Luxembourg Tech School

LEVEL GO
2025-2026

6 – Loops in p5.js

What will we cover?

2 important coding concepts
that you need to understand to be able to code cool things:

REUSABILITY:

Functions

REPETITION:

Loops

←
today

Recap Quiz

We have covered a lot so far!

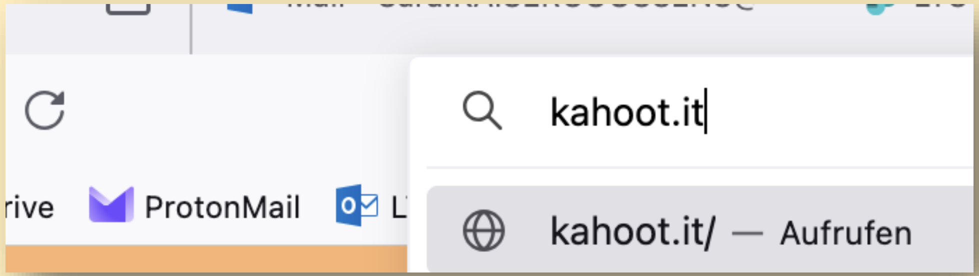
To refresh everyone’s memory, we have a p5.js recap Kahoot!

TASK

1

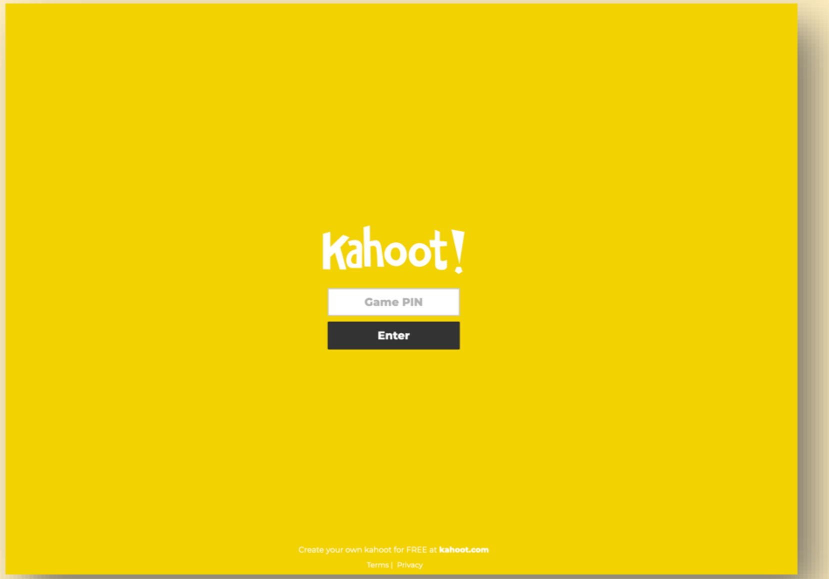
Open a new browser window and go to the website:

kahoot.it



2

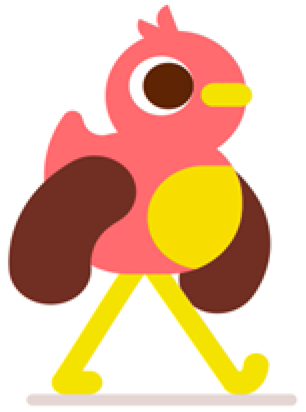
Type the **Game PIN** that will be displayed and give yourself a **(nick)name**.



Loop

Walking with code: 2 possibilities

Do each step separately = code each step individually



1. Take a step
2. Take a step
3. Take a step
4. Take a step
5. Take a step
6. Take a step
7. Take a step
8. Take a step
9. Take a step
10. Take a step

Use a loop to run a code repeatedly and take steps without having to code each single one

1. If steps are less than 10
2. Then take a step

Computers are really good at **repeating** things

And they don't get bored.

They like performing the same task over and over again **until specific criteria are met**.

Image: Charlie Chaplin in Modern Times (1936)

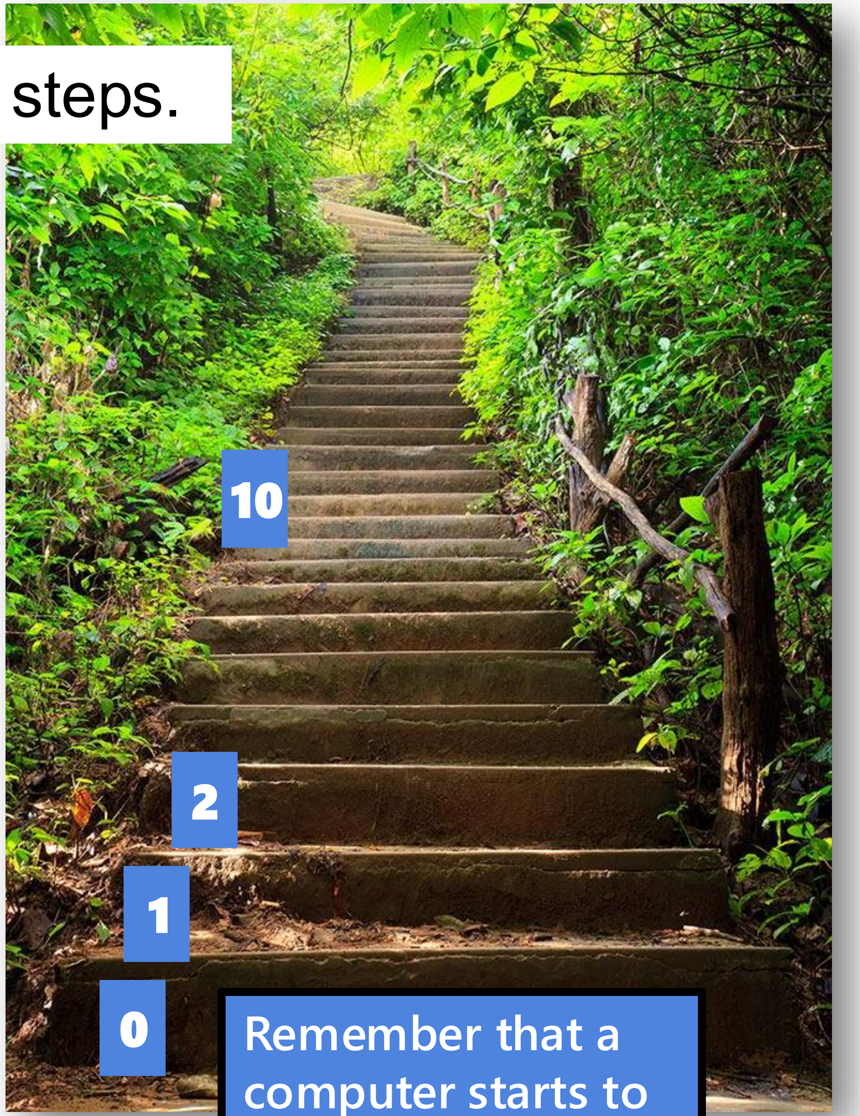
How loops work

Before we dive into **for loops**, let's think about climbing steps.

1. Which step should I **start** from?
2. Until which step (**stop** point) should I continue?
3. How many **steps** should I climb every time?

Do the climbing

repeat



Remember that a computer starts to count at 0.

How loops work

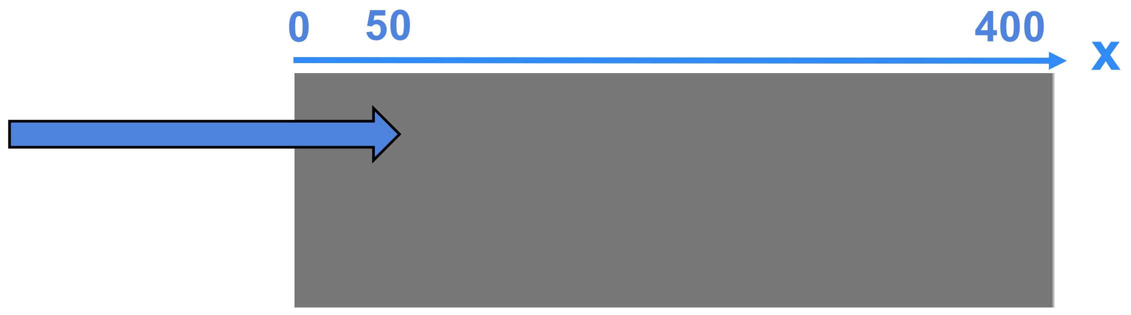
1 Start at 50 px

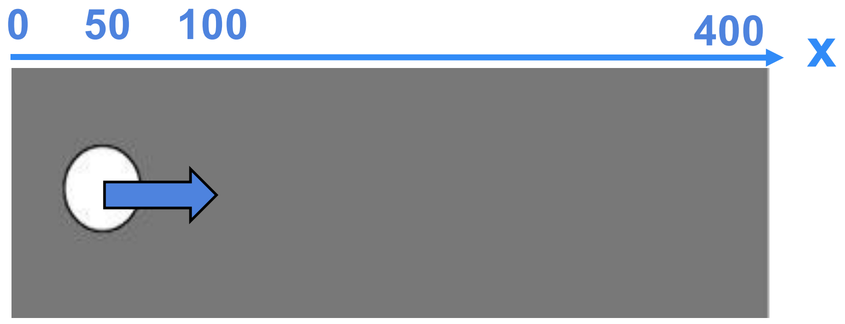
2 Continue until the edge of the canvas (400 px is the stop point)

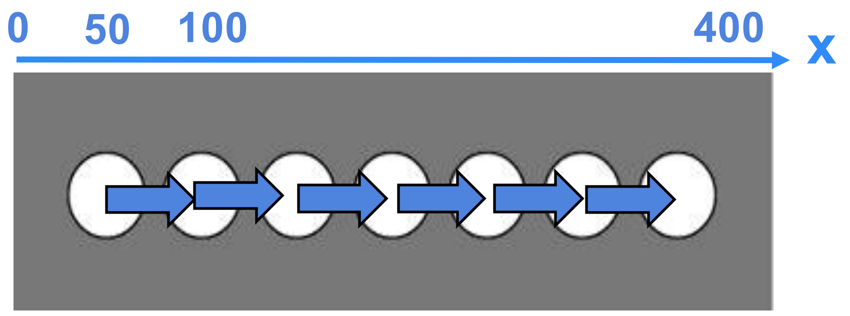
3 Move every time 50 px to the right

Draw an ellipse

repeat







Our for loop explained (1)

1 **START**

Creates a new loop counter to keep track of the pattern, a variable called x with a starting value of 50

2 **CHECK**

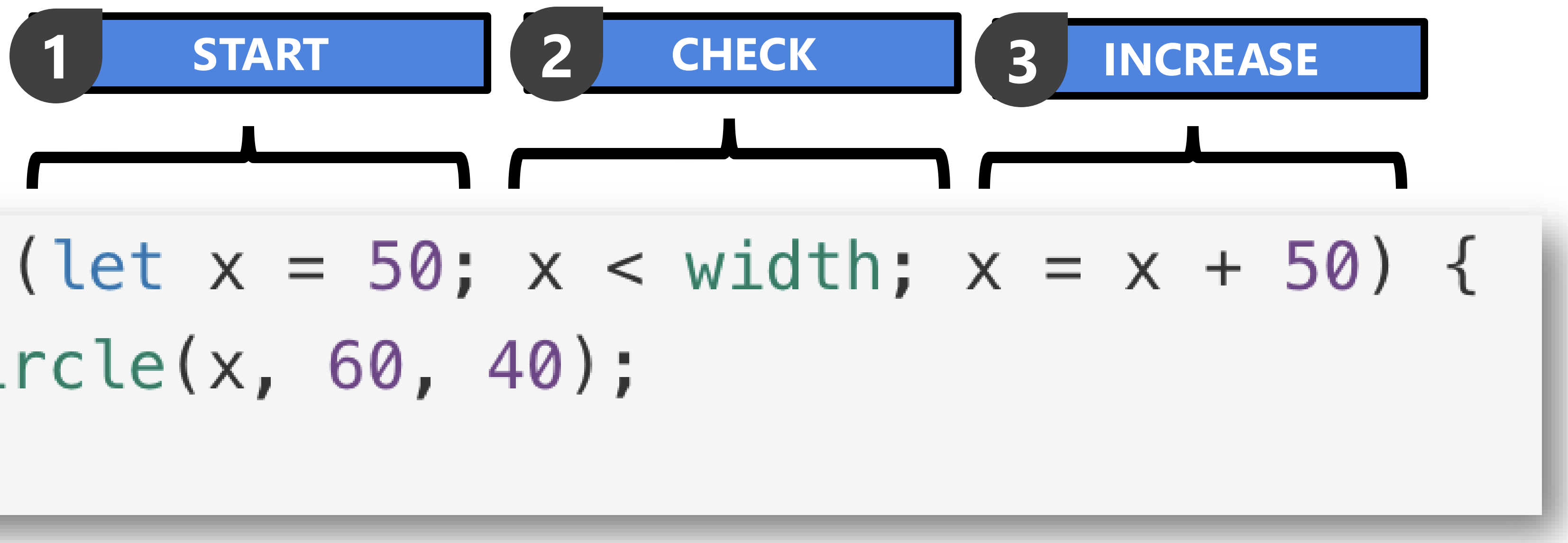
Every round see if the loop should continue. The loop repeats for as long as x is less than our width of the canvas

3 **INCREASE**

Every round the loop counter x is increased by 50

```
for (let x = 50; x < width; x = x + 50) {
  circle(x, 60, 40);
}
```

Our for loop explained (2)

