



MINNESOTA ZOO

OPERATION CURIOSITY & WONDER

My Observations, Questions, and Data about the Natural World

THIS SCIENCE JOURNAL BELONGS TO:





OPERATION CURIOSITY & WONDER

Third-Fifth Grade

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

Information for Teachers and Families: FOURTH GRADE

Overview:

Using our **powers of observation** is the first step in investigating and learning about the natural world. It is also one of the practices of science and engineering. This approach allows us to learn the content knowledge of science and pair it with the critical thinking of defining problems and creating solutions associated with engineering. The Minnesota Zoo wants to get children outside and help them to build connections to the natural world. The purpose of these activities is to connect learners to the natural world around them and their academic standards, provide opportunities for social-emotional learning, and deepen their understanding of how the world around them works.

How it works at home:

Students start by reading the science mystery for the week. Then, for the remainder of the unit, they pick a location to visit each day. This could be in a yard, a park nearby, farmland, forest, or even looking out a window of the home. They will bring the materials listed with them and spend **10-15 minutes** each day doing the activities outlined for the day. The lessons will help provide clues to the story. If possible, an adult can accompany the learner so they can share their thoughts and ideas and build connections with the people around them during this time. Depending on the learner, they can talk through their ideas and/or express themselves through writing or drawing. Encourage them to show their understanding in the way that best fits their learning! Have fun with this. It provides an opportunity for students to make simple observations about the natural world that connects them to their senses and nurtures their sense of curiosity and wonder!

Using the Student Sheets:

(See Appendices for Minnesota Academic Benchmarks)

4th grade: These daily lessons are meant to help learners use their scientific skills or **powers of observation** to make sense of the world around them. As winter turns to spring, there will be many chances to observe and take notes! By using the same activities each week on the designated day, ideally in the same location, you should see patterns emerge through student data. It is recommended that learners create a science journal to document and organize their discoveries.

Feedback for the Minnesota Zoo:

Thank you for your interest in our Distance Learning Resources! We are interested in learning about your experience with these resources, and we are asking you to take approximately 5 to 10 minutes of your time to complete a brief survey to provide valuable feedback to the Minnesota Zoo. The survey can be accessed at <https://survey.mn.gov/s.asp?k=158697965283>.

Information for Adults Helping to Facilitate: FOURTH GRADE

Overview:

The purpose of these activities is to connect learners to the natural world around them and their academic standards, provide opportunities for social-emotional learning, and deepen their understanding about how the world around them works.

How it works at home:

Pick a spot to go to each day of the week. This could be in your yard, a park nearby, farmland, forest, or even a window in your home. Bring the materials listed with you. Spend **10-15 minutes** each day doing the activities outlined for the day at this spot. This is meant to 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!

Proposed Daily and Weekly Schedule

Monday	Tuesday	Wednesday	Thursday	Friday
Earth Science: Rocks and Minerals	Life Science: Animals and Ecosystems	Earth Science: Clouds and Weather	Earth Science: Sun and Moon	Earth/Life/Physical Science: Water
Location: Outdoor area where there are living rocks (any kind)	Location: Outdoor area where you may be able to see or hear animals (any kind)	Location: Outdoor area where learner can see the sky	Location: Outdoor area where learner can see the sky	Location: Outdoor space with water (rivers, lakes, creek, sewer drain, ponds, puddles)
Materials: • Story of the week • The day's lesson • Appendix: Weather Investigation Tool • Paper or notebook (journal) • Pencil/pen	Materials: • The day's lesson • Paper or notebook (journal) • Pencil/pen	Materials: • The day's lesson • Appendix: Cloud Resources • Paper or notebook (journal) • Pencil/pen	Materials: • The day's lesson • Appendix: NASA Moon Calendar • Paper or notebook (journal) • Pencil/pen	Materials: • The day's lesson • Appendix: Water Cycle • Paper or notebook (journal) • Pencil/pen

Optional Materials:

- Camera (to document what you are studying),
- Binoculars or hand lens
- Colored pencils or crayons
- Computer or iPad (for further investigations and resources)



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

1. Did you notice anything new this week?
2. What changes do you think will happen next week?
3. Was anything particularly interesting today?
4. Is there something you want to explore more of after today?



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Introduction for Learners—Day One

Story of the Week

1. **Read** the story provided by your teacher from [Everyday Science Mysteries](#). When finished, answer the following questions.
 - a. What problem are the characters trying to solve?
 - b. What do you already know that helps you solve the mystery?
 - c. What do you need to learn more about this week to help you solve the mystery?
 - d. How is this story connected to nature?

Getting to know your environment!

2. **Find** a spot outside that you would like to explore for the next few weeks or go to a window (if you cannot go outside). This could be a park, a yard, forest or farmland. There are great places to explore nature all around us! Soon, you will become an expert about this place and will be able to share everything you know.
 - a. Where will you explore? _____
3. Take a minute to quietly observe the environment. Find a place to sit or stand. Use your “powers of observation” to carefully learn about your spot.
 - a. Look high and low, what do you see?
 - b. Close your eyes and listen for a few minutes. What do you hear?
 - c. Pay attention to your breathing and take long breaths in and out. What do you smell?
4. Why did you select this spot or place? What about it is interesting to you?

5. Create a list of the different parts of this environment that you saw, heard, smelled, etc. Label them as living or nonliving. Do not worry about identifying everything with its scientific name. Describe it the best you can using descriptive adjectives. *Example: a dark blue bird, tall oak tree, grainy sand, etc.*

Part of Environment	Descriptive Word	Living or Non-living?	Why?
<i>Example: Bird</i>	<i>Example: Dark Blue Bird</i>	<i>Example: Living</i>	<i>Example: Because it grows and develops</i>



Next, circle or color the living things green.



Put a box around the non-living things or color them red.

