Loops & Conditionals

For loop

```javascript
for (var i:int = 0; i < 20; i++) {
    // code here
}
```

While loop

```javascript
while (x == 3) {
    // code here
}
```

If statement

```javascript
if (x == 3) {
    // code here
} else if (x > 4) {
    // code here
} else {
    // code here
}
```
Java

Casting

```java
int x = 42;
double y = (double) x;
```

String equality

```java
String x = "hello";
String y = "hello";
if (x.equals(y)) {
    // ...
}
```

Constant

```java
public static final int x = 42;
```

Flash

Casting

```flash
var x:int = 42;
var y:Number = x as int;
```

String equality

```flash
var x:String = "hello";
var y:String = "hello";
if (x == y) {
    // ...
}
```

Constant

```flash
public static const x:int = 42;
```
Java

Casting
```
int x = 42;
double y = (double) x;
```

String equality
```
String x = "hello";
String y = "hello";
if (x.equals(y)) {
    // ...
}
```

Constant
```
public static final int x = 42;
```

Any others?

Flash

Casting
```
var x:int = 42;
var y:Number = x as int;
```

String equality
```
var x:String = "hello";
var y:String = "hello";
if (x == y) {
    // ...
}
```

Constant
```
public static const x:int = 42;
```
- Sprites are our main graphical building block.

- We can create a new empty Sprite:

  ```javascript
  import flash.display.Sprite;
  ...
  var mySprite:Sprite = new Sprite();
  ```

- We can write classes that extend Sprite. Useful because we get a Graphics object for each Sprite.
## Sprite

<table>
<thead>
<tr>
<th>AS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sprite.graphics;</td>
<td>Graphics object used to draw on the Sprite.</td>
</tr>
<tr>
<td>sprite.x; sprite.y;</td>
<td>The (x, y) coordinates of the Sprite. You can change these to move the Sprite.</td>
</tr>
<tr>
<td>sprite.width; sprite.height;</td>
<td>Width and height of the Sprite.</td>
</tr>
<tr>
<td>sprite.addChild(child);</td>
<td>Used to add other Sprites onto the Sprite.</td>
</tr>
<tr>
<td>sprite.stage;</td>
<td>A reference to the “stage” for the Flash movie.</td>
</tr>
<tr>
<td>sprite.visible;</td>
<td>Boolean that determines whether Sprite is visible or not.</td>
</tr>
<tr>
<td>sprite.rotation</td>
<td>Angle of rotation in degrees. Default is 0.</td>
</tr>
<tr>
<td>sprite.alpha</td>
<td>Value between 0 and 1 which indicates how transparent the sprite is.</td>
</tr>
</tbody>
</table>

MyProgram
MyProgram

truck
addChild(truck);
MyProgram

truck
Confusing subtlety: Graphics draws shapes relative to the (x, y) position of the Sprite it’s attached to.
Stage

- The main container for everything, even the document class Sprite.
- All Sprites have a reference to the stage for the movie.
- Holds information about the movie:

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>stage.stageWidth;</td>
<td>Overall width and height of movie.</td>
</tr>
<tr>
<td>stage.stageHeight;</td>
<td></td>
</tr>
<tr>
<td>stage.mouseX;</td>
<td>Mouse (x, y) coordinates.</td>
</tr>
<tr>
<td>stage.mouseY;</td>
<td></td>
</tr>
</tbody>
</table>

http://livedocs.adobe.com/flash/9.0/ActionScriptLangRefV3_flash/display/Stage.html
Animation
An animation consists of a series of frames.

Each frame is displayed on the screen for a short time (~50 times per second).

Creates the illusion of movement.
package {
    import flash.display.Sprite;
    import flash.events.Event;

    public class MyAnimatedProgram extends Sprite {
        public function MyAnimatedProgram():void {
            // setup code
           .addEventListener(Event.ENTER_FRAME, onEnterFrame);
        }

        private function onEnterFrame(e:Event):void {
            // this code runs multiple times a second
        }
    }
}
<table>
<thead>
<tr>
<th>AS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math.abs(value);</td>
<td>Returns absolute value of passed in value.</td>
</tr>
<tr>
<td>Math.sin(value); Math.cos(value); Math.tan(value);</td>
<td>Returns sin/cos/tan of value (radians).</td>
</tr>
<tr>
<td>Math.atan2(value); Math.atan2(y, x);</td>
<td>Arctangent functions.</td>
</tr>
<tr>
<td>Math.log(value);</td>
<td>Returns the natural log of value.</td>
</tr>
<tr>
<td>Math.max(value1, value2); Math.min(value1, value2);</td>
<td>Returns the max/min of the two values.</td>
</tr>
<tr>
<td>Math.pow(value1, value2); Math.sqrt(value);</td>
<td>Power and square root functions.</td>
</tr>
<tr>
<td>Math.round(value);</td>
<td>Returns rounded value.</td>
</tr>
<tr>
<td>Math.random();</td>
<td>Returns a pseudorandom number between 0 and 1.</td>
</tr>
<tr>
<td>Math.PI, Math.E</td>
<td>Constants for π and e.</td>
</tr>
</tbody>
</table>

Mouse interaction

- We have access to the current (x, y) position of the mouse. We can set a Sprite’s position to those coordinates to make it follow the mouse.

- This interaction doesn’t have a lot of “pop” to it. Can we make the motion “springy” or “bouncy”?

- Instead of snapping the Sprite to the (x, y) position of the mouse every frame, we can apply a force to the Sprite in the direction of the mouse.

- To give the motion a springy effect, the force we apply every frame can be proportional to the distance from the Sprite to the mouse. A large distance means a larger force is applied that frame; a smaller distance means a smaller force.
Mouse interaction

Springy Mouse Follow
Mouse interaction
Springy Mouse Follow
Mouse interaction

Springy Mouse Follow
Mouse interaction
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Mouse interaction

Springy Mouse Follow

1. Calculate the x and y components of the displacement vector from the Sprite to the mouse.

2. Calculate the magnitude and angle of the displacement vector from $dx$ and $dy$.

3. Calculate a force value based on the displacement magnitude.

4. Split the force into x and y components and add them to the x and y velocity components of the Sprite.

You may remember from physics class that $F = ma$. But we don’t really care about mass, so to simplify things we’re just doing $F = a$. 

Next week!

- Mouse clicks, key presses
- Displaying text to the screen
- Simple game programming