PARCIAL III - CI3641 - JOAO PINTO 17-10490

PREGUNTA 3

ASOCIACIÓN DINÁMICA DE MÉTODOS

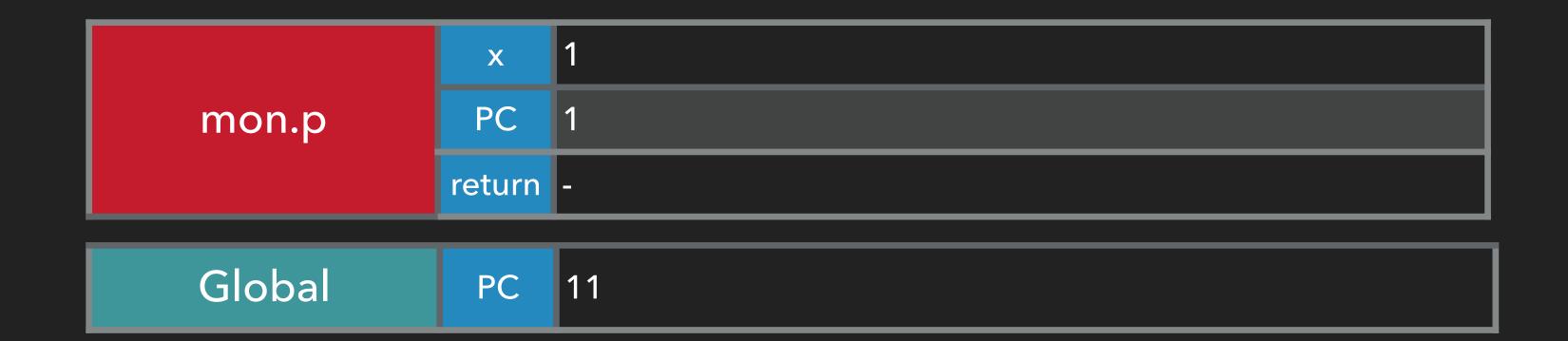
EJECUCIÓN PASO A PASO

```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
▶ 1
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
▶ 3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
▶ 5
             c = 2 * b - x
             return q(a + b + c)
▶ 6
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 4, b = 9
don	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
don.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0

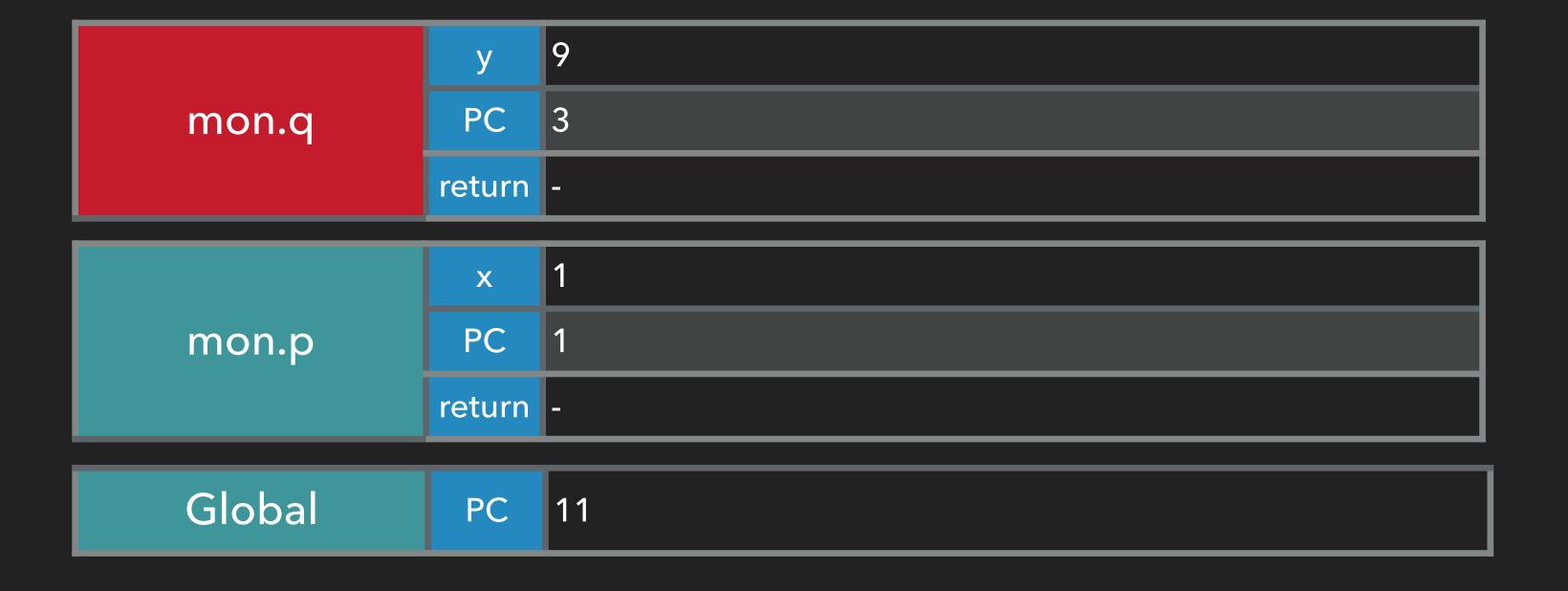
```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
▶ 3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
             c = 2 * b - x
             return q(a + b + c)
▶ 6
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



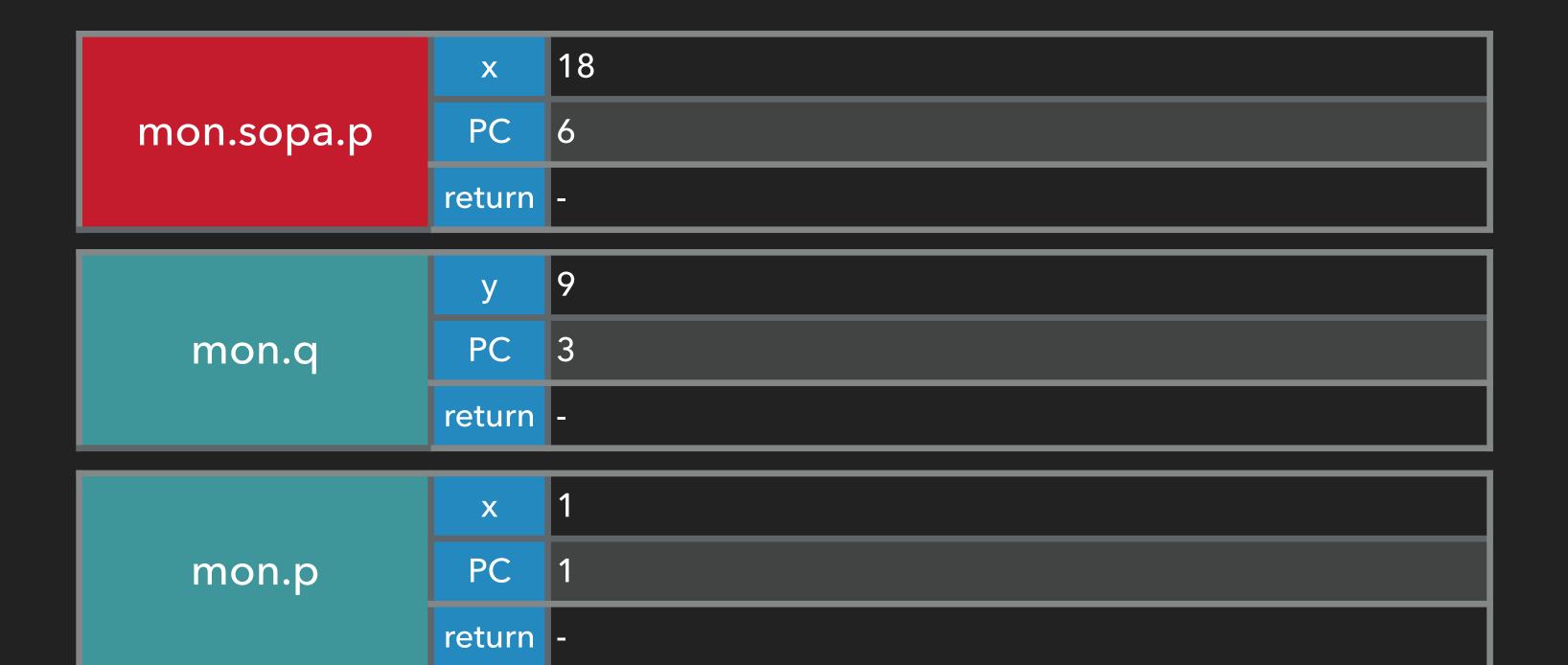
```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
             c = 2 * b - x
             return q(a + b + c)
▶ 6
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
don.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0



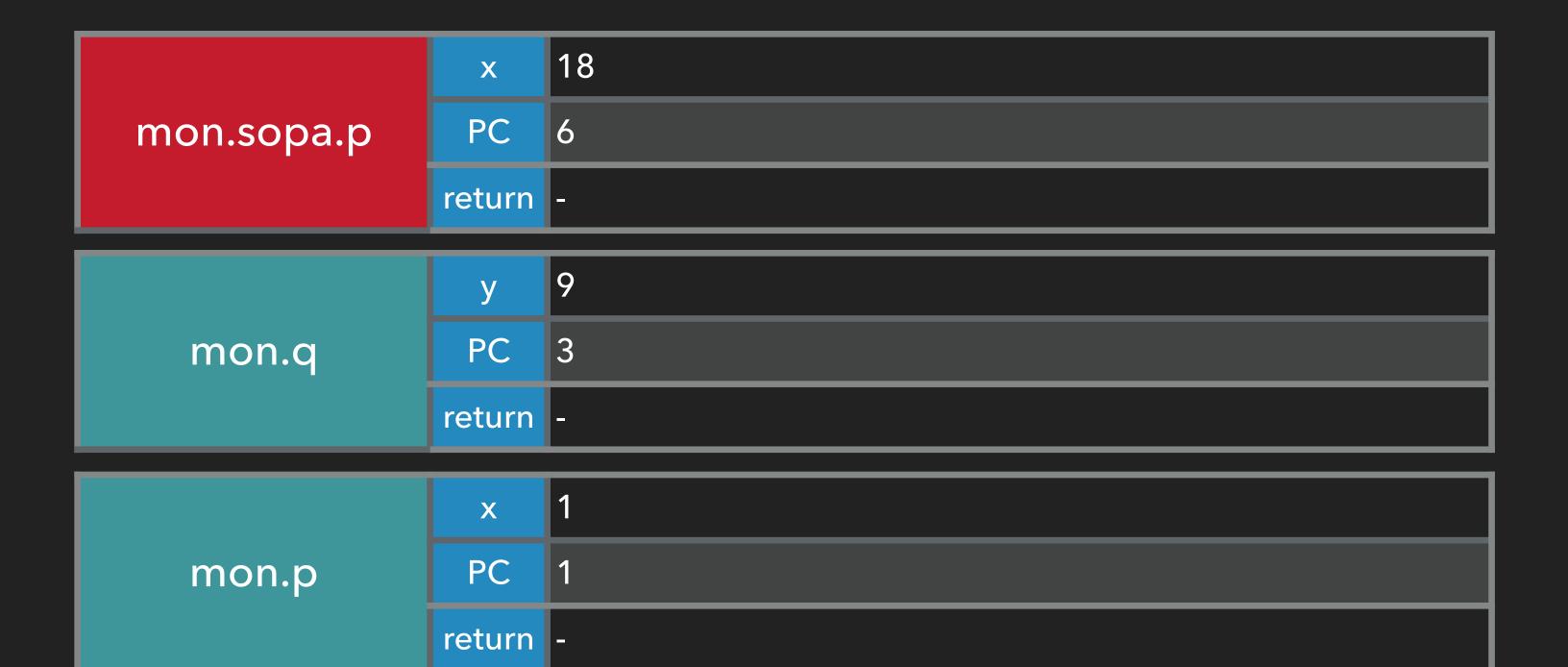
```
class A {
        int a = 4, b = 9
        fun p(int x): int {
• 0
            a = b * x