6. What do the living things have in common? How are they different?

7. What do the non-living things have in common? How are they different?

8. Create a “rule” that helps you determine if something is living:

- “All living things _____.”
- “All non-living things _____.”

9. What is the weather like today? Using the following headings, create a [Weather Investigation Tool](#) to record your observations of the weather each day. Use your creativity and as much detail as you can to help you become an expert on your exploration spot. Make it fun and interesting for you by adding pictures, colors, and a legend or key.

Temperature/Weather Type	Sky Cover/Color/Visibility
Suggestions for what this section MAY include: <u>Temperature:</u> include the units you use <u>Weather type:</u> include a drawing, symbol or words like... • Rainy • Sunny • Stormy • Snowy • Cloudy • Windy • Any others you come up with	Suggestions for what this section MAY include: <u>Sky Cover:</u> describe the level of cloudiness... • Few • Isolated • Scattered • Broken • Overcast <u>Color of Sky:</u> • Choose several colors that you predict the sky will be. If you pick blue, be very specific about the different shades of blue (pale, deep, light blue) <u>Visibility:</u> • Clear • Somewhat Hazy • Very Hazy
Precipitation/Clouds	Wind
Suggestions for what this section MAY include: <u>Clouds:</u> draw at least 5 different types of clouds you predict you will see. <u>Determine heights of clouds:</u> use words like... • Low • Middle • High <u>Is it raining or snowing?:</u> create a scale that will help you describe it using words like... • Light • Moderate • Heavy	Suggestions for what this section MAY include: <u>Wind Speed:</u> create a scale that shows us different wind speeds. You can use numbers (such as 0 = no wind, 1 = light wind, etc.) or words like... • Calm • Light • Breezy • Strong



OPERATION CURIOSITY & WONDER

Third-Fifth Grade

Monday

Grade: 4

How am I connected to the natural world?

ROCKS MINERALS

Directions: Each week, **find** several rocks in your area. **Draw/photograph** for documenting it. Pay careful attention to details and things that make these rocks special, including looking carefully at the area you find them. Use your *powers of observation*! Each week, answer these prompts:

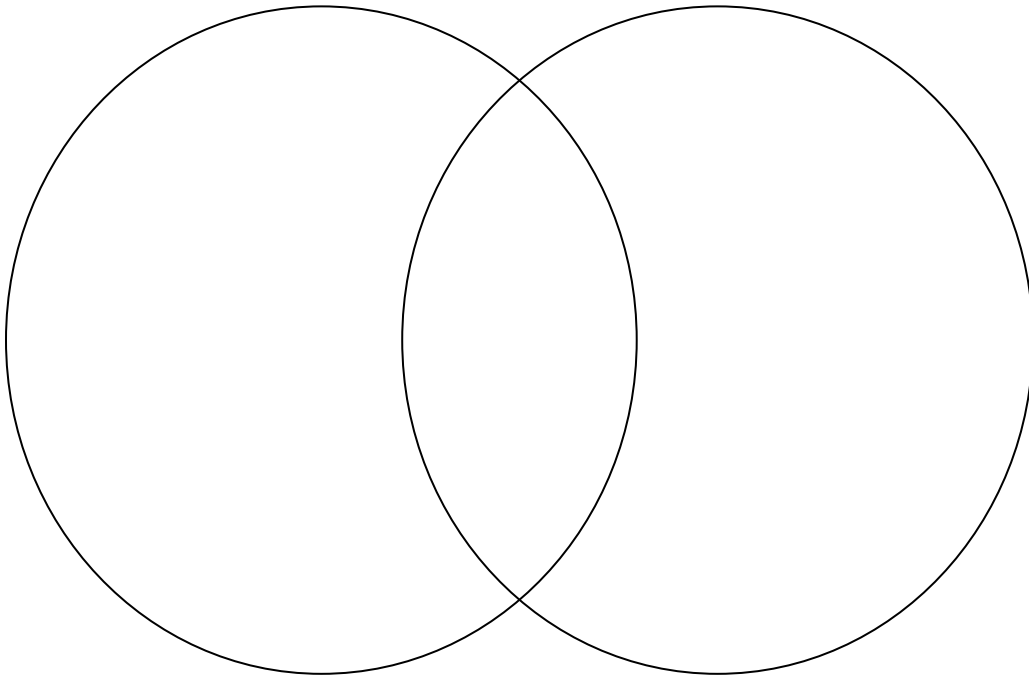
I am exploring this area: _____

What is the weather like today? Fill in the chart using the [Weather Investigation Tool](#) you created.

DATE (month/day/year)	TIME (AM or PM)
Temperature/Type of Weather (Units)	Sky Cover/Color/Visibility
Precipitation/Clouds	Wind

1. **Find** two rocks. Why did you select the two you did? What about them is interesting to you?

2. Looking at all the rocks you collected, how would the rocks be classified or grouped? **Use the diagram below** to help you sort through the similarities between your rocks and the differences.

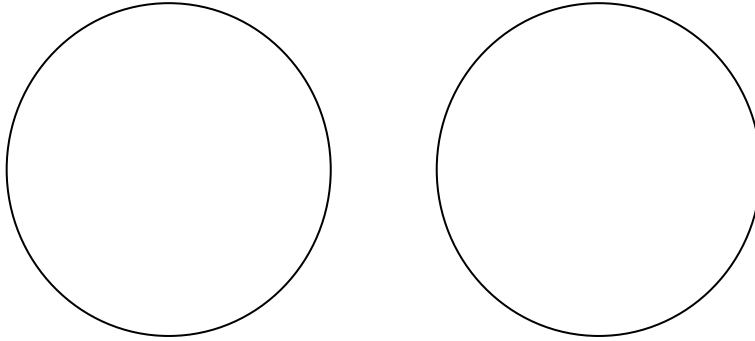


3. Do they have more in common or are they very different? What clues tell you?
4. **Look** closely at the ground near the location where you found each rock. How would you describe what makes up the soil, or layer of Earth? *For example: minerals, water, air, living and once living things*
5. Soil is very important to plants and animals. Did you know that Minnesota has its own official State Soil? It's called Lester soil. There is even a song about it! How are your rocks a part of this **system**?



