Computational Thinking

Science Scratch Activities and Lessons

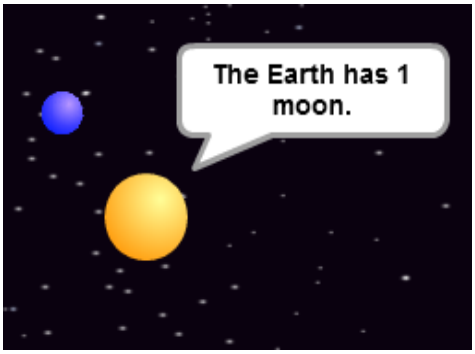
Grades 3—5

Judy Rocke

rockejudy@gmail.com

Science Grades: 3, 4, & 5

1. How Many Moons



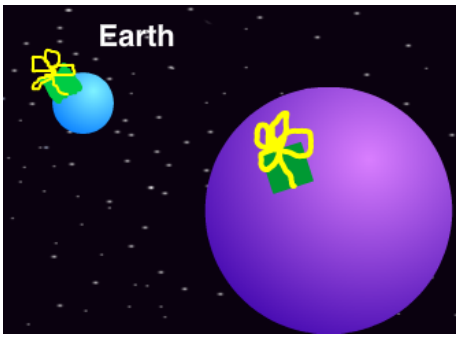
Summary: Students use information from a table to create a project using clones, which show the number of moons each planet in our solar system and Pluto has. They use this information to determine whether or not they agree with the State of Illinois' decision to make March 13, 2006, Pluto Day. Students also write about different points of view.

Link for Teacher: https://scratch.mit.edu/projects/121309675/

Link for Students: https://scratch.mit.edu/projects/121329200/

Lesson: p. 4 Click here

2. Mass and Weight



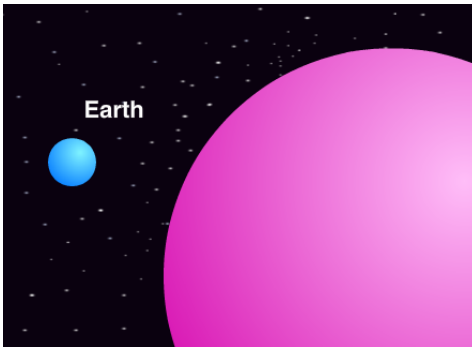
Summary: Students use information from a table to create a project which asks how much a package weighs on Earth. The project uses that information to tell how much that same package would weigh on the other planets in our solar system, the moon, and Pluto.

Link for Teacher: https://scratch.mit.edu/projects/120443573/#editor

Link for Students: https://scratch.mit.edu/projects/121422421/#editor

Lesson: p. 10 Click here

3. Pluto — Planet or Dwarf Planet?



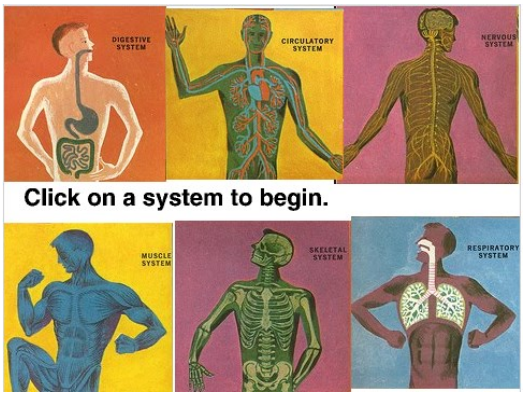
Summary: Students compare Earth's size to other planets in our solar system, the size of the moon, and the size of Pluto. Based on the sizes, they determine whether or not they agree with the 2006 decision to reclassify Pluto from a planet to a dwarf planet.

Link for Teacher: https://scratch.mit.edu/projects/120400979/#editor

Link for Students: https://scratch.mit.edu/projects/120490962/#editor

Lesson: Click here

4. Human Body Systems



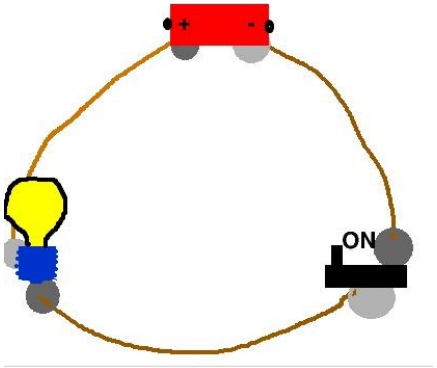
Summary: Students write 2 true statements and 1 false statement about each body system. When a system is clicked, their three statements will appear for the system selected. The user must pick the false statement.

Link for Teacher: **https://scratch.mit.edu/projects/188233814**

Link for Students: https://scratch.mit.edu/projects/213384583

Lesson: No lesson at this time, but directions are given in the Student link under Seep Project Page.

5. Complete the Circuit



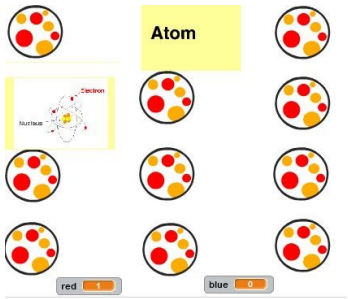
Summary: Students decide if they should use ***and*** statements or, ***or*** statements in a script, which also uses variables, to complete a simple circuit. If the light, battery, and switch are positioned correctly, the light "lights up" as shown here. If they are not in the correct position, the light bulb does not light.

