



## Demos, Labs, & Science Stations Feature:

- Hands-on Investigations
- STEM Challenge
- Scientific Literacy
- Inquiry Process Skills

EARTH SCIENCE - 5E

NGSS · TEKS

**EARTH'S WATER**

**INVESTIGATION STATION**

**IMAGINATION STATION**

**OBSERVATION STATION**

**EVALUATION STATION**

**Coriolis Effect**

EARTH'S WATERS

Coriolis effect is the movement of wind and water to the right or lefts that is caused by the Earth's rotation. It has great influence in the movement of global wind patterns and ocean currents. In the northern hemisphere, the Coriolis effect causes fluids, such as air and water, to deflect to the right in a clockwise direction. In the southern hemisphere, it causes fluids to deflect to the left in a counterclockwise direction.

globe markers

North pole and south pole on the globe.

Each group member place the globe between their two index fingers (one at north pole and one at south pole) and rotate the globe in a counterclockwise direction at a slow and steady pace.

Another group member will use a marker to draw a line from the north pole to the south pole in the observation area, sketch the line on circle A. Use an arrow to show the direction the line is coming from. Make sure to label the equator, along with the North and South poles.

Each group member having a group member draw a line from the equator to the north pole and the south pole. Your observations on circle B.

time, with a group member.

**DEMOS, LABS, & SCIENCE STATIONS**

HANDS-ON · STEM · CRITICAL THINKING

**ENGAGING  
READING!**

**GRAPHING,  
WORD  
PROBLEMS &  
MEASUREMENT!**

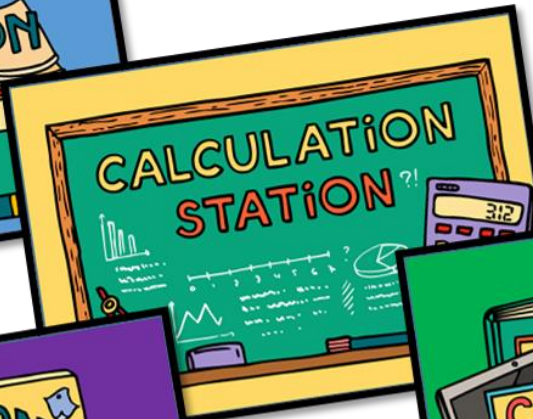
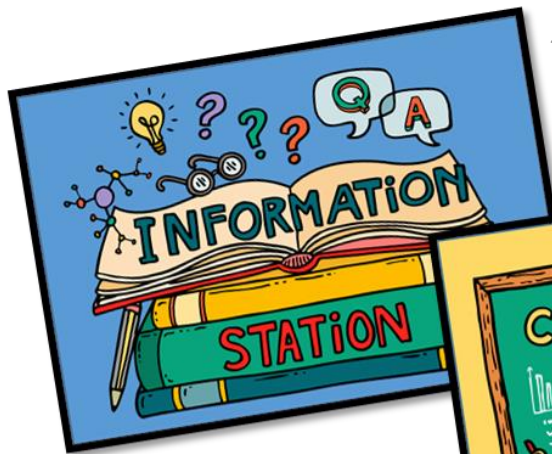
**INQUIRY  
SKILLS &  
PROCESSES!**

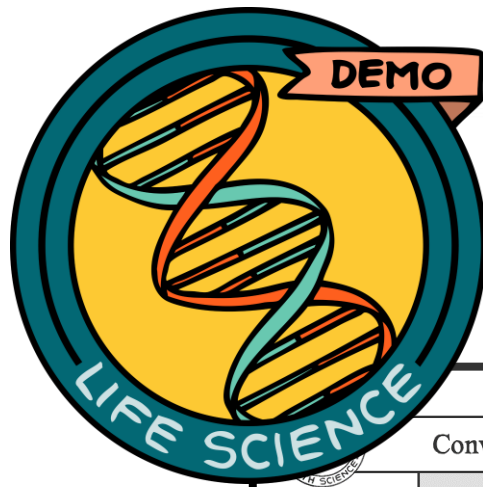
**HANDS-ON  
INVESTIGATIONS!**

**STEM CHALLENGES!**

**ALL Station Signage Included!!**

Color & Black and White





Teacher guide and answer key  
offered for every lab!

Easy-to-get materials!



