YOUNG PROGRAMMER CHALLENGE

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MEET EACH OTHER

- What is your **Name**?
- What is your favorite **Color**?
- What is your most wanted **Superpower**?

AGENDA

- Introduction on Programming
- Tools we use for today
- Program with libraries and functions
- Project I: drawing with shape functions and color functions
- Project II: animation with math functions
- Show your work!

WHAT IS PROGRAMMING?

- ***Programming*** is the process of creating a set of instructions
- Instructions to tell a computer how to perform a task in steps
- Programming can be done using a variety of computer ***languages***

WHAT DO MOM AND DAD DO WITH PROGRAMMING AT BMS?

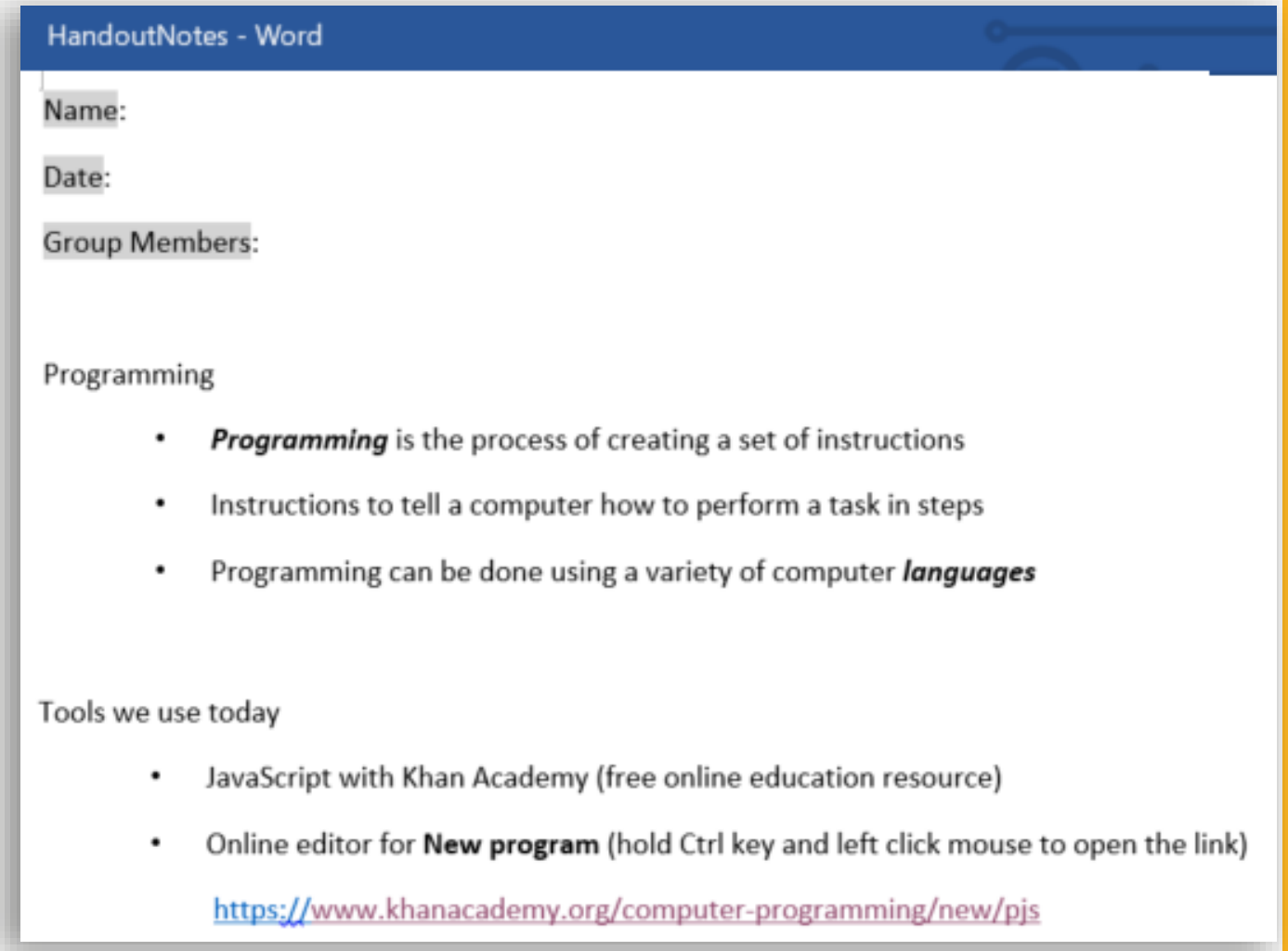
- What do you think?