Link for Teacher: https://scratch.mit.edu/projects/163382427

Link for Students: https://scratch.mit.edu/projects/163440427

Lesson: **Click here**

6. Match Game

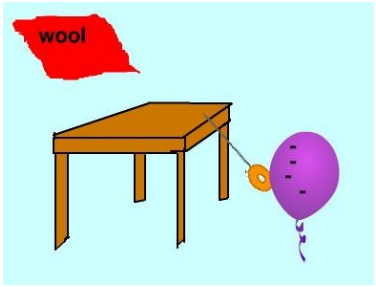


Summary: Students complete a match game using a partial script. The game can be used as review for vocabulary. In this example, the student called "red" found a match. Notice red's score is 1 and blue's score is still 0. Red found a match: the picture of an atom matches the word atom.

Link https://scratch.mit.edu/projects/163523233

Lesson: **Click here**

7. Static Electricity



Summary: Students need to understand what causes static electricity before they can fully understand circuits. In this activity student add their voice recordings to explain what happens in the demonstration.

Link for Teacher: https://scratch.mit.edu/projects/163512292

Link for Students: https://scratch.mit.edu/projects/163493649

Extra Link Balloon and Hair: **https://scratch.mit.edu/projects/163457298**

Lesson: **Click here** **p. 24**

Title: How Many Moons?

Summary: Students use information from a table to create a project using clones, which show the number of moons each planet in our solar system and Pluto has. They use this information to determine whether or not they agree with the State of Illinois' decision to make March 13, 2006, Pluto Day. Students also write about different points of view.

Common Core:

- (RI.4.7) Interpret information presented visually, orally, or quantitatively (e.g. in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- (RL.4.6 CCR Anchor Standard 6) Assess how point of view or purpose shapes the content and style of a text.
- (RI.4.8) Explain how an author uses reasons and evidence to support particular points in a text.
- (W.4.1) Write opinion pieces on topics of texts, supporting a point of view with reasons and information.

Programming Skills with Scratch:

- Create and use clones
- Use a go to x, y block
- Use a repeat block
- Use a pick random _ to _ block

Link for Teacher: https://scratch.mit.edu/projects/121309675/

Link for Students: https://scratch.mit.edu/projects/121329200/

Introduction:

Give examples of statements that have different points of view.

- You might use the statement, "The school day should be lengthened."
- Ask would teachers, parents, and students all have the same or different points of view on this statement?

Activity:

1. Read and discuss with students Victoria Jaggard's National Geographic News article dated March 11, 2009. (*Pluto a Planet Again — On Friday the 13th, in Illinois).* P. 8 (worksheet*)*
2. Read and discuss the Illinois Senate Resolution found at: http://www.ilga.gov/legislation/96/SR/PDF/09600SR0046lv.pdf p. 9 (Worksheet)
3. To persuade someone, opinions should be based on facts. Ask what facts are in the Illinois Senate Resolution.
4. Ask students what they think the criteria for classifying a planet should be.
5. When students suggest that planets have one or more moons, open the **Link for Student**.
6. Explain that this is a partial project that they will complete. When completed it will show the number of moons each planet, including Pluto, has.
7. Be sure students know how to use a repeat block. P. 6—7 (Worksheet)
8. Be sure students understand clones and how they are used in this project.
9. When their project is complete, they will write a persuasive paragraph to the State of Illinois telling whether or not they agree with the Illinois Senate Resolution on Pluto Day.
10. Students will also write a paragraph telling whether or not they think that every state in the United States would have the same point of view as Illinois has about Pluto Day.

Extension:

1. Let students add audio to their project.
2. Give time for students to talk about and share their projects.

Name: _____

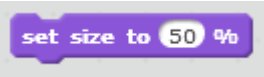
How Many Moons?

1. Open, remix, and save the partially completed **Link for students** at:

   https://scratch.mit.edu/projects/121329200/#editor

2. Notice how the repeat block for Earth has a 1 in the box. Why do you think it has a 1? What number will you use in this block for Mars? (Mars has two moons.)

3. Look at the script that starts with the block When I start as a clone. Explain what each of these blocks tells each clone to do when it starts.

- 

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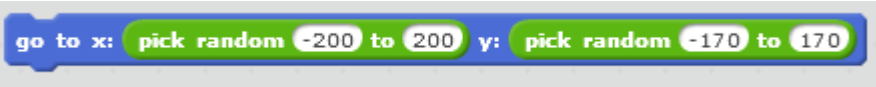
- 

4. Use this table to complete this project. When you are finished, the project should let the user choose any planet or Pluto in our solar system. It will tell how many moons that planet has and represent each of those moons with a clone. The clones will be many different colors.

5. **Save your project!**

	Number of Moons
Mercury	0
Venus	0
Earth	1
Mars	2
Jupiter	92
Saturn	83
Uranus	27
Neptune	14
Pluto	5

Facts to Support Your Opinion.

Write a paragraph about one of these two topics. You get to decide which one!

- Write a paragraph to the Sate of Illinois telling why you agree or disagree with the Illinois Senate Resolution about Pluto Day. Remember to use at least one fact to persuade the State of Illinois.

- Write a paragraph telling whether or not you think that every state in the United States would have the same or different point of view as Illinois about Pluto Day. Remember to use at least one fact to support you opinion.

Pluto a Planet Again -- On Friday the 13th, in Illinois

Victoria Jaggard
National Geographic News

It took about three minutes for members of the Illinois state senate to make the unanimous vote: "that March 13, 2009, be declared 'Pluto Day' in the State of Illinois in honor of the date its discovery was announced in 1930."

