

Activity: 1001 Ways to Move

Grade Level: Grade 4

Major Emphasis: Animal Movement

Major Curriculum Area: Science

Related Curriculum Areas:

Refer to Outdoor Education Curriculum Matrix 3-5
Science
Physical Education

Program Indicator:

The students will compare animals in terms of structures adapted to the environment.

Student Outcomes: The student will:

1. determine that there are many ways to solve a problem. **(DL4)**
2. conclude that nature has found many ways to solve the problem of animal movement. **(DL4)**
3. simulate the movements of a variety of animals.

Readiness: (DL2)

1. Review the major classifications of animals:

vertebrate	worms	mammals	amphibians
invertebrate	insects	birds	fish
microbes	spiders	reptiles	mollusks

2. Related vocabulary:

locomotion	adaptation
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Materials:

large chart paper	large white tag board with a large circle	clip boards
paper and pencil	boundary markers (yarn, rope, traffic cones)	plastic baggies
desert animal pictures	Desert Movement Game (Supplement A)	a paper cup

Procedures: (DL3&4)

This lesson should be presented as a series of challenges or problems relating to movement. Keep the statement of the problem simple and do not give examples to illustrate possible student solutions. Some students may have difficulty at first, but by working in teams, they should catch on and will feel greater satisfaction without receiving help from the activity leader.

1. Divide students into teams of three.

2. Provide each team with this challenge:
Think of 10 ways a person can move across this space (wherever activity is located). Provide each team with a clipboard, paper and pencil. One member of the team should record the team's responses. If the team can think of ten ways, they have met the challenge. If they think of more than ten, they have surpassed the challenge.
3. When all or most teams have at least ten responses, have teams take turns reading their ideas. Responses may be silly or serious, simple or complicated. *Do not mention this before they begin. Each group will answer in their own way.* Possible responses are:
 - a. walk across
 - b. cartwheel across
 - c. build a helicopter, fly around the world and land on the other side

All of the above answer the challenge. *Remember that these should not be given as examples.* Share responses for a short time, just long enough to demonstrate that there are many, many different ways to solve the problem of movement.

4. Reorganize students into teams of four or five.
5. Present the second challenge:
Think of the most creative way you can to move across this space as a team and be prepared to demonstrate this way to the rest of the group.
6. When each team has thought of a way and practiced it, bring teams together and have each one demonstrate their way of moving across the space. *Be sure not to be judgmental in assessing the quality of each team's responses.*
7. Present the third challenge:
As a whole group, let's think of as many ways as possible that animals move from one place to another. Record responses on a piece of large graph paper. Possible responses are:
 - a. walk on two legs - man, ostrich
 - b. walk on four legs - dog, raccoon
 - c. fly with two wings - almost all birds
 - d. fly with four wings - insects
 - e. hop on two legs - kangaroo
 - f. slither - snake
 - g. wiggle - fish
 - h. walk on six legs - insects
 - i. walk on eight legs - spiders
 - j. squirt jets of water - mollusks
 - k. kick legs through water - frogs
 - l. propeller - rotifer
 - m. cilia - paramecium

Allow time for student to think of types of animal movement that they have learned through books, TV, films and their own experiences. They may not think of some of the above responses, because they are outside their own experiences. Encourage them to think of as many as possible.

8. Present the fourth challenge: **(MC)**
After talking about the desert animals (sidewinder, golden mole, camel, kangaroo, webbed-footed gecko) and having students practice the movements of each, do the Desert Movement Game. (Refer to Supplement A)
 - a. Divide students into teams.
 - b. Set up the relay course by marking the starting and ending lines with string (about 25 feet).
 - c. Line up the teams behind the starting line. Assign students the animal they will be. *Remember that two children are needed to imitate a camel.*
 - d. Give a starting signal. Have first students move (moving as their animal) to the ending line and back to the starting line.
 - e. Second students start when touched by the first students, etc.
 - f. The first team to finish all the laps of the game wins.

9. Present the fifth challenge: *Have a Critter Race!*
 - a. Divide into teams of two.
 - b. Each team goes into the forest and picks through the leaves or looks on a tree or bush and catches at least one animal (insect, caterpillar, worm) and puts it in a baggy. *Note: Collecting materials such as spades or nets can be provided but are not necessary.*
 - c. When every team has at least one "critter", have a race to see which critter moves fastest from the middle of a circle to the outside. Put critters in a paper cup, turn it upside down on the center of a circle drawn on white tag board. To begin the race, lift the cup. At the conclusion of the race, return the critters to their forest habitat.

