CREATIVE COMPUTING

Harvard Graduate School of Education

UNIT 2
ANIMATIONS

Turn up the music!

WHAT'S INCLUDED

PERFORMING SCRIPTS
BUILD-A-BAND
ORANGE SQUARE, PURPLE CIRCLE
IT'S ALIVE!
DEBUG IT!
MUSIC VIDEO

UNIT 2 OVERVIEW

THE "BIG IDEA"

Kids have shared more than six million projects in the Scratch online community – animations, stories, games, and beyond – and one of our goals with the guide is to reflect this enormous diversity of creations. Within activities, we support opportunities to personalize and avoid presenting challenges that have only one "right" answer; across activities, we engage learners in a variety of genres. In this unit, we start to explore this creative diversity with a deep dive into animation, art, and music.

Creative diversity in Scratch has often been highlighted by learners. Here are a few quotes from learners who were asked, "If you had to explain what Scratch is to one of your friends, how would you describe it?"

It's a program that lets you explore your imagination. You can do whatever you want in it. You can create anything. There really is no limit to what you can make. You design your own stuff, and once you start you just don't want to stop because as you learn more, you can see there's more possibilities, and the more possibilities there are, the more you want to expand on what you just learned.
Bradley, 12 years old

It's just that there's endless possibilities. It's not like you can just make this project or this project and that's all that you can make.
Nevin, 9 years old

It's really great to express yourself creatively. You could do anything with it. You can make video games, music, art, videos, anything. The possibilities are endless, no limitations, really.
Lindsey, 12 years old

Well, I like that you can sort of do anything on it. It's like you can do whatever you want, really. You can be as creative as you want to be.
Aaron, 10 years old

LEARNING OBJECTIVES

Students will:

+ be introduced to the computational thinking concepts of loops, events, and parallelism
+ become more familiar with the concepts of sequence
+ experiment with new blocks in the Events, Control, Sound, and Looks categories
+ explore various arts-themed Scratch programs
+ create an animated music video project

KEY WORDS, CONCEPTS, & PRACTICES

+ loops
+ events
+ parallelism
+ control
+ broadcast
+ scripts
+ presentation mode
+ bitmap
+ vector
+ animation
+ gallery walk

NOTES

+ Many activities in this unit include elements of sound and music. We recommend having headphones readily available for students.
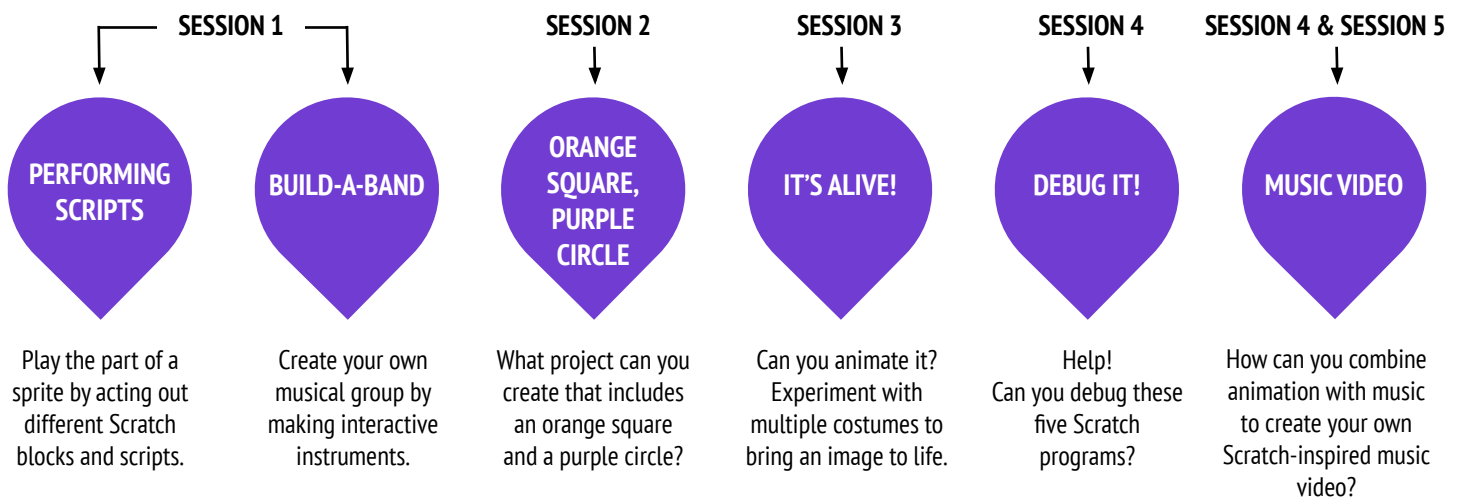
CHOOSE YOUR OWN ADVENTURE

Programming in Scratch is like directing theatre. In theatre, just as in Scratch, there are characters (sprites, in Scratch parlance), costumes, backdrops, scripts, and a stage. Scratch programming utilizes cues called "events", which signal when things should occur in a project, such as: activating a project (when green flag clicked), triggering sprites' actions (when this sprite clicked), or even sending a silent cue across sprites or backdrops (broadcast).