- Clinic trial study
- Database management
- Marketing and sales
- And many many more!

Superpower to talk to dragons, snakes…

TOOLS FOR TODAY

- Online editor: https://www.khanacademy.org/computer-programming/new/pjs
- ***HandoutNotes*** on your desktop
- chrome


HandoutNotes - Word

Name:

Date:

Group Members:

Programming

- ***Programming*** is the process of creating a set of instructions
- Instructions to tell a computer how to perform a task in steps
- Programming can be done using a variety of computer ***languages***

Tools we use today

- JavaScript with Khan Academy (free online education resource)
- Online editor for **New program** (hold Ctrl key and left click mouse to open the link)

https://www.khanacademy.org/computer-programming/new/pjs

PROGRAM

chrome

Google

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(3) New Program | Computer progra

https://www.khanacademy.org/computer-progra

If you're **new** to JavaScript or ProcessingJS, you ca

= function(){ } Called repeatedly during **program** ex

HandoutNotes - Word

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https://www.khanacademy.org/computer-programming/new/pjs

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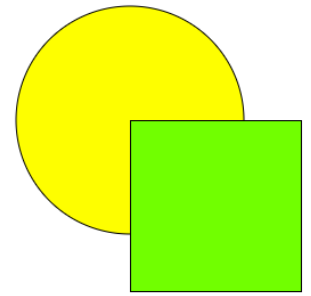
Error

New Program Edit title

```
1  fill(255, 255, 0);
2  ellipse(200, 200, 200, 200);
3
4  fill(85, 255, 0);
5  rect(200,200,150,150);
6
```



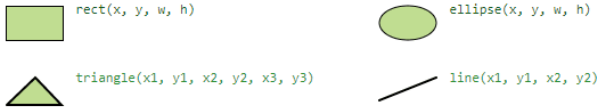
Save

Documentation

ProcessingJS

If you're new to JavaScript or ProcessingJS, you can learn more from this course: Intro to JS.