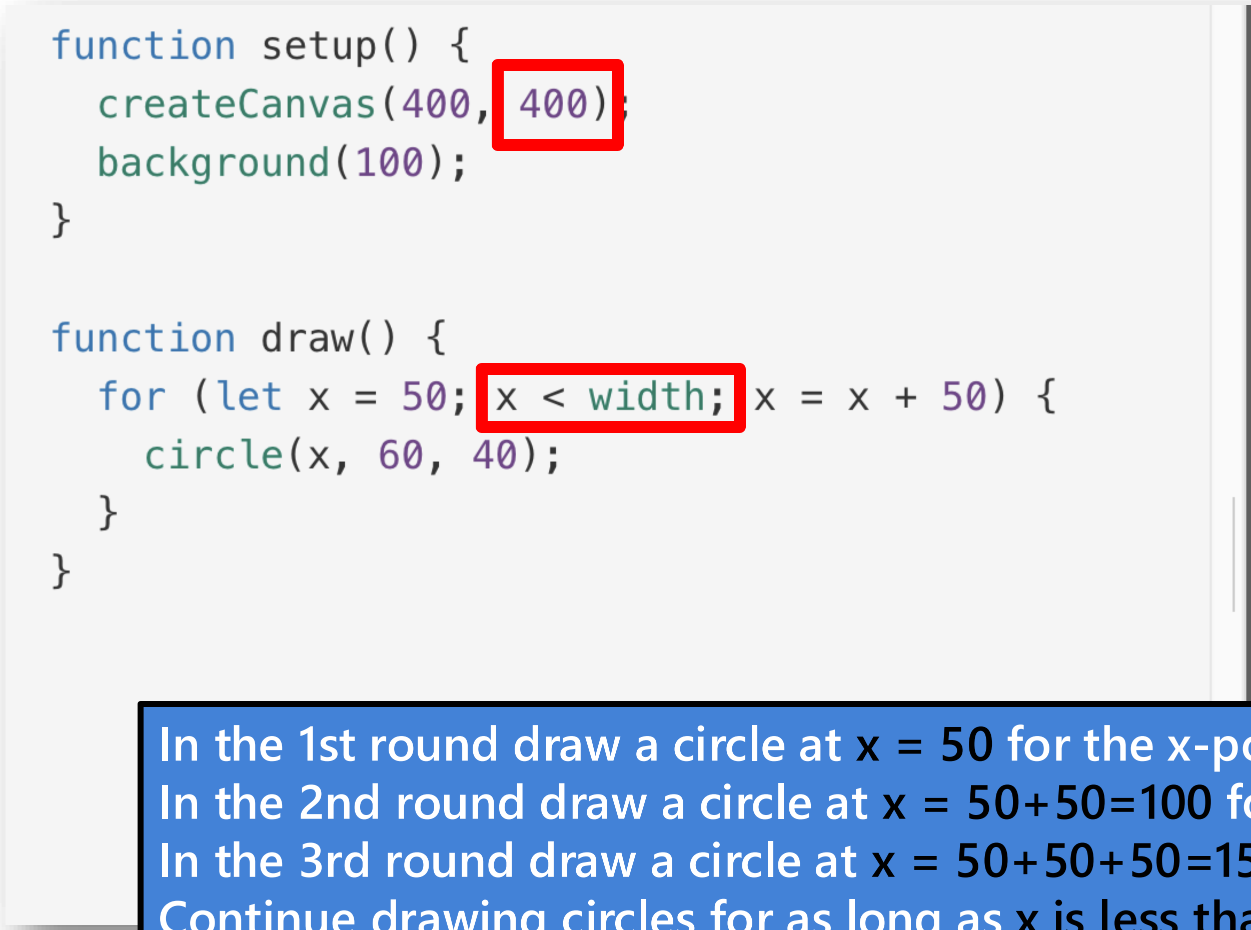


```
for (let x = 50; x < width; x = x + 50) {
  circle(x, 60, 40);
}
```

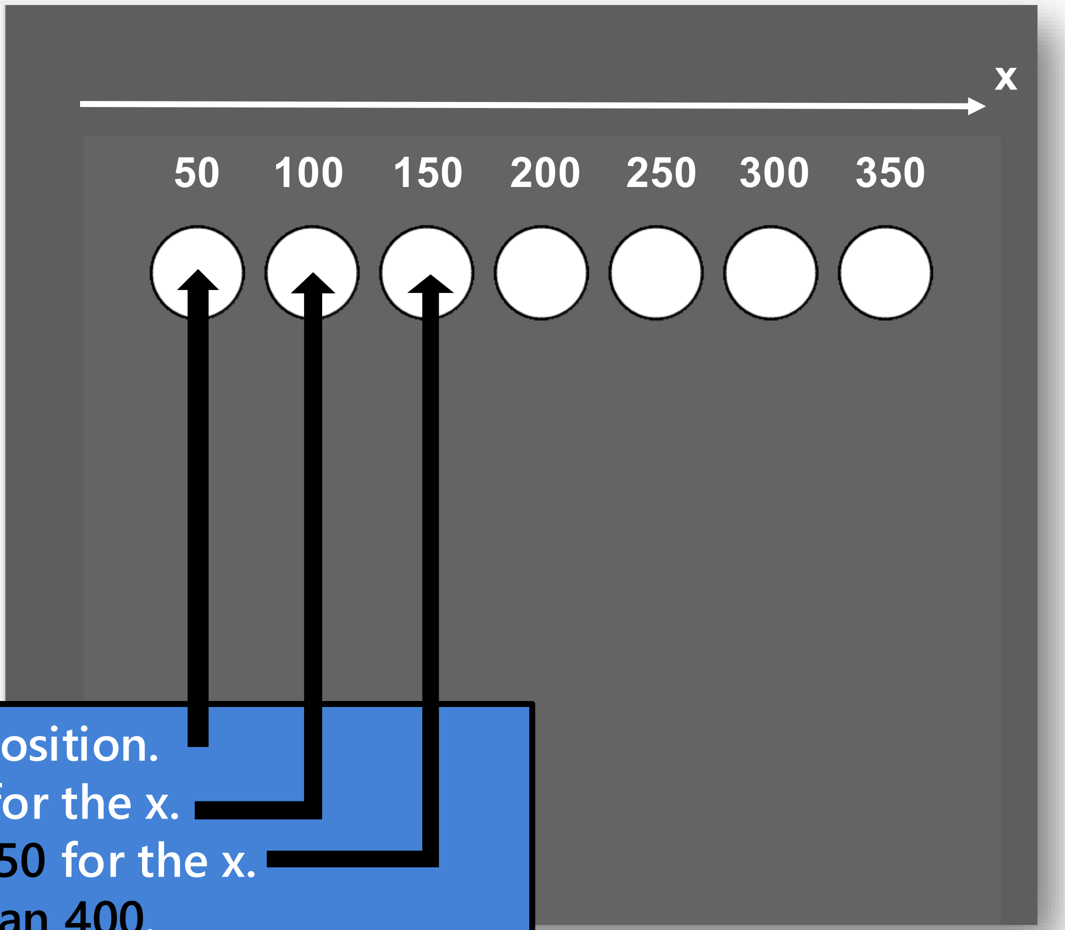
This might seem like a lot to take in, but you can think about it as a few steps:

1. A loop variable **x** is created and initialized to the first number in the pattern.
2. The check is evaluated, and if it's ***false***, the loop exits, and its body is skipped.
   If it's ***true***, then the body is executed.
3. After the body executes, the loop variable **x** is updated.
4. Then the code jumps back to the beginning of the loop and performs the check again.

Our for loop explained: full sketch (3)



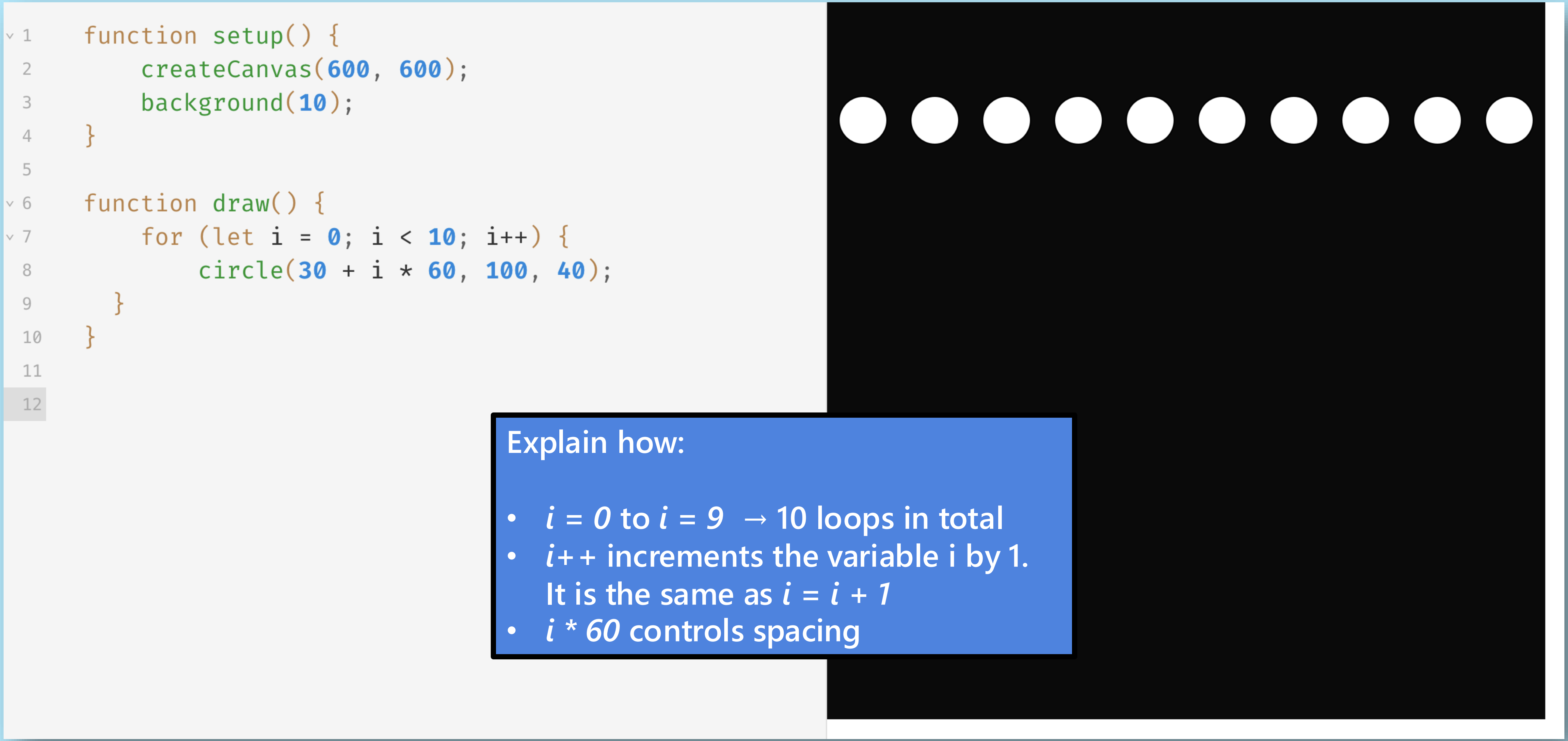
```
function setup() {
  createCanvas(400, 400);
  background(100);
}

function draw() {
  for (let x = 50; x < width; x = x + 50) {
    circle(x, 60, 40);
  }
}
```



In the 1st round draw a circle at x = 50 for the x-position.
In the 2nd round draw a circle at x = 50+50=100 for the x.
In the 3rd round draw a circle at x = 50+50+50=150 for the x.
Continue drawing circles for as long as x is less than 400.
As soon as x reaches 400, stop drawing circles.

Activity

Let's try out a for loop

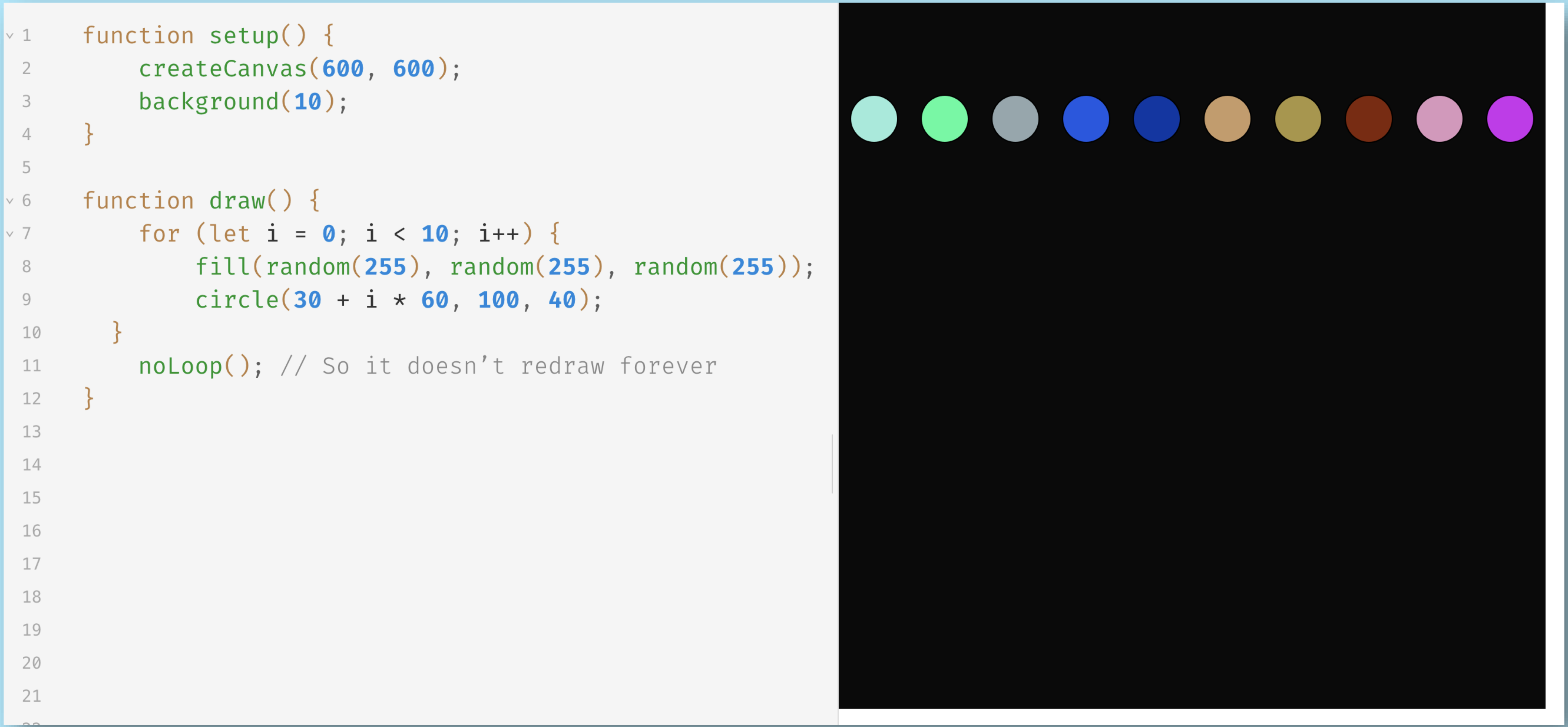


```
function setup() {
    createCanvas(600, 600);
    background(10);
}

function draw() {
    for (let i = 0; i < 10; i++) {
        circle(30 + i * 60, 100, 40);
    }
}

