

THE ART OF FLYING

INSECTS | LEVEL 1

Skills

Hypothesizing, observing, following directions, discussing, reading, illustrating, writing, and using models

National Science Standard

Content Standard C: Life Science

Students should develop an understanding of the characteristics of organisms, the life cycles of organisms, and organisms and their environments.

Objectives

- Students will understand how insects' wings operate. Students will then create a model simulating how an insect moves its wings.

Assessment

Assess student participation in both the initial and concluding class discussions for active involvement and appropriate responses. Evaluate how well the students followed either oral or written directions for creating the model. Observe students' demonstration of the models they made assessing their understanding of how to make the wings move. Assess their illustrations for accuracy.

Materials

- "Wonderful Wings" handout for each student—duplicated on cover stock
- "I Can Fly!" activity sheet for each student
- Empty toilet paper tubes, or paper towel tubes cut in half for each student
- Transparent tape
- Chalkboard or overhead projector
- A variety of insect specimens with wings intact (optional)
- Handheld magnifying glasses (optional)

Background

Unlike our own arms, insect wings have no muscles in them. Large muscles located in the thorax or main trunk move insect wings. When these muscles flex they squeeze the thorax, changing its shape and causing the wings to move. Wings are also brought forward and backward or twisted to expose a leading edge. Most insects have four wings, but some insects do not have any. In this lesson, students make models simulating this action.

Subjects

Science

Time

Preparation: 40 minutes

Teaching: 60 minutes

Evaluation: 10 minutes

Vocabulary

Definitions on Page 4 of Lesson

insect

wings

thorax

muscles

flex

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Lesson Presentation

Preparation:

Because young students will have difficulty cutting slits in the cardboard tubes, make the cuts before beginning the simulation.

Example:



Looking at Wings:

Distribute the “Wonderful Wings” handout to each student. Have students take a few minutes to look carefully at the illustrations of insects. Challenge students to identify insects they are familiar with. As a class, read the names of the insects and discuss the shape, placement, and pattern of the insects’ wings. If available, place real insect specimens around the classroom. Invite students to look closely at the wings of these insects, paying special attention to the wing structure by using magnifying glasses provided at each bug inspection station.

How Wings Move:

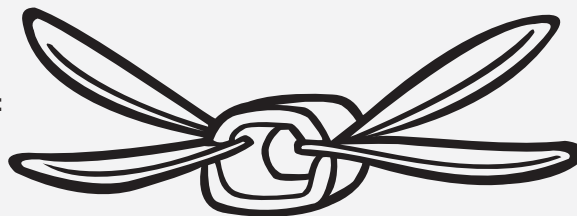
Pose a question to the group. How do students think **insects** move their **wings**? Share the ideas on the whiteboard or screen. Some students may suggest that insects have muscles in their wings that move them.

Have students stand up and find a **muscle** in their arm and **flex** it. Next, have them pretend their arms are wings. As they each lift an arm out to the side, challenge students to find the muscles that flex to lift the arm. They will discover that the deltoids, the triangular muscles located on the shoulder, are mainly responsible. Ask them if any other parts of their bodies change shape as they lift their arms.

Explain that insects don’t have muscles in their wings. Most insect wings are made of very thin membranes, thinner than tissue paper. Because they contain no muscles, insect wings do not have the ability to move on their own. The insect’s midsection, the **thorax**, is where the muscles used to move the wings for flight are located. These muscles contract and relax, causing the thorax to change shape as it produces each wing movement.

Draw this sample diagram on the board or overhead and discuss how the muscles in the thorax change the shape of the thorax and make the wings move.

Sample Diagram:



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Making a Model:

Explain that students will be using cardboard tubes and paper wings to simulate how an insect flies. Distribute the pre-cut cardboard tubes and “I Can Fly” activity sheets. Depending on the skill level of your students, either read the instructions as a class and have students complete one step at a time, or have students read and follow the instructions on their own or in small groups.

