THE JAVASCRIPT ARTIST

15/10/2016

Objectives

- Learn how to program with JavaScript in a fun way!
- Understand the basic blocks of what makes a program.
- Make you confident to explore more complex features of JavaScript.
- Unleash your creativity.
- Review a bit of Maths!
- To encourage you to present your work.

What is Javascript?

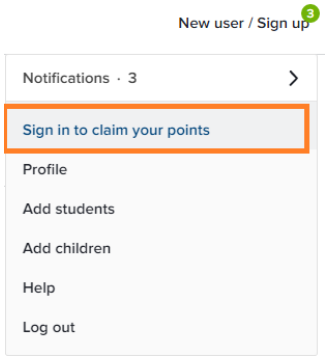
- Set of commands which our internet browsers understand.
- Like any other language (e.g. French, English, Dutch) we need to respect a specific syntax / format when writing the programs.
- Without JavaScript, the web pages would not be cool! Facebook, Gmail, Twitter all use JavaScript to make their website more user-friendly.

What can we do with Javascript?

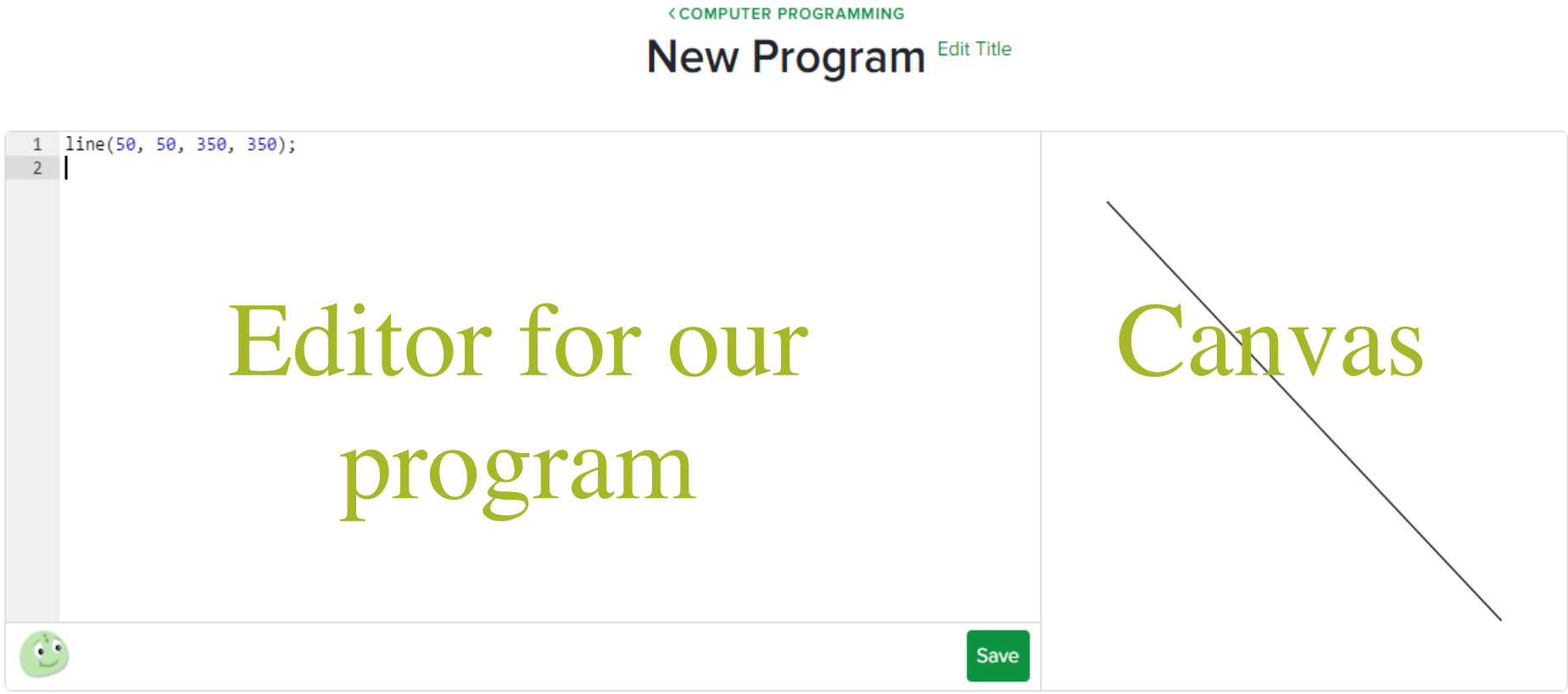
- Play music
- Interaction on a web page (E.g. zoom on a photo, drag drop an email in the bin etc.)
- Drawing on a web page
- Game development
- And a lot more!
- See by yourself:
- http://lights.helloenjoy.com/
- http://www.patatap.com/
- https://www.cubeslam.com/

