Hour of Code with Swift Playgrounds

The Incredible Code Machine Facilitator Guide

Welcome

Lead your own Hour of Code event

Celebrate Computer Science Education Week—host your own Hour of Code event with Swift Playgrounds on iPad. The Hour of Code is a nationwide initiative by Computer Science Education Week and Code.org to introduce millions of students to one hour of computer science and computer programming.

Plan your event from start to finish

Use this guide to set up and lead your Hour of Code with Swift Playgrounds. You'll find tips and activities to help you before, during, and after the event.

Get started with Swift Playgrounds

Swift Playgrounds is a free iPad app that makes learning to code fun and interactive with real Swift code. The app comes with a complete set of Apple-designed lessons.

This year's Hour of Code challenge is The Incredible Code Machine. Become a master builder and create your own machine with code. This challenge is recommended for 12-to-14-year-olds.

If you're new to Swift Playgrounds, you may also want to explore Hour of Code: Starting Your Coding Journey. This challenge introduces students to Learn to Code 1 and Byte's World. Download the Facilitator Guide.
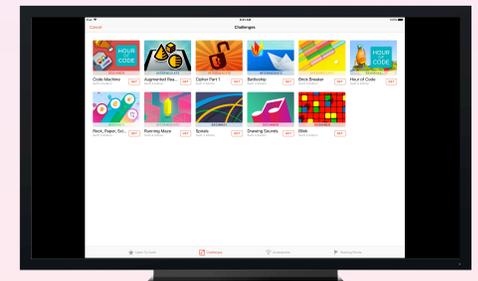
What you'll need

An iPad running iOS 10 or later for each participant is recommended.† Participants can also share iPad devices and code together.

The Swift Playgrounds app. Download here.

Optional: Display for guiding participants through the activities.

†Compatible with iPad Air or later, iPad mini 2 or later, and all iPad Pro devices.

Before the event

1. Plan and invite

- Set a date and find a location for your event.
- Announce your event to teachers, parents, and your community on social media using the hashtag #EveryoneCanCode.
- Invite your group to attend.
- Explore more tools to promote your Hour of Code event.

2. Prepare

Here are some things you can do to prepare in the days leading up to your event.

- Watch these helpful video lessons on coding concepts that are introduced in the Incredible Machine challenge:
  - Introduction to Commands
  - Introduction to Functions and Loops
  - Introduction to Arrays
- Explore the Incredible Machine Hour of Code challenge in Swift Playgrounds.
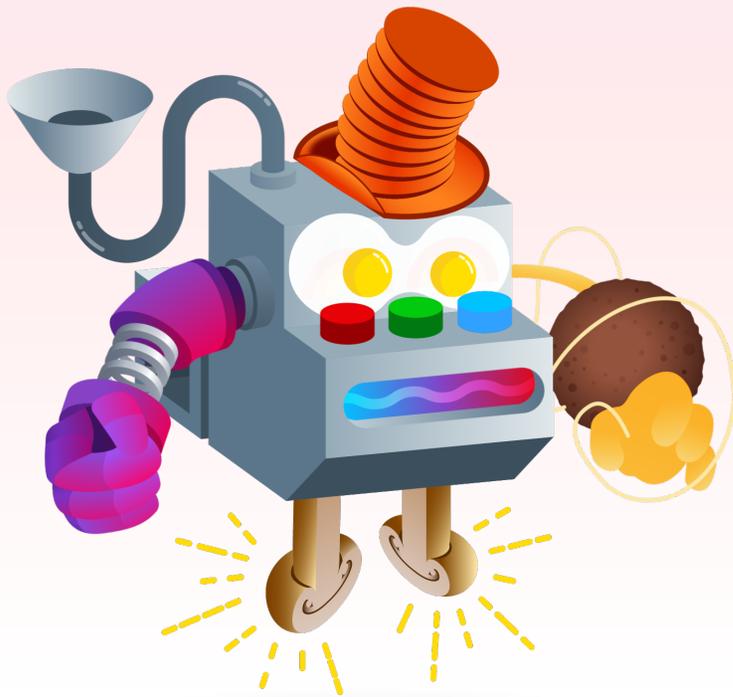
3. Set up the iPad devices

To get ready for the Hour of Code, follow the steps below to prepare the iPad devices. If you're using school-owned iPad devices, work with your IT admin to install Swift Playgrounds.

Participants using their own iPad devices will also need to follow these steps to prepare for the event:

1. Download the Swift Playgrounds app.

2. Open the Swift Playgrounds app.

3. On the Challenges page, tap the Code Machine challenge.

4. Tap Get, then tap Open.

Tap the Hour of Code challenge.

Event Overview

- **Introduction** (5 mins)
- **Warm-up Activity** (10 mins)
- **The Incredible Code Machine** (40 mins)
- **Wrap-up** (5 mins)

During the event

Intro (5 minutes)

Welcome your group to the event and take a few minutes to introduce coding and Swift Playgrounds. Remind participants how code powers virtually everything around us. When you want a pizza, code places your order online. And when you use your favorite apps, code lets you send a message, share a photo, or swap faces with your cat in a photo.

