9.3

Adaptive Value of Behavior

Hamadryas baboons can live in groups with hundreds of individuals.

CAN YOU EXPLAIN IT?

Naked mole rats are native to parts of Africa. Unlike their relatives, including guinea pigs and porcupines, naked mole rats have long ratlike tails and pink, wrinkly skin that is nearly hairless. They spend almost their entire lives in darkness, living in underground community burrows. With an average 30-year life span, naked mole rats live longer than any other rodent.

FIGURE 1: A colony of naked mole rats has a single queen and many workers.

Naked mole rat communities are organized in caste systems. A caste system places people or organisms in groups according to their jobs or roles in society. The two primary groups in a naked mole rat colony are reproducers and non-reproducers. Typically, a colony has one breeding female—the queen—and a few breeding males.

The non-reproducers, both male and female, will never mate. They are the workers of the colony. They carry food, build nests, clean, dig tunnels, and care for the queen and her young. The significantly larger queen steps over the workers as she moves about the burrow, using chemical odors to establish her dominance.

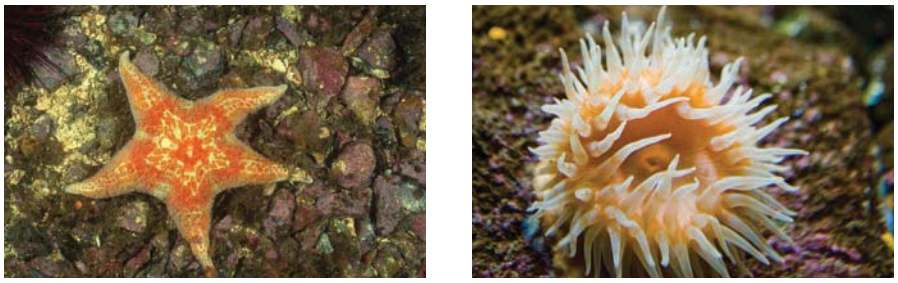
Gather Evidence As you explore the lesson, make a list of questions you have about the social system of the naked mole rat. Return to your list throughout the lesson.

Predict How could a population, such as the naked mole rats, evolve to the point where not all individuals reproduce?

Evolution of Behavior

FIGURE 2: Normally motionless, this sea anemone will swim away when it detects a sea star.

Explore Online



a Sea Star, *Dermasterias imbriacata*

b Sea Anemone, *Stomphia coccinea*

The sea anemone, *Stomphia coccinea*, has no brain or spinal cord and usually sits motionless. Yet, when it comes in contact with the sea star, *Dermasterias imbriacata*—its predator—the anemone detaches itself from its perch and swims away to safety. At other times, with other organisms, the anemone will not swim away.

Predict How does the sea anemone know when it comes into contact with a sea star versus some other object?

Responsive Behavior

The environment of every organism constantly changes. In order to thrive, organisms, such as the sea anemone, must respond to these changes. Anything that triggers a response is called a stimulus (*pl. stimuli*). An internal stimulus triggers a response to a change in an organism's internal environment, such as an infection. An external stimulus is any change in the external environment, such as contact with a predatory sea star, that causes a response.

Sense organs have specialized cells with receptors that detect changes in the environment and communicate information through nerves to the brain. The brain then sends a message back to the appropriate system telling it how to respond. This works well in organisms with complex nervous systems. However, this feedback mechanism also works in organisms such as the anemone, which only has a network of neurons with no centralized brain. Receptor cells on the outer surface of the anemone detect an external stimulus, which elicits an escape response.

Model Draw a model of the processes that occur when you interact with an internal or external stimulus, such as touching something very hot.

The sea anemone in Figure 2 never learned to swim away from the sea star, but it still knows to move to safety. This is an example of an innate behavior, sometimes called an *instinctive behavior*. Innate behaviors are passed from generation to generation without learning. An innate behavior is performed correctly the first time an animal tries it, even when the animal has never been exposed to the stimulus that triggers the behavior.

Innate behaviors are typically found where mistakes can have severe consequences. A sea anemone that does not swim away from the sea star, *Dermasterias imbriacata*, may be attacked. By having set reactions to particular stimuli, animals can automatically respond correctly in a life-or-death situation.

Function of Behavior

Collaborate With a partner, discuss how innate behaviors help organisms maintain homeostasis.