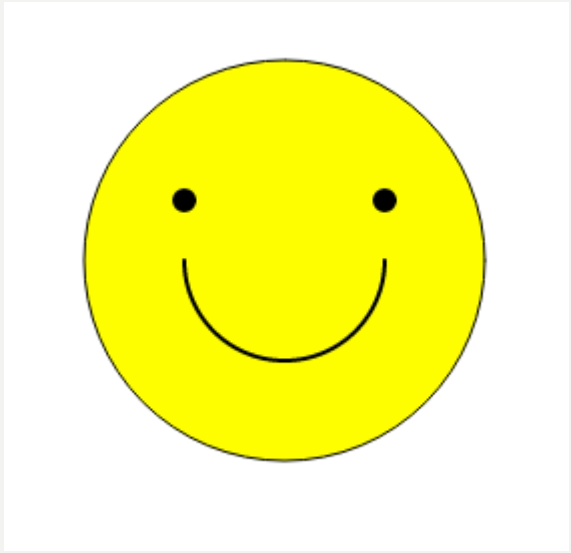
Shapes

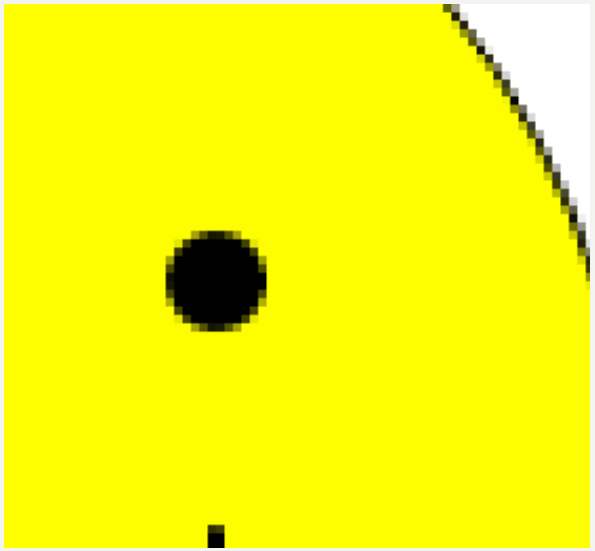


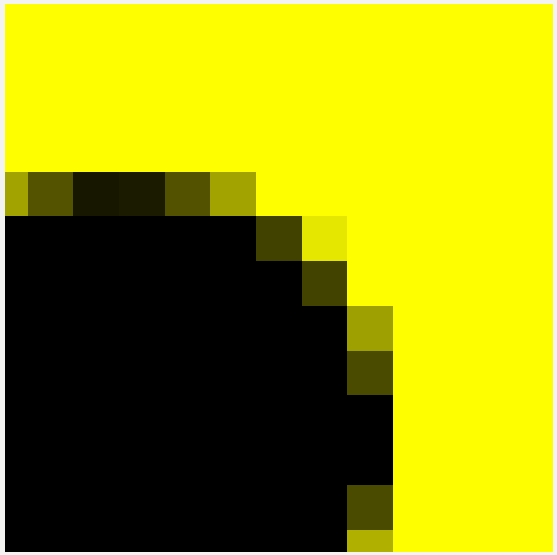
PROJECT I: DRAWING

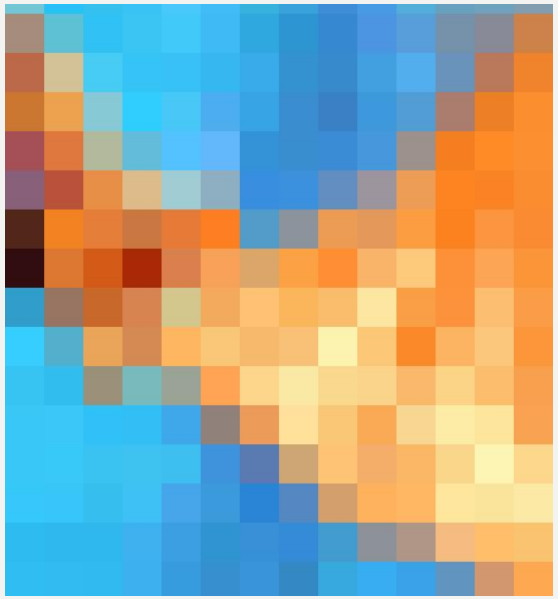
```
1  // face color
2  fill(255, 255, 0);
3  // face
4  ellipse(200, 200, 200, 200);
5
6  // smiling mouth
7  arc(200, 220, 120, 100, 0, 179);
8
9  // eye color
10 fill(0, 0, 0);
11 ellipse(200+50, 200, 10, 10);
12 ellipse(200-50, 200, 10, 10);
13
```

DIGITAL IMAGES: PIXEL



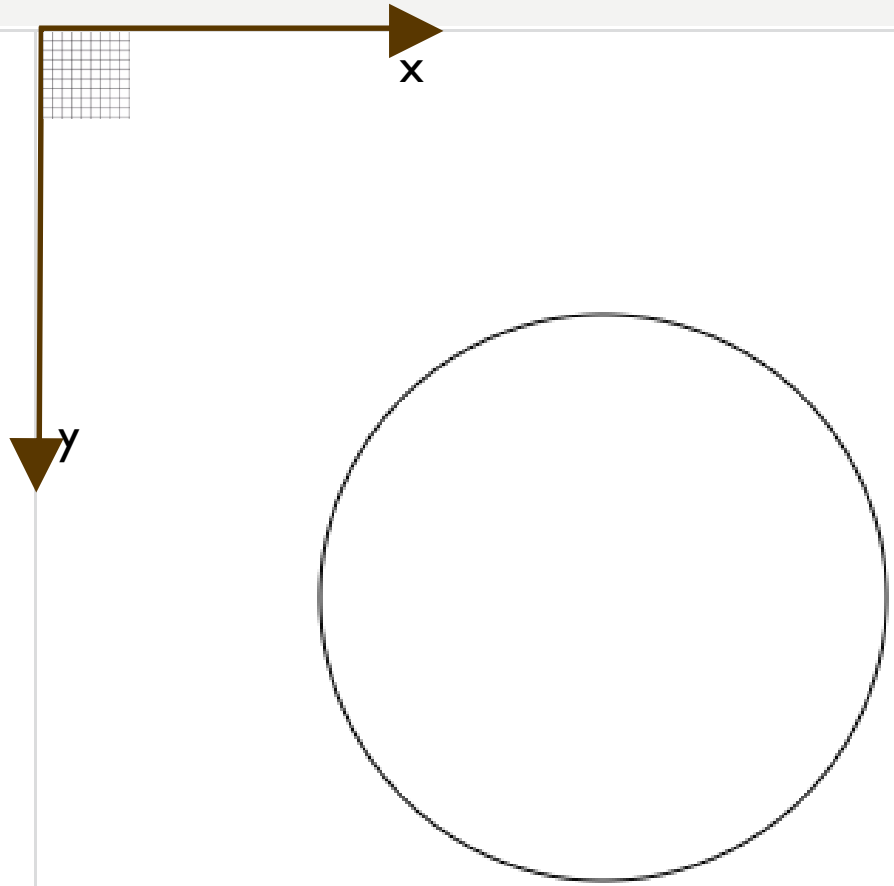






FUNCTION & PARAMETERS

```
1  ellipse(200, 200, 200, 200);
2
```



- Default canvas is 400 x 400 pixels
- ellipse(x, y, w, h)
  - x the x-coordinate of the center
  - y the y-coordinate of the center
  - w the width of the ellipse
  - h the height of the ellipse

