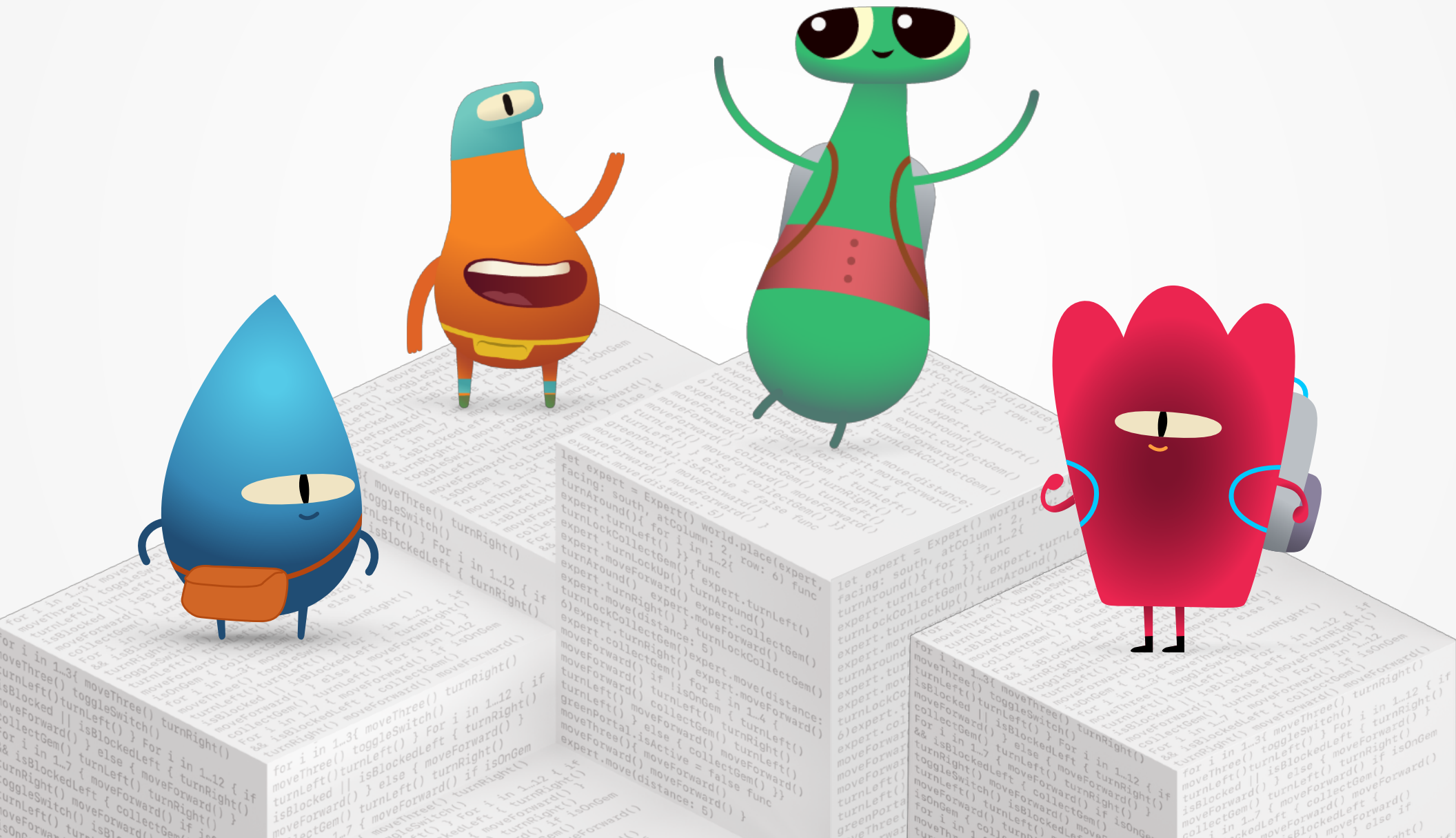
Swift Coding Club

Everyone Can Code



Welcome to the Swift Coding Club!

Learning to code teaches you how to solve problems and work with others in creative ways. And it helps you bring your ideas to life.

Swift Coding Clubs are a fun way to learn to code and design apps. Activities built around Swift, Apple's coding language, help you collaborate as you learn to code, prototype apps, and think about how code can make a difference in the world around you.

You don't have to be a teacher or a coding expert to run a Swift Coding Club. The materials are self-paced, so you can even learn alongside your club members. And you can all celebrate your club's ideas and designs with an app showcase event for your community.

This guide is arranged in three sections:

Get Started

Everything you need to launch a Swift Coding Club.

Learn and Apply

Modules and activities for club sessions.

Celebrate

Helpful resources to plan and host a community event.

Coding Resources

Swift Coding Clubs are built around a variety of resources for teaching code. Apple takes coders from learning the basics on iPad to building real apps on Mac.

Everyone Can Code | Ages 10+

Use Swift code to learn coding fundamentals with Swift Playgrounds on iPad. Learn more >

Develop in Swift | Ages 14+

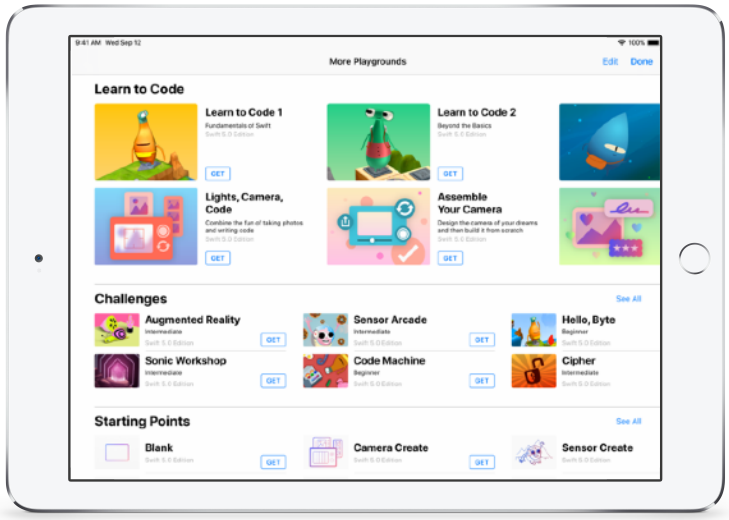
Learn to develop apps in Xcode on Mac. Learn more >

Get Started

1. Explore Everyone Can Code resources

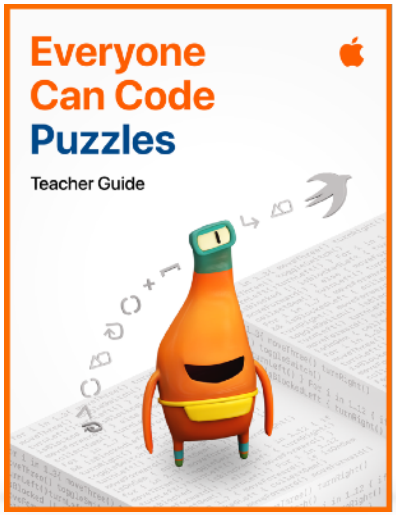
Everyone Can Code introduces learners to the world of coding through interactive puzzles, playful characters and engaging activities. Before you start designing your club experience, it's helpful to explore the Everyone Can Code resources below.

