Smithsonian
Science Education Center

A Weighty Problem
Student Scratch Guide

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Welcome!

Tell Your Story About A Weighty Problem
You've had a chance to investigate mixing water and drink powder in class to see how their combined weight is affected. Now we'd like you to explain what you've learned by telling a story in a program called Scratch.

We started to make a program you can use to tell your story. In our story, a bunny and some of his friends are hiking through the forest. The bunny's backpack is too heavy. The bunny wonders if mixing their water and drink powder together might lighten the load. You can use the weight data you recorded in class and the forest characters to tell your story.

Your teacher will show you an example of what an animation could look like. Here is a project to get you started.
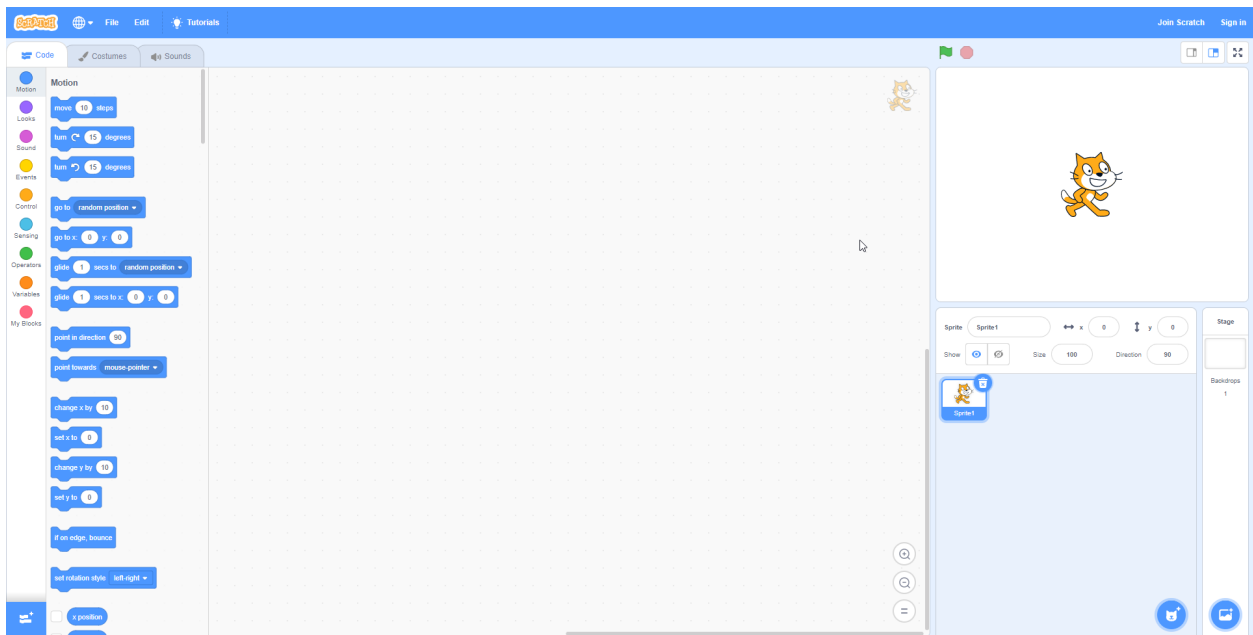
- https://scratch.mit.edu/projects/787796199/
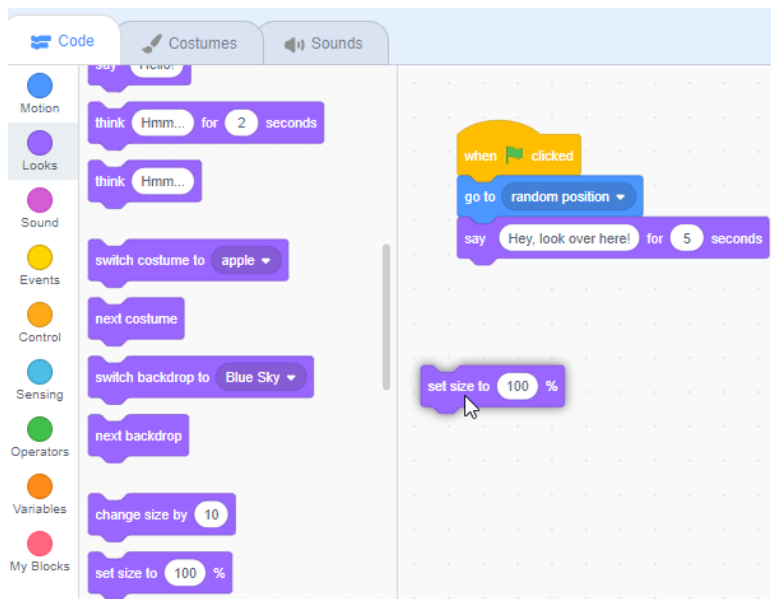
Learning the Basics

If you're new to Scratch, there are a few basic things to know.