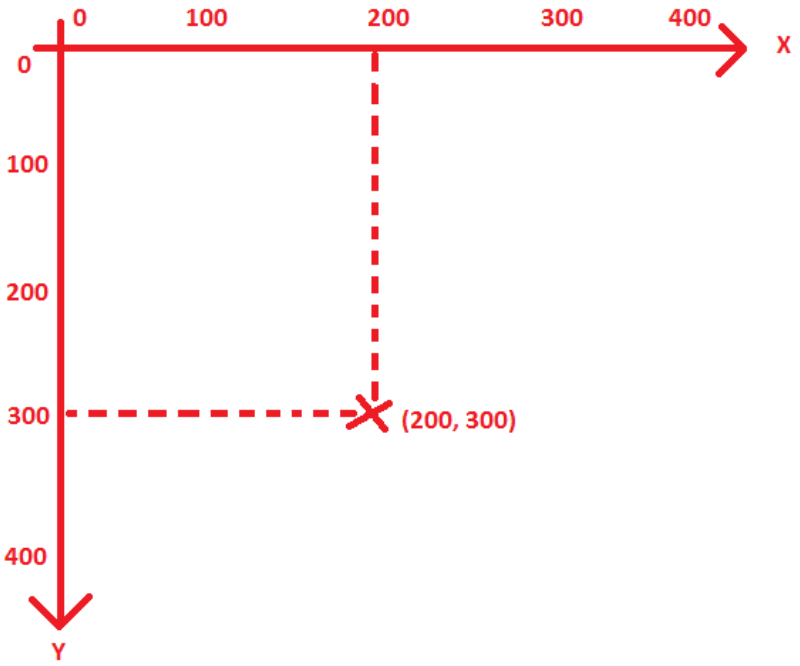
How do we code?

- We will use a nice online editor to write our program.
- Log to https://www.khanacademy.org/computer-programming/new/pjs
- Sign in using your Gmail or Facebook account, so that you can save your work.



The Editor


COMPUTER PROGRAMMING
New Program
Edit Title
1 line(50, 50, 350, 350);
2
Editor for our program
Canvas
Save



The Canvas

- Our painting area
- 400 x 400
- Follows (x, y) coordinates system
- X – from left to right
- Y – from top to bottom
- As an exercise, can you locate:
  - (300, 100)
  - (50, 400)
  - (0,0)
  - (400,400)
  - (399, 17)