When the models are completed, have students gently squeeze their tubes to get the wings to move. Ask them which part of their model they think is like an insect’s thorax. They may need to experiment with where they position their hands on the tube to get the best wing motion. Students should be squeezing the middle of the tube where the wings are fastened. Ask students to demonstrate the motion for each other. The observing student should be looking at the open end of the tube to see the cross-section. Ask the student who is observing to pay particular attention to how the shape of the thorax changes when the muscles are “flexed” by the other student. Walk around the classroom and have students demonstrate to you the best place to squeeze the tube to achieve the best movement of the wings.

Reviewing What We Learned:

Conclude the lesson with a class discussion. Refer back to the hypotheses that students offered about wing movement at the beginning of the lesson. Ask students the following questions:

1. What do humans use to move their arms?
2. Do insects have muscles in their wings to make them move?
3. Do insects use muscles to move their wings?
4. Where are those muscles located?

Have students illustrate the answer to question 4, labeling the wings and thorax.

Modifications

Beginner: Have students work in small groups to create their insect models. Answer the discussion questions as a class.

Advanced: Challenge students to think of other ways to model the flying action of insects. Could they use balloons or slightly deflated rubber balls? Have them create their own models to show how movement in the thorax affects an insect’s wings.

Provide students with a variety of materials and then challenge them to create similar models of insects using different materials to create the wings. Have students create a written plan and then take notes as they experiment. Ask students to create a written summary of their experiment and present it to the class orally.

More Ideas

Give students time to decorate their winged insects. Students can create an imaginative insect of their own design. Remind students that most insects have four wings and some insects do not have wings. Have them use items such as pipe cleaners for legs or antennae, and markers or colored paper to decorate the

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tube. Challenge them to duplicate the patterns they observed on the real insect's wings or the illustrations of insect wings. Hang the finished models from the ceiling and enjoy all the creative winged insects.

Technology Connection

Invite students to find photographs of winged insects on the Internet. Either guide their search, using the key words below, or locate sites and make links available. Have students focus on the patterns in the wings. Challenge students to draw a wing with a pattern from one of the sites.

Key Words:

Insects

Winged Insects

Teacher Resources

www.einsteins-emporium.com/life/arthropods/insect_identification_winged.htm

www.bugbios.com

www.ent.iastate.edu/imagegallery

www.wingsandthings.com

Definitions:

INSECT A small invertebrate animal that has six legs and one or two pairs of wings.

WINGS Paired appendages that enable an animal to fly.

THORAX The middle section of an insect's body bearing its legs and wings.

MUSCLES Soft tissue in human and animal bodies that produces the force and motion required for movement.

FLEX To bend a limb or joint.