Quietly adopted on February 26, the state resolution is meant to honor Pluto discoverer Clyde Tombaugh, who was born and raised in the farming village of Streator.

“This is one of those things that the village is very proud of," said Illinois State Senator Gary Dahl, who sponsored the resolution.

"I don't think we are changing the status of the planet. We're simply asking that March 13 be declared Pluto Day and that, for the day, Pluto is a planet."

National Pride

Despite these seemingly humble intentions, the bill has reignited heated debate over what exactly a planet is.

"Go, Illinois!" said planetary scientist Alan Stern, principle investigator for NASA's New Horizons mission to Pluto.

"I think it's wonderful, in the sense that, as an American, I'm proud that Clyde Tombaugh made one of the biggest finds in 20th-century astronomy."

Mike Brown, an astronomer at the California Institute of Technology, agreed that Tombaugh deserves accolades.

"I am amazed at what he did," Brown said.

Even with advanced computers and larger telescopes, "it took 77 years until we found something bigger than he did"—the distant object now called Eris, which Brown discovered in 2005.

Still, Brown calls the Illinois resolution "very silly," noting that such legislation can be dangerous to public understanding of science. "The impression that it gives is that there's still a vigorous scientific debate going on, and there's just not."

Senate Resolution

WHEREAS, Clyde Tombaugh, discoverer of the planet Pluto, was born on a farm near the Illinois community of Streator; and

WHEREAS, Dr. Tombaugh served as a researcher at the prestigious Lowell Observatory in Flagstaff, Arizona; and

WHEREAS, Dr. Tombaugh first detected the presence of Pluto in 1930; and

WHEREAS, Dr. Tombaugh is so far the only Illinoisan and only American to ever discover a planet; and

WHEREAS, For more than 75 years, Pluto was considered the ninth planet of the Solar System; and

WHEREAS, A spacecraft called New Horizons was launched in January 2006 to explore Pluto in the year 2015; and

WHEREAS, Pluto's average orbit is more that three billion miles from the sun; and

WHEREAS, Pluto was unfairly downgraded to a "dwarf" planet in a vote in which only 4 percent of the International Astronomical Union's 10,000 scientists participated; and

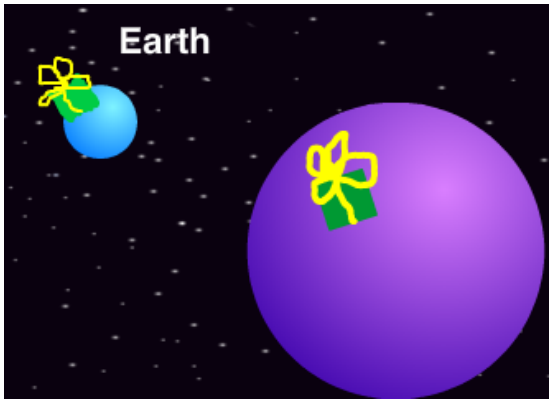
WHEREAS, Many respected astronomers believe Pluto's full planetary status should be restored; therefore, be it

RESOLVED, BY THE SENATE OF THE NINETY-SIXTH GENERAL ASSEMBLY OF THE STATE OF ILLINOIS, that Pluto passes overhead through Illinois' night skies, that it be reestablished with full planetary status, and that March 13, 2009, be declared "Pluto Day" in the State of Illinois in honor of the date its discovery was announced in 1930.

Find the Senate Resolution PDF at:

http://www.ilga.gov/legislation/96/SR/PDF/09600SR0046lv.pdf

Title: Mass and Weight



Summary: Students use information from a table to create a project which asks how much a package weighs on Earth. The project uses that information to tell how much that same package would weigh on the other planets in our solar system, the moon, and Pluto.

Common Core:

- (RI.4.7) Interpret information presented visually, orally, or quantitatively (e.g. in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Science Skills

- Compare and contrast mass and weight

Programming Skills with Scratch:

- Create, use, and set two variables. One called weight. One called planet.
- Use a multiplication block from the Operators category
- Use an if then block

Link for Teacher: https://scratch.mit.edu/projects/120443573/#editor

Link for Students: https://scratch.mit.edu/projects/121422421/#editor

Introduction:

1. Let students use a balance scale and a spring balance to measure the mass and weight of several objects.
2. Discuss mass and weight. The mass of an object is the same everywhere. It is the amount of matter in the object. Mass always equals your weight on Earth. Weight depends on gravity. With more gravity, an object weighs more. With less gravity, an object weighs less. With no gravity, their weight would be zero, but their mass would not change. More resources can be found at: http://chemistry.about.com/od/chemistryterminology/a/What-Is-The-Difference-Between-Mass-And-Weight.htm
3. Explain that on Earth if an object is not moving, its mass and weight will be the same. But that is not true on other planets. The mass does not change, but the weight will be different because each planet has a different gravitational pull.