            return q(a)
        fun q(int y): int {
▶ 2
            return a + y
    class B extends A {
        A sopa = new C()
        fun q(int y): int {
            return sopa.p(a + b) + y
▶ 3
    class C extends B {
        int c = 0
        fun p(int x): int {
            a = 3 + x
            c = 2 * b - x
            return q(a + b + c)
        fun q(int y): int {
▶ 7
            return c + y
▶ 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	Α	С	p -> C, q -> C	a = 3 + 18, b = 9, c = 18 - 18
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



```
class A {
        int a = 4, b = 9
        fun p(int x): int {
            a = b * x
• 0
            return q(a)
        fun q(int y): int {
▶ 2
            return a + y
    class B extends A {
        A sopa = new C()
        fun q(int y): int {
            return sopa.p(a + b) + y
▶ 3
    class C extends B {
        int c = 0
        fun p(int x): int {
            a = 3 + x
            c = 2 * b - x
            return q(a + b + c)
        fun q(int y): int {
▶ 7
            return c + y
▶ 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 9, b = 9
don	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0



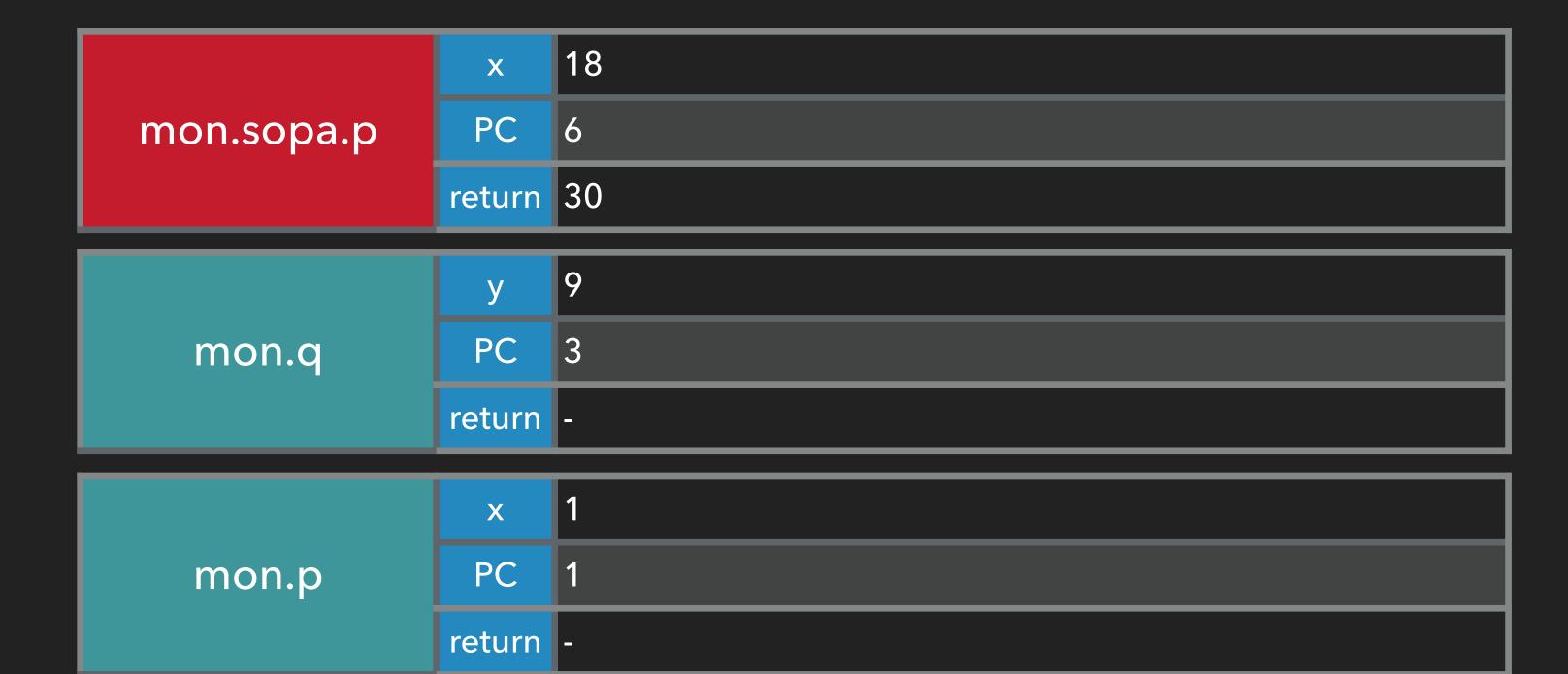
```
class A {
        int a = 4, b = 9