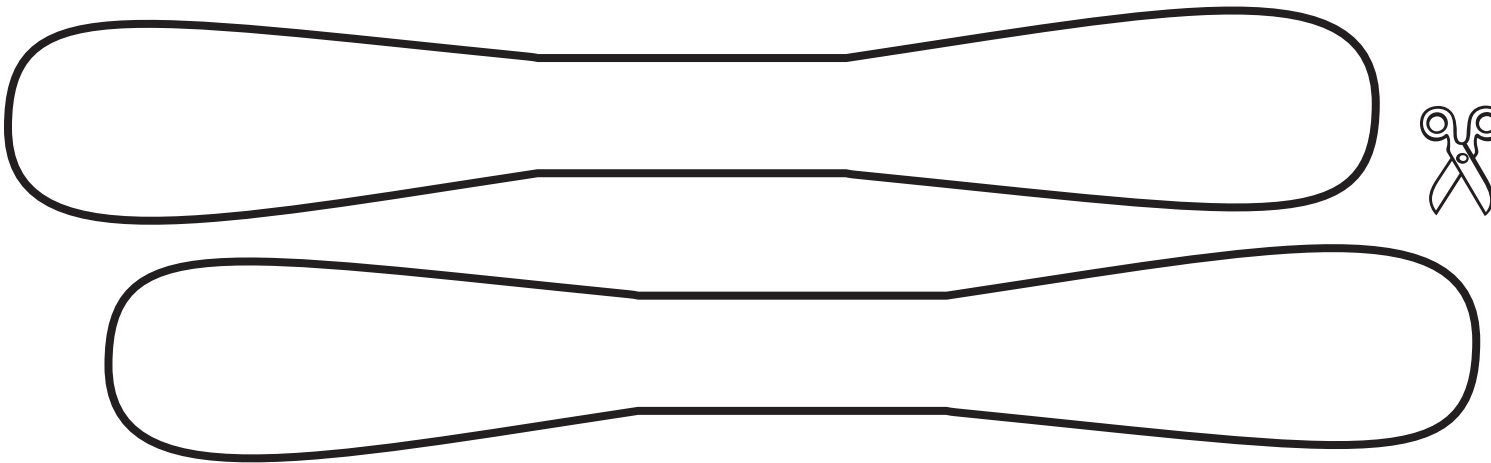
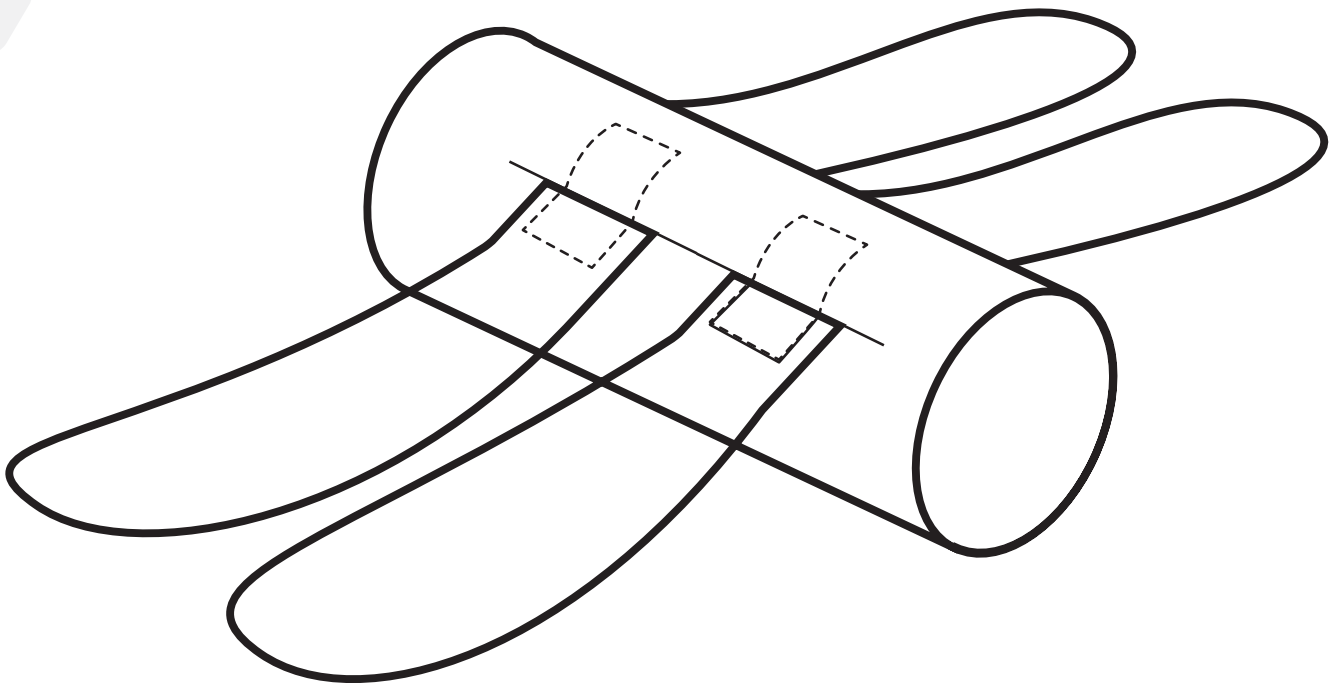
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I CAN FLY!