Swift Playgrounds is a free iPad app that makes learning Swift interactive and fun. There's a built-in library of lessons, as well extra challenges created by leading developers and publishers.



Download and explore Swift Playgrounds >

Everyone Can Code Puzzles includes activities to introduce coding concepts, connect them to everyday life, and then apply them by solving puzzles in Swift Playgrounds.



Download the Everyone Can Code curriculum >

2. Check your tech

Be sure you have the following before your first meeting:

- **iPad.** Swift Playgrounds requires a 64-bit iPad with iOS 10 or later, or iPadOS 13. This includes iPad mini 2 or later, iPad Air or later, or iPad Pro. It's best if each person has their own device, but they can also share and code together.
- Swift Playgrounds app. Download Swift Playgrounds >
- **Everyone Can Code Puzzles.** This book will guide participants through activities in the Build a Project and Quiz Your Friends modules. Download Everyone Can Code Puzzles >

Visit Apple Support to get help with Apple products.

3. Make a plan

Here are some things to consider:

- Who are your club members? What are their interests? Do they have experience with coding or are they brand new?
- How often will your club meet? If you're planning a summer camp, how many hours of coding activities will you have?
- What technology is available for the club?
- What are the goals of your club?

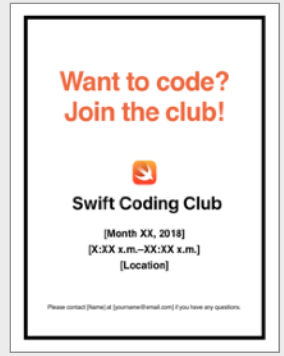
4. Spread the word

Let people know about your Swift Coding Club. Here are some ideas and resources to attract new members to your club:

- **Announce your club.** Use email, social media, the web, flyers or word of mouth to let your community know about your club.
- **Host an informational meeting.** Ask potential club members about their interests and the types of projects they'd want to create. Talk about ideas for holding community events and how club members can get involved. You can also share a short video about the club online.

These items can help you promote and personalise your Swift Coding Club:

- **Posters.** Download this free template, then personalise it to create your own poster. Print and display it, or make a digital poster to share online. Make sure you include details for when and where the club will meet and how to join.
- **Stickers and T-shirts.** Use these Swift Coding Club stickers to help promote your club. T-shirts are a great way to recognise members who participate in app showcase events. Download the Swift Coding Club T-shirt template to make shirts for your members.



Swift Coding Club poster

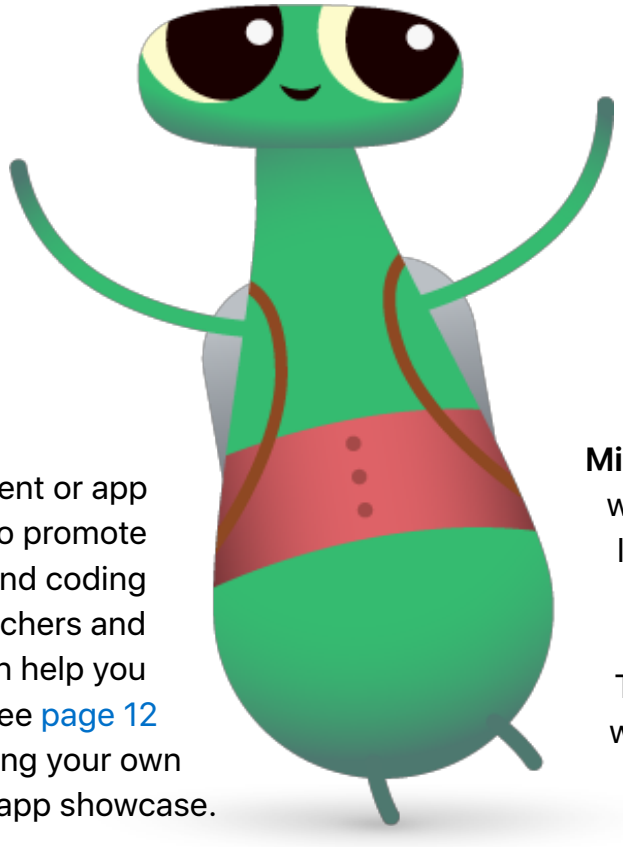
Swift Coding Club sticker

Swift Coding Club T-shirt

Tips for Club Leaders

Build a leadership team. Having a group of members who help with leading the club can make it much easier and more fun. Which club members have leadership potential? Think about adding officers to your club for events, coding, app design and more.

Learn together. Club leaders don't have to know everything. Help your members work on their own research and problem-solving skills and encourage them to help others.



Share ideas. Some members will be interested in making games. Others might want to create apps to help people, learn Swift or control robots. Think about ways for members to work together on projects they care about.