Activity:

1. Open the **Link for Teachers.**
2. Show students how the project works. Be sure students understand what both variables, weight and planet, do in the scripts.
3. The package does not weigh the same amount on all planets because the gravitational pull of each planet differs. Large or dense planets have more gravitational pull than small or less dense planets. The mass of the package will stay the same on all planets.
4. Weight is determined by this formula: *weight = mass x gravitational pull.*
5. Notice this block for Mercury in the script. Mercury's gravitational pull is 0.378. To find the weight of the package on Mercury, multiply the mass (which is the same as its weight on Earth) by 0.378. Use the table to find the gravitational pull of other planets. This table was compiled by NASA. The complete table can be found at: http://nssdc.gsfc.nasa.gov/planetary/factsheet/planet_table_ratio.html

5. Be sure students know how to drop a multiplication block into a say block.
6. Have students open the **Link for Students**. Explain that this is a partially completed project. They will need to complete this project so that it tells the weight of any package on any planet in our solar system, the moon, or Pluto.
7. Students will compare mass and weight by completing a chart.

Extensions:

1. Allow students to "discover and name" some new planets. Ask them to make a table explaining the gravitational pull of each "newly discovered" planet. Allow them to add these "newly discovered" planets to their project.
2. Allow time for students to share and talk about their projects.

Name: _____

Mass or Weight?

1. Open, remix, and save the partially completed **Link for Students** at:

https://scratch.mit.edu/projects/121422421

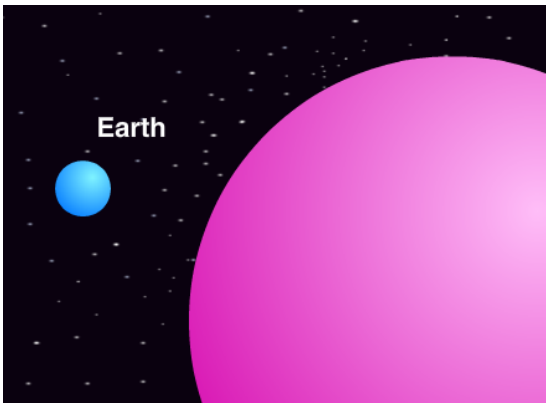
2. Use this table to complete the project.

	Gravitational Pull
Mercury	.378
Venus	.907
Mars	.377
Jupiter	2.36
Saturn	.916
Uranus	.889
Neptune	1.12
Pluto	.071
The Moon	.166

3. Compare mass and weight. Read each statement in the chart below. If the statement is true for mass, check the mass column. If the statement is true for weight, check the weight column.

	Mass	Weight
This can be zero if there is no gravitation pull on the object.		
This is measured using a spring balance.		
This is constant on all planets.		
This changes depending on gravity.		
This is measured using a balance scale.		
This cannot be zero.		

Title: Pluto — Planet or Dwarf Planet?



Summary: Students compare Earth's size to other planets in our solar system, the size of the moon, and the size of Pluto. Based on the sizes, they determine whether or not they agree with the 2006 decision to reclassify Pluto from a planet to a dwarf planet.

Common Core:

- (RI.4.7) Interpret information presented visually, orally, or quantitatively (e.g. in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
- (W.4.1) Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- (SL.4.5) Add audio recording and visual displays to presentations when appropriate to enhance the development of main ideas or themes.
- (4NBT.A.2) Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Programming Skills with Scratch:

- Create and use a list to hold values
- Use items from a list to set sizes of a sprite
- Use an answer and wait block
- Use an if then block
- Drop blocks from Operators category into another block
- Add audio recording to project

Link for Teacher: https://scratch.mit.edu/projects/120400979/

Link for Students: https://scratch.mit.edu/projects/120490962/

Introduction:

1. Give examples of various facts and opinions. Ask what makes a fact different than an opinion.
2. Ask if just because something is believed for a long period of time, is that enough to make it true? In previous centuries people believed that the earth was flat. Can you think of other things that you thought were true, but were later proven to be untrue?

Activity:

1. Discuss how Pluto was first identified and discuss the issues that have caused it to be reclassified to a dwarf planet instead of a planet.
2. Give students copies of the charts that list diameters of planets and the size that planets would be if Earth were size 100. Tell students this information came from NASA. These ratios are found at: http://nssdc.gsfc.nasa.gov/planetary/factsheet/planet_table_ratio.html
3. Discuss how sometimes people learn better by seeing things, not just by studying charts.
4. Show students the **Link for Teachers** above. Click the green flag and input a few planets. Talk about how this project shows the same information as the chart in a more visual way. Explain that students will create their own projects that include information for all the planets, the moon, and Pluto.
5. Tell students that after their projects are complete, they will write a paragraph explaining if they agree or disagree with the decision to reclassify Pluto. They will have to include at least one fact, not just opinions in their paragraph.
6. Be sure students know how to record their voices in Scratch.
7. Be sure students know how to drop blocks into other blocks.
8. Be sure students know how to input items into a list. (Do not put commas in a list. This is only important when students enter Jupiter's information. Its size is 1,121 when compared to Earth. Student should enter 1121 not 1,121 into the list.)
9. Be sure students can understand and use an if then block

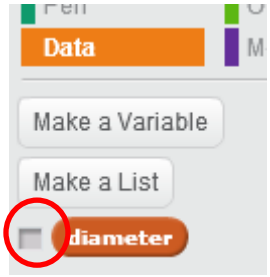
Extension:

1. Encourage students to change the color of each object as it appears on stage.
2. Give time for students to talk about and share their projects.

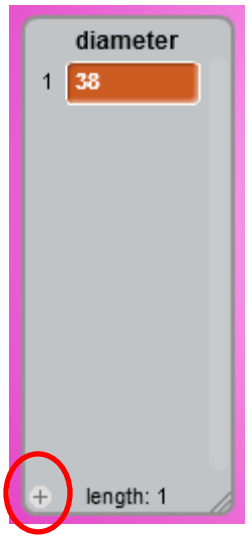
Name: _____

Pluto — Planet or Dwarf Planet?