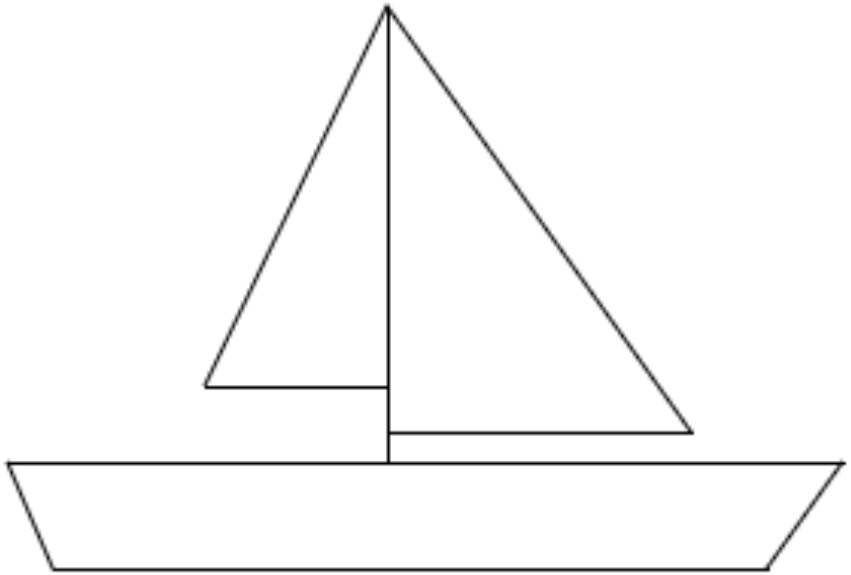
Our first program

line(50, 50, 350, 350); ← *Ends with semi-colon*

function *Parameters*

- What do you see on the Canvas?
- Change the value of the parameters 50, 350 etc.
- Can you draw a square?

```
line(100, 100, 300, 100);
line(300, 100, 300, 300);
line(100, 100, 100, 300);
line(100, 300, 300, 300);
```

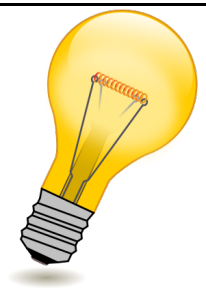


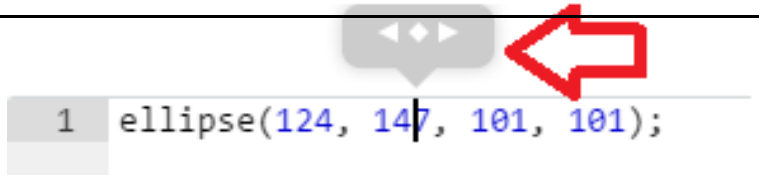
A small exercise

- Can you draw the small boat with what we have learned so far?
- Do not forget to save your work!

Circles

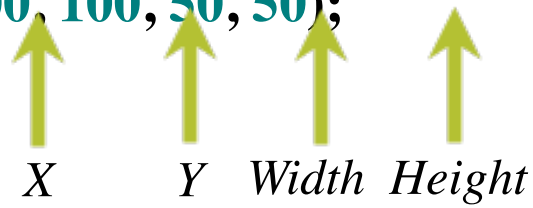
- **ellipse(120, 150, 100, 150);**
- This command draws an ellipse on the canvas.
- By changing the parameters, can you draw a circle?

	When clicking on one of the parameter, you can see a pointer appearing. When you slide this pointer, the values of the parameters will be changed. That will be easier for you to visualize your changes on the canvas.



