**Investigating Shadows**

A shadow is a dark outline or image cast by an object that blocks light. It is formed when light hits an opaque object that does not let the light pass through. Everywhere else around the opaque object, the light continues in a straight path until it bounces off the ground or wall behind the object. The result is a dark patch, or shadow, with the same outline as the object surrounded by light. Explore some of the features of shadows, such as how the size of a shadow and the size of the object that produced the shadow are related.

**Required Materials**

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* Flashlight
* Scissors
* White paper or poster board
* Ruler or measuring tape
* Objects to produce shadows
* Science notebook
* Graph paper

**Investigation 1: Outdoor Shadow Activity**

1. Find a partner. Go outside and measure his or her height.
2. Have your partner stand facing the sun and draw the shadow that is created. Then answer the following questions in your science notebook:
   * ***How was the shadow made?***
   * ***What is the length of the shadow?***
   * ***How does this compare with the height of your partner?***
   * ***What affects the height and position of the shadow?***
   * ***Does the shadow give an accurate picture of the shape of your partner's body? Explain why or why not.***
3. Draw your partner's shadow again, but this time have your partner turn with his or her shoulder facing the sun. Compare the two drawings you made and write a paragraph about how they are alike and how they are different.

**Investigation 2: Changing the Length of Shadows**

1. Choose several objects from around the room (books, papers, or items that your teacher has provided). Choose one thing that you can see through and one object that you cannot see through.
2. Darken the classroom so that you can use your flashlight to create shadows. Take the object you can see through and your flashlight and produce a shadow.
   * ***What does the shadow look like?***
   * ***Can you change the length of the shadow? How?***
3. Use your flashlight to form a shadow using the object that you cannot see through.
   * ***What does the shadow look like?***
   * ***How is it similar to the shadow you made in #2 above?***
   * ***How is it different?***

**Investigation 3: Comparing Shapes and Shadows**

1. Choose a two-dimensional (flat) object and use your flashlight to produce a shadow.
2. Then choose an object that is three-dimensional and use your flashlight to produce a shadow. Answer the following questions in your science notebook:
   * ***How are the shadows produced by these objects alike?***
   * ***How are the shadows produced by these objects different?***
3. List any questions you still have about shadows in your science notebook and suggest ways that you can answer them.

**Investigation 4: What Affects the Size of a Shadow?**

1. Use the materials in Science, Optics & You to determine what affects the size of a shadow
2. In your science notebook, write your plan for finding the information. Then, share your plan with a classmate and put your plan into action!
3. Write a description of how your plan worked in your science notebook and discuss your findings.