        fun p(int x): int {
• 0
            a = b * x
            return q(a)
▶ 1
        fun q(int y): int {
▶ 2
            return a + y
    class B extends A {
        A sopa = new C()
        fun q(int y): int {
            return sopa.p(a + b) + y
3
    class C extends B {
        int c = 0
        fun p(int x): int {
            a = 3 + x
▶ 5
            c = 2 * b - x
▶ 6
            return q(a + b + c)
        fun q(int y): int {
            return c + y
▶ 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 9, b = 9
don	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0

	У	30
mon.sopa.q	PC	7
	return	0 + 30 = 30
	Х	18
mon.sopa.p	РС	6
	return	-
	у	9
mon.q	PC	3
	return	-

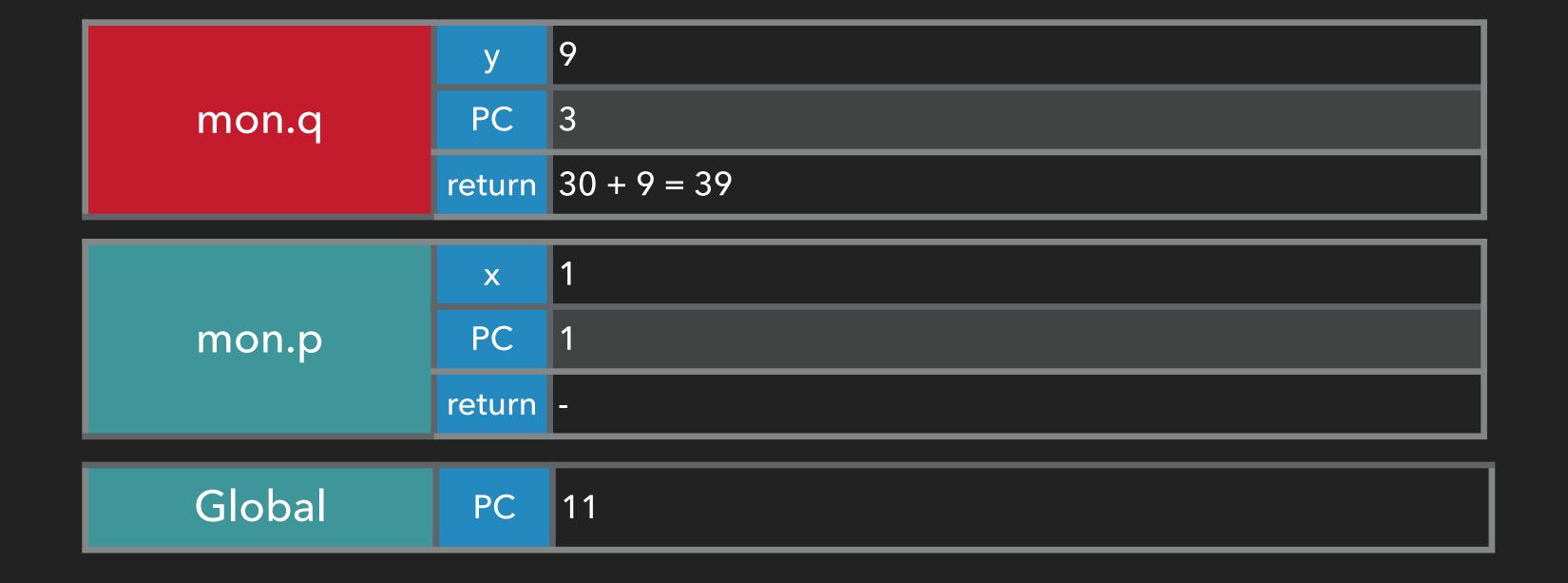
```
class A {
        int a = 4, b = 9
        fun p(int x): int {
• 0
            a = b * x
            return q(a)
        fun q(int y): int {
▶ 2
            return a + y
    class B extends A {
        A sopa = new C()
        fun q(int y): int {
            return sopa.p(a + b) + y
▶ 3
    class C extends B {
        int c = 0
        fun p(int x): int {
            a = 3 + x
            c = 2 * b - x
            return q(a + b + c)
        fun q(int y): int {
▶ 7
            return c + y
