Newton's Laws Of Motion

Objectives

The student will correlate Newton's Laws to various animal behaviors.

Materials

- ❑ Newton's Law cards, 2 copies and cut apart
- ❑ Animal Physics cards, 2 copies and cut apart
- ❑ scissors

Background

Isaac Newton was a scientist in the 1600s whose greatest achievement was his work in physics. He was especially important in providing the theory and ideas about gravity. By 1666 Newton had written his three laws of motion. These three laws still stand today and are the basis for understanding many physics concepts. The three laws are:

Newton's First Law: An object in motion stays in motion, unless acted upon by another force. For example: a student riding a skateboard will continue to move until they hit a rock, which causes the skateboard to stop moving, but the student to continue moving (sometimes head over heels!).

Newton's Second Law (part A only): When net force acts upon an object, the object accelerates in the direction of the force. For example: when a student kicks a soccer ball, the ball will move in the direction the force (or the kick) was applied.

Newton's Third Law: For every force there is a reaction force that is equal in size, but opposite in direction. For example: when the space shuttle takes off, the fuel exhaust pushes downward against the launch pad while the reaction to that force pushes the rocket upward into the sky. These forces are equal in size, but opposite in direction! In this experiment, students will identify the Laws of Motion and match them to animal behaviors.

Answers

A 1	F. . . . 2
B 1	G. . . .3
C 2	H. . . .3
D 2	I. 3
E 2	J. 3

Action

1. Begin the activity by introducing the study of physics and Newton's Laws. (See Background Information, previous page.) Newton's Laws surround us everyday and are even found in the animal kingdom.
2. Explain that in this activity, students will have an opportunity to match animal behaviors with Newton's Laws.
3. Divide the class into two equal groups, Group A and Group B.
4. Give each student in Group A an Animal Physics card. Give each student in Group B a Newton's Law card. Since there are only three Laws, several students in group B will have the same law listed on their card.
5. Begin the activity by having a student in Group A read their animal physics card aloud. Then ask the students in Group B to silently read the law listed on their cards and stand up if they think their law corresponds to the behavior.
6. Ask the students who stood up which of Newton's Laws they have listed on their card and why they think the law correlates to the behavior. If students that are standing only represent one law and that law is correctly matched to the behavior, Group B gets a point. Because Group B has correctly matched the behavior to the law, the teacher will collect the animal physics card. If there is more than one law being represented, then Group B will discuss what their final answer will be as a team. If final answer is correctly matched to the behavior, then Group B gets a point. If an incorrect law is given as an answer, a point is taken away.
7. Next, select a student from Group B to read their Newton's Law aloud.
8. Students in Group A silently read their animal physics card and stand up if they think they have a behavior that matches the law. If only one student stands up and their behavior correctly matches the law, then Group A gets a point. If multiple students stand up (multiple behaviors are represented) for the law, then group A will discuss what their final answer will be as a team. Remember that there are several behaviors that correspond to each of the three laws, therefore there can be more than one correct answer. The students will have to select one to be their final answer. If the final answer is correctly matched to the Law, they get a point. If an incorrect Law is given as an answer, a point is taken away.
9. Repeat steps five through eight until all animal physics cards have been collected.

Newton's Laws Of Motion

A. Animal Physics Card
A jockey rides her horse to the final hurdle of a competition. at the last minute the horse stops in front of the hurdle instead of jumping over it; the horse's impulse sends the jockey off the horse and into the air.

B. Animal Physics Card
A llama is running at a constant speed while carrying packages on its back. The packages are not tied down to the llama. When the llama makes an abrupt stop, the packages are sent into the air.

C. Animal Physics Card
Two male rhinos of equal size are competing for a territory. They are pushing on each other with equal force. There is no resolution to the conflict because neither of the two rhinos is more forceful than the other one.

D. Animal Physics Card
A male antelope tries charging at anther slightly smaller male entering his territory. Because the charging male is only slightly larger than the other, he ends up pushing the other male only a slight distance.

E. Animal Physics Card
A mother elephant gently nudges her calf to drink. The mother elephant is careful of the force she is using because she is much larger than her calf.

F. Animal Physics Card
A male giraffe has a large heavy head that is used to strike other males with tremendous force during con-frontations.

G. Animal Physics Card
A fish swimming through water pushes water backwards with its fins. The water propels the fish forward.

H. Animal Physics Card
An eagle soars through the air by pressing its wings downwards. The air in turn propels the bird upwards.

I. Animal Physics Card
Two antelopes begin to charge at one another. Once they strike, they both fall backwards with the same force they pushed into each other with. if one pushes on the other, both move, one to due the action force and the other due to the reaction force.

J. Animal Physics Card
A baby rhino runs playfully at his moth-er and bumps into her. The baby falls backward from the impact.

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Newton's Law Card

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Newton's Law Card

Newton's Second Law: the acceleration of an object is dependent upon two variable—the net force acting upon the object and the mass of the object. the acceleration of an object depends directly upon the net force action upon the object and inversely upon the mass of the object. For example: as the net force increases so will the object's acceleration. However, as the mass of the object increases, its acceleration will decrease.

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