Lunar Maze Challenge

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Subject

STEM Computer Science and Math

Grade Level

3rd through 5th grades

Objectives

NASA has asked your team to navigate a rover in search of ice on the Moon for future human colonies. Program your rover to autonomously navigate the lunar maze. If you get off track, the rover will be lost forever in a deep crater!

Materials

iPads, laptops, Spheros, Calculator, Measuring Tape, Sphero Unit Circle, Clipboard, Worksheet, Pencils

Education Standards Addressed

CCSS.Math.Content.4.NBT.A.3
Use place value understanding to round multi-digit whole numbers to any place.

CCSS.Math.Content.5.NBT.A.4
Use place value understanding to round decimals to any place.

CCSS.Math.Content.5.NF.B.3

Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

CCSS.Math.Content.5.NF.B.7

Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

CCSS.Math.Content.7.NS.A.2

Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

CCSS.Math.Content.HSN-Q.A.3

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Activities and Procedure

(Students should have a laptop for their group where they have the activity on screen for watching videos and completing each step as they go.)

https://edu.sphero.com/cwists/cwistings/1386278/13154

Step 1 – Your Mission

NASA has asked your team to navigate a rover in search of ice on the Moon for future colonies. Program your rover to autonomously navigate the lunar maze. If you get off track, the rover will be lost forever in a deep crater!

Program the SPRK robot to go through the maze all by itself. If the rover goes outside the lines, you will be lost forever in a crater.

Watch YouTube video:

https://www.youtube.com/watch?v=9jI8Uqip60w

Watch YouTube video:

https://www.youtube.com/watch?v=x2adl6LszcE

Step 2 – How to Program

Learn the basics of how to program a square in the Sphero EDU app.

Watch YouTube video:

https://www.youtube.com/watch?v=ZfpPvnEsbto

Step 3 – Lights and Sounds

Create a program in Sphero EDU. The "home" screen is at the bottom where you will find movements, lights, and sounds to use while programming the robot.

Step 4 – Roll

The roll block can be found under the Movement tab. This is what allows the sphero to move. The first part of the roll block is for direction. Forward – 0 degrees, Right – 90 dgrees, Backwards – 180 dgrees, Left – 270 dgrees. The second part of the roll block is for speed. This activity will use a speed of 40. The third part of the roll block is time in seconds. This activity is a speed of 40 per 1 second. (1s)

Step 5 – Delay

The delay block is found under the purple "controls" tab. This allows the robot to pause.

Step 6 – Getting into Groups

The activity is best done in groups of 3. There will be 2 program designers and a coder. One program designer will be in charge of measuring the length of the maze the SPRK robot needs to travel, as well as the angle the robot will need to turn. The second designer will have the clipboard and worksheet to record the measurements for the maze. They will then use the calculator to determine how many seconds the SPRK will need to travel for. The coder will take the data from the two program designers and input the data in the Sphero EDU app.

Step 7 – The Recipe

Following a recipe allows you to back the perfect cake. When writing code, it is like writing a recipe for your robot to follow. Luckily the worksheet is your recipe. Each block of code corresponds to a row on the worksheet.

Step 8 – Let's do the math!

Before you start programming your maze, the first thing you need to do is the Roll Test. Program the SPRK to travel for 1 second at a speed of 40. Measure how far the SPRK goes from where it starts to where it stops rolling in inches. After measuring this write it on the worksheet as D, distance traveled. Your D, distance traveled will stay the same throughout the entire activity.

When programming your SPRK through the maze, the distance the SPRK needs to travel in the maze is the "Distance for SPRK to travel" and the "Distance traveled" will always be your variable D that was found during the roll test.

To find out how many seconds the SPRK needs to travel in the maze divide the "Distance for SPRK to travel"/"Distance traveled from roll test"!

Closure

At the end of the activity, each maze group shares out their code and presents their Sphero run through the lunar maze.

Differentiation

Ozobots can be used in place of the Sphero robots for younger grades. Students would not use the Lunar Maze Challenge worksheet. Instead, they would use ozoblockly to program distance in steps and speed in fast or slow.

Resources

https://edu.sphero.com/cwists/cwistings/1386278/13154

www.edu.sphero.com

Activity designed by **ameineke**

Link: https://www.instagram.com/aspengineer/