

Using Methods

More on writing methods

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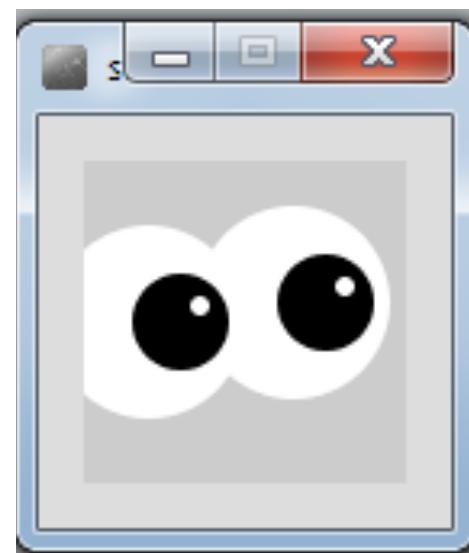
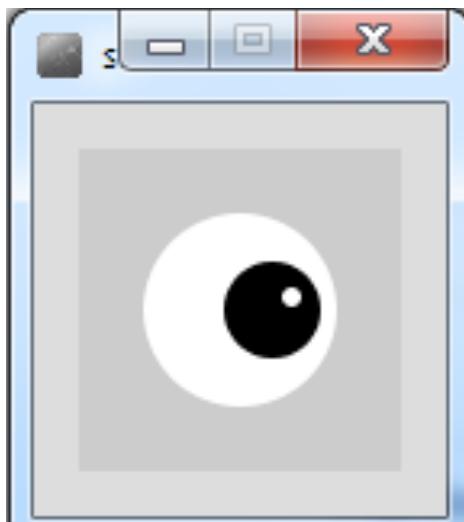


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Topics List

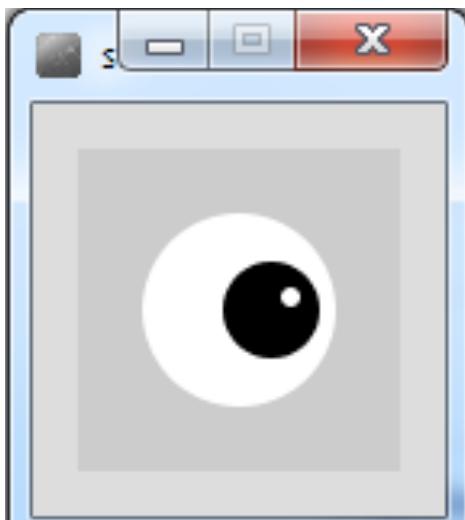
- Method Example: Eyes
- Method Example: X's
- Overloading Methods
- Method Example: Celsius / Fahrenheit Converter



Example 6.1 – Draw an eye

```
void setup()
{
    size(100,100);
    noStroke();
}
```

```
void draw()
{
    background(204);
    fill(255);
    ellipse(50,50,60,60); //outer white circle
    fill(0);
    ellipse(50+10, 50, 30, 30); //black circle
    fill(255);
    ellipse(50+16, 46, 6, 6); //small, white circle
}
```



What if we wanted to achieve this output?



Each eye takes a six
lines of code to draw.

```
void draw()
{
    background(204);
    //Right eye
    fill(255);
    ellipse(65,44,60,60);  //outer white circle
    fill(0);
    ellipse(65+10, 44, 30, 30); //black circle
    fill(255);
    ellipse(65+16, 44-5, 6, 6); //small, white
    circle
    //Left eye
    fill(255);
    ellipse(20,50,60,60);  //outer white circle
    fill(0);
    ellipse(20+10, 50, 30, 30); //black circle
    fill(255);
    ellipse(20+16, 50-5, 6, 6); //small, white
    circle
}
```

What if we wanted to Draw Six Eyes?



Are we going to repeat the six lines of code SIX times?

What if we wanted to draw 100 eyes → 600 lines of code!