FUNCTION & PARAMETER(S)

- How do you put a giraffe into a fridge?
  - Open the fridge
  - put in the giraffe
  - and close the door
- How do you put an elephant into a fridge?
  - Open the fridge
  - take out the giraffe
  - put in the elephant
  - and close the door

function PutAnimalInFridge(animal) {

- Open the fridge
- If not empty, take out the object
- put in the animal
- and close the door

}

LIBRARY AND FUNCTIONS

ProcessingJS

If you're new to JavaScript or ProcessingJS, you can learn more from this course: Intro to JS.

Shapes

rect(x, y, w, h)

ellipse(x, y, w, h)

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

line(x1, y1, x2, y2)

point(x, y)

arc(x, y, w, h, start, stop)

bezier(x1, y1, cx1, cy1, cx2, cy2, x2, y2)

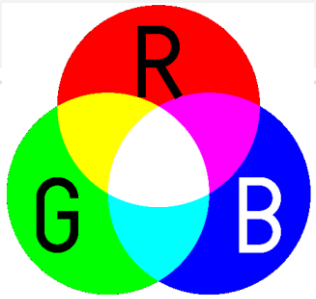
quad(x1, y1, x2, y2, x3, y3, x4, y4)

image(image, x, y, width*, height*)

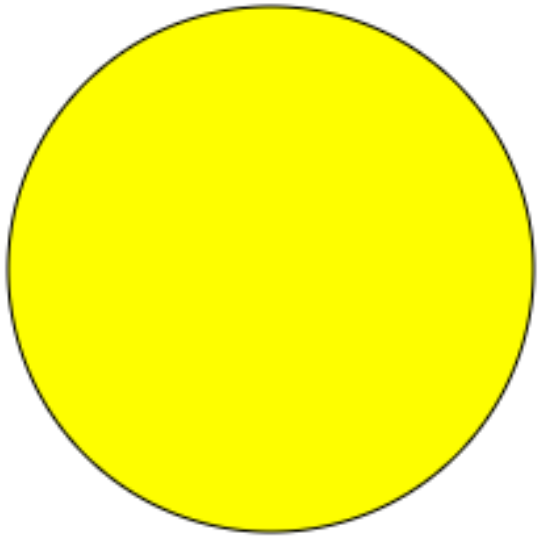
RGB COLOR

(red, green, blue)

```
1  fill(255, 255, 0);
2  ellipse(200, 200, 200, 200);
3
```



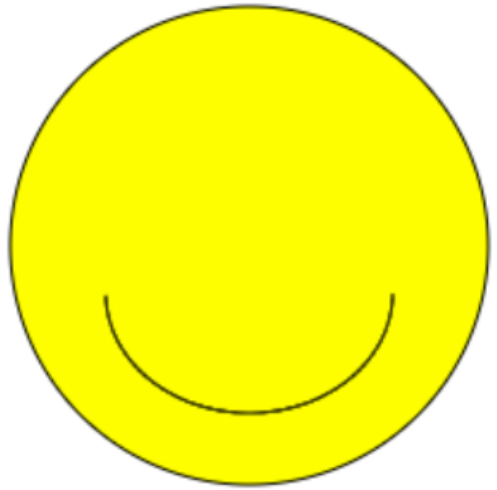
- RGB color
- supported in all browsers.
- RGB color value: (red, green, blue)
- Each parameter in (red, green, and blue) defines the intensity of the color as an integer between 0 and 255.



DRAWING EXAMPLE I
SHAPE & COLOR

```
1  // face color
2  fill(255, 255, 0);
3  // face
4  ellipse(200, 200, 200, 200);
5
6  // smiling mouth
7  arc(200, 220, 120, 100, 0, 179);
8
```

arc(x, y, w, h, start, stop)

