Variables

What is this?
Variables is one of 10 modules in Getting Unstuck, a Scratch curriculum developed by the Creative Computing Lab. The aim of the curriculum is to foster classroom cultures that support creative and conceptual fluency with code.

Find more modules and the orientation to Getting Unstuck at gettingunstuck.gse.harvard.edu

What's inside?

For the teacher

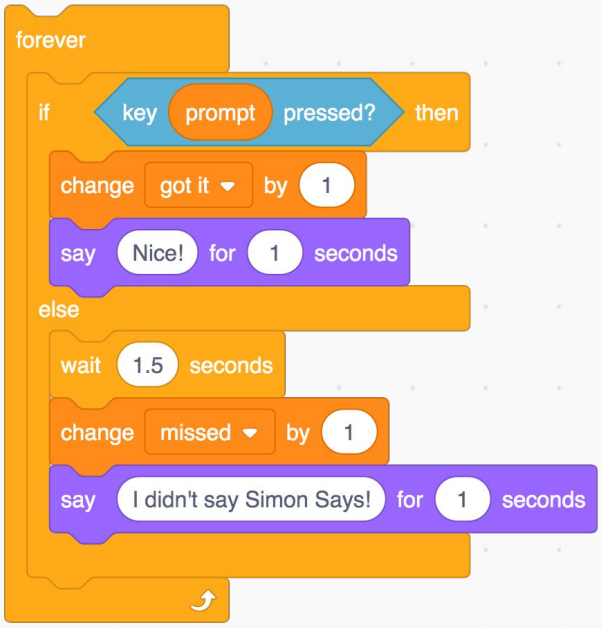
For the student

Prompt Overview

Create a project that uses a variable to change how something happens.

What concept will we explore in this module?

This project explores the use of variables. Variables are a way of storing, retrieving, and interacting with data.



After a "Simon Says" prompt is given, the sprite checks to see if the correct key was pressed (or not). If so, either the "Got it!" or "Missed!" score variable goes up by 1, based on the user's response.

When the player's health reaches 0, the sprite broadcasts a "game over" message to begin an end-game sequence, such as a "GAME OVER" backdrop with different music.

What can students make with variables?

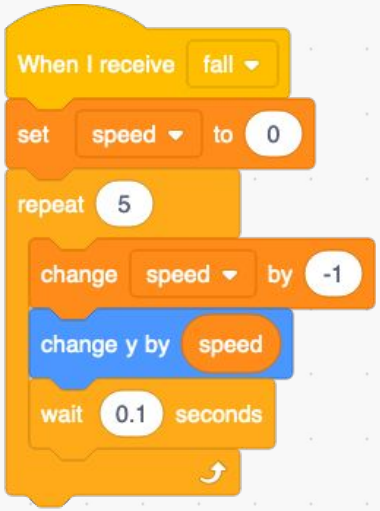
A variable can be explained as a "box" that can hold modifiable values, but it can only hold one value at a time. A variable can store numbers or strings (strings are text).

Students can create a variable by clicking *Make a Variable* in the block palette. While variables have many uses, a common application is to use variables for keeping track of things like the score in a game. When a variable reaches a certain number, this can cause something else to happen in the project.

What else should I know about variables?

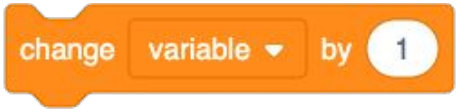
Student projects will likely employ both variables and conditionals because this project is about using a variable to change how something happens in the program.

When a variable is created, students can choose if a variable is global (i.e., can be read or changed by any sprite or the Stage) or local (i.e., can be read or changed by a single sprite). The use of variables can help students explore abstracting and modularizing (i.e., exploring connections between the whole and the parts).



This speed variable adjusts a sprite's y-position such that it looks like a sprite is falling down to the stage. This can be used to simulate gravity.

There are many different ways to go about creating this project.
Here are a few blocks that students will likely use:

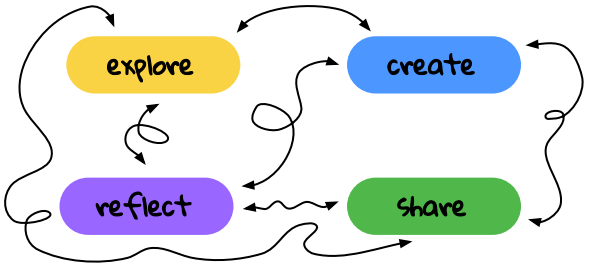
	This block is a reporter block that reports the current value of a variable. Whenever a variable is created, a version of this block appears with the variable's given name on it.
	The block will set the specified variable to the given value, which can be a string or number. Students may want to use this at the beginning of the program (i.e., after *when green flag clicked*) to "reset" a variable (e.g., set "score" to 0).
	This block changes the specified variable by a specified amount. For example, a student may use this block to increase the score (e.g., change "score" by 1) when a certain event happens in the program.
	These blocks change whether the specified variable is displayed on the Scratch stage.

Additional resources

- Add a Score: Use the *Add a Score* (pp. 47–52) guide to learn more about how students might use variables to add a score to their project
- Variables in Envelopes: This Code.org lesson offers a few different unplugged activities to help students understand the concept of variables
- Getting Unstuck 2020: Explore *Variables* projects that other teachers have made

Activities Overview

The activities in this module are designed to help students create Scratch projects that are unique and matter to them, while exploring a particular computer science concept. This work is supported through the essential design studio practices of exploring, creating, sharing, and reflecting.