A lizard sunning itself on a rock is likely not just relaxing. If the rock becomes shaded, the lizard will shift its position to a warmer part of the rock. These behaviors actually help the lizard regulate its internal body temperature. Too hot? No problem. The lizard simply moves to a shadier spot. This behavior explains how ectotherms interact with their external environment to control their internal body temperature.

Maintaining a balanced internal state, or homeostasis, is critical to the health and functioning of an organism. When your internal temperature is below a normal temperature of 37 °C (98.6 °F), your body responds by shivering to produce heat. This is a biological response to an internal stimulus. Behavioral responses to the environment also help organisms maintain homeostasis. These responses are often movements or reactions that will help support a balanced state, increasing the chance of survival.

Cause and Effect

FIGURE 3: Red crabs migrate during mating season.

Migration

To survive and reproduce, animals need water, food, and shelter. For many species, this requires individuals to move from one location to another or migrate. Each species has one or more triggers that cue migration. Certain species of birds often migrate from one area to another in a seasonal pattern. Each season brings changes in temperature, availability of food, and length of day.

Some migration cues are biological. In some species, depletion of energy reserves may signal a need to travel to available food sources. In others, changes in hormone levels or reproductive life cycles trigger mass movements. The breeding ritual of the red crabs of Christmas Island starts at the beginning of the rainy season. The crabs must migrate at this time because their eggs must be released in the sea before sunrise during the last quarter phase of the moon.

Predict According to what you know about natural selection and evolution, how does a behavior evolve, such as mass migration of a species, where all individuals respond in the same way at the same time?

FIGURE 4: A Swarm of Locusts

Weighing the Costs of Behavior

Every behavior has benefits and costs. A swarm is a large, dense group of animals, such as insects or birds. A swarm offers many advantages to living and traveling. Swarms confuse predators, which protects individual members. A swarm also may be better at finding food than an individual.

A swarm has disadvantages too. The size of a swarm can actually attract predators, leaving individuals on the outer edges of the swarm particularly at risk. A group with more individuals requires greater resources, which must be shared.

Gather Evidence When would swarming behavior be beneficial and when would it be too costly? How might a behavior such as swarming evolve among species?

Costs of Behavior

Behavioral costs can be measured in terms of energy, risk, and opportunity.

Energy costs describe the difference between the energy used in carrying out an activity and the energy used if the individual had done nothing. For example, it takes energy for a lizard to move from a shady spot to a sunny spot. However, it is worth that energy cost in order to maintain body temperature.

Risk costs are the increased chance of being injured or killed by carrying out a certain behavior versus doing nothing. Consider the wolves in Figure 5. Wolves risk injury or even death by fighting with other wolves. However, they may win access to mates or better territory if they win. Sometimes, the benefits outweigh the risks.

Opportunity costs result when an animal spends time doing one behavior and loses an opportunity to do a different behavior. For example, when a songbird defends its territory from rivals, it is using time that could have been spent foraging or mating.

FIGURE 5: Fighting can result in serious injury or even death.

Benefits of Behavior

If a predator approaches an animal suddenly, the stimulus elicits an involuntary, or innate, behavior such as running that is meant to protect the animal. One of the main benefits of an innate behavior is that it increases survivorship, or the number of individuals that survive from one year to the next. This will in turn increase an animal's fitness by natural selection. A behavior will be expressed if its benefits outweigh its costs. So, the benefit of maintaining homeostasis by basking in the sun outweighs the risk cost of a lizard exposing itself to predators. Behaviors that improve an individual's fitness will be passed on to future generations.

All organisms require food to survive. At times it is more beneficial for an individual to gather food alone. A solitary hunter only needs to find enough food for itself or its young. In other species, such as lions, group hunting is more beneficial. The division of labor reduces the energy cost and risk cost per individual. Group hunts increase the potential to take down bigger or more prey and the group has greater protection. However, a group must find more food and there is more competition for that food.

In some group hunts, the pack works together to pursue and take down the prey. In other groups, such as bottlenose dolphins, individuals have specific roles. Bottlenose dolphins forage in groups of three to six, with one individual acting as the driver to herd the fish toward other dolphins lined up as barriers to prevent the fish from escaping. The driver slaps its tail, causing the fish to leap into the air. This makes it easier for the dolphins to catch the fish. Clearly the energy cost per individual and risk from predators is less for the group, which gathers far more fish than a solitary hunter.

Analyze Some spiders build webs that include visible zigzag lines. But more visible webs catch fewer insects than do less visible webs. What benefits do you think the spider gets by building such a visible web?

FIGURE 6: Lions hunt in a group.