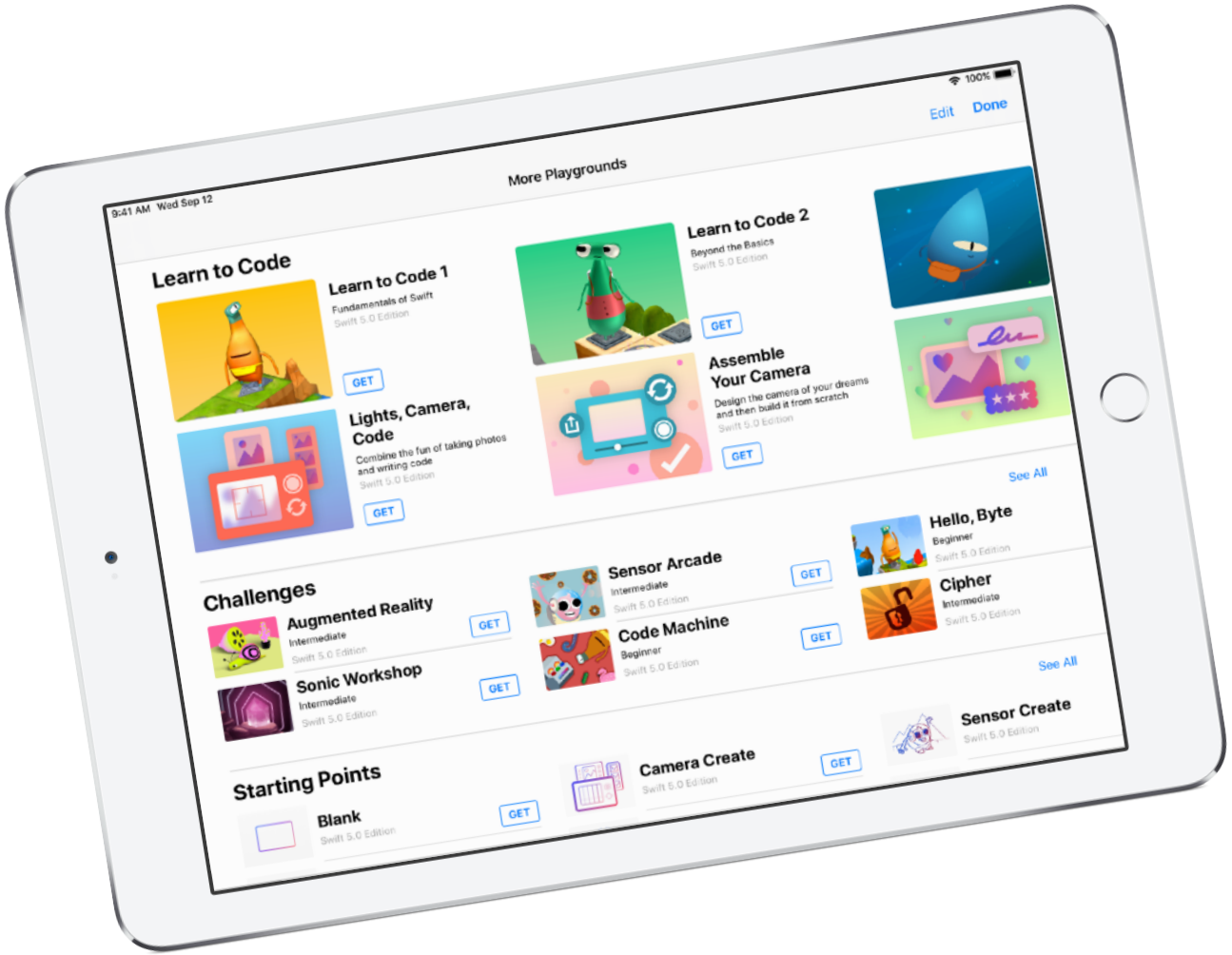
Show off. A community event or app showcase is a great way to promote your club, design ideas and coding skills to friends, families, teachers and the community. It might even help you to recruit more members. See page 12 to get tips on holding your own community event or app showcase.

Mix it up. Sometimes members who are more advanced can leave others behind. See if those members can partner up with beginners for pair programming. Teaching someone else is a great way to learn!

Learn and Apply

1. Explore Swift Playgrounds

The club materials are built around Swift Playgrounds, which includes a built-in library of lessons, as well as extra challenges created by leading developers and publishers. Start by familiarising yourself with the content in Swift Playgrounds and features of the app.

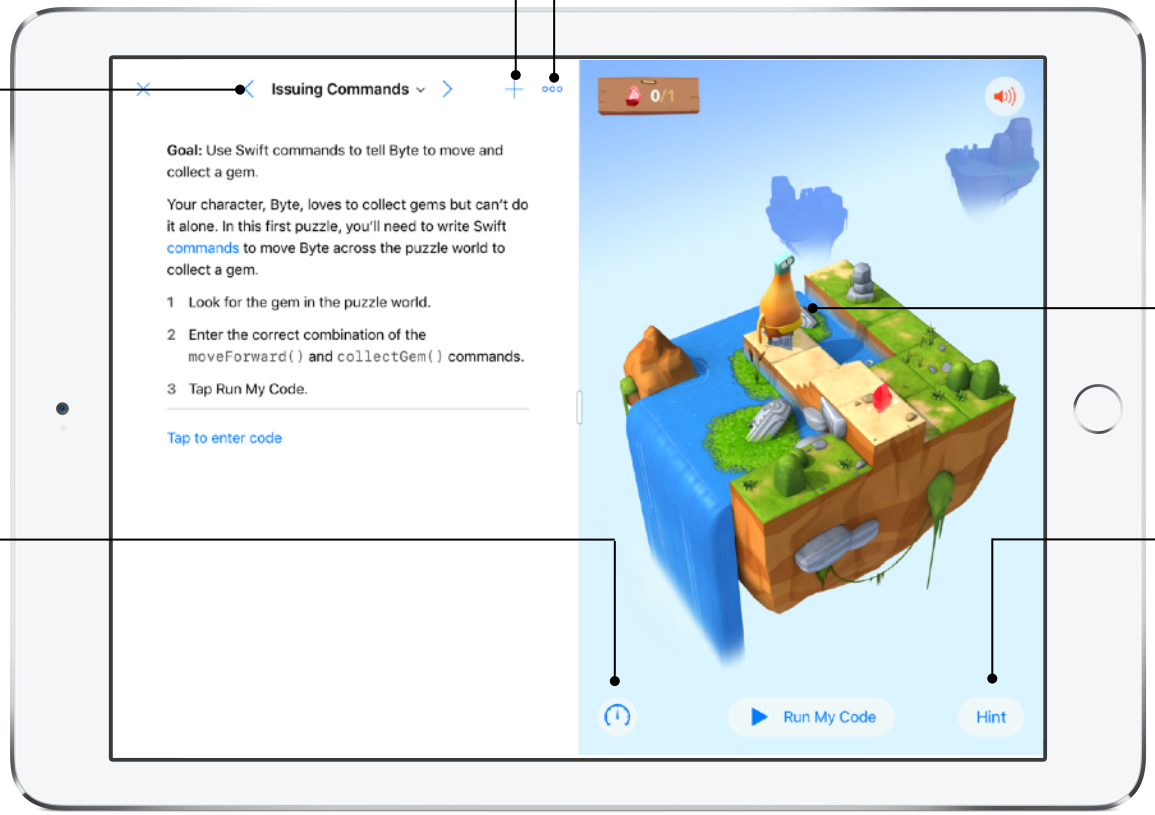


Swift Playgrounds Features

Snippets Library
To minimise typing, tap in the toolbar to access the Snippets Library and quickly drag commonly used pieces of code.

Tools
Use this menu to reset the page, take a picture, create a PDF or record a movie.

Pages menu
Tap the page heading to see all playground pages. Tap a page or use the arrows to navigate between pages.



Choose a character
Personalise your experience by tapping the character to choose a different one.

Control the speed
Speed up or slow down the code.

Highlight code as it runs
Use Step Through My Code to highlight each line of code as it runs to better understand what the code is doing.

