SPRK

schools ⚡ parents ⚡ robots ⚡ kids

Sphero Maze Mayhem STEM Challenge	Total time:	4.5 Hours
	Setting:	Classroom

Overview

SPRK STEM challenges are fun, interactive activities that challenge students to use creativity and team-work to move through simple steps of the design process in order to build Sphero-based creations. In this challenge students will program Sphero to navigate an original maze built by you or by the class. This challenge will require students to gather data about the best route through the maze and figure out how to build a program so that Sphero can successfully navigate through the mayhem.

Getting started

Spheros are controlled via Bluetooth on either Apple (iPod, IPhone, or iPad) or Android devices. Ideally, you would do this lesson in groups of 3 or 4 students, each with their own Sphero and device. This lesson is designed for iPads or other tablets, but other devices could be used. Here is what each group would need:
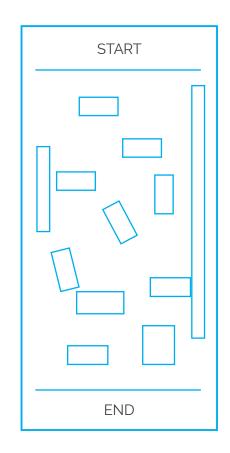
- iPad or tablet with Sphero Macrolab loaded. You can get Sphero Macrolab for free from the iTunes app store or Google Play.
- Sphero that has been fully charged

Materials

- Books and other objects to build the maze
- Measuring tape or rulers
- Protractors
- Large space on the floor for building the maze
- Stopwatch
- Masking tape

PART 1: Introduction – 15 minutes

- Break students into groups
- Briefly introduce Sphero and how it works
- Describe the Maze Challenge
- This STEM challenge is unique because the primary activity will be programming rather than building
- We suggest students take on specific roles for Parts 3 and 5 (Data Gathering and Programming). A couple of these roles could be:
    - Part 3: measurer, recorder, drafter/drawer, calculator
    - Part 5: reader (reads instructions written in part 3 to programmer), translator, programmer, & tester
- In order to ensure all students get exposure to the different roles it may be useful to have them switch roles every 15-20 minutes.

PART 2: Maze Building - 15 minutes

Using books and other objects create a maze for Sphero to navigate, add interesting obstacles (such as water features) and narrow passages. If you include multiple pathways that Sphero could use to make it through the maze, teams will need to determine which route will be the easiest to navigate or that they can program Sphero to move the quickest through.

- As a class build the maze that students will then program their Spheros to move through.
- Optionally, you can build the maze before the students come in (which will expedite the activity)

PART 3: Data Gathering - 30 minutes

During this section students will have time to collect all necessary information to build their macro to navigate the maze.

- In order to know how long to program sphero to drive at different headings it will be necessary to figure out how fast it moves. To do this the students may want to make a simple Macro where Sphero moves straight forward for 1 second at 100% speed. Then the students can measure how far Sphero has moved in that second. With that information, they can determine the rate or speed at which Sphero rolls.
- Next, students should work in groups to draw the maze on a piece of paper.
- As a team, students should determine the path they plan to take through the maze and then draw it on their paper. Students may need to take measurements to help decide the best route.
- The teams then should take any necessary measurements of distances and angles in order to build a program to navigate through the maze, following the path they drew in the previous step.

PART 4: Planning – 30 minutes

In Part 4 students convert the information they have collected on their drawing into written instructions in plain language. The development of sequential instructions will be extremely useful for programming. At the end of this phase, each group should have a drawing of way they will move through the maze and step by step instructions.

- Students should write down a list of instructions in their own words of how they will have Sphero navigate the maze.

PART 5: Programming – 90 minutes

Time to put all of the planning to work and start programming! Students build a macro in MacroLab to move through the maze.

- In teams build a MacroLab program to navigate the maze according to the instructions written in the previous step.
- Students should be testing the macro as they go to ensure it will work when its time to send their Sphero through the maze.

PART 6: Testing – 45 minutes

Time to perform! To make it more exciting, think about adding penalties when Sphero runs into objects in the maze or let teams who chose different paths race simultaneously.

- Each team tests their macro by moving their Sphero through the maze for time.

PART 7: Reflection and discussion– 45 minutes

Each individual should write up their reflections on the activity. Some potential prompts and questions that you may want to ask are:

- What worked and what didn't?
- How would each student do things differently in the future?
- What route worked best?
- What was the trickiest part of the maze?
- What was the most challenging part of the activity?
- Which role did each student enjoy most and least from parts 3 and 5?

PART 8: Share your experience on @SpheroEdu

We love seeing SPRK in action! Tweet us a few photos and we'll share them with the world!

PLAY IS A POWERFUL TEACHER

gosphero.com/education