

Create a Drawing App with Scratch

[Teacher Overview Video](#)

Objective: *Students will be able to...*

- Create a drawing app by programming keyboard and mouse inputs to create fun drawings in Scratch.

CSTA Standard

- **1B-CS-02** Model how computer hardware and software work together as a system to accomplish tasks.

Materials & Tools

- [Scratch](#) coding platform
- [Slides](#)
- **Example Program:** See this [completed example program](#) (for teachers).

Computer Science Explanation
 Creating a new app allows programmers to use a program they developed to accomplish new tasks. Students will use inputs from the keyboard and mouse to create a drawing app in Scratch and then use their app to create fun drawings!



Lesson Preparation

- The Scratch URL is <https://scratch.mit.edu/>. Students do not need to log in to Scratch for this lesson. If students will be saving their programs (use “Remix”), they can download their program or log into Scratch if they have an account. Instructions for saving are in the slides and lesson plan.
- The program uses the Pen extension. The slides and video show how to install this.
- This program works best with a laptop or computer and has limited functionality on a tablet. It requires a keyboard for the tablet, and it draws when you tap a location on the drawing canvas, not when you drag your finger across the screen.
- Depending on your class, students may have time to complete only part of the program, which is totally fine! This lesson is designed for any exercise to be a possible stopping point.

Vocabulary

Word	Definition
Loop	A programming structure that repeats one or more commands
Event	Anything that causes, or triggers, something in a program to happen

Lesson Agenda

- Discuss Drawing and Introduce the Program (5 mins)
- Create the App - Guided Practice (15-20 mins)
- Extensions (10-15 mins)
- Showcase, Cleanup, and Save if desired (10 mins)

Lesson Details

(Slides 2-4) Introduce the objective and vocabulary.

Discuss Drawing and Introduce the Program (5 mins)

(Slides 5-6) Discuss how students use lines to create art. Today, they'll go a step beyond that. They will create their very own drawing app and use it to create new drawings! Ask students to think about the steps they take to draw on paper and connect these ideas to programming in Scratch.

(Slides 7-8) Introduce the inputs that students will program to control their drawing tool.

- The mouse pointer draws the lines.
- The up and down arrows lift and lower the pen onto the page.
- The left and right arrows make the line thinner and wider.

Create the App - Guided Practice (15-20 mins)

You can guide students one of two ways; display each slide and have students follow along, or project your screen as you add blocks to make the program. Students will build the program on their devices along with you.

(Slide 9) Have students go to <https://scratch.mit.edu/> to open Scratch. They do not need to sign in for this project. However, if your students already have accounts, they may sign in.

(Slide 10) Students who are not signed in will need to press the "X" to remove these boxes.

(Slide 11) Once students are in Scratch, they will install the pen extension, which gives them access to the coding blocks they'll need to create the app. Our project will use the cat as our pen. Have students follow the animation now.

(Slides 12-21) These slides describe how to build the app step-by-step. You can use the following script if desired.

- (Slide 12) Now we're ready to start programming our app! Each time the user clicks the green flag, they'll be starting a new drawing. We want to lift the pen up off of the page (called a stage in Scratch), erase any lines that are on the page, and set the pen size. We will use the cat as our pen today. These are called initial conditions because they are set every time the program starts.
- (Slide 13) Let's watch this animation and then add our blocks. We start in the yellow Events blocks. Get a "green flag clicked" event block now. Then go to the Pen blocks. Add your three green pen blocks now. We can set a pen size if we want a slightly wider line. I set mine to 5.
- (Slide 14) Let's add code to make the line follow our mouse pointer. When you draw on paper, you move the pencil for as long as you want to draw. We want our program to do the same thing.

- (Slides 15-16) We'll use a forever loop to tell the program to follow the mouse pointer for as long as the user draws. Follow along with this animation. Add a blue "go to" block inside the forever loop and change the word "random" to "mouse pointer."
- (Slide 17) Let's test our program. Click the green flag and move your mouse. Does your character (called a sprite in Scratch) follow your mouse pointer?
- (Slide 18) Now we want to lift and lower the pen when the user presses certain arrow keys on the keyboard. Let's add a "when key pressed" event block. Change the word "space" to "up arrow" and add the "pen up" block.
- (Slides 19-20) You can program the down arrow now and then test your program. Can you lift and lower the pen to stop drawing one line and start a new one somewhere else?
- (Slide 21) You can now use the same steps to program the left and right arrow events. When the user presses the right arrow, we want our line to get thicker, so we use a positive number in the "change pen size" block. You'll have time to experiment and try different numbers in these blocks to see how it changes your program.

At this time, students can draw with their app and experiment to see how changing values in their pen blocks will change the drawings. If time permits, use the next slide to have students program the app to change the color of the line when the user presses the space key.

(Slides 23-24) Show slide 23 and have students program the pen to change the color of the line. Encourage them to experiment with the value in the "change pen color" block to see how it changes their program. Slide 24 show the completed program.

Common Challenges and Questions

Question/Challenge	Answer
I only draw dots.	The "go to mouse-pointer" block drawing must be inside the forever loop.

Extensions (10-15 mins)

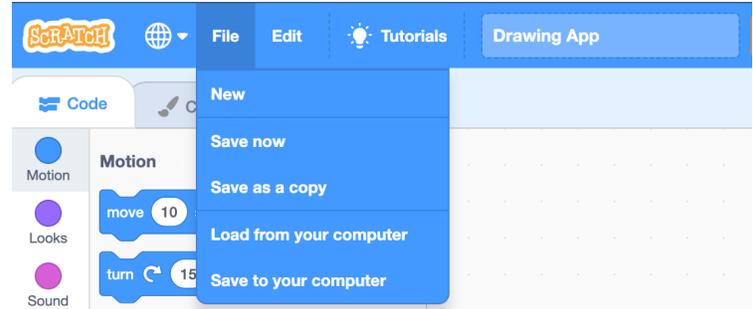
(Slides 25-26) Students who finish early can:

- Program the "E" key to erase lines.
- Choose a specific color for the line.
- Try drawing your school's mascot or a favorite animal!

Showcase and Save (5-10 mins)

(Slides 27-28) Give students the opportunity to share their art programs and drawings with the class or with a partner. Students can save their projects using one of the following ways:

- Students can save the program to their device by clicking on “File” and then “Save to your computer.” They can then reopen the program later.
- If they signed in to a Scratch Account, the project has saved automatically.



Resources

Assessment Rubric

Category	4	3	2	1
	Advanced: demonstrates superior performance	Proficiency: demonstrates consistent performance	Moving toward proficiency/expectations	Experiencing significant difficulty
Create a drawing app by coding keyboard and mouse inputs, events, and loops.	Student successfully creates the drawing app and includes an extension.	Student successfully creates the drawing app.	Student successfully creates a drawing app, but one element is missing, such as making the line wider.	Student needs significant support to create a drawing app.

CodeHS has a growing library of 150+ coding and interdisciplinary lessons just like this one! We also provide professional development and implementation support. If you're interested in bringing a comprehensive CS Curriculum to your school/district, please visit us at codehs.com/elementary.

Scratch is developed by the Lifelong Kindergarten Group at the MIT Media Lab. See <http://scratch.mit.edu>.