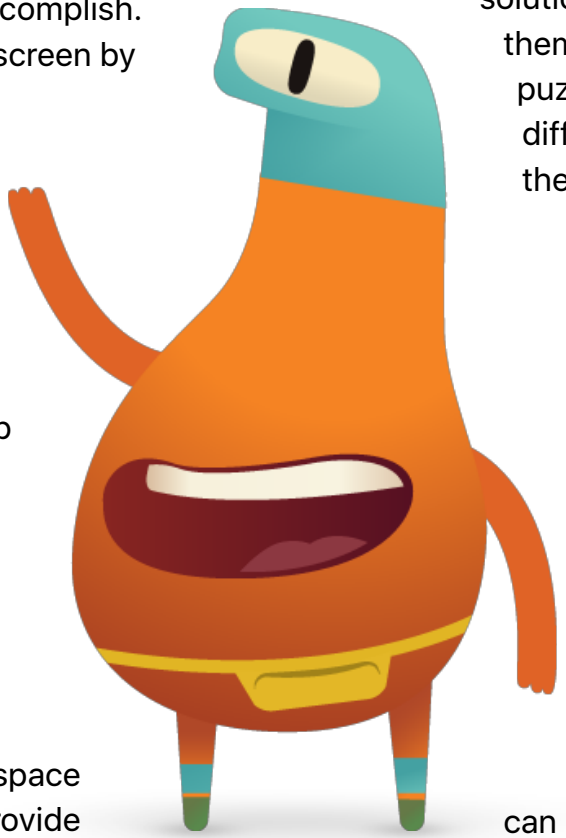
Hint
This feature provides helpful suggestions. And though it will also eventually reveal a puzzle's solution, you can't simply cut and paste the solution. To move on, you still have to complete the steps and write the code yourself.

Tips for Learning with Swift Playgrounds

Explore the puzzles first. Encourage club members to zoom and rotate Byte's world in the live view so they can take a good look at what they need to accomplish. They can also view it full screen by touching and holding the partition between the two windows, then dragging to the left.

Break down the puzzles. The puzzles get tricky. Club members can divide a puzzle into parts to help them think through all the steps to solve it. They can use Pages or Notes to plan and write out their steps before entering the code.

Set up a help desk. Maintain a space where club experts can provide support to their peers.



Solve in multiple ways. Each puzzle has many solutions. If members finish early, encourage them to think of different ways to solve the puzzles. Thinking flexibly and comparing different solutions can help them improve their critical thinking skills.

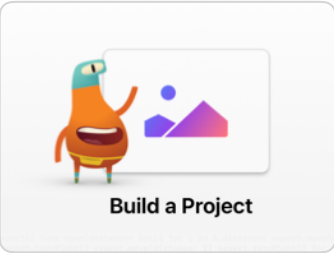
Pair programming. Have club members try working together on one iPad. They can brainstorm how to solve the puzzles and take turns writing the code.

Use accessibility features. Swift Playgrounds works well with the built-in accessibility features in iOS and iPadOS so that everyone can learn to code. For example, coders can invert colours, enable greyscale and zoom to adjust visibility.

2. Choose your modules

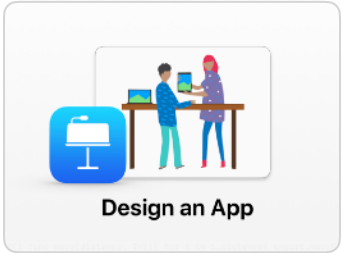
Club materials are organised in modules that interweave coding and creative design activities. Each module consists of 12 one-hour sessions and addresses a particular theme and level of coding expertise. In Learn and Try sessions, club members explore key concepts and apply them to coding puzzles and challenges within Swift Playgrounds. And in Apply and Connect sessions, they consider how we use code to explore ideas and create new products. They apply their coding and design skills to build or design a Swift Playgrounds project for a particular audience.

You'll find facilitator guides for each module in the second part of this document, or you can use the links below to explore them now.



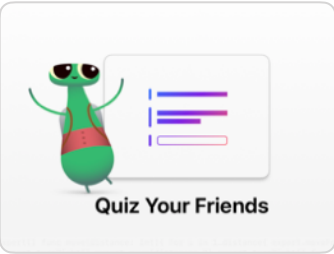
Build a Project

Club members use iPad to master coding basics in Learn to Code 1 and Learn to Code 2 in Swift Playgrounds. They apply their new skills to design and build a playground project that responds to touch events. View module >



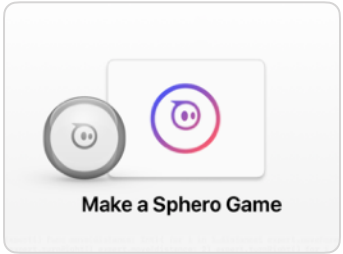
Design an App

Club members work together to design an app to help solve a problem in their community. They engage in a design process that shows them how to brainstorm, plan, prototype and evaluate an app of their own. View module >



Quiz Your Friends

Club members build on the skills they developed in Build a Project by completing more challenging puzzles in Learn to Code 1 and Learn to Code 2 in Swift Playgrounds. They create a playground project that requests and responds to user information. View module >



Build a Sphero Game

Club members program Sphero to re-create classic arcade games. They work together to explore the code behind the game and edit the code to create their own experience. They use their skills to design their own game using one or more Sphero robots. View module >

3. Take it further

You can also add sessions that support your members' interests. You could expand on design and coding activities with experiences such as exploring a connected device, building a drone obstacle course, or creating a robot rescue mission challenge.

To prompt design brainstorming, you might even want to add guest speakers or field trips to help club members better understand the audience and design requirements for a project.

Celebrate

Community event or app showcase

Involve the broader community and explore the potential of code for solving contemporary problems by hosting a community event or app showcase. These events are also the perfect way to show off your club members' talents!

1. Plan the big event. Set a date and invite students, teachers, parents and community members to attend.

Allow time for each team to present their project and hold a short Q&A session. If you have a large group, you can split the club into two rounds where members can watch each other's presentations.

Consider finishing the event with a fun slideshow of photos taken throughout club sessions.