The *Variables* module includes 18 activities. We recommend using the 6 activities below as the foundation for the learning experience and incorporating additional activities as desired. Based on teachers' classroom use of the activities, we expect that this module will span five 45-minute sessions.

Activity Type	Activity Name	Activity Description
Explore	Inspiration Studio	Inspire imagination with a curated collection of Scratch projects
Create	Project Prompt	Dive into the project prompt and experiment with blocks
Create	Unstuck Strategies	Try some strategies to get unstuck when challenges are encountered
Share	Heart and Star	Support progress and exploration through peer feedback
Reflect	Journal Entries	Engage reflection on progress each session through formative assessment
Reflect	Self Assessment	Honor growth and explore potential next steps through summative assessment

Along with the 6 foundational activities, we encourage you to include some of the 12 additional activities listed on the next page. These activities are intended to offer other ways of supporting your students' (and your own!) creative and conceptual fluency. We hope that you remix and reimagine these activities, as well as include activities you are excited about from other sources—whatever works best for you and your students!

Activity Type	Activity Name	Activity Description
Explore	Brainstorm Ideas	Connect to interests and experiences through an invitation to imagine
Explore	Read Me	Read a little bit of Scratch code featuring the key concept
Explore	Unplugged	Explore key concepts through teacher-led movement and play
Create	Make a Plan	Record ideas and intentions for projects using a planning template
Create	Storyboard	Document project dreams with visuals and text
Create	Remixable	Remix a project that was designed to be reimagined
Share	Red Yellow Green	Explore multiple perspectives with peer feedback
Share	Leave a Comment	Give and receive feedback via the Scratch website
Share	Gallery Walk	View and respond to others' projects through a class tour
Reflect	Think, Pair, Share	Consider progress individually and share with others
Reflect	Notes and Credits	Document thinking with the *Notes and Credits* feature on the Scratch website
Reflect	Code Comments	Make thinking visible through code commenting

These activity pages are designed to be shared with students—to guide their work and to help them keep track of their learning. We call a student's collection of activity pages their **design journal**. To help organize the activity pages in students' design journals, we have included a cover page. This cover page offers an overview of the project prompt through text and video, as well as a list of key activities for quick reference. You will need to update the cover page to reflect the activities you choose to include.

We have also created how-to Scratch logistics pages that may be helpful for students as they work through the module, including: how to share a project to a studio, how to fill in a Scratch project page, how to give credit, and how to give feedback.

Teaching the Module

How will you bring the *Variables* module to life in your classroom? Here we offer some planning prompts and reflection questions to help you get ready to explore, create, share, and reflect with your students!

- ❏ Choose activities (from the foundational and additional activities summarized in the adjacent table, or from other sources) that you'll use to teach this module.
- ❏ Create a Scratch studio for students to share projects.
- ❏ Set up students' design journals by customizing the cover page and including relevant activities.
- ❏ Create your own *Variables* Scratch project to help familiarize yourself with the prompt.
- ❏ Make plans for differentiation in order to support all of your students and their unique needs.
- ❏ Identify any specific computer science standards or cross-curricular connections you would like to make.
- ❏ Connect with other Getting Unstuck educators on Twitter or on Facebook.

Explore	**Share**
Inspiration Studio	Heart and Star
Brainstorm Ideas	Red Yellow Green
Read Me	Leave a Comment
Unplugged	Gallery Walk
Create	**Reflect**
Project Prompt	Journal Entries
Unstuck Strategies	Self Assessment
Make a Plan	Think, Pair, Share
Storyboard	Notes and Credits
Remixable	Code Comments

What else will help you prepare? What will help your students imagine and create their wonderful projects?

We've included this page to help you map out your chosen activities across different sessions and to document your thoughts about how sessions went. You may have more sessions; you may have fewer sessions—just add or remove rows as needed.

	What will you do? Which activities will you include?	How was it? What would you change?
Session 1		
Session 2		
Session 3		
Session 4		
Session 5		

Variables Design Journal

Name	
Username	

Create a project that uses a variable to change how something happens.

Click on the video to learn more about this project!

What do you want to do?

- Explore the inspiration studio
- Create my project
- Try a strategy to get unstuck
- Share with a heart and star
- Reflect in my journal entries
- Self-assess my process

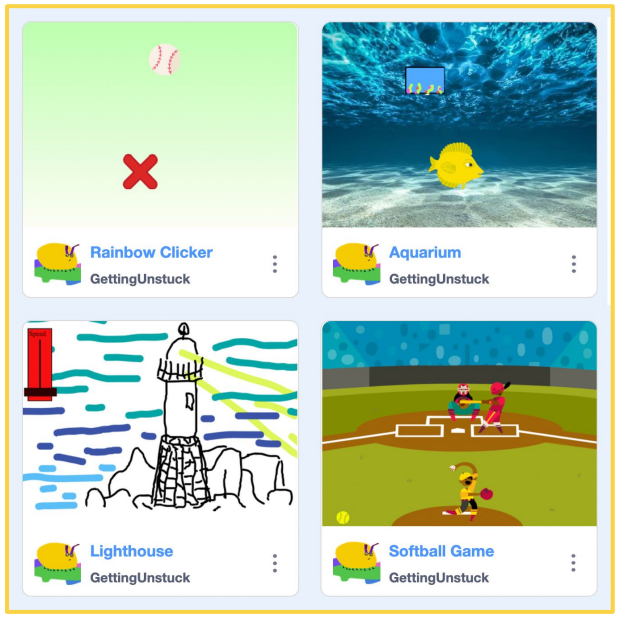
Explore

Inspiration Studio

Name	
Username	

Exploring projects that other Scratchers have made can help us get inspired about what we want to make!

