Animation: Multicultural

Overview

A sprite can be animated by repeating sets of blocks that alternate between switching costumes or moving to the next costume along with repeated step movement. Adjusting the wait times of these repeated actions will increase or decrease the speed of the animation. Naming each of the costumes and changing the size of the sprites can assist in the creation of the animation.

Module Objectives

Students will be able to:

- animate a sprite at one location using a repeat loop and multiple costumes.
- animate a sprite with movement using a repeat loop.
- distinguish between the functionality of `switch costume` and `next costume` blocks.

Big Idea:

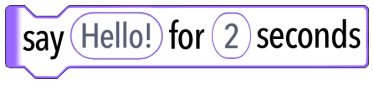
Loops are critical aspects of computing. It is simple to think of repeating a single block. However, most loops repeat a sequence of actions. Animation in Scratch is a fun, engaging way to practice this concept. An important aspect of animation is the wait block - controlling the speed of the animation.

Module Overview

Lesson 1: Exploring Animation (120 minutes)	Lesson 2: Creating with Animation (120 minutes)
The concept of animation is introduced. Students modify a Scratch project to animate a sprite both in one location and with movement using loops.	Students use animation in an open-ended, create project.
Assessment:	
Animation: Assessment Google doc PDF Form Answer Key	

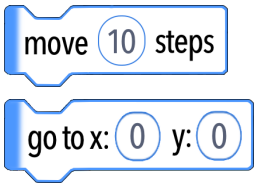
Prior Knowledge

Looks



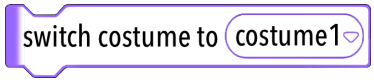
Events

Motion

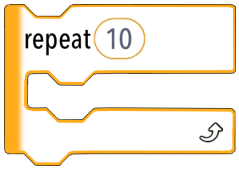


New Blocks

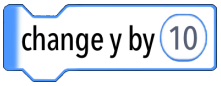
Looks



Control



Motion



(extension)

Lesson 1: Exploring Animation (120 minutes)

Lesson Overview	Lesson At-a-Glance
In this lesson, students animate sprites both at one location and then with movement by repeating sets of blocks. Students modify the code of an existing project to animate dragon boats in a race by cycling through a series of costumes. Vocabulary: animation, loop, argument	**Engage** (35 minutes) **Explore** (65 minutes) **Reflect** (20 minutes)

Lesson Preparation

Student Materials

Engage
- Animation: Flip Book

Explore
- Animation: L1 TIPP&SEE Sheet
  Google doc PDF Form Answer Key
- Animation: L1 Modify Sheet
  Google doc PDF Form
- Animation: L1 Modify Step-by-Step Sheet (only as needed)
  Google docs PDF

Scratch Project(s) & Teacher Materials

Prep
- Dragon Boat Races Information
- Create an example Flip Book or a few flipbooks for the class
- RoaR and hiSS poster
- WHAT?!? Debugging Poster

Engage & Explore
- Animation Engage Video: Drive YouTube
- Animation: Dragon Boats Scratch Project
  Teacher Sample Student Modify
- WHAT?!? Debugging Strategy Video:
  Drive YouTube

Engage

Flip Book (15 minutes - Optional)

In order to introduce students to animation, have them create a simple flip book using the Animation: Flip Book page. To create the flip book, students cut out the 16 images, put them in order, and staple the book together. Show students how to animate the images in the flip book by holding the left side and flipping through the pages to see the movement of the monkey and the snake. Explain to students that this is an example of basic animation, the topic of today's class! The monkey shows how a sprite can be animated at one location using only costume changes. The snake shows how costume changes can be combined with movement to animate a sprite from one location to another.

Introductory Discussion (15 minutes)

Use Question / Student Answer / Teacher Clarification to introduce animation through this sequence of questions.

What is animation? What are some examples of animation? *[Cartoons, flip books, animated movies]*

In an animation, what causes the characters to move? *[The animation cycles through pictures of the characters that look slightly different. As you move quickly through the pictures, it looks like the character is moving.]*

Animation in programming works the same way that we think of animation in real life. Using repeated changes to the sprites and movement at varying speeds, the actions of sprites become animated either in place or as they move on the screen.

Note: if students have seen or made flip books before or taken burst photos, that will help them to visualize how a set of slightly different pictures be used to create animation. Here is a fun youtube video of a soccer flip book.

Can something be animated if it doesn't change location (or move across the screen)? *[Yes, a sprite can be animated by changing its appearance, but its location on the screen can stay the same. Some examples are a monkey juggling, someone waving their hands, etc.]*

In Scratch, a sprite can be animated through costume changes without changing locations using `wait` and `next costume` or `switch costume to __` blocks. In Scratch, a sprite's costume is more than the clothes that it is wearing, changing the costume in Scratch is most often used to change body positions, so a sprite can have his or her hand raised in one costume and down in another costume. This allows the use of costume changes to animate a sprite in one location. This animation can happen by using the series of blocks multiple times or by placing them in a `repeat` loop.