Rock A		
Provide a detailed drawing that shows the <u>luster</u> or how much the rock shines. Luster: (put an "x" on the line that best describes the shininess and write a score in the blank below) 1 No shine Very shiny 5 Luster Score: _____	How could you safely test the rock's <u>hardness</u>? Describe your process and score the hardness of the rock. Hardness: (put an "x" on the line that best describes the hardness and write a score in the blank below) 1 Very soft Very hard 5 Hardness Score: _____	How could you safely test the rock's ability to make a mark or <u>streak</u> on the sidewalk? Describe your process and score the streak ability of the rock. Streak: (put an "x" on the line that best describes the ability to streak and write a score in the blank below) 1 No mark Easy to mark 5 Streak Score: _____
Rock B		
Provide a detailed drawing that shows the <u>luster</u> or how much the rock shines. Luster: (put an "x" on the line that best describes the shininess and write a score in the blank below) 1 No shine Very shiny 5 Luster Score: _____	How could you safely test the rock's <u>hardness</u>? Describe your process and score the hardness of the rock. Hardness: (put an "x" on the line that best describes the hardness and write a score in the blank below) 1 Very soft Very hard 5 Hardness Score: _____	How could you safely test the rock's ability to make a mark or <u>streak</u> on the sidewalk? Describe your process and score the streak ability of the rock. Streak: (put an "x" on the line that best describes the ability to streak and write a score in the blank below) 1 No mark Easy to mark 5 Streak Score: _____

7. Using a magnifying device (if you have one) and your *powers of observation*, **draw** an “up close” or magnified view of your rocks. What can you see when you are able to closely examine them?



8. **Analyze** the weather data you recorded today and make observations about the human-designed world around your rocks. **Write** a couple of sentences describing either the **positive** (good) or **negative** (bad) impacts that weather and humans could have on rocks like yours in the future.

9. Choose one of your rocks. From the rock’s perspective, **create** a story about its experiences today.



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10. Today, I noticed....

11. I wonder about...

All Done for Monday!

Tuesday

Grade: 4

How am I connected to the natural world?

ANIMALS ECOSYSTEMS

Directions: Each week, **find one animal in your area.** **Draw/photograph** it at least one time per week. Pay careful attention to details and things that make this animal special. Use your *powers of observation*! Each week, answer these prompts:

I am exploring this area: _____

What is the weather like today? Fill in the chart using the [Weather Investigation Tool](#) you created.

DATE (month/day/year)	TIME (AM or PM)
Temperature/Type of Weather (Units)	Sky Cover/Color/Visibility
Precipitation/ Clouds	Wind

1. **Find** an animal in your area. Use more than one of your sensing powers to listen and look closely! Describe the animal's behavior. Is it making noises? Is it moving? What do you think the behaviors and noises mean?

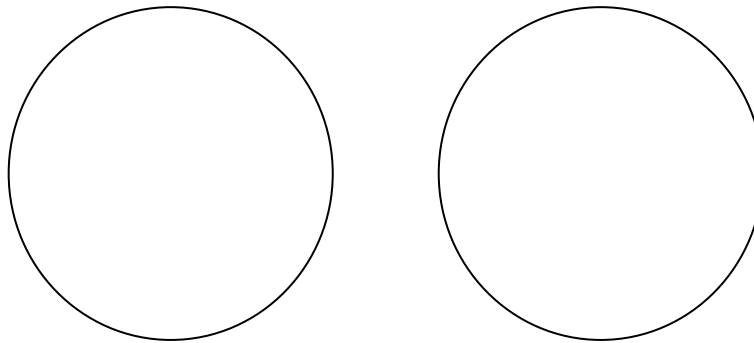


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5. **Look** at your animal's characteristics or features. **Draw** or **write** about one characteristic. Explain how it helps the animal survive and explain how its use may change if the suggested changes happen in the environment.

Animal characteristic	How it helps it to survive	Environmental change
		<i>The temperature stays below freezing</i>
		<i>All food is located underground</i>

6. What would it look like if you had a magnifying lens to view different parts of your animal? Select an area to examine closely. **Draw** and **describe** what you would see.



7. Animals have physical adaptations and behavioral adaptations. Examples of physical adaptations are the beak of a bird or the fur of a bear. Behavioral adaptations are actions living things do to help them survive. An example might be migration or moving to another place when seasons change. **Describe** one physical and behavioral adaptation you observe in the animals around you.

• Physical: _____

• Behavioral: _____

Learn more!

Interested in learning more about migration? Check out the website [Journey North](#) to learn more about how butterflies and birds migrate.

8. All animals have adaptations that help them find food or avoid being food. Using your observations of physical and behavioral characteristics, **create** a fun 'food' story your animal may have experienced today. Did it involve a rock from yesterday?

9. Today, I noticed....

10. I wonder about...

All Done for Tuesday!

Wednesday

Grade: 4

How am I connected to the natural world?

CLOUDS WEATHER

Directions: Look up outside and **find** clouds in the sky. **Draw** or **photograph** what you see at least once per week. Pay careful attention to details and things that make the sky special. Use your *powers of observation*! Each week, answer these prompts:

I am exploring this area: _____

What is the weather like today? Fill in the chart using the [Weather Investigation Tool](#) you created.