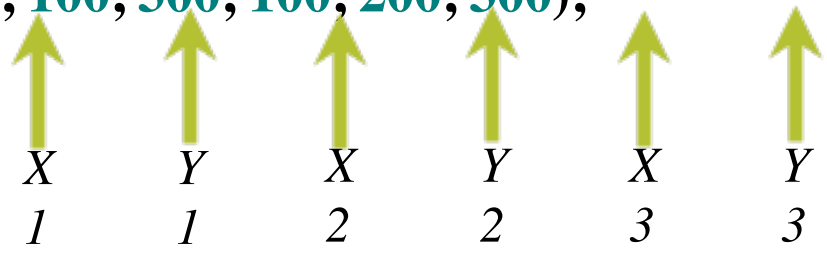
Rectangles

- **rect(100, 100, 50, 50);**



Triangle

- Has 3 points
- **triangle(100, 100, 300, 100, 200, 300);**



Colors

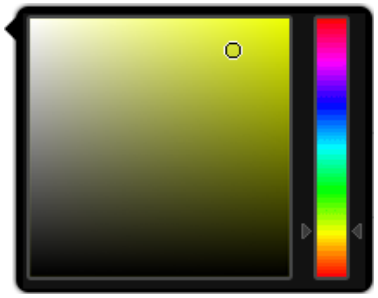
- So far, our drawings were of black lines!
- In JS, you can mix RED, GREEN and BLUE to make any colors. Shortname = RGB.
- Amount of Red, Blue and Green varies from 0 to 255.
- Drawing a red rectangle

```
stroke(255, 0, 0);
rect(10, 10, 100, 100);
```

R = 255, G = 0, B = 0

- Chose the color picker to chose your color.

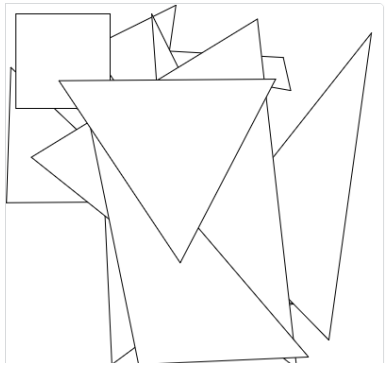
  Notice how the parameters change.

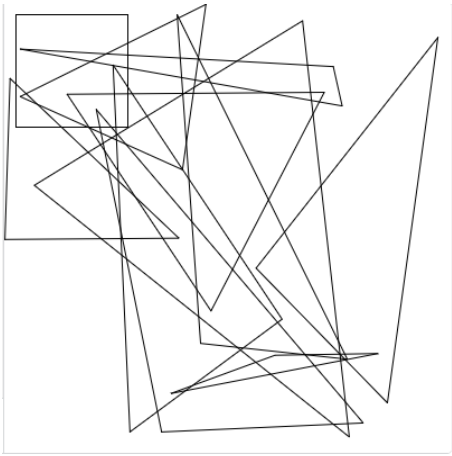


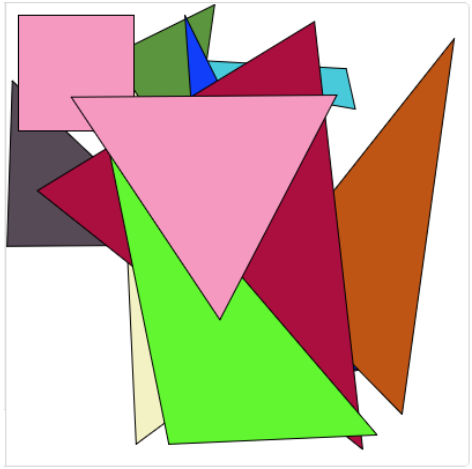
Colors (ctd..)

- If you draw several shapes that overlap, you will not completely see the shapes behind.
- This is because these shapes are filled with the white color.
- To make them transparent, before drawing a shape, use ➔ noFill();
- To fill them with a particular color, before drawing a shape, use ➔ fill(r, g, b);

  r, g, b will of course be between 0 and 255.







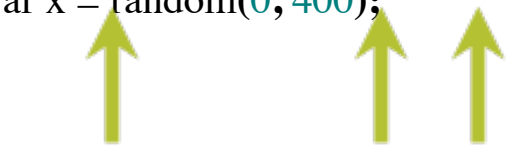
A small exercise

- Try to make this snowman in the sun.
- Make use of what you have learned before.
- Enleash your creativity!

Random & Variables

- To generate a random number use the command:

```
var x = random(0, 400);
```



- A variable is a place in memory where you can store a value and use it later. It can even be modified.
- Here, the name of the variable is x, which will store a random value from 0 to 400.
- Variable x can take values like 0, 1, 1.5, 114.56, 200.99, 400, 399.99 etc..
- Use different names for different variables: y, z, myVariables, toto, .. Should always start with a letter of the alphabet.
- Can you generate a rectangle of a random color?