▶ 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	Α	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



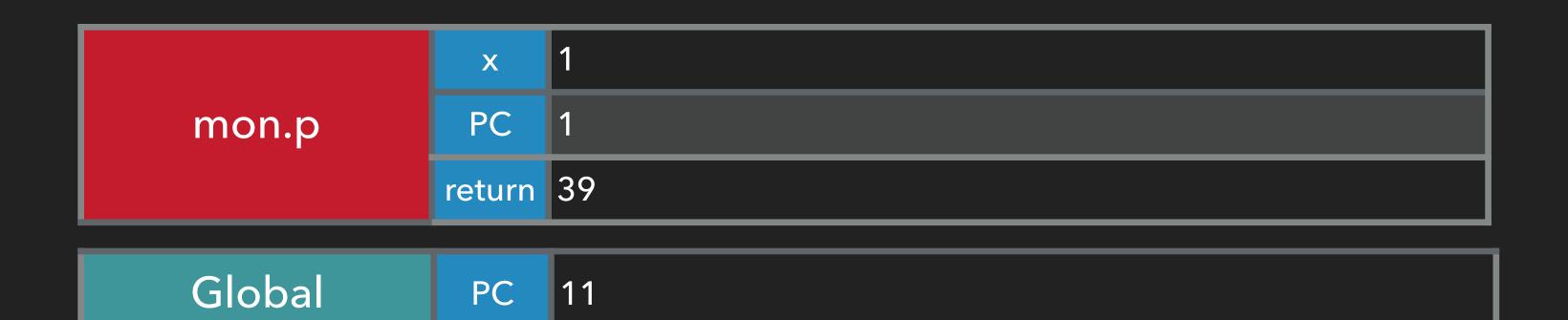
```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
             c = 2 * b - x
             return q(a + b + c)
▶ 6
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 9, b = 9
don	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	Α	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
▶ 3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
▶ 5
             c = 2 * b - x
             return q(a + b + c)
▶ 6
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
11 print(mon.p(1) + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	Α	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0

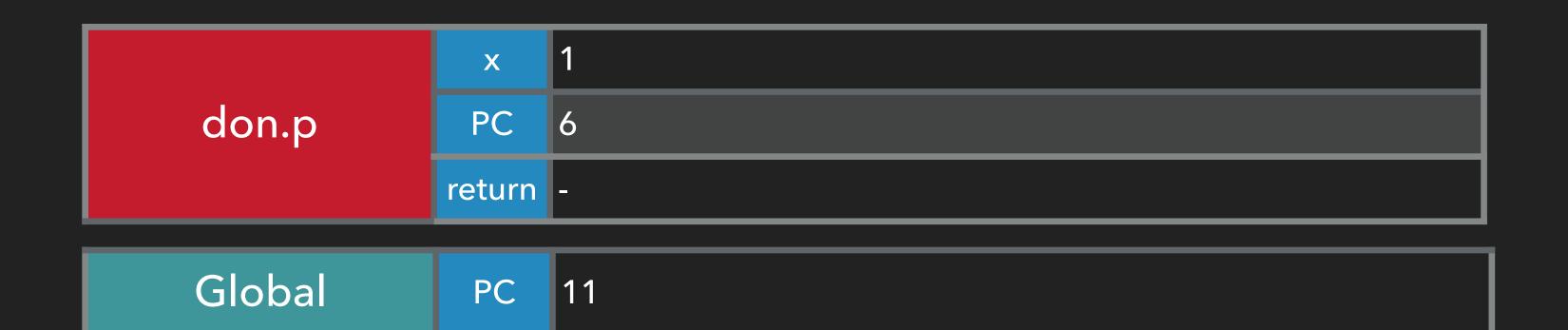


```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
▶ 1
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
▶ 5
             c = 2 * b - x
             return q(a + b + c)
▶ 6
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
▶ 11 print(mon.p(1) 39 + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	Α	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0

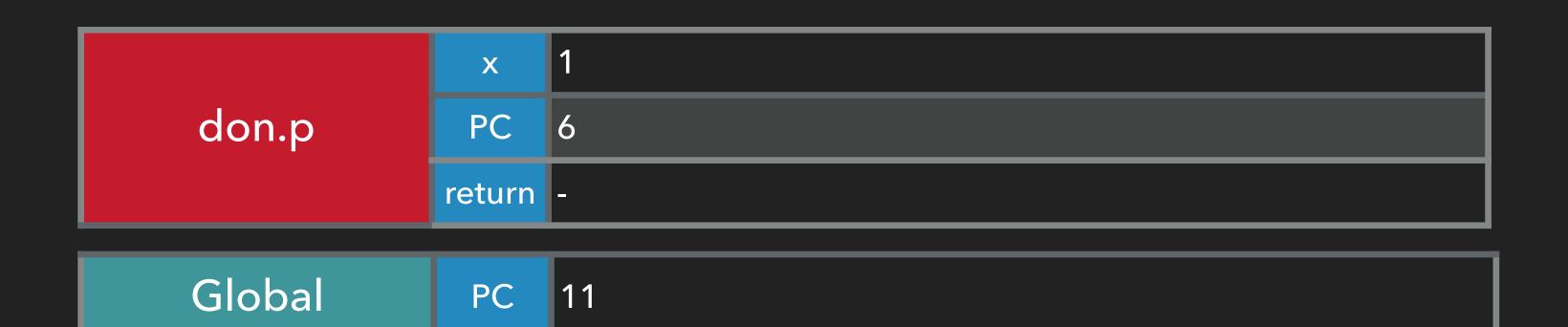
```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
▶ 1
