Chapter 6: Inheritance

EECS 1030

moodle.yorku.ca

State of an object

```
final int WIDTH = 3;
final int HEIGTH = 4;
final int WEIGHT = 80;
GoldenRectangle rectangle =
  new GoldenRectangle(WIDTH, HEIGHT, WEIGHT);
```

Problem

Draw the memory diagram.

Memory diagram

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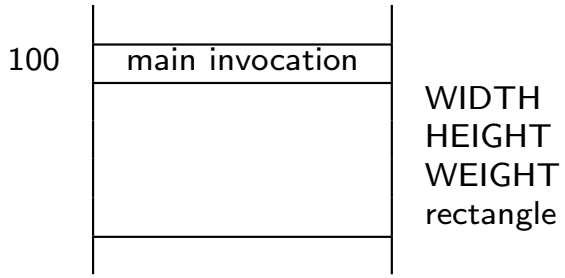

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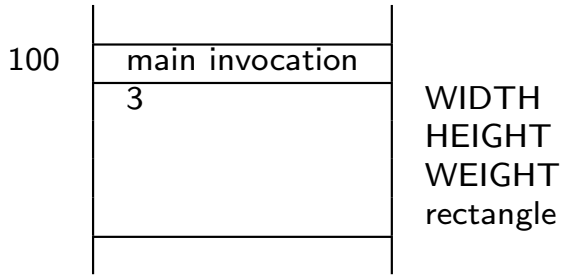

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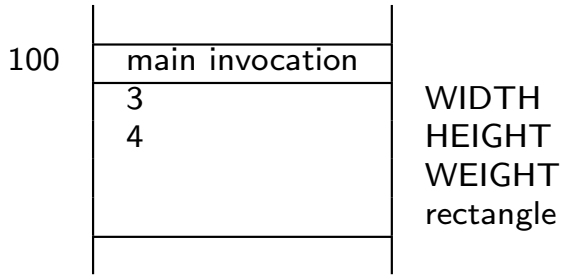

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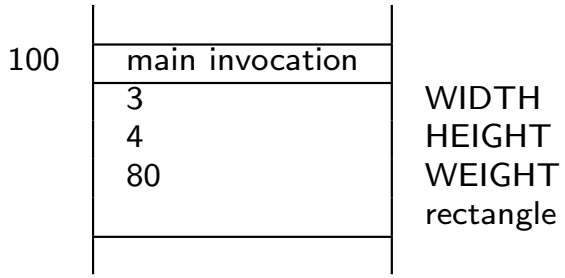

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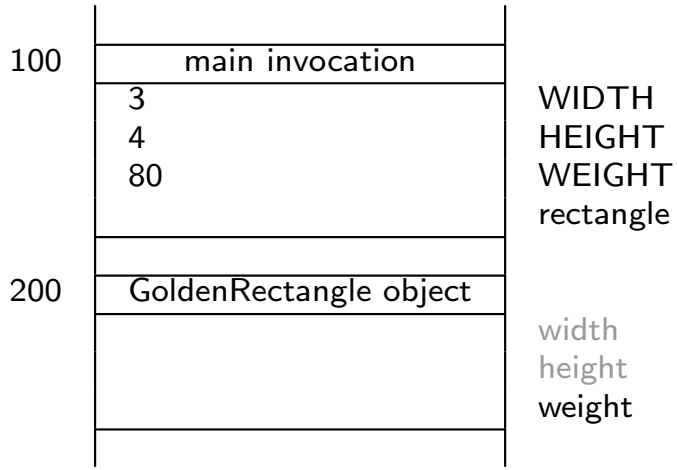

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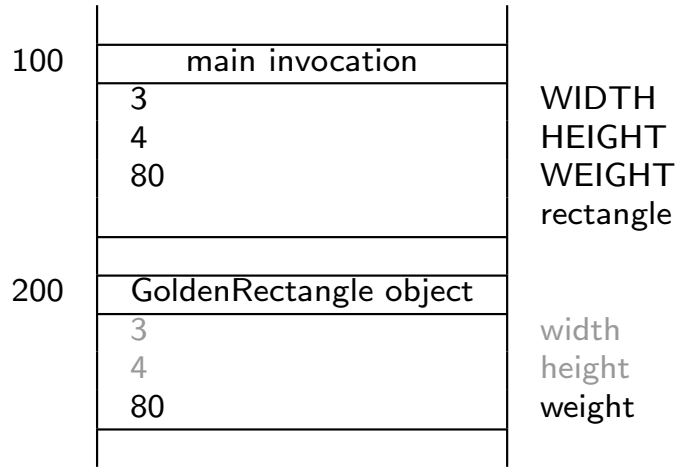

