

Earth Science Day 1: Rain Gauge

Materials:

Scissors	1
Empty Bottle	1
Permanent Marker	1
Pebbles or rocks	1 cup
Measuring tape or ruler	1
Tape	2 feet
Water	amount depends on bottle size

Video Link: <https://youtu.be/rkIFKBkLTm8>

Background:

- Other names for **rain gauges** include **udometers** and **pluviometers**.
- Tulsa's **climate** is considered “humid subtropical”, meaning it has hot and humid summers and cold to mild winters.
 - May is the wettest month in Tulsa, with an average of 5.9 inches of **precipitation**, or rainfall.

Vocabulary:

Rain Gauge	a device for collecting and measuring the amount of rain that falls.
Climate	the weather conditions prevailing in a certain place for a over a long period of time. This is different than weather, which is how the atmosphere is behaving minute-to-minute.
Precipitation	rain, snow, sleet, or hail

Preparation:

Over time, collect water bottles, milk jugs, or soda bottles as usable recyclables.

Instructions:

1. With your marker, draw a line at the point on the bottle where it begins to turn into a funnel shape.
2. Using scissors, carefully cut the bottle along the line, removing the top of the bottle. Save this piece for later use.
3. Pour the pebbles or rocks into the bottom of the bottle to weigh it down and keep it from tipping over in the wind. Pour water in until it reaches the top of your rocks.
4. With your marker, draw a line at the top of your rocks. Using your ruler, make marks 1 inch apart, beginning at the top of your rocks.
5. Place the top of the bottle upside down so that it rests comfortably at the top of the **rain gauge**. Tape around the bottle so that your funnel is secure.
6. Place your **rain gauge** in an open area where it will not be blown over.
7. Wait for the rain to come and check your rain gauge daily, weekly, or monthly. This information can be charted or graphed and averaged (add rainfall data by inches, and then divide by number of days or weeks tracked).

Evaluation:

- How much **precipitation** fell yesterday? Can you tell me how much rain fell in inches? In centimeters?
- What is the difference between how much rain fell yesterday and today? Between this week and last week?
- How much rain do you think we will get next year during this time? Why?

Further Exploration:

Visit...

- http://teacher.scholastic.com/activities/wwatch/investigate/weather_maker.htm to simulate temperature and precipitation changes to see how to make different types of weather.

Read...

- [STEM Starters for Kids: Meteorology Activity Book](#), by Jenny Jacoby and illustrated by Vicky Barker



Earth Science Day 2: Shadow Tracking



Materials:

White paper or sidewalk	1
Marker or chalk	1
Small toy or figurine	Variety, 1 +
Tree/stationary object	1
Optional Extensions:	
Measuring tape or ruler	1
Paper	1
Writing Utensil	1

Video Link: <https://youtu.be/MTjsEhOQno4>

Background:

- When light from the sun comes down to earth and hits an object, the object casts a shadow.
 - The shadow is cast because the object blocks the sunlight.
 - However, when objects are transparent (like a glass window), the sunlight goes through it.
- Shadow lengths change throughout the course of the day because of the earth's relationship to the sun.
 - As the earth rotates on its axis, each geographical location experiences a different view of the sun in the sky.
- As Earth spin towards the light of the sun, we see sunrise.
 - Our shadows are longer during the morning, when the light hits at an angle.
- As Earth continues to spin, we see the sun higher in the sky and shadows cast are shortened because the sun is above the object.
 - Shadow lengths also depend on the seasons because of Earth's axis.
 - During the summer, our location is tilted toward the sun, so our shadows in the middle of the day are very short.
 - During the winter, our location is tilted away from the sun, so our midday shadows are longer.

Vocabulary:

Shadow	the absence of light; if light cannot get through an object, the surface on the other side will have less light.
Light	a form of energy that travels in particles and a wave
The Sun	Earth's nearest star; a source of light for the Earth that also generates energy

Preparation:

Plan to do this experiment on a day when there will be a maximum amount of **sunlight**.

Instructions:

Activity 1: Object's Position in Relationship to Sunlight

- Find an object that you can move around. This can be yourself, your favorite toy, a shoe, or another moveable object.
- Take your object to a cement area (like a sidewalk) that gets a lot of sunlight.
 - If you are using yourself as the object, you will need another person to help you with this next step. If you are using an object, you will not need another person.
- Place the object on the sheet of paper or on the cement. Using your marker (if using paper) or chalk (if on cement), trace the **shadow** that the object creates.
 - Remember that the shadow is the absence of **light**; the object is blocking the **light** from going through it.
- After tracing the **shadow**, move your object to face a different direction. Does the **shadow** change? Trace this new, different **shadow**. Repeat moving and tracing the **shadow** as many times as you like.