Example 6.2 – Drawing Two Eyes

```
void setup()
{
    size(100,100);
    noStroke();
}
```



```
void eye(int x, int y)
{
    fill(255);
    ellipse(x,y,60,60); //outer white circle
    fill(0);
    ellipse(x+10, y, 30, 30); //black circle
    fill(255);
    ellipse(x+16, y-5, 6, 6); //small, white circle
}
```

```
void draw()
{
    background(204);
    eye(65,44);
    eye(20,50);
}
```

Example 6.3 – Drawing Six Eyes

```
void setup()
{
    size(100,100);
    noStroke();
}
```



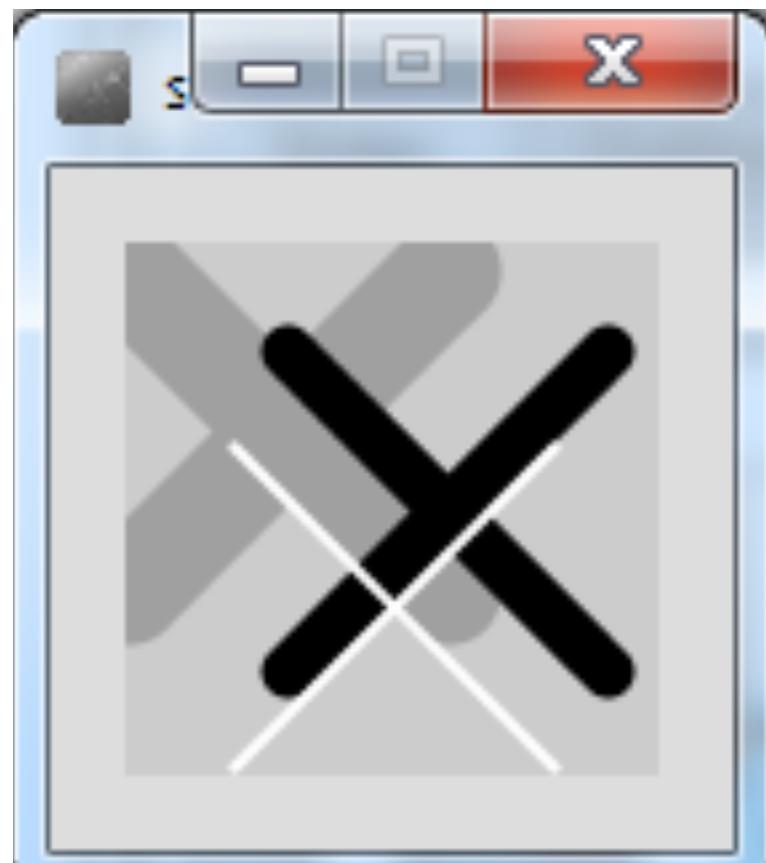
```
void eye(int x, int y)
{
    fill(255);
    ellipse(x,y,60,60);
    fill(0);
    ellipse(x+10, y, 30, 30);
    fill(255);
    ellipse(x+16, y-5, 6, 6);
}
```

```
void draw()
{
    background(204);
    eye(65,44);
    eye(20,50);
    eye(65,74);
    eye(20,80);
    eye(65,104);
    eye(20,110);
}
```

Topics List

- Method Example: Eyes
- Method Example: X's
- Overloading Methods
- Method Example: Celcius / Farenheit Converter

Method Example: X's



How about this Solution? Example 6.4

```
void setup()
{
    size(100,100);
}
```



```
void draw()
background(204);
//draw thick, light gray x
stroke(160);
strokeWeight(20);
line(0,5,60,65);
line(60,5,0,65);
//draw medium, black x
stroke(0);
strokeWeight(10);
line(30,20,90,80);
line(90,20,30,80);
//draw thin, white x
stroke(255);
strokeWeight(2);
line(20,38,80,98);
line(80,38,20,98);
}
```

Problem? Code duplication

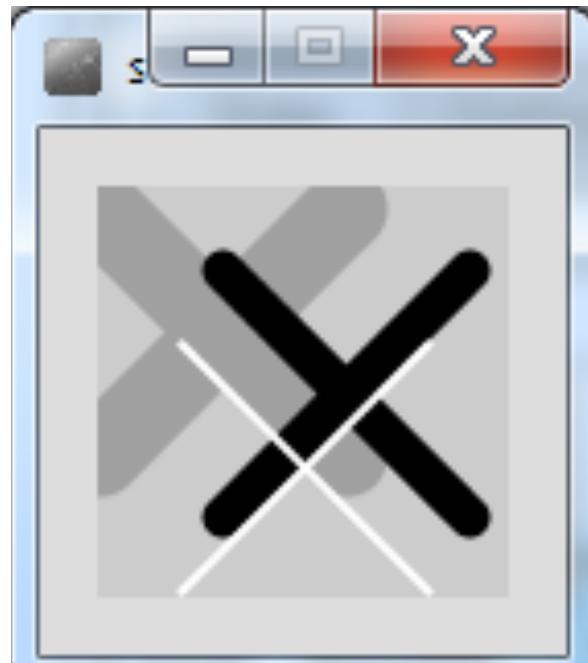
```
//draw thick, light gray x  
stroke(160);  
strokeWeight(20);  
line(0,5,60,65);  
line(60,5,0,65);
```

```
//draw medium, black x  
stroke(0);  
strokeWeight(10);  
line(30,20,90,80);  
line(90,20,30,80);
```