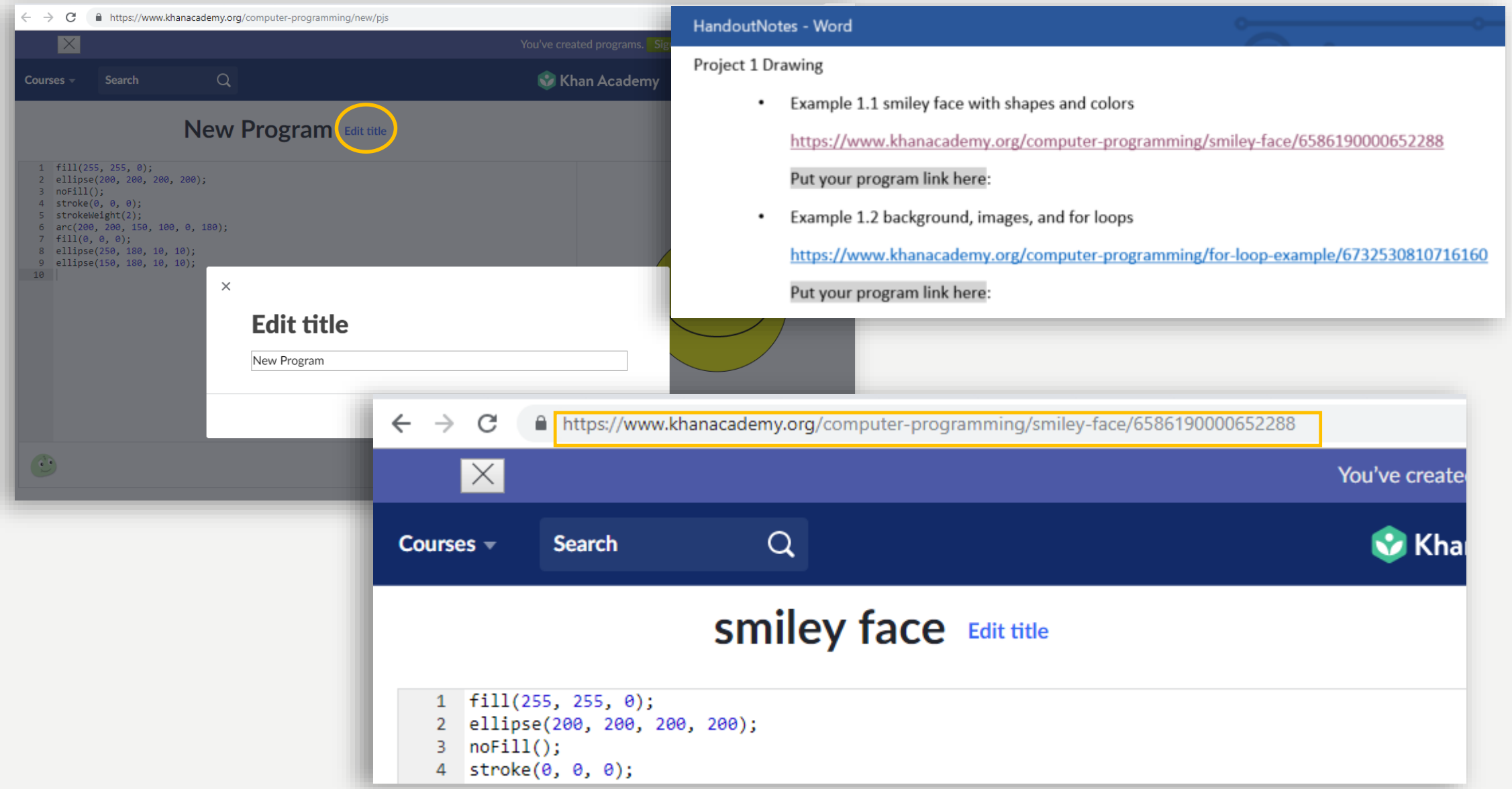


DRAWING EXAMPLE I SHAPE & COLOR

```
1  // face color
2  fill(255, 255, 0);
3  // face
4  ellipse(200, 200, 200, 200);
5
6  // smiling mouth
7  arc(200, 220, 120, 100, 0, 179);
8
9  // eye color
10 fill(0, 0, 0);
11 ellipse(200+50, 200, 10, 10);
12 ellipse(200-50, 200, 10, 10);
13
```

- Can you change the face to your favorite color?
- Can you add two ears?
- Tips:
  - Each ear is a shape
  - Click on the (R,G,B) color values to get a color palette
  - Click on any pixel location or length number to get a sliding bar

EDIT TITLE AND SAVE THE LINK



DRAWING EXAMPLE II BACKGROUND

```
1  // background color
2  background(90, 210, 255);
3
4  // grass color
5  fill(53, 171, 57);
6  noStroke();
7  rect(0,300,400,400);
8
9
```