Activity 2: Earth's Rotating Axis & Shadows Over Time

- Pick a stationary object (like a tree or a sign) that is in a sunny location and casting a **shadow**. You can also use your moveable object from activity one, but we won't move the object this time.
- Using your marker (if using paper) or chalk (if the shadow is on cement), trace the **shadow** on the sheet/paper or cement.
- Note what time you traced the first **shadow**. Come back each hour and re-trace the **shadow**. After you have spent the day tracing the **shadow**, reflect on the questions asked in the evaluation.

Optional Extension

Use a ruler to measure the length of the **shadows** at different times of the day. Make sure to measure the same part of the **shadow** each time they measure!

- After measuring, chart the data on a graph, with time of day as the X axis and length of **shadow** on the Y axis.

Evaluation:

- How did your **shadow** change over time? Why do you think it changed over time?
- Does it look different? How does it look different?

Further Exploration:

Visit...

- <https://www.science-sparks.com/shadow-activity-ideas/> to find more activities that teach children about shadows.

Read...

- [Oscar and The Moth: A Book about Light and Dark](#), by Geoff Waring,
- [Playing with Light and Shadows](#), by Jennifer Boothroyd



Earth Science Day 3: Rain Cloud in a Jar

Materials:

Clear Cup or Jar	1
Shaving Cream (foamy)	1 can
Cup, filled with water	1
Blue Food Coloring	1 bottle
Cotton Balls	5
Spoon	1
Hot Water	1 cup
Glass Jar or Bowl	1
Plate	1
Ice Cubes	4

Video Link: <https://youtu.be/iLUylyMkhfY>
<https://youtu.be/tUTgGrWEQcU>

Background:

- **Clouds** are formed when water warms up and changes into a gas (water vapor) which rises up into the air. As it rises higher in the sky, the water vapor cools down and turns back into tiny drops of liquid.
- When enough droplets collect, they become large and heavy, and are pulled down towards earth by the force of gravity.

Vocabulary:

Weather	what is going on in the air outside; the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time
Clouds	very lightweight water droplet or ice crystal particles that float in the air
Precipitation	rain, snow, sleet, or hail

Preparation:

Prepare the area with a placemat or cloth in the case of spilling the rain cloud jar.

Instructions:

Activity 1: Make It Rain

1. Pour about two inches of very hot water into a glass jar.
2. Cover the jar with a plate and wait a few minutes before you start the next step.
3. Put the ice cubes on the plate. Observe what happens.
 - The cold plate causes the moisture in the warm air, which is inside the jar to condense and form water droplets.
 - This is the same thing that happens in the atmosphere. Warm, moist air rises and meets colder air high in the atmosphere. The water vapor condenses and forms **precipitation** that falls to the ground.

Activity 2: Heavy Raincloud Simulation

1. Pour some water into a small cup. Pour some blue food coloring into the cup and stir it, making blue water. Set it aside.
2. Fill a clear cup or jar with tap water. Put a dollop of shaving cream (shaving cream represents cumulus clouds) on top of the clear cup of water, enough to cover the surface.
3. Dip the cotton balls, one at a time, into the blue water so that the cotton ball fills with blue water.
4. Squeeze the cotton balls to drip the blue water onto the shaving cream cloud.
 - The blue water should go through the shaving cream and fall slowly into the clear water, demonstrating that when **clouds** get heavy with water, they expel the rain into our clear skies, making rain.
5. Reflect on the activities by answering the questions below.

Evaluation:

- What happened when you squeezed the blue water onto the shaving cream?
- How much blue water did it take to start raining in the sky?
 - Did it take longer than you thought? Shorter?
- How can we tell that it's going to rain?
- How can we prepare for rain?

Further Exploration:

Visit...

- <https://www.timeforkids.com/g34/what-are-storms/> to learn about different types of storms that affect the earth.

Read...

- [Thunder Cake](#), by Patricia Polacco
- [A Party for Clouds: Thunderstorms](#), written by Belinda Jensen and illustrated by Renée Kurilla



Earth Science Day 4: Paper Mountains

Materials:

White Paper	1
Washable Markers	1 or more
Cup of Water	1
Water dropper or pipette	1
Spray Bottle	1
Towel	1

Video Link: <https://youtu.be/yCKWzn-ICel>

Background:

- The shape of the land and the pull of **gravity** both influence how water moves over Earth. The paper mountains in this activity behave like a miniature model **watershed**. The way the marker ink moves with the water represents how water can carry surface particles through a **watershed**.
- **Rainwater** and snowmelt pick up and carry whatever is on the land—such as trash and debris on streets, exposed soil from land slides or construction, or pollution from mines or farms—to the nearest body of water. What happens upstream always influences the water quality and processes downstream.

Vocabulary:

Gravity	the force that attracts a body toward the center of the earth, or toward any other physical body having mass
Rainwater	water that has fallen or been obtained from rain
Watershed	an area or ridge of land that separates waters flowing to different rivers, basins, or seas

Preparation:

Place an an absorbent towel on your work area to minimize messes.

