

Sphero SPRK+ Maze Challenge

First Sphero Challenge (Grades 3-5)

Goal Outcome: Students will apply programming and measurement skills to code a SPRK+ robot to navigate a maze autonomously.

Background: Engineers send commands to rovers on Mars to navigate autonomously.

Activity Length: 2-3 30 minutes class periods

Standards:

ISTE: *Computational Thinker*

PA Computer Science Standards: *1B.AP.08-11, 1B.AP.15-16*

Materials (per team of 2-3 students):

- SPRK+ robot
- iPad
- Whiteboards and markers
- Ruler and Protractor

Teacher Set-up:

1. Open Lightning Lab and log on to the school account on each iPad.
2. Create 3 - 4 different mazes from masking tape ranging from easy to hard. Teams will be rotating through each maze. Make sure to make the maze width wide enough (1 ft.).
3. Assign student teams to a maze. Students need to be able to work together to plan the course (measurements) as well as code the Sphero in the Lightning Lab.

Student Directions:

When Planning:

1. Using whiteboard and markers, draw out a miniature version of your team's maze.
2. Take measurements using the ruler and protractor to determine the distance and angles the SPRK will need to travel.
3. Write out the commands needed to navigate your maze on each section of the accompanying miniature maze. For example – Go straight 7 cm, Make a 90 degree angle, Go straight 8 cm.

When Coding:

1. Go into the Lightning Lab and click on Programs. Click "+" and choose a name for this program (maybe a team name and maze 1-4). Choose "Block" program type. Click "Create".
2. To figure out how far SPRK goes in one second: click on "Actions" at the bottom and then drag "Roll" command into workspace.
3. Determine what you need to set the "Speed" and "Time" to get different distances.
4. Use the commands you wrote on your miniature maze from when your team planned out and measured your route.
5. Test results in maze and modify as needed!

Art Incorporation: I feel that this lesson would allow for me to incorporate the visual art standards thus enhancing the activity. Located under Anchor Standard 2: Organize and develop artistic ideas and work, a third grader should be able to “individually or collaboratively construct representations, diagrams, or maps of places that are part of everyday life” (NCCAS, page 2). This lesson requires students to practice programming a Sphero SPRK robot through a series of mazes. Instead of using a maze, I would have students work to design a map of our town, school building, or our historical landmarks in town. This would incorporate the visual arts standards because students would work collaboratively to organize what details they want to include and develop a realistic map that the Sphero robot would then drive through. Students could create challenge cards such as, “Starting at the light on North Center Street, program your Sphero to arrive at the Dauntless Firehall successfully.” This activity would make a connection to what we are learning in our lab to their everyday life using their visual display of a map.

Works Cited

National Coalition for Core Arts Standards. (2014). *National Core Arts Standards: Visual Arts* [PDF File]. Retrieved from file:///C:/Users/ahoffman/Pictures/Visual%20Arts.pdf