Lesson Plan

5th Grade Science
Teacher: Kandis Torch

Standards

Ohio's Learning Standards for Technology
Grade 3-5

Information and Communications Technology

Topic 3: Use digital learning tools and resources to construct knowledge.

- Interpret images, diagrams, maps, graphs, infographics, videos, animations, interactives, etc in digital learning tools and resources to clarify and add to knowledge.
- Organize observations and data collected during student explorations to determine if patterns are present.

Design and Technology

Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.

Ohio Learning Standards for Science
5th Grade

Physical Science (PS)

1. The amount of change in movement of an object is based on the mass of the object and the amount of force exerted.

Objectives

Technology

A. Students will be able to create a program for the Sphero to perform by linking blocks together to develop the process.

B. Students will gather data from the Sphero Edu app and Sphero robot and organize it in a chart. They will interpret the data and

look for a pattern to determine how mass affects speed (more mass, less speed).

Science

A. Students will be able to describe the amount of change in movement of an object is based on the mass of the object and the amount of force exerted on it.

B. Students will be able to correctly measure the distance an object travels and the time it takes in order to calculate the speed of an object.

C. SWBAT explain the mass of an object affects its speed. More mass, less speed. Students will be able to explain how to increase the speed of an object (apply greater force or reduce its mass)

Lesson Activities

1. Speed practice problems- Students solve 2 speed problems (displayed on the SMART board). Compare speeds of 2 objects.

2. Ozobot Speed Lab- Students draw a track for Ozobot to travel, with the goal of having a fast speed.

    a. Color codes on track to increase the speed of the robot.

    b. Measure the distance around the track and record the measurement in the chart on the lab sheet.

    c. Use the timer and measure the time it takes Ozobot to go around the track.

    d. Record the time in the chart. Repeat.

3. Sphero lab- Students will test the effects of mass on speed. Follow lab directions posted on the SMART board.

    a. Measure the mass of the Sphero/Sphero Mini using a digital scale. Record the measurement in the table.

b. Create the program to make Sphero move. Students will use the iPads to create the process using blocks to code the program.

c. Students will connect the Sphero/Sphero Mini to the iPad. Place the robot behind the start line. Press "play" on the program. Start the stopwatch.

d. Stop the stopwatch when the robot stops moving. Record the time in the table on the lab sheet.

e. Measure the distance the robot moved.

f. Calculate the speed.

g. Repeat these steps for the "Sphero + cart" and "Sphero/cart/cargo".

h. Students complete reflection questions with their team.