```

Explain how:

- *i = 0* to *i = 9* → 10 loops in total
- *i++* increments the variable i by 1. It is the same as *i = i + 1*
- *i * 60* controls spacing

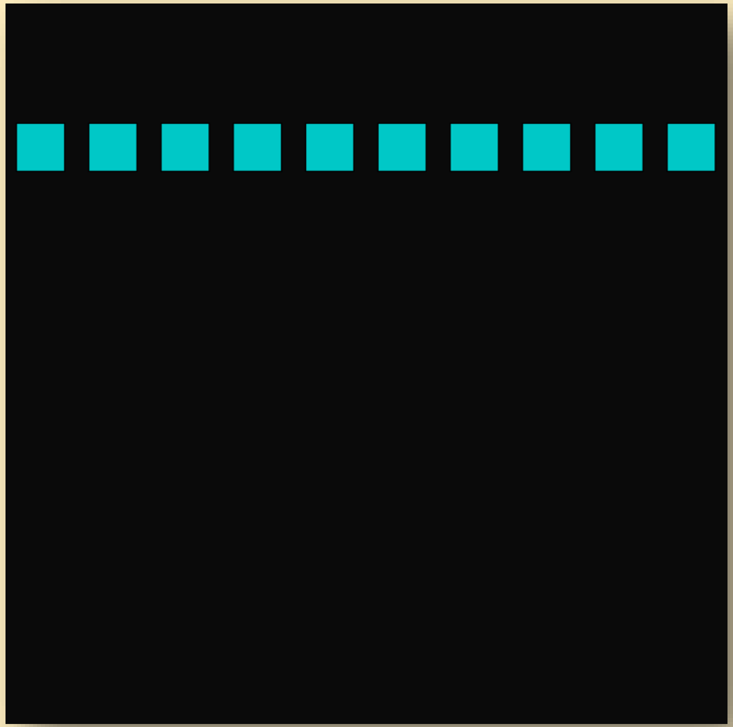
Add some random colours for fun



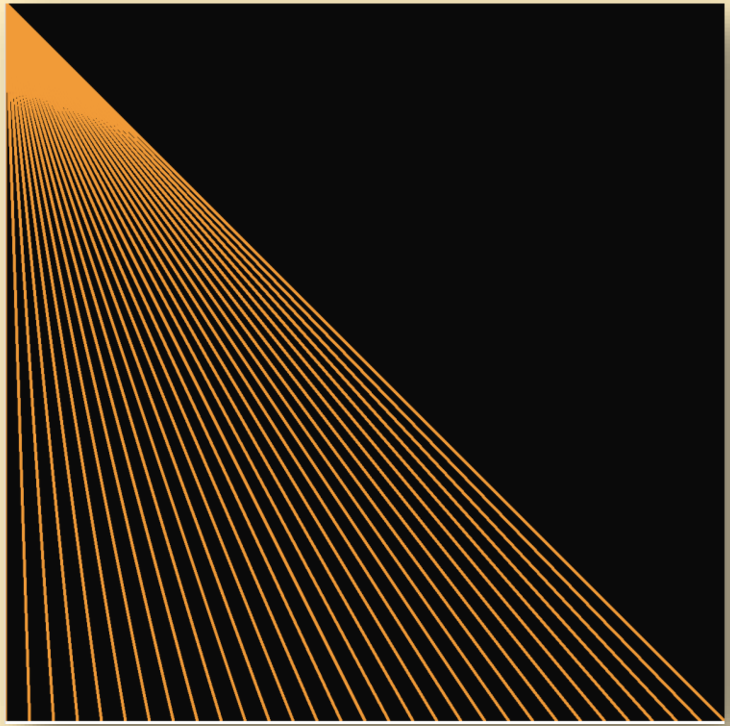
```
function setup() {
    createCanvas(600, 600);
    background(10);
}

function draw() {
    for (let i = 0; i < 10; i++) {
        fill(random(255), random(255), random(255));
        circle(30 + i * 60, 100, 40);
    }
    noLoop(); // So it doesn't redraw forever
}
```

Use a for loop to repeat other shapes

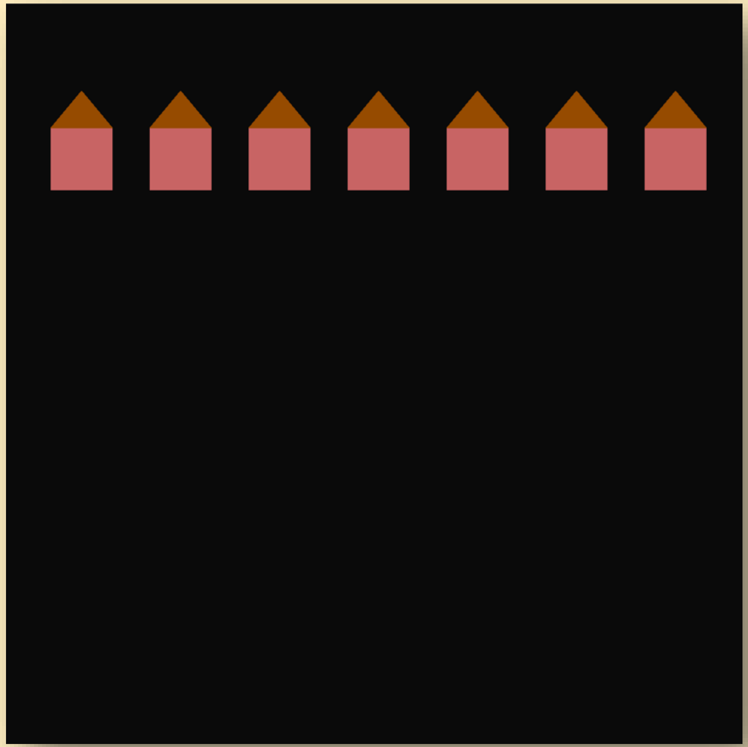
Try to recreate one of the following - *or make your own version*:



`rect(x, y, w, h, detailX?, detailY?)`

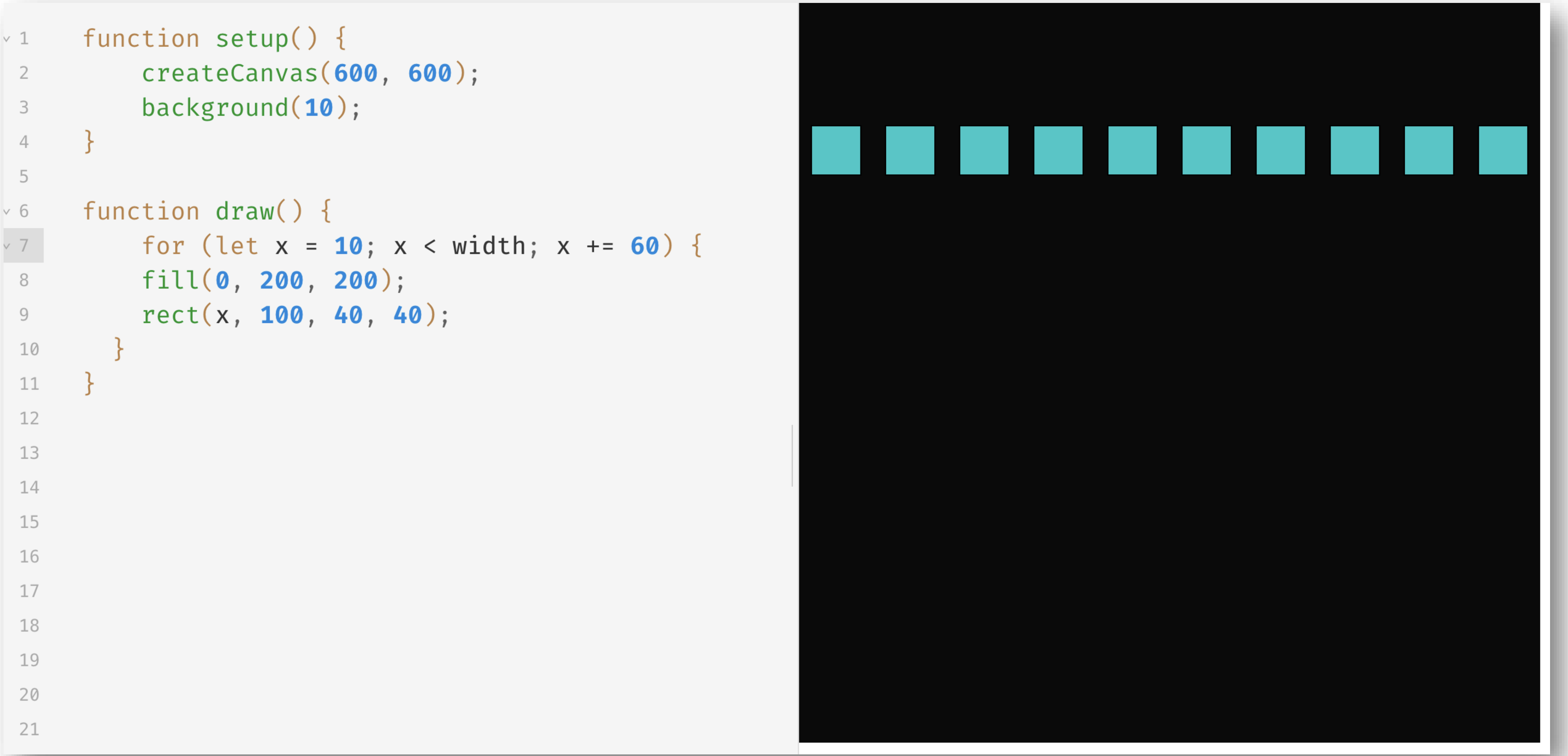


`line(x1, y1, x2, y2)`



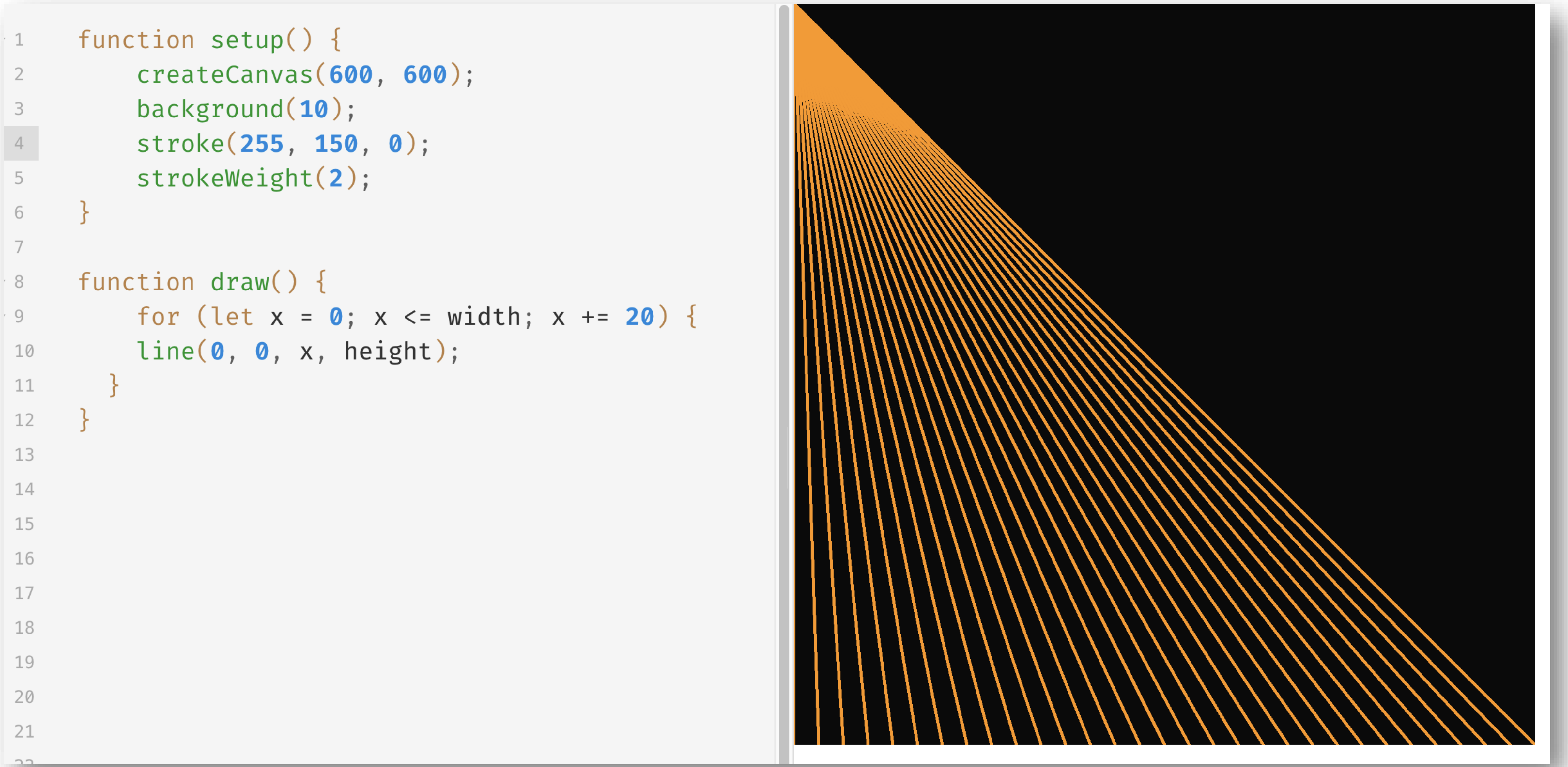
`triangle(x1, y1, x2, y2, x3, y3)`

Example: Loop with *rect()*



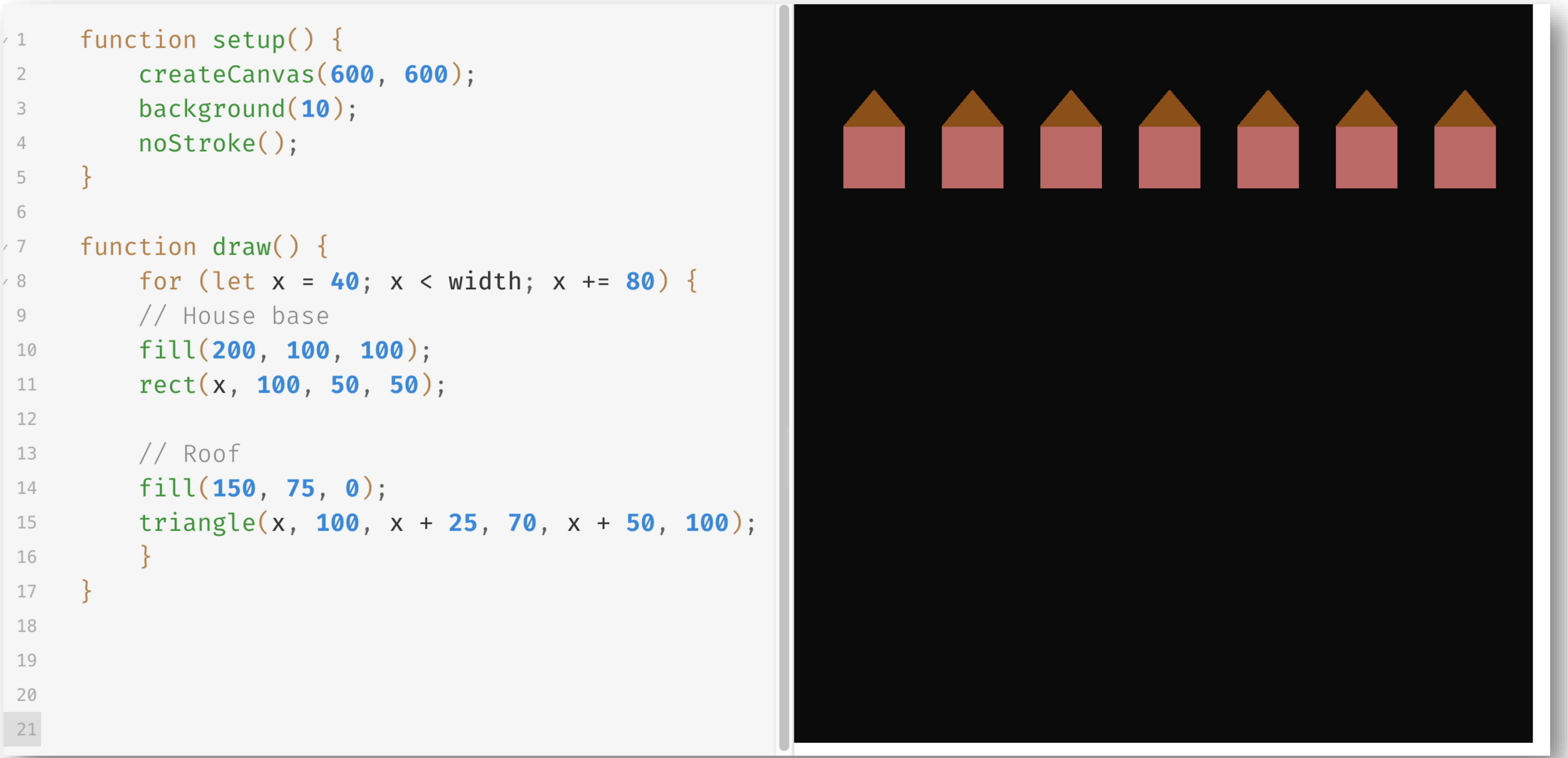
```
function setup() {
    createCanvas(600, 600);
    background(10);
}

function draw() {
    for (let x = 10; x < width; x += 60) {
    fill(0, 200, 200);
    rect(x, 100, 40, 40);
  }
}
```

Example: Loop with *line()*



```
function setup() {
    createCanvas(600, 600);
    background(10);
    stroke(255, 150, 0);
    strokeWeight(2);
}

function draw() {
    for (let x = 0; x <= width; x += 20) {
    line(0, 0, x, height);
  }
}
```

Example: Loop with *rect()* + *triangle()*



```
function setup() {
    createCanvas(600, 600);
    background(10);
    noStroke();
}

function draw() {
    for (let x = 40; x < width; x += 80) {
    // House base
    fill(200, 100, 100);
    rect(x, 100, 50, 50);

    // Roof
    fill(150, 75, 0);
    triangle(x, 100, x + 25, 70, x + 50, 100);
    }
}
```

Nested Loops

Remember: a for loop

1 START

Creates a new loop counter to keep track of the pattern, a variable called x with a starting value of 50

2 CHECK

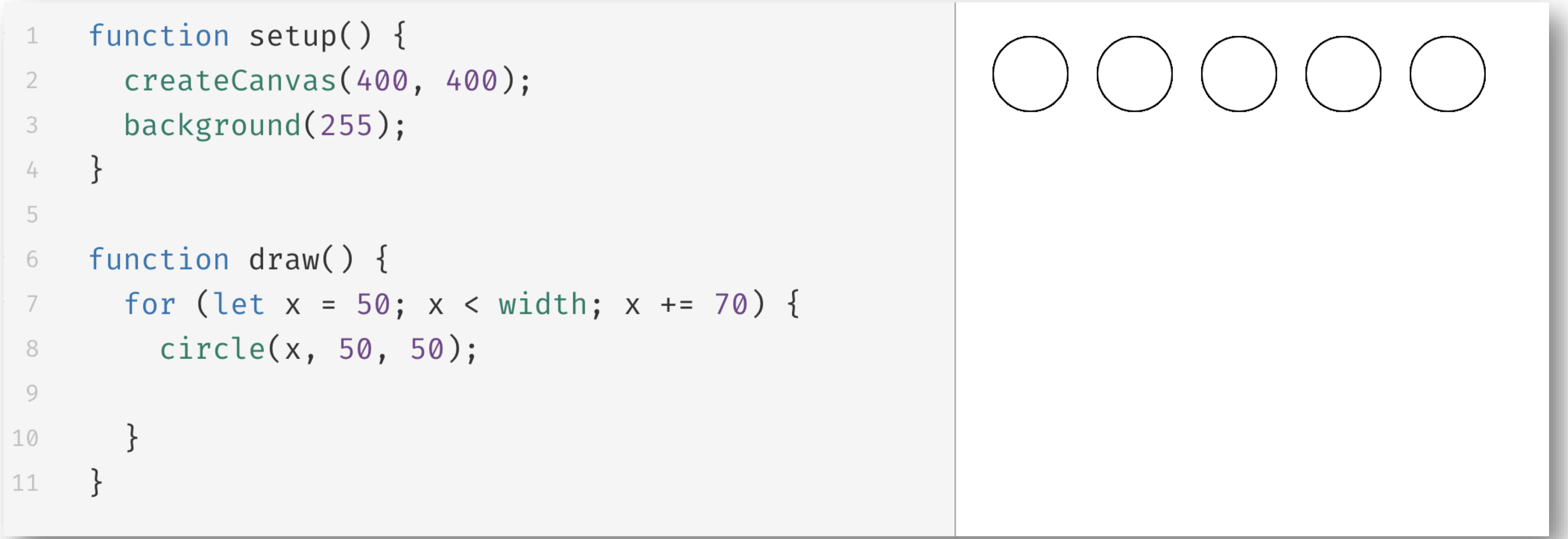
Every round see if the loop should continue. The loop repeats for as long as x is less than our width of the canvas

3 INCREASE

Every round the loop counter x is increased by 50

```
for (let x = 50; x < width; x = x + 50) {
  circle(x, 60, 40);
}
```

Intro to nested loops

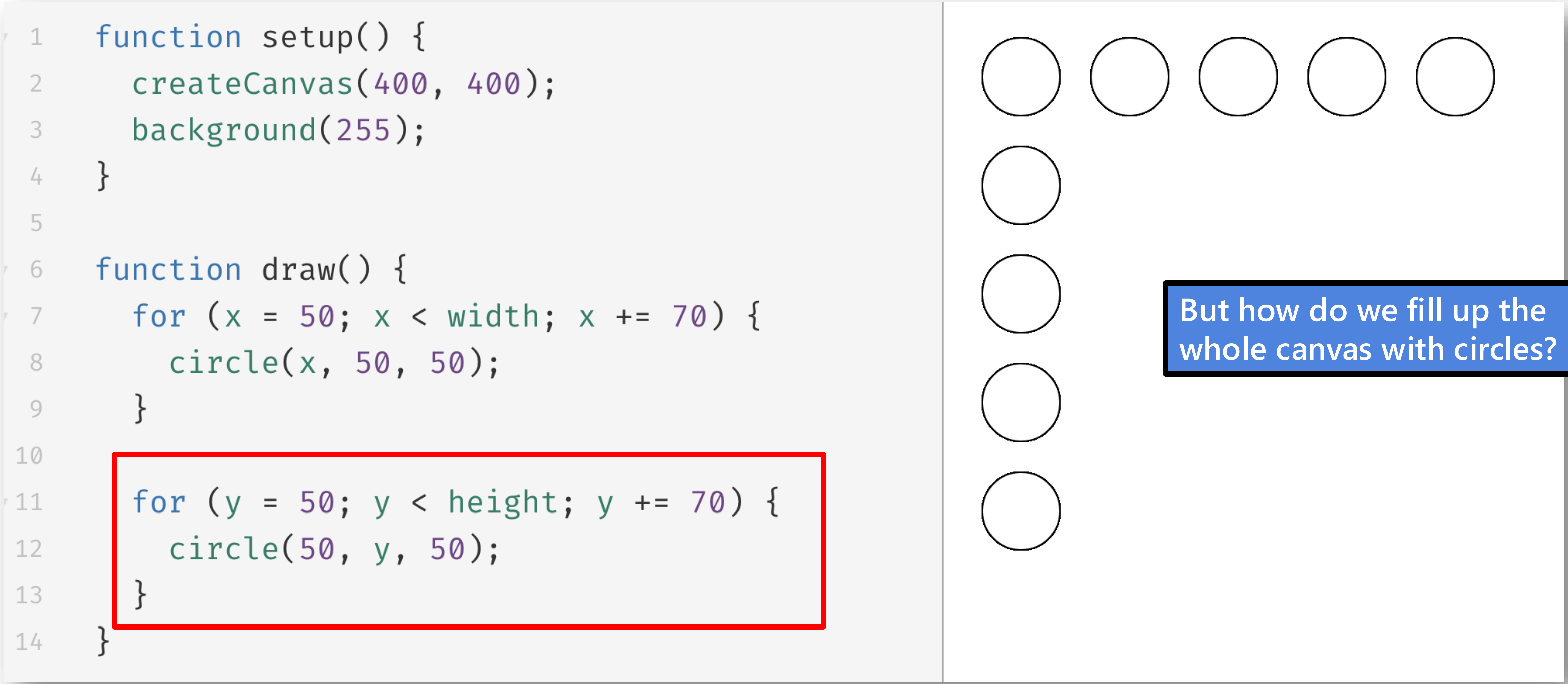


```
function setup() {
  createCanvas(400, 400);
  background(255);
}

function draw() {
  for (let x = 50; x < width; x += 70) {
    circle(x, 50, 50);

  }
}
```

With *x < width;* we draw circles all along the width of our canvas!

Add circles along the y-axis

We can add another for loop to draw circles along the y-axis.

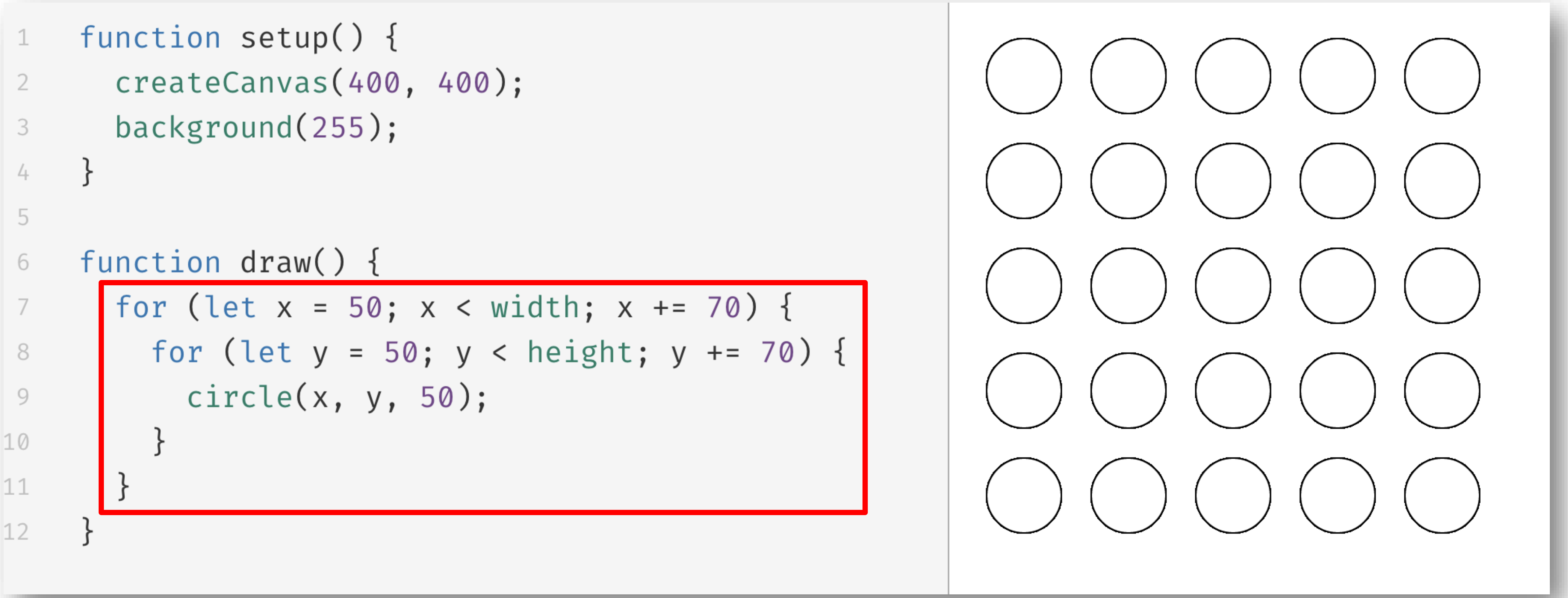


```
function setup() {
  createCanvas(400, 400);
  background(255);
}

function draw() {
  for (x = 50; x < width; x += 70) {
    circle(x, 50, 50);
  }

  for (y = 50; y < height; y += 70) {
    circle(50, y, 50);
  }
}
```

But how do we fill up the whole canvas with circles?