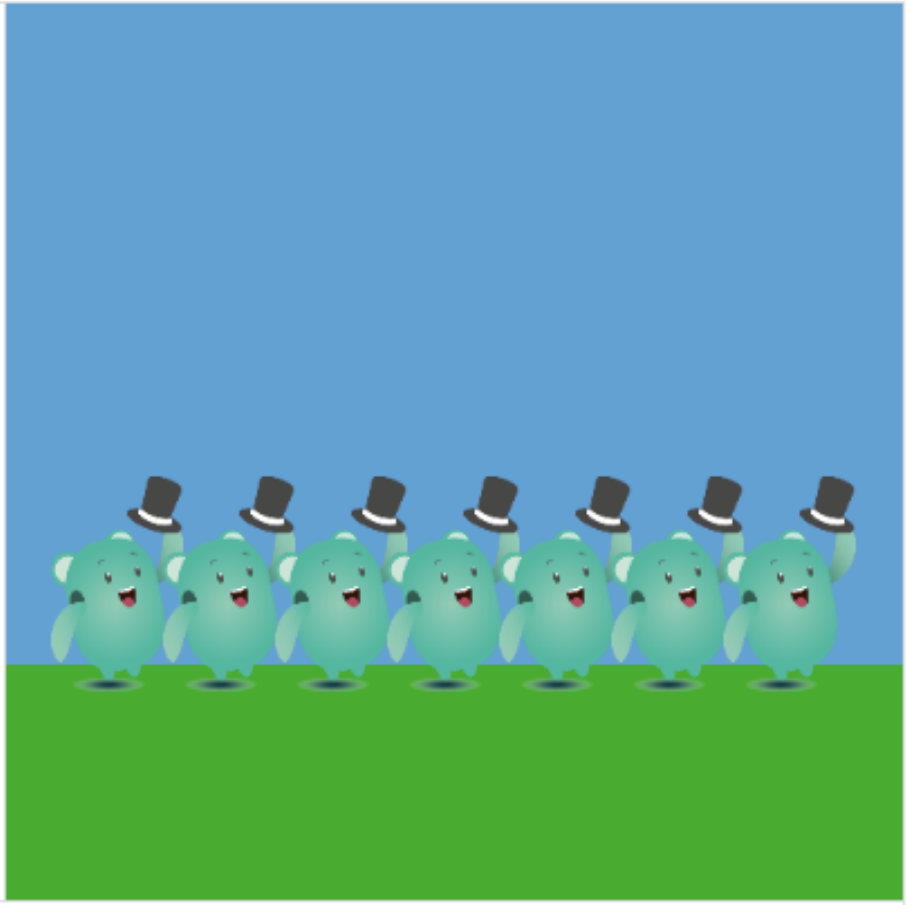
DRAWING EXAMPLE II INSERT IMAGE

```
1  // background color
2  background(90, 210, 255);
3
4  // grass color
5  fill(53, 171, 57);
6  noStroke();
7  rect(0,300,400,400);
8
9  // Draw the image at its default size
10 image(getImage("avatars/mr-pants-with-hat"), 85, 15);
11
12 // Draw a smaller image
13 image(getImage("avatars/mr-pants-with-hat"), 20, 211, 59, 96);
14
```

- image(getImage(image_address), x, y, width*, height*)
- Parameters:
  - x the x-coordinate of the top left corner
  - y the y-coordinate of the top left corner
  - width (Optional) the width of the drawn image
  - height (Optional) the height of the drawn image

FOR LOOP

```
1  // background color
2  background(88, 160, 209);
3
4  // grass color
5  fill(53, 171, 57);
6  noStroke();
7  rect(0,295,400,400);
8
9  // Draw the image at its default size
10 //image(getImage("avatars/mr-pants-with-hat"), 85, 15);
11
12 // Draw a smaller image
13 //image(getImage("avatars/mr-pants-with-hat"), 20, 211, 59, 96);
14
15 for (var i=0; i<7; i++) {
16     image(getImage("avatars/mr-pants-with-hat"), 20+i*50, 211, 59, 96);
17 }
18
```