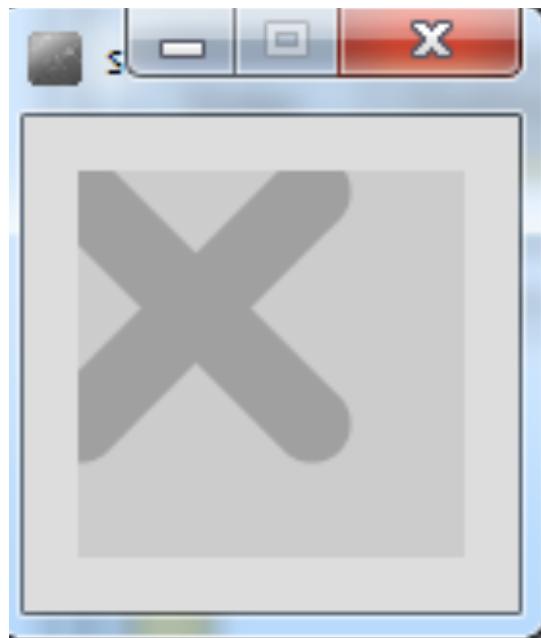
```
//draw thin, white x  
stroke(255);  
strokeWeight(2);  
line(20,38,80,98);  
line(80,38,20,98);
```

A Solution with Methods

- We will incrementally build a solution that uses methods to produce this output...



Example 6.5 – Using a Method to Draw a Thick, Light Gray X.



```
void draw()
{
    background(204);
    drawX();
}
```

```
void drawX()
{
    //draw thick, light gray x
    stroke(160);
    strokeWeight(20);
    line(0,5,60,65);
    line(60,5,0,65);
}
```

Example 6.6 – Drawing a Thick X, Passing Colour as a Parameter.



```
void draw()
{
    background(204);
    drawX(0);
}
```

```
void drawX(int gray)
{
    stroke(gray);
    strokeWeight(20);
    line(0,5,60,65);
    line(60,5,0,65);
}
```

Example 6.7 – Drawing X, Passing Colour and Weight.

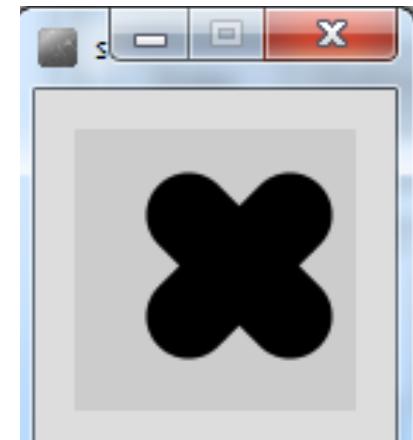
```
void draw()
{
    background(204);
    drawX(0, 30);
}
```

```
void drawX(int gray, int weight)
{
    stroke(gray);
    strokeWeight(weight);
    line(0,5,60,65);
    line(60,5,0,65);
}
```



Example 6.8 – Drawing X, Passing colour, weight, position, size

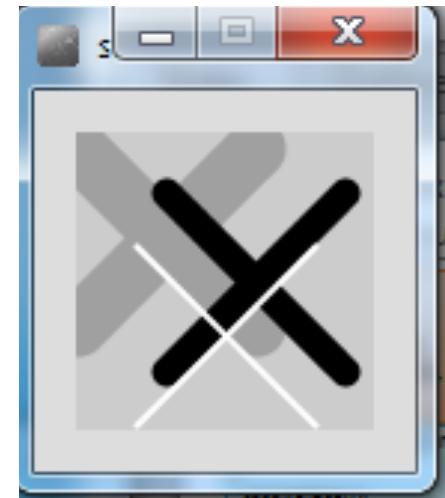
```
void draw()
{
    background(204);
    drawX(0, 30, 40, 30, 36);
}
```



```
void drawX(int gray, int weight, int x, int y, int size)
{
    stroke(gray);
    strokeWeight(weight);
    line(x, y, x+size, y+size);
    line(x+size, y, x, y+size);
}
```

Example 6.9 – Drawing Multiple Xs

```
void draw()
{
    background(204);
    drawX(160, 20, 0, 5, 60);
    drawX(0, 10, 30, 20, 60);
    drawX(255, 2, 20, 38, 60);
}
```

