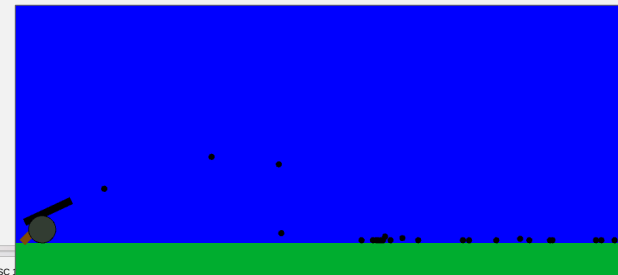


## More of the Same (Arrays)

## Arrays

When do you need arrays?

- you have multiple things which are drawn and animated in the same way, and
- no predictable relationship between animated values
  - each thing needs its own set of animation variables



## The Idea of Array Variables

a single bouncing ball

```
float y;
float yspeed;
```

y yspeed



two bouncing balls – each need their own y and yspeed

```
float y1, y2;
float yspeed1, yspeed2;
```

y1 yspeed1 y2 yspeed2

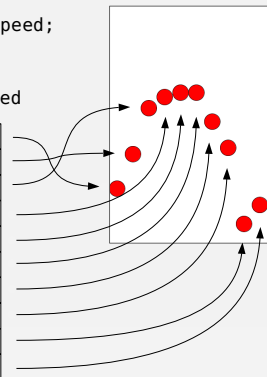


a row of bouncing balls – each need their own y and yspeed

```
float[] y;
float[] yspeed;
```

y yspeed

0  
1  
2  
3  
4  
5  
6  
7  
8  
9



## Working With Array Variables

- declare – specify name, base type, and that this is an array variable
 

```
float[] y;
```
- initialize the array variable
  - create the array – specify the number of compartments
 

```
y = new float[10];
```
- initialize each compartment
  - do whatever you'd do for one thing, wrapped in a loop to go through each compartment

```
for ( int i = 0 ; i < y.length ; i = i+1 ) {
    y[i] = ...;
}
```

common patterns

```
initialize all compartments to the same value    y[i] = 0;
initialize all compartments to random values    y[i] = random(low,high);
initialize all compartments to different values but with a predictable pattern → additional loop variable(s)
```

## Working With Array Variables

- use – do whatever you'd do for one thing, wrapped in a loop to go through each compartment

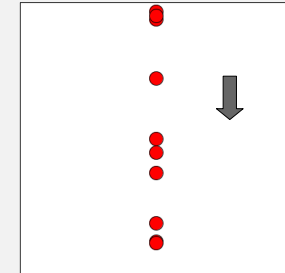
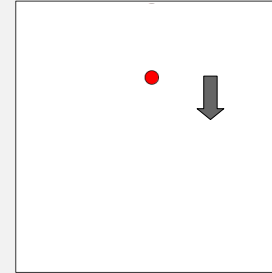
```
for ( int i = 0 ; i < y.length ; i = i+1 ) {
  fill(255,0,0);
  ellipse(width/2,y[i],20,20);
}
```

- update – do whatever you'd do to update one thing, wrapped in a loop to go through each compartment

```
for ( int i = 0 ; i < y.length ; i = i+1 ) {
  y[i] = y[i]+1;
}
```

## Array-ifying a Sketch

- start with a single element
  - circle with random y coordinate, moving down
- convert single animation variables to array variables



## Array-ifying a Sketch

each ellipse may have a different, unrelated y coordinate so this animation variable becomes an array variable

<code>float y;</code>	→	<code>float[] y;</code>
<code>void setup () {   size(400,400); }</code>		<code>void setup () {   size(400,400); }</code>
<code>y = random(0,height);</code>	→	<code>y = new float[10]; for ( int i = 0 ; i &lt; y.length ;   i = i+1 ) {   y[i] = random(0,height); }</code>
<code>void draw () {   background(255);    fill(255,0,0);   ellipse(width/2,y,20,20);    y = y+1; }</code>	→	<code>void draw () {   background(255);    for ( int i = 0 ; i &lt; y.length ;     i = i+1 ) {     fill(255,0,0);     ellipse(width/2,y[i],20,20);   }    for ( int i = 0 ; i &lt; y.length ;     i = i+1 ) {     y[i] = y[i]+1;   } }</code>

drawing and animating that were done for the one thing are now repeated for each of the things, using the information from the corresponding compartment of the array