For (var i=0; i<7; i++){

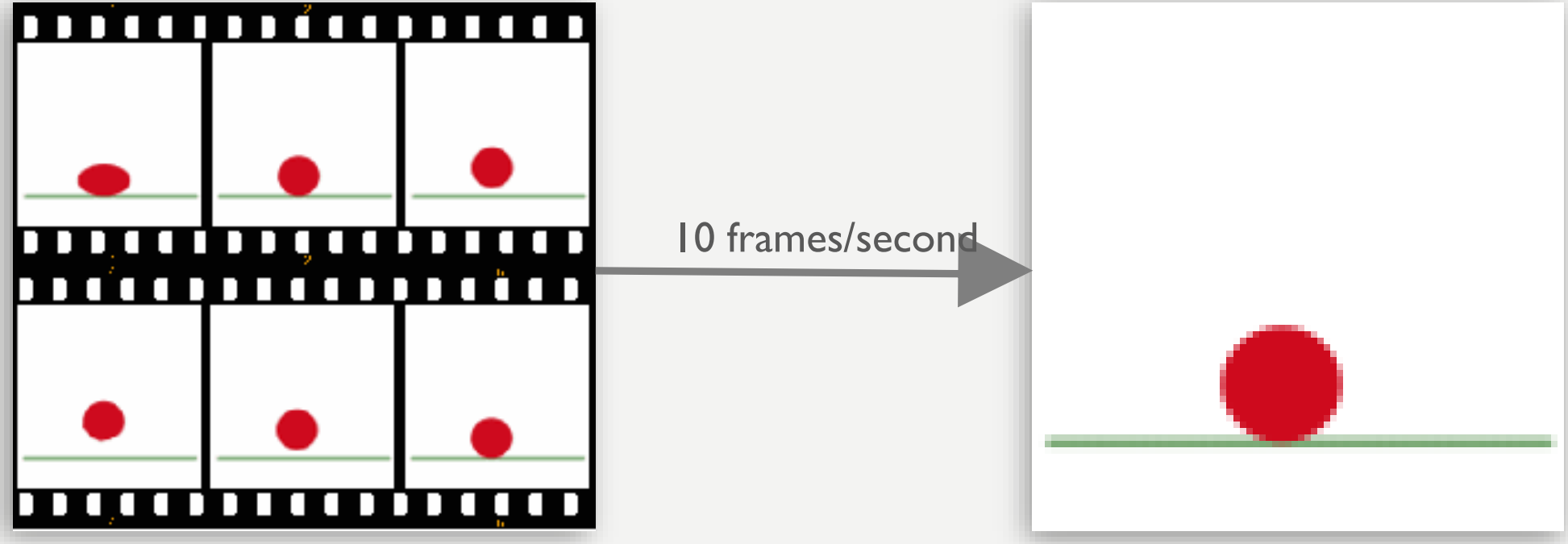
what do you want to do, repeatly along i values

}

CREATE YOUR OWN DRAWING

PROJECT II: ANIMATION

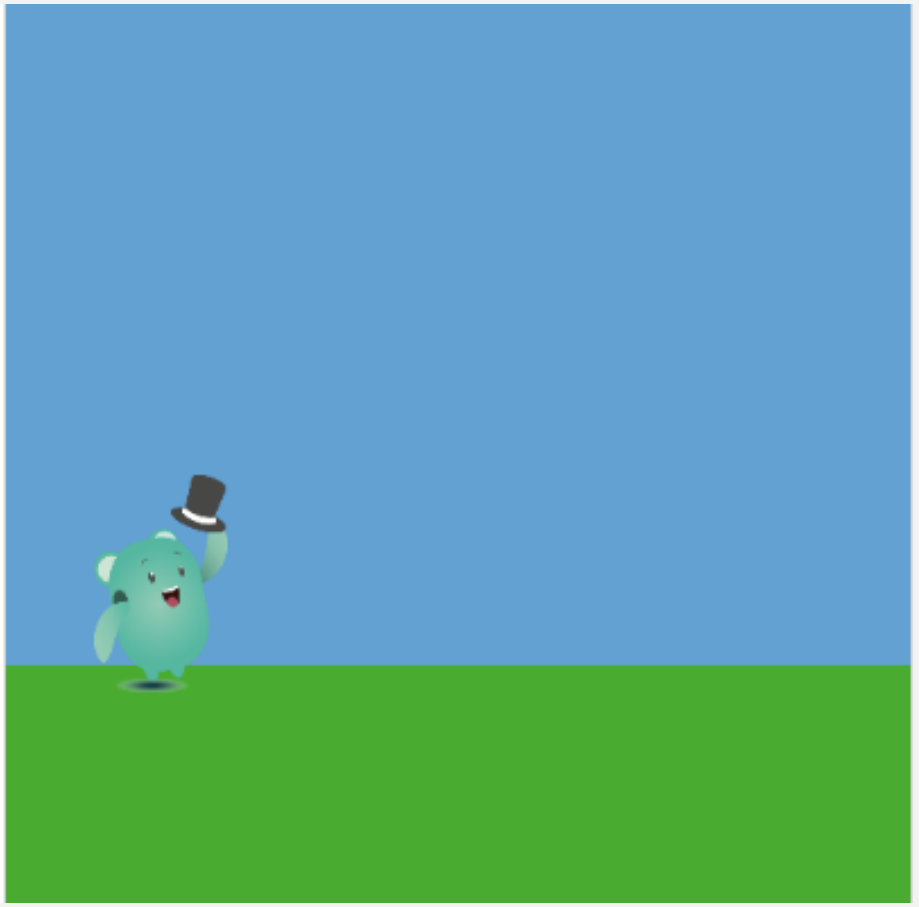
- Continuous movements?
- The bouncing ball animation (right) consists of these 6 ***frames***.
- ***Frame rate***, how many images being played per second