1. Open, remix, and save the partially completed **Link for students** at: https://scratch.mit.edu/projects/120490962



2. Click on the Data category. Notice there is a list started called *diameter*. Click the box in front of *diameter.* The list appears on the stage that has 38 entered as the first item. This number is from the chart below. It shows that Mercury, the first item in the chart, is size 38 if the Earth were size 100.



3. This list will keep the size of each planet when the Earth is size 100. Enter the rest of the information from the chart below into this list. Use the plus sign, +, to make more lines in the list. When you are finished, click the box next to the word *diameter* to hide the list so the list does not show on the stage.

Object	Size when Earth is size 100	Diameter in Miles
Mercury	38	3,031
Venus	95	7,521
Mars	53	4,222
Jupiter	1,121	88,846
Saturn	945	74,900
Uranus	401	31,763
Neptune	388	30,779
Pluto	19	1,473
The Moon	27	2,159

4. Look at the script for the sprite called *objects.* It has one script completed for Mercury. Test this script to be sure it works.

5. Notice this block. This block sets the size of the sprite to item #1 of the list called *diameter.* Since the number in item #1 of the list is 38, it sets the size of Mercury to 38.

6. Complete the scripts for the other planets, Pluto, and the moon. Be sure to test your scripts to be sure they work each time you complete a planet.

Save your project!

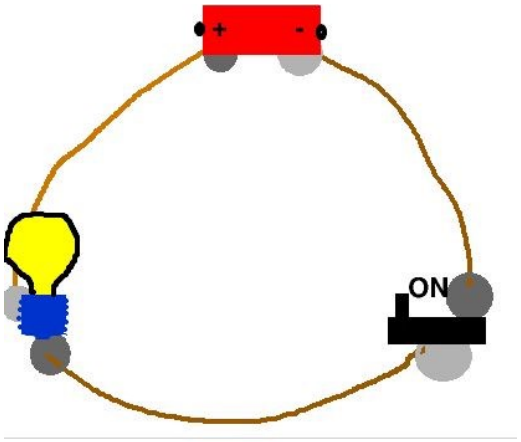
Try this:

- Make a new list that orders the all the planets in our solar system, Pluto, and the moon from smallest in size to largest in size. Be sure to include Earth in your list. (The diameter of Earth is about 7,926 miles.)

Facts to support your opinion:

- Write a paragraph that uses at least one fact. Tell whether or not you agree that Pluto should have been reclassified as a dwarf planet in 2006.

Complete the Circuit 4th grade Science



Summary: Students decide if they should use ***and*** statements or, ***or*** statements in a script, which also uses variables, to complete a simple circuit. If the light, battery, and switch are positioned correctly, the light "lights up" as shown here. If they are not in the correct position, the light bulb does not light.

Programing skills with Scratch:

- Decide if a script needs an "and" block or if it needs an "or" block
- Modify a script in order to create a new script
- Join blocks from the OPERATORS category
- Create and set variables
- Use the and, equal, or, variable, set ___ to, and sensing blocks

Links:

- Scratch activity *Circuit Teacher* at: https://scratch.mit.edu/projects/163382427
- *Scratch activity Circuit Student* at: https://scratch.mit.edu/projects/163440427

Resource for lessons and activities for circuits: (Goals are listed in these resources.)

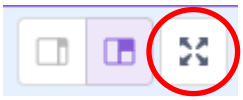
⇒ Teaching Engineering Curriculum or K-12 Educators, activity Bulbs & Batteries in a Row at: https://www.teachengineering.org/activities/view/cub_electricity_lesson05_activity1

Lesson:

1. Before beginning this Scratch activity be sure students understand circuits. The two resource lesson above have activities students can complete to become familiar with circuits.
2. Before the lesson, use **Unplugged Activities** to help students understand the difference between using "and" and "or" in programming. p. 19 (Unplugged Activity)
3. Be sure students understand how variables are used in this activity.

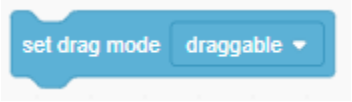
- This activity creates three variables. One for bulb, one for battery, and one for switch.
- When the green flag is clicked, all three variables are set to "no". This means they are not in the proper place to complete a simple circuit.
- When each sprite is placed correctly in the circuit, the variable for each is set to "yes". This means the sprite is in a proper place to complete a simple circuit.
- When all three sprites have variables that are set to "yes", the circuit is complete and the light bulb switches costume and the light bulb "lights up".

4. Open the Scratch activity *Circuit Teacher* with Full Screen Control. Move the sprites around on the screen to complete a circuit and watch the light bulb "light up". (Start Full Screen Control by clicking on this button at the top of the stage.)



5. NOTE: You cannot move sprites around the screen in Full Screen Mode unless you change their information:

- Click the sprite below the stage you want to be able to move in Full Screen Control.



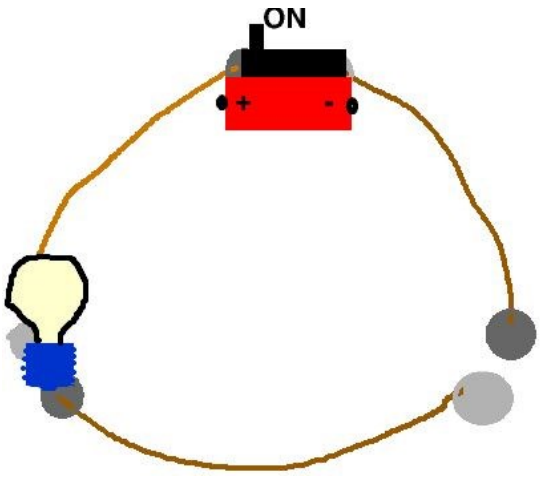
- Go to the Sensing Category and click the "set drag mode" block to draggable.
- This allows the sprite to be moved or dragged in Full Screen Mode.