### Convection Currents

EARTH'S WATERS

**Activity** Students will observe currents forming in the water and what causes them.

**Materials**

- clear glass heat-proof dish or bowl
- hot plate
- water
- oven mitts
- food coloring

**Procedure**

1. Fill a clear dish with water and allow students to view from the side.
2. When the water is still, add a drop of food coloring. Have students make observations.
3. Dump out colored water.
4. Fill the clear dish with water again, and begin to heat on a hot plate. Ask for predictions on what they may see while the water is heating.
5. Add a couple of drops of food coloring to the water above the center of the hot plate. Have students make observations.
6. You may want students to draw their observations.

**What's Happening**

Ocean currents result from two processes – the action of wind on the surface of the water and from variation in water temperature that causes movement – a process known as convection. Convection occurs because the oceanic waters heat up, becoming less dense. This water moves above the cooler water and gives off its heat to the surrounding environment. As it cools, it begins to sink, and the process starts again. Convection results in the continual circulation of ocean water on a global scale.

**Discussion**

Q: Compare the movement of food coloring between the room temp water and the heated water.

A: The food coloring just dropped in and was slowly moving in the room-temperature water, the heated water formed a current that moved the water faster, mixing the food coloring in faster. In room temp water, the heated water formed a current which moved the water faster mixing the food coloring in faster.

Q: How did heat cause a current to form?

A: Warmer water is less dense than cooler water, so when the water was heated at the bottom, it began to rise, causing the cooler water to move lower. When that heated, the water would rise, causing a continuous cycle.

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Discussion questions and  
teacher set-up included!

### Coriolis Effect

EARTH'S WATERS

Name \_\_\_\_\_ Date \_\_\_\_\_

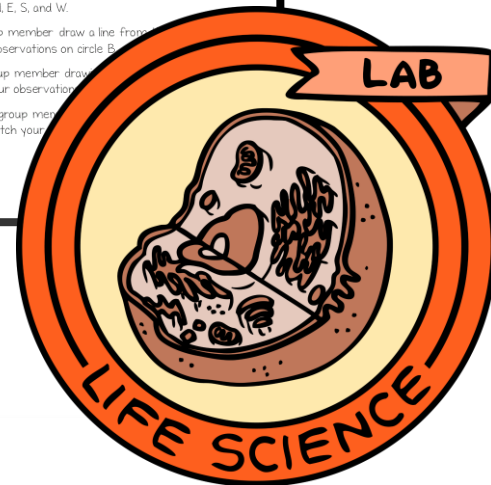
The Coriolis effect is the movement of wind and water to the right or left caused by Earth's rotation. As a result, it significantly influences the movement of global wind patterns and ocean currents. In the northern hemisphere, the Coriolis effect causes fluids, such as air and water, to curve to the right in a clockwise direction. In the southern hemisphere, it causes fluids to curve left in a counterclockwise direction.

**Materials**

- inflatable globe
- dry-erase markers

**Procedure**

1. Locate the equator, north pole, and south pole on the globe.
2. Have one group member place the globe between their two index fingers (one at north pole and one at south pole) and rotate the globe in a counterclockwise direction at a slow and steady speed.
3. As the globe spins, another group member will use a marker to draw a line from the north pole to the equator.
4. On your answer sheet in the observation area, sketch the line on circle A. Use an arrow to indicate the direction from which the line is coming. Make sure to label the equator, along with compass directions – N, E, S, and W.
5. Repeat steps 2-4, this time having a group member draw a line from the equator to the north pole. Record and sketch your observations on circle B.
6. Repeat steps 2-4 a third time, with a group member drawing a line from the equator to the south pole. Record and sketch your observations on circle C.
7. Repeat steps 2-4 for a final time, with a group member drawing a line from the equator to the south pole. Record and sketch your observations on circle D.





Group members will read a passage and then complete a task to help increase science literacy and deepen their understanding of the science concept.



### Coral Bleaching

One of the Earth's most beautiful and important ecosystems are coral reefs. Although coral reefs cover less than 1% of the Earth's surface, they are home to approximately one-quarter of all marine species. They are vital not only to marine life but to more than 500 million people who depend on them for food, jobs, and recreation.

Coral reefs are found in tropical oceans near the equator. Some of the largest reefs include the Apo Reef in the Philippines, the Mesoamerican Reef in the Caribbean basin, and the Great Florida Reef near the Florida Keys. However, the most extensive system of coral reefs is found along the east coast of Australia, called the Great Barrier Reef, which stretches for more than 1,400 miles.