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
▶ 3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
             c = 2 * b - x
             return q(a + b + c)
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
► 11 print(mon.p(1) 39 + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 9, b = 9
don	А	С	p -> C, q -> C	a = 3 + 1, b = 9, c = 18 - 1
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



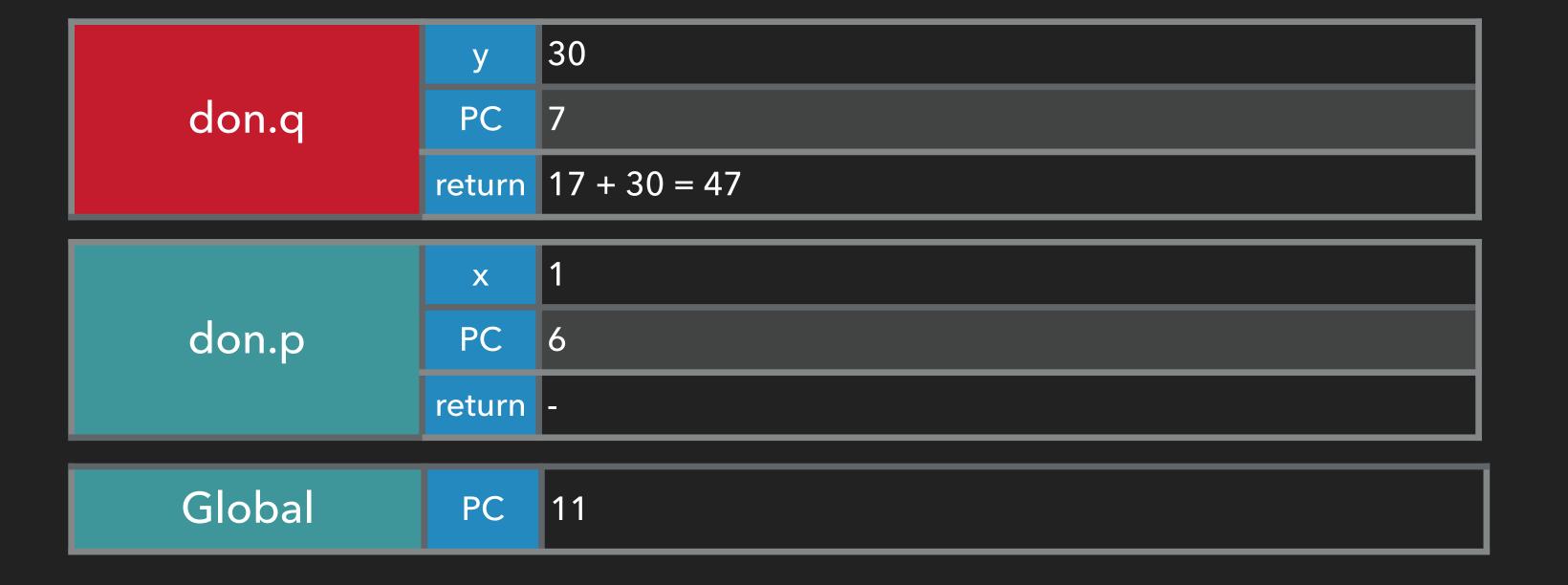
```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
▶ 3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
▶ 5
             c = 2 * b - x
             return q(a + b + c)
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
► 11 print(mon.p(1) 39 + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 17
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



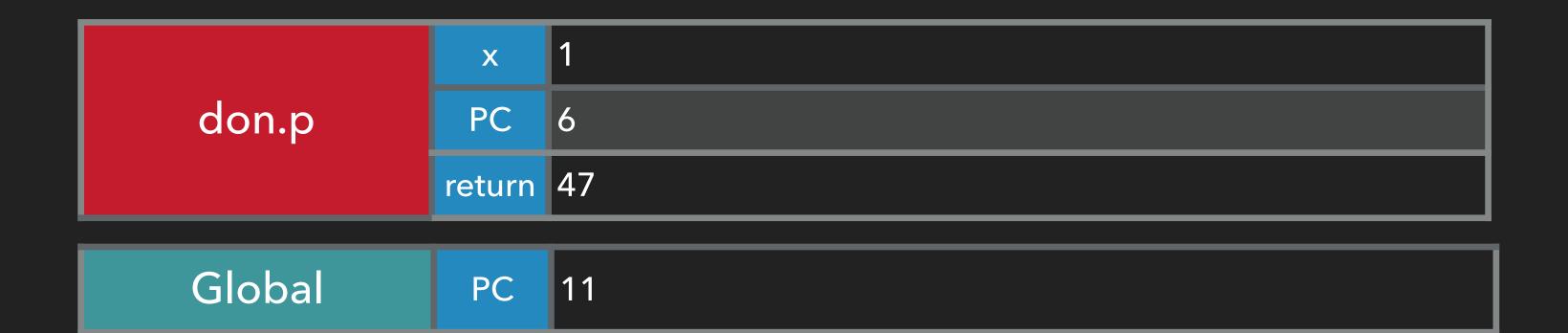
```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
▶ 3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
             c = 2 * b - x
             return q(a + b + c)
▶ 6
         fun q(int y): int {
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
► 11 print(mon.p(1) 39 + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 17
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