Decision if.. Else if

- The « if » block allows the program to take decision. It is pretty much the same reasoning when a person decides what to wear on a rainy or sunny day.
- This program generates a random number between 0 and 100 and then outputs a text specifying where the number lies.

```
var x = random(0, 100);

fill(255, 0, 0);

text(x, 5, 10);

if (x < 10) {

  text(" is less than 10!", 50, 10);

}

else if (x >= 10 && x <= 50) {

  text(" is between 10 and 50!", 50, 10);

}

else {

  text(" is greater than 50!", 50, 10);

}
```

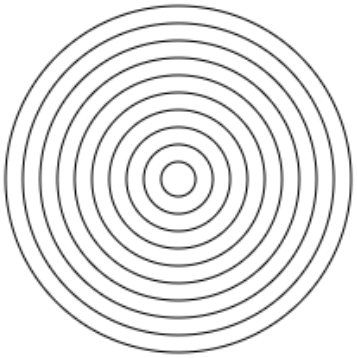
Loops

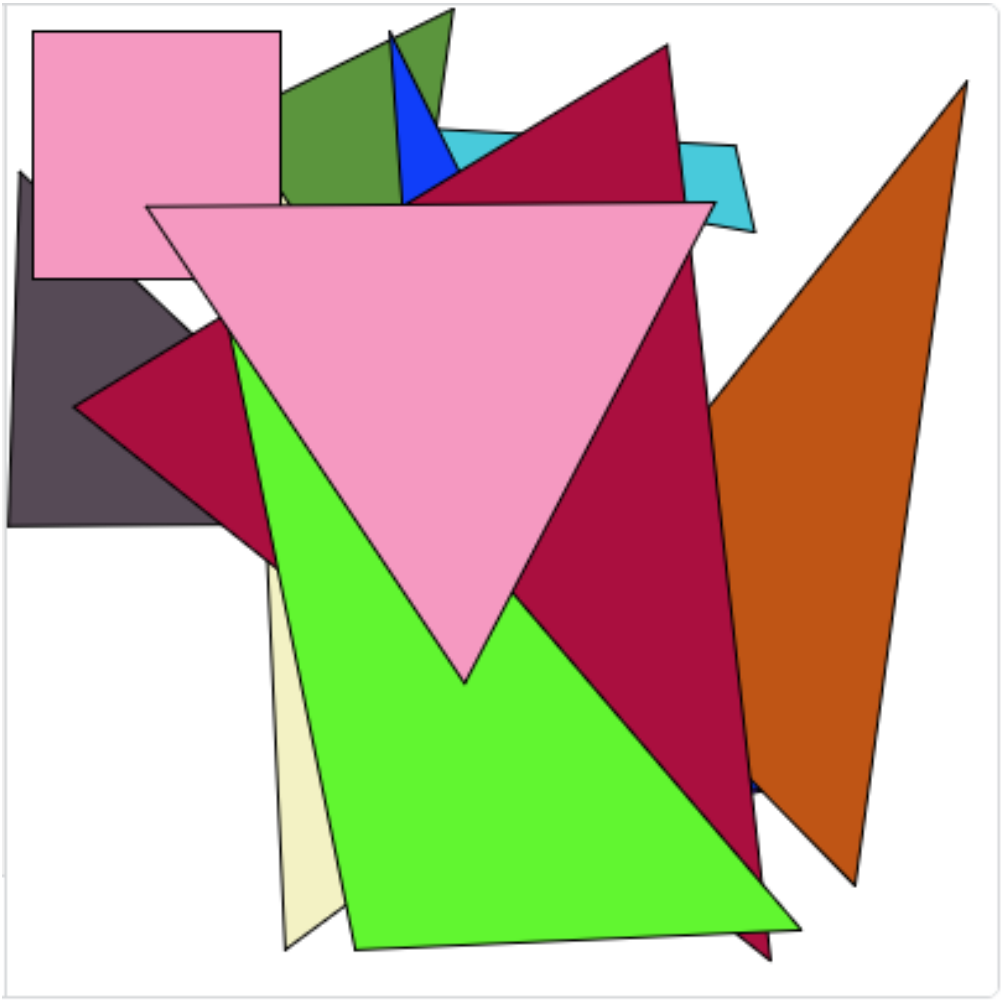
- Loops are used to repeat a piece of code several times.
- Generate 10 circles.

```
noFill();

var i = 1;

while (i <= 10) {

  ellipse(200, 200, i*20, i*20);
  i = i + 1;

}
```