4. Discuss lab results (whole class)

5. Video clip- NFL Newton's 2nd law of motion

6. Exit ticket

Name _____ **Ozobot Speed Racer**

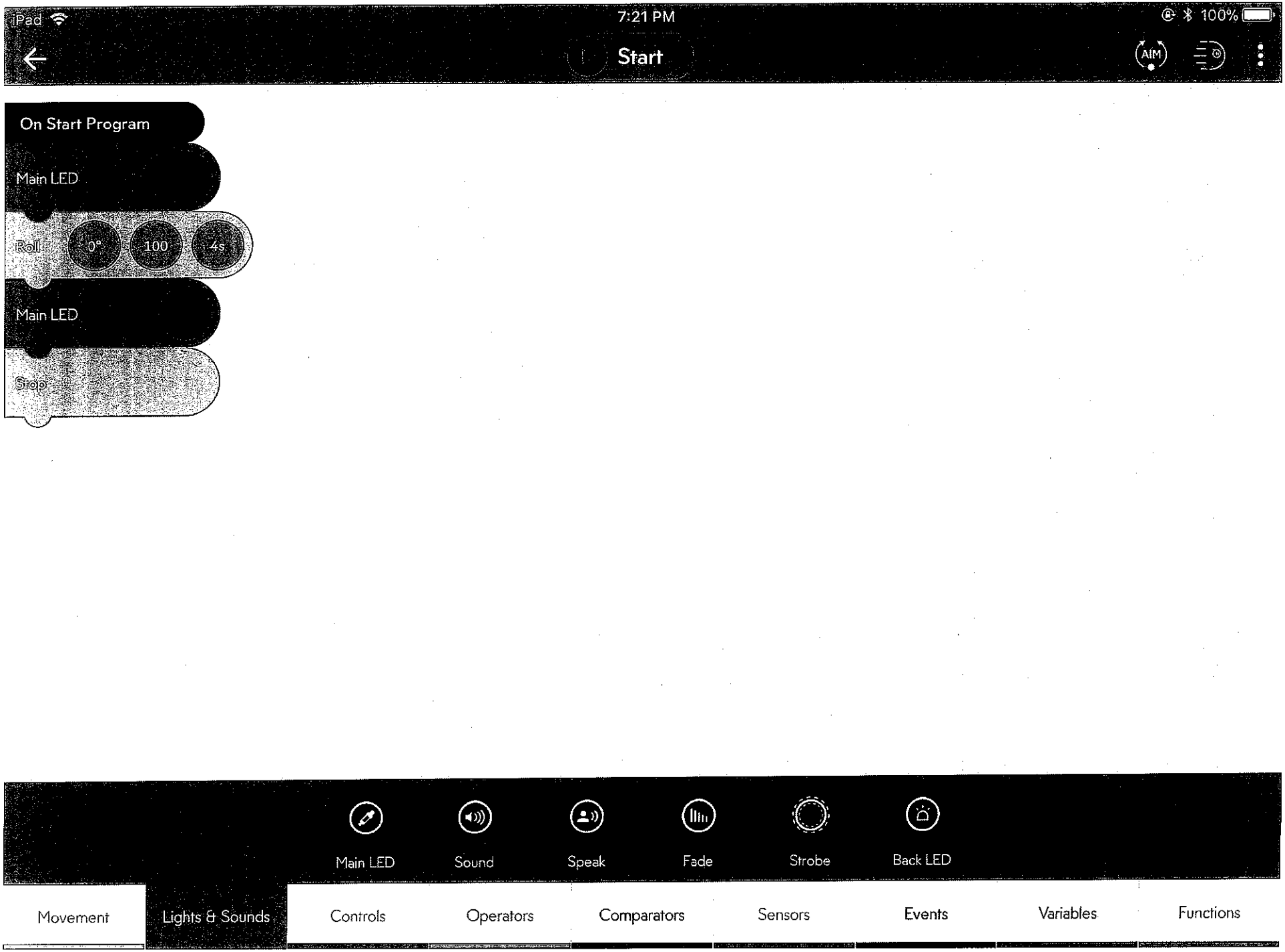
Challenge: Code a rectangular track for Ozobot to travel around on the grid paper. Only include codes to change the speed- do not add special actions to the track.

Lab Directions:

1. How long is your track? Each box is 1 centimeter. Count the number of boxes in the perimeter of your track. Record the distance in the table below.
2. Check that the stopwatch reads zero. Practice starting and stopping the stopwatch.
3. Make a starting line on your track.
4. Calibrate the Ozobot.
5. Turn on Ozobot. Start the stopwatch when Ozobot is placed on the track and starts moving .
6. Stop the stopwatch when Ozobot crosses the finish/start line. Record the time in the table below.
7. Calculate the speed. Divide the distance by the time. (You can use the calculator app!) Round to the nearest tenth. Record the speed in the table.
8. Repeat this process for all three trials.
9. Calculate the average of the speeds. (Round to the nearest tenth.)

Speed = _____ ▬ _____

Ozobot	**Distance** (cm)	**Time** (sec)	**Speed** (cm/sec)
Trial 1	22 cm		
Trial 2			
Trial 3			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Speak
Fade
Strobe
Back LED
Movement
Lights & Sounds
Controls
Operators
Comparators
Sensors
Events
Variables
Functions

SPHERO MOTION

PART 1 Mass of Sphero = _____

	Distance	Time	Speed
Roll 1			
Roll 2			
Roll 3			

PART 2 Mass of Sphero + Cart = _____

	Distance	Time	Speed
Roll 1			
Roll 2			
Roll 3			

PART 3 Mass of Sphero + Cart + Cargo = _____

	Distance	Time	Speed
Roll 1			
Roll 2			
Roll 3			

Conclusion

1. Look at the results from all three parts of the lab. (Do you notice any patterns?) What happens to the speed as the mass increases?

Make a prediction:

2. If we increase the mass of the cargo, what will happen to the speed of the Sphero?

3. Why do you think that will happen?