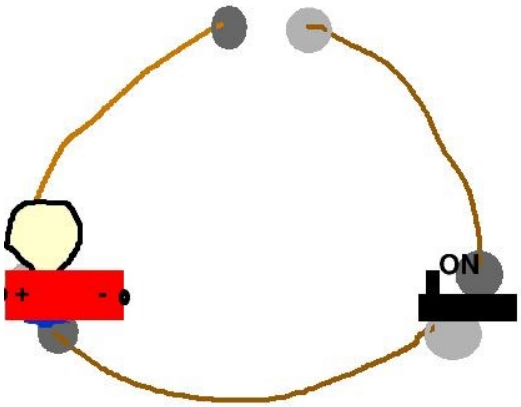
6. Notice these two sections of scripts found in the light's scripts and the battery's scripts.

Light's scripts:

Battery's scripts:

7. Why are these sections important? To find out take them out of the script for the battery and the light. Then place the sprites on the stage to match these pictures. Notice without these scripts the light "lights up" when the sprites are in these incorrect places. Why?





8. Open the Scratch activity *Circuit Students*.
9. Decide if you want students to work alone or with partners.
10. Tell students they will remix and complete this activity. They will need to complete scripts by deciding if the "and" statement or an "or" statement should be used.
11. They will also have to create the script used by the switch sprite. Currently that sprite does not have any scripts. Tell students to study how the bulb and battery scripts look to help them with the scripts they will create for the switch's scripts.
12. Allow time for students to share their projects.

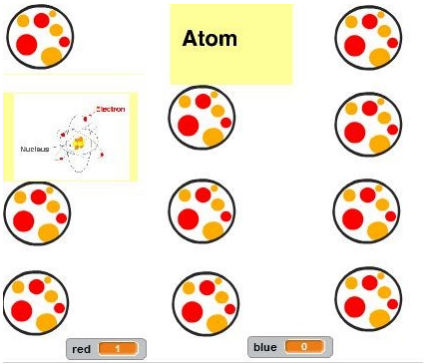
Extensions:

- Ask students to add another light to the project to create a series circuit. Note: They will need to create new wire sprites.

Unplugged Activity:

- Ask students what the difference is between "and" and "or".
- To help them understand that "and" means both, and "or" means one or the other, but not necessarily both, ask them to stand if:
    - ⇒ Stand if you right or left handed.
    - ⇒ Stand up if you are left and right handed. (Note: some students might be ambidextrous and can use both hands well.)
    - ⇒ Stand up if you were born in the summer.
    - ⇒ Stand up if you have brown eyes.
    - ⇒ Stand up if you have brown eyes, and were born in the summer, and have a pet, and are in 4th grade.
    - ⇒ Stand up if you have brown eyes, or were born in the summer, or have a pet, or are in 4th grade.
    - ⇒ Stand up if you have a sister or a brother.
    - ⇒ Stand up if you have a sister and a brother.
    - ⇒ Stand up if you like dogs or cats or horses.
    - ⇒ Stand up if you like dogs and cats and horses.
- Let students suggest some questions.

Match Game - 4th grade Science



Summary: Students complete a match game using a partial script. The game can be used as review for vocabulary. In this example, the student called "red" found a match. Notice red's score is 1 and blue's score is still 0. Red found a match: the picture of an atom matches the word atom.

Programming Skills with Scratch:

- Create a second costume for a sprite using text and drawing tools
- Modify a script in order to create a new script
- Use the next costume, and switch costume blocks

Links and Materials needed:

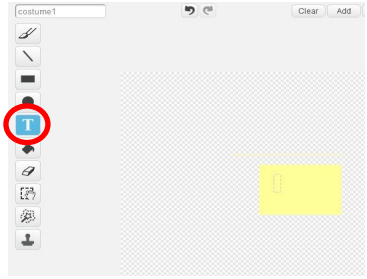
- Scratch activity *Match Game* at: https://scratch.mit.edu/projects/163523233
- Copies of How to Add Facts p. 21 (worksheet)

Lesson:

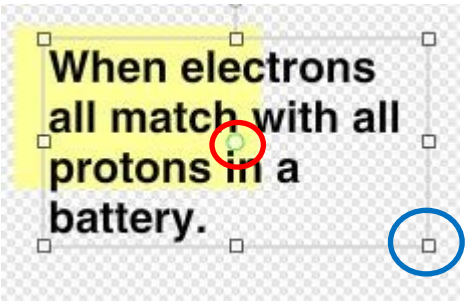
1. Use this activity as a way for students to show what they know. Ask each student or pairs of student to decide what information to include in their game.
2. Open the scratch activity, *Match Game.*
3. Explain that this is a partially completed script. Only the first 4 beach balls have information on their second costume. And only the first 4 beach balls have scripts that make them switch costumes. Ask students which beach balls might have a match. (In this activity, the first beach ball matches the third and the second matches the fourth.)
4. Click on one of the first four the beach balls to see their other costume. Notice how all the information for each beach ball fits on the yellow square. This is because the information must be small enough not to overlap other beach balls' information when clicked.
5. Show students how to add facts to their game. Pass out How to Add Facts p. 21 (worksheet).
6. Show students how to give players, "red" and "blue", points for finding a match. (Press "r" to give red a point. Press "b" to give blue a point.
7. Give students time to decide which facts to include in their game. You may want to "ok" their facts before they begin remixing and coding their game.
8. Allow time for students to open and remix the activity. Students should look closely at the completed scripts for the first 4 beach balls. Then after they have completed the 2nd costumes for the other beach balls, they should complete the scripts for all beach balls.
9. Be sure to allow time for students to share their games with others.