Initially, set value of i = 1
While the value of i less or equal to 10:

- Increment its value by 1.
- Draw a circle





A small exercise

- Gerate 10 shapes on the canvas and fill them with random colors.
- Place them randomly on the canvas.

Images

- We can also insert an image on the Canvas.
- We have a library of cool images at our disposal.
- This command is used to insert an image on the canvas.

```
var mrPink = getImage("avatars/mr-pink");
image(mrPink, 10, 10);
```

Simple Animations

- Special function « draw »

```
draw = function() {
.
.
};
```

- This function is called about 30 times per second.
- We can exploit this special function to make animations.
- It is as if the entire canvas is cleaned and the shapes are redrawn on it.

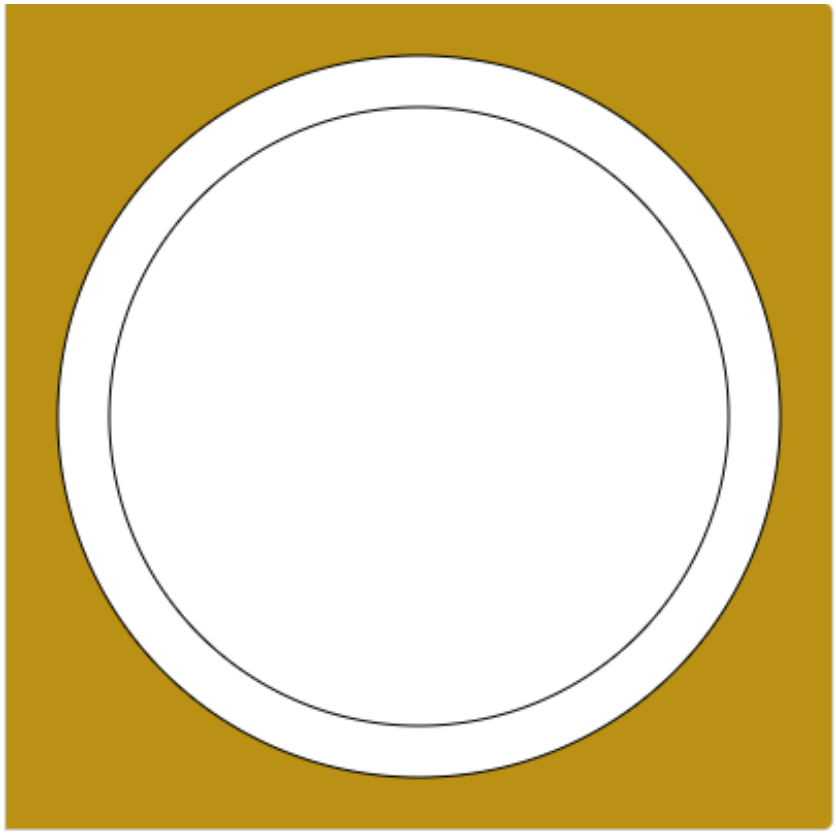
Animation using the draw function

```
var x = 0;

var dx = 10;

draw = function() {

  background(255, 255, 255);  // we always paint the background in white

  fill(255, 0, 0);

  ellipse(x, 200, 10, 10);

  x = x + dx;

  if (x >= 400) {

     dx = -10;

  }

  else if (x < 0) {

     dx = 10;

  }

};
```

This piece of code draws a moving ball on the canvas.