https://www.khanacademy.org/computer-programming/brouncing-ball/4523813120868352

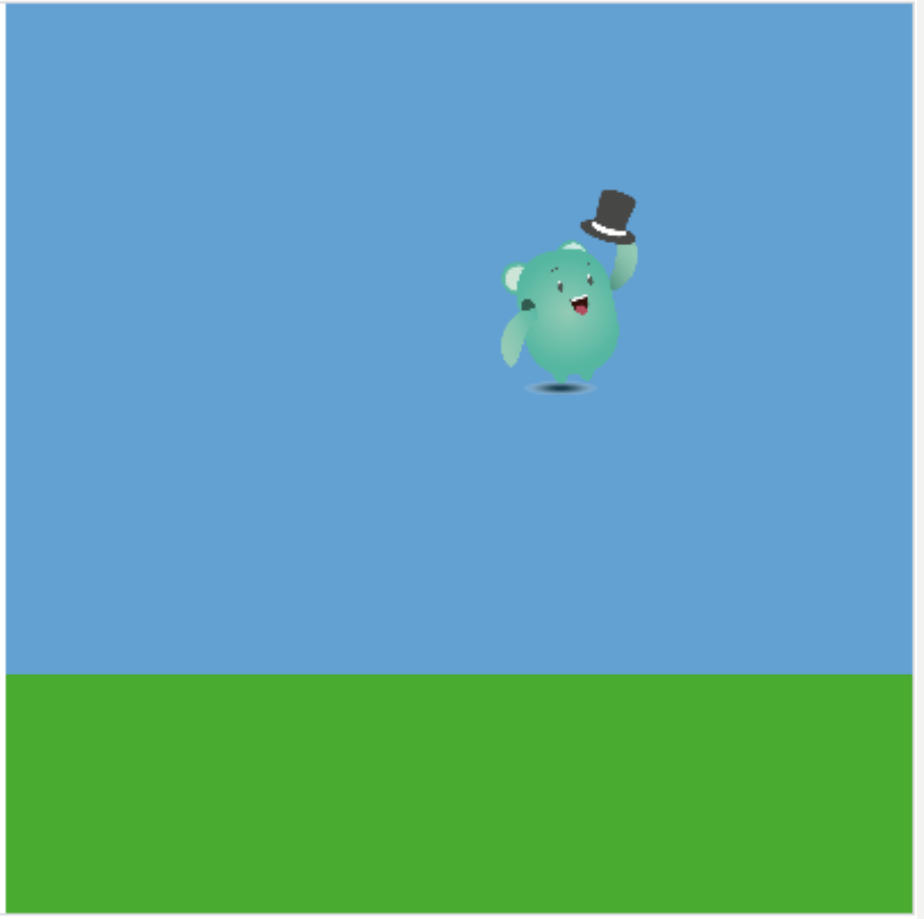
ANIMATION EXAMPLE I

```
1  var x=20;
2
3  draw = function() {
4      // background color
5      background(88, 160, 209);
6
7      // grass color
8      fill(53, 171, 57);
9      noStroke();
10     rect(0,295,400,400);
11
12     image(getImage("avatars/mr-pants-with-hat"), x, 211, 59, 96);
13     x=x+1;
14     if (x>400) {
15         x=0;
16     }
17 };
18
```



ANIMATION EXAMPLE II

```
var x0=165;
var y0=166;
var t=0;
var r=100;
var x=x0+r*sin(t);
var y=y0-r*cos(t);
draw = function() {
    // background color
    background(88, 160, 209);
    // grass color
    fill(53, 171, 57);
    noStroke();
    rect(0,295,400,400);
    image(getImage("avatars/mr-pants-with-hat"), x, y, 60, 90);
    t=t+1;
    //r=r+0.5;
    x=x0+r*sin(t);
    y=y0-r*cos(t);
     if (x>400 | y>400 | x<1 | y<1) {
         t=0;
         r=100;
     }
};
```



CREATE YOUR OWN ANIMATION

CONGRATULATIONS
YOUNG BMS PROGRAMMERS

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