    public void calculate() {
        this.n = 4 * super.n;
    }
    public void print() {
        this.calculate();
        System.out.println("In B: " + this.n);
    }
}

```

```

class C extends B {
    int n;
    public C() {
        this.n = 100;
    }
    public void calculate() {
        this.n = 4 * this.n;
    }
    public void print() {
        super.print();
        System.out.println("In C: " + this.n);
    }
}

```

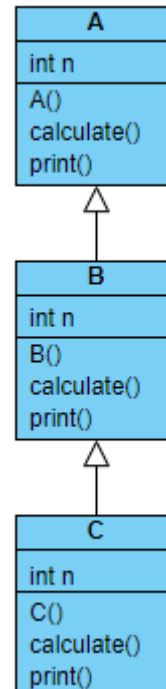
```

public class Main {
    public static void main(String[] args) {
        A x1 = new A();
        x1.print();

        B x2 = new B();
        x2.print();

        C x3 = new C();
        x3.print();
    }
}

```



x1 – class A obj

| | |
|---|-----------------|
| A | n = 0 -> 1 -> 4 |
|---|-----------------|

x2 – class B obj

| | |
|---|------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 -> 4 |

x3 – class C obj

| | |
|---|---------------------|
| A | n = 0 -> 1 |
| B | n = 0 -> 10 |
| C | n = 0 -> 100 -> 400 |

In A: 4
In B: 4
In B: 10
In C: 400

Program output

Done!