1) Try to add 2 or 3 more balls moving at the same time but different speeds.
2) Add a paddle somewhere on the canvas and make the ball bounce when it hits the paddle.

CHALLENGES

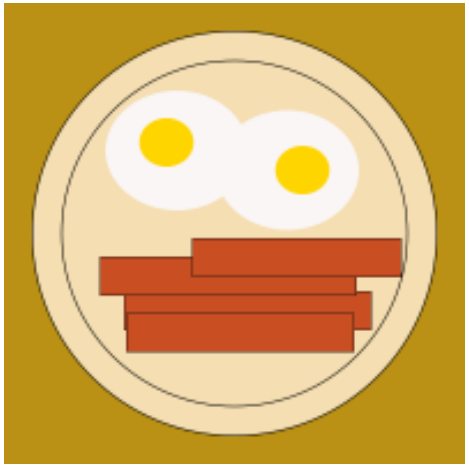


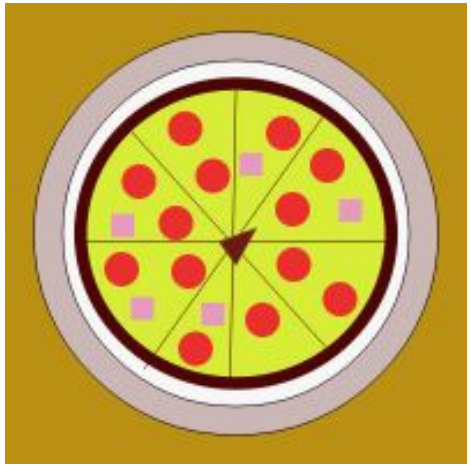
Challenge #1

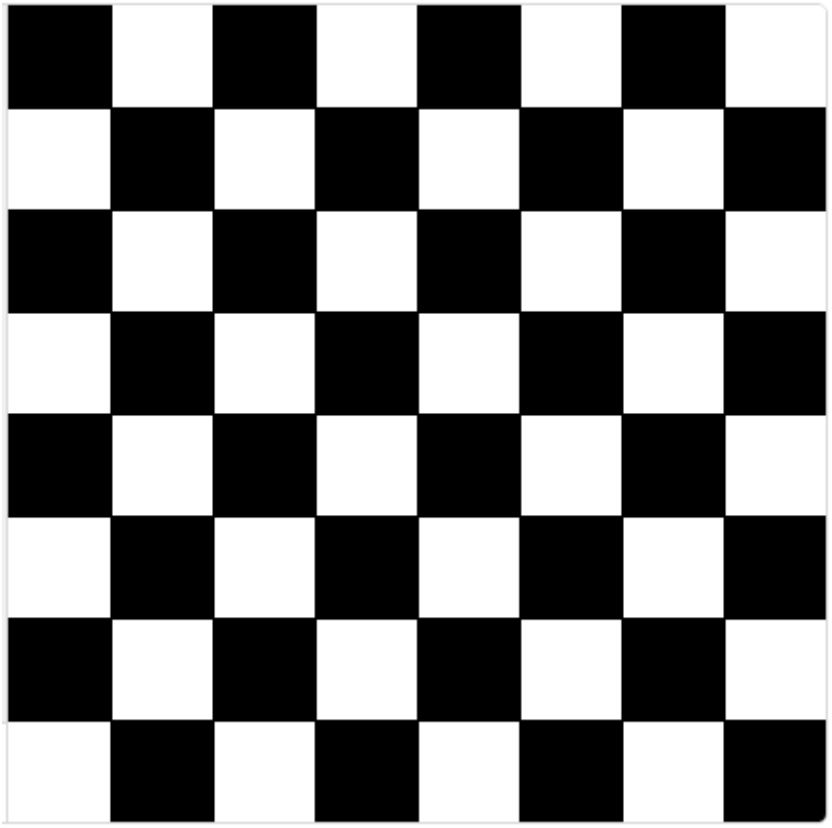
- On the left is a picture of a plate on a wooden table. What's on your plate for dinner?
- Use the shapes you have learned to decorate your plate.
- Here is the program to start with:

```
background(186, 145, 20); // wooden table

ellipse(200, 200, 350, 350); // plate

ellipse(200, 200, 300, 300);
```