DATE (month/day/year)	TIME (AM or PM)
Temperature/Type of Weather (Units)	Sky Cover/Color/Visibility
Precipitation/ Clouds	Wind

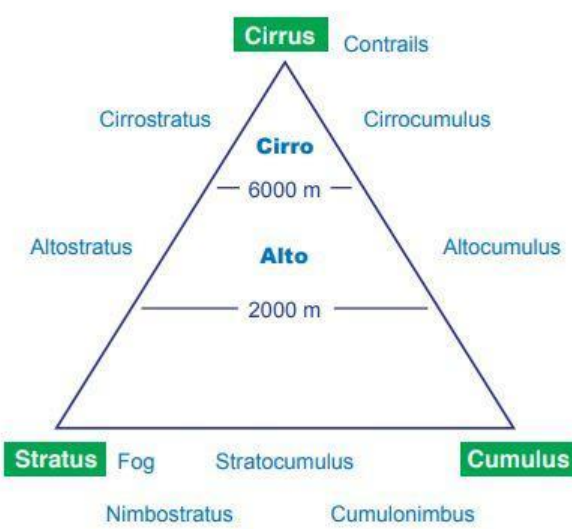
1. Use your *powers of observation* and look up at the sky! **Find** a cloud. Observe it for a moment.
 - a. What is your cloud doing?

b. What does it look like? **Sketch** it the best you can.

c. As you continue to observe it, is the cloud changing shape? If so, why?

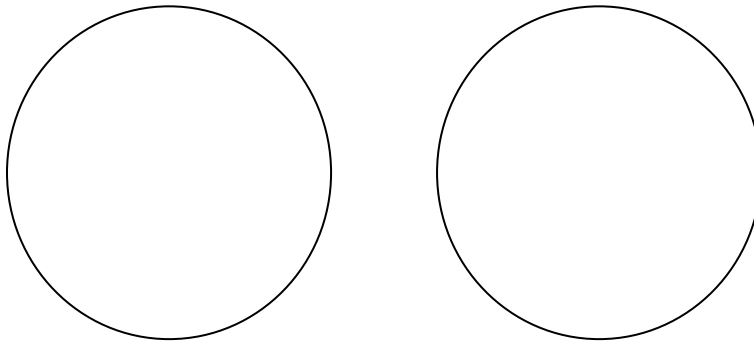
2. What do you already know about clouds?

3. What words would you use to describe the clouds today? Use *Appendix C: Cloud Resource* to help you.

Descriptive Words	What term matches the description?
	See <i>Appendix C: Cloud Resource</i> Cloud Type 

4. Clouds help meteorologists (scientists who study the weather) predict different kinds of weather. What does your cloud tell you about the weather today? Does it give you any clues about tomorrow? Does the daily weather chart you filled in for today support this? Why or why not?

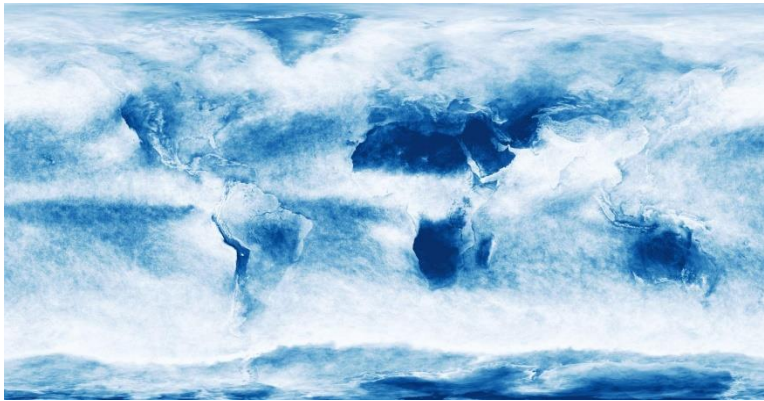
5. What would it look like if we had a magnifying lens view of your cloud? Use your imagination to **draw** what you would see. Think about what clouds tell us about the weather and what they might be made of!



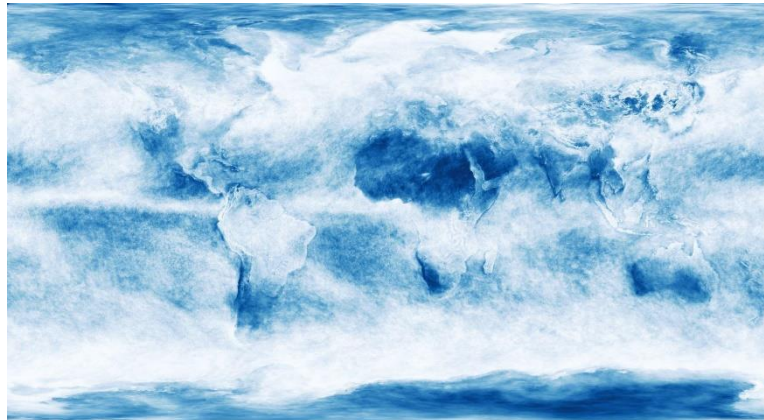
6. Think about the clouds and their relationship with the rocks and animals you observed this week. Write a sentence or two about how the clouds have a direct impact on you and other living things and non-living things.

7. NASA's Earth Observatory Satellite program tells us lots of information about the Earth. The program's mission is to help us picture climate and environmental changes as they happen on our planet. **Compare** the [cloud cover during January 2020](#) with the [cloud cover during July 2019](#).

NASA Earth Observatory January 2020



NASA Earth Observatory July 2019



- a. What do you notice? Can you find the United States? Minnesota? What parts of the world are covered with more clouds in July? How about January?

Learn more!

If you are interested in learning more about NASA's Earth Observatory Satellite Program and the data available, go to <https://neo.sci.gsfc.nasa.gov/>. You can learn more about the atmosphere, energy, land, life, and the ocean.