Coral look like plants and rocks but are actually colonies of coral polyps, which are tiny animals. Coral is known for its attractive colors. Healthy coral gets its shades of color from microscopic algae that live on it. The algae are the coral's primary food source and help it to survive.

In March 2016, scientists observed a horrific sight while flying over the Great Barrier Reef. Instead of vibrant colors, all they saw was white. The coral was bleaching, a sign that the reef could be in serious trouble.

Coral bleaching occurs when the coral is stressed. Stress is caused by changes in conditions such as nutrients, light, or temperature, causing the algae living on the coral to be expelled. Without its primary food source, the coral turns white or pale and is more prone to disease. If the bleaching is not severe, coral can recover. However, if there is prolonged algae loss and continued stress, the coral will eventually die.

There are several main causes of bleaching. Extremely low tides, overexposure to sunlight can also cause bleaching. Precipitation from water, and runoff can carry pollutants into the ocean, causing stress to the coral. Climate change is the leading and most concerning cause of coral bleaching is a change in the ocean's temperature. Some coral reefs have died in 2016 due to a massive coral reef's will disappear.

You can take steps to help coral reefs. Conserve water when you do walk or ride your bike. Trees not only reduce runoff and the rising temperature.

### A

Where are coral reefs found and how much of the Earth's surface do they cover?

### B

How do the coral and algae benefit from each other?

### D

Explain the major cause for coral bleaching.

### A

### B

distribution of nutrients in the

### C

1. Niagara Falls is a powerful river. How does the river's shape the land?

2. What makes up a river system?

### D

Name \_\_\_\_\_ Date \_\_\_\_\_

A1. \_\_\_\_\_

A2. \_\_\_\_\_

B1. \_\_\_\_\_

B2. \_\_\_\_\_

C1. \_\_\_\_\_

C2. \_\_\_\_\_

Group members will have images, illustrations, or actual samples at this station that show applications or processes of the science topic.



Group members will work with one another to explore the concept through hands-on activities, so they may practice specific inquiry process skills as they learn.

**INVESTIGATION STATION**

### Properties of Water

Problem: What unique properties of water are due to its molecule?

**Materials:**

- water
- pennies
- 2 eye droppers
- rubbing alcohol
- Teaspoon
- salt
- Petri dish
- Fork

**Procedure:**

**Part A: Water on a Penny**

1. Predict how many drops of water the prediction on the answer sheet.
2. Using the eye dropper, count the number of the penny before the water spills off the table.
3. Use the other eye dropper to place different pennies. Count until the rubber data table.

**Part B: Floating a Paper Clip**

1. Fill the petri dish to nearly the top with water.
2. Using a steady hand, carefully use the of the water. Record your observations.
3. Remove the paperclip and add a teaspoon carefully.
4. Use the fork again to rest the paperclip observations.
5. Answer the questions on your answer sheet.

Name \_\_\_\_\_ Date \_\_\_\_\_

Directions: Complete the data tables.

**Part A: Drops on a Penny**

| Liquid          | # of drops |        | Observations |
|-----------------|------------|--------|--------------|
|                 | predict    | actual |              |
| Water           |            |        |              |
| Rubbing Alcohol |            |        |              |

**Part B: Floating a Paper Clip**

| Solution  | Observations |
|-----------|--------------|
| Water     |              |
| Saltwater |              |

1. Which property of water was demonstrated by the water drops on a penny? Explain.
2. Which property of water was demonstrated using the paperclip? Explain.
3. What are other properties that will make water a unique compound?



**INVESTIGATION STATION**

**A**

Describe the water cycle.

**B**

What sources of water on Earth are available for human use? Explain why.

**C**

Compare spring and neap tides.

**A**

A: A continuous process by which water moves through the living and nonliving parts of the environment. Process includes evaporation, condensation, and precipitation.

**B**

A: Ground water, fresh water such as lakes and rivers, only 3% of water on Earth is drinkable - the rest is ocean.

