LIGHT PAINTING

OVERALL TIME *1- to 2-hour lesson*

GROUPS *Three to four kids*

PROGRAMMING LEVEL *Intermediate Block: Simple Controls (Loops), Sensors, and Comments*

CONTENT THEME *Science*

OBJECTIVE

- **I will create a long exposure photograph.**
- **I will create and execute a program, either using the Draw or Blocks canvas.**
- **I will create an original work of art using the Sphero BOLT and long exposure photography.**

OVERVIEW

Learn how to use long exposure photography to take pictures that capture an image over time. Create a light-filled program using the Sphero BOLT to create your own artwork to share with others.

MATERIALS

- **Sphero BOLT**
- **Two smartphones or tablets**
- **Long exposure photography app (ie. LongExpo)**
- **Tripod that will hold a phone or tablet**
- **Painters tape**

EXPLORATION: DRAWING LIGHT WITH THE SPHERO BOLT

Use the Sphero BOLT to paint with light!

Watch the video below to find out how.

▶ *https://youtu.be/hek4uEJ7WLw*

Sphero BOLT + Long Exposure Photography = Light Painting!

The Sphero Edu app allows you to create programs for the Sphero BOLT. These programs tell the Sphero BOLT what to do. To get started quickly, take a look at the Light Write program (*https://edu.sphero.com/remixes/1100273*) or Shape Shifter (*https://edu.sphero.com/remixes/963849*). Light Write uses premade functions that program the Sphero BOLT to draw different letters with light. Shape shifter is a simple Blocks program that allows you to draw all the polygons.

Another place to start is the Draw canvas. If you are unfamiliar with Draw, check out this simple getting-started activity (*https://edu.sphero.com/cwists/preview/6872x*).

And for you more advanced programmers, give the Blocks or Text canvas a shot.

Remember that your program needs to have the Main LED lights on, and preferably, changing colors throughout the program.

EXPLORATION: CAMERA SETUP

The video below will help you get your camera set up. If you want to follow along, use the Shape Shifter program (*https://edu.sphero. com/remixes/963849*) and set the number of sides to three.

▶ *https://youtu.be/8DU1n2oafP4*

There are numerous long exposure photography apps available for smartphones. Continue to Step 3 to learn how which settings will be most important.

EXPLORATION: FINDING THE RIGHT SETTINGS

Change the settings in your camera app so that it is in "light trail" mode with the highest sensitivity and longest shutter speed possible.

- Sensitivity relates to how much light is necessary to capture an image. A higher sensitivity is typically used when there is less light available for taking the image. For example, a low sensitivity might be used in bright sunlight, but a high sensitivity might be used indoors.

- Shutter speed is the length of time light is exposed to a camera's sensor. A fast shutter speed helps freeze action. A slow shutter speed can make moving objects blurry, often creating a sense of movement.

SKILLS BUILDING: TESTING YOUR PROGRAM

Put the Sphero BOLT in the left corner of your shot and take a long exposure photo as you run one of your programs from the Sphero Edu app.

Did the Sphero BOLT stay in the frame of the camera the entire time? Make any adjustments needed to the camera's position to ensure that the Sphero BOLT stays in the shot the entire time.
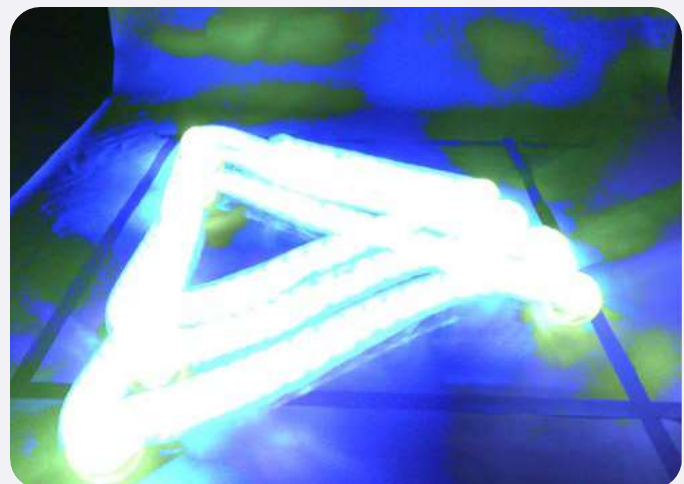

If you are struggling with a new program, go back to Step 1 for a couple sample programs you can use.

SKILLS BUILDING: PERFECT PICTURE

*What does your picture look like? Did it capture the Sphero BOLT's light trail?* If you were unable to capture a picture similar to the one below, explore the long exposure app's settings. Encourage kids to ask for help!

CHALLENGE: CREATE YOUR OWN ARTWORK

You have had time to prepare the camera and test your programs, and now it's time to create some artwork.

Pick the program (or create a new one) that you want to be your final product. If you want something more spontaneous, don't hesitate to create a new Draw canvas and have at it!
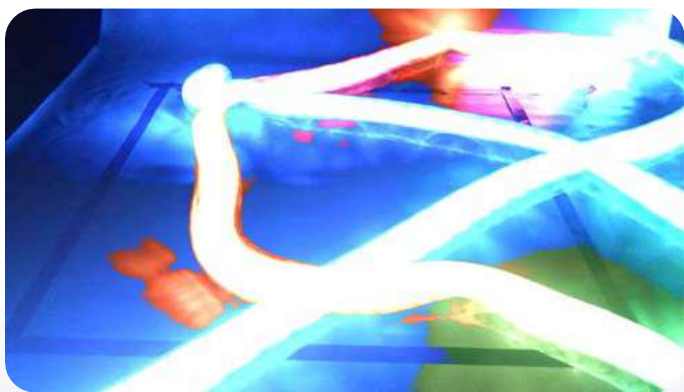
Be sure that the camera is picking up all of the Sphero BOLT's movements. What have you noticed if the program is too busy or the Sphero BOLT's movements are too close to one another?

CHALLENGE: COLLABORATIVE ART (OPTIONAL)

Get together with some classmates and create a collaborative piece of art. You can simply run your programs simultaneously and snap a long exposure picture, or do something new and more coordinated. Again, feel free to use the Draw or Blocks canvas.

Share a picture of your collaborative artwork at the end.

Watch the video below to see how students just like you used their Sphero BOLT to create their own artwork.

▶ *https://youtu.be/1NbLRiL1Mbw*

REFLECTION

Take some time to reflect on this experience. Use these questions to guide a discussion with a partner:

- *Did your photo turn out the way you thought it would?*

- *What could you do to make your light drawing even better?*

- *How do you think changing the sensitivity or shutter speed might affect your photo?*

If time allows, modify your program until you are happy with your design.