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Third-Fifth Grade

8. Today, I noticed....

9. I wonder about...

All Done for Wednesday!

Thursday

Grade: 4

How am I connected to the natural world?

SUN
MOON

Directions: Look up outside and **find** the sun and the moon in the sky. Pay careful attention to details and things that make the sky special. Use your *powers of observation*! Each week, answer these prompts:

I am exploring this area: _____

What is the weather like today? Fill in the chart using the [Weather Investigation Tool](#) you created.

DATE (month/day/year)	TIME (AM or PM)
Temperature/Type of Weather (Units)	Sky Cover/Color/Visibility
Precipitation/ Clouds	Wind

1. **Look** for the sun. Give it one **positive** (good) feedback statement.

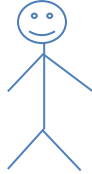
I like it when _____.

2. Can you see the moon? Why do you think it would be 'out' during the day?

3. Is the sun visible today? **Complete** the following chart. If clouds are blocking the sun, fill in the chart based on what you already know.

What time is it?	In relation to you, draw the sun's position in the sky.	
		
Do you remember last week? How does it compare? DIFFERENT SAME FIRST TIME MAKING OBSERVATION	How is it different/similar? (Is it higher, lower, brighter, etc.) If it is the first time you are making this observation, how do you think it might have changed?	What do you predict for next week?
What is your reason for your thinking this way? How do you know?		

4. Now stand with your back to the sun. **Complete** the following chart. If clouds are blocking the sun, fill in the chart based on what you already know.

What time is it?	Draw the sun and your shadow in relation to you.	
		
Comparison from last week DIFFERENT SAME FIRST TIME MAKING OBSERVATION	How is it different/similar? If it is the first time you are making this observation, how do you think it might have changed?	What do you predict for next week?
What is your reason for your thinking this way? How do you know?		

5. During the evening, **look** for the moon. **Complete** the following chart. If clouds are blocking the moon, fill in the chart based on what you already know.

What time is it?	Draw the moon. Be sure to include the parts you can see and do not see.
Comparison from last week	What will the moon look like next week? Draw what you expect to see this time next week.
What is your reason for your thinking this way? How do you know?	

6. Think about the sun and the moon's relationship with the animals you observed this week. Write a sentence or two about how the position of the sun or the moon's phase impacts their lives.

7. NASA has sent several orbiters, landers, and rovers to [explore the planet Mars](#) so NASA scientists can become experts on Mars much like you are becoming an expert of your place! In addition to exploring other planets, NASA scientists also spend a lot of their time learning more and more about our own planet, Earth! One NASA project called the [NASA Earth Observatory](#), and it collects data on our planet all day, every day!

Think about how you have made observations and gathered data. Which machine do you think would be best to gather information about our planet, Earth?

- a. Consider the benefits and limitations of a rover, orbiter, and lander and explain your reasoning.
- b. How might clouds and weather impact each one?
- c. Does your answer change if we are exploring a planet that is too far away for humans to set foot on it, like Mars?

10. Today, I noticed....

11. I wonder about...

All Done for Thursday!

Friday
Grade: 4

WATER

How am I connected to the natural world?

Directions: Use your *powers of observation* and **look** for a source of water! This could be a river, lake, creek, pond or even a storm drain near your house. **Draw** or **photograph** it at least once per week. Pay careful attention to details.

I am exploring this area: _____

What is the weather like today? Fill in the chart using the [Weather Investigation Tool](#) you created.

DATE (month/day/year)	TIME (AM or PM)
Temperature/Type of Weather (Units)	Sky Cover/Color/Visibility
Precipitation/ Clouds	Wind

1. How have you used water today? How do you think your use of water compares to other people in your home? Do you use less or more?

2. **Observe** your home at mealtime. How is water used? Give two examples and then describe if the water changes from solid to liquid or liquid to gas.

3. **Think** about what you already know about water. Write down three statements using observations and evidence to show what you know what water is like as a solid, liquid, and gas.

Solid	Liquid	Gas

4. Based on what you have observed, what causes solid water to become liquid? How about liquid to a gas?

Solid to Liquid	Liquid to Gas
<i>Draw or explain what happens to cause this change:</i>	<i>Draw or explain what happens to cause this change:</i>
<i>Are these observations different from last week? If the first week, leave blank.</i>	<i>Are these observations different from last week? If the first week, leave blank.</i>



- | Observations Based on Senses | | | |
|------------------------------|-----------------|------------------|-------------------|
| <i>I hear...</i> | <i>I see...</i> | <i>I feel...</i> | <i>I smell...</i> |

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Educator Corner

b. The animal you observed on Tuesday and this water source?

c. The clouds you observed on Wednesday and this water source?

d. The sun (or the moon) you observed on Thursday and this water source?

10. How would you describe the quality of the water you observed today? Did it look clean or dirty? How did you know? *Clues could include the living things you saw interacting with the water, the color of the water, things found in or near the water, the smell, or how well you could see to the bottom when looking in it.*

11. **Think** about everything you observed/explored this week in your area. Choose one of the following to **create** a story or 4-5 sentences of what would happen if...

- a. One part of the environment went missing.
- b. A beneficial human-designed structure, system, or interaction was removed from this area.
- c. A harmful human-designed structure, system, or interaction was removed from this area.

12. Today, I noticed....

13. I wonder about...

All Done for Friday!

Engineering Extension A: Fourth Grade

[Renewable sources](#) of energy are used across the globe to provide electricity for our homes, cars and even satellites like the International Space Station. NASA uses the energy of the Sun to power some of its planet-exploring machines and has sent several orbiters, landers, and rovers to explore the planet Mars. Tools like these help scientists become experts on new systems much like you are becoming the expert of your spot! Early versions of the rovers like [Opportunity Rover](#) were powered by solar panels. [Solar panels](#) convert sunlight to electric energy that can power rovers like Opportunity as well as the lights in our homes.



