October 2001

SeaWorld/Busch Gardens

Rhino Rally

9-12 Classroom Activities

Survival of the Fittest

OBJECTIVE

Students will identify their strongest and weakest sense, and correlate that information with the type of habitat for which they would be best suited if they were animals.

ACTION

1. First, conduct the following four activities to identify the students' weakest and strongest sense(s).
2. Next, after each experiment is recorded, ask your students to hypothesize about which animal(s) they might associate with their strongest and weakest sense. Which habitat would be the most conducive to their survival? Ask the students which of the following senses are humans' best? If you'd like to take the experiment further, have the students present their findings and graph the class as a whole.
3. In conclusion, discuss:
   Animals with great color vision usually are diurnal. Black and white vision or color-blindness would most often be best suited at night. High sensitivity to touch would mean you'd be a great nocturnal animal - or you'd need whiskers (like a porcupine), heat sensing pits (like some snakes), or antennae (like some insects) to grope your way. A great sense of smell is either a nocturnal trait (like some snakes) or a diurnal trait (like rhinos, gazelle, antelope, etc.). Hearing is a fantastic sense for a bird of prey or a social animal needing to communicate with others in an area that is visually limiting like a rainforest.

BACKGROUND INFORMATION

Just by looking at most animals you can infer a lot about the animal's habitat and senses. For example, sharks are designed for aerodynamic swimming (it's obvious they do not live in trees!). The Solomon Island skink is an obvious tree dweller because of its long, sharp claws, prehensile tail, and bright green camouflage. It also has color vision, which is helpful in finding fresh green leaves for food, telling us it is a diurnal animal (active during the day). Tigers have sharp claws and sharp teeth—obvious carnivores. They also do not see in color, a trait shared by most nocturnal animals.

Black rhinos are seen as aggressive animals, but in reality they are actually quite shy. Scientists believe their aggression is a result of poor eyesight. In fact, at a distance of only 15 feet, they seem unable to distinguish the difference between a man and a tree. Black rhino babies walk behind their mothers not only so that their path is clear of swinging branches, but also because they rely on their mothers' sight and size to protect them. Some researchers believe black rhinos have such bad eyesight because their ancestors were forest dwellers, living in thick, dense foliage where sharp eyesight wasn't necessary. Conversely, white rhino babies walk in front of their mothers because their habitat is different from that of black rhinos and they do not need to be wary of swinging branches. They also have better eyesight and are able to see across the grasslands much easier.

Because all rhino species have different habitats, each relies on different senses. The white rhino's hearing is less acute than a black rhino's. Both have a great sense of smell.

MATERIALS

Test 1: Hearing (per class)
- four objects to make noise with, such as blocks, stones, coins, a glass, empty can, or pen
- one blindfold (scarf or handkerchief)
- five sets of earplugs
- five stopwatches (or clock) that make a ticking noise
- five 10' or longer tape measurers
- copy of "Hearing Chart"

Test 2: Vision (per class)
- three sets of 4" by 4" squares of six different colors of construction (such as yellow, green, white, gray, black, purple, etc.)
- two red and blue cardboard or poster board pieces, approximately 12" by 18"
- one white cardboard or poster board piece, approximately 12" by 18"
- scissors
- tape
- room where lighting can be varied (lights on and off, shades open or closed, etc.)
- copy of "Vision Chart" for each student

Test 3: Touch (per student pair)
- two tooth picks
- one 12" ruler
- copy of "Touch Chart"
- pencil
- two 2" pieces of masking tape

Test 4: Smell (per class)
- six smelly items such as canned tuna, blue cheese, peanut butter, orange slices, vanilla, a flower, black licorice
- six paper lunch sacks; one for each smelly item
- copy of "Smell Chart" for each student
- pencils

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Test 1 - Sense: Hearing

This activity will gauge how well students can listen when not allowed to see. blindfolded students will need to identify sounds coming from different directions.