1. Click on this link: scratch.mit.edu/studios/27321018
2. Visit a few of the projects in the *Variables* studio.
   Choose a project that you think is interesting.

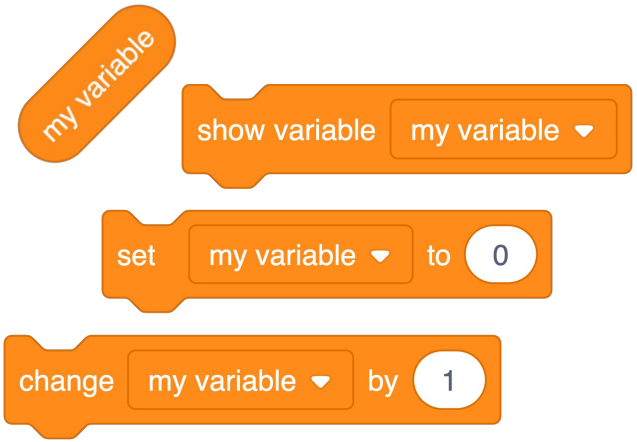


Why is this project interesting to you?

3. Open that project and click 

4. Find a variable that changes how something happens in this project.

What is the name of the variable you found? What does it do?



Create

Variables

Name	
Username	

Create a project that uses a variable to change how something happens.

Studio link		Project link	

Get started

- ❏ Sign into Scratch.
- ❏ Click **Create** to start a project.
- ❏ Share your project in the class studio. (Need help?)
- ❏ Start working on your project!

Keep going

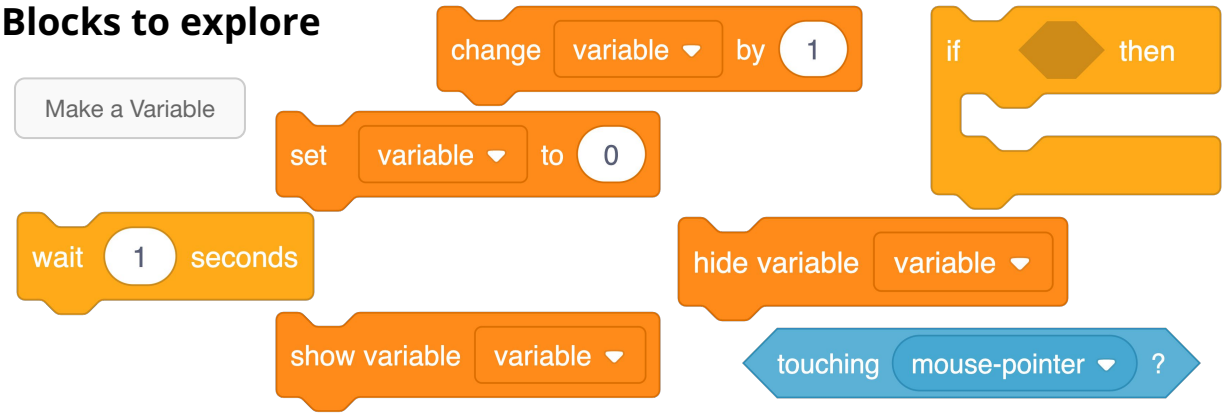
Stuck? Try using the strategies on the *Unstuck Strategies* page!

Done? Explore ideas for what you could do next: scratch.mit.edu/projects/541477729

Finish up

- ❏ In your project's *Instructions*, explain how others should use your project. (Need help?)
- ❏ In your project's *Notes and Credits*, explain how you made your project. (Need help?)

Blocks to explore



Create

Unstuck Strategies

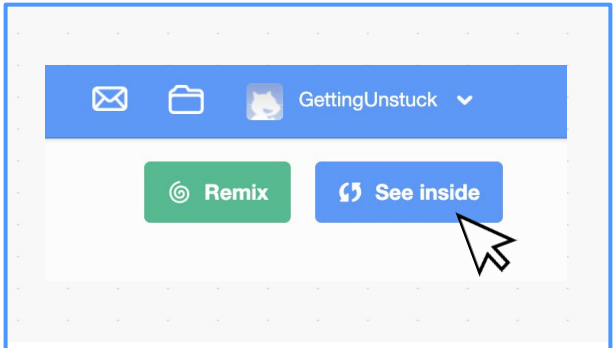
Name	
Username	

Getting stuck is part of the process when working on projects! Here are some strategies to help.

Make a small goal

When we have big ideas, sometimes it can be hard to start our projects!

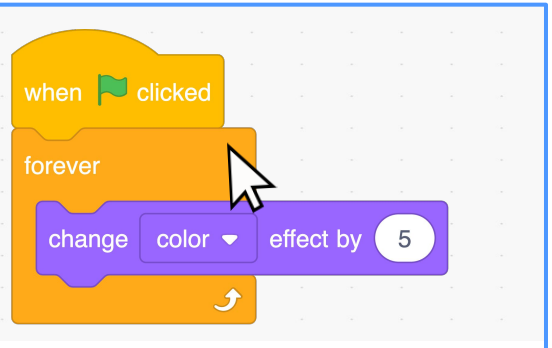
Write down one thing you want to do today in your project's *Notes and Credits*.



Be inspired by others

Go to your class studio to see others' projects. Find a project and click *See Inside.*

What do you notice? What is something you could try in your own project?



A stack at a time

Click on a stack to run those specific blocks in your project. Do they work?

If not, try pulling the stack apart into smaller sections, then click on each of those sections.

Which strategies did you try for this project? Which strategies worked for you?