How could solar panels be helpful to humans on Earth? Where would be the best place to put a solar panel in the area you are exploring? Why? If possible, [watch this video](#) from National Geographic for more information or this video from [Bill Nye the Science Guy!](#)

Wondering Questions

1. What is the difference between renewable and nonrenewable energy sources?
2. How will you decide the best place for your solar panel?
3. What do you need to know?
4. What impacts the amount of sunlight that will reach the panel?
5. Where are solar panels used in Minnesota? In other states?
6. Why use solar panels instead of other forms of energy?
7. How will the weather and the climate we live in help you decide where to put your solar panel?

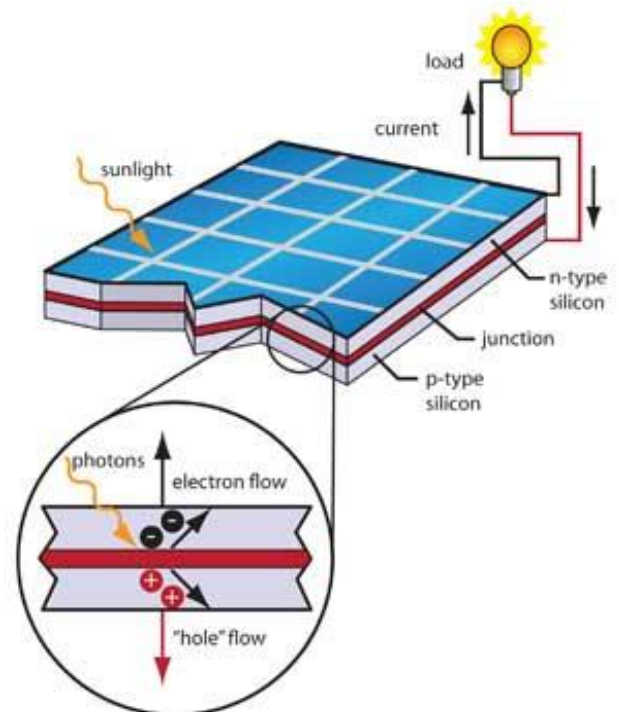


Photo source: NASA Climate Kids

Build Time!

8. Create a map of the place you are exploring.
 - a. Is there any reason it might be nice to have electricity in your spot? What do you wish it had?
 - b. Label three different possible sites or places you think would be best suited for a solar panel. Give at least one reason for each site.
 - c. Identify one place that would not be a good site and explain why.
 - d. Take pictures and document your process (if possible).

Evaluate Your Design:

9. How did you decide on the site for your solar panel? What influenced your decision?

10. Could that location change based on the time of year or time of day?



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Educator Corner

Engineering Extension B: Fourth Grade

Water is a precious resource all over the world. Here in Minnesota, we have an abundance or, a lot, of water in the form of lakes, rivers, watersheds, and ponds. Depending on where we live, water we use in our homes comes from different sources. In Saint Paul, Minnesota, the [water comes from the Mississippi River](#) and is filtered through a chain of lakes into a treatment plant.

It is a long journey from the Mississippi to our faucet and involves many processes. You might think that much of the Earth's water is freshwater because we have so much of it in Minnesota and because 70% of the Earth is covered in water. The reality is, only about 3% of Earth's water is freshwater and the majority of it is locked in glaciers and ice.

Our drinking water is filtered to get rid of harmful pollution and toxins like bacteria, chemicals, waste, litter, and other harmful substances. To learn more about how we get clean drinking water, you will design your own filter system using everyday household items. Our water filters will simulate the process our drinking water goes through, using materials that are not harmful to us and can be found all over outside.

Getting Started

Use the observations and data you have been collecting to help you create your water filter. Use your creativity to design, test, and build your device using what you know and have been learning. You can use either: one 2 liter bottle or two smaller plastic water bottles.

Wondering Questions

1. What will work best? One large water bottle or two smaller ones?
2. What makes some water taste better than other water?
3. How can we build a water filter system that does not leak?
4. Where does water pollution come from?
5. How much water do I use every day? What everyday activities require the most water?
6. What materials will make the best filters?

Earliest Model

7. Models are tools scientists use to help them predict patterns and explain how things work or could work when they can't directly observe or see them. Draw a model that explains how each of the materials you chose to use in your filter will help filter out the "pollution". Ideas of materials that may help: napkins, paper towels, coffee filters, leaves, sand, gravel, cotton balls, clay, screens or mesh.

Material	Why You Chose It	How it will work (Draw or Write out)

Build Time!

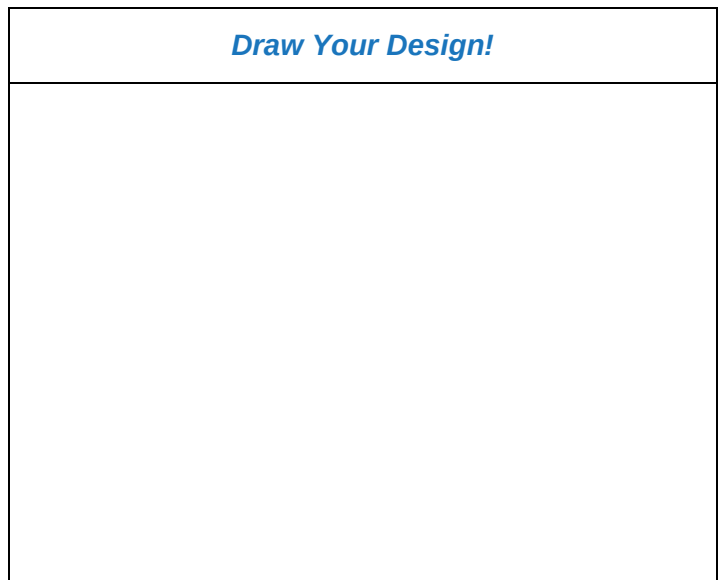
Build your Water Filter

- Use any combination of one 2-liter bottle or two smaller water bottles.
- Ask an adult to help you cut them according to your design.
- Use the helpful materials listed above or come up with your own!

