Use your Powers of Observation and the Practices of Science and Engineering

Information for Teachers and Families

Overview:

These activities explore various methods of communication by reflecting on how humans communicate, investigating ways animal communicate, and comparing data in order to draw conclusions. By using their powers of observation and practicing critical science skills, students will gain a more complete understanding as they connect to the natural world.

How it works at home:

In a four-part series, students will first organize their thoughts on what they already know about human communication, then actively investigate communication in the natural world using their senses, inquiry skills and practical science skills. In the end, they compile and analyze their data to reach conclusions.

Using the Student Sheets:

(See Appendix for Minnesota Academic Benchmarks)

3rd-5th grade: This lesson is meant to help learners use their observation skills or ***powers of observation*** to make sense of the world around them. The student sheets give direction and guiding questions for each of the activities.

Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Human Communication	Sound Communication	Non-verbal Communication	Scent Communication	Touch Communication

Information for Adults Helping to Facilitate

Overview:

These activities explore various methods of communication by reflecting on how humans communicate, investigating ways animal communicate, and comparing data in order to draw conclusions. By using their powers of observation and practicing critical science skills, the students will gain a more complete understanding as they connect to the natural world.

How it works at home:

The lessons provide an opportunity for learners to make simple observations about the natural world that connects them to their senses and nurtures their sense of curiosity and wonder! Day 1-3 and Day 5 activities require space, something to write on and a writing instrument. Students will need to pick a spot or area for the investigations. This could be in your yard, a park nearby, farmland, forest, or even a window in your home. Spend **15 minutes** gathering the data for the activities then answer a few follow up questions. Day 4 needs a larger space, a partner, and a few items that can be found in your household.

Proposed Daily and Weekly Schedule

Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Human Communication	Sound Communication	Non-verbal Communication	Scent Communication	Touch Communication
Location: Anywhere to think and write.	***Location:*** Favorite space outside that has animals (birds, squirrels, etc.)	***Location:*** Favorite space outside that has animals (birds, squirrels, etc.)	***Location:*** Large space (inside or out) with different sections or areas.	***Location:*** Anywhere for observing animals.
Materials: • Worksheet, blank sheet of paper, or journal • Pencil or pen	***Materials:*** • Worksheet, blank sheet of paper, or journal • Pencil or pen	***Materials:*** • Worksheet, blank sheet of paper, or journal • Pencil or pen	***Materials:*** • 4 different scent items (spices, soap, etc.), • cotton balls • 8 small containers with lids	***Materials:*** • Worksheet, blank sheet of paper, or journal • Pencil or pen
Optional: • Computer or iPad • Media to watch programming	***Optional:*** • Computer or iPad • Media to watch programming	***Optional:*** • Computer or iPad • Media to watch programming	***Optional:*** • Computer or iPad • Media to watch programming	***Optional:*** • Computer or iPad • Media to watch programming

Questions to Help Students Think Critically and Show Understanding (Optional):

1. Did you notice anything new this week?
2. What was your favorite part of this investigation?
3. What do you wonder about after today?

Technology Connection (Optional)

In the majority of the lessons, there is an option of viewing a short video to see examples of some of the behaviors we are highlighting in species around the world. If students do not have access to technology, the same information is provided in the text box and accompanying pictures.

Investigation of Human Communication—Day One

1. Think about the different ways we communicate with the world. Then either copy the chart format below in a science journal/separate sheet of paper or use this page. This will be your guide to help organize your thoughts.

2. List five different ways you communicate with others and their meaning. We provided an example to get you started.

Method of communication…	**Who I am directing the communication to…**	**What it means…**
Example: Whistle	*Example: Dog*	*Example: Come inside*

Think and Reflect!

3. Review your chart above. Write an **"I noticed…"** statement. (*Hint: Do you see a pattern? What method of communication is used the most? Etc.*)

4. What reasons can you give for what you noticed?

5. At the end of this lesson, I have these questions:

Investigation of Sound Communication—Day Two

Did you know?



A lyrebird is an Australian bird that is known for its ability to mimic natural and artificial sounds from its environment. Lyrebirds can mimic the sounds of other birds and even human-made objects like chainsaws. They do this to attract a mate—the more complex the sound the more likely they are to be chosen. Besides finding a mate, what are other reasons a bird might make a sound in the wild?

To see a video of the lyrebird's song, visit:
Amazing! Bird Sounds From The Lyre Bird - David Attenborough - BBC Wildlife,
https://www.youtube.com/watch?v=VjE0Kdfos4Y

What sounds can you hear in Minnesota this time of year? What do you think these animals are trying to communicate?

1. Find a place outside where there are some animals (birds, squirrels, etc.) to sit quietly for 10-15 minutes. It can be in your yard or a nearby park. For this activity, you will only use your sense of hearing.