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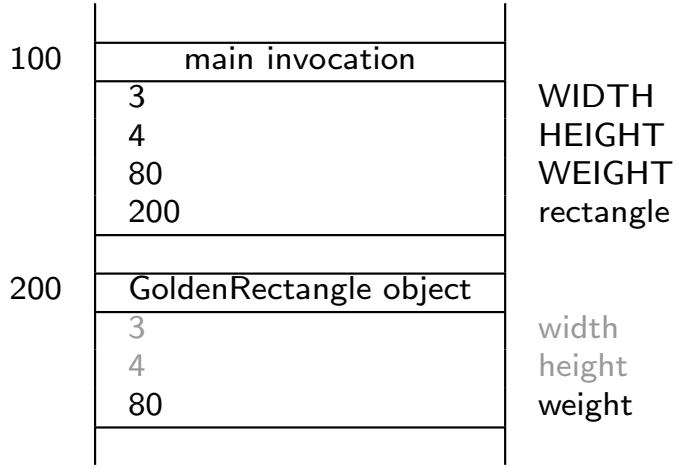

State of an object

Note

The private attributes width and height of the Rectangle class are part of the state of a GoldenRectangle object, but are *not* inherited.

As a result, the private attributes width and height of the Rectangle class *cannot* be accessed by their name in the GoldenRectangle class.

The extends keyword

To specify that the GoldenRectangle class is a subclass of the Rectangle class, we use the following class header:

```
public class GoldenRectangle extends Rectangle
```

Attributes

Question

Which attributes do we introduce in the GoldenRectangle class? Provide names and types.