Make your "pollution"

- Mix a combination of the following in a cup or bowl: dirt, food scraps from home like eggshells, orange peels, lettuce leftovers (no cheese or meat!), sand, parts of leaves and grass, cooking oil and food coloring (if you have it), paper clips, and small plastic pieces.

Draw Your Design!





8. Mix your “pollution” and at least one-up of water. Pour this mixture through your filter. What does the water coming out of the filter look like? Would you consider it clean? Why or why not?

9. Look inside your filter to see what type of pollution was caught. Do you see any patterns? What did your filter do well at removing? What went through?

10. How did you decide which materials to use?

11. What materials were best at filtering the water?

Revised Model

12. Revise your model to reflect how the filter actually worked.

Material	Why You Chose It	How it actually worked (Draw or Write out)

13. How can you improve your design? Are there materials at home, school or elsewhere that could help you engineer this better?

14. Why do you think clean water is important for all living things?

15. Some living things actually help us filter our water, such as mussels that live in Minnesota rivers and lakes! Many mussels in Minnesota are disappearing and are endangered because of pollution. What do you think having fewer mussels does to our water over time?

Learn more!

To learn more about mussels and what the Minnesota Zoo is doing to help save them go to our [Freshwater Mussel Conservation](#) webpage or join the [Show Us Your Mussels Challenge](#).

16. Show off your work! Take pictures of your device and send them to the Minnesota Zoo so we can cheer you on!



Post pictures to Instagram: @mnzoo, @mnzooedu



Post Pictures to Facebook: Minnesota Zoo Educators Facebook Page

Formative and Summative Assessment of Learning Wrap Up for Students

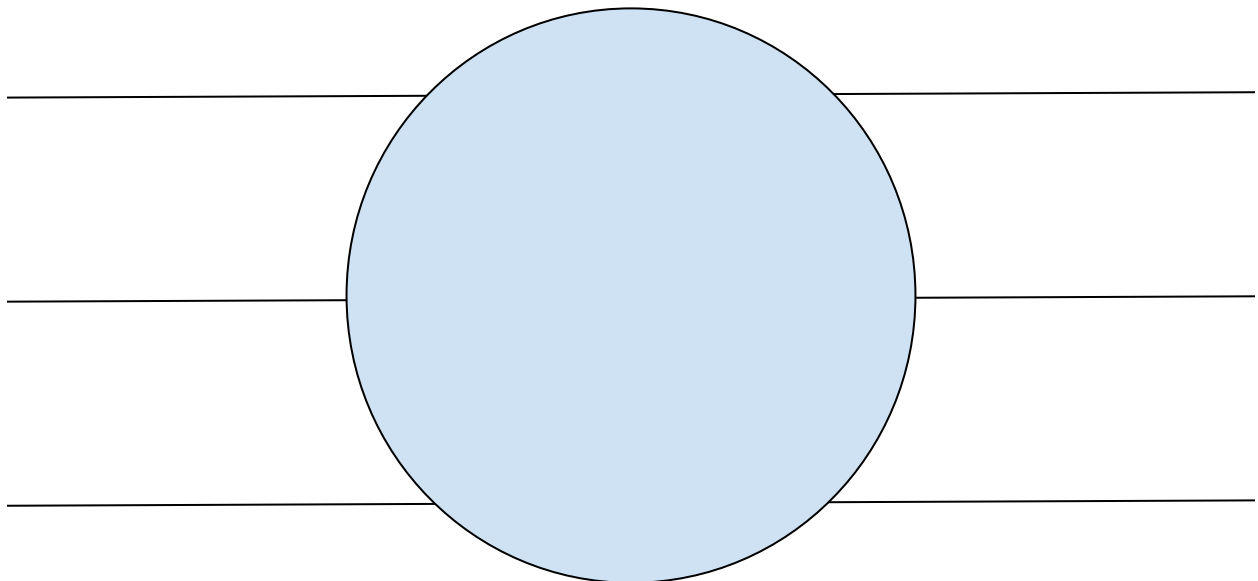
Checks for Understanding

We hope you had fun exploring your area this week. Next week should bring more change and excitement. Answer these questions and keep in a safe place so you can show your teacher all the neat things you learned.

1. Write two or three sentences explaining the area you choose and why.
2. All living things are interconnected and dependent on different non-living things. On the lines next to the circle, write three living and three nonliving parts of the ecosystem you explored. Then, draw lines through the circle, connecting the ones that have a relationship. Note: Each part may have several lines leading to or from it. Be sure to indicate the relationship (for example, food, shelter, etc.)