Name: _____ **How to Add Facts**

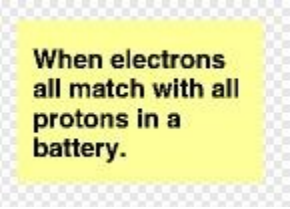
1. Click a sprite below the stage. Notice when a sprite is clicked, it flashes on the stage. This way you know which sprite is which.
2. Click the *Costumes* tab.
3. Click the 2nd costume which is a yellow box.



4. Click the **T** shown in the paint tools**.** Then click inside the yellow box. A small blue box will appear where you can begin typing.



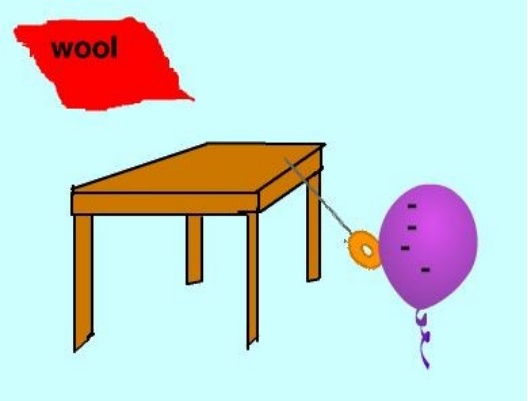
5. Type your information. Remember to keep it short. You do not have much room. For example, you might type this match for “dead battery”, and notice that it does not fit in the yellow box. You can resize the text by clicking and dragging the small box circled in blue.



6. You can reposition the text so that it fits in the center of the yellow box by clicking and dragging the tiny circle shown circled in red in the picture above. Now your text will look like this.

7. Experiment. See if there are other ways to make sure your information fits on the yellow square.

Static Electricity 4th grade Science



Summary: Students need to understand what causes static electricity before they can fully understand circuits. In this activity student add their voice recordings to explain what happens in the demonstration.

Goals:

- Students understand how static electricity affects different objects.

Programming Skills with Scratch:

- Modify a script in order to create a new script
- Add recording to an activity, Use the play sound __ recording , and play sound __ until done blocks
- Use broadcasts blocks from the Event category

Links and Materials:

- Scratch activity *Static Electricity Teacher* at: https://scratch.mit.edu/projects/163512292
- Scratch activity *Static Electricity Student* at: https://scratch.mit.edu/projects/163493649
- Scratch activity *More Static Electricity with Hair* at: https://scratch.mit.edu/projects/163457298
- Copies of Planning Pages 1 & 2 (worksheet 1 and worksheet 2)
- Resources Used:
  - ⇒ *Teaching Engineering Curriculum for k-12 Educators,* activity called Static Cling found at: https://www.teachengineering.org/activities/view/cub_electricity_lesson01_activity1
  - ⇒ *Teaching Engineering* Curriculum *for k-12 Educators,* activity called Charge It! found at: https://www.teachengineering.org/activities/view/cub_electricity_lesson02_activity1

Lesson:

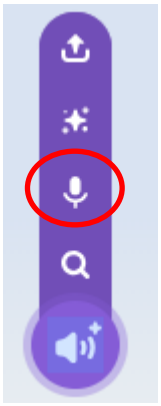
1. Before beginning this Scratch activity, look at the Static Cling resource shown above. This suggests and explains an activity for students showing how a balloon or a comb can become negatively charged by rubbing it on a wool cloth or on a student's hair. Then the balloon is held near a piece of cereal hanging on a string from an edge of the table. Because the balloon (now negatively charged) is in a different state of charge than the cereal, the cereal is drawn towards the balloon. When the two touch, some of the negative charge from the balloon moves to the cereal. When both the cereal and balloon have identical charges, the two no longer attract and the cereal drops away from the balloon.
2. Also look at the Charge It! resource shown above. This explains how a balloon is charged and how only a portion of the balloon becomes negatively charged when rubbed on material, not the entire balloon. There are also other activities for students that help explain static electricity. Make time to complete these activities with students before continuing with this Scratch activity.

3. Open the Scratch activity *Static Electricity Teacher* in full screen mode. Turn up the volume and click the green flag. Discuss this activity with students. Look at the scripts. Notice that even the backdrops have scripts. Discuss what each script does.

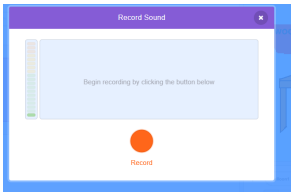
4. Open the Scratch activity *Static Electricity Student*—https://scratch.mit.edu/projects/163493649

in full screen mode. Click the green flag. Then open the Scratch activity *More Static Electricity* —https://scratch.mit.edu/projects/163457298 Click the green flag.