Some inspirations for challenge #1







Challenge #2

Generate an 8 x 8 checkerboard

Tips:

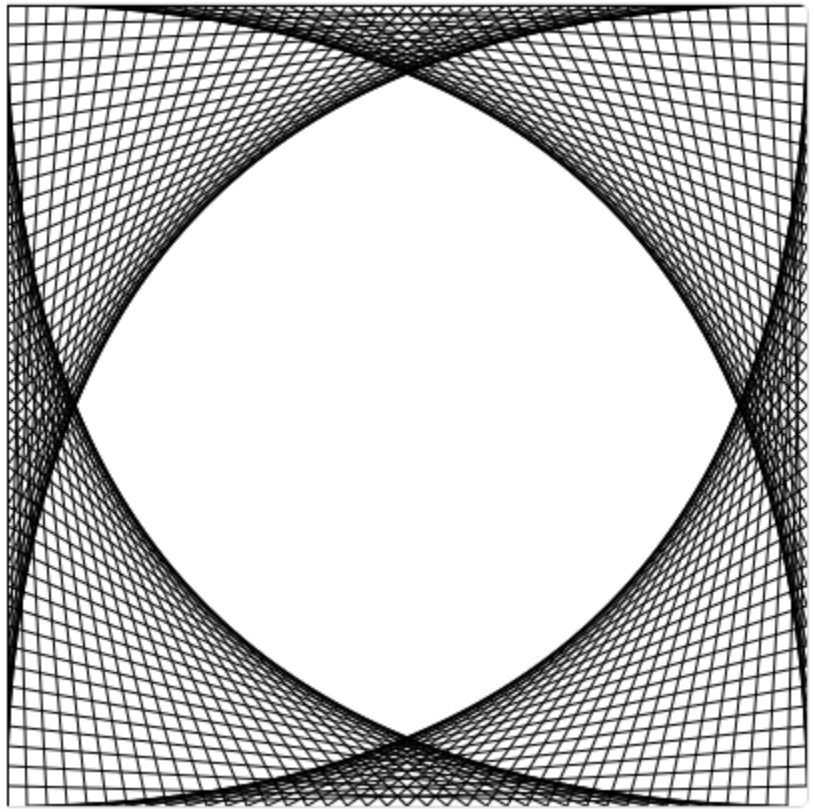
1) Use a while loop inside another while loop

2) Make your program in 2 parts. First part displays black squares on row 1, 3, 5, 7. Then, display the black squares on row 2, 4, 6, 8

Challenge #2 solution

```
var x, y;

y = 0;
while (y < 400) {
  x = 0;
  while (x < 400) {
    fill(0, 0, 0);
    rect(x, y, 50, 50);
    x = x + 100;
  }
  y = y + 100;
}
```

```
y = 50;
while (y < 400) {
  x = 50;
  while (x < 400) {
    fill(0, 0, 0);
    rect(x, y, 50, 50);
    x = x + 100;
  }
  y = y + 100;
}
```



Challenge #3

- If you cannot picture how this drawing is made, try out on paper first to get an idea.
- Then write a program to do the same actions that you have made on paper.

Challenge #3 solution

```
var x = 0;
while (x < 400) {
line(0, 400-x, x, 0);
   line(x, 400, 400, 400-x);
   line(x, 0, 400, x);
   line(0, x, x, 400);

   x = x + 10;
}
```

Challenge #4

- Use the animation techniques that you have learnt to make a lively aquarium full of fishes!
- Use pictures, shapes, colors to build your aquarium.
- Be creative!

BRAVO!
YOU ARE NOW A
JAVASCRIPT NINJA!