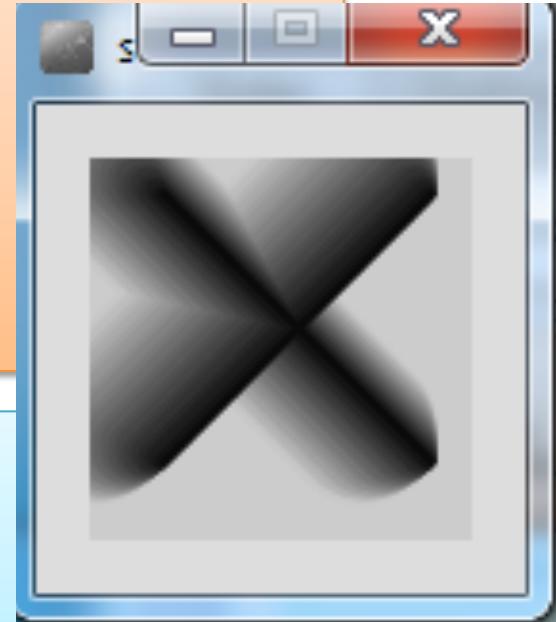


```
void drawX(int gray, int weight, int x, int y, int size)
{
    stroke(gray);
    strokeWeight(weight);
    line(x, y, x+size, y+size);
    line(x+size, y, x, y+size);
}
```

Example 6.10 – Drawing Multiple Xs using a for Loop

```
void draw()
{
    background(204);
    for (int i = 0; i < 20; i++){
        drawX(200-i*10, (20-i)*2, i, i/2, 70);
    }
}
```

```
void drawX(int gray, int weight, int x, int y, int size)
{
    stroke(gray);
    strokeWeight(weight);
    line(x, y, x+size, y+size);
    line(x+size, y, x, y+size);
}
```



Topics List

- Method Example: Eyes
- Method Example: X's
- Overloading Methods
- Method Example: Celsius / Fahrenheit Converter.

Overloaded Methods

- Multiple methods can have the same name, once they have a different parameter list.
- In the previous examples, we wrote the following methods:
 - void drawX()
 - void drawX(int gray)
 - void drawX(int gray, int weight)
 - void drawX(int gray, int weight, int x, int y, int size)

Overloaded Methods

Method signature	Parameter List
void drawX()	no parameter
void drawX(int gray)	int
void drawX(int gray, int weight)	int, int
void drawX(int gray, int weight, int x, int y, int size)	int, int, int, int, int

Overloaded Methods

- A program can have two or more methods with the same name, only if their parameter list is different.
- When Java is checking that a parameter list is different, it is not checking the name of the variables, it is checking the data type of the variables e.g. this is permitted as the data type is different:
 - void drawX(int gray)
 - void drawX(float gray)

*Q. Would this be allowed
void drawX(int gray)
void drawX(int grayX)*

Example 6.11 – Overloading Methods

```
void draw()
{
    background(204);
    drawX(0);
}
```

Which drawX method is called and why?

```
void drawX(int gray){
    stroke(gray);
    strokeWeight(5);
    line(0,5,60,65);
    line(60,5,0,65);
}
```

```
void drawX(float gray){
    stroke(gray);
    strokeWeight(20);
    line(0,5,60,65);
    line(60,5,0,65);
}
```

Overloaded Methods

- When you call a method, Java matches the number and type of the arguments you passed to the method with all the declared methods.
- When a match is found, Java invokes that method e.g.

<code>drawX(0)</code>	calls	<code>void drawX(int gray)</code>
<code>draw(0.0)</code>	calls	<code>void drawX(float gray)</code>

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- Method Example: Eyes
- Method Example: X's
- Overloading Methods
- Method Example: Celcius / Farenheit Converter

Example 6.12 - Fahrenheit / Celsius Converter

```
void setup()
{
    float celsius = farenheitToCelsius(451.0);
    println("Celsius value is: " + celsius);
}
```

Farenheit
value is
hardcoded
as a literal.

Return type

Celsius value is: 232.77779

```
float farenheitToCelsius(float farenheit)
{
    float result = (farenheit - 32.0) * (5.0/9.0);
    return result;
}
```

Example 6.13 - Updated

```
float farenheitToCelsius(float farenheit)
{
    float result = (farenheit - 32.0) * (5.0/9.0);
    return result;
}
```

...is exactly
the same
as this...

```
float farenheitToCelsius(float farenheit)
{
    return (farenheit - 32.0) * (5.0/9.0);
}
```



Questions?