Summary:

1. Identify means of animal locomotion. Give examples.
2. How are you physically adapted to move in your environment? What mechanical devices have humans developed to aid in movement (cars, skateboards, wheelchairs, etc.)?

Follow-Up:

1. Compare skeletal structures of vertebrates that move in different ways (hop, fly, walk, swim, etc.) to see how they are alike and different. Discuss in terms of adaptation. **(DL2)**
2. Have students sketch the skeletal structures of several animals which move differently (bat, fish, snake, horse, human, etc.). Instruct students **not** to label or otherwise identify their sketches. In pairs, teams or as a whole class challenge other students to identify the animal type and its means of locomotion. **(DL2)**

Extension Activities: (DL2)

1. Create and design a collage of animals which move in different ways.
2. Write a story about how an animal with a disability might survive.
3. Play "Bat and Moth" from Nature Scope: Amazing Mammals Part II.
4. Research the world's fastest/slowest mammal, bird, fish, etc.
5. Play the game "Amoeba Tag" from Play Fair.
6. Research/explore the effects of a new mode of locomotion upon a specific culture (the role ships played on exploration; the effect of the Transcontinental Railway on the lifestyles of native americans; etc.). (MC)

Teacher Resources:

Books:

- < *Investigating Nature Through Outdoor Projects, National Zoo, Education Department.
- < *Nature Scope: Amazing Mammals Parts 1 and 2, National Wildlife Federation.
- < *North American Wildlife, Reader's Digest.
- < *Play Fair, Weinstein and Goodman.
- < *Nature Scope: Discovering Deserts, National Wildlife Federation.

Supplementary Material:

- < *Outdoor Biological Instructional Strategies (OBIS).

Desert Animal Movement Game

Student Outcomes:

The student will imitate the movements of desert animals in a game enabling the student to describe ways desert animals are adapted to their special habitat.

Materials:

Pictures of: sidewinder rattlesnake, golden mole, camel, kangaroo, web-footed gecko
String, rope or traffic cones for marking boundaries

Procedures:

Begin by talking about each of the animals listed below (Show pictures of each animal as you explain how it moves). Have students practice the movements before the actual race begins.

The ***Sidewinder Rattlesnake*** lives in open, sandy areas. Most snakes have a hard time getting a grip on sandy surfaces. The sidewinder has "solved" this problem by using its strong muscles to loop its body to the side in an S-curve and move sideways over the sand. The rough scales on its underside dig into the sand, helping it to move surprisingly fast. The snake stays cool since only two points of its body touch the hot sand at any one time.

To imitate a sidewinder, students can get into a squatting position, facing the direction they want to go. Have them clasp hands together and move with a sidewinding serpentine (snake) motion.

The ***Golden Mole*** is a small sand-colored animal streamlined for burrowing. It's torpedo shape and short, broad forelimbs are for "swimming" breast stroke style through the sandy desert soil. It's shovel-shaped nose pushes sand and soil out of its way. Have the students move on their knees and move their arms in breast stroke motions to imitate a golden mole.

The ***Camel*** walks with a swaying gait, moving both legs on one side of its body at the same time. A camel's broad feet (dinner plate size) keep it from sinking into the soft sand. Soles of its feet are covered with leathery skin to protect them from hot sand and sharp rocks.

Students work in pairs, one behind the other, with hands on shoulders of the one in front. Have them move by stepping forward with both right feet then left.

The ***Kangaroo*** uses its strong hind legs to bound away in a series of zigzag jumps. Other desert animals (kangaroo, rat, jerboa) move the same. Scientists think that this type of movement helps some animals escape from predators/enemies. Most deserts do not have much vegetation in which animals can hide.

To imitate the kangaroo, have students hold their arms close to their chests while they jump forward.

The ***Web-footed Gecko*** is a lizard who gets its name from the webbing between its toes. The webbed toes are used for digging burrows and running on soft sand without sinking. Students imitate geckos by getting on their hands and knees and moving quickly on all fours.

Start Game: Mark a starting and ending line with string (25 feet long). Divide group into teams of six.

Line up each team behind the starting line. Call out the names of animals to be imitated in the game.

Remember that two students are needed for the camel. Have each student move to the end and back to start, touching the next student upon return.