2. Design awards. Friendly competition can be a great motivator. Inspire club members by offering awards that recognise specific strengths in coding and design, for example:

- Best Engineering
- Best Innovation
- Best Design
- Best Presentation

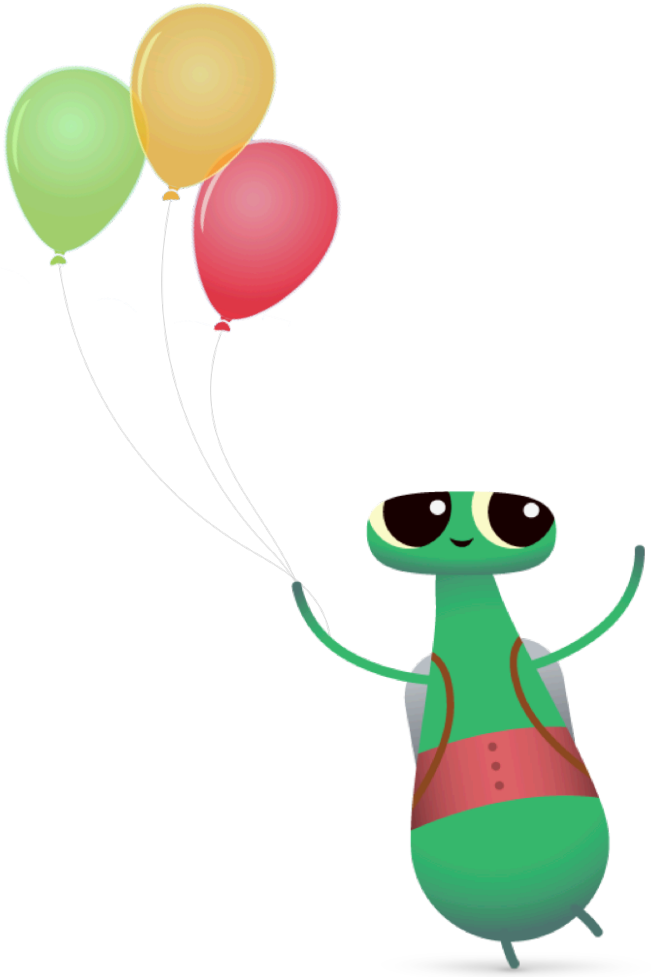
You could also encourage audience participation with a People's Choice award.

You can download and modify this certificate for different awards.

3. Recruit judges and mentors. Judges and mentors can be teachers or staff, students with expertise in coding, experts from the developer or design industry, school governors, local community leaders, or individuals who would benefit from the project idea.

Judges don't have to wait until the showcase to meet the club. Consider inviting them as guest speakers to share their expertise when learners are in the brainstorming or planning phase of their project.

4. Share and inspire. You may want to record the presentations. Share them with the wider community and create a highlight reel to inspire future club members.