ACTIVITY SHEET

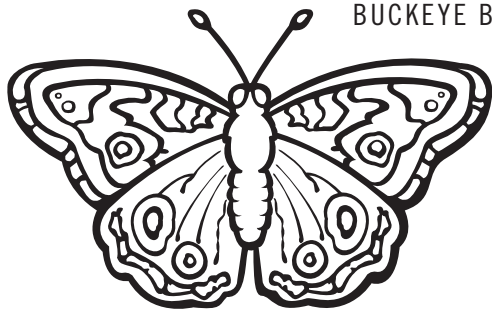
NAME _____

1. Cut out the two airplane propeller shapes below.
2. Slide the wings through the slits in the tube.
3. Put a piece of tape on each side of the tube near the slit to keep the wing from sliding.
4. Squeeze the tube gently to move the wings.

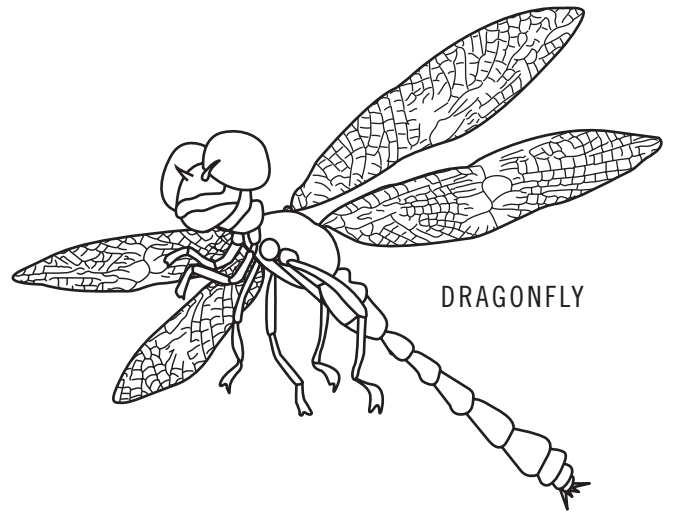


WONDERFUL WINGS

HANDOUT



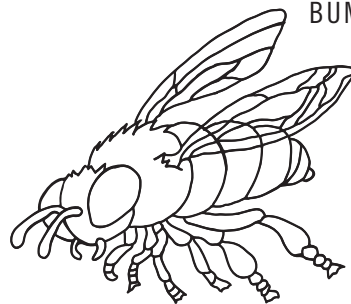
BUCKEYE BUTTERFLY



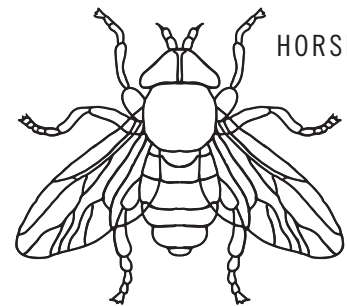
DRAGONFLY



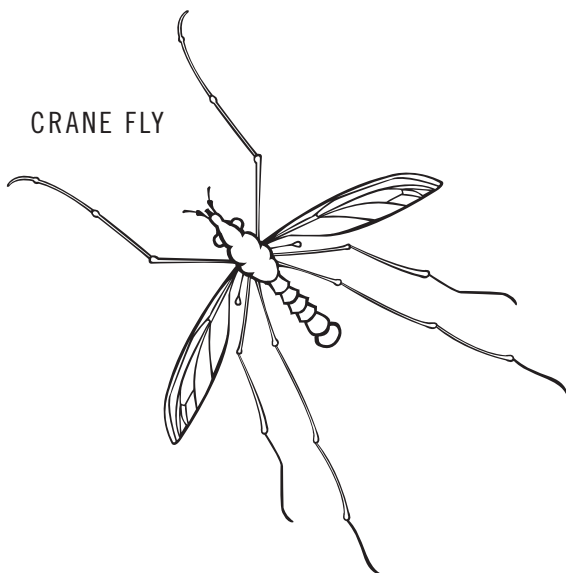
BAND WINGED
GRASSHOPPER



BUMBLEBEE



HORSE FLY



CRANE FLY



MONARCH
BUTTERFLY