

SPERO 2.0

Purchase from: <https://www.sphero.com/sphero>

Tutorials at: <https://edu.sphero.com>



Sphero: Technical Specs

Overview

Sphero is a ball robot with some amazing capabilities. With a simple drag-and-drop interface through the Sphero edu app, you can code Sphero to move in any direction and control its speed and LED lights. The robot also has a full suite of sensors that you can utilize when coding, including a collision sensor, gyroscope, velocity sensor, accelerometer and more.

Battery Life

Sphero typically has a battery life of approximately 1 to 1.5 hours. With constant use (full motor functions), the battery life is typically 1 hour. With sporadic use, Sphero can sometimes stretch to 2 hours.

Sensors

Read/Write: These are sensors that can be recorded by the robot as well as changed by the robot in response to a condition.

📄_Heading

📄_Speed

📄_Color

Read Only: These are sensors that can only be recorded or read by the robot. They cannot be changed through the code in response to a condition.

📄_Location

📄_Velocity

📄_Orientation

📄_Accelerometer

📄_Gyroscope

☒ _Vertical Acceleration

You can learn more about how each sensor works by double tapping its icon within the Sphero edu app.

Pairing Sphero with a Mobile Device

Pairing the Sphero with a mobile device is incredibly easy. Just make sure that the mobile device's Bluetooth is on and open the Sphero app you want to use. The Sphero SPRK+ will then automatically connect.

Goals of Programming with Sphero (and with teens)

There are 3 major goals of the Sphero Code Club. These are to demystify and spark an interest in coding and robotics, foster 21st Century skills, and strengthen the 40 Developmental Assets of Young Adults.

Demystify and Inspire

A major goal of the Code Club is to demystify and spark an interest in coding and robotics. The Sphero robot is a great low-barrier tool for introducing coding concepts. Because the coding interface uses drag & drop blocks of code, teens can gain proficiency coding the Sphero quickly, which builds confidence and lowers the intimidation factor. When it becomes accessible to them, teens have the comfort and confidence needed to become inspired by the possibilities of coding and robotics.

Foster 21st Century Skills

Another goal of the code club is to foster 21st Century skills that are necessary to thrive and be competitive in current job markets. The skills referenced here have been identified by the Institute of Museum and Library Services.

Critical Thinking & Problem Solving

Coding the Sphero robots allows teens to practice effective reasoning and systems thinking to solve challenges in new ways. By challenging them to examine the different coding blocks available and figure out how to complete a challenge or fix errors in their code, teens must critically examine the different pieces of code and how they come together to produce a desired result.

Creativity & Innovation

At the code club meetings, teens are given the freedom to be creative and are encouraged to let their curiosity lead them. Teens create their own activities and coding challenges, and therefore have the flexibility to develop new and innovative solutions. Teens will often work in pairs and small groups on different activities, giving them the chance to share their ideas and see each other's differing perspectives. They also are given the freedom to fail and see failure as a chance to learn and improve.

Communication & Collaboration

Since the code clubs are social gatherings, there are plenty of opportunities for teens to collaborate on activities. They gain experience compromising to achieve a shared goal and communicating through instructing, encouraging, convincing and questioning others.

Strengthen 40 Developmental Assets

The Sphero Code Club also strives to strengthen the building blocks of support that are needed for teens to grow into healthy and responsible adults. The club strengthens several of the 40 Developmental Assets of Young Adults, as defined by the Search Institute.

Boundaries, Expectations, & Constructive Use of Time

The club provides adult role models that the teens see on a regular basis. The staff facilitators and the teens bond over the activities during the program. Staff model positive behaviors such as showing an appreciation for learning and resilience when a piece of code fails to perform as intended. Teens also model positive peer behaviors for each other as they engage in group activities. The code club also provides a youth program to the teens that allows them to engage in creative activities.

Social Competencies & Positive Identity

The Sphero Code Club provides many opportunities for teens to improve their social competencies. During each meeting, teens plan and make decisions about what activities they wish to do. They forge new or stronger friendships with other teens and get opportunities to practice peaceful conflict resolution in a safe setting.

Finally, the goal of the club is also empower teens by giving them personal power and fostering strong self-esteem. By giving the teens control over the activities in the club and letting them choose their own learning directions, the club fosters a sense of agency, that they can control what happens to them. This is key to developing healthy self-esteem and a sense that they have a power over their own lives.

Social Engagement

Social engagement is the #1 most important thing to most teens, and for good reason. It's important to understand this when programming for this audience. Sometimes socializing will take precedence over the program itself, whether it's intended to or not!

To maintain a healthy balance between focus and social time, try to read the audience and break up activities that require heavy thinking with periods of low-key recreation. Teen programming shouldn't be about controlling teen behavior, nor should it be about letting the teens disregard the activities. It's about providing channels for socializing alongside the focus of the program.

Session Goals

At the conclusion of the module, participants will have demonstrated that they've learned the programming language within the Sphero Edu app to program Sphero SPRK to perform various actions.

By the end of this module, you will be able to:

1. Connect a Sphero to the Galaxy Tab S2 devices
2. Use the controls in the Sphero Edu app
3. Log into the Sphero Edu app on the Galaxy Tab S2 device
4. Understand the Sphero Edu interface.
5. Do Sphero Edu's introductory block 1 tutorial that's available in the Activities area of the app

Activity #1:

III. Log into the Sphero Edu app and connect Sphero

Time: 5 minutes

Content: Show students how to log into student accounts in the Sphero Edu app and pair Sphero with a tablet.

☒ _ Give each student the login information to a student account and have them log in.

☒ _ Sphero robots should pair automatically with the tablets once the SPRK Sphero Edu app is open. If this doesn't happen automatically, tap the "Connect Robot" button and select "Sphero 2.0".