Swift Coding Club

Everyone Can Code

Certificate of Achievement

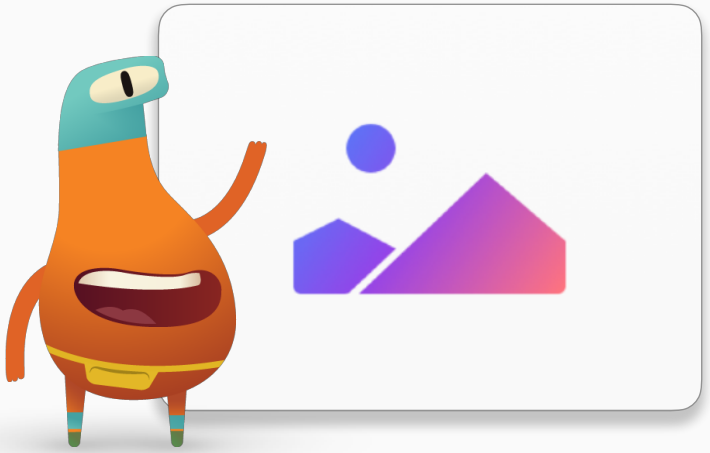
Awarded to

For

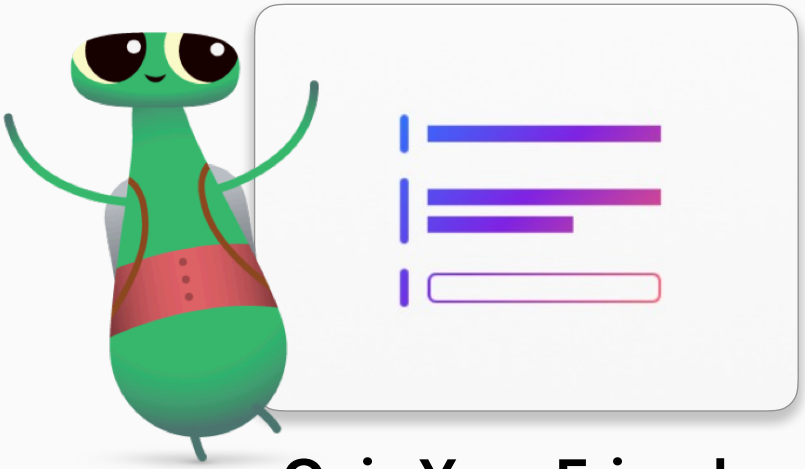
Signature

Date

Swift Coding Club Modules

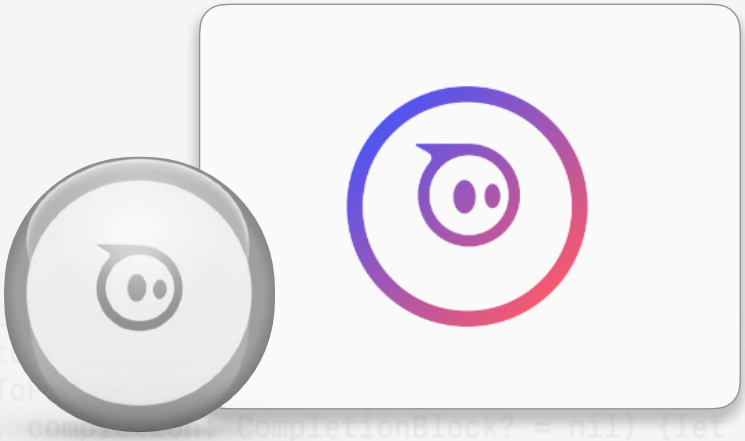


Build a Project

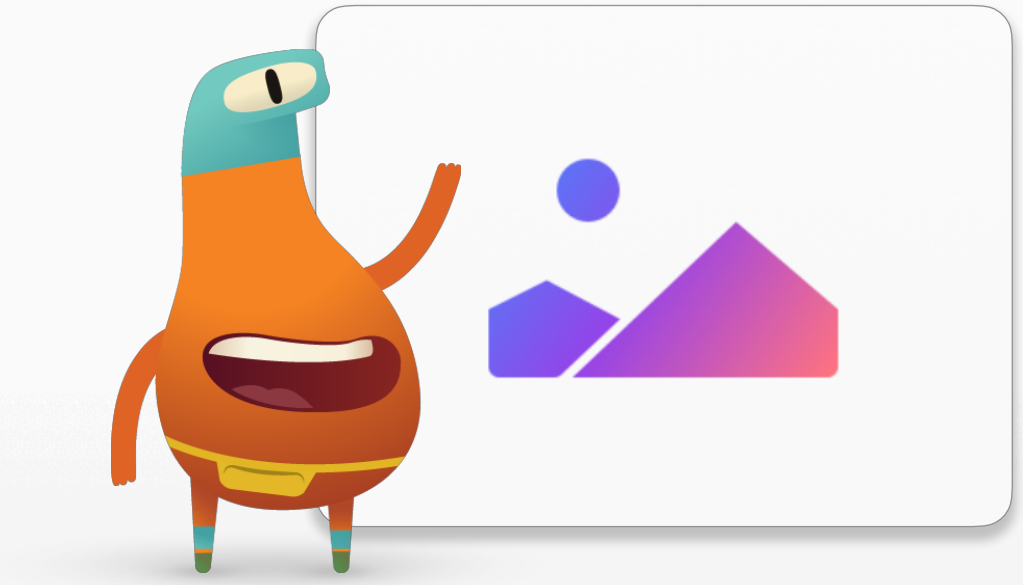


Quiz Your Friends

Design an App



Make a Sphero Game



Build a Project

Build a Project
Module Overview

In these sessions, club members master coding basics by completing fun activities from the Everyone Can Code Puzzles guide. They practise code by solving puzzles in Learn to Code 1 and Learn to Code 2 in Swift Playgrounds and apply their new skills to design and build a playground project that responds to touch events.

In Learn and Try sessions, club members explore key concepts and apply them to coding puzzles and challenges within Swift Playgrounds. In the Apply and Connect sessions, they'll learn about using code to explore ideas and create new products. At the end of the sessions, consider hosting a community event for club members to demonstrate their projects.

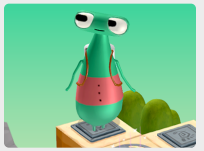
To learn more about each activity, access additional resources and find out how to support or challenge club members, explore the Everyone Can Code Puzzles Teacher Guide.

Session Overview

- Learn and Try: 6 sessions
- Apply and Connect: 6 sessions
- Community Event

Resources

Learn to Code 1



Learn to Code 2

Spirals

Shapes

Build a Project

1 Commands

Explore the foundational concept of a command — a specific instruction given to a computer. Learn to code using commands in a sequence.

Learn: Watch the introduction to Commands in Learn to Code 1

Hide and Seek (page 3)

Try: Complete puzzles in the Commands chapter in Learn to Code 1 (pages 4–10)

Learn to Code 1 Commands

- Introduction
- Issuing Commands
- Adding a New Command
- Toggling a Switch

2 Functions

Learn how to create your own commands by authoring functions, and call functions you've written.

Learn: Watch the introduction to Functions in Learn to Code 1

Origami (page 15)

Try: Complete puzzles in the Functions chapter in Learn to Code 1 (pages 16–21)

Learn to Code 1 Functions

- Introduction
- Composing a New Behaviour
- Creating a New Function
- Nesting Patterns

3 For Loops

Explore for loops, and how you can make your code more efficient using functions and loops.

Learn: Watch the introduction to For Loops in Learn to Code 1

Pattern Maker (page 26)

Try: Complete puzzles in the For Loops chapter in Learn to Code 1 (pages 27–31)

Learn to Code 1 For Loops

- Introduction
- Using Loops
- Looping All the Sides

Build a Project

4 Variables

Learn about how computers store information using variables, and how to code using variables.

Learn: Watch the introduction to Variables in Learn to Code 2

NewsBot (page 36)

Try: Complete puzzles in the Variables chapter in Learn to Code 1 and Spirals starting point (pages 37–43)

Learn to Code 2 Variables

- Introduction
- Keeping Track

Spirals

- Overview
- Hypocycloids
- Epicycloids
- Hypotrochoids
- Ellipses
- Playtime

5 Conditional Code

Explore Boolean logic and how to write conditional code.

Learn: Watch the introduction to Functions in Learn to Code 1

Someone Says (page 49)

Try: Complete puzzles in the Functions chapter in Learn to Code 1 (pages 50–56)

Learn to Code 1 Functions

- Introduction
- Checking for Switches
- Using else if
- Looping Conditional Code
- Defining Smarter Functions

6 Design for an Audience

Consider different user perspectives and how to design products for a specific audience.

Connect: See it from someone else's point of view (page 58)

Build a Project

7 Types and Initialisation

Learn how to describe types and how to initialise types in your code.

Learn: Watch the introductions to the Types and Initialisation chapters in Learn to Code 2

Qualities of a Good Design (page 62)

Try: Complete puzzles in the Types and Initialisation chapters in Learn to Code 2 (pages 63–66)

Learn to Code 2 Types

- Introduction
- Deactivating a Portal

Initialisation

- Introduction
- Initialising Your Expert
- Using Instances of Different Types

8 Interactive Shapes

Explore the Shapes Starting Point in Swift Playgrounds, which is where you'll start your project development in the sessions that follow. Experiment with the Create, Touch and Animate pages, and work out what each section of code achieves, and how. As a group, list the graphic elements and functions available to you within the Shapes Starting Point.

Shapes

- Create
- Touch
- Animate

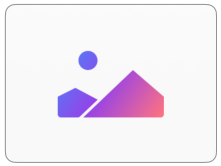
9 Build a Shapes Project

Explore how you can create a hand-eye coordination project in the Shapes Starting Point. Revisit and add to your list of graphic elements and functions.

Apply: Build a hand-eye coordination project (page 67)

Shapes

- Canvas



Build a Project

10 Design a Project

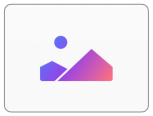
Brainstorm other projects you could create using the Shapes Starting Point. Consider the graphic elements and functions available, and how they could meet the needs of a specific audience. Explore ideas collectively, then work in pairs to sketch an original idea that shows how the project achieves your purpose and is designed for a specific audience.

11 Build the Project

Work in pairs to code your project idea in the Canvas page of the Shapes Starting Point. Refer to your sketch from the last session.

Shapes

- Canvas

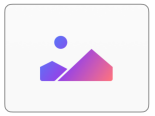


12 Evaluate the Project

Test your playground project with your peers. Practise explaining how your project works — along with your design decisions — to prepare for the community event, where you'll share your creations.