What is a loop? *[Something that keeps going for a long time.]*

In programming, a **loop** is an action or series of actions that are repeated until a condition is determined to be true. Some loops happen a certain number of times and then stop while others run forever. All loops end at some point, but that ending time can be determined by completing the loop a set number of times or continuing the loop for as long as the program is running.

What are things that you do that are loops? *[Blinking, heart beating, jumping jacks, walking]*

Just like in real life, in order for these actions to occur in a computer program, animation is needed to show them happening.

Can there be more than one block, or instruction, in a loop? *[Yes, loops commonly contain more than one block. Some examples are `move` then `wait` and `next costume` then `wait`.]*

A loop can contain as many instructions as the programmer desires. The program will run through all of the instructions in order until it reaches the end and then begin at the top of the list again for as many times as the loop is run.

What block do we need to use to place a sprite at its starting location after it has moved across the screen? *[The `go to x:__y:__` block]*

In programming, when a sprite changes location and needs to start at a certain beginning location, commands are included in the program to set up the action.

Note: This is called initialization and will be covered in depth in a later Scratch Encore module. At this time, students only need to know how to reset the sprite to the correct location.

	Animation Engage Video Use the recorded Animation Engage Video to introduce content for students who miss class when the concept is introduced, when teaching online or asynchronously, or for students who benefit from multiple exposures to content.

Reviewing TIPP&SEE (5 minutes)

Tell students that today the you are going to review **TIPP&SEE**, and then they will do it entirely themselves. Point out the **TIPP&SEE** classroom poster and remind students that they can look there if they forget a part of the strategy.

- **What is the purpose of TIPP?** *[To get your head in the game - focus you on the project and task at hand.]*
- **What events do you try when you play?** *[green flag, clicking on sprites, keys on keyboard]*
- **What are you watching for when you play?** *[For each event you cause, what sprite did what action]*
- **What is the purpose of SEE?** *[Find the code that did something and explore how new blocks work]*

Explore

Using TIPP&SEE (15 minutes)

Students open the Animation: Dragon Boat Races student project (https://scratch.mit.edu/projects/323363385/) and complete the Animation.Multicultural: L1 TIPP&SEE Sheet to work through the **TIPP&SEE** strategy in more detail on their own. Once students have completed the worksheet, debrief the activity as a class.

Introduce WHAT?!? Debugging Strategy (15 minutes)

- **What** did the programmer want the project to do?
- **How** did the program go wrong?
- **Analyze** what happens. What did you observe?
    - **A**nalyze the Sprite's behavior.
    - **A**nalyze the code from the beginning to see if you can spot where the error occurs.
        - Look for **A MESS**:
            - **A**rguments: A number in a white circle is incorrect
              (You will want to introduce the word **argument** to students at this time. Certain blocks have a white oval in them. An **argument** is a value that can be typed into the white oval inside of certain blocks. This value can be a number as used in the repeat, move, and wait blocks or text/words as used in the say block.)

- **M**issing: Block(s) missing
- **E**xtra: Extra block(s)
- **S**crambled: Blocks out of order
- **S**ubstitute: Used the wrong block(s)

- **T**hree before me - If you didn't find the bug yet, talk to three classmates before asking the teacher.

	**WHAT?!? Debugging Strategy Video** Use the recorded WHAT?!? Debugging Strategy Video to introduce the strategy for students who miss class when the strategy is introduced, when teaching online or asynchronously, or for students who benefit from multiple exposures to content.

Modify Project (35 minutes)

Pass out the Animation.Multicultural: L1 Modify Sheet. Remind students to **R**oa**R** and h**iSS** (**R**eload, **R**emix, **S**hare and +Add to **S**tudio) the Animation: Dragon Boat Races student project: https://scratch.mit.edu/projects/323363385/. A step-by-step building sheet may be given to students who need additional help. Remind students that they need to share the project so it is accessible to you and others.

In this activity, students use the WHAT Debugging Strategy to debug the project and do the following:

- Animate the Red Dragon Boat (rowers) to "cheer" in place `when down arrow key pressed`.
- Animate the Red Dragon Boat sprite to race to the right side of the stage and complete the race `when space key pressed`.

Extensions:

- Adjust speeds to switch which sprite "wins" the race.
- Make the winner celebrate with a say block and a *slow* victory lap.
- Add the fish and make it jump.
- Put in another sprite and animate it in place and across the screen.

Reflect & Discuss

Reflect (10 minutes)

New Blocks and Concepts and Reflection Questions are included on the Animation.Multicultural: L1 Modify Sheet.

New Blocks and Concepts:	**Journal Questions:**
• `wait__secs` • `repeat__` • `next costume` • `switch costume` • Animation • Loop	• How is animation in Scratch different from what you thought it was at the beginning of the lesson? How is it the same? • What is the difference between the `next costume` vs. `switch costume` blocks?