**D**

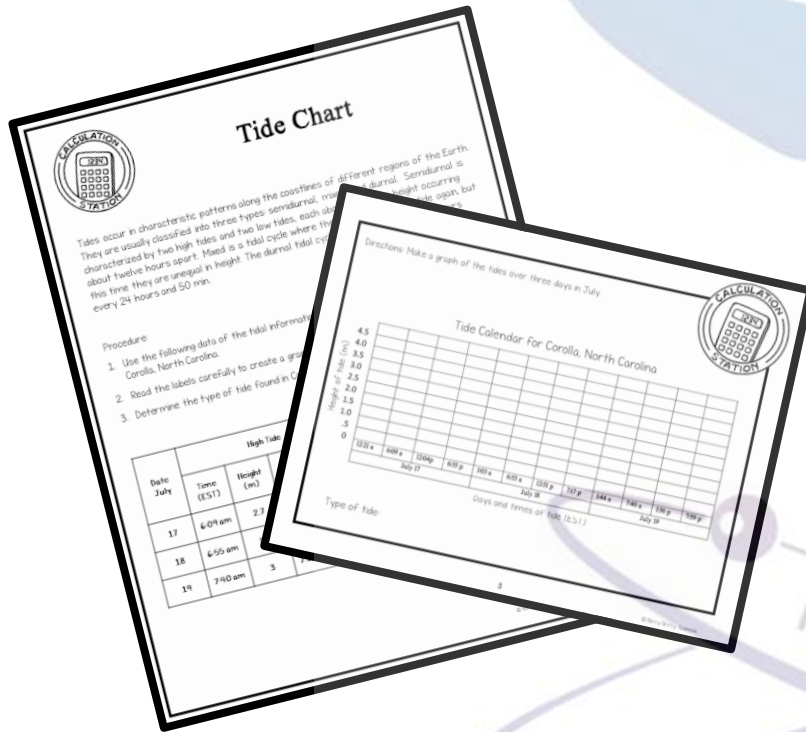
aves move into shallow water, the of the wave the ocean floor, down, making length decrease. water piles up, the wave height increase.

Name \_\_\_\_\_ Date \_\_\_\_\_

There are three different options for this station: interviews, videos, or group essay. Depending on the option you choose, group members will communicate what they know by answering questions in creative ways.



Group members use their math skills to complete the station challenge. Skills may include graphing, analyzing data, using models, measurement, and calculating formulas or word problems.



**Wave Factors**

Challenge: Model the movement of waves and determine a factor of wave height.

**Materials:**

- variable speed fan
- clamp light
- ring stand
- timer
- ruler
- plastic tray
- water

**Procedure:**

1. Fill a plastic tray with water.
2. Set ring stand next to the tray.
3. Place the fan about 2 cm from the water.
4. Turn the fan on for one minute.
5. Keeping the fan on, observe the waves. Record your observations.
6. Observe the shadows of the waves. Record your observations.
7. Repeat steps 3-5, changing the fan speed.
8. Answer the questions.

Complete the data table:

| Fan Speed | Wave Height (cm) | Observations |
|-----------|------------------|--------------|
| Low       |                  |              |
| Medium    |                  |              |
| High      |                  |              |

1. Is wave height affected by wind speed? Explain your answer.

2. Describe what you observed with the waves' shadows as the wind speed increased.

Group members will work together to solve a STEM (Science, Technology, Engineering, Math) challenge by creating models or designs that demonstrate their understanding of the science topic being taught.



This station makes science concepts relevant for students by asking them to imagine scenarios that will bring about discussion and critical thinking.

## USER-FRIENDLY PAGES:

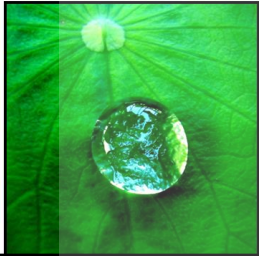
Students easily recognize which answer sheet to use at each station by matching station icons located on each page!



### Limiting Water Use

Directions: Use your imagination to answer the statement below.

IMAGINE you are a government official during a period of extreme drought.





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### Drip, Drop, Splat!

Problem: How does the density of a liquid and drop height effect the size and shape of splatter platters?

**Materials:**

- colored water (graduated cylinder A)
- colored syrup (graduated cylinder B)
- eye dropper
- paper
- metric rule
- meter stick

**Procedure:**

- Make a hypothesis of how density of a liquid will effect splatter size on your lab sheet.
- Place the piece of paper down on the lab table in order to catch splatters.
- Measure the heights listed in the data table using a meter stick. Place meter stick with end starting at zero on paper and move up stick when increasing height of drop.
- Use the eye dropper to drop ONE drop of colored water and ONE drop of colored syrup. Make sure to drop on different places on paper.
- Measure the size of the splatter in MILLIMETERS. Record in data table on answer sheet.
- Repeat for each height.
- Use the collected data to graph the splatter size versus drop height for each liquid.