Scratch Code Editor
Scratch uses lego-style code blocks and sprites to create animations, video games, and more!


The empty white canvas above is where code blocks are placed. You can drag and drop code blocks from the left hand "Code" menu into your canvas to begin telling your story.
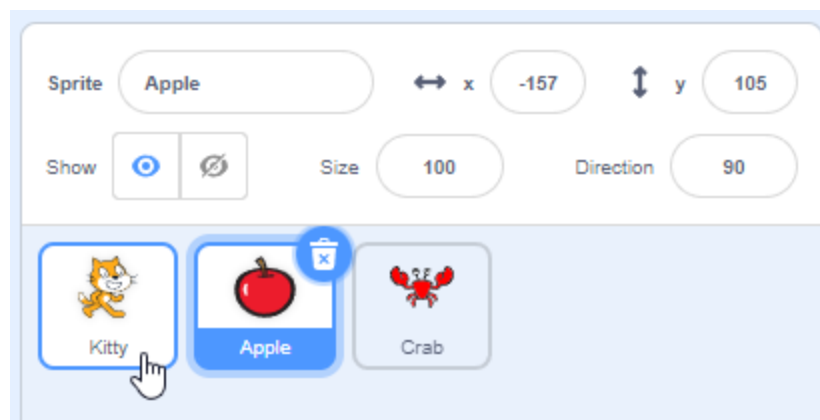
The Viewport
On the right-hand side of the editor, you will see your animation. This window is your "stage"- where the sprites you add will act out your story based on the blocks you choose. Above the viewport is a green flag icon and a red stop icon.
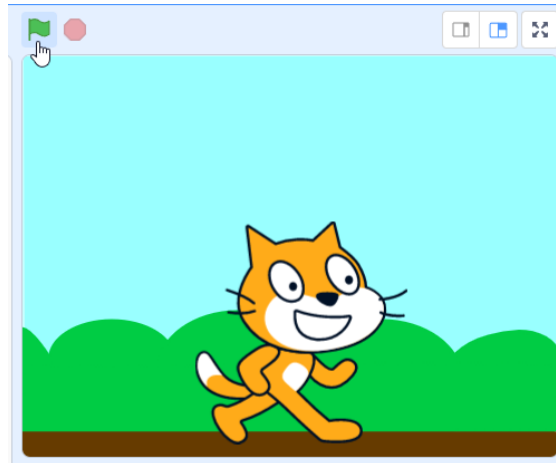
Clicking on the green flag icon will begin executing your code from the very beginning. At any time, you can stop your program by clicking the stop icon.

Sprite Selection
You can add code blocks to different characters and objects by choosing their "sprite." Below your viewport is a list of sprites in your project. Selecting a sprite will swap your canvas to show the code attached to that sprite.


XY Coordinates
With Scratch, sprites are positioned on to the viewport using an X/Y coordinate system. If you've never heard of X/Y coordinates, you can think of it this way:
- The starting spot, or origin, is the center of the viewport.
- The X value tells the sprite how far left or right to go.
- The Y value tells the sprite how far up or down to go.

The good news is you can click and drag sprites around the stage, and **this will automatically update the X and Y value** in the X/Y circles under the stage. Then you can enter these values in your code.
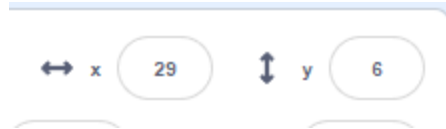

Be Creative!

Scratch makes it easy to unleash your creativity. So feel free to try new things and tell the story your own way! To help you out, we've included some hints and instructions below for how to bring your animation to life.