Share

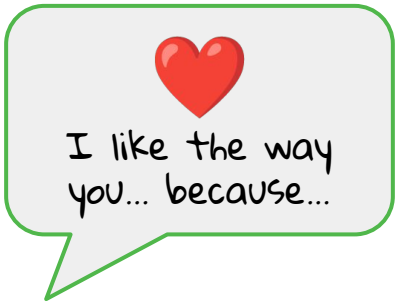
Heart and Star

Name	
Username	

Sharing your project with classmates can help you get feedback about what to work on next.

1. Show your project to a classmate.

2. Ask them to say one thing they like about your project.



3. Ask them to say one thing you could try in your project.

4. Switch!

Reflect

Journal Entries

Name	
Username	

Use the boxes below to write or draw your thinking, or share a link to a video or audio reflection.
Try using these sentence starters to help you share your ideas!

Today I learned...

I need help with...

I wonder how I could...

Today I was proud of...

Date	Student reflection	Teacher response

Reflect

Self Assessment

Name	
Username	

Write in each box: what is something you are proud of?	Expectations	Write in each box: what is something else you could try?
	Personalization: I customized my project with sprites, sounds, and/or backdrops to make it look the way I want.	
	Prompt: My *Variables* project uses a variable to change how something happens.	
	Community: I helped someone with their project and got help from someone else.	
	Effort: I persevered through challenges and tried different strategies to solve problems.	

What inspired you to make your project?

What else should your teacher know?

Teacher response:

Explore

Brainstorm Ideas

Name	
Username	

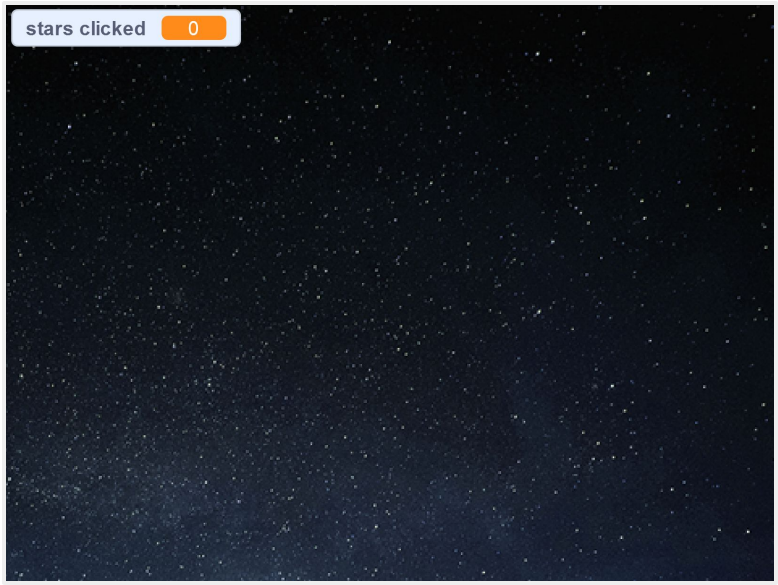
Let's brainstorm ideas for what project you could make. Start by thinking about what happened yesterday. What did you do? What did you see or hear? What did you notice?

Write down three things you did yesterday.	Draw yourself doing something you love.
Draw something you saw yesterday.	Write down one idea for your Scratch project. Tell a classmate about your idea!

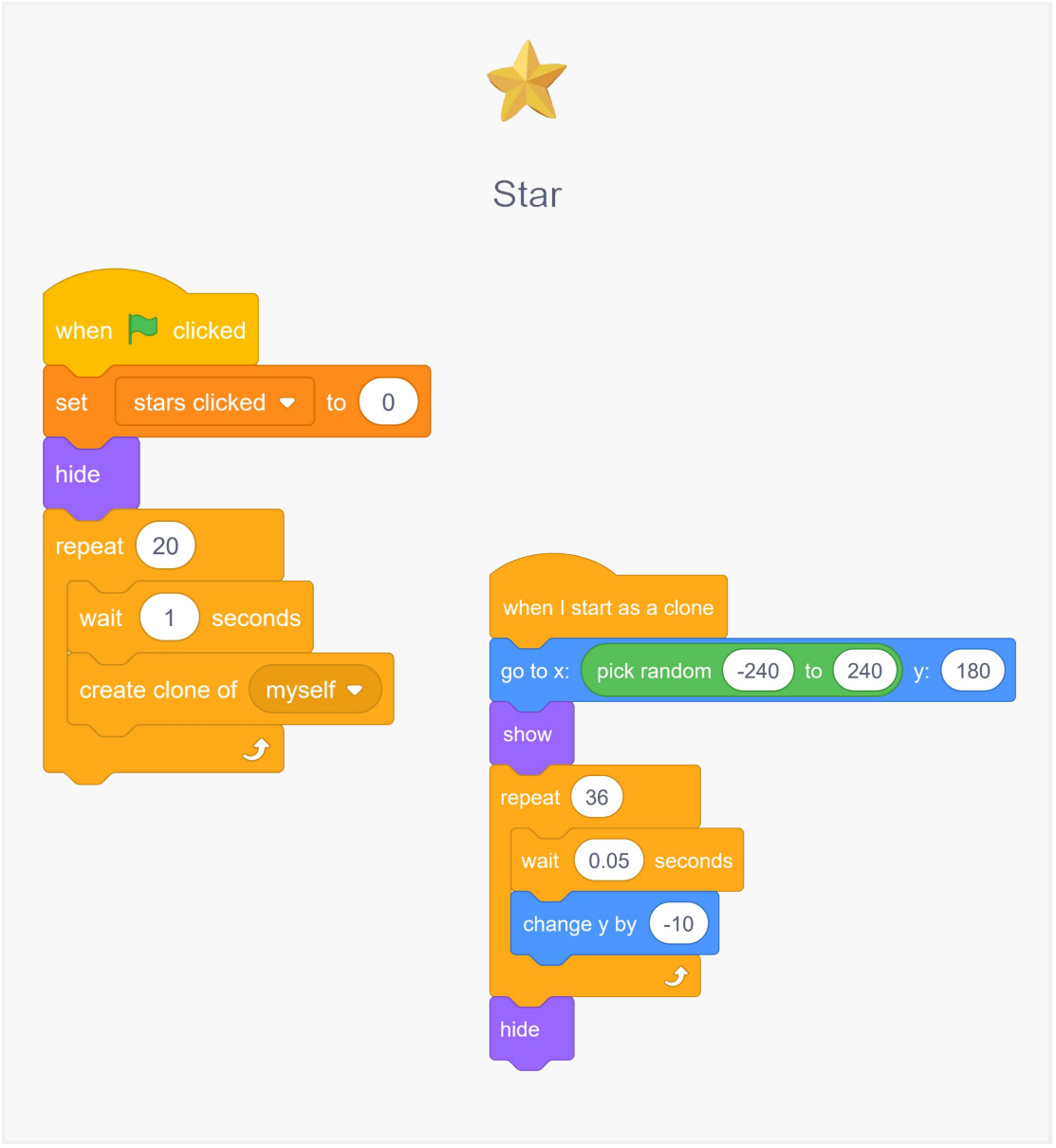
Explore

Read Me

Name	
Username	



Read the code for this *Variables* project.
What happens in this project?



Explore

Unplugged

In this teacher-facilitated unplugged activity, students will explore how variables can be used for different purposes.

Activity

- Form groups of 3–4 students. Each group will play Rock, Paper, Scissors.
- Designate two students to be the players and one or two students to be counters.
- Initially, the student counter(s) should pick a total number of rounds and stop the game when that number of rounds has been played.
- Then, the student counter(s) should agree on a winning number of points. They should then individually count the wins for each player and stop the game when one of the players reaches the winning score.

Discussion

- How did the counting change during the activity?
- In a Scratch project, a variable stores a value (number or text) that can be changed when the project is run. What variables were present in the games that you just played? What other kinds of variables might be used in a game of Rock, Paper, Scissors?
- How could you use a variable in your project?
- What kinds of projects could you make?

This activity is adapted from [Intro to CS with MakeCode](#).

Create

Make a Plan

Name	
Username	

Write or draw your ideas to share what you're currently thinking about for your *Variables* project!

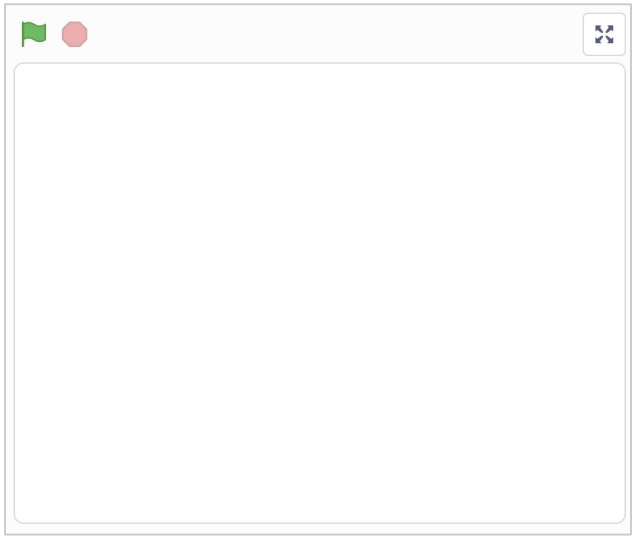
What is your project about?	What will happen in your project?
What do you want to use a variable for?	How will the variable change something in your project?

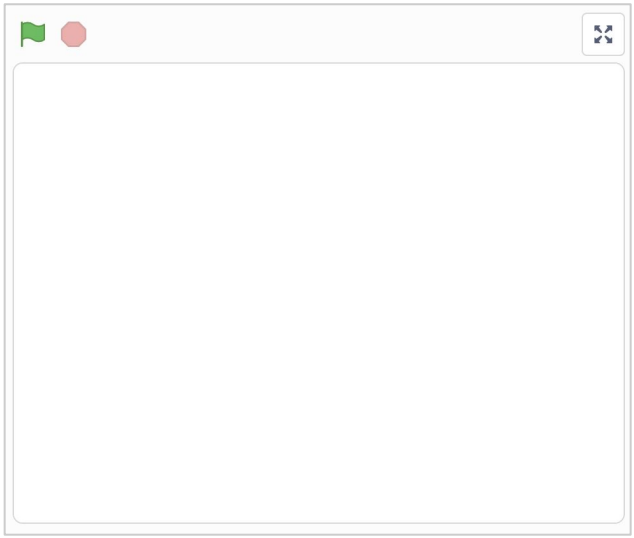
Create

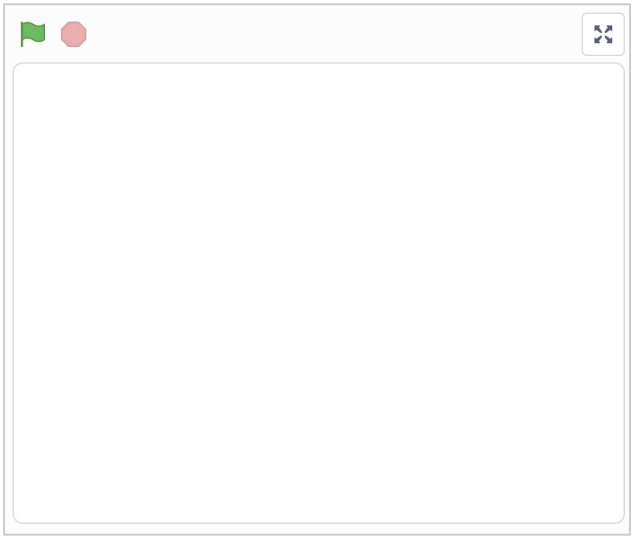
Storyboard

Name	
Username	

What happens in your project? Draw the important events and write about them underneath.







Now that you've made a storyboard, what are you going to work on next in your Scratch project?

Create

Remixable

Name	
Username	

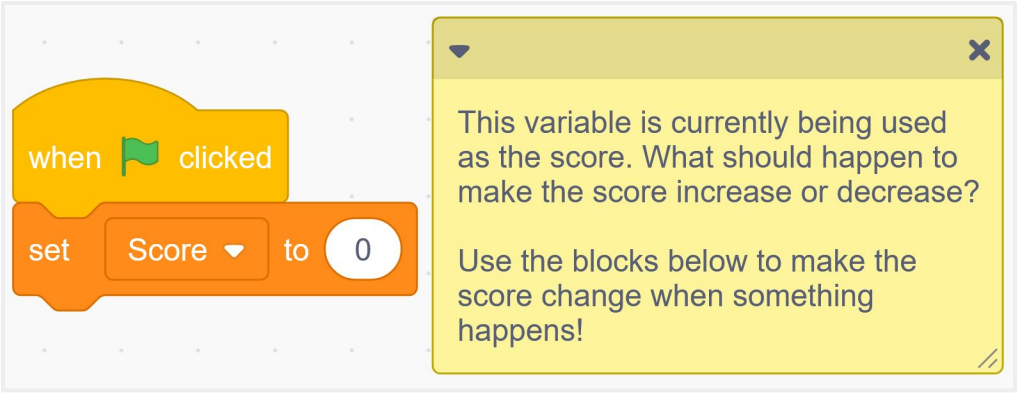
1. Go to the Remixable for *Variables* at scratch.mit.edu/projects/549352599
2. Read the instructions and notes.
3. Try out the project! What do you notice?
4. Click See inside to explore the code.
5. Click Remix to create a remix.

What are 3 things you could change in this project to make it your own?

1.

2.

3.



Share

Red Yellow Green

Name	
Username	

Find three peers to give you feedback on your project. Read their feedback and decide what to do next.

For peers: Write your name and red, yellow, and green suggestions in the table.

Peer Name	RED Something I'd change	YELLOW Something I wondered	GREEN Something I liked

For you: Based on this feedback, one thing I'm going to work on next is...

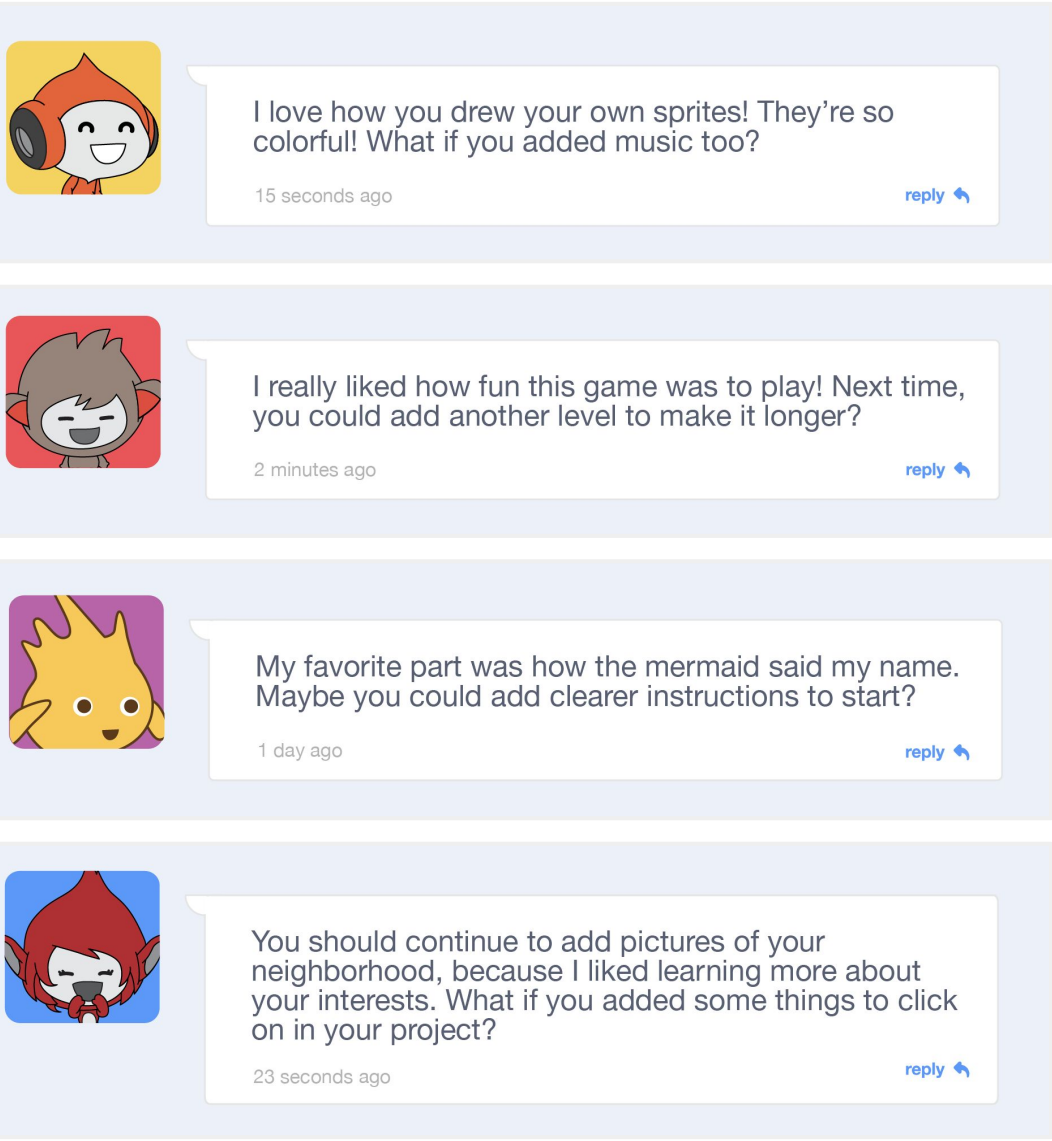
Share

Leave a Comment

Name	
Username	

Feedback from others can help you decide what to work on next. One way that we can share feedback is by leaving comments on Scratch projects!

1. Log onto Scratch, and find your class studio.
2. Click on a project that you want to explore.
3. After you've tried it out, scroll down to the *Comments* section.
4. Write a constructive comment for the project creator to help them work on their Scratch project.
5. Click the Post button.
6. Go back to the class studio to view another project. Try to find projects that have no comments to help everyone get feedback!



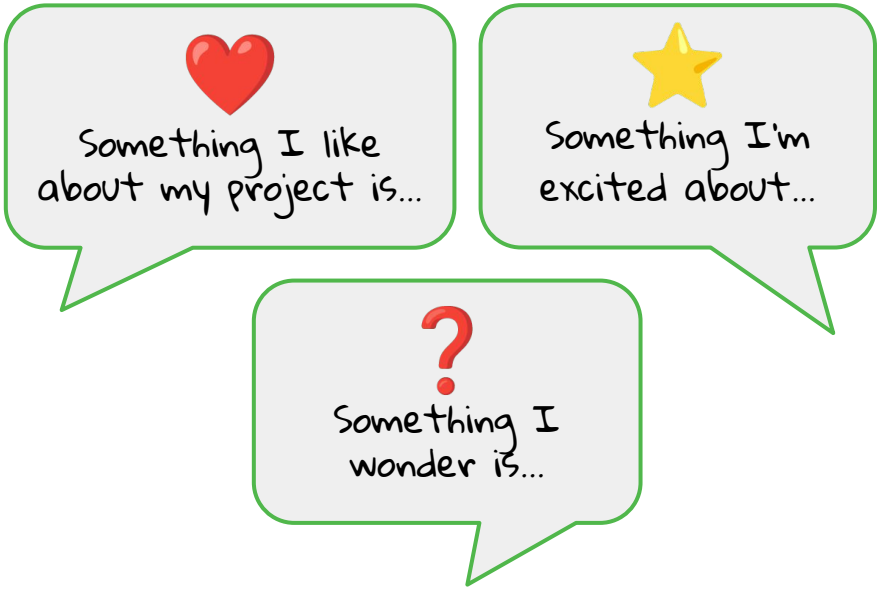
Share

Gallery Walk

Name	
Username	

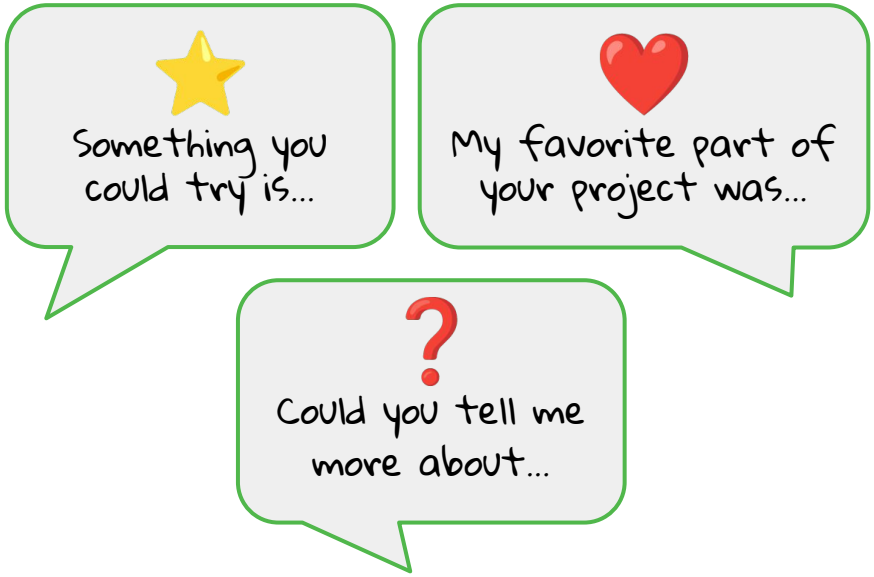
For the project sharer

- Show your project to your classmate.
- Share something you like about your project.
- Share a question you have about your project.



For the feedback giver

- Share something you like about their project.
- Share something they could try in their project.
- Switch! Show your project and get feedback!



When both of you have shared your projects, find a new partner.
Show your project and give feedback to at least three other people!

Reflect

Think, Pair, Share

Name	
Username	

Think: By yourself, think about the questions below. You can write or draw in the boxes.

What is something going well in your project?	What is something that you are working on?	What do you want to work on next?

Pair: With a partner, take turns sharing your responses to the questions above. After you listen to your partner, ask them one question about their project.

Share: What is one thing you want to share with the whole class?

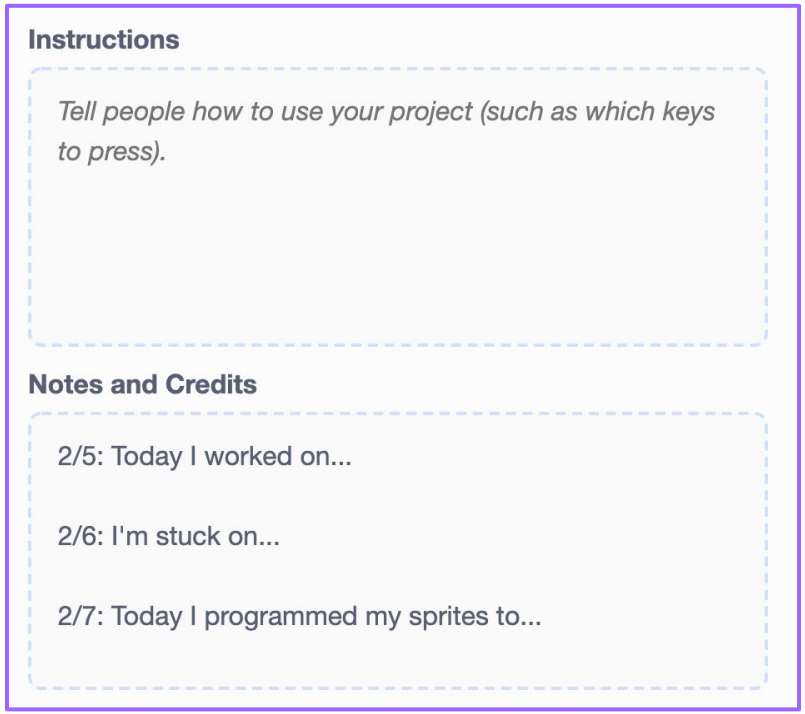
Reflect

Notes and Credits

Name	
Username	

Writing in the *Notes and Credits* helps others learn about your ideas and how you created your project.

1. Log onto Scratch, and find your project.
2. Go to the *Notes and Credits* section of your project.
3. Using the sentence starters below, write 1–2 sentences about what you did today.
4. When you're done, go to your class studio and read what others have written about their projects!



Today I worked on...

I was inspired by...

Next I want to make...

My project is about... because...

Something new I tried was...

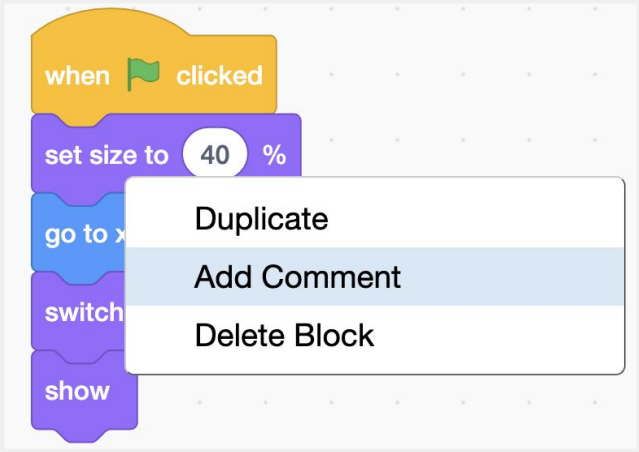
Reflect

Code Comments

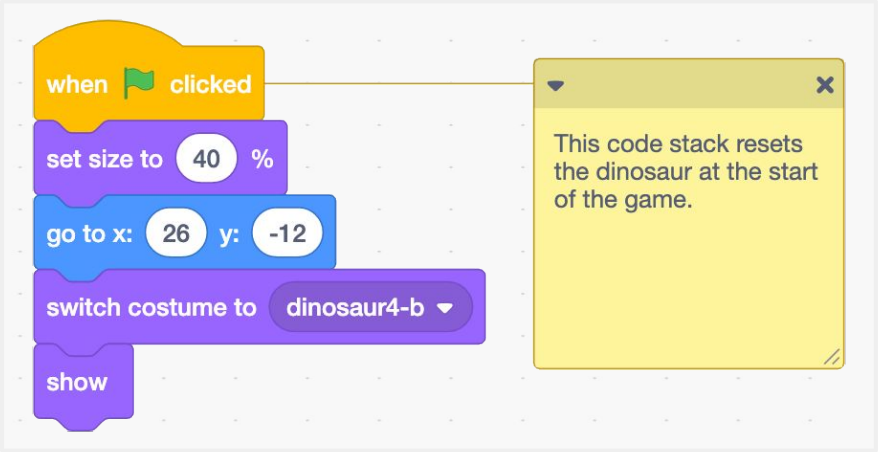
Name	
Username	

Writing comments about specific code stacks can help others learn about how your code works.

First, right-click on a code stack in your project. Then, click on *Add Comment.*



Once the sticky note pops up, write a 1–2 sentence comment on the sticky note.



Try using these sentence starters to write a comment that explains your thinking.

When you're done, go to your class studio and read what others have written about their projects!

This code stack makes...

This code stack resets...

I used these blocks to...

I added this code so that...

Getting Unstuck was made possible with support from the National Science Foundation through grant #1908110. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.