**Analyze and Conclude**

- Was your hypothesis correct? Explain.
- What were two controls in your experiment that helped you collect the most accurate data possible?

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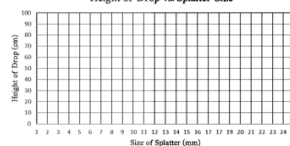
Date \_\_\_\_\_



Hypothesis \_\_\_\_\_

|               | Drop Height (cm) |    |    |    |     |
|---------------|------------------|----|----|----|-----|
|               | 5                | 25 | 50 | 75 | 100 |
| Colored Water |                  |    |    |    |     |
| Colored Syrup |                  |    |    |    |     |

Height of Drop vs. Splatter Size



Legend

☐ Water

☐ Syrup

Analyze and Conclude:

- \_\_\_\_\_
- \_\_\_\_\_

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## TEACHERS SAVE TIME:

Laminate station pages and reuse for each class and for years to follow!

## Inquiry and Process Skills

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  Demo

  Guided Inquiry Lab

  Science Stations

| Inquiry-Based Science Unit:<br>Earth's Waters | Classifying | Communicating | Compare & Contrast | Creating Models | Gather/Organize Data | Generalizing | Identifying Variables | Inferring | Interpreting Data and Graphs | Making Decisions | Manipulating Materials | Measuring / Calculating | Observing | Predicting |
|-----------------------------------------------|-------------|---------------|--------------------|-----------------|----------------------|--------------|-----------------------|-----------|------------------------------|------------------|------------------------|-------------------------|-----------|------------|
| Convection Currents                           | X           | X             | X                  |                 |                      | X            |                       | X         |                              | X                | X                      |                         | X         |            |
| Coriolis Effect                               |             | X             | X                  | X               | X                    |              | X                     |           | X                            |                  | X                      | X                       |           | X          |
| Information Station:<br>Coral Bleaching       |             |               |                    |                 | X                    | X            |                       | X         |                              |                  |                        |                         |           |            |
| Observation Station:<br>Images & Questions    | X           |               | X                  |                 | X                    | X            |                       | X         |                              |                  |                        |                         | X         |            |
| Investigation Station:<br>Properties of Water | X           |               | X                  |                 | X                    |              | X                     |           | X                            |                  | X                      |                         | X         | X          |
| Calculation Station:<br>Tide Chart            |             |               | X                  |                 | X                    |              | X                     |           | X                            | X                |                        | X                       |           |            |
| Communication Station:<br>Questions           | X           | X             |                    |                 |                      | X            |                       |           |                              | X                |                        |                         |           |            |
| Creation Station:<br>Wave Factors             |             | X             |                    | X               | X                    |              |                       |           | X                            | X                | X                      | X                       | X         | X          |
| Imagination Station:<br>Limiting Water Use    |             | X             |                    | X               |                      |              |                       |           |                              | X                |                        |                         |           | X          |

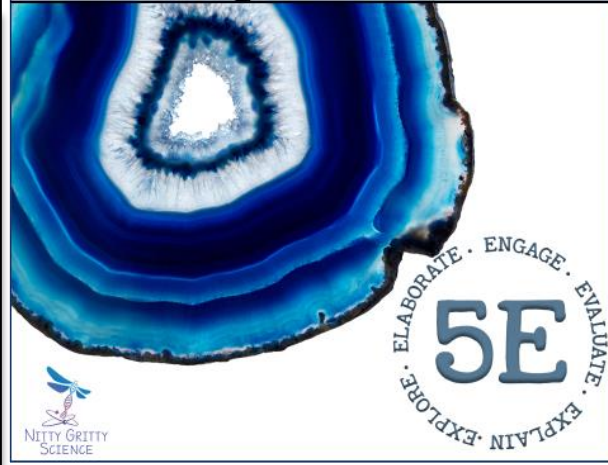
NGS promotes scientific inquiry throughout the curriculum. Students become more confident and effective learners while developing problem-solving and critical thinking skills. Process skills, such as planning, organizing and evaluating, help students to complete projects and assignments. These skills allow students to independently gather information, analyze it, and draw their own conclusions.

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