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Answer

```
private int weight;
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Note

We do *not* introduce attributes `width` and `height` in the `GoldenRectangle` class, since they are already present in the super class `Rectangle`.

Constructors

Question

Where do we initialize the state of an object?

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Which attributes are part of the state of a `GoldenRectangle` object?

Constructors

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Where do we initialize the state of an object?

Answer

In the constructors.

Question

Which attributes are part of the state of a `GoldenRectangle` object?

Answer

`width`, `height` and `weight`.

Constructors

Problem

In the constructors of the `GoldenRectangle` class, we have to initialize the attributes `width`, `height` and `weight`. However, we *cannot* access `width` and `height` by their name, that is, *cannot* use `this.width` and `this.height` in the constructors of the `GoldenRectangle` class.

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Solution

Delegate to a constructor of the `Rectangle` class.

Memory diagram

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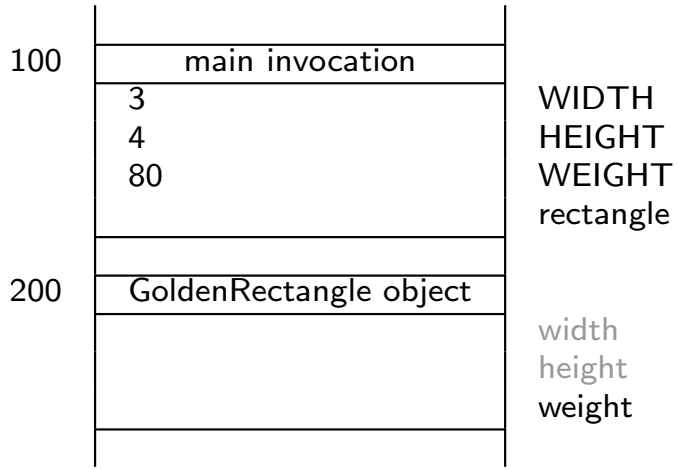

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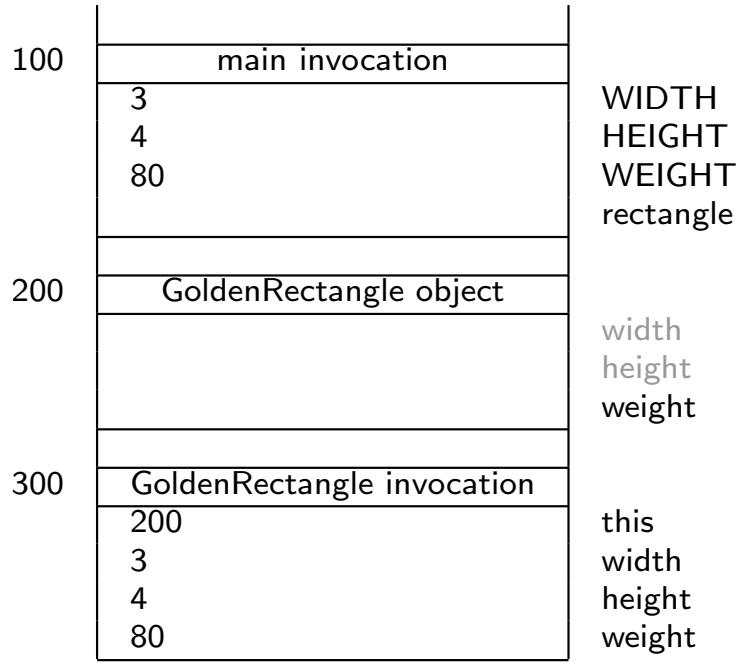

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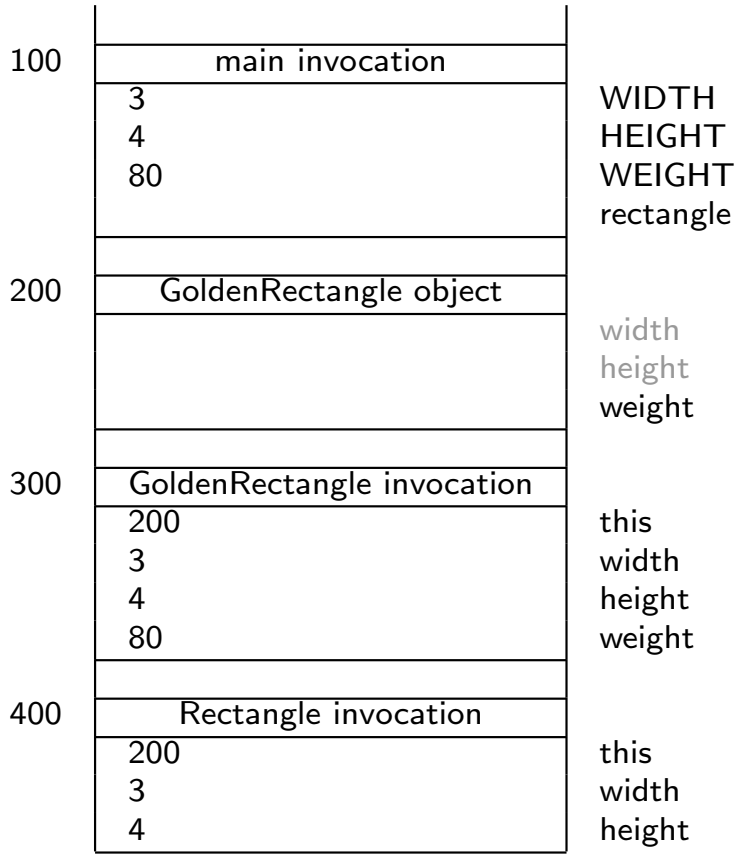

Memory diagram

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this.width = width;
this.height = height;
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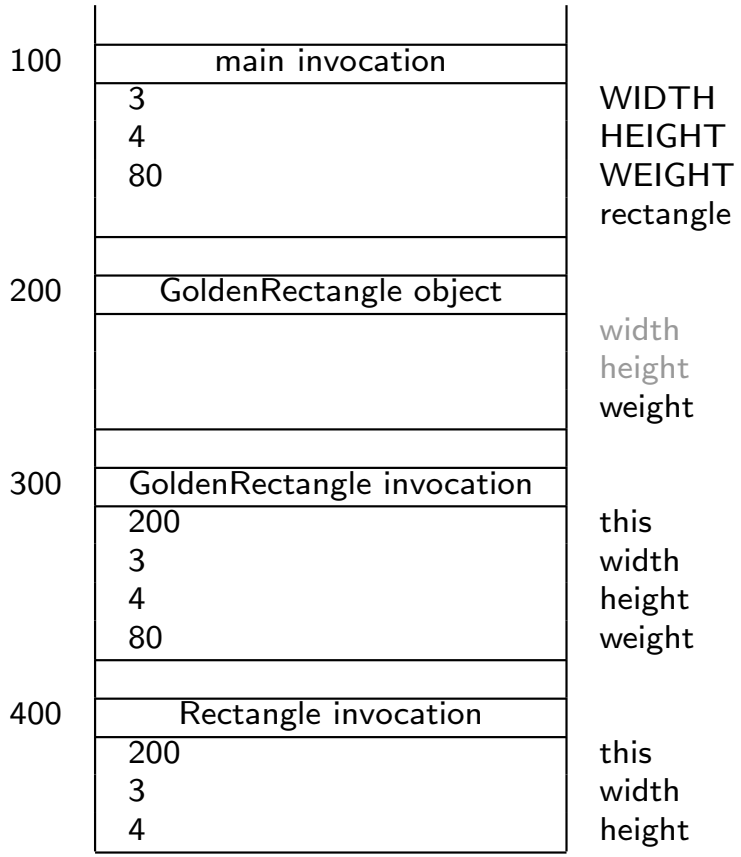

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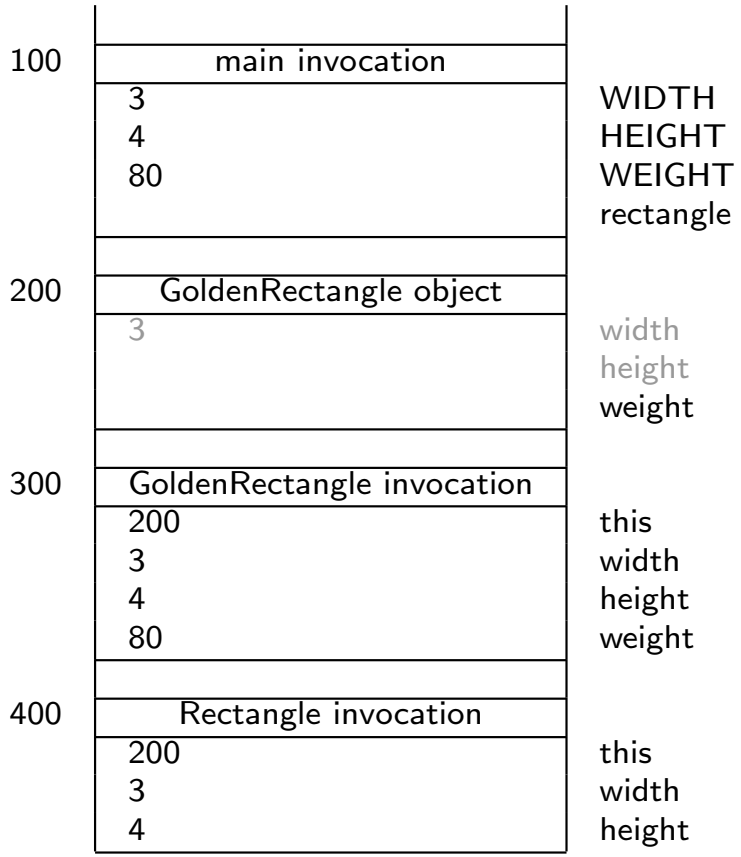

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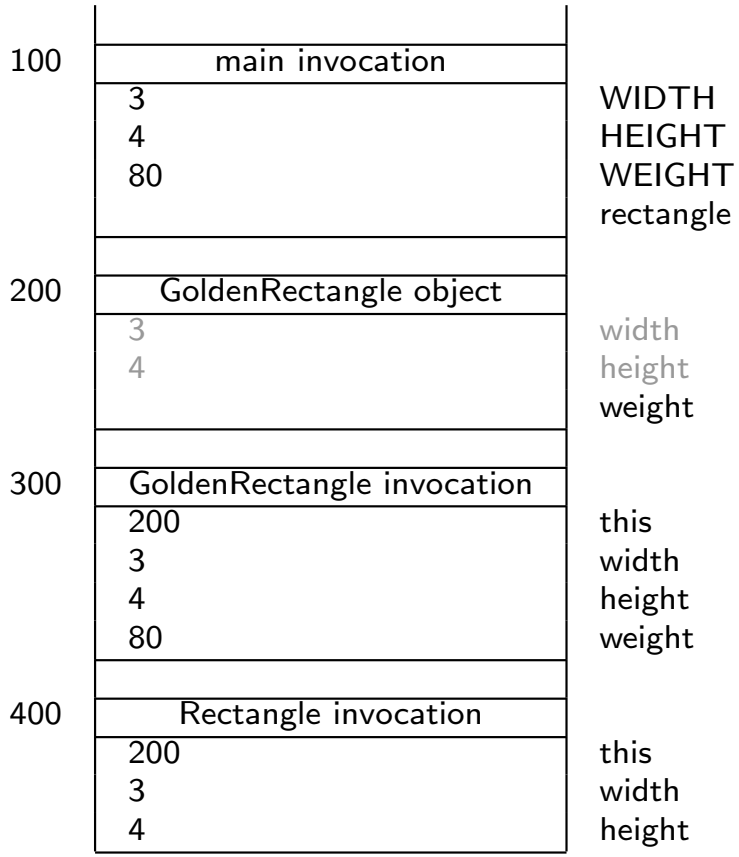

Memory diagram

