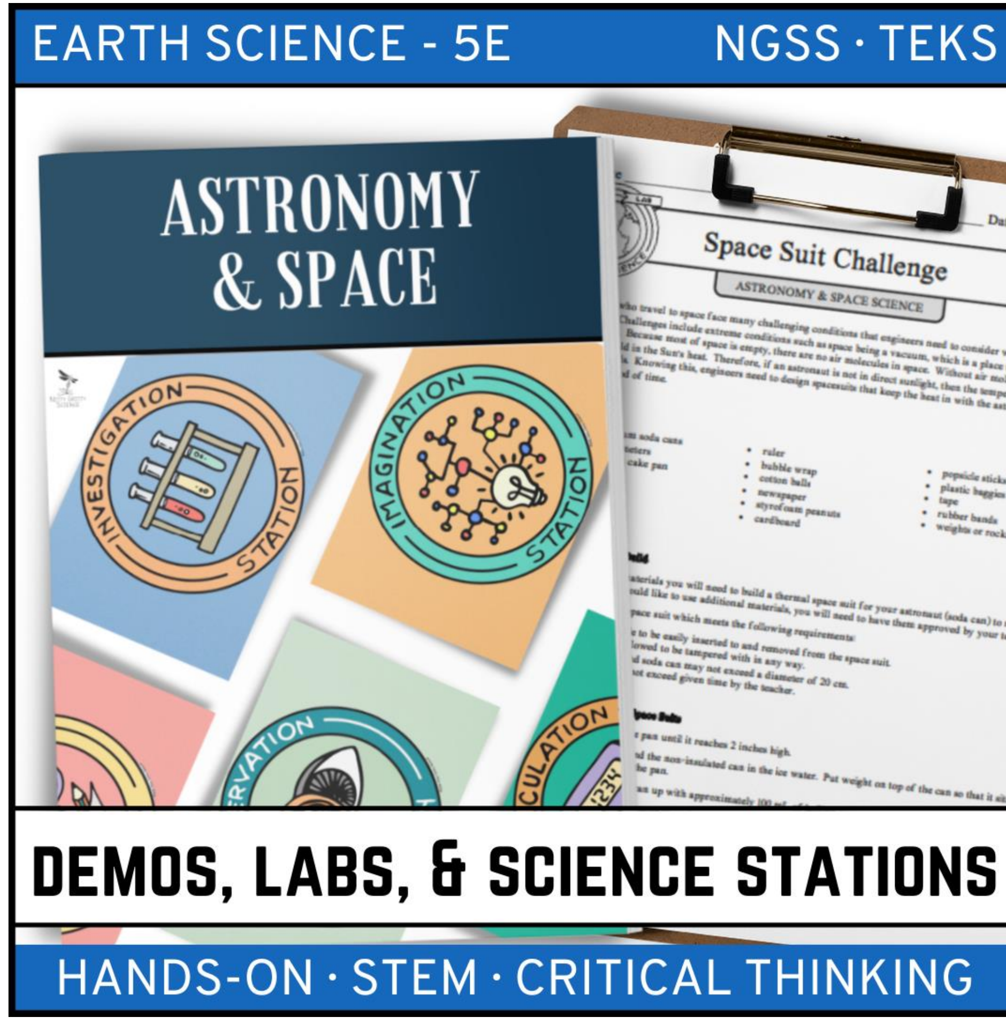
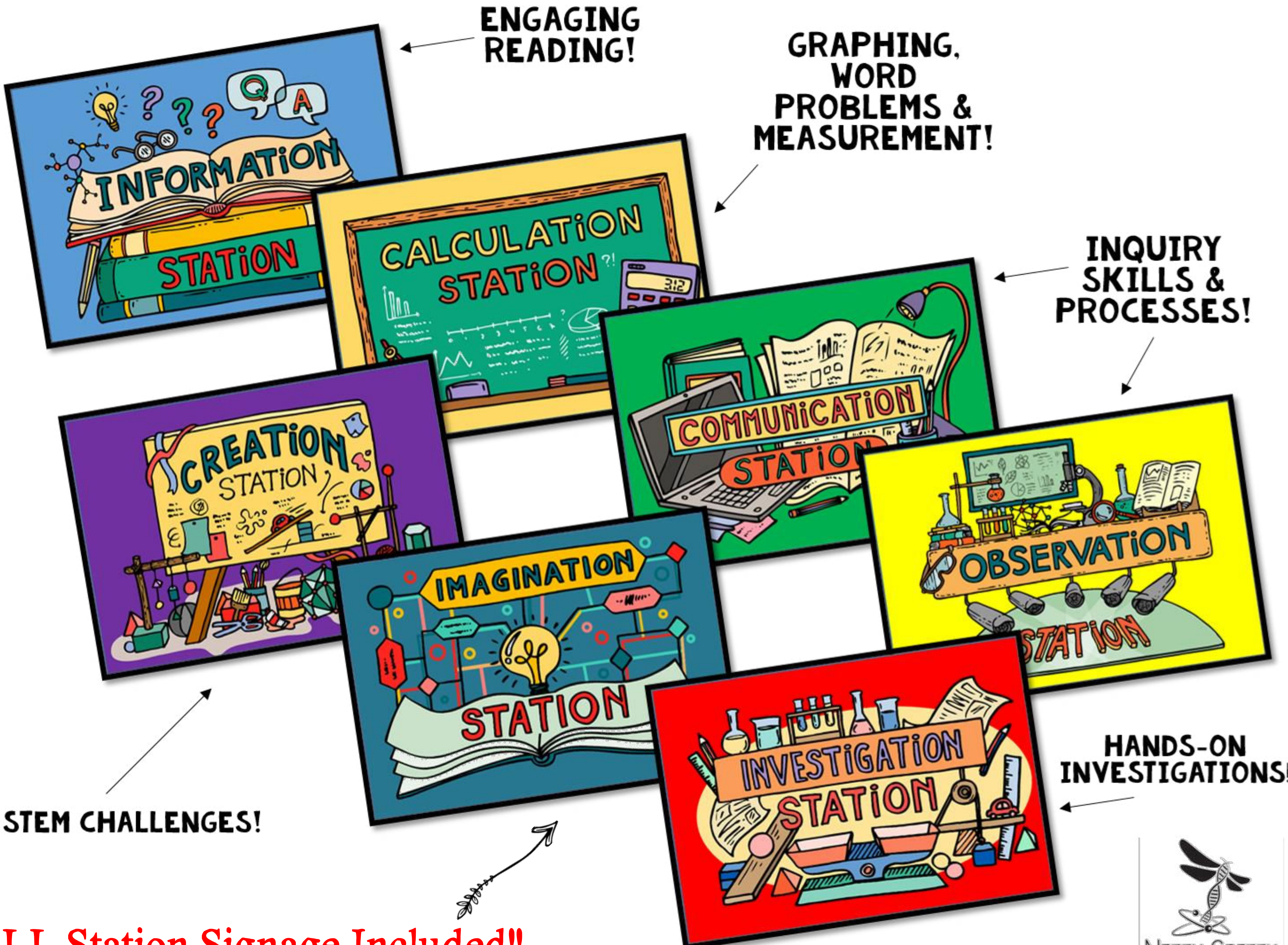
EXPLAIN · EXPLORE · ELABORATE · ENGAGE · EVALUATE · 5E Nitty Gritty Science