Fill the whole canvas with a nested loop

We have first an outer loop. And then add inside the first loop a second inner loop. This is called **a nested loop.**



```
function setup() {
  createCanvas(400, 400);
  background(255);
}

function draw() {
  for (let x = 50; x < width; x += 70) {
    for (let y = 50; y < height; y += 70) {
      circle(x, y, 50);
    }
  }
}
```

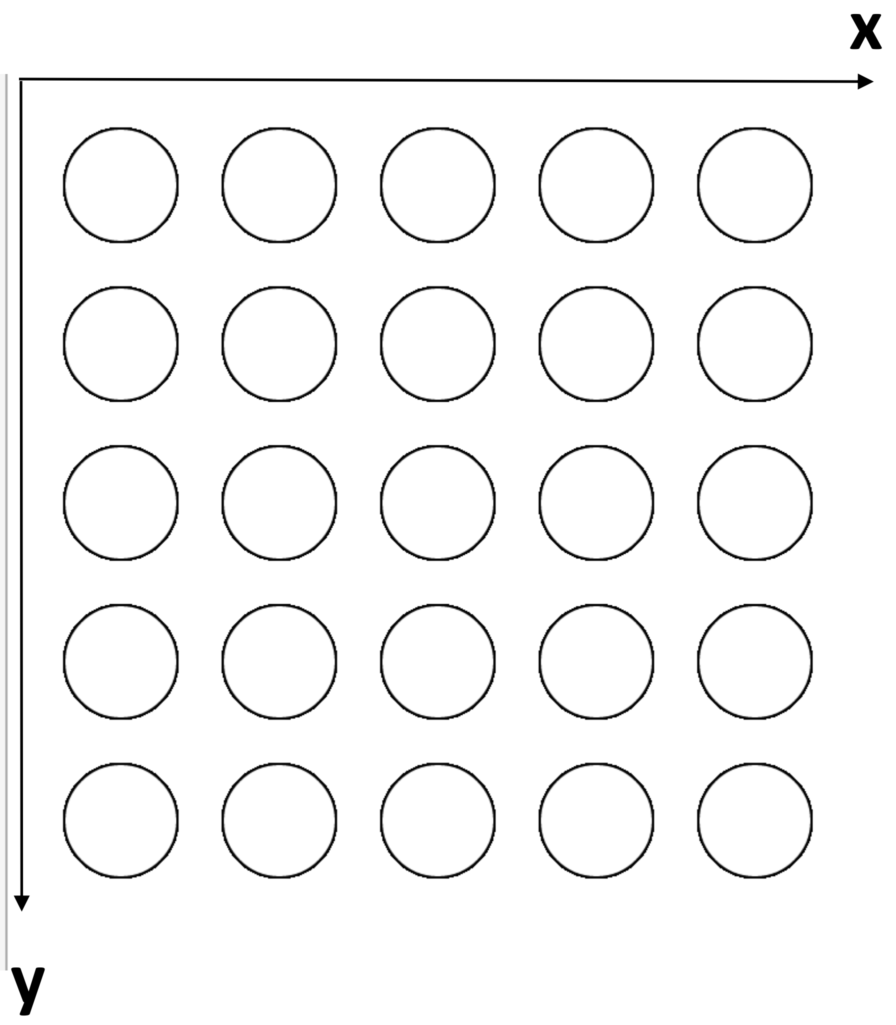
A nested for loop

```
function setup() {
  createCanvas(400, 400);
  background(255);
}

function draw() {
  for (let x = 50; x < width; x += 70) {
    for (let y = 50; y < height; y += 70) {
      circle(x, y, 50);
    }
  }
}
```

You can see the outer loop in green.

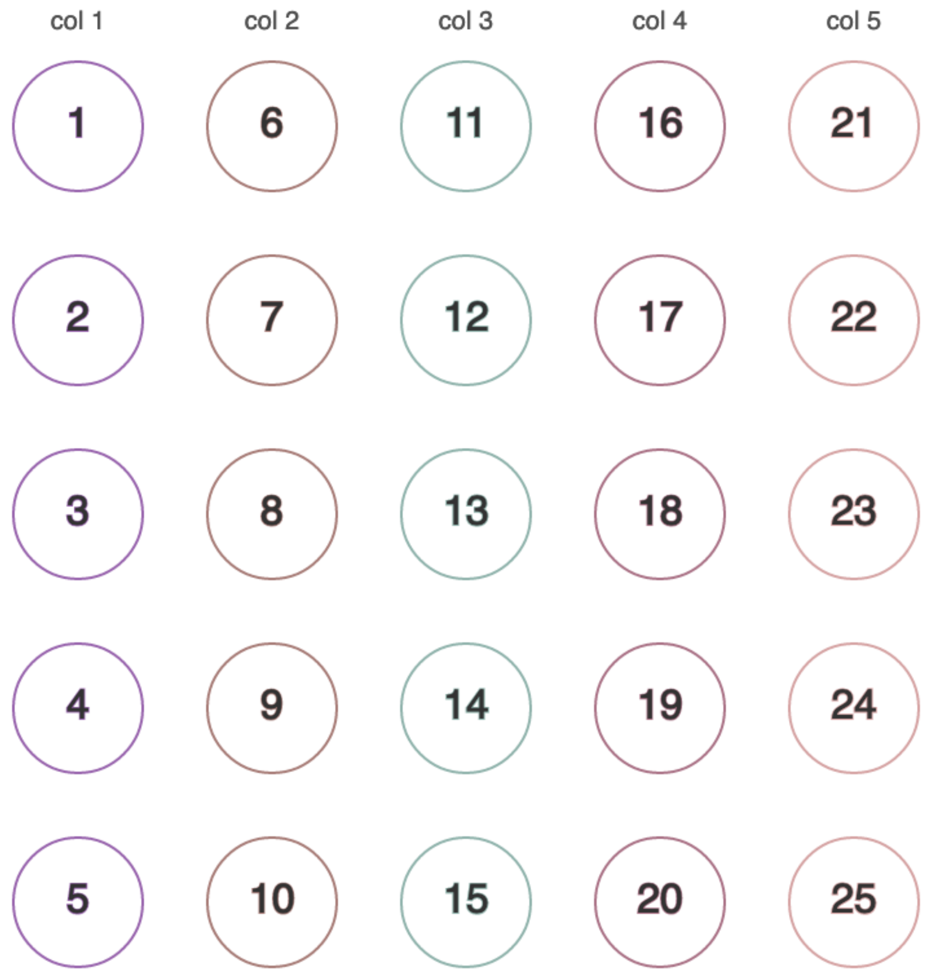
The repeated code is inside the curly brackets.
This is the inner loop.

And the code block (draw circles).

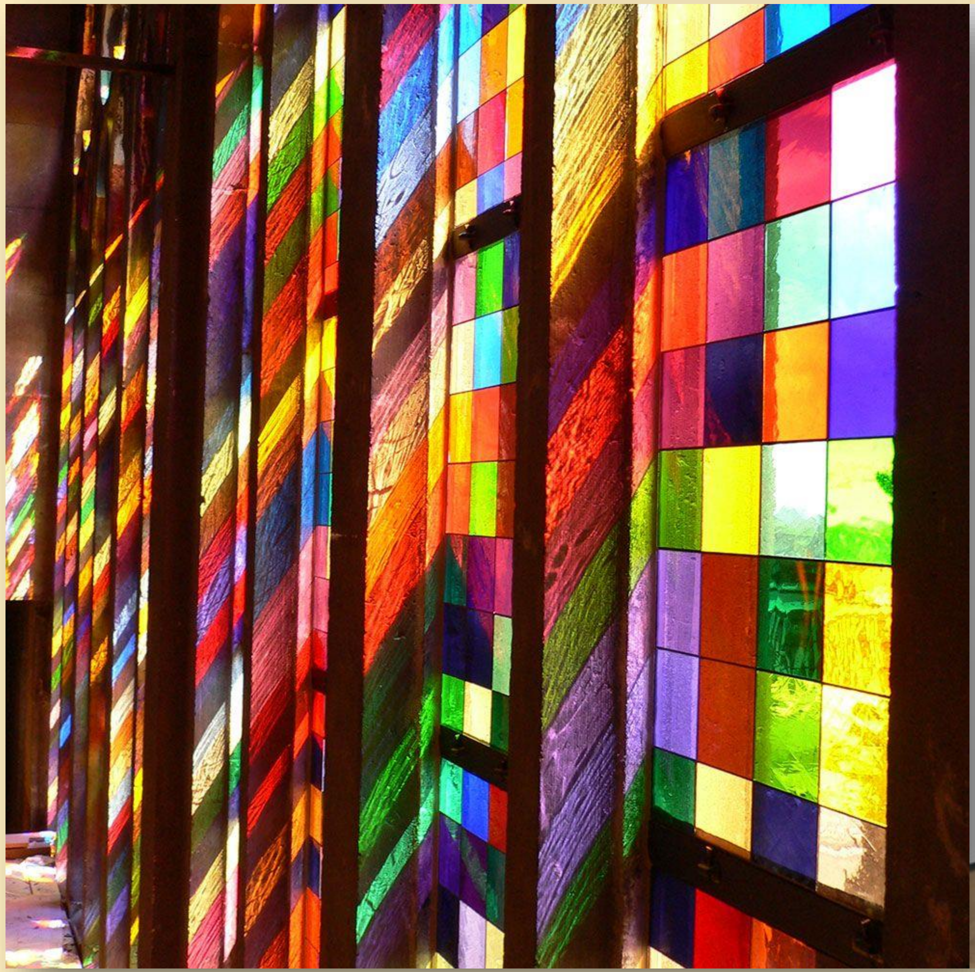


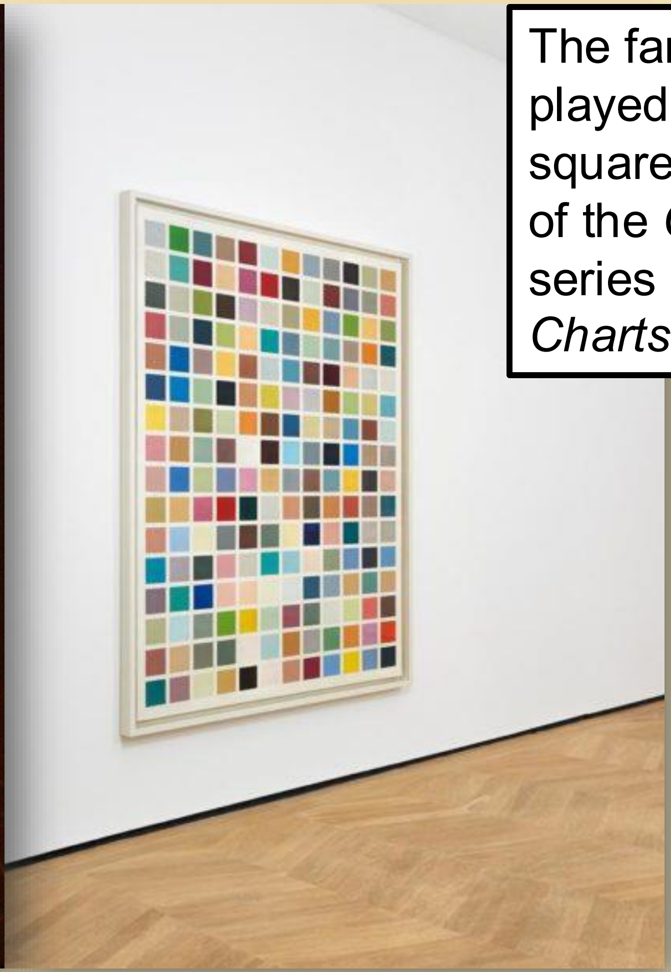
We have 2 loop counters: x and y

Nested loop order



Let’s create a colour grid





The famous artist *Gerhard Richter* played with such randomly colored squares for his creation of the windows of the *Cathedral in Cologne* and for a series of paintings called *Colour Charts*.

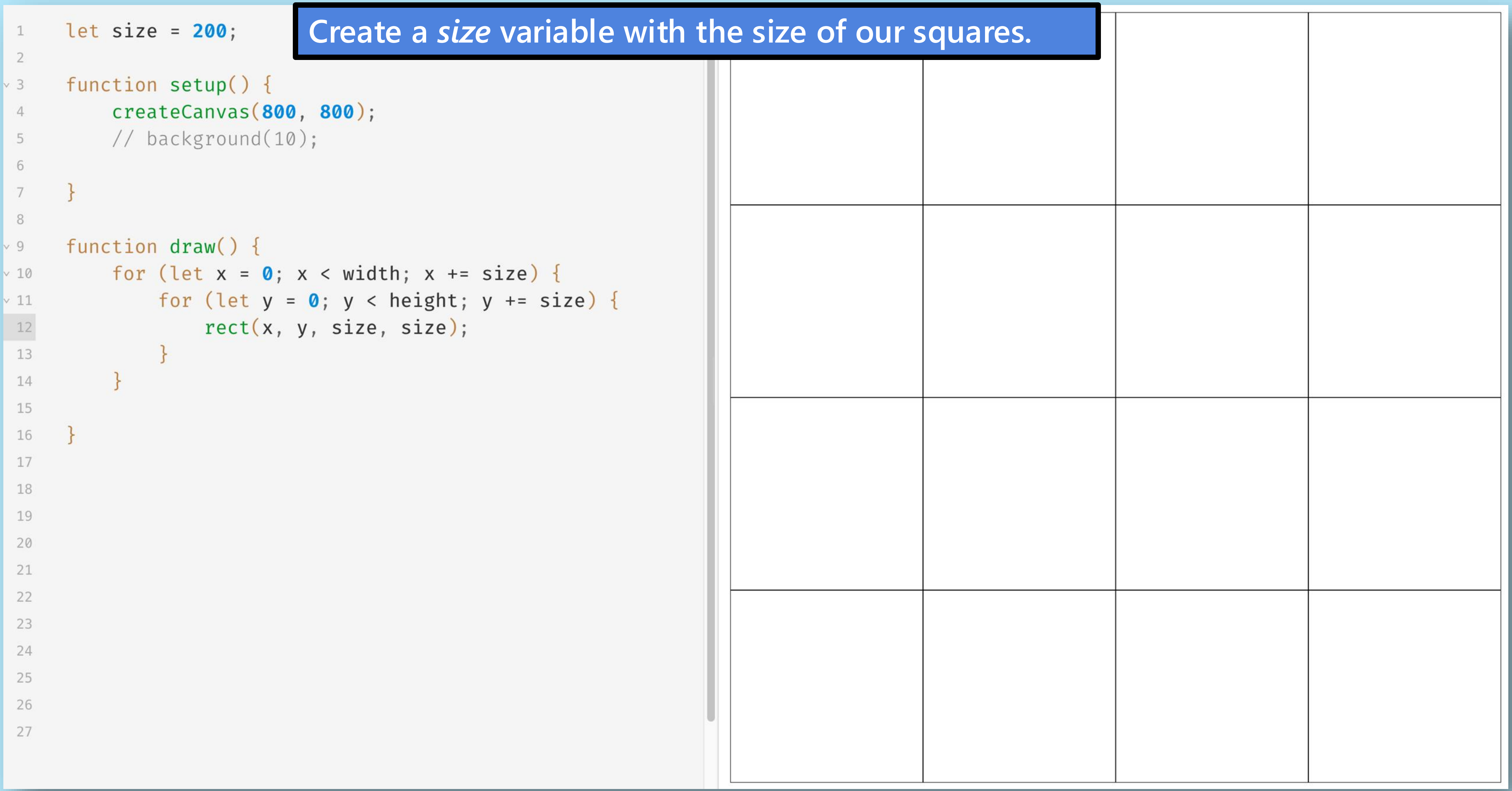
We will do the same with p5.js and even make it animated!