2. Take three deep breaths to relax, then close your eyes to concentrate on what you hear around you. Try to focus on just one sound you hear.

3. After 5 minutes, open your eyes. Fill in the chart below based on what you heard. Repeat three more times, each time focusing on a different sound.

I heard this sound… *(describe as best you can)*	**It was directing the communication to…**	**I think it means…**

Think and Reflect!

4. Look around at your surroundings. Take note of where you are (busy or quiet area, how many animals or humans present). Note the time of day and the weather conditions. Could any of these factors influence what you heard? Explain your reasoning.

5. What was the purpose of closing your eyes for the activity? To figure it out, try keeping your eyes open. How does it compare?

6. What is something you are still wondering about at the end of this lesson?

   I wonder…

Investigation of Non-Verbal Communication—Day Three

Did you know?



Tigers communicate in many ways besides sound. You can learn a lot just by watching their tails. An upright, slowly wagging tail indicates friendliness, while an outstretched, quickly wagging tail indicates excitement, and a tail that is barely moving and angled towards the ground indicates tension.

To see more non-verbal communication from the Minnesota Zoo's tigers, view Animal Enrichment at the Minnesota Zoo: https://www.youtube.com/watch?v=15Nb-7qwQ4c&list=PLUCbevzXL4Z1xSYMc1VLrL8W3Y8659rKR

What type of non-verbal communication are the animals in your neighborhood demonstrating? What do you think it means?

1. Return to your previous spot from yesterday or find a new comfortable place to sit for 10-15 minutes. Take a few deep breaths to relax.

2. Cover your ears and concentrate on what you see around you. Select a nearby animal to watch quietly.

3. After 5 minutes, uncover your ears. Fill in the chart below based on what you saw. Repeat three more times, each time focusing on a different non-verbal behavior.

I saw this non-verbal communication… *(describe as best you can)*	**It was directing the communication to…**	**I think it means…**

Think and Reflect!

4. Take note of where you are when you observe. Include details like activity level, how many humans are present, time of day, the weather conditions, etc. Could this influence what you saw? Explain your reasoning.

5. What is something you are still wondering about at the end of this lesson?

   I wonder…

Investigation of Scent Communication—Day Four

Did you know?



The tamandua is often called a lesser anteater because it is much smaller than its relative, the giant anteater. Their smelly scent gives tamanduas the nickname "stinkers of the forest." Tamanduas can spray a foul-smelling secretion said to be four times more powerful than a skunk's!

To learn more about tamanduas, visit:
https://www.youtube.com/watch?v=4z6YEQK0QK0

Why do animals give off scents? Is it always bad? What else can scent be used for in nature? How do humans use scents? Is it different?

Today requires a little prep work and a partner to participate with you. The required items are:

- Four distinct scents—kitchen spices or soap products work well. For example, you could use vanilla extract, vinegar, cinnamon, perfume, shampoo, etc.
- Cotton balls or other items to retain the scents (small pieces of old material, rag, unscented tissue, etc.)
- Eight containers to hold the scented items (old film canisters, small Tupperware, Dixie cups covered in plastic wrap secured by rubber bands).
- Partner to work with. If working alone, try to use similar containers (see note in the directions below).

Lab Directions:

1. For each scent, apply the scent substance to a cotton ball and place it in a small container with a lid. Repeat so that you have two samples of each scent.
    - IMPORTANT: If the containers are not the same, make sure you do not put the same scent in a similar looking container. We do not want what you see to influence this activity.

2. Place one container of each scent in different locations of the area you are using. These locations will represent four different territories. Keep the other paired scent container with you.
    - NOTE: If you are working alone, mix up or shuffle the containers before you set up the territories.

3. When ready, explain to your partner you have communicated to them through smell where their territory is. Have your partner randomly choose one of the containers you have in your possession, explain that this is their scent before they carefully smell the scent inside.
    - NOTE: Shuffle or mix up the containers and choose one at random.