If you have a video display or projector, show this inspiring video about how developers got their start (4 minutes, includes sound).
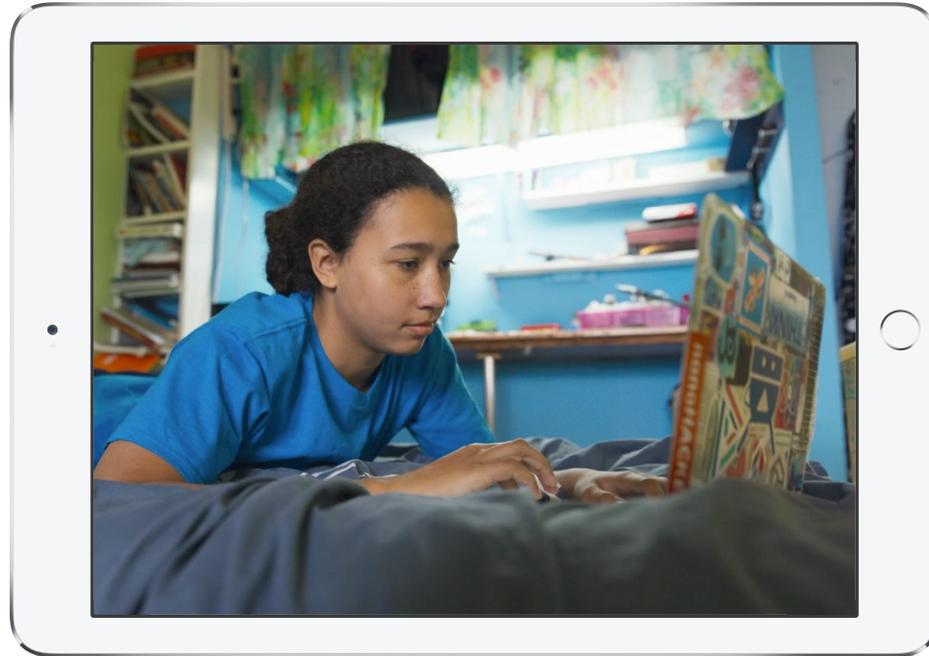
Explain that Swift Playgrounds is an app for iPad that helps you learn and explore coding with Swift, the same powerful programming language used to create popular apps in the App Store.

Warm-up Activity: Inputs and Outputs (10 minutes)

Help participants understand how computers interact with code through inputs and outputs.

Play a game of Pass the Message with the group. Start the chain by whispering a simple phrase, such as "I went on a bike ride this weekend and saw a giant robot," to the first person, who then whispers what they heard to the next person, and so on.

Here's the catch: each person needs to change one word in the sentence. It could be any word in the sentence from "I" to "robot." The sentence doesn't have to make sense by the end of the activity. What sentence did the group end up with?

Before moving into the app, lead a brief discussion about the activity. When each person passed on the message, they provided an input to the next person. They then applied a rule—to change one word—and then outputted the result. This is similar to what a computer does with code. It takes in input, processes it, and then provides the output.

Ask the group

Q. What are some ways you can provide input to a computer?

A. Keyboard, camera, microphone, bluetooth, GPS, etc.

Q. What are some ways a computer can provide output?

A. Speakers, screen, printer, etc.

Q. What are some everyday activities that you do with a computer and what are the inputs and outputs?

A. Use Siri to text a friend: Input "text" via microphone, output text on a screen.
   Use a calculator app to add: Input math problem via keyboard, output answer on a screen.
   Create in GarageBand: Input music via screen, output sound via speakers

Now we'll use these concepts in the Swift Playgrounds app.

Input: What's put in, taken in, or used by a device or system.

Output: What's produced by a device or system.

The Incredible Code Machine (40 minutes)

In the Swift Playgrounds app, tap to open the Hour of Code 2017 challenge. Explore The Incredible Code Machine together and learn what it can do and how it works. The machine is missing some parts. The challenge is to use logic and basic coding skills, like functions and loops, to figure out how to create new parts for it. By the end of this challenge, you'll have a fully restored machine, complete with customizable parts.

Participants may try to create more parts than needed on the beginning pages. Move them on as necessary.

Tap the Table of Contents icon to return to the Introduction, or to jump to other pages in the challenge.

You can combine these items. For new items you create, you can tap them to see the "recipe."

