Creating Sprites

Sprites

First, we need to know how to add things to the world, so they appear on the screen.

In JavaScript, you create new things using the `new` keyword, followed by the kind of thing you want to make (such as `World`, `Sprite`, or `Text`).

We can add images to the World by creating `Sprites`. A Sprite is an image on the screen, which we can move about, rotate, flip, scale, make transparent, and so on. Let's make our first sprite.

- Add this code, after the block which makes the World.

```
var poop = new Sprite
poop.costume = '💩'
```

Save. Have a look at Chrome—now there should be a tiny poop in the middle of the screen!

We use the `var` keyword so we have a name to refer to our Sprite with.

As before, we can set object attributes using "dot notation", and giving it the new value.

Here are some kinds of values: *(These are just examples, don't type them in!)*

- **Challenge**: Set the `scale` attribute of your sprite to make it twice as big. (The scale is a number, starting at `1.0`).

> Remember that you have to include the name of your Sprite, so it should be `poop.scale` rather than `scale`. It won't work to write `scale` by itself, since the computer won't know which sprite you're talking about.

When we make a sprite, we get to specify its initial values. We can change any of them later, too (more on that in the next chapter).

Here are some other properties you can try:

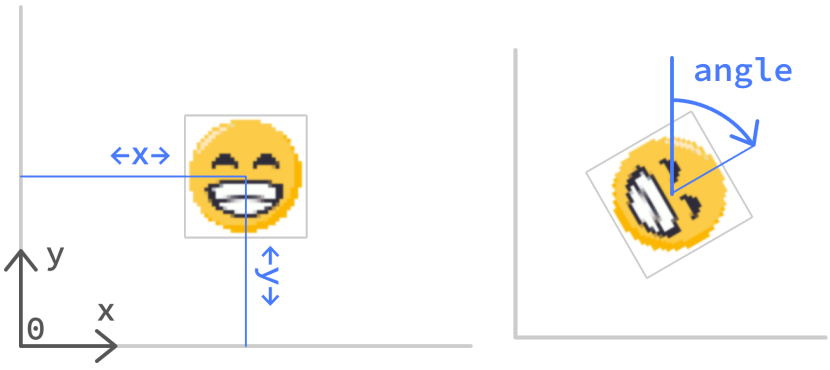
- `opacity` (a number between 0 and 1, starting at `1.0`)
- `angle` (a number, in degrees, starting at `0`)
- `flipped` (a boolean, initially `false`)

Coordinates

Let's move our sprite about. We can do this using the attributes `poop.posX` and `poop.posY`.

These are the co-ordinates of the center of the sprite, starting from the bottom-left corner of the screen.

Here's a quick diagram introducing coordinates:



- Move your poop to the position `(100, 200)`.

```
poop.posX = 100
poop.posY = 200
```

We can add other Sprites, too!

- Add a second sprite, called `cow`.

```
var cow = new Sprite
cow.costume = '🐄'
```

Edges

We just used the `.posX` and `.posY` attributes to set the **center** of the sprite.

We can also set the **edges** of the sprite, using the attributes `.top`, `.bottom`, `.left`, and `.right`.

- Move the cow to touch the left side of the screen.

```
cow.left = 0
```

- Move the poop to be to the right of the cow.

```
~~poop.posY = 100~~
```

Delete this line.

```
poop.left = cow.right
```

*Add this line. Make sure it's after **both** of the `poop` and `cow` variables have been created.*

Notice that you can't use the name of a Sprite before you create it. If you write `cow` in your program above the `var cow = new Sprite` line, it won't work.

- Now move the cow.

```
cow.left = 200
```

Add this line at the bottom of your program.

Notice that the poop doesn't move, even though we've moved the cow. This is important: when you set an attribute using `=`, it only happens once.

Randomness

Let's introduce some uncertainty into our creation.

We can use `uw.randomInt(1, 10)` to pick a random number between `1` and `10`. (This is just like `pick random _ to _` from Scratch.)

- Move your poop to a random `posX` position.

```
poop.posX = uw.randomInt(0, world.width)
```

- **Challenge:** Move your poop to a random `posY` position.

Refresh the page. Every time you refresh, the position of the poop should change!

Now try copy/pasting the code for the poop, to make a couple more random ones.

- Make two more poops.

Text

We've seen how to do images; now let's add some text to the screen.

When someone starts programming, it's traditional to for them to introduce themselves by saying "Hello world!". Let's do that now.

- Create a `Text` object.

```
var label = new Text
label.text = "Hello world!"
```

- Change it to red.

```
label.fill = 'red'
```

The End

Good job! Now you know how to:

- Make JavaScript objects with the **`new` keyword**
- Use **`var` to name them**, so you can refer to them later
- **Set their attributes**, using dot notation and `=`
- Create `Sprites` and `Text`
- Set the **position** of objects inside the world
- How to **pick random numbers** using `uw.randomInt`

Let's continue on to chapter two!