Instructions:

1. Crumple up a piece of paper and gently open it most of the way. It should still show ridges (high points) and valleys (low points).
2. Choose one of the ridges and color the whole ridgeline with a washable marker. Use lots of ink!
3. Make a prediction. If water fell on the ridge you just colored, where would it go? What would happen to the colored ink?
4. Test your prediction. Use a dropper, spray bottle, or pour a little bit of water to place water onto the peak, simulating a rainstorm. Was your prediction correct? Were you surprised by anything?
5. Repeat this experiment with more ridges on your crumpled paper. Do your predictions change as you make and observe more simulated rainstorms?

Optional Extension:

- Do this activity with a partner and see if your waters combine together! What do you think the quality of the water would be like if the waters combined? Why?
- Alternately, use more than one marker to color the ridges of your paper. What happens to the runoff?

Evaluation:

- How does this experiment remind you of bodies of water in Tulsa?
- How can we keep our water ways more clean?
- How does this experiment encourage you to change your behavior?

Further Exploration:

Visit...

- <https://ssec.si.edu/game-center> to play earth-science themed games that are vetted by learning experts.

Read...

- [The Wondrous Workings of Planet Earth: Understanding Our World and Its Ecosystems, by Rachel Ignotofsky.](#)

Earth Science Day 5: 3D Nature Suncatcher

Materials:

Cardboard Box	1
Parchment or contact paper	4 feet
Packing Tape	1 roll
Craft Knife	1
Scissors	1 pair
Paper Bag	1

Video Link: https://youtu.be/x6j_8clRt70

Background:

- **Light** is a form of energy made out of photons.
- **Light** is capable of travel through a vacuum, but not solid objects.
 - **Light** can pass directly through or is refracted by transparent materials, such as water or glass.
 - **Light** cannot pass through and is reflected back or absorbed in opaque materials, such as books or cardboard.
 - **Light** is scattered by translucent materials, such as thin sheets of plastic.
- Waves of **light** change speed based upon the medium they are travelling through.
- **Light** from the sun comes down to earth and hits an object; when it hits an object, the object casts a **shadow**.
 - The **shadow** is cast because the object blocks the sunlight.
 - However, when objects are transparent (like a glass window), the sunlight goes through it.

Vocabulary:

Shadow	the absence of light; if light cannot get through an object, the surface on the other side will have less light
Light	a form of energy that travels in particles and waves
Specimen	an individual animal, plant, piece of a mineral, etc. used as an example of its species or type for scientific study or display

Preparation:

Plan to do this experiment on a day when there is a lot of **sunlight** in the sky. An adult will need to help with this creation.

Instructions:

Activity 1: Nature Walk & Specimen Investigation

1. On our nature walk today, we are going to look for some things that we want to investigate. Some things that you might think are interesting are flower petals, leaves, small twigs, tiny pebbles. We are looking for small parts of nature, or **specimens**.
2. While we are on the walk, there are some important things to remember:
 - Try to find pieces of nature that have fallen to the ground or that are no longer living. When we pick something, we kill it, as plants are living creatures. On our investigation, we are looking for things that do not need to be picked, but rather can just be collected from the ground.
3. When you see something interesting on the ground, pick it up and investigate it!
 - Look at its properties...
 - What does it feel like? Smell like? Look like? What color is it? Does it change color when you hold it up to the **sunlight**?
4. After you've investigated it, put it in the bag that you're carrying for our project later!

Activity 2: 3D Nature Suncatcher

1. Ask an adult to cut square holes in all four sides of your box, so that each side looks like an empty picture frame. They will use the craft knife to do this.
2. Place the contact or parchment paper over each of the newly cut frames of your box. Be sure to secure all sides with packing tape. If using contact paper, be sure the sticky side faces outward.
3. Gather the natural objects collected on your walk and attach them to your box. If using contact paper, they will stick on their own. If using parchment paper, you will need to use tape to secure your **specimens**.
 - If you want to extend the lifespan of your suncatcher, you can press or dry the natural objects before attaching them to the box. You can also cover them in packing tape so that they are sealed.
4. After adding all of your **specimens** to your box, find a spot inside or outside with great **sunlight**. Hold your suncatcher up to the sun or **light** source to see how the different types of plants affect the **light** that comes through.
 - Try putting your suncatcher near a **light** bulb to see what happens when the **light** source is INSIDE. How does that change the appearance of the natural objects?

Evaluation:

- How do you think the **sunlight** helps the things that you saw on your walk today? In what ways might the **sunlight** harm the things you saw on your walk?
- When you shine a **light** on the different pieces, what do they do?
 - Are they opaque? Do they block the **sunlight**?
 - Are they transparent? Does the **sunlight** go right through the object and look crystal-clear?
 - Are they translucent? Does the **light** go through, but it makes things a bit blurry on the other side?

Further Exploration:

Visit...

- <http://dailystem.com/wp-content/uploads/2020/04/77-STEM-activities-for-Families-Nature.pdf> to find a list of nature activities to do at home.

Read...

- [A Walk in the Forest](#), by Maria Dek
- [The Big Book of Blooms](#), by Yuval Zomme