Inspired by the theatre metaphor, this unit's arts-themed activities are designed to help students explore the computational concepts of loops, events, and parallelism, culminating in the design of personalized music videos.

POSSIBLE PATH

	SESSION 1		SESSION 2	SESSION 3	SESSION 4	SESSION 4 & SESSION 5
PERFORMING SCRIPTS	**BUILD-A-BAND**		**ORANGE SQUARE, PURPLE CIRCLE**	**IT'S ALIVE!**	**DEBUG IT!**	**MUSIC VIDEO**
Play the part of a sprite by acting out different Scratch blocks and scripts.	Create your own musical group by making interactive instruments.		What project can you create that includes an orange square and a purple circle?	Can you animate it? Experiment with multiple costumes to bring an image to life.	Help! Can you debug these five Scratch programs?	How can you combine animation with music to create your own Scratch-inspired music video?

IT'S ALIVE!

SUGGESTED TIME
30–45 MINUTES

OBJECTIVES
By completing this activity, students will:
+ become more familiar with the computational concepts of sequence and loops by experimenting with Control blocks
+ be able to explain the difference between sprites and costumes
+ practice experimenting and iterating through developing an animation project

ACTIVITY DESCRIPTION

❏ Optionally, show example projects from the It's Alive! studio and have the It's Alive! handout available to guide students.

❏ Introduce the concept of an animation as looping through a series of incrementally different pictures, such as in a flipbook or a claymation film. Encourage students to explore loops by changing costumes or backdrops to create an animation.

❏ Invite students to share their work with others by hosting a gallery walk: have students put their projects in presentation mode and then invite them to walk around and explore each other's projects. Optionally, have students add their projects to the It's Alive studio or a class studio.

❏ Ask students to think back on the design process by responding to the reflection prompts in their design journals or in a group discussion.

RESOURCES

❏ It's Alive! handout
❏ It's Alive! studio
http://scratch.mit.edu/studios/475529

REFLECTION PROMPTS

+ What is the difference between a sprite and a costume?
+ What is an animation?
+ List three ways you experience loops in real life (e.g., going to sleep every night).

REVIEWING STUDENT WORK

+ Can students distinguish sprites and costumes?
+ Some Scratchers are particularly interested in developing animation projects and prefer to spend their time drawing and designing sprites, costumes, or backdrops. How might you engage students in both the aesthetic and technical aspects of projects?

NOTES

+ The difference between sprites and costumes is often a source of confusion for Scratchers. The metaphor of actors wearing multiple costumes can help clarify the difference.
+ Students can animate their own image by taking pictures of themselves using a camera or webcam.

NOTES TO SELF

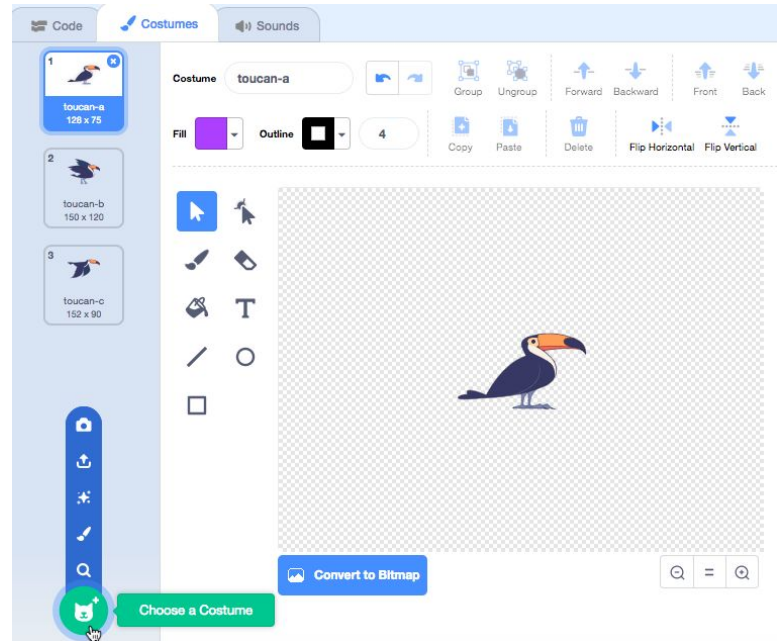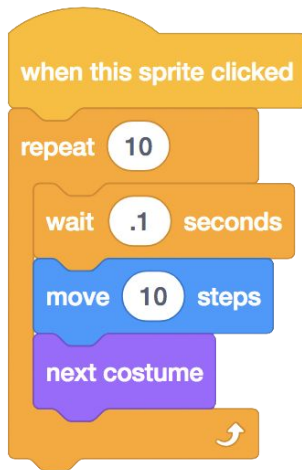❏ _____

