

Opening the Box



Activity Opening the Box

Focus: To set the stage for the study, children explore the materials that accompany the study and ponder how they might use the items for scientific exploration.

Materials: Cardboard box; prisms*; mirrors* (if need be, remove protective plastic film); flashlight*; theater lighting gels*; eyedroppers*; spray bottle*; and other materials included with the curriculum.

Setting: Class meeting. Later, children can experiment with some of the materials in the Science Center; other materials are added over the course of the study.

** Indicates items that are included with the curriculum*

To generate interest and excitement, gather the Rainbows, Color, and Light materials listed above into a cardboard box and bring them to a class meeting. Tell the children that the materials were sent for them to experiment with. Take out the items one at a time and pass them around so children can look at them. Ask children for ideas about how they might use the items and what they might be able to learn from using these materials. Encourage them to think like scientists!

As a class, generate and discuss guidelines for sharing and using the materials. After the meeting, place some of the materials, such as the flashlight, prisms, and mirrors in the Science Center and invite children to explore them and experiment further. Add other materials as they are introduced in subsequent activities.

Observe the ways children work and play with the materials over the course of the study. The activities children initiate on their own will give you valuable information about their interests, understanding, questions, and approach to finding things out. The questions and ideas children arrive at independently will often provide a lead-in to one of the activities or extensions described in this manual. Children’s independent explorations with the materials may also have the potential to take your class’s study in other interesting directions, such as a deeper investigation of shadows or bubbles. Don’t hesitate to follow these paths and see where they lead.

TEACHER NOTE: Hang one prism in a sunny window several days prior to teaching “Rainbow Effects: Prisms.” (See the next activity for more details.)

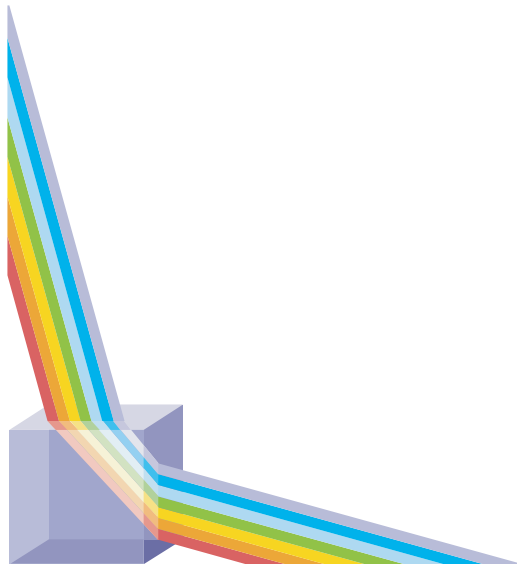
Language Arts Extension

Photograph the children while they work with the materials. Put the photographs into a book and help children write captions to explain how they were acting as scientists in each picture. For inspiration, you and the children might review some of the ideas in the book *What is a Scientist?* and the corresponding activity. (See pages 34-35.)

Connections

This is a good activity for initiating the study.

Rainbow Effects: Prism



Activity Rainbow Effects: Prism

Focus: Children communicate observations and ideas as they describe rainbows, then explore how to make rainbows in the classroom using a prism and a light source.

Materials: Prisms*; flashlight*; clear fishing line; and paper and drawing materials (optional).

Setting: Class meeting or small groups for initial discussion and introduction of materials. Children experiment with the materials in the Science Center throughout the study.

**Indicates items that are included with the curriculum*

TEACHER NOTE: For the purposes of this study, the term rainbow is used to describe the spectrum of colors produced when white light is separated by refraction. The term rainbow effects is used to describe any display of colors produced from white light, even if not the result of refraction.

Experiment with the prism and flashlight prior to the meeting to familiarize yourself with how to position the light to create a rainbow, where the rainbow will project, whether to darken the room slightly, and other variables.

