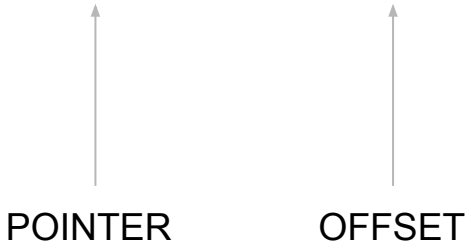
Arrays

What are arrays?

Arrays are a LIST of variables!

```
int number[] = {1, 2, 3, 4, 5, 6};
```

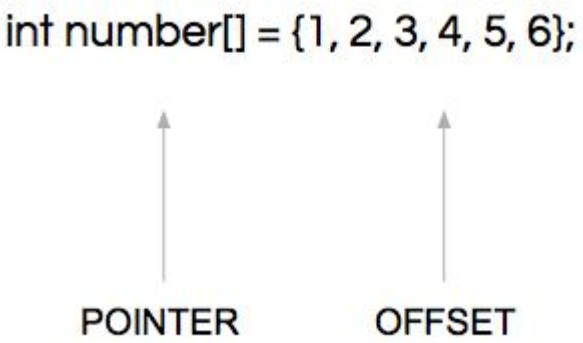


Why use them?

MEMORY MANAGEMENT!

EASE OF USE!

BECAUSE I SAID SO!



Arrays are extremely useful for memory management within your programs. Arrays use **adjacent** memory storage, which makes accessing variables quite cost efficient. This is referred to as a **pointer/offset** structure.

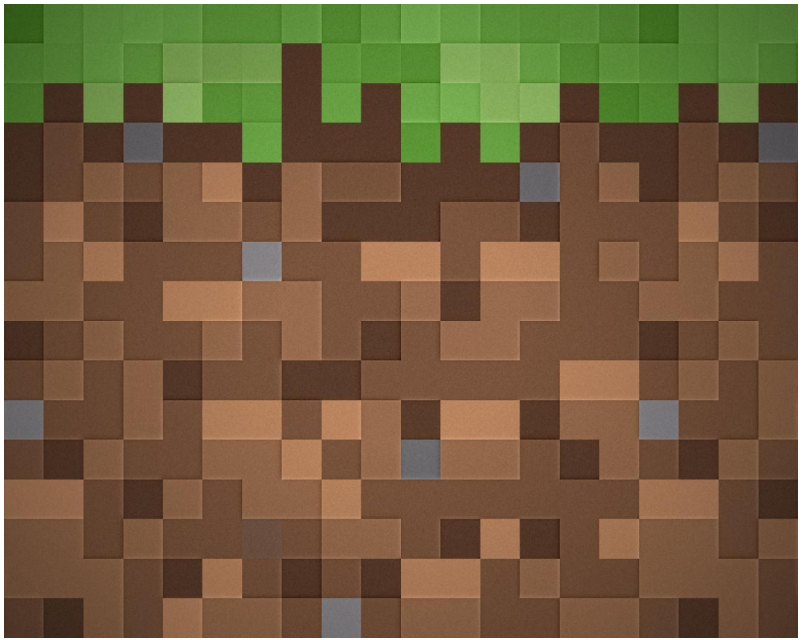
What do they look like?

int[] numbers = { 90, 150, 30 }; - Processing

var shoppingList: [String] = ["Eggs", "Milk"] - Swift

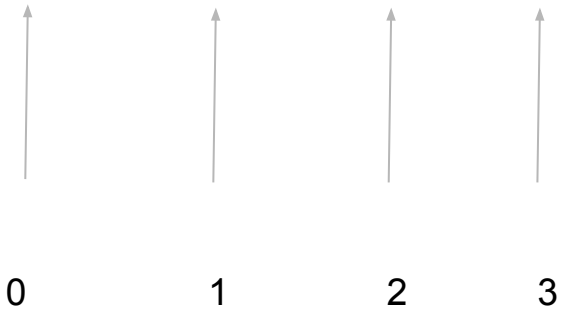
var cars = ["Saab", "Volvo", "BMW"]; - JS

Images are arrays of colors!



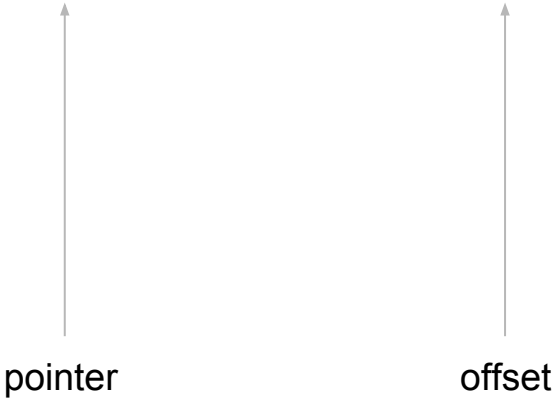
Indexes

Int[] num = {1, 2, 3, 4}



Pointer/Offset

```
int num[] = {1,2,3,4,5,6}
```



Accessing array data individually

Int[] num = {1, 2, 3, 4}

num[0] = 1

num[1] = 2

num[2] = 3

num[3] = 4

There’s a better way!

FOR LOOPS!

For Loop

Loops execute a particular line or lines of code a set amount of times.

This is super helpful because it means you don’t have to type the same line of code over and over again.

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Structure of a for loop

```
for (int i = 0; i < 5; i++) {
    //code block to be executed
print(i)
}
```

Statement 1 is executed before the loop (the code block) starts.

Statement 2 defines the condition for running the loop (the code block).

Statement 3 is executed each time after the loop (the code block) has been executed.

EXAMPLE!!!!!

```
void setup(){

  for (int i = 0; i < 5; i++){

    println(i + " is the current value");

  }

}
```

See how easy that was. Now you never have to type out 0-4 ever again!

Iterating through array data with a for loop!

```
int num[] {1,2,3,4};

for (int i = 0; i < num.length; i++){

//do something

}
```

For as long as the value of i (currently 0) is LESS than the length of the array (4, because we have 4 pieces of data in it), i will increment and perform the code in the {} each time.

Do something!

```
int num[] = {1, 2, 3, 4};

void setup() {

  for (int i = 0; i < num.length; i++) {

    println(num[i]  + " is the current value");

  }

}
```

This prints out each number in the array to the console, fun!

Appending Arrays!

How do you add to an existing array programmatically?

```
int num[] = {1, 2, 3, 4};

int num2[] = append(num, 5);

void setup() {

  for (int i = 0; i < num2.length; i++) {

    println(num2[i] + " is the current value");

  }

}
```

Cool things

https://gist.github.com/whoisbma/8fd99f3679d8246e74a22b20bfa606ee - Raycasting in p5JS using 2D Arrays

https://gist.github.com/whoisbma/fa995387326813931eab - Processing Pac-Man!

HOMEWORK

TWO THINGS!

Use FOR LOOPS and ARRAYS to create some crazy visual patterns and displays.

Bonus points: Incorporate a 2D array into your homework.

Preparation for tomorrow

http://natureofcode.com/book/chapter-1-vectors/

Math help:

https://www.khanacademy.org/science/physics/one-dimensional-motion/displacement-velocity-time/v/introduction-to-vectors-and-scalars

https://www.khanacademy.org/science/physics/two-dimensional-motion/two-dimensional-projectile-mot/a/what-are-velocity-components

https://www.khanacademy.org/math/geometry/right-triangles-topic/intro-to-the-trig-ratios-geo/v/basic-trigonometry