Sphero RVR: Speed Test

When using movement programming blocks for the RVR robot, students will need to figure out how far it can travel at certain speeds. This involves doing some Speed Tests to determine the centimeters per second, and is a great application for math concepts such as unit rate and ratios and proportions. The information gathered here can inform many other math-related lessons with the Sphero RVR robot.

Materials

- Sphero RVR robot
- Masking Tape or floor markers
- Sphero RVR Speed Test Chart, found here (make your own copy)
- Measuring Tape
- Floor Space

Student Objectives

- Students will use Sphero RVR programming blocks from the EDU app to determine the centimeters per second speed of the robot.
- They will complete the Speed Test Chart (see link above) to experiment with various speed code numbers.
- Using their knowledge of ratios, proportions and unit rate, students will understand how to figure out how far the RVR will travel at various speed numbers and different time periods.

Teacher Technology Skills Needed

- Understanding of the Sphero RVR movement blocks and speed settings

Standards

NYSED Standards

- NY-6.RP.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0 (b not equal to zero), and use rate language in the context of a ratio relationship.
- NY-6.RP.3b Solve unit rate problems.

- NY-7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Procedure

1. Review the movement blocks from Sphero EDU programming app and/or website http://edu.sphero.com . Remind students that the speed block requires number settings from 0 to 255.

2. Introduce the Speed Test Chart (here) and mention that they will have to complete it by testing their RVR robot out at different speeds.

3. Review ratios, proportions and unit rate. Remind students that to find the unit rate of the RVR, they will divide the distance traveled (centimeters) by the time period (seconds). The answer will be expressed as "centimeters per second, or cm/s".

4. Once the unit rate is found, use it to write a proportion so students can determine how far the RVR will travel for any number of seconds (and, by extension, how long it will take to travel a certain distance). Develop the following proportion template used for this lesson:

$$\frac{centimeters\ traveled}{1\ second} = \frac{?\ centimeters}{?\ seconds}$$

5. Give students time to perform their speed tests, complete the chart, and discuss unit rate with each other. They will need to keep their Speed Test Chart handy when performing other movement programs with their RVR robots. For example, when tracing triangle paths (or other shapes), they will have to know how far the RVR will travel at various speed settings.

Extension Activities

This basic programming challenge can be enhanced by having students add the following ideas to their program (assuming it works and follows the teacher's criteria):

- ✓ Add LED and sound programming so that when the RVR starts moving, it will flash certain colors and/or play sounds.
- ✓ Once the class agrees on a unit rate for the speed settings of 20, 40, 60 and 80, ask if they can figure out the changes to the unit rate for every 10 speed numbers used in Sphero EDU blocks.
- ✓ Given a situation where the RVR has to travel 50 centimeters, ask students to figure out three different movement blocks at various speeds to make the RVR travel that distance.