Murmurations

Murmurations are a form of group behavior in which thousands of starlings flock together as shape-shifting clouds. The birds fly together as one, creating incredible patterns as the flock twists and turns in the sky. Murmurations are often triggered by the presence of a predator, which is outmaneuvered by the rapid pattern changes.

Explain Murmurations require a great deal of energy expenditure. Explain the function of this behavior and the cost-benefit relationship. Does the benefit derived from the behavior outweigh the cost?

Social Interactions

FIGURE 7: When a predator is near, individuals in a group will move in unison for protection.

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Similar to flocking of birds, schooling in fish is a group activity that benefits the individual members. Fish school for several reasons, including foraging for food, defending themselves from predators, and reproducing. Swimming in a group also may improve hydrodynamics, or the dynamics of fluids, and reduce the energy cost associated with traveling through water. In the absence of predators, schools will often break apart, or the fish will take cover when in danger.

Analyze How do you think schooling behavior evolved over time? How does it increase the fitness of individuals in the school?

FIGURE 8: Springbok Pronking

Living in a Group

Sometimes, springboks hop on all four legs rather than run away when they spot a predator. This behavior, called *pronking*, alarms the rest of the herd but makes the individual visible to predators. Pronking gives the herd enough time to escape and signals to the predator that the herd already spotted it. Social behaviors include any and all interactions between individuals of the same species. Social groups interact in many ways, such as through communication, mate selection, and defense.

Explain Pronking carries with it a high energy costs and high risk costs. Why would an individual put itself at risk to alert and protect the rest of the group? What are the potential benefits?

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FIGURE 9: Chimpanzee Pant-hooting

Communication

Communication is the sharing or exchange of information and is critical to the survival of individuals and groups, as well as for the species itself. Vocalizations, plumage, songs, mutual grooming, and pheromone trails are all forms of animal communication.

Chimpanzees live in dense tropical rain forests where it is easy to lose sight of others. They use a variety of vocalizations to stay in touch and let each other know where they are located. Other vocalizations are used to show excitement, greet group members, and alert the group to predators. Chimpanzees also communicate through facial expressions and body postures.

Mate Selection

Courtship displays are behaviors most often used by male members of a species to attract females. Scientists theorize that females use courtship displays to judge the condition of their potential mate or the quality of his genes. For example, as shown in Figure 10, blue-footed boobies high step and strut to show off their blue feet to potential partners. The pigment that gives the blue-footed booby its bright blue feet comes from its food. So an individual that is more successful at finding food will have brighter feet. The courtship "dance" helps females find the most fit partner.

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FIGURE 10: Blue-Footed Booby

Defense

Defensive behaviors are responses to threatening stimuli from the environment. These various behaviors are meant to reduce harm to the individual. Animals will often put themselves in harm's way to protect their young as well. For example, the adult penguins in Figure 11 put themselves between their young and a petrel, who will eat young penguins. Groups of animals also will warn each other of danger with different vocalizations. Vervet monkeys, for example, use one call to indicate that a predator is a snake and another to indicate that it is a large cat or bird. This tells group members where to look and where to escape.

Explore Online

FIGURE 11: Penguins protecting their young from a petrel.

Model Make a model that explains how different types of behavior benefit the individual, and thereby the group. For each type of behavior, include elements that explain how this trait evolved over time.

Cooperation

Lions hunt together in packs, called *prides*, to increase their chances of success. Most prey can outrun a single lion but not an entire hunting group. The group works together to stalk the prey and make a barrier to prevent its escape. They then pounce together to take down the prey. This behavior is an example of *cooperation*, which involves behaviors that improve the fitness of the individuals involved.

Reciprocity

Vampire bats live together in tightly knit communities, providing protection and warmth to each other. A female vampire bat will donate food that she has collected from her hunt to a bat that is unable to hunt for its own food, voluntarily regurgitating and sharing part of its meal. This comes at a cost to the donor bat, because it has used energy to gather the food and is losing some energy by sharing.

FIGURE 12: Vampire bats share food with other bats.

Vampire bats keep track of which bats share food and, in turn, will share food with those bats. This is an example of reciprocity, another form of cooperative behavior among animals. The idea is that one action, such as sharing food, will result in a future beneficial response, such as being the recipient of shared food. Research has shown that bats in need of food received more donations if they had previously shared food with other bats.

Gather Evidence Which individuals within a larger community of bats would be most beneficial to feed after missing a meal or two?

Explore Online

FIGURE 13: Meerkats show altruistic behaviors.