Change Characters Entirely

Don't like the bunny? No problem! You've got 3 other characters to choose from using the *Looks > Switch costume to x* block. If you, for example, wish to change the Main Actor sprite into the Turtle, change all the *Switch costume to BUNNY STAND* blocks to *Switch costume to TURTLE STAND*. And don't forget about the other poses!
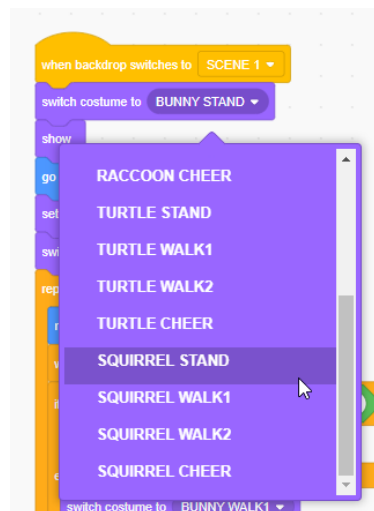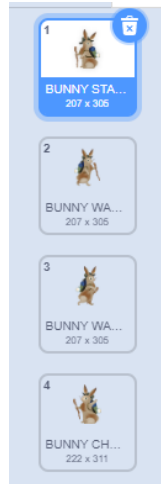

The characters you can choose from are the Bunny, Turtle, Raccoon, and Squirrel.
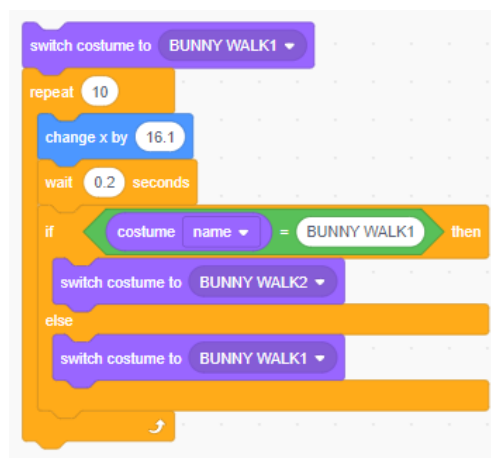
Make the Character Move

Your character needs to move across the screen at least once.

On the "Main Actor" sprite, you'll see the bunny has 16 costumes - 4 sets of different animals with each costume showing a different pose. One standing, two walking, and one cheering pose.

For the bunny to walk, we must move our bunny forward, and swap between two costumes to make it look like the bunny is taking steps.

Take a look at the blocks in "Scene 1" to see how this works, and try to replicate it on Scene 2 and the Final Scene!


Take a look at this code in Scene 1

Make the Character Speak
We want your character to tell the story of your research.
- Introduce the problem in Scene 1
- Explain the investigation in Scene 2
- Share what you learned and have some fun in the Final Scene

We can do this by making the character say things!

Keep an eye out for the "say" block. You can change the words you see and even add in more say blocks if you want to have your character say more things!
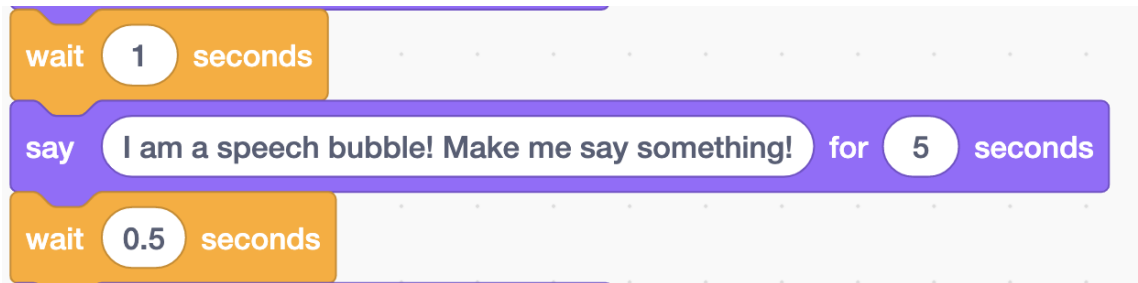
Add Props to the Scene

You can decorate your scenes with camping props! You'll notice a "Prop" sprite, and within the sprite are a number of costumes to choose from.

Now to add a new prop sprite, you'll have to follow a few steps:

To make them appear, start with an *Events > When backdrop switches to x* block, with x being the scene you'd like the sprite to appear on.

