SPRK

schools ⚡ parents ⚡ robots ⚡ kids

STEP 1: Scenario

You and your partner are engineers working with a team of ocean researchers who are investigating the forces that move sunken objects across the ocean floor.

It is your job to determine if a spherical robotic sensor, similar to Sphero would work well to gather the data they need.

Sphero will be used as a prototype for your programming and data collection to track how forces move objects around the ocean floor, as well as the level of impact when collisions or other forces act on the robot to move it.

You will need to:

1. Create an X-Y axis on which to plot Sphero's movement.

2. Create a program to gather collision detection information from Sphero.

3. Plot the points and level of impact on the X-Y axis so Sphero's path of movement can be tracked.

4. Create a program that responds when a significant force is detected by the sensor.

Materials Needed:

- 1 Sphero
- Electrical or masking tape
- Sample Program

Use the STEP 3: **Gather Collision Data** worksheet to create the X-Y axis for your testing.
The intersection of the two axes will be the "drop point" where Sphero lands on the ocean floor.

Step 2: Prepare Sphero for testing.

Prepare Sphero to act as a sensor.

1. On a flat surface in the classroom, use electrical or masking tape, create a mark on the floor.

2. Place Sphero on the mark and align the tail light with the lower half of the Y-axis.

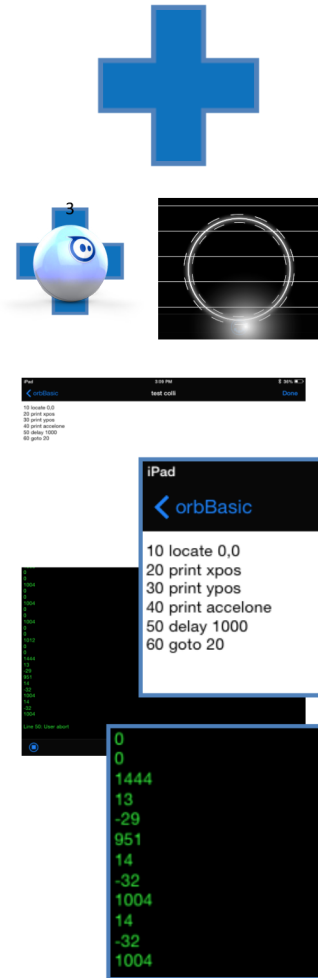This will be the starting position for the sensor test.

3. Create this OrbBasic Program on your smart device.

Each time Sphero is moved by an external force, the program will output:
- Location on x-axis **(xpos)**
- Location on y-axis **(ypos)**
- Force of impact **(accelone)**

4. Take a few minutes to experiment with the program and the kinds of values that are printed when Sphero is pushed or pulled by a force.
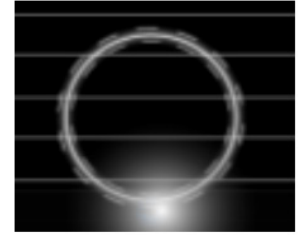
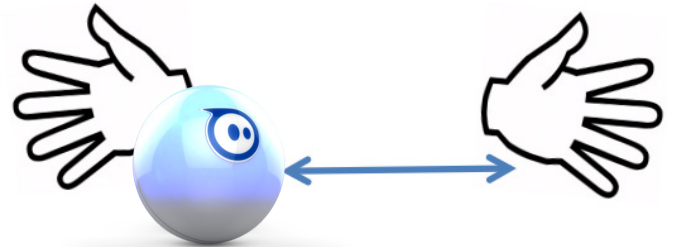**NOTE:** An impact of 5000 may be strong enough to damage Sphero.

iPad

< orbBasic

```
10 locate 0,0
20 print xpos
30 print ypos
40 print accelone
50 delay 1000
60 goto 20
```

```
0
0
1444
13
-29
951
14
-32
1004
14
-32
1004
```

Step 3: Gather Collision Data
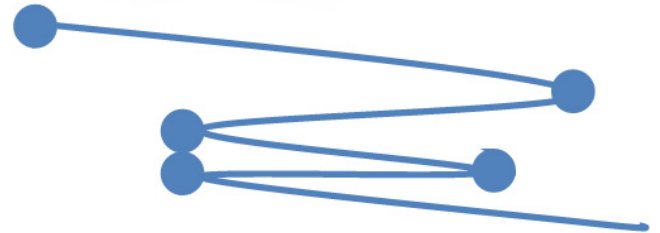
Prepare Sphero to act as a sensor.

1. To simulate life for a research robot on the ocean floor, place Sphero on the mark on the floor and aim the tail light. Location data will be gathered from this "drop point" (the location where it landed on the ocean floor).

2. Pass Sphero back and forth between your hands by rolling it along a flat surface. Pause after each roll to let your partner plot its coordinates and the force with which it was hit. Do this 5 times and then trade roles for a total of 10 points of impact.

3. Each time Sphero is moved, use the data printed to your smart device to note Sphero's location on the X-Y axis you created below. Connect the points to trace Sphero's movement around the ocean floor.

Make sure to note the force of each impact as well!