5. Notice there are no recordings in either of these activities explaining what is happening. Tell students they will remix one of these scripts, decide where to add recordings to the script, and decide what to say in order to explain what is happening. Allow them to choose which script to remix.



6. Be sure students know how make a recording of their voice using Scratch:
   - Click the **Sounds** tab.
   - Delete the pop sound (or whatever sound is shown) by clicking on the x.
   - Click the microphone icon.
   - Click the circle to record and click again to stop recording. Click play to hear your recording. If you do not like the recording, delete it and record again.
   - Use the start sound__ and play sound __ until done blocks in the scripts.
   - If this picture appears, student should press "allow".



7. Be sure students understand how to use a broadcast block in scratch.

8. Decide if you want students to work alone, in groups, or with partners.

   There are 2 different planning sheet. One for the Balloon and Cereal, and another for the Balloon and Hair activity. Be sure to give the correct sheet to each student or partners. Ask students to complete this planning page before they begin to remix the activity.

9. Ask students to examine the scripts for the activity they choose closely. They should decide where recording blocks are needed in the script, and what should be recorded for each block. (Hint: They might place wait blocks in the script to help them decide where these recording blocks should go.) Pass out the What will I say? P. 24 (worksheet) or p. 25 (worksheet).

10. Be sure to allow time for students share the completed projects.

Name: _____ What will I say? BALLOON and CEREAL

1. How many recordings will I need?_____
2. Look at the scripts below for the balloon and backdrop. Where will each recording be placed in the script? Put a red star where you will place each recording. Number each star.

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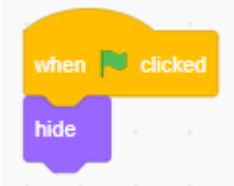
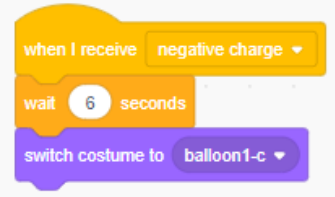
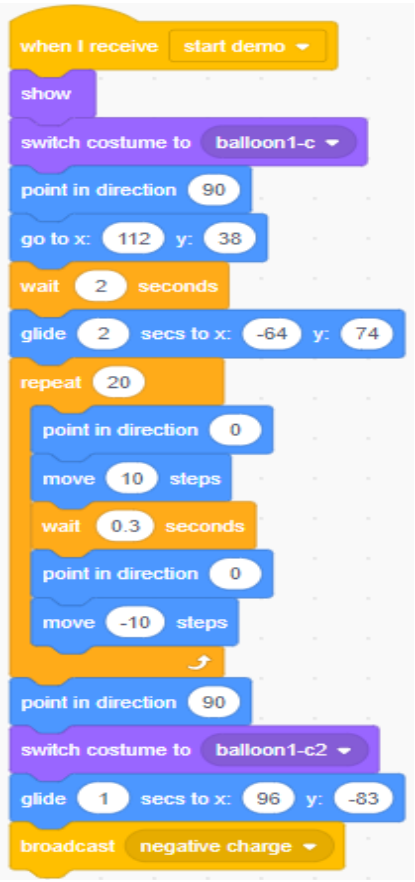






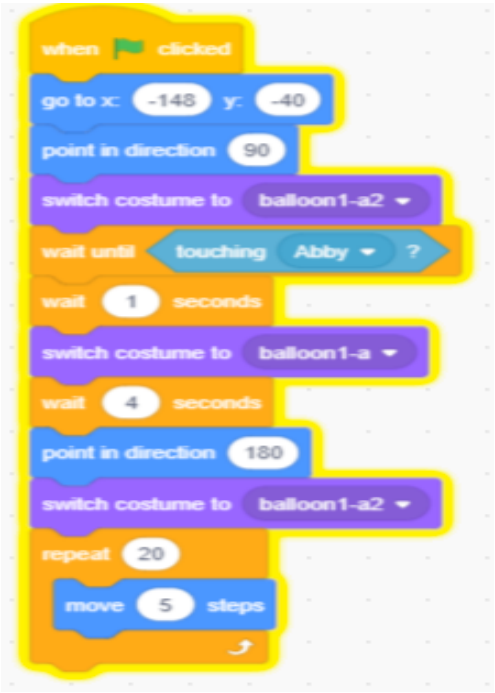
⇒ Scripts for balloon:

Name: _____ What will I say? BALLOON and HAIR

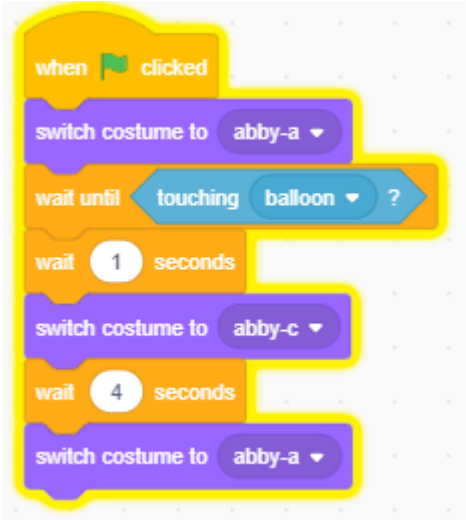
1. How many recordings will I need?_____

2. Look at the scripts below for the balloon and backdrop. Where will each recording be placed in the script? Put a red star where you will place each recording. Number each star.

⇒ Script for balloon:



⇒ Script for Abby:



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3. On another piece of paper write what you will record for each numbered, red star you placed in the scripts for the balloon and Abby.