

Animal Symmetry

Reading Preview

Key Concepts

- What is symmetry?
- What can you infer about an animal based on its symmetry?

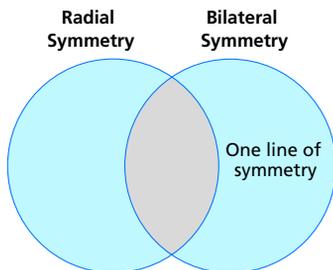
Key Terms

- bilateral symmetry
- radial symmetry

Target Reading Skill

Comparing and Contrasting

As you read, compare and contrast the characteristics of animals with bilateral symmetry and radial symmetry in a Venn diagram like the one below. Write the similarities where the circles overlap, and write the differences on the left and right sides.

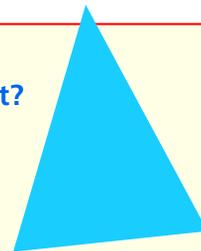


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Discover Activity

How Many Ways Can You Fold It?

1.  Trace the triangle onto a sheet of paper and cut it out. Then draw a circle by tracing the rim of a glass or other round object. Cut out the circle.
2. Fold the triangle so that one half matches the other. Do the same with the circle.
3. See how many different ways you can fold each figure so that the two halves are identical.



Think It Over

Classifying Name an animal whose body shape can be folded in the same number of ways as the triangle.

Have you ever stopped to look at a butterfly perched on a flower? You probably noticed that bright colors and dark lines criss-cross its wings, making a pretty pattern. Did you also see that the pattern on the left side of the butterfly is a mirror image of the pattern on the right?

The Mathematics of Symmetry

As you can see from the photo of the butterfly in Figure 7, a butterfly's body has two halves. Each half looks like a reflection of the other. **This balanced arrangement of parts, called symmetry, is characteristic of many animals.** A butterfly's symmetry contributes to its pleasing appearance. But, more important, the balanced wings help the butterfly to fly easily.

FIGURE 7

Butterfly Halves

This butterfly's body has two mirror-image halves.

Applying Concepts What is this balanced arrangement called?



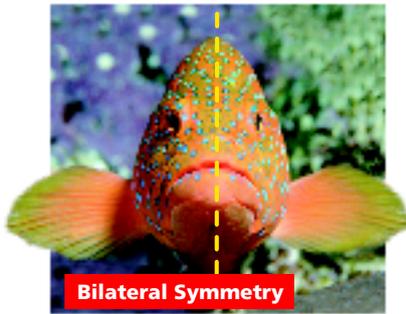


FIGURE 8

Types of Symmetry

Animals have either bilateral or radial symmetry, except for most sponges, which usually have no symmetry.

Animals have different types of symmetry, as shown in Figure 8. In the case of a fish, you can draw a line lengthwise down the middle of its body. This line is called a line of symmetry. An object has **bilateral symmetry** if there is just one line that divides it into halves that are mirror images. In contrast, objects with **radial symmetry** have many lines of symmetry that all go through a central point. For example, the sea star is circular if you look at it from the top. Any line drawn through its center can divide the sea star into two symmetrical halves. A few animals, such as most sponges, have no symmetry.



How many lines divide an animal with bilateral symmetry into halves?

Symmetry and Daily Life

Animals without symmetry tend to have simple body plans. In contrast, the bodies of animals with bilateral symmetry or radial symmetry are complex. **Depending on their symmetry, animals share some general characteristics.**

Animals With Radial Symmetry The external body parts of animals with radial symmetry are equally spaced around a central point, like spokes on a bicycle wheel. Because of the circular arrangement of their parts, animals with radial symmetry, such as sea stars, jellyfishes, and sea urchins, do not have distinct front or back ends.

Animals with radial symmetry have several characteristics in common. All of them live in water. Most of them do not move very fast. They stay in one spot, are moved along by water currents, or creep along the bottom.

FIGURE 9

Radial Symmetry

The sea stars in this tide pool have radial symmetry.



FIGURE 10

Bilateral Symmetry

Animals with bilateral symmetry, like this tiger, have a front end with sense organs that pick up information.



Animals With Bilateral Symmetry Most animals you know have bilateral symmetry, including yourself! In general, animals with bilateral symmetry are larger and more complex than those with radial symmetry. They have a front end that typically goes first as the animal moves along. These animals move more quickly and efficiently than most animals with radial symmetry. This is partly because bilateral symmetry allows for a streamlined body. In addition, most animals with bilateral symmetry have sense organs in their front ends that pick up information about what is in front of them. For example, a tiger has eyes, ears, a nose, and whiskers on its head. Swift movement and sense organs help animals with bilateral symmetry obtain food and avoid enemies.

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Where are the sense organs of an animal with bilateral symmetry typically found?

Section 2 Assessment

Target Reading Skill **Comparing and Contrasting**

Use the information in your Venn diagram about symmetry to help you answer Question 1 below.

Reviewing Key Concepts

- a. Reviewing** What is symmetry?
- b. Comparing and Contrasting** How are bilateral symmetry and radial symmetry alike? How are they different?
- c. Applying Concepts** What kind of symmetry does a grasshopper have? Explain.
- a. Identifying** What general characteristics do animals with radial symmetry share?
- b. Summarizing** What four body characteristics do animals with bilateral symmetry usually have?
- c. Making Generalizations** How would having sense organs in front be helpful to an animal?

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At-Home Activity

Front-End Advantages With a family member, observe as many different animals as possible in a yard or at a park. Look in lots of different places, such as in the grass, under rocks, and in the air. Explain the advantages an animal with a distinct front end has. Tell the person what this type of body arrangement is called.