Demos, Labs, & Science Stations Feature:

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





ALL Station Signage Included!!

Color & Black and White

NITTY GRITTY SCIENCE

Teacher guide and answer key offered for every lab!

Easy-to-get materials!


Orbits of Inner Planets

ASTRONOMY & SPACE SCIENCE

Activity: Students will recognize the planets that orbit closer to the Sun have faster revolutions than those farther away.

Materials:

- sidewalk chalk
- outdoor area (basketball court, parking lot)
- meter stick

Procedure:

Before demo:

1. Have students go out and help you measure concentric circles in the parking lot with sidewalk chalk. The circles should be centered on an object (SUN) with a radius of 3.5 meters, 5.0 meters, and 7.5 meters.

During class:

2. Choose four students – one to represent the Sun and the other three to represent the inner planets of Mercury, Venus, and Earth.
3. Have students model the orbits around the Sun by walking around each path at the same speed. Ask the other students to make observations.

What's Happening?

The planets orbit around the Sun. Revolution is the movement of one object around another, and one complete revolution around the Sun is a year. The planets follow a path, or an orbit, as they revolve around the Sun. The closer they are to the Sun, the faster they revolve around the Sun.

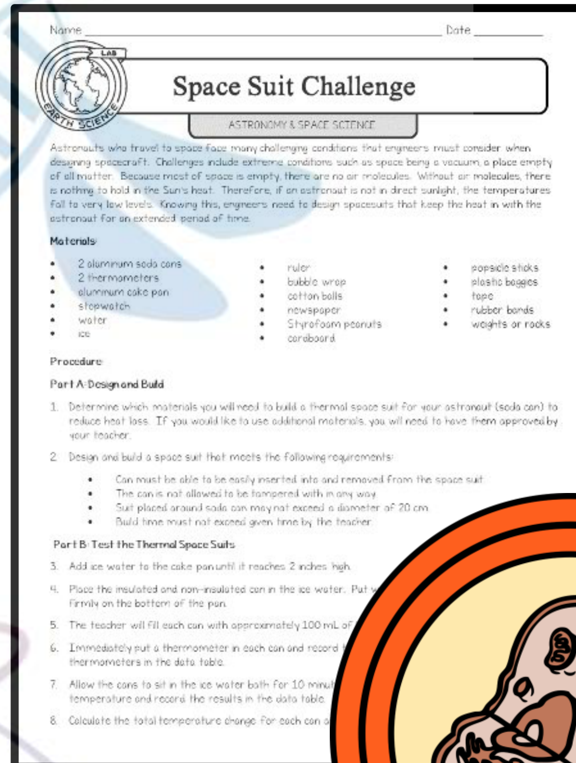
Discussion:

Q: If everyone moved at a constant speed, which planet orbited the Sun the fastest? The slowest?

A: Fastest – Mercury, Slowest – Earth

Q: Do you think all planets orbit the Sun in a perfect circle? Why or why not?

A: Kepler discovered that the orbit of each planet is an ellipse, an oval shape, which may be elongated or nearly circular.


Name ________________________ Date ________

Space Suit Challenge

ASTRONOMY & SPACE SCIENCE

Astronauts who travel to space face many challenging conditions that engineers must consider when designing spacecraft. Challenges include extreme conditions such as space being a vacuum, a place empty of all matter. Because most of space is empty, there are no air molecules. Without air molecules, there is nothing to hold in the Sun's heat. Therefore, if an astronaut is not in direct sunlight, the temperatures fall to very low levels. Knowing this, engineers need to design spacesuits that keep the heat in with the astronaut for an extended period of time.

Materials:

- 2 aluminum soda cans
- 2 thermometers
- aluminum cake pan
- stopwatch
- water
- ice
- ruler
- bubble wrap
- cotton balls
- newspaper
- Styrofoam peanuts
- cardboard
- popsicle sticks
- plastic baggies
- tape
- rubber bands
- weights or rocks

Procedure:

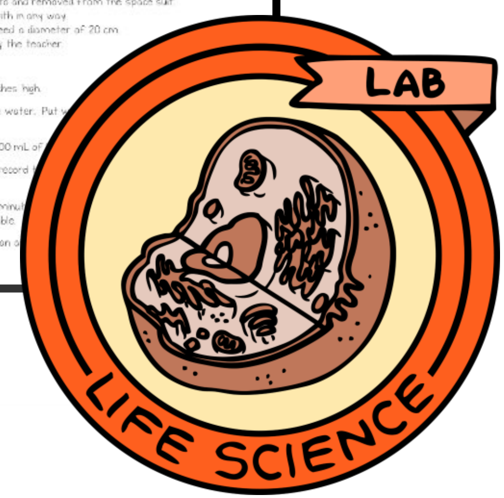
Part A: Design and Build

1. Determine which materials you will need to build a thermal space suit for your astronaut (soda can) to reduce heat loss. If you would like to use additional materials, you will need to have them approved by your teacher.
2. Design and build a space suit that meets the following requirements:
   - Can must be able to be easily inserted into and removed from the space suit.
   - The can is not allowed to be tampered with in any way.
   - Suit placed around soda can may not exceed a diameter of 20 cm.
   - Build time must not exceed given time by the teacher.