Then, add a *Looks > Show* block to this event, and drag the sprite where you want it to appear. If you want the sprite to appear on the next scene, you can simply stop here, but if there's a scene you do not want the sprite to appear on, make sure to add another *Events > When backdrop switches to x* block, set the proper scene, and add a *Looks > Hide* block.

Here's an example of how this might look in the code editor:
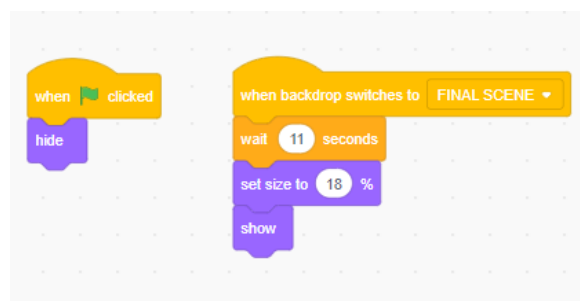
Changing the Weights Shown on the Graph

You need to change the weights shown on the bar graph to match the data from your investigation. Here's a hint - take a look at the code for the Main Actor sprite. Can you find any blocks where you could change the Water, Powder, and Combined Mixture weights?

Changing the Weights Shown on the Scale

You also need to change the weights displayed on the scale to match the weights of your in-class experiment. Here's another hint - you should see a sprite called "Scale

Label." You can change the weights using this sprite, but not in the code editor. Can you think of somewhere else you should check?

Extra Tips and Tricks

Cloning
Did you know you can clone sprites? This could be really helpful on the final scene if you wanted to add more props. You can quickly clone the Prop sprite by right clicking and pressing "Duplicate."
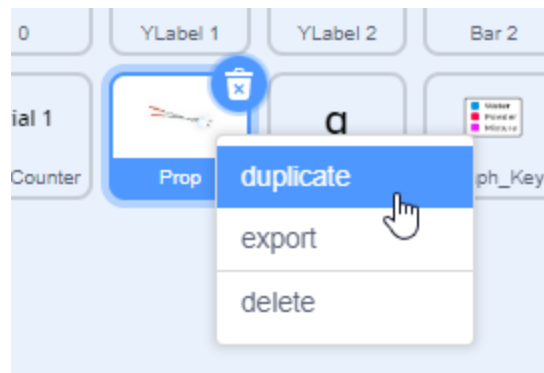

This will copy over the code and costumes available on the original prop sprite!

Copy/Paste
Scratch allows you to copy and paste code blocks, so by using CTRL + C and CTRL + V, you can quickly use your animation elsewhere on the same sprite. This will let you experiment without losing your progress!

Show Block
Did you add a character or prop to your scene in the code editor, but don't see it when you start your animation? You might be missing the "Show" block. Every character or prop needs this block - otherwise it won't appear!
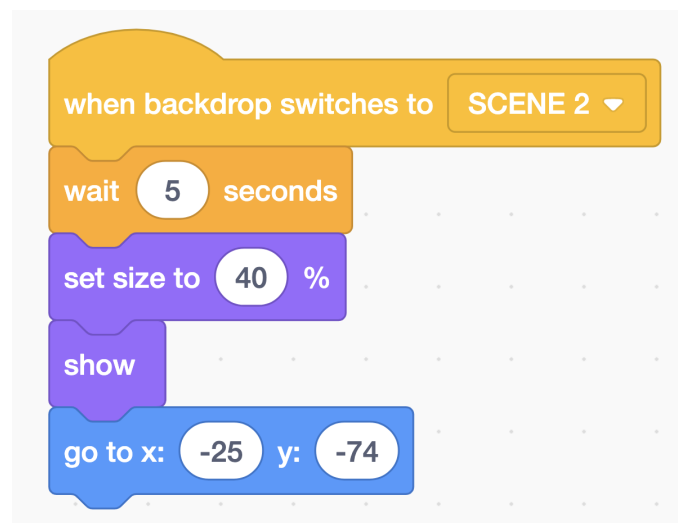
Fixing Costume Positions

If you change the value of the scale label, and find that it's overlapping the weight unit symbol or isn't positioned correctly, you can go to the Costumes menu, and using the cursor tool, move the text to the left or right to correct it.

Tell Your Story!

We hope you enjoy using our Scratch project to tell your story of A Weighty Problem! If you have any questions as you work, ask your peers and teacher for help. Remember to be creative and have fun with your story!