ACTION Part A

1. Arrange students in a circle around the room. Select five students and distribute noise-makers WITHOUT other students seeing noisemakers. Give one student the "Hearing Chart" sheet to record observations. Select another student, give student a blindfold and ear plugs, and ask student to sit blindfolded in the middle of the circle.
2. Have the blindfolded student place an earplug in one ear (does not matter which).
3. Instruct students with a noisemaker to make their noise when you point to them. Point to a student with a noisemaker.
4. Ask the blindfolded student to point in the direction of the sound and identify it.
5. Repeat this step with other students with noisemakers, each of whom will make a different sound. You may even have students with noisemakers move to different places in the circle and repeat noisemaking.
6. Ask the blindfolded student to unplug her or his ear. Repeat the process with both ears unplugged. Is she or he better able to identify the location and source of the sounds?
7. Select other students in the class and repeat the experiment.

ACTION Part B

1. Divide students into five groups and give each group a ticking stopwatch and ear plugs.
2. Each student group selects one student for the center of each student group circle. Have students place an ear plug in one ear. Choose another student to record distance on chart.
3. One member of the group holds the ticking stopwatch close to the center student's ear and gradually moves it away from his or her ear until he or she can no longer hear the sound. Measure and record the distance between the center student's ear and where the stopwatch was when he or she could no longer hear it. Repeat this step for the other ear.

DISCUSSION

Part A: Which sounds did the students in Part A find to be the easiest to identify? Which were hardest? Does this tell you anything about the way we hear and the sounds we expect to hear? Did the students who had already seen the noisemakers have an easier time than the student that went first?

Part B: Did students notice a significant difference between the distances their left ear could hear as opposed to their right ear? Why do you think this is? Could some animals possibly benefit from this? For example, owls have one ear that sits higher on their head than the other and focus opposite directions so that when flying, they are able to hear sounds both above and below them. Rhinos and other animals are able to swivel their ears in order to hear sounds behind them as well as to the sides and in front.

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Names:_____

Hearing Chart

Part A

	Sound/Direction	Sound/Direction	Sound/Direction	Sound/Direction
Student 1	_____/_____	_____/_____	_____/_____	_____/_____
Student 2	_____/_____	_____/_____	_____/_____	_____/_____
Student 3	_____/_____	_____/_____	_____/_____	_____/_____
Student 4	_____/_____	_____/_____	_____/_____	_____/_____
Student 5	_____/_____	_____/_____	_____/_____	_____/_____

Part B

	left ear distance in./ft.	right ear distance in./ft.
Student 1	_____	_____
Student 2	_____	_____
Student 3	_____	_____
Student 4	_____	_____
Student 5	_____	_____

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Test 2 - Sense: Vision

This experiment will evaluate how students view different colors as presented on different background colors and under different lighting conditions.

Background: It can easily be demonstrated that the colors we see are affected by outside factors such as the distance from which they are viewed, the background of the object we are looking at, and the lighting of the surrounding environment. Bongo antelopes, which are a dark orange-red color, are easily camouflaged in the tropical forests because in low light, red is the first color in the spectrum to disappear (it has the shortest wave length).

ACTION

1. Tape or glue one set of the six squares of construction paper on the white cardboard. Write numbers #1 through #6 under the squares. Place the second set of squares on the red cardboard, and the third set of squares on the blue cardboard. The placement and numbers assigned to the squares *must be exactly the same* for all cardboard panels. Distribute the "Vision Charts" to students. Students should work in groups of five or six.
2. Place the squares on the blue cardboard background at the front of the classroom under normal classroom lighting so all students can see. Allow students 5 minutes to fill in the first column "blue board/light room" of the "Vision Chart."
3. Turn off classroom lights and ask students to complete the second column "blue board/dark room."
4. Remove the blue cardboard panel and replace with the red panel. Turn classroom lights on. Allow students 5 minutes to complete the third column "red board/light room." Turn classroom lights off and have students fill in the fourth column.
5. Remove red panel. Now confirm color identies by showing the squares on the white cardboard background under normal classroom light conditions. Determine colors and confirm as a class. Write colors under the "paper colors" column on the "Vision Chart."
6. When complete, discussed as a group. Did all the students tested see all of the colors correctly under all of the conditions?

How do animals adapt to their own limited or unlimited vision? Based on your data from this experiment, using these colors how would you camouflage yourself at night? How would the results change if you, as an animal, were striped, spotted, etc? Were any of the students color blind, seeing completely different colors than other students?

