

# AREA OF A RECTANGLE

**OVERALL TIME** 1- to 2-hour lesson

**GROUPS** Three to four kids

**PROGRAMMING LEVEL** Draw: Manual Movement, Distance, Direction, Speed, and Color

**CONTENT THEME** Math

## OBJECTIVE

- I will calculate the area of multiple shapes using an equation.
- I will use the Sphero BOLT's sensor and location graph features to gather data.
- I will create and execute a program using the Draw canvas.

## OVERVIEW

Explore the area of a rectangle. Use the sensor data in the Draw canvas to calculate the area of a rectangle in various unit measures. Discover how the calculation of area is used in real life situations.

## MATERIALS

- Sphero BOLT
- Graph paper
- Pencils

## EXPLORATION: FIND RECTANGLES

Look around the room and find objects in real life that are made of rectangles. Remember a rectangle has four straight sides like a square but can have one pair of opposite sides that are longer than the other pair.

- Is a square a rectangle?
- Is a rectangle a square?

Point these out to your partner and discuss:

*How do you tell if one rectangle is larger or smaller than another rectangle?*



## EXPLORATION: PROGRAM A RECTANGLE

Tap on the “New Program” icon at the top of the activity and select the Draw canvas. Give the program a name like “Rectangle A” and tap “Create.”

Draw a rectangle that is 2 blocks by 3 blocks. If you need any help with the Draw canvas, watch the video clip below.

► <https://youtu.be/ldjdVF97uVo>

Have your partner check your rectangle for accuracy. Run the program so your Sphero BOLT makes the 2 blocks by 3 blocks rectangle. As the program is running, notice the sensor data that appears. If you are using a Chromebook, tap the three dots in the top right corner and select “Sensor Data” after Sphero BOLT has completed the program. The sensor data is saved each time you run the

program. The Sphero Edu app will keep the five newest version of the data.

Take a look at the “Location Data” and describe what you see. *Does it show the rectangle you expected?*

Draw a few more rectangles. Make each a different size. Have your partner check to make sure each drawing is in fact a rectangle. Talk about the following:

- *Which of your rectangles was the largest? How can you tell?*
- *How can you use the sensor data to determine which was larger?*

### SKILLS BUILDING: WHAT IS AREA?

The **area** of a two-dimensional object is the amount of space it covers or takes up. You can figure out the actual size of a rectangle by calculating its area. You can do this with other two-dimensional shapes, as well.

Watch the video below with a partner and answer the following questions:

▶ <https://youtu.be/1dqAOKdJmRI>

- *What is area?*
- *What is the formula of area for a rectangle?*
- *Do you think you could use the location graph and sensor data to calculate the area of the rectangles you programmed?*

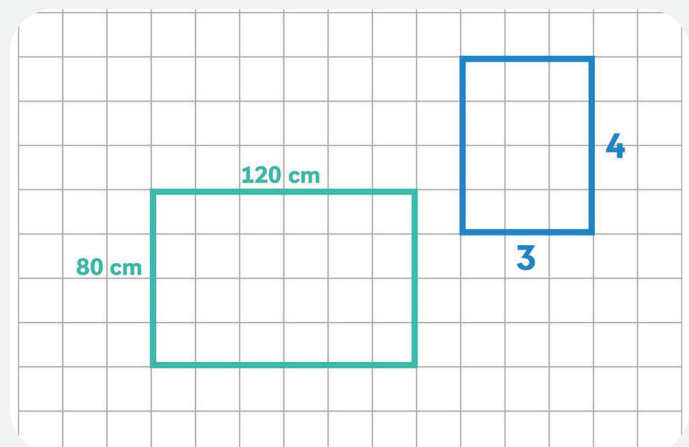
### CHALLENGE: FIND THE AREA, PART 1

You can use the first Draw program you created earlier or create a new one. On the Draw canvas, draw two different sized rectangles. Be sure to use the grid on the canvas to help you draw each one. If it helps, use a different color for each rectangle.

Looking at these drawings, determine how many square units each rectangle measures. This is one way to measure the area of each rectangle.

Now, run the program. Watch the location data for each rectangle. After the program stops, tap the three dots in the right corner, and open “Sensor Data.”

- Notice that that location data measures the path of the Sphero BOLT in centimeters (cm).
  - On some graph paper, do your best to recreate each rectangle that you drew on the Draw canvas.
  - Using the location data and measurements, approximate the length and width of the two rectangles in centimeters.



### CHALLENGE: FIND THE AREA, PART 2

Use the measurements you collected from the Location Data now to calculate the approximate area of each of your programmed rectangles.

Remember that the equation used to find area is:  $A = l \times w$ .

Show your work on your graph paper and take a picture to attach at the end of this step.



### CHALLENGE: FIND THE AREA, PART 3

Look around your classroom again. Select a few items that are rectangles and go measure them.

On a new piece of graph paper, do your best to recreate the items. Use the grid lines to help you accurately draw each side of the object. Label the length and width of the item on your graph paper.

Now calculate the area of these items. However, this time, you and your partner will do your own calculations on a separate piece of paper. When both of you are done, compare your answers and discuss the following:

- *How did you calculate the area?*
- *Are our answers the same? If not, why?*
- *When else would you ever need to find the area of an object or space?*