☒ _ Click on the steering wheel icon to make sure that the Sphero is being recognized by the app.

IV. Open the Sphero Edu App and Play with Sphero

Time: 5 to 30 minutes

Content: Ask students to click on the steering wheel in the top right of the screen.

Activity #1:

☒ _ Students will learn to aim and pilot Sphero and adjust Sphero's colors.

☒ _ Some groups may want to play with Sphero for a longer period of time, which is fine. If students wish to move on to coding, continue to the next activity.

V. Introduction to Coding in Sphero Edu

Students will do steps 3 and 4 of the Block 1: Intro tutorials.

Time: 30 – 45 minutes

Activity #1:

Provide the students with a brief demo of how to control the coding portion of the Sphero Edu app.

1. Have them open up a new program by tapping the "Programs" button at the bottom of the screen, then the "+" in the bottom right. Then tap "Create".

2. Demonstrate that you can tap on the tabs at the bottom of the screen to pull up different coding blocks. Scroll left & right to see all the blocks under each tab.

3. Double tapping a block tells you what it does.

4. Drag and drop code blocks on the blank canvas to add or move blocks of code.

5. Tap on the bubbles within a block to change numerical inputs. Ex: In the "Roll" block, you can change the duration, speed, and heading of the Sphero.

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6. Tap and hold your finger on a block in order move it. Dragging a block up to the trash can at the top of the screen deletes the block.
7. Tapping a block on the canvas once brings up different options. You can highlight multiple blocks at once, copy and paste, or write a note to yourself about the code.
8. The Sphero Edu saves automatically.

Activity #2:

Wrap Up

Time: 5 minutes

Content:

- ☒ _Have students log out of the app and power down the tablets.
- ☒ _Review what they learned today
- ☒ _Ask whether anyone has questions
- ☒ _Review resources for learning more – online resources, upcoming sessions, etc..
- ☒ _Share additional resources for today's session and any upcoming sessions.
- ☒ _Remind students to complete evaluations (end of series).
- ☒ _Thanks students for coming

Block 1 Tutorial Handout – Steps 3 & 4

This Module teaches how to use:

- ▣ _Action Blocks
- ▣ _Control Blocks (Delay and Loop)
- ▣ _Operators (Add/Subtract/Multiply/Divide)
- ▣ _Sensors (Heading- read & write)

Step 3 – Program a Square

1. Tap the **Program** button.
2. Start in the **Actions** category.
3. Drag the **Roll** block on to the canvas. Place it under the **On Start Program** block.
4. Change the properties of the **Roll** block.
 - a. Duration - It's measured in seconds. **Set it to 2s.**
 - b. Speed - It's measured on a scale of 0-255. **Set it to 50.**
 - c. Heading - **Set it to 0 degrees.**
5. Add three more **Roll** blocks.
 - a. Change the heading angle on the new blocks.
 - i. Block two is **90 degrees.**
 - ii. Block three is **180 degrees.**
 - iii. Block four is **270 degrees.**
6. Place the Sphero on the ground. Tap the **Aim Ring** (looks like steering wheel) icon and orient the blue tail light so that it's facing you.
7. Press **Start**.
8. You will notice that the turns are not sharp. The next steps will fix this issue.
 - a. Add a **Delay** after each **Roll** command.
 - b. In the **Controls** category, select a **Delay** command and drop it after each **Roll** command. Set each **Delay** command to **1 second.**
9. Place the Sphero on the ground. Tap the **Aim Ring** (looks like steering wheel) icon and orient the blue tail light so that it's facing you.
10. Press **Start**.

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Step 4 – Square with Loops

1. Delete all but one of the **Roll** and **Delay** block combo. Drag them into the trash that's at the top.
2. Open the **Controls** category. The **Controls** category allows you to change the flow of the program and add conditional logic to a program.
3. Drag the **Loop** block to the canvas. Drag it to the top so that it's underneath the **On Start Program** block.
4. Drag the **Roll** and **Delay** blocks inside of the **Loop** block.
5. Set the **Loop to 4**.
6. Go to the **Operator** category. You will add a **Heading**.
 - a. Select **Add** and drag it into the **Heading** field of the **Roll** block.
7. Go to the **Sensors** category
 - a. Select **Heading** and drag it to the left side of the **Operators** statement.
8. Tap on the **Bubble** to the right of the +sign. Set the value to **90 degrees**. It means that it will add 90 degrees to the heading angle.
9. Place the Sphero on the ground. Tap the **Aim Ring** icon and orient the blue tail light so that it's facing you.
10. Press **Start**.
11. Fix the starting angle.
 - a. Add a block before the loops start that will add an angle of 270 degrees. $270+90=360$ degrees. That's the same as 0 degrees and will allow the Sphero to move straight ahead.
 - i. Go to the **Action** category and add a **Set Heading** block to the canvas. Drag it so that it's placed under the **On Start Program** block and before the **Loop** block.
12. Place the Sphero on the ground. Tap the **Aim Ring** icon and orient the blue tail light so that it's facing you.
13. Press **Start**.
14. Change Sphero's color while it is in motion.
 - a. Go to the **Actions** category and drag a **Set Color** block into the loop. Drop it before the **Roll** command. Tap on the color block and pick a color.
 - b. Go the **Actions** category and drag another color block onto the canvas. Drop it after the **Roll** command. Tap on the color block and choose an ending color.
15. Change Sphero's sound while it is in motion. *The sounds will play from the tablet, not the robot. Adjust the volume on your device.
 - a. Go to the **Actions** category and drag a **Sound** block to the loop. Make sure that it's the first block in the loop. Select a sound that you'd like to play.
16. Place the Sphero on the ground. Tap the **Aim Ring** icon and orient the blue tail light so that it's facing you.
17. Press **Start**.