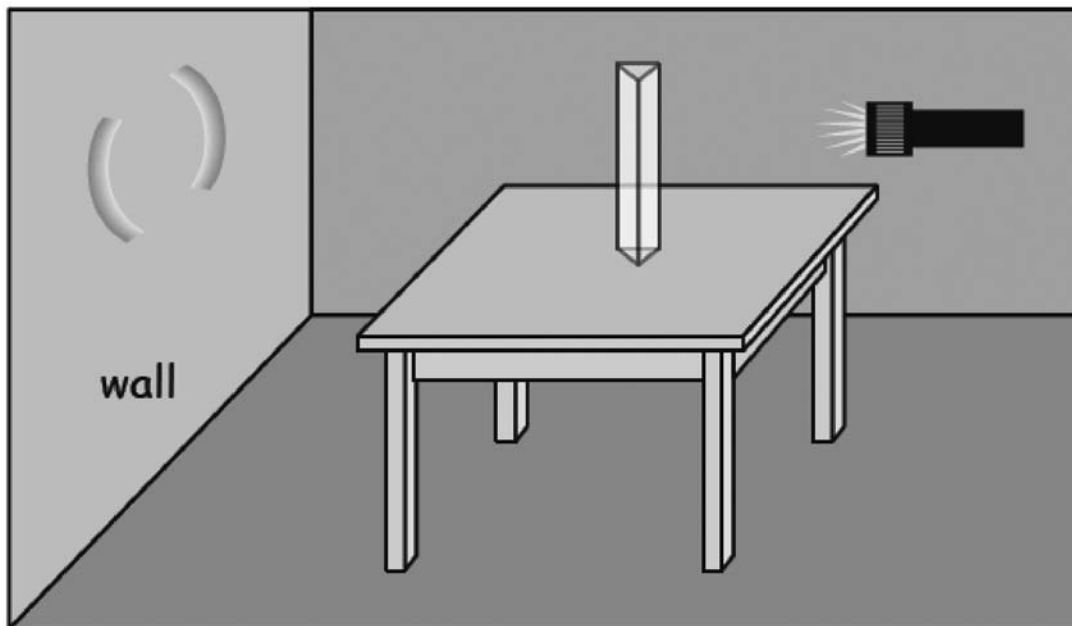
If you don't have a sunny place to hang the prism in or near your classroom, skip the following two paragraphs and the Teacher Note and begin this activity by working with the children to generate a rainbow using the flashlight and prism, as described in the third paragraph on page 39.

A few days prior to this activity, securely wrap clear fishing line around the middle of a prism and hang it in the sunniest window in your classroom. (If your classroom doesn't get enough sunlight, use a sunny hallway nearby.) After a few children have noticed a rainbow generated by the prism, have a class meeting.

Begin the meeting by asking the children what they noticed. Children will probably report that they saw colors or a rainbow. Encourage them to expand on their descriptions by probing about details, such as colors, shape, size, location, and weather conditions. You might help them focus on the role of light by asking the children whether they think they would have seen the same thing on a cloudy day or at night. Or, save this question and introduce it to children as they work independently with the materials in the Science Center.

TEACHER NOTE: Children may blend descriptions of what they saw in the classroom with descriptions of other rainbows they have seen or traditional depictions of rainbows, such as an arc shape. Guide children to focus on what they actually saw. Point out that it is often difficult to describe something from memory, which is why scientists try to record what they see when they see it—with drawings, photographs, or words. Use differences in descriptions to promote further discussion and exploration.

Show the entire class or small groups of children a prism and flashlight and ask them how you might use the materials to make a rainbow. Allow children to help as you try their suggestions. Discuss their ideas and the results of various actions as you work. Encourage the children to work collaboratively to generate one or more rainbows. Emphasize that adult scientists also figure things out by working together, testing and changing ideas, and talking about what works and what doesn't.



TEACHER NOTE: If children are having difficulty generating a rainbow, consider setting the prism on a stable platform several feet from a wall; then children can focus on how to position the flashlight to generate a rainbow, without worrying about moving the prism at the same time.

While it is easier to use a flashlight for demonstration purposes, help children make the connection between the rainbows generated by the flashlight and the ones created by hanging the prism so sunlight hits it. Note that flashlights typically make less spectacular rainbow effects than bright sunlight does.

Once the group is successful in creating a rainbow, ask them to describe it. (Help children realize that the shape of a rainbow is not always an arc; this may surprise many children.) You might also pass out paper and drawing materials for children to draw their observations. Remind them to draw exactly what they see. You can also enlist the group's help in sounding out and writing descriptive words on chart paper or the board. To conclude, tell children that, over the course of the study, they will experiment with other ways to make rainbows.

Put the flashlight and prism in the Science Center for children to experiment with further. They may want to use different light sources (or use no light source at all); vary the position of the light source; channel the beam of light from the flashlight through a rolled-up piece of paper; change the size, intensity, or location of the rainbow produced; or pursue other self-directed explorations. Facilitate children's explorations, as needed, and encourage them to share their discoveries with the rest of the class. You may want to keep a rainbow journal and some drawing materials in the Science Center so children can record their observations.

Art Extension

Children can create pictures of rainbows using watercolors, colored pencils, tempera paints, or other media.

Science Extensions

Ask children what they would like to learn about rainbows. Write down their questions and help them find ways to pursue them—through the activities in this study, additional experiments, books, or other resources.

In addition to the prisms, hang up decorative, multi-faceted crystals in your classroom window or other sunny spot with clear fishing line. Encourage the children to compare the crystals and the prisms. How do they differ in shape and size? Do they create similar rainbows?

Connections

This should be the first of the Rainbow Effects activities.