Share & Discuss (10 minutes)

Consider having students present their projects to the class (or make time for a walk around showcase where students run each other's projects on individual computers). If there is time, consider leading a discussion identifying examples of when students would use `next costume` vs. `switch costume`.

Assessment: Student projects should be graded based on completion of all required elements.	**Integration:** Culture - Chinese Dragon Boat Racing
Differentiation: ● Prepare block definition sheets for students to add to their journals. Options include: List the block names (students fill in the definitions), block names and definitions provided (students match block names to the definitions). ● Provide a list of the type and number of blocks needed to complete each activity.	

Lesson 2: Creating with Animation (120 minutes)

Lesson Overview	Lesson At-a-Glance
Students create an animation in an open-ended, create project.	**Engage** (15 minutes) **Explore** (80 minutes) **Reflect** (25 minutes)

Lesson Preparation	
Student Materials	Scratch Project(s)
Explore ● Animation: L2 Create Sheet Google doc PDF Form Assessment ● Animation: Assessment Google doc PDF Form Answer Key	Explore ● Animation: Dragon Boat Races Dragon Boat Races Teacher Sample

Engage

Introductory Discussion (15 minutes)

Remind students that in the last lesson, they learned how to animate sprites in one place and with movement. Ask students what methods were used to animate sprites in the previous activity. *[They changed a sprite's costumes using the* `next costume` *or* `switch costume` *blocks, and to create movement, they used a* `repeat` *loop containing* `wait` *and* `move` *blocks.]*

Open the Animation: Dragon Boat Races Teacher Sample Project (https://scratch.mit.edu/projects/323363817/) and review with students the difference between the animation without movement (Dragon Boat rowers "cheering") when the down arrow key is pressed and animation with movement (Dragon Boat rowing and racing across the stage) when the space key is pressed.

Explore

Create Project (80 minutes)

Introduce today's activity: To create an animation of the students' choice. Pass out the Animation: L2 Create Sheet to give students guidance throughout the project.

To complete this task, students will:

- Create a new Scratch project
- Add a backdrop
- Add 3 sprites (with multiple costumes) to the project
- Animate at least 2 sprites in place

- Animate at least 1 sprite to move across the stage
- Animations should include:
    - Costume changes
    - Movement from left to right (at least 1 sprite)
    - Repeat loops
    - Speed control (with `wait` blocks)
- Test the code.

Explain to students that they can create any project that is interesting to them, but some ideas are:

- Animate sprites playing or participating in their favorite sport
- Tell a story - consider telling a story about their culture
- A project of their choice!

Remind students to run their project to test that it works as expected. Debug and re-test if necessary. Students should **S**hare and +Add to **S**tudio before exiting Scratch.

Extensions:

- Add additional sprites and have them animated in place and/or across the screen
- Experiment with different types of animation - using `turn`, `move`, `point in direction`, `Change x by`, and `change y by`.

Reflect & Discuss

Reflect (10 minutes)

Reflection Questions are included on the Animation: L2 Create Sheet.

Journal Questions:

- What was challenging about this project?
- How did you work through the challenges you faced?

Share & Discuss (15 minutes)

Consider having students present their projects to the class (or make time for a walk around showcase where students run each other's projects on individual computers). If there is time, lead a discussion about how animation could be used in other projects (e.g. animate characters in a game, to create an animation to tell a story, to change a sprite's appearance to show change over time - a plant growing).

Assessment: • Student projects should be graded based on completion of all required elements. • Students will complete the Animation: Assessment based on the concepts covered in this module.	**Integration:** Art - Animation and drawing
Differentiation:	

- Prepare a block definition sheets to add to journals - block names listed (students fill in the definitions) or blocks and the definitions completed, students match block names to the definitions
- Provide a list of the type and number of blocks needed to complete each activity

Standards

CSTA Standards

1B-AP-10 Create programs that include sequences, events, loops, and conditionals. (P5.2)

1B-AP-12 Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features. (P5.3)

1B-AP-14 Observe intellectual property rights and give appropriate attribution when creating or remixing programs. (P5.2, P7.3)

1B-AP-15 Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended. (P6.1, P6.2)

1B-AP-17 Describe choices made during program development using code comments, presentations, and demonstrations. (P7.2)

2-AP-16 Incorporate existing code, media, and libraries into original programs, and give attribution. (P4.2, P5.2, P7.3)

1B-IC-20 Seek diverse perspectives for the purpose of improving computational artifacts. (P1.1)

1B-IC-21 Use public domain or creative commons media, and refrain from copying or using material created by others without permission. (P7.3)

ISTE Standards

1. **Empowered Learner:** Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences. Students:

    c. use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

    d. understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

2. **Digital Citizen**: Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical. Students:

    b. engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.

4. **Innovative Designer:** Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.

    a. know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

d. exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

6. **Creative Communicator:** Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.

b. create original works or responsibly repurpose or remix digital resources into new creations.