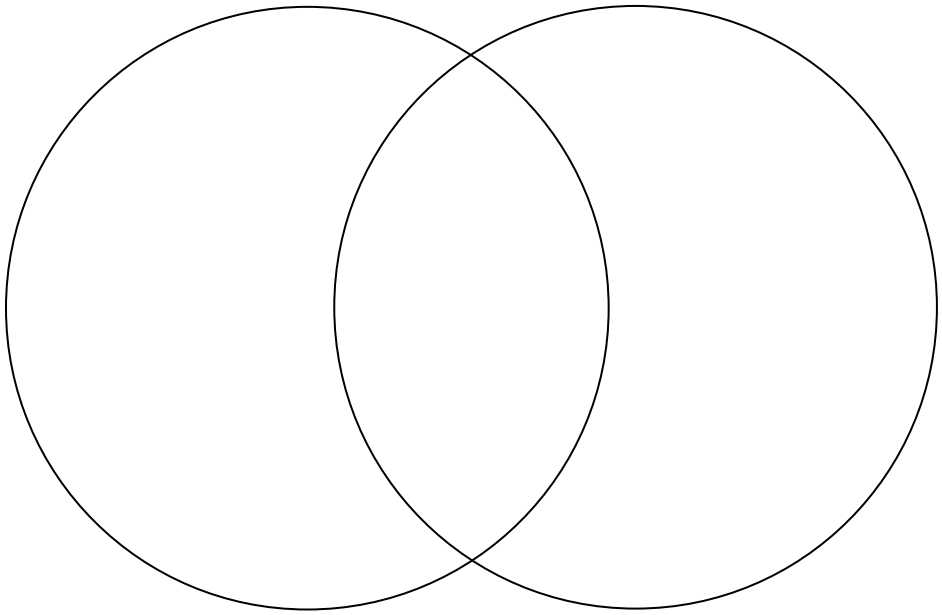
4. Have your partner visit each of the placed containers and carefully smell it to see if it matches their scent.

5. When they successfully find their territory, have them relocate the containers for you to try to find yours.

6. Record any observations below:

Think and Reflect!

7. This lab was investigating how animals use scent. How does this compare to humans using scent to communicate? Create a Venn diagram comparing their similarities and differences.



8. What did you notice during this investigation?

   I noticed…

9. What were you left wondering about?

   I wonder…

Investigation of Touch Communication—Day Five

Did you know?

Like many other types of monkeys, Japanese macaques, or Snow monkeys, communicate through touch. From grooming each other to remove bugs, to wrestling, actions often speak louder than words.



To see more Snow monkey interactions, visit:
Minnesota Zoo's Snow Monkey Nikko's Birthday,
https://www.youtube.com/watch?v=vT7u40pSx60

How are animals in your neighborhood interacting through touch? What do you think they are trying to communicate to one another?

Now that you are better skilled at using your **powers of observation,** look for signs of animals using touch communication as you walk around your neighborhood or wherever you like to sit and watch! Take mental notes of what the animal is doing and what part of its body is being used. What is the behavior? What could it mean?

I saw this touch communication… *(describe best you can)*	**It was directing the communication to…**	**I think it means…**

Think and Reflect!

1. Write down 1-2 sentences that sums up the data you collected on both human and animal communications.

   Over the last 4 days, I noticed…

2. **I think scientists study animal communication because…**

3. **By specifically studying the way they animals communicate with each other, we can learn…**

4. What can we use these discoveries to do? How can they help people and animals?

Engineering Extension: 3rd-5th Grade

As you explore and spend time outside each day, look at the animals you are observing. What parts of the animals help them to communicate? What features make it easier to communicate? Which parts make it harder?

Animal	Type of communication (sound, touch, scent, feel)	Adaptation that helps it to communicate	Adaptation that makes it hard to communicate
Squirrel			
Bird			
Dog			
Other			

Build Time!

You are going to build an animal perfectly adapted to live in your neighborhood and specially adapted to communicate as effectively as possible. First, draw a picture of what your new animal will look like. Remember, engineers always design and then re-design to keep improving their design. They don't stop after the first try.

Design 1:	**Design 2:**
Which design is the best solution for the most effective communication? Why?	

Look around your house and outside to find objects that may be helpful in building your new animal. Take pictures of your process and document your learning. Make sure to tell us what makes your animal such a good communicator!

Take pictures and send them to the Minnesota Zoo so we can see your masterpiece and cheer you on! Post pictures to @mnzoo, @mnzooedu and the Minnesota Zoo Educators Facebook Page (MnZooEdu)

Appendix: 3rd-5th Grade Benchmarks

Nature of Science and Engineering		
3.1.1.1.1 Provide evidence to support claims, other than saying "Everyone knows that," or "I just know," and question such reasons when given by others. 3.1.1.2.1 Generate questions that can be answered when scientific knowledge is combined with knowledge gained from one's own observations or investigations. *For example:* Investigate the sounds produced by striking various objects. 3.1.1.2.3 Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed. *For example:* Make a chart comparing observations about the structures of plants and animals. 3.1.1.2.4 Construct reasonable explanations based on evidence collected from observations or experiments. 3.1.3.2.1 Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and develop tools. *For example:* Ojibwe and Dakota knowledge and use of patterns in the stars to predict and plan.	4.1.2.2 Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.	5.1.1.1.2 Recognize that when scientific investigations are replicated, they generally produce the same results, and when results differ significantly, it is important to investigate what may have caused such differences. For example: Measurement errors, equipment failures, or uncontrolled variables 5.1.1.1.3 Understand that different explanations for the same observations usually lead to making more observations and trying to resolve the differences. 5.1.1.2.1 Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question. 5.1.1.2.2 Identify and collect relevant evidence, make systematic observations and accurate measurements, and identify variables in a scientific investigation.