REPETITION:
Loops

Prepare the grid

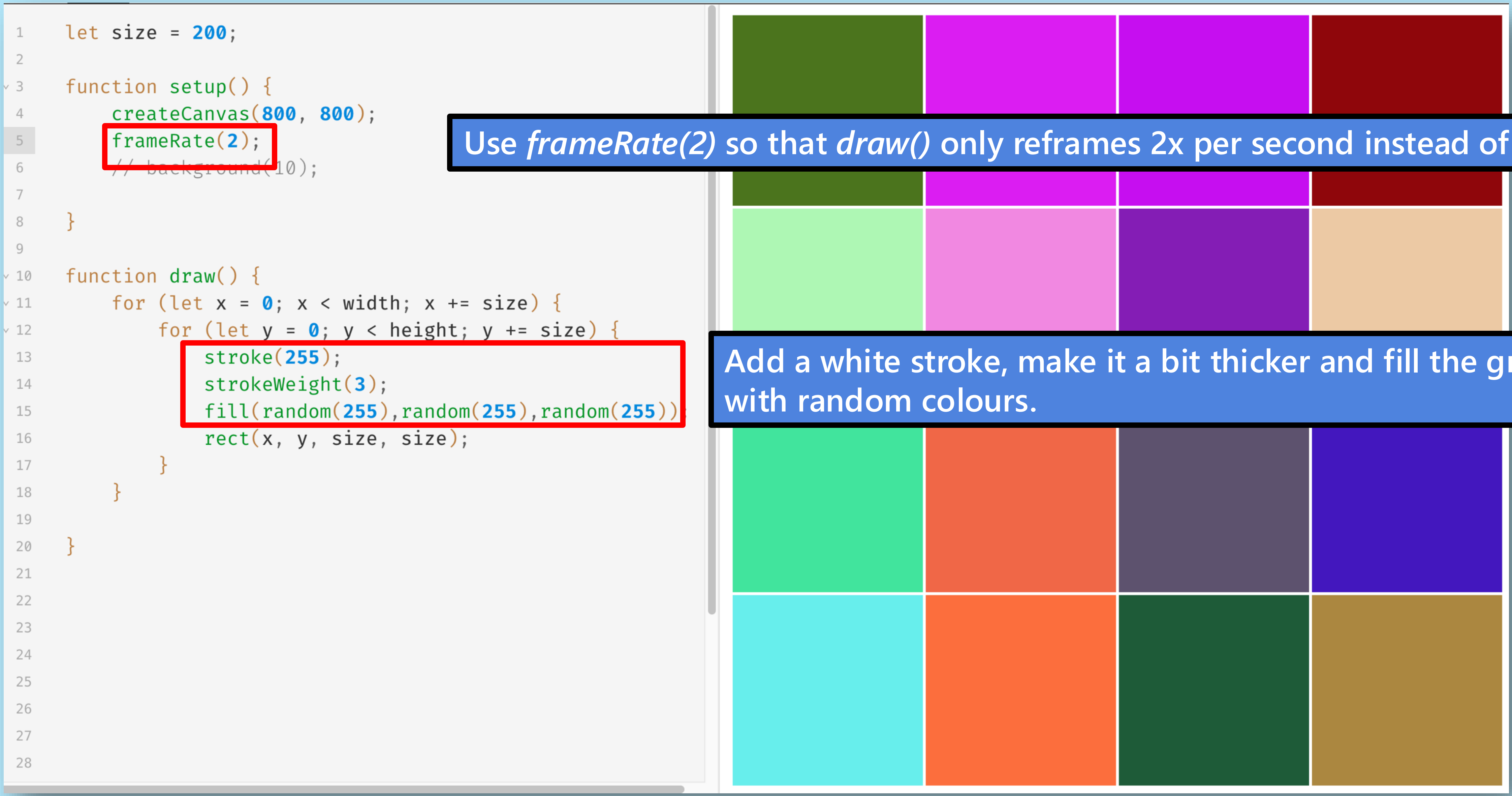
We want to have a grid with 4x4 squares.

Create a *size* variable with the size of our squares.



```
let size = 200;

function setup() {
    createCanvas(800, 800);
    // background(10);

}

function draw() {
    for (let x = 0; x < width; x += size) {
        for (let y = 0; y < height; y += size) {
            rect(x, y, size, size);
        }
    }

}
```

Fill the grid with random colours

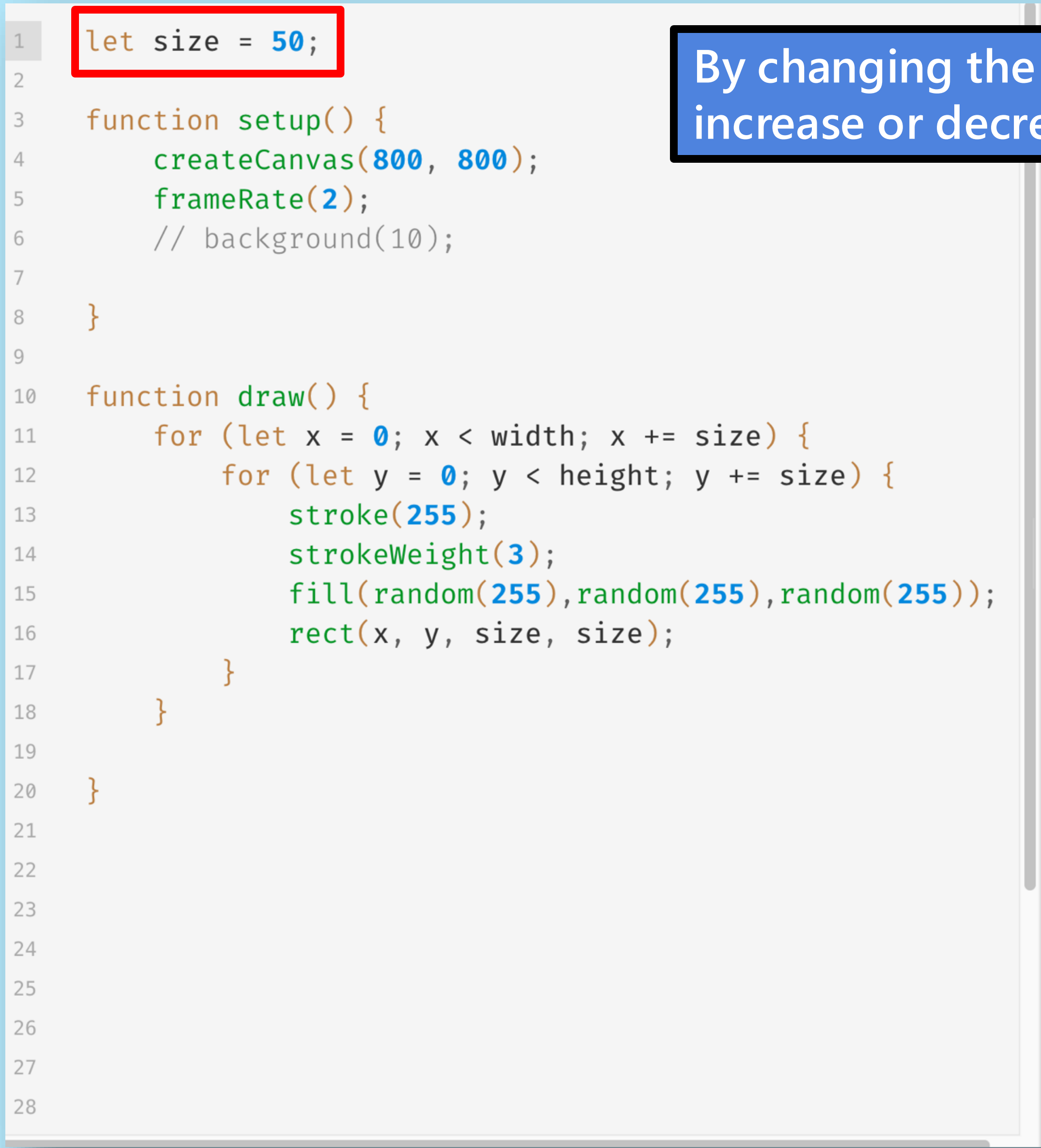


```
let size = 200;

function setup() {
    createCanvas(800, 800);
    frameRate(2);
    // background(10);

}

function draw() {
    for (let x = 0; x < width; x += size) {
        for (let y = 0; y < height; y += size) {
            stroke(255);
            strokeWeight(3);
            fill(random(255),random(255),random(255));
            rect(x, y, size, size);
        }
    }

}
```

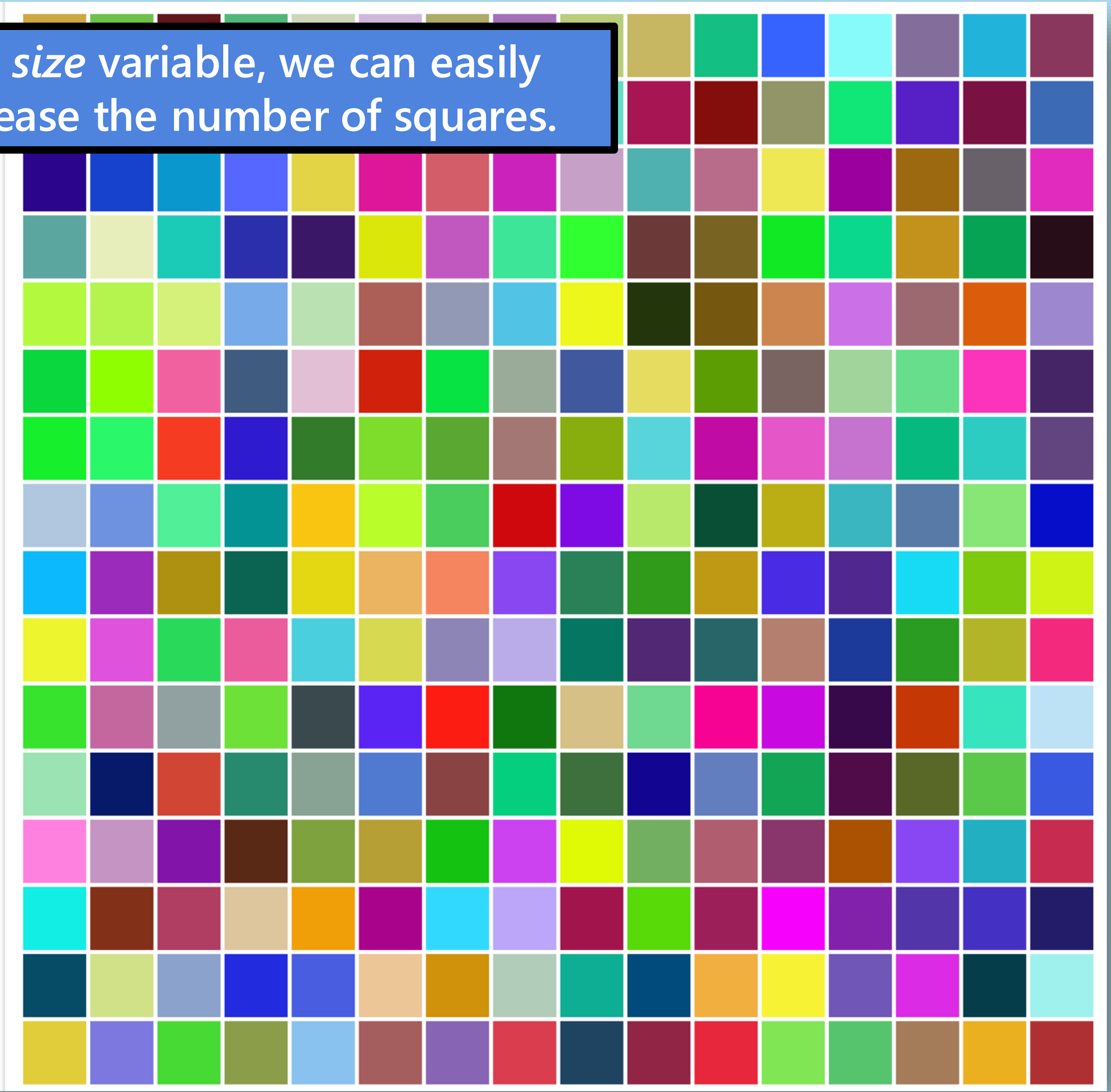
Use *frameRate(2)* so that *draw()* only reframes 2x per second instead of 60x

Add a white stroke, make it a bit thicker and fill the grid with random colours.