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IT'S ALIVE!

HOW CAN YOU TAKE AN IMAGE OR A PHOTO AND MAKE IT COME ALIVE?

In this activity, you will explore ways of bringing sprites, images, and ideas to life as an animation by programming a series of costume changes.

START HERE

❑ Choose a sprite.

❑ Add a different costume.

❑ Add blocks to make the image come alive.

❑ Repeat!

THINGS TO TRY

❑ Try sketching your animation ideas on paper first – like a flipbook.

❑ Experiment with different blocks and costumes until you find something you enjoy.

❑ Need some inspiration? Find projects in the Animation section of the Explore page.

FINISHED?

+ Add your project to the It's Alive studio:
  http://scratch.mit.edu/studios/475529

+ Challenge yourself to do more! Add more features to your project to make your animations look even more lifelike.

+ Help a neighbor!

+ Share your project with a partner and walk them through your design process.

+ Find an animated project you're inspired by and remix it!

DEBUG IT!

SUGGESTED TIME
15–30 MINUTES

OBJECTIVES
By completing this activity, students will:
+   investigate the problem and find a solution to five debugging challenges
+   explore a range of concepts (including sequence and loops) through the practices of testing and debugging
+   develop a list of strategies for debugging projects

ACTIVITY DESCRIPTION

❏   Optionally, have the Unit 2 Debug It! handout available to guide students during the activity.

❏   Help students open the Debug It! programs from the Unit 2 Debug It! studio or by following the project links listed on the Unit 2 Debug It! handout. Encourage students to click on the "Look Inside" button to investigate the buggy program, tinker with problematic code, and test possible solutions.

❏   Give students time to test and debug each Debug It! challenge. Optionally, have students use the remix function in Scratch to fix the bugs and save corrected programs.

❏   Ask students to reflect back on their testing and debugging experiences by responding to the reflection prompts in their design journals or in a group discussion.

❏   Create a class list of debugging strategies by collecting students' problem finding and problem solving approaches.

RESOURCES

❏   Unit 2 Debug It! handout
❏   Unit 2 Debug It! studio
    http://scratch.mit.edu/studios/475539

REFLECTION PROMPTS

+   What was the problem?
+   How did you identify the problem?
+   How did you fix the problem?
+   Did others have alternative approaches to fixing the problem?

REVIEWING STUDENT WORK

+   Were students able to solve all five bugs? If not, how might you clarify the concepts expressed in the unsolved programs?
+   What different testing and debugging strategies did students employ?

NOTES

+   Facilitate this activity in a whole group by having students act out the Debug It! programs in a similar way to the Performing Scripts activity, or introduce performing scripts as a new strategy for testing and debugging projects.

NOTES TO SELF

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DEBUG IT!

In this activity, you will investigate what is going awry and find a solution for each of the five Debug It! challenges.

START HERE

❑ Go to the Unit 2 Debug It! Studio:
http://scratch.mit.edu/studios/475539
❑ Test and debug each of the five debugging challenges in the studio.
❑ Write down your solution or remix the buggy program with your solution.

FEELING STUCK?

THAT'S OKAY! TRY THESE THINGS...

❑ **DEBUG IT! 2.1** http://scratch.mit.edu/projects/23266426

In this project, Scratch Cat wants to show you a dance. When you click on him, he should do a dance while a drum beat plays along with him. However, as soon as he starts to dance he stops but the drumming continues without him! How do we fix this program?

❑ **DEBUG IT! 2.2** http://scratch.mit.edu/projects/24268476

In this project, when the green flag is clicked Pico should move towards Nano. When Pico reaches Nano, Pico should say "Tag, you're it!" and Nano says "My turn!" But something is wrong! Pico doesn't say anything to Nano. How do we fix the program?