```
...
this.weight = weight;
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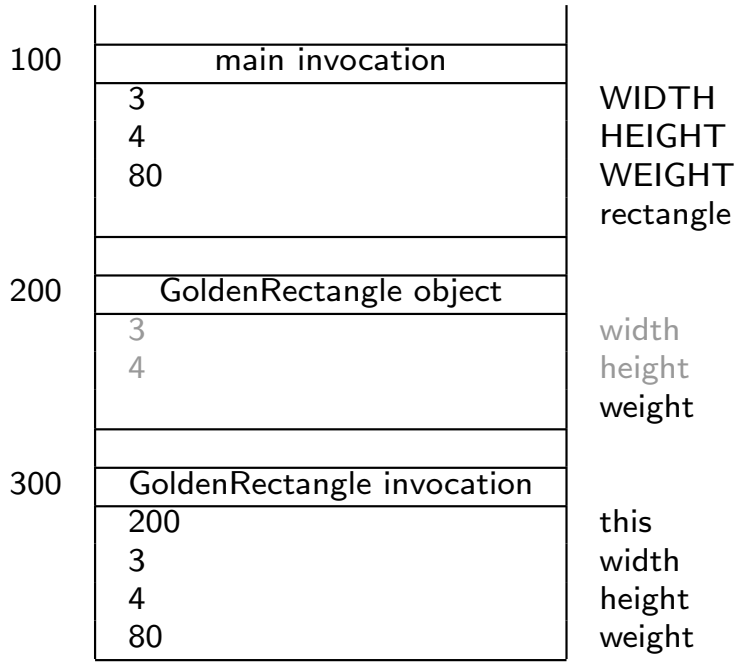