Make the squares smaller

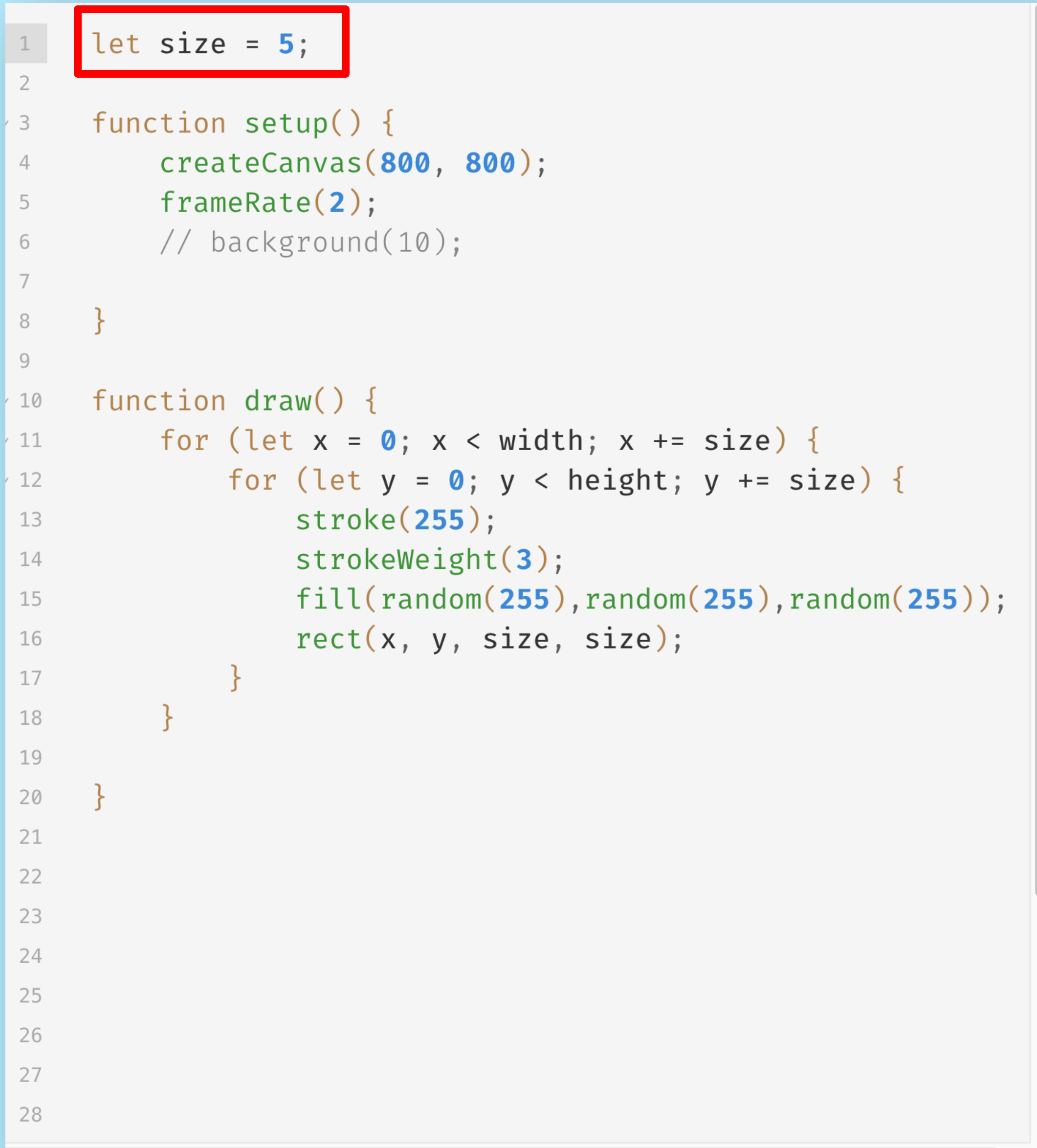


```
let size = 50;

function setup() {
    createCanvas(800, 800);
    frameRate(2);
    // background(10);

}

function draw() {
    for (let x = 0; x < width; x += size) {
        for (let y = 0; y < height; y += size) {
            stroke(255);
            strokeWeight(3);
            fill(random(255),random(255),random(255));
            rect(x, y, size, size);
        }
    }

}
```

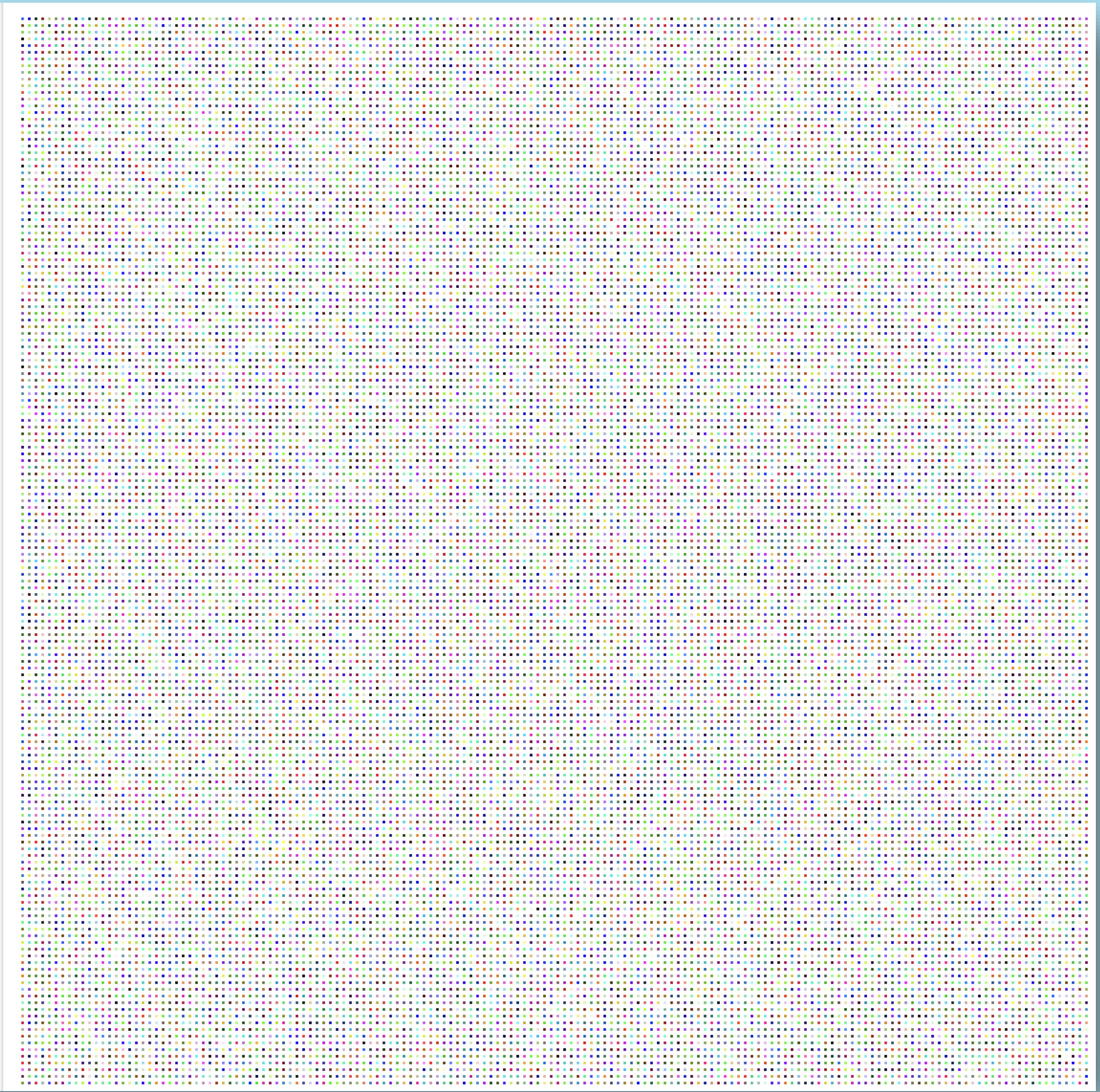


By changing the *size* variable, we can easily increase or decrease the number of squares.

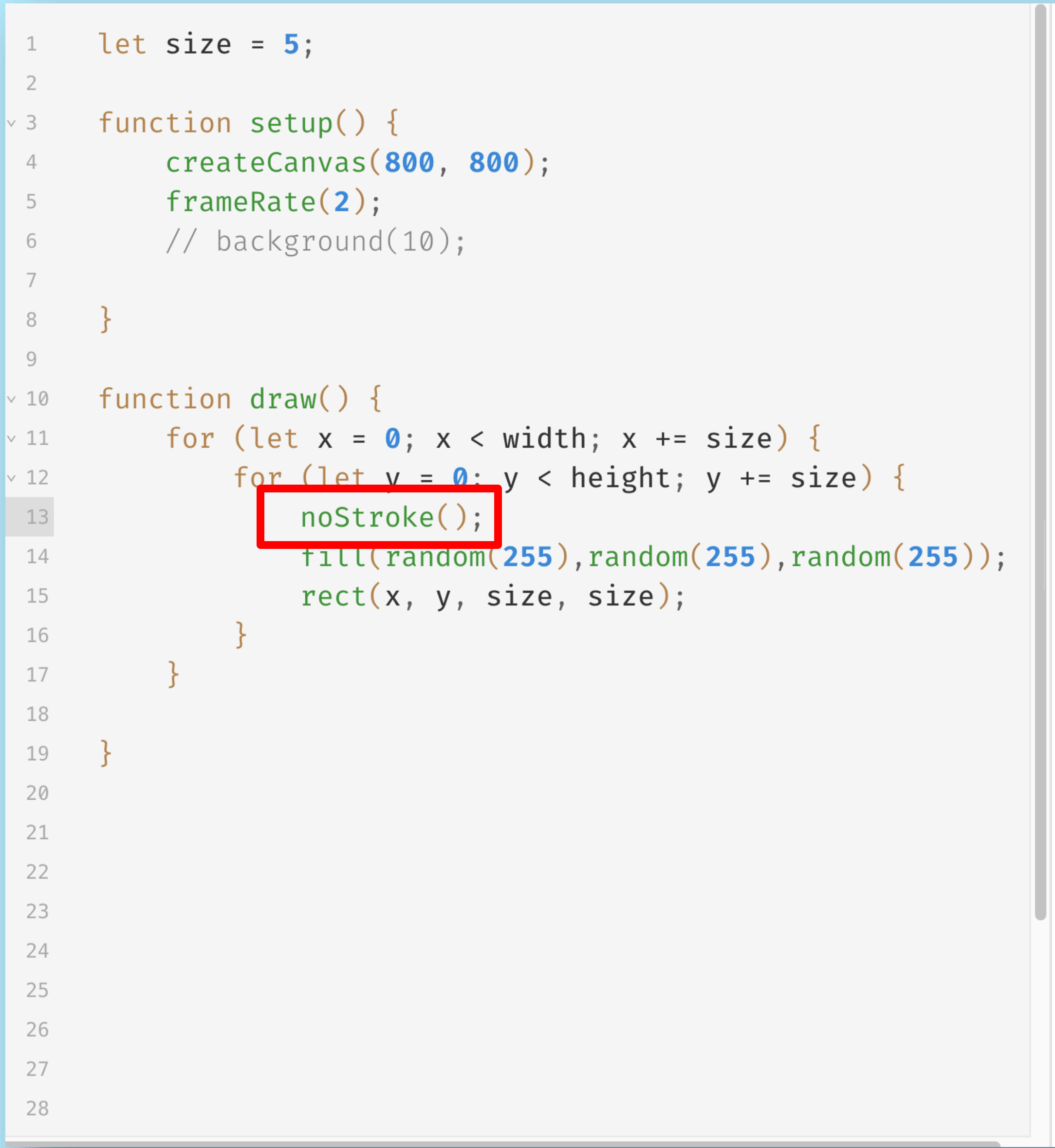
And even smaller



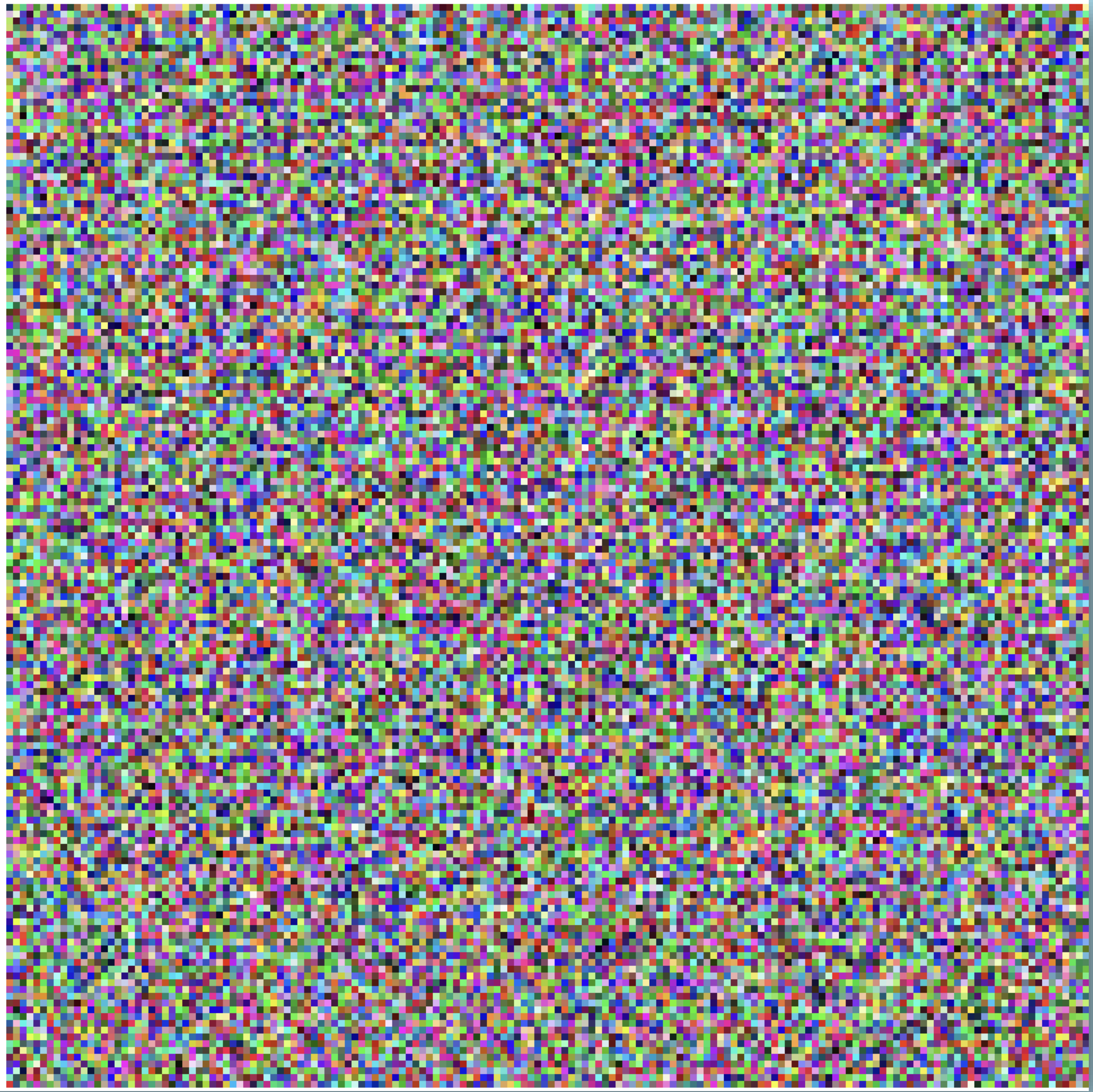
```
let size = 5;

function setup() {
    createCanvas(800, 800);
    frameRate(2);
    // background(10);

}

function draw() {
    for (let x = 0; x < width; x += size) {
        for (let y = 0; y < height; y += size) {
            stroke(255);
            strokeWeight(3);
            fill(random(255),random(255),random(255));
            rect(x, y, size, size);
        }
    }

}
```