❑ **DEBUG IT! 2.3** http://scratch.mit.edu/projects/24268506

This project is programmed to draw a happy face but something is not quite right! The pen continues to draw from one of the eyes to the smile when it should not be doing so. How do we fix the program?

❑ **DEBUG IT! 2.4** http://scratch.mit.edu/projects/23267140

In this project, when the green flag is clicked an animation of a flower growing begins and stops once it has fully bloomed. But something is not quite right! Instead of stopping when all the petals have bloomed, the animation starts all over. How do we fix this program?

❑ **DEBUG IT! 2.5** http://scratch.mit.edu/projects/23267245

In this project, the Happy Birthday song starts playing when the green flag is clicked. Once the song finishes, instructions should appear telling us to "click on me to blow out the candles!" But something is not working! The instructions to blow out the candles are shown while the birthday song is playing rather than after it finishes. How do we fix this program?

FINISHED?

❑ Make a list of possible bugs in the program.
❑ Keep track of your work! This can be a useful reminder of what you have already tried and point you toward what to try next.
❑ Share and compare your problem finding and problem solving approaches with a neighbor until you find something that works for you!

+ Add code commentary by right clicking on blocks in your scripts. This can help others understand different parts of your program!
+ Discuss your testing and debugging practices with a partner – make notes of the similarities and differences in your strategies.
+ Help a neighbor!

MUSIC VIDEO

SUGGESTED TIME
45–60 MINUTES

OBJECTIVES
By completing this activity, students will:
+ be able to create a project that combines animation and music by working on a self-directed music video project
+ gain more familiarity with sprites, costumes, and sounds

ACTIVITY DESCRIPTION

❏ Introduce students to the idea of creating a music video in Scratch that combines music with animation. Optionally, show a few project examples from the Music Video studio.

❏ Give students open-ended time to work on their projects, with the Music Video handout available to provide guidance and inspiration. Encourage students to give credit on the project page for using others' ideas, music, or code.

❏ Help students give and receive feedback while developing their projects. We suggest checking in with a neighbor: have students stop midway and share their works-in-progress with one other person or in their critique groups (see the Unit 0 Critique Group activity) to ask for feedback. Optionally, invite students to add their projects to the Music Video studio or a class studio.

❏ Ask students to think back on the design process by responding to the reflection prompts in their design journals or in a group discussion.

RESOURCES

❏ Music Video handout
❏ Music Video studio
http://scratch.mit.edu/studios/475517

REFLECTION PROMPTS

+ What was a challenge you overcame? How did you overcome it?
+ What is something you still want to figure out?
+ How did you give credit for ideas, music, or code that you borrowed to use in your project?

REVIEWING STUDENT WORK

+ Did the projects combine sprites and sound?
+ What parts of the projects did students choose to animate?
+ Are there certain blocks or concepts introduced up until now that students might still be struggling with? How might you help?

NOTES

+ To further personalize projects, help students include a favorite song or record themselves singing or playing an instrument, using features under the Sounds tab.
+ Questions about remixing and plagiarism may arise during this activity. Take this opportunity to facilitate a discussion about giving credit and attribution using the Scratch FAQ about remixing:
https://scratch.mit.edu/info/faq#remix/

NOTES TO SELF

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MUSIC VIDEO

In this project, you will explore ideas
related to theatre, song, dance, music,
drawing, illustration, photography, and
animation to create a personalized music
video!

START HERE

- ❑ Add sound.
- ❑ Create and animate a sprite.
- ❑ Make them interact together!

- ▢ - - - ▶ take a photo
- ⬆ - - - ▶ upload sprite from file
- ✦ - - - ▶ receive a surprise sprite
- ✎ - - - ▶ paint your own sprite
- 🔍 - - - ▶ choose sprite from library

- ⬆ - - - ▶ upload sounds from a file
- ✦ - - - ▶ receive a surprise sound
- 🎤 - - - ▶ record your own sounds
- 🔍 - - - ▶ choose sounds from library

THINGS TO TRY

- ❑ Use costumes to help bring your animations to life!
- ❑ Make your sprite interactive by adding scripts that have the
  sprite respond to clicks, key presses, and more.
- ❑ Add instructions on the project page to explain how people
  can interact with your program.

BLOCKS TO PLAY WITH

FINISHED?

- + Add your project to the Music Video
   studio:
   http://scratch.mit.edu/studios/475517
- + Be sure to give credit to any music, code,
   or other work used in your project.
- + Challenge yourself to do more! Create
   your own sprites, sounds, or costumes!