

Insect Vision

BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

Grade 1—Quarter 2

Activity 12

SC.F.1.1.4

The student understands that structures of living things are adapted to their function in specific environments.

SC.F.1.1.5

The student compares and describes the structural characteristics of plants and animals.

SC.H.1.1.1

The student knows that in order to learn, it is important to observe the same things often and compare them.

ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 40 hands-on activities at this grade level.

1. Ask, *If you had great big compound eyes like insects have, what would you be able to do that you can't do with your real eyes? (I'd be able to see in all directions at the same time.) What would you not be able to do that you can do with your real eyes? (I wouldn't be able to see one big picture of things around me. I'd see lots of little broken-up pictures.)*
2. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide opportunities to identify areas that may require additional review before proceeding further with the activity.

Insect Vision

OBJECTIVES

Students experiment with models of simple and complex eyes to discover how insect vision differs from our own. They discuss how compound eyes help insects survive.

The students

- ▶ build and test model insect eyes
- ▶ compare human sight with insects' sight
- ▶ conclude that simple and complex eyes are good for detecting light and movement but not fine detail

SCHEDULE

About 30 minutes

VOCABULARY

compound eye
simple eye

MATERIALS

For each student

- 1 Activity Sheet 12, Parts A and B

For each team of four

- 1 lens, multifaceted
- 1 tube, cardboard, 2 cm × 3 cm
- 1 tube, cardboard, 3 cm × 13 cm

For the class

- 1 model insect, from Activity 11*
- 8 shts paper, tissue, 20 in. × 30 in., white
- 2 rolls tape, masking

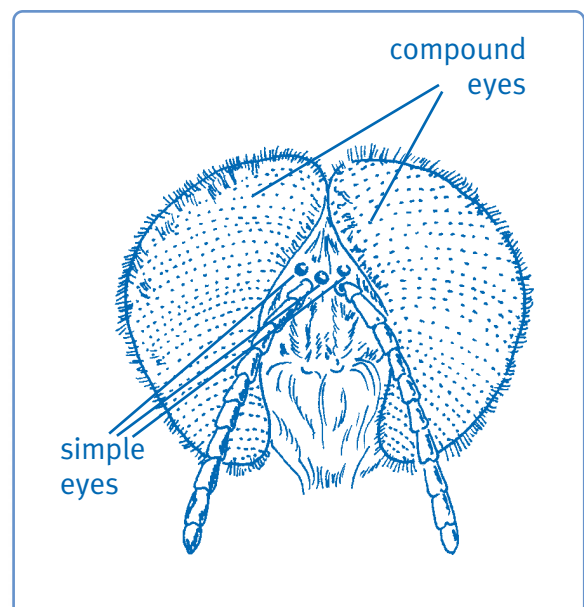
*provided by the teacher

PREPARATION

- 1 Make a copy of Activity Sheet 12, Parts A and B, for each student.
- 2 Cut the tissue paper into 10-cm (about 4-in.) squares. Each team of four will need one paper square.
- 3 Before students build the model insect eyes, build the models yourself as described in step 2, pages 159–160, so you can supervise students. The completed models should look like the drawings on Activity Sheet 12, Part A. If you think your students will not be able to build the models successfully, assemble them yourself beforehand.

BACKGROUND INFORMATION

Insects have zero, one, two, or three simple eyes on the tops of their heads. Scientists do not know much about these eyes but think they are good only for detecting dark and light.



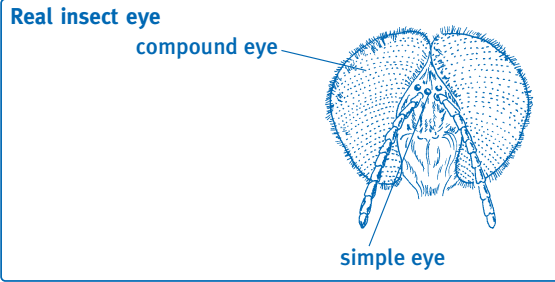
▲ Figure 12-1. Simple and compound insect eyes.

Most insects also have bulging compound eyes on the sides of their heads. These compound eyes are composed of thousands of separate lenses. Each lens sends a separate image to the insect's brain. Because the compound eyes bulge out to the side, insects are able to see all around them. Dragonflies have 25,000 lenses in each eye and thus see the world as a mosaic of 50,000 separate images! (The insect's brain processes these images, however, and how the insect actually perceives all this information is not yet known.)

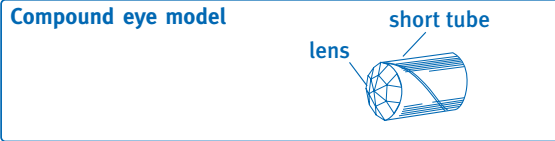
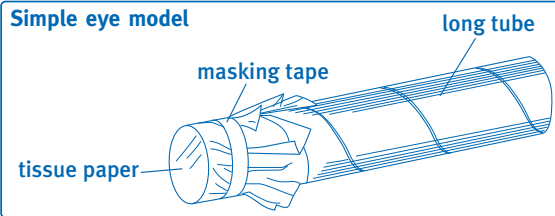
The advantage of this kind of sight seems to be a great sensitivity to movement. The disadvantage seems to be an inability to see fine details clearly.

▼ **Activity Sheet 12, Part A**

Insect Vision



Make these insect eye models.