Create variations



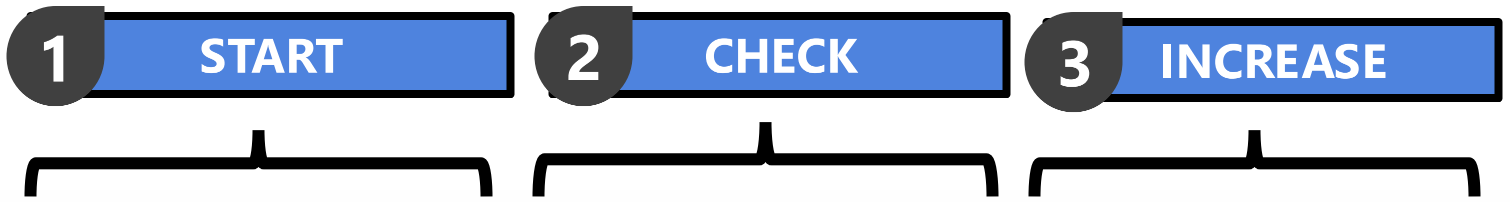
```
let size = 5;

function setup() {
    createCanvas(800, 800);
    frameRate(2);
    // background(10);

}

function draw() {
    for (let x = 0; x < width; x += size) {
        for (let y = 0; y < height; y += size) {
            noStroke();
            fill(random(255),random(255),random(255));
            rect(x, y, size, size);
        }
    }

}
```



Review

Review For Loop

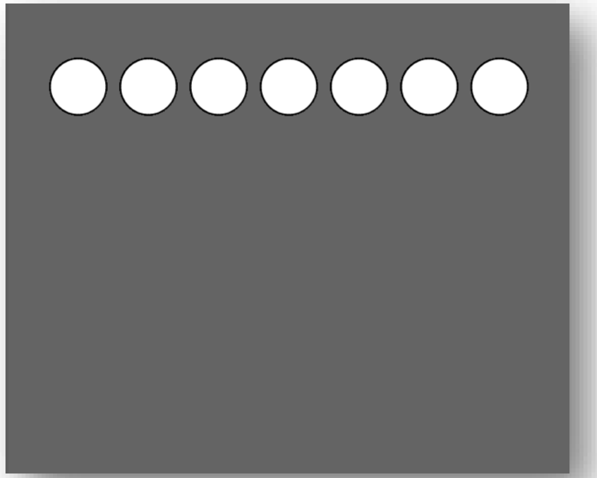
A **for loop** lets you **repeat a pattern** without writing the same line of code over and over again.

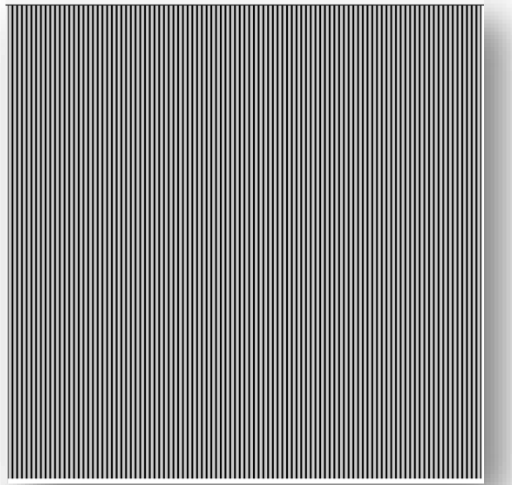


```
for (let x = 50; x < width; x = x + 50) {
  circle(x, 60, 40);
}
```

Review Loop Structure

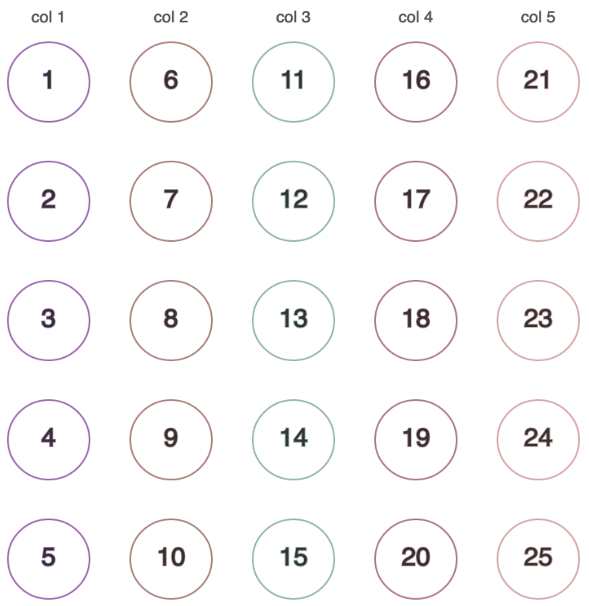
You should use a for loop when you have code that **uses a pattern** that **starts** at a number, **increases** by a number, and **stops** at a number.

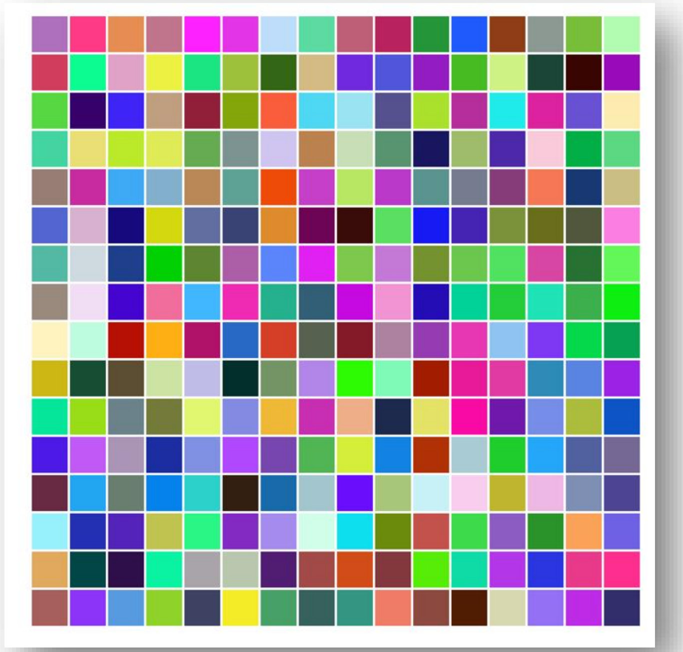




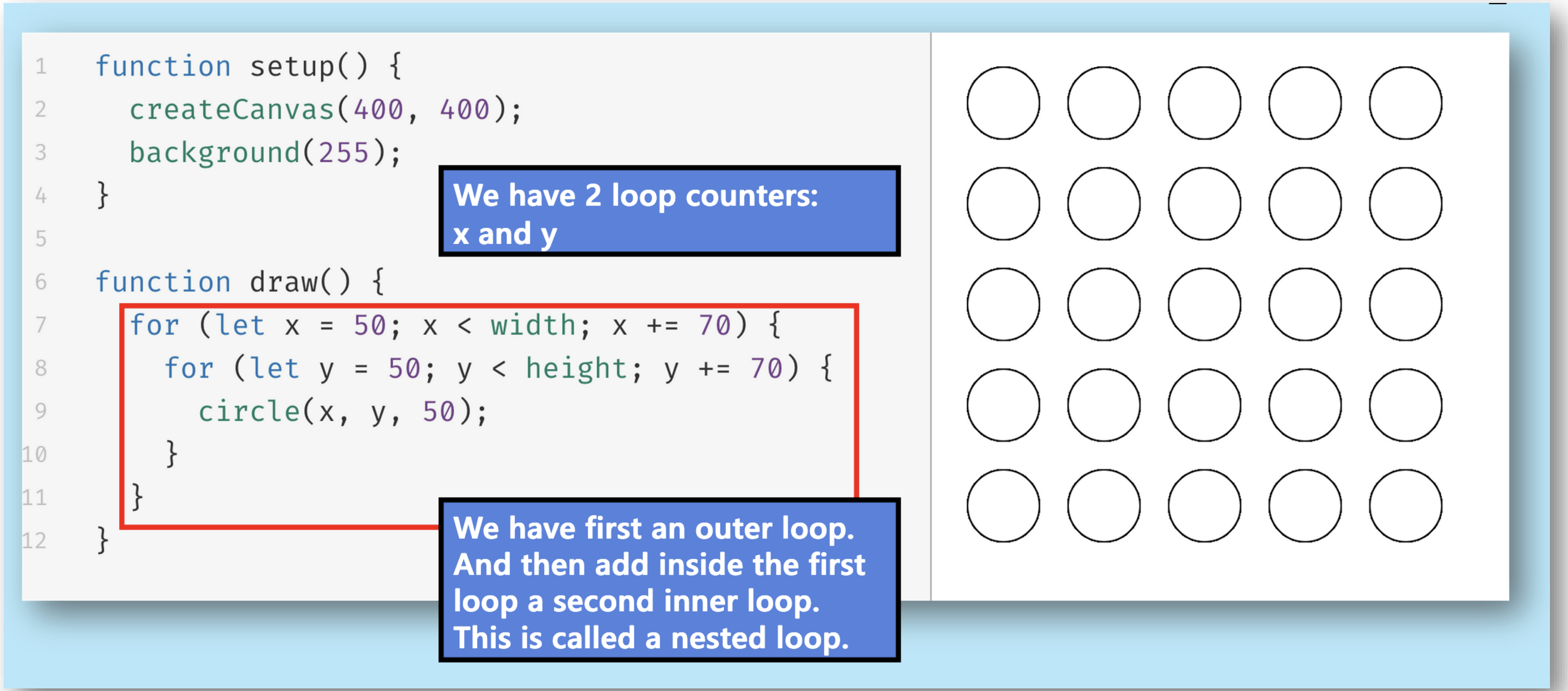
Review Nested Loop

A for loop inside of another for loop is called a **nested for loop**. These are useful when your pattern involves more than one number or if you're working with grids.





Review Nested Loop



```
function setup() {
  createCanvas(400, 400);
  background(255);
}

function draw() {
  for (let x = 50; x < width; x += 70) {
    for (let y = 50; y < height; y += 70) {
      circle(x, y, 50);
    }
  }
}
```

We have 2 loop counters:
x and y

We have first an outer loop.
And then add inside the first loop a second inner loop.
This is called a nested loop.

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Fondation ABBL pour l'éducation financière

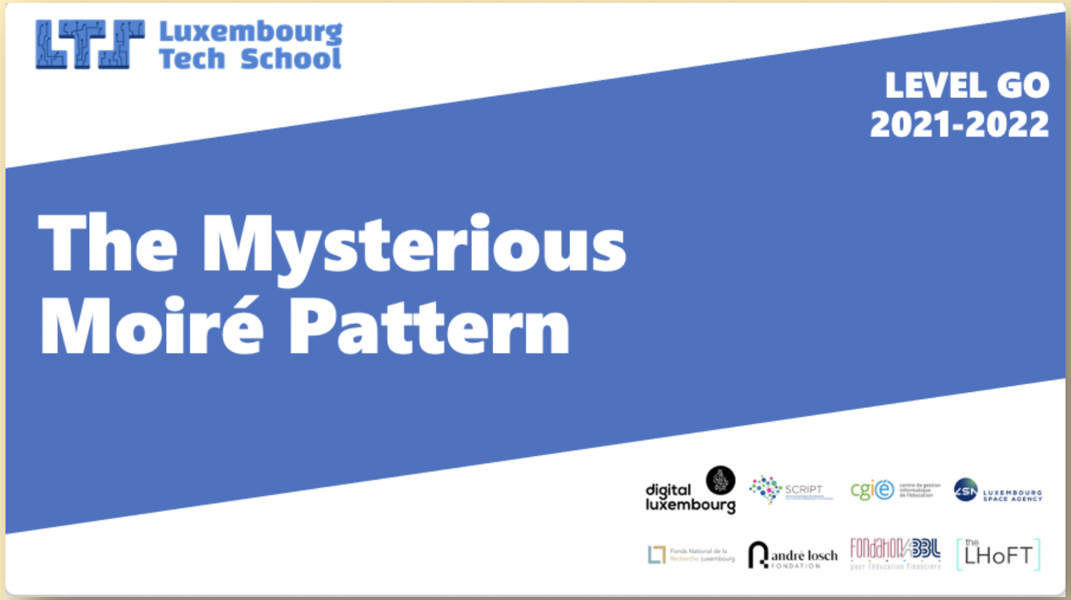
Luxair

the LHoFT

Luxembourg-City Incubator

Extra Activity: Moiré Pattern

You can learn more about **“The mysterious Moiré Pattern“** and how to create one yourself in the slides shared with you on Teams.



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The Mysterious Moiré Pattern