Altruism

Meerkats, such as those shown in Figure 13, stand and watch for predators. When an individual sees a predator, it raises an alarm to the group. This signaling brings attention to itself and increases its own risk of being attacked but may save other individuals. This type of behavior is known as *altruism*. Altruism is a kind of behavior in which an animal reduces its own fitness to help other members of its social group. In other words, the animal appears to sacrifice itself for the good of the group.

Model Explain how you could model the cost-benefit relationship exhibited in altruistic behaviors.

How can we explain the evolution of altruism if behavior is supposed to increase fitness? British evolutionary biologist William Hamilton realized that alleles can be transmitted and therefore spread in a population in two ways, either directly from an individual to its offspring or indirectly by helping close relatives survive.

When an animal reproduces, its offspring gets half of its alleles. But its relatives also share some of the same alleles, in the following proportions:

- Parents and siblings share 50 percent of the animal's alleles.
- Nephews and nieces share 25 percent of its alleles.
- First cousins share 12.5 percent of its alleles.

The total number of genes an animal and its relatives contribute to the next generation is called inclusive fitness. It includes both direct fitness from reproduction and indirect fitness from helping kin survive. When natural selection acts on alleles that favor the survival of close relatives, it is called kin selection.

Eusocial Behavior

FIGURE 14: Weaver ants work together in eusocial colonies.

Analyze How is it possible for a behavior to evolve when there is only one reproductive female and the rest of the colony never reproduces?

Among colonies of insects, such as wasps, bees, and ants, only a small number of reproductive females exist. In honeybee colonies, one queen produces a few male offspring along with thousands of sterile female workers. These worker bees are incapable of reproduction and spend their short lives maintaining and protecting the hive, gathering food, producing wax and honey, and feeding the young. The workers live for about six weeks during the summer, while the queen can live for several years. Female offspring that will one day take the queen's place are raised in a separate cell and are fed a special diet.

If you were to look across many eusocial colonies, you would find that they share a common feature, haplodiploidy. This means their sex is determined by the number of chromosome sets in an individual. Males are haploid and females are diploid. Female social insects produce daughters through eggs fertilized by sperm. Unfertilized eggs produce sons. In these animals, daughters share half of their mother's alleles but all of their father's alleles. Sisters therefore share up to 75 percent of their alleles overall with one another, compared with 50 percent in humans and most other animals. The close relationship between sisters in a colony may influence the evolution of eusociality.

Explain Compare and contrast individual behaviors and group behaviors. What requirements are there for these behaviors to evolve?

Learned Behaviors

Young chimpanzees learn how to perform many tasks, some requiring the use of tools. Chimpanzees can learn to use leaves to drink water or to use rocks to crack open hard-shelled nuts and fruits. The chimpanzee in Figure 15 is using a twig to fish termites out of a mound. These are all examples of behaviors that must be learned. Chimpanzees are not born knowing how to use tools. They learn by watching and trying to imitate the behavior from their mother or other individuals in their social group.

Gather Evidence Why might some animals need to learn behaviors? What are some advantages of learned behaviors over those that are part of genetics?

Explore Online

FIGURE 15: A chimpanzee termite fishing.

Learning

Some aspects of behavior are influenced by genes, but many can be modified by experience. Learned behaviors are actions that change with experience. Learning takes many forms, ranging from changes in behaviors that are largely innate to problem-solving in new situations. In each case, learning involves the strengthening of nerve pathways. Most behaviors are not simple reactions to stimuli using preset pathways in the animal's brain. Instead, they represent a combination of innate tendencies influenced by learning and experience. Learning allows animals to quickly adapt to changes in their environment, increasing their ability to survive and reproduce.

Analyze Is learning genetically controlled? Consider the example of the chimpanzee learning to use tools. Can the chimpanzee pass on what it has learned? Can the chimpanzee pass on the ability to learn? Use evidence to support you claims.

Cultural Behavior

Cultural behavior is behavior that is spread through a population largely through learning, rather than selection. The key to cultural behavior is that the behavior is taught to one generation by another, known as *cultural transmission*.

For example, the orca shown in Figure 16 intentionally beaches itself to hunt seals in the shallow waters. Only orcas in certain parts of the world, and only certain groups, exhibit this behavior. Orcas learn this from their mothers and other members in their group and will teach it to their offspring as long as the behavior is advantageous.

The development of cultural behavior does not require living in complex societies. The transmission of birdsong in some taxonomic groups of birds is an example of cultural behavior. However, living close together in social groups may help to enhance the transmission and expression of cultural behaviors.