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Name:_____

Vision Chart

paper colors	blue board/ light room	blue board/ dark room	red board/ light room	red board/ dark room
square 1 _____				
square 2 _____				
square 3 _____				
square 4 _____				
square 5 _____				
square 6 _____				

Questions:

Which colors were difficult to see on the blue background?

Which colors were difficult to see on the red background?

What difference did the lighting conditions make?

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Test 3 - Sense: Touch

This experiment measures students' sensitivity to touch.

Background: Some animals have whiskers, some do not. Rhinos have no need of them because they are diurnal feeders. Nocturnal animals use whiskers to feel their way in the darkness. For example, the prehensile-tailed porcupine has whiskers that are as long as their body is wide. When entering a hole or borrow, if the porcupine's whiskers touch both sides, it knows its body can't fit inside and turn around, so, it does not enter the hole.

ACTION

1. Divide students into pairs. Give each pair two toothpicks, one ruler, a copy of the "Touch Chart," and two pieces of tape. Tape one toothpick at the 1-inch mark on the ruler and the other toothpick at the 5-inch mark, with each toothpick protruding about 1/2 inch off the ruler.
2. Have one student from each pair close his or her eyes and turn with his or her back to their partner. The partner should gently, but firmly press the ruler with two toothpicks against the student's back (between the shoulder blades).
3. The student receiving the toothpick stimulus responses with a "one" or "two" verbal answer, depending on how many pricks are felt. The answer is recorded on the chart.
4. Next, the partner holding the ruler with toothpicks will move one toothpick 1/2 inch closer to the other and repeat Step 2.
5. Using 1/2 inch increments, move the toothpicks together until the partner feels that there is only one toothpick against his or her back.
6. Partners will switch roles and do this experiment again, recording all results. Have students answer the questions at the bottom of the page.
7. When complete, discuss the answers as a class.

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Name:_____

Touch Chart

position of tooth-picks (inches)	Student 1 How many toothpicks did the student feel?	Student 2 How many toothpicks did the student feel?
1 in./5 in.	1 or 2	1 or 2
1 in./4.5 in.	1 or 2	1 or 2
1 in./4 in.	1 or 2	1 or 2
1 in./3.5 in.	1 or 2	1 or 2
1 in./3 in..	1 or 2	1 or 2
1 in./2.5 in.	1 or 2	1 or 2
1 in./2 in.	1 or 2	1 or 2
1 in./1.5 in.	1 or 2	1 or 2
1 in./1 in.	1 or 2	1 or 2

DISCUSSION

How far apart where the toothpicks when you felt one point of pressure?

_____ inches

Animals with whiskers are sensitive to fine touch, as are bugs with antennae. These animals are usually nocturnal animals with poor eyesight. Based on these results, would you make a better nocturnal or diurnal animal?
Hint: More sensitive touch would be better suited to a nocturnal lifestyle.

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Test 4 - Sense: Smell

The student will identify various aromas.

Background: Often an animal, such as the black rhino, compensates for its lack of sight (or other sense) by an enhanced sense of smell. So acute is their own as well as their predator's sense of smell that when a baby rhino defecates, the mother immediately covers the pile with her own feces or urine to throw the predator off of her baby's scent.

ACTION

1. Place selected items in separate, paper lunch bags. (If any items are wet, line bag with wax paper or plastic wrap.) Introduce activity by telling students they will be identifying unknown items by smell. Distribute "Smell Chart" sheet to students.
2. Turn down the lights and walk through the classroom having each student smell and then record his or her guess for each bag.
3. Turn the lights back on and reveal each item. Have students answer questions on the bottom of the sheet. Discuss results as a class.

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Smell Chart

Scent #1 _____

Scent #2 _____

Scent #3 _____

Scent #4 _____

Scent #5 _____

Scent #6 _____

QUESTIONS

Did you identify all the scents correctly? _____

Some animals, such as anteaters, armadillos, reptiles, and rhinos, need a keen sense of smell. Others, such as owls, vultures, and other birds of prey, havea very weak sense of smell. Which are you—a carnivore in need of tracking prey with your nose like a snake, or a bird of prey needing to track your prey with great eyesight instead?

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