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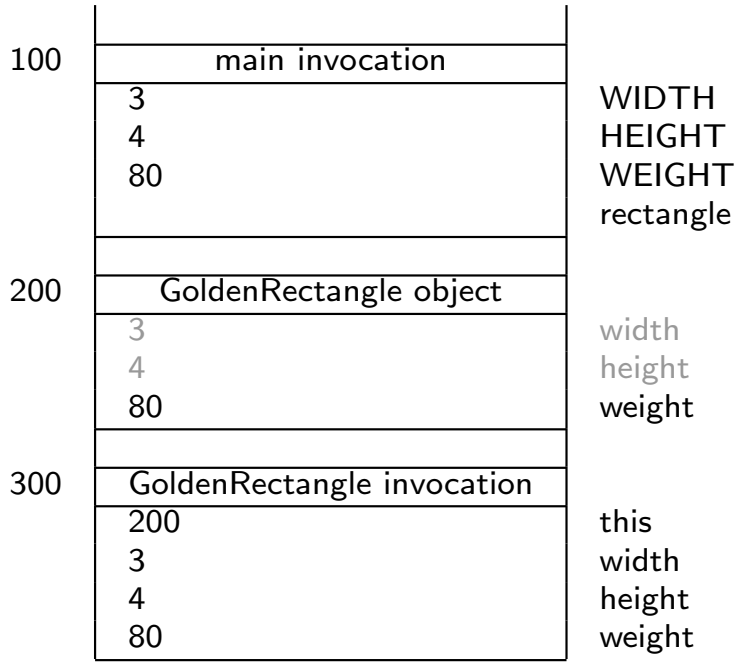

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Answer

Although it may not be the most intuitive syntax, we use

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super(width, height);
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Note

`super` has an implicit parameter, namely `this`.

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Although it may not be the most intuitive syntax, we use

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Note

`super` has an implicit parameter, namely `this`.

Rule

If we delegate to the constructor of the super class, then this has to be done first, that is, `super` needs to be the first statement of the constructor.

Delegation

Problem

Implement the constructor of the `GoldenRectangle` class.

Question

Which methods are inherited by the `GoldenRectangle` class from the `Rectangle` class?

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Answer

compareTo, getArea, getHeight, getWidth, scale, setHeight and setWidth.

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Which methods are overridden of the `Rectangle` class in the `GoldenRectangle` class?

Methods

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Which methods are inherited by the `GoldenRectangle` class from the `Rectangle` class?

Answer

compareTo, getArea, getHeight, getWidth, scale, setHeight and setWidth.

Question

Which methods are overridden of the `Rectangle` class in the `GoldenRectangle` class?

Answer

equals, hashCode and toString.

Question

Which methods of the `GoldenRectangle` class are new?

Methods

Question

Which methods of the `GoldenRectangle` class are new?

Answer

getWeight.

Inherited methods

Nothing needs to be done.

New methods

Problem

Implement getWeight method.

Overridden methods

Problem

Implement equals, hashCode and toString.