Explore Online

FIGURE 16: Orcas learn to hunt through cultural transmission.

Explain Construct an explanation as to how learned and cultural behaviors can increase an individual's fitness.

Language Arts Connection

The Evolution of Play Behavior

The polar bear cubs in Figure 17 may look like they are fighting, but they are actually just playing. Play fighting, also known as *rough-and-tumble play*, carries the risk of injury and uses energy. Why risk so much to play?

Determining what play behavior is can be tricky, as there is sometimes a fine line between what is play and what is genuine fighting. According to researchers, play involves behaviors that are an adaptation of normal behaviors, such as fighting, fleeing, or feeding. It also involves communications, such as postures or facial expressions, to let other individuals know that this is play.

Although play is fun, it is hypothesized that this activity also builds skills among juveniles that will be beneficial to them as adults. Play is observed in many forms; however, researchers classify it into three categories—play as physical training, social training, and cognitive development. Cognition is the mental process of knowing through perception or reasoning.

Many young mammals engage in physical play as they wrestle and nip at each other with juvenile teeth. This physical play strengthens growing muscles and is thought to develop skills that may be needed later for hunting or protecting themselves or their own offspring as adults.

Social training involves learning from others. Think about behaviors that may be familiar in animals, such as interactions between wolves. Different postures signal different messages. One signal may be described as a "play bow," which sends a message that the wolves want to play. As juveniles, play provides the opportunity to learn social signals that may be used for other purposes, such as gaining attention, courting, or showing aggression. Cognitive development occurs as playful peers learn from one another.

Scientists are still researching why animals play and how the behavior evolved. They do know that the benefits of play, like those of other animal behaviors, outweigh the associated risks.

FIGURE 17: Play is often a juvenile form of adult behavior such as hunting or fighting.

Language Arts Connection

Write an explanatory blog post that supports the claim that play behavior has evolved because it benefits the individual by giving them practice for events later in life. What evidence is there that play has evolved for these reasons? As you write your argument, consider following these steps:

- Introduce your claim, or the point your argument makes.
- Develop your claim by providing strong, logical reasons and evidence.
- Link ideas to show how your reasons relate to your claim.
- End with a conclusion that wraps up your argument.

EXAMPLES OF ANIMAL BEHAVIOR | USING AN ETHOGRAM | CAREER: ANIMAL BEHAVIORIST

Go online to choose one of these other paths.

Lesson Self-Check

CAN YOU EXPLAIN IT?

FIGURE 18: Naked mole rats live in a eusocial colony.

Naked mole rats live underground, as moles do. Each solitary, underground colony typically has only one reproductive female, the queen, and a few breeding males. The remainder of the colony consists of non-reproducing individuals that spend their entire lives as workers, maintaining and protecting the colony, gathering food, and taking care of the queen's offspring.

Explain Refer to the notes in your Evidence Notebook to explain why animals, such as naked mole rat workers, evolved not to reproduce.

Many of the eusocial insects investigated in this lesson are haplodiploid. Naked mole rats, however, are diploid animals. Their colonies, though, are still made up of closely related animals. These animals often live in areas where it is difficult for individuals to survive on their own. For example, naked mole rats live in colonies of 70 to 80 individuals. Most of the colony are the queen's siblings or offspring. Non-reproducing adults are either soldiers or workers. Soldiers defend the colony, while workers work together as a chain gang to dig through the soil to find edible tubers.

This eusocial behavior may have evolved due to the amount of work needed to find food. If leaving the colony leads to starvation, kin selection may favor staying in the burrow to work together as a group instead.

CHECKPOINTS

Check Your Understanding

1. How does a behavior that actually increases risk to an individual, such as pronking in springboks, ensure that genes will be passed along to offspring? Select all correct answers.

- **a.** The behavior draws attention to the herd.
- **b.** The behavior alerts the herd.
- **c.** The behavior confuses predators.
- **d.** The behavior uses energy.
- **e.** The behavior decreases opportunity costs.

2. Classify each behavior as innate or learned.

- **a.** Chimpanzees use tools to fish for termites.
- **b.** Newly hatched sea turtles crawl into the sea.
- **c.** Bats fly out of caves at night to eat mosquitoes.
- **d.** Bears fish for salmon out of a running stream.
- **e.** Birds avoid eating monarch butterflies because they taste bad.
- **f.** Penguins dance ecstatically to attract a mate.
- **g.** Honeybees associate certain colors and fragrances with nectar.
- **h.** Cockroaches run for dark spaces when lights are turned on.