```
class A {
         int a = 4, b = 9
         fun p(int x): int {
• 0
             a = b * x
             return q(a)
▶ 1
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
         A sopa = new C()
         fun q(int y): int {
             return sopa.p(a + b) + y
▶ 3
     class C extends B {
         int c = 0
         fun p(int x): int {
             a = 3 + x
▶ 5
             c = 2 * b - x
             return q(a + b + c)
         fun q(int y): int {
▶ 7
             return c + y
\triangleright 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
► 11 print(mon.p(1) 39 + don.p(1) + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	А	С	p -> C, q -> C	a = 4, b = 9, c = 17
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0



```
class A {
        int a = 4, b = 9
         fun p(int x): int {
• 0
            a = b * x
            return q(a)
▶ 1
         fun q(int y): int {
▶ 2
            return a + y
     class B extends A {
        A sopa = new C()
         fun q(int y): int {
            return sopa.p(a + b) + y
3
     class C extends B {
        int c = 0
         fun p(int x): int {
            a = 3 + x
▶ 5
            c = 2 * b - x
            return q(a + b + c)
▶ 6
         fun q(int y): int {
▶ 7
            return c + y
▶ 8 A mon = new B()
▶ 9 A don = new C()
► 10 B go = new C()
▶ 11 print(mon.p(1) 39 + don.p(1) 47 + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	А	В	p -> A, q -> B	a = 9, b = 9
don	А	С	p -> C, q -> C	a = 4, b = 9, c = 17
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	А	С	p -> C, q -> C	a = 4, b = 9, c = 0

```
class A {
         int a = 4, b = 9
         fun p(int x): int {
            a = b * x
             return q(a)
         fun q(int y): int {
▶ 2
             return a + y
     class B extends A {
        A sopa = new C()
         fun q(int y): int {
            return sopa.p(a + b) + y
▶ 3
     class C extends B {
        int c = 0
         fun p(int x): int {
            a = 3 + x
            c = 2 * b - x
▶ 6
             return q(a + b + c)
         fun q(int y): int {
▶ 7
             return c + y
▶ 8 A mon = new B()
▶ 9 A don = new C()
▶ 10 B go = new C()
▶ 11 print(mon.p(1) 39 + don.p(1) 47 + go.p(1))
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 17
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 0
mon.sopa	Α	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0

El objeto go tiene el mismo tipo dinámico y los mismos valores <u>iniciales</u> para a, b y c que el objeto don.

