

LESSON PLAN: ACTIVITY 3: MAKING SCALE MODEL SHADOWS OF BEAR'S NEIGHBORHOOD

In this lesson, students will construct a model neighborhood to demonstrate their understanding of shadows. Many questions and suggestions for variants on the activities are presented to allow you to tailor this lesson to your particular needs. It is best to make the model of Bear's neighborhood when the sun is relatively high in the sky, either near the beginning or the end of the school year. You'll want to measure the sun shadows with students at least twice, and perhaps three or four times during the year, to see how they vary with the time of year.

PREPARATION

Ideally, you will have completed Activity 1: Shadows above or have measured sun shadows in some other context, so your discussion can be more directed. You may, for example, discuss the time of day when the various events in the book occur, and the direction in which the Bear's shadow will fall at these times.

Organize the materials for the activity. Clear a space in the room if you cannot construct your model neighborhood outdoors, or identify and reserve, if necessary, a place on the playground to build the model.

Teaching Tip

When you construct Bear's imaginary neighborhood on the playground or in a field, do it away from the potential shadow of the school building! For young children, it's best to construct the model outdoors where the position of the Sun is determined by the Earth's rotation, tilt, and location in its yearly revolution around the Sun.

Materials

For small 3-D model:

- some appropriate area in the classroom, art room or other available space, large enough to build a scale model of the neighborhood (about 5x5 feet)
- cardboard
- scissors
- glue
- cardboard boxes of various sizes to represent buildings in Bear's neighborhood
- foil to make the pond and brook
- Model trees or small pieces of shrubs to represent the trees
- tape
- pencils, crayons, and markers
- a bright lamp





WARM-UP & PRE-ASSESSMENT

- Re-read Bear Shadow by Frank Asch (See Activity 2) and briefly discuss.
- Be sure the students know their compass directions. If necessary, teach them beforehand how to find North on a compass.

PROCEDURES

1. Divide students into groups of 3-4.
2. Explain to the students that the class will make a 3-D model of the neighborhood where Bear lives. Use a compass (teacher or students can do this) to find North. The model should show clearly which direction is north, either with an arrow or by orienting a three-dimensional model correctly with respect to the actual directions. Tell them to be sure the map/model includes:
 - Bear's house
 - the pond where he went fishing
 - the brook he jumped over
 - the tree he hid behind
 - the cliff he climbed
 - the place where he tried to nail the shadow to the ground
 - the place where he dug the hole to bury the shadow
3. Start making the model by asking the students to decide a place for the pond. Once they have made that decision, assign each group a feature to place on the model. Have each group explain the reasoning that led to each placement. There may be disagreements, but the criterion for "correctness" is whether the placement parallels the pictures in the book.

Materials cont'd:

For large 3-D map/model to be built outdoors:

- an appropriate place on the school grounds
- six or seven different-sized large cardboard boxes
- scissors
- glue
- duct tape
- pencils, crayons, and markers
- any additional material students [e.g. fallen branches, a broom, a mop, a ladder, a tarp] can use to create landmarks like the tree, Bear's house, and so on
- A Teddy Bear of appropriate size to represent Bear
- compass





Teaching Tip

Some questions might be posed to all students, or to groups, either to answer "immediately" or to direct their thinking during model construction. Some questions may also be used for assessment of the children's understanding, their attentiveness to the story details, and their reasoning. In all cases, the response to a question should contain an explanation of how the answer was obtained, not just the answer itself.

4. When the model is complete, the students will use the thermometers to measure the temperature in the sunlit areas and the shaded areas. Record the temperatures at each location in a chart so that the students can easily see any differences. Ask the students can explain why some areas are warmer or cooler. Help the children conclude that it's hotter in light than it is in shadow.

Discussion questions may include:

- At what time of the year does the story happen?
- At what time of day did Bear go out to fish?
- At what time of day did Bear try to nail his shadow to the ground?
- At what time of day did Bear try to bury the shadow?
- How long did Bear nap?
- How many windows are there in Bear's house?
- Which direction does the door of Bear's house face?





ASSESSMENT

Sample assessment questions:

- Could Bear see his shadow when he faced the Sun? What about when he turned the other way? If you're not sure of the answer, can you find a way to test it and show me?
- When did Bear lose his shadow? Could you ever lose your shadow? If so, how? If not, why not?
- Why was Bear afraid of his shadow? Are you afraid of your shadow? Why or why not?
- Can your shadow do something without you? Can you do something without your shadow? How?
- Name three places where Bear could not see his shadow. Name three places where YOU can not see your own shadow!
- Could Bear see his shadow on the pond? If so, when? If not, why not? What else could he see in the pond when he looked down into it? [Possible "reflection" discussion, to compare the differences between shadows and reflections, especially for dispelling myths.]





CURRICULUM CONNECTIONS

Science:

- Add toy figures and flashlights to the block corner or science area, to allow youngsters the freedom to try out ideas.
- On a sunny day, set out two or three prisms of different sizes and shapes and let the children explore the effect of sunlight passing through the prism.
- Have students draw and measure each other's shadows with string at different times during the day in order to observe and describe changes in the size of the shadow.
- In general, have materials available for children to freely explore and manipulate.

Art: Have the students color the cardboard cutouts of Bear's model neighborhood, and then shine a light on them to prove that different colored-shadow will not appear. Explain and show how light is needed to see color, and that the less light that is available, the less one is able to see color. A good demonstration of this is by using a dimmer switch on a stage in the auditorium. Lower the lights until only faint images are visible, then raise the lights to show how colors become more intense with increased light (up to the optimal point), and then can get bleached out when the light becomes too intense.

LESSON ADAPTATIONS

Have students set up a dollhouse, accessories and a lamp as the Sun. Hold the lamp at different angles, and ask students to speculate on such questions as:

- What time of day is it for the dolls?
- Where would they want to plant their garden so it gets the most light?
- Where is the coolest part of the house to rest in the middle of summer (assuming they have no air conditioning?)
- In the coldest winter months, where could they sit inside to be warmed by the Sun? What time of day or night would that be?