3. Which of the following best explains how behaviors, such as swarming and flocking, help protect organisms?

- **a.** Individuals in swarms or flocks act as decoys to distract predators.
- **b.** Working together in swarms or flocks requires less energy.
- **c.** The movement and size of the swarm or flock confuses predators.
- **d.** Swarms and flocks can overtake larger predators.

4. Which of the following characteristics is the best criteria for classifying a colony as eusocial?

- **a.** Female workers engage in group foraging.
- **b.** Opportunistic mating occurs randomly between males and females.
- **c.** Within the colony there are only a few breeding females.
- **d.** The colony is characterized by the defensive behavior of females.

5. A female ground squirrel may send out a call warning her offspring that a predator is near. Often, the mother sacrifices her own life since the predator can more easily locate her from the call. Even though this behavior results in death, it is beneficial to her in that:

- **a.** half of her alleles are preserved in each offspring.
- **b.** all of her alleles are preserved in each offspring.
- **c.** the predator may be less likely to attack the population again.
- **d.** the alleles that caused her behavior will no longer be in the gene pool.

6. How does cooperative behavior contribute to the survival of animals?

- **a.** Cooperative behavior puts one individual at risk for the survival of the whole group.
- **b.** Cooperative behavior benefits one individual, which will be reciprocated in the future.
- **c.** Cooperative behavior enables individuals to work together toward a common goal that will benefit the group.
- **d.** Cooperative behavior engages all members of a group to work together for the benefit of a few.

7. Use the following terms to classify each type of behavior: *communication, reciprocity, altruism, defensiveness, migration*. You may use each response more than once.

- **a.** A bat shares a part of its food with another.
- **b.** A monkey brings attention to itself when sounding an alarm to the group.
- **c.** Bison respond to a threat stimuli from the environment.
- **d.** Ants leave a pheromone trail to food.
- **e.** Black bears leave an established territory to find new sources of food.
- **f.** Nonbreeding female workers care for the queen's offspring.
- **g.** A male peacock fans its feathers and struts.

8. Identify the most likely costs of each behavior using the following terms: *opportunity costs, risk costs, energy costs*.
   - **a.** A group of bats tend to their young rather than flying out to gather food.
   - **b.** Two worker termites guard the entrance to the mound.
   - **c.** A leopard chases down a gazelle in an attempt to eat it.

9. An antelope is grazing on the savanna and feels thirsty. It takes a drink from a nearby watering hole. As the antelope drinks, another antelope in the herd signals danger. The antelope and herd members sprint away. After running, the antelope feels hot and goes to lie in the shade.

   Identify each of the following as a stimulus or a response. If you identify it as a stimulus, decide if it is an internal or external stimulus.
   - **a.** feels thirsty
   - **b.** drinks water
   - **c.** sprints away
   - **d.** lies in shade
   - **e.** feels hot

10. Two separate groups of chimpanzees, living in separate regions, both use tools to gather honey. One group uses long sticks as tools to gather honey from a log and the other uses chewed leaves to collect the honey. Which of the following would best explain these two behaviors used for the same purpose?
   - **a.** cultural transmission
   - **b.** cooperation
   - **c.** transitive behavior
   - **d.** migratory behavior

11. Which of the following best explains how a certain behavior may be more likely to be selected for and evolve as an innate behavior?
   - **a.** The behavior is easily learned.
   - **b.** The behavior has very low risk and opportunity costs.
   - **c.** The benefits of the behavior for survival outweigh the costs.
   - **d.** The behavior is in response to a stimulus.

MAKE YOUR OWN STUDY GUIDE

In your Evidence Notebook, design a study guide that supports the main ideas from this lesson:

A behavior is anything an organism does in response to a stimulus and helps the organism maintain homeostasis in a changing environment.

A behavior is selected for if the benefit of the behavior outweighs the cost or risk.

Behaviors may be classified as innate or learned. Innate behaviors are those that are instinctive and are heritable. Learned behaviors are acquired through observation, practice, and experience and may be culturally specific.

Remember to include the following information in your study guide:

- Use examples that model main ideas.
- Record explanations for the phenomena you investigated.
- Use evidence to support your explanations. Your support can include drawings, data, graphs, laboratory conclusions, and other evidence recorded throughout the lesson.

Consider how any behavior that increases the survival of an individual or its reproductive success will likely be passed from one generation to the next.