# LUMINOUS SCIENCE LESSON: C4A
## DATA VISUALIZATION TECHNIQUES

**Instructional Objectives:** Students identify data visualization techniques. Students examine how neopixels interact with a painted surface.

- **Before this lesson -** Complete lesson:
  **S4: Identifying Measurable Variables**
  **A5: Painting Lanterns**
- **With this lesson -** The following lessons can be combined with or taught concurrently with these lessons:
  **A5: Painting Lanterns**
  **C3: Reading Sensors and Collecting Data**
  **C4B: Using and Storing Data**
  **S5B:Variable correlation**

## TEACHER PREP

**Before completing this activity teachers should:**
Have strips of 8 neopixels with connector wires soldered to the micro:bit (see LED Light Connections Options slides), be familar with the neopixels, if desired have a sample breakoutboard setup, and gather materials.

## STUDENT PREP

**Before completing this activity students should:**
Be familar with writing basic programs on the micro:bit, have a final project investigation question and should have done some practice painting techniques.

# MATERIALS LIST:

○ **Micro:bits**

○ **USB cables**

○ **Breakout board setups (optional)**
   note: check LED Light Connections
   Options slides

○ **Soldered neopixel strands**

○ **Student practice paintings**

○ **Computers with internet browser**

○ **Lab notebook or journal**
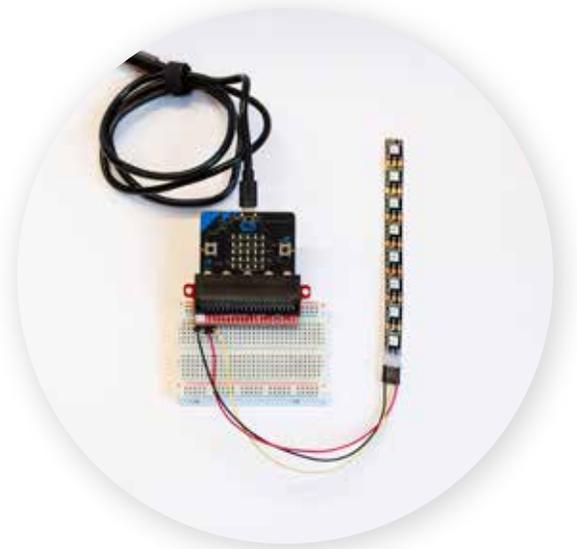
*One possible setup for the
micro:bit and neopixels*

# STANDARDS

| **Studio Arts** | Express<br>Develop Craft | **K-12 CS** | Hardware & Software<br>Abstraction<br>Visualization & Transformationi |
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# ACTIVITY INSTRUCTIONS:

**2** Ask students to think about and sketch as many ways they can represent the numbers 7 and 11. Prompt them to think about what they might stand for and to think about methods they know for representing numbers.

**3** Have students share out sketches. Discuss how there are many ways to represent two numbers and what they mean is influenced by the context.

**10** Introduce data visualization to the class. Discuss the examples provided in the resource slides. Talk about purposes of data visualization such as: communicating a lot of information at once and seeing trends, or modeling a system to see if a question you are asking or answering matches the data, making predictions. Show and discuss slides about visual encodings and types of data.

**10** Introduce neopixels to the class as the primary tool students will use to visualize data. Look at the list of the types of visual encodings possible and ask students if there are any they don't understand. Next prompt students to list the variables they are interested in for their final project investigation question and to sketch some ideas about ways they could encode the data in their lights using the provided worksheet.

**10** Demonstrate how to connect lights to the micro:bit. Walk students through how to program the neopixel lights to all light up one color. Begin with pseudocode and then guide students through programming the lights in MakeCode.

**15** Give a few different challenges for students to choose from and remind them to write pseudocode. Possible challenges: 1) Turn on only a single neopixel light 2) Change the light color with button presses 3) Change the brightness of the light with button presses. Have students test out their code using the example neopixel strips. During this time have students take out their practice paintings and examine how the different light colors and light brightnesses affect their paintings.

## Tips:

*Consider sending sample code to the students and have them manipulate it.*

*To expand on the data visualization ideas, look at the resources slides for this lesson which can be worked into other lessons.*

*Choose to use either setup 1 (with breadboard) or setup 2 (without breadboard) depending on classroom supplies.*