Arrays & For Loops
Agenda

Variables v.s. arrays

Introduction of arrays

Introduction of for loops

Text Adventure Presentation
Variables
Arrays
Arrays

First
box[0]

box[1]

box[2]

box[3]

Last
WHY USE ARRAYS?
// Arrays are extremely efficient in utilizing computer memory because they use adjacent memory storage making it easy to access variables

Variable

1

Array

1 6 4 5 3 2
What do they look like in code? 

```java
int[] numbers = {90, 150, 30};

String[] names = {
    "Leah", "Nathan", "Ray", "Youchun", "Philipp", "Jakie", "Archit"
};
```
```java
int[] num = new int[6];
```

INDEXES

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

num[0] = 1;
num[1] = 2;
num[3] = ?;
value

position (index)
Hello!

value

position (index)
Example of arrays

- Images are arrays of colors
- Animations (GIFs)
FOR LOOPS

What is a for loop?
Book analogy

- Find a book with numbered pages.

- Pick a starting page number and an ending page number.

- Ask student suggestion for an increment value.

- Turn the pages of the book as the increment value and perform a task on landing on a page. Eg. Draw a circle on that page.
A loop that executes a particular line or lines of code a set number of times. Extremely useful to iterate.
Structure of a for loop

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

**Statement 1** Declare a variable to keep track of how many times the loop executes.
**Statement 2** Defines the number of times the loop executes.
**Statement 3** Iterate the variable so the loop does not execute infinitely.
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!
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!
Array Functions and Operations
Appending Arrays

How do you add to an existing array programmatically?

```java
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 PROJECTS

https://gist.github.com/whosisbma/8fd99f3679d8246e74a22b20bf8606ee
// Raycasting in p5.js using 2D Arrays by Bryan Ma
https://gist.github.com/whosisbma/fa995387326813931eab
// Processing Pac-Man by Bryan Ma
HOMEWORK

Create patterns using arrays and for loops

- Try incorporate a 2D array into your homework
Resource

What is an array? - Daniel Shiffman

Declare, Initialize, and Use Array in Processing - Daniel Shiffman

Prepare for tomorrow - vectors and physics:

Intro to vectors & scalars

What are velocity components?

Intro to the trigonometric ratios