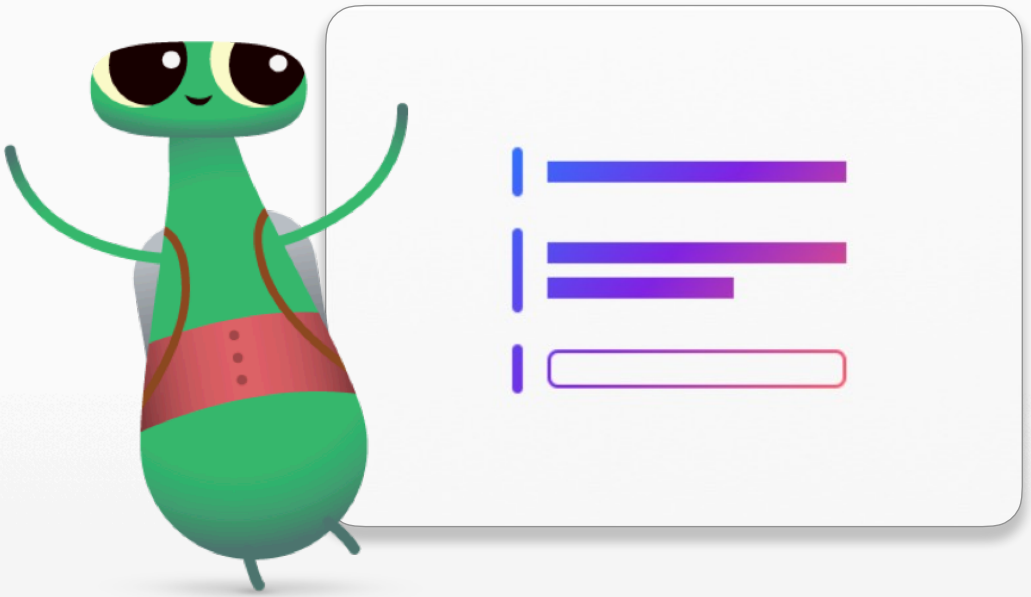
Shapes

- Canvas



Community Event

Celebrate the club's achievements in a community event. You can demonstrate your project, explain your design process and receive feedback from your community.



Quiz Your Friends

Quiz Your Friends
Module Overview

In this module, club members build on their skills by completing more challenging activities in the Everyone Can Code Puzzles guide. They practise their code by solving puzzles in Learn to Code 1 and Learn to Code 2 in Swift Playgrounds and use their advanced skills to develop a playground project that requests and responds to user information. This module requires understanding of materials in Puzzles chapters 1–6, the completion of the Build a Project clubs module or equivalent background knowledge.

In Learn and Try sessions, club members explore key concepts and apply them to coding puzzles and challenges within Swift Playgrounds. In the Apply and Connect sessions, they'll learn about using code to explore ideas and create new products. At the end of the sessions, consider hosting a community event for club members to demonstrate their projects.

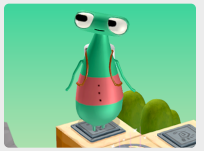
To learn more about each activity, access additional resources and find out how to support or challenge club members, explore the Everyone Can Code Puzzles Teacher Guide.

Session Overview

- Learn and Try: 4 sessions
- Apply and Connect: 8 sessions
- Community Event

Resources

Learn to Code 1



Learn to Code 2

Rock Paper Scissors

Answers

Quiz Your Friends

1 Functions with Parameters

Learn how to give computers more information by making functions more specific with parameters.

Learn: Watch the introduction to Functions with Parameters in Learn to Code 2

Recipe for Success (page 71)

Try: Complete puzzles in the Functions with Parameters chapter in Learn to Code 2 (pages 72–75)

Learn to Code 2 Functions with Parameters

- Introduction
- Moving Further Forward

2 Design a Game

Use the Rock, Paper, Scissors challenge in Swift Playgrounds to design a new and improved edition of the game.

Apply: Build a Rock, Paper, Scissors game (page 76)

Rock, Paper, Scissors

- Overview
- Personalise the Game
- Add Actions
- Add Hidden Actions
- Add Opponents

3 Logical Operators

Learn how to code specific behaviour in response to certain conditions using logical operators.

Learn: Watch the introduction to Logical Operators in Learn to Code 1

Someone Says, Round 2 (page 81)

Try: Complete puzzles in the Logical Operators chapter in Learn to Code 1 (pages 82–85)

Learn to Code 1 Logical Operators

- Introduction
- Using the NOT Operator
- Checking This AND That
- Checking This OR That

Quiz Your Friends

4 Create a Quiz

Combine knowledge of operators with conditions, variables, functions, and functions with parameters to create a quiz in the Answers Starting Point in Swift Playgrounds.

Apply: Build a quiz (page 86)

5 Design a Quiz Project

Come up with an idea for your own playground quiz project, built on the Answers Starting Point. Determine the purpose of your quiz, explore designs for quiz apps, consider the target audience and sketch your own idea.

6 While Loops

Learn about while loops and how to use them to loop a block of code until a condition is true.

Learn: Watch the introduction to Logical Operators in Learn to Code 1

Playground Games (page 90)

Try: Complete the puzzles in the Logical Operators chapter of Learn to Code 1 (pages 91–94)

Answers

- Text
- Types

Learn to Code 1 Logical Operators

- Introduction
- Running Code While…
- Create Smarter While Loops
- Nesting Loops

Quiz Your Friends

7 Refine the Quiz

Update your original quiz to bring different modes into your while loops. You'll use these skills in later sessions when you'll code your own project idea.

Apply: Refine your quiz (page 95)

Answers

- Text
- Types

8 Arrays and Refactoring

In this session, club members learn new technical skills using arrays, then use those skills to refactor their code.

Learn: Watch the introduction to Arrays and Refactoring in Learn to Code 2

Evaluate (page 99)

Try: Complete the puzzles in the Arrays and Refactoring chapter in Learn to Code 2 (pages 100–105)

Learn to Code 2 Arrays and Refactoring

- Introduction
- Storing Information
- Iteration Exploration
- Stacking Blocks
- Getting in Order
- Fixing Index Out of Range Errors

9 Add Choices to the Quiz

Update your quiz playground project to include lists of choices and begin to imagine the projects you might build with lists of choices.

Apply: Add choices to your quiz (page 106)

Answers

- Text
- Types

Quiz Your Friends

10 Design a new Project

Brainstorm other projects you could create using the Answers Starting Point. Explore ideas collectively, then work independently to come up with an idea, identify the purpose and audience, and sketch a wireframe.

11 Build the Project

Build your own project in the Answers Starting Point. Use your wireframe from the previous session as a guide.

Answers

- Text
- Types

12 Evaluate the Project

Test your playground project with your peers. Practise explaining how your project works — along with your design decisions — to prepare for the community event, where you'll share your creations.

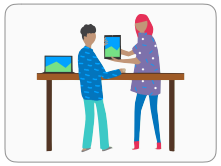
Answers

- Text
- Types

Community Event

Celebrate the club's achievements in a community event. You can demonstrate your project, explain your design process and receive feedback from your community.

Design an App



Design an App
Module Overview

In this module, club members work in small teams to design an app to help solve a problem in their community. They are guided through a design process in which they brainstorm ideas, plan their app, build a working prototype in Keynote and evaluate the app. Each team then creates an app pitch video that documents their process and shows off their app!

The design process content is presented in an App Design Journal that helps club members record and track their ideas as they go through the design cycle. The idea is to document their process to help reiterate and improve their app project. It's also very useful as a reference and starting point for future projects.