▼ **Activity Sheet 12, Part B**

Insect Vision

1. Look through each tube. Write *yes* or *no* to tell what you can see.

| Can you . . . | Simple Eye (tissue paper) | Compound Eye (lens) |
|-------------------------|---------------------------|---------------------|
| Find lights or windows? | yes | yes |
| Find a dark area? | yes | yes |
| Read the clock? | no | probably no |
| Read a book? | no | no |

2. Now use only the compound eye model. Write *yes* or *no* to tell what you can see.

| Can you . . . | From across the room | From one meter away |
|--|----------------------|---------------------|
| Tell who a student is? | probably no | probably yes |
| Tell when a student waves his or her arms? | yes | yes |
| Read a book? | no | probably no |

Guiding the Activity

- 1 Distribute a copy of **Activity Sheet 12, Parts A and B**, to each student. Write *simple eye* and *compound eye* on the board. Point out the drawing of an insect's head on Activity Sheet Part A. Explain that the drawing shows the front of an insect's head. Remind students where the simple eyes and compound eyes are located by showing them on your insect model from Activity 11. Then ask, **What differences do you see between the simple eyes and the compound eyes?**

Tell students that one helpful thing about compound eyes comes from how big they are and where they are on the insect's head. Hold up your model insect, with its head facing the class. Explain that if they can see any part of one or both compound eyes, the insect would be able to see them. Ask, **Who can see at least one of the compound eyes?**

Hold up the model insect with its head facing away from the class. Ask, **Can you see the eyes now?**

Repeat your question while holding the model insect's bottom side toward students and then the top side toward them, to model an insect flying overhead or below them.

Ask, **What directions can an insect see with its compound eyes?**

Ask, **Do your eyes work like an insect's compound eyes?**

Explain that human eyes are simple eyes with one lens, like an insect's simple eyes. But an insect's simple eyes are not as powerful as a human's simple eyes.

- 2 Tell students that they will build models of an insect's two kinds of eyes and use the models to find out what it would be like to see like an insect.

Additional Information

The simple eyes are small. The compound eyes are big and bulge out to the sides.

All students should be able to see all or part of at least one compound eye.

Again, all students should be able to see all or part of at least one compound eye.

Students should be able to see all or part of at least one eye from all angles.

An insect can see in all directions at once with its compound eyes.

No. I can only see in front of me and a little bit below, above, and to the sides. I can't see far up, down, or to the sides or behind me unless I turn my head.

Guiding the Activity

Distribute one short cardboard tube, one long cardboard tube, a tissue paper square, and a lens to each team. Tell teams to share the rolls of masking tape. Point out the two drawings of the model eyes on Activity Sheet Part A. Then walk students through the following instructions for building the model eyes:

- ▶ **Simple eye model:** Put the tissue paper square over one end of the long tube. Fold it back over the end of the tube. Keep the paper as smooth as you can where it covers the end. Use masking tape to hold the paper tightly in place.
- ▶ **Compound eye model:** Gently push the lens into one end of the short tube. Make sure it is wedged in tightly so it doesn't fall out.

Tell students that the tube with the tissue paper is a little bit like an insect's simple eye. The tube with the lens is a little bit like an insect's compound eye.

3

Instruct students to look through each model eye. Let them experiment freely with looking at near and distant objects. Then read aloud the instructions for question 1 on Activity Sheet Part B, and have students complete the table.

Next, read the instructions for question 2 aloud, and have students complete that table.

Additional Information

Circulate around the room and help students with the model assembly as needed.



▲ *Figure 12-2. Testing model insect eyes.*

Guiding the Activity

4 When all students have completed both questions, ask, **What could you see with the simple eye model?**

What could you see with the compound eye model?

Which kind of eye do you think helps an insect keep from being eaten by a bird or other animal?

Additional Information

All I could see with the simple eye was light and dark. Everything was blurry.

The compound eye broke up what I saw into many separate pieces. I could see things move.

The compound eye; students should be able to infer that the large, bulging compound eyes let the insect see movement all around it so it can quickly spot another animal that is trying to catch it.

REINFORCEMENT

Have students try other tasks with the model eyes. For example, can they walk slowly across the room without bumping into anything? Can they recognize someone's face using two compound eyes?

SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

CLEANUP

Disassemble (or let students disassemble) the model eyes. Return the cardboard tubes, lenses, and masking tape to the kit. Discard the used tissue paper squares. Leave the Insects Chart and Insects Guide available for students' reference in Activity 13.

SCIENCE AT HOME

Encourage students to look for common insects at home, both indoors and outdoors. Tell them to draw a picture of each different kind of insect they see and to write the name of each insect below the drawing. Encourage students to ask other family members for help with spelling the insect names.

Connections

Science Challenge

Electron microscopes show that each of the thousands of facets of an insect eye is a roundish mass covered with ridges and bumps, something like the skin of an orange. Before electron micrographs showed these objects at higher magnification, scientists thought that the facets were hexagonal because they are arranged in a honeycomb pattern over the surface of the eye. Students could build a model of this compound eye structure by gluing tiny beads (preferably rough) onto two halves of a hollow plastic ball.

Science and the Arts

No one knows what the world looks like to an insect because what an animal perceives depends on how its brain processes the information from the eyes. Still, students can expand their visual thinking by supposing that to an insect, the world looks like what students saw through the multifaceted lens. Have students draw or paint pictures from a bug's-eye view of the world. Remind them to consider whether they are flying insects, looking down on the world, caterpillars on a bush, or beetles viewing a giant world from below. Have the multifaceted lenses available to help students remember how objects appear through them.

Science and Language Arts

Ask students to name as many different kinds of insects as they can think of. (They could refer to the lists they compiled in Science at Home, page 161.) List the names on the board. Then choose one name, and ask students to suggest as many words as they can that rhyme with that name. For example, for *fly*, students might suggest *pie*, *sky*, *why*, *tie*, and the like. Then ask volunteers to use the insect name and one or more rhyming words to construct a simple rhyming statement—for example, “There’s a fly in my pie!” Repeat with other insect names.