Por lo tanto los resultados (y pasos) de ejecución de go.p(1) son idénticos a los de don.p(1).

Se omiten los pasos, en la siguiente lamina están los resultados.

```
class A {
        int a = 4, b = 9
        fun p(int x): int {
            a = b * x
• 0
▶ 1
            return q(a)
        fun q(int y): int {
▶ 2
            return a + y
    class B extends A {
        A sopa = new C()
        fun q(int y): int {
            return sopa.p(a + b) + y
▶ 3
    class C extends B {
        int c = 0
        fun p(int x): int {
            a = 3 + x
            c = 2 * b - x
▶ 6
            return q(a + b + c)
        fun q(int y): int {
▶ 7
            return c + y
▶ 8 A mon = new B()
▶ 9 A don = new C()
▶ 10 B go = new C()
▶ 11 print(mon.p(1) 39 + don.p(1) 47 + go.p(1) 47)
```

Nombre	TE	TD	Methods table	Values
mon	Α	В	p -> A, q -> B	a = 9, b = 9
don	Α	С	p -> C, q -> C	a = 4, b = 9, c = 17
go	В	С	p -> C, q -> C	a = 4, b = 9, c = 17
mon.sopa	А	С	p -> C, q -> C	a = 21, b = 9, c = 0
don.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0
go.sopa	Α	С	p -> C, q -> C	a = 4, b = 9, c = 0

IMPRIME

> 133

ASOCIACIÓN DINÁMICA DE MÉTODOS

RESULTADOS

FINALMENTE

El programa imprime:

```
A mon = new B()
A don = new C()
B go = new C()
print(mon.p(1) + don.p(1) + go.p(1))
```