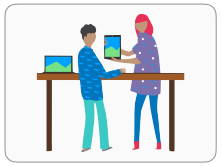
At the end of this module, host an App Showcase to celebrate your club members' ingenuity. Download the App Showcase Guide for tips and resources to plan your event.

Session Overview

- Brainstorm: 3 sessions
- Plan: 2 sessions
- Prototype: 4 sessions
- Evaluate: 2 sessions
- Pitch: 1 session
- Showcase

Resources

App Design Journal



Design an App

1–3 Brainstorm

Explore app ideas and determine the purpose, audience and focus of your app.

Brainstorm

- Purpose
- Ideas
- Audience
- Focus
- Reiterate

4–5 Plan

Consider how you'll use iOS features within your app and investigate key design elements for the app's user interface (UI).

Plan

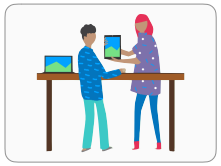
- UI/UX
- iOS features
- Design

6–9 Prototype

Design your app's user interface, storyboard your screens, and build a working prototype of your app in Keynote.

Prototype

- Design
- Flowchart
- Build



Design an App

10–11 Evaluate

Test your prototype with peers and community members, then iterate on your design in response to feedback.

Evaluate

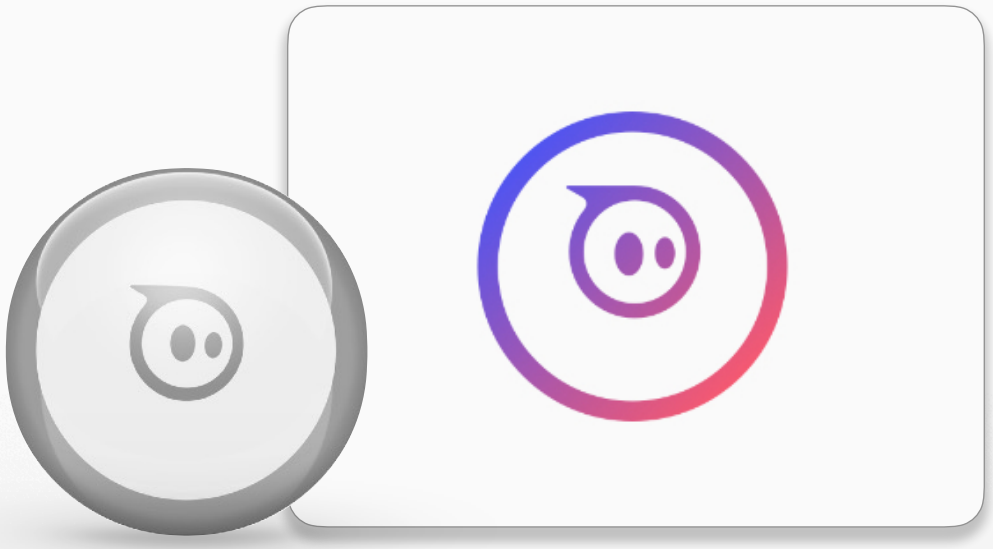
- Observation
- Interview

12 App Pitch

Make a three-minute presentation or video of your pitch describing the problem your app is trying to solve and how.

App Showcase

Share the club's app prototypes and pitches with the broader community through an App Showcase. Find inspiration for planning and conducting your event in the App Showcase Guide.



Make a Sphero Game

Make a Sphero Game
Module Overview

In this module, club members use Swift Playgrounds to program Sphero to re-create classic arcade games. This module requires club members to have access to at least one Sphero per pair of club members.

Club members explore the data collected by Sphero and how they can use these features to create interactive games. They work together to understand the code required to build the game, and then edit the code to create their own unique spin on the experience.

Club members then apply their understanding to design their own game using one or more Sphero robots. They share their games through a community event, where they invite the community to view or play their games, and explain their design and coding decisions.

Session Overview

- Sphero Pong: 3 sessions
- Sphero Bop It: 2 sessions
- Sphero Pac-Man: 2 sessions
- Design a Game: 5 sessions
- Community Event

Resources

Sphero Mini Robot
(One for each pair of club members)

Sphero Arcade 1

Sphero Arcade 2

Sphero Arcade 3

Sphero Template

Make a Sphero Game

1 Sphero Pong

Explore Sphero Arcade 1 in Swift Playgrounds. Learn how to get Sphero moving, then open the Original Pong page and work in pairs to play the game. Determine the code needed to build the game, sketch out your ideas, then annotate your sketch with pseudocode.

Sphero Arcade 1

- Introduction
- Roll
- Aim
- Heading
- Collisions
- Original Pong

2–3 Sphero Pong

In small groups, create a “live” game of Sphero Pong, where your feet are the paddles. At the end of Session 3, look at the code you thought you needed to build the Sphero Pong game and discuss whether you needed anything else.

Sphero Arcade 1

- Real-World Setup
- Bounce Angle
- Back and Forth
- Keeping Score
- Winning the Game
- Play the Game

4–5 Sphero Bop It

Work in pairs to re-create the Bop It game with Sphero. Explore Sphero Arcade 2 to learn how to program each gesture and increase the challenge within the game. Edit the code to create your own moves and explore what other code you might need to link the visual playground interface to Sphero.

Sphero Arcade 2

- Introduction
- Tap
- Toss
- Spin
- Shake
- Randomise Game
- Difficulty Ramp
- Play the Game

Make a Sphero Game

6–7 Sphero Pac-Man

Work in pairs to re-create the Pac-Man arcade game with Sphero. Explore Sphero Arcade 3 to learn how to program Sphero as a joystick, score the game and create enemies. Edit the game to make play more challenging and explore what other code you might need to create all aspects of the visual interface.

Sphero Arcade 3

- Introduction
- Simple Controls
- Scoring
- Power-Ups
- Basic Enemies
- Advanced Enemy
- Play the Game

8–9 Navigate a Maze

Program Sphero to navigate a maze in the Sphero Template playground. Sketch your maze, then create it using masking tape. You might want to start with a simple maze. Use the Drive template page to orient Sphero, then program Sphero to navigate the maze in the template page. You can work in small groups or create a single maze and race your Sphero robots to determine who completed the maze with the greatest speed and accuracy.

Sphero Template

- Template
- Drive

10–12 Design a Game

Brainstorm your own game design using Sphero. The game could be a physical version of an arcade game, an obstacle course challenge, or even a game that involves more than one Sphero. Sketch and plan your game, then create a playground project using Sphero Template. Remember to decompose the different elements of your game and use comments in your code to share your thinking.

Sphero Template

- Template
- Drive

Community Event

Celebrate the club's achievements in a community event. You can demonstrate your project, explain your design process and receive feedback from your community.

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