Living

Nonliving





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- @MNZOO**
Educator Corner

Rubric for Daily Work (Prompts 1-6 from Checks for Understanding)

	4	3	2	1
Reason for Selecting Area	Writes 2-3 sentences. Gave clear reason and expanded on why	Writes 1-2 sentences. Gave a clear reason but didn't expand on why	Writes 1 sentence. Gave reason. Did not expand on why	Wrote nothing. Left blank.
Living and Non-Living Parts	Lists 3 living parts List 3 nonliving parts Drew a couple of lines connecting some and one for others	Lists 3 living parts List 3 nonliving parts One or no line connecting 2 parts	Lists 2 living parts List 2 nonliving parts Either drew or no line connecting 2 parts	Lists 1 living parts List 1 nonliving parts Either drew or no line connecting at least 2 things
Weather and Impact	Described both a positive and negative impact completely listing WHO was impacted by WHAT and HOW	Described both a positive and negative impact slightly mentioning WHO was impacted by WHAT and HOW	Describe either a positive and negative impact slightly mentioning both WHO was impacted by WHAT and HOW	Described either a positive and negative impact did not list WHO was impacted by WHAT and HOW
Observations	Wrote 2-3 sentences explaining what was noticed	Wrote 1-2 sentences explaining what was noticed	Listed a word or two about what was noticed	Listed nothing-left blank
Questions	Wrote 2- 3 sentences about what they wonder about	Wrote 1-2 sentence about what they wonder about	Listed a word or two about what they wonder about	Listed nothing- left blank
Letter to Main Character in Science Mystery	Wrote a letter with a clear mention of the clues and expanded on it that helped solve the mystery	Wrote a letter with a mention of a clue but didn't expand on it that helped solve the mystery	NA	Wrote a letter but didn't talk about clues that helped solve the mystery

7. Finish the story! Write a story that tells the end of the weekly mystery. Be sure to use evidence from your observations to explain what happened and apply your learning. Requirements to help you write your story:
 - a. 3 paragraphs
 - b. 2-5 sentences in each paragraph
 - c. 10 or more adjectives in your story
 - d. 5 observations you used to write your story
 - e. 2 patterns you noticed
 - f. Includes information about plants, animals, clouds/weather, sun and moon, and water
 - g. Extra Extension: write and illustrate your story. Read it to someone in your home!

Rubric for Finishing the Mystery (Prompt 7 from Checks for Understanding)

	4	3	2	1
Structure: Paragraphs and Sentences	Writes 3 sentences with 2-5 sentences. Syntax and grammar are consistent with progress so far this academic year.	Writes 3 paragraphs with 2-5 sentences. Syntax and grammar are inconsistent with progress so far this academic year.	Writes less than 3 paragraphs or 2-5 sentences per paragraph. Syntax and grammar are inconsistent with progress so far this academic year.	Writes less than 3 paragraphs and less than 2-5 sentences per paragraph. Syntax and grammar not grade-level appropriate.
Includes Data and Observations of Plants, Animals, Clouds/Weather, Sun/Moon, and Water	Uses data to form conclusions and provides detailed observations from all 5 themes and includes an additional theme not outlined by days.	Uses data to form conclusions and provides detailed observations from 5 themes.	Uses data to form conclusions and provides detailed observations from 4 or fewer themes.	Uses data but may not provide conclusions and provides observations without details from 4 or fewer themes.
Observations and Descriptive Details	Uses more than 10 adjectives in the story that accurately match 5 or more observations.	Uses 10 adjectives in the story that accurately match 5 observations.	Uses less than 10 adjectives in the story that accurately match 5 observations.	Uses less than 10 adjectives in the story that do not accurately match 5 or less observations.
Patterns	Use their observations and the practices of science and engineering to explain 2 or more patterns that emerged from their data. The explanation uses evidence to draw conclusions.	Use their observations and the practices of science and engineering to explain 2 patterns that emerged from their data. The explanation uses evidence to draw conclusions.	Use their observations and the practices of science and engineering to explain 2 patterns that emerged from their data. The explanation does not use evidence to draw conclusions.	Use their observations and the practices of science and engineering to explain 1 or fewer patterns that emerged from their data. The explanation does not use evidence to draw conclusions.

Appendix: 4th Grade Minnesota State Science Standards

Nature of Science	Earth Science	Physical Science
4.1.2.1.1 Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used. 4.1.2.2.1 Identify and investigate a design solution and describe how it was used to solve an everyday problem. <i>For example:</i> Investigate different varieties of construction tools. 4.1.2.2.2 Generate ideas and possible constraints for solving a problem through engineering design. <i>For example:</i> Design and build an electromagnet to sort steel and aluminum materials for recycling. 4.1.2.2.3 Test and evaluate solutions, considering advantages and disadvantages for the engineering solution, and communicate the results effectively. 4.1.3.3.1 Describe a situation in which one invention led to other inventions.	4.3.1.3.1 Recognize that rocks may be uniform or made of mixtures of different minerals. 4.3.2.3.1 Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation. 4.3.4.1.1 Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.	4.2.1.1.1 Measure temperature, volume, weight and length using appropriate tools and units. 4.2.1.2.1 Distinguish between solids, liquids and gases in terms of shape and volume. <i>For example:</i> Liquid water changes shape depending on the shape of its container. 4.2.1.2.2 Describe how the states of matter change as a result of heating and cooling.



OPERATION CURIOSITY & WONDER

Third-Fifth Grade

Resources

UCAR Center for Science Education

<https://scied.ucar.edu/learning-zone/clouds/cloud-types>

Minnesota Secretary of State

<https://www.sos.state.mn.us/about-minnesota/state-symbols/state-soil-lester/>

NASA Visualization Studio

<https://svs.gsfc.nasa.gov/4236>

NASA Mars Missions

<https://mars.nasa.gov/>

NASA Earth Observatory Satellite Program

<https://neo.sci.gsfc.nasa.gov/>

NASA Climate Kids

<https://climatekids.nasa.gov/sun-people/>

NASA GLOBE Program

www.globe.gov

Journey North

<https://journeynorth.org/>

University of Minnesota Extension

<https://extension.umn.edu/how-manage-soil-and-nutrients-home-gardens/living-soil-healthy-garden>

Science Society of America

<https://www.soils4kids.org/about>

National Geographic

<https://www.nationalgeographic.com/environment/energy/reference/renewable-energy/>

Bill Nye the Science Guy

<https://www.billnye.com/the-science-guy/energy>

City of Saint Paul

<https://www.stpaul.gov/departments/water-services/water-quality>