Messed up your code? Try resetting the page

Tap Equipment to track your new parts

Input

Output
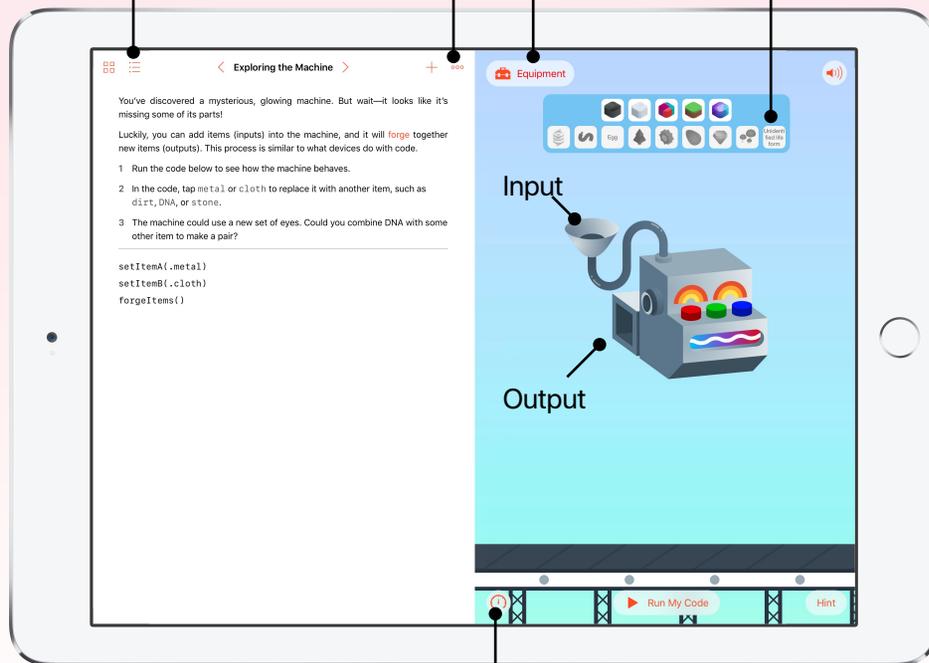
Use Step Through My Code to highlight each line of code as it runs.

Regroup and review the experience together:

- Ask the group to show off their machine with the new parts they've added.

- Were there any patterns to the combination of items and the types of new parts? For example:
  - The red light typically applied "heat" to make items like fried eggs.
  - Combining metal usually results in something with metal in it.

- What strategies did you use to create all the parts? (loops, arrays, and so on)

- How does the machine work, and how does it relate to Pass the Message game?

Wrap-up (5 minutes)

Congratulate your group for completing their Hour of Code with Swift Playgrounds. At the end of the session, show them how to use the Table of Contents to see their Swift Playgrounds Hour of Code participation certificate. You can use Twitter to share screenshots of participants' unique Incredible Code Machine with the Apple Education community. You can tag it @AppleEDU and use the hashtag #EveryoneCanCode.

Remind them that they can keep learning by downloading the Learn to Code 1 and 2 playgrounds. Encourage them to keep coding so that one day they can build apps that bring their ideas to life.

Explore more

Everyone Can Code is a program designed to give everyone the power to learn, write, and teach code. Tap the links below to explore free teaching and learning materials we created to make it easy to continue coding with Swift.

For elementary school on iPad

- Get Started with Code 1 Teacher Guide provides lessons to help any teacher guide K–2 students through coding basics with visual-based apps like codeSpark Academy and Tynker.

- Get Started with Code 2 Teacher Guide helps teachers continue the coding journey with students in grades 3–5 through fundamental coding concepts using a visual-based app like Tynker.

If you're looking to host an Hour of Code with elementary school students, check out the following challenges.

Tynker

Introduce participants who are just getting started with Everyone Can Code to the two Tynker courses used in the curriculum with these one-hour challenges:

- Get the Space Quest challenge
- Get the Space Quest Teacher Guide

- Get the Dragon Blast challenge
- Get the Dragon Blast Teacher Guide

Those who have already started with Tynker can check out their other Hour of Code challenges here:

- Get the Tynker Hour of Code challenges
- Get the Hour of Code teacher guides

codeSpark Academy

codeSpark Academy has these two challenges for Hour of Code that you can access on their website:

Snoopy's Snow Brawl Challenge. In this brand-new challenge, teams play a friendly snowball fight against their friends or the computer. Using sequencing and loops, they'll program their characters to throw and avoid snowballs. The last team standing wins.

codeSpark Academy Puzzles. Those who are new to codeSpark Academy can also try this challenge that introduces them to The Foos characters. Kids will learn about sequencing and loops through a series of puzzles. And they'll help The Foos solve problems in each level by programming them to perform a set of commands.

For middle school and above on iPad

- Swift Playgrounds is a free iPad app for first-time coders with a complete set of Apple-designed Learn to Code lessons that make getting started fun and interactive.

- Swift Playgrounds: Learn to Code 1 & 2 Teacher Guide provides lesson plans, evaluation rubrics, downloadable presentations, and more to help any teacher bring Swift Playgrounds into the classroom.

- Swift Playgrounds: Learn to Code 3: Teacher Guide helps teachers build on coding skills from Learn to Code 1 & 2. It includes story activities, code review lessons, Keynote presentations, journal prompts, and more.

For high school and above on Mac

The Intro to App Development with Swift course introduces students to the world of app development and the fundamentals of Swift and Xcode. The course culminates in a final project where they can choose one of two basic iOS apps to build.

- Intro to App Development with Swift
- Intro to App Development with Swift: Teacher Guide

App Development with Swift takes students further, whether they're new to coding or want to expand their skills. By the end of the course, they'll be able to build a fully functioning app of their own design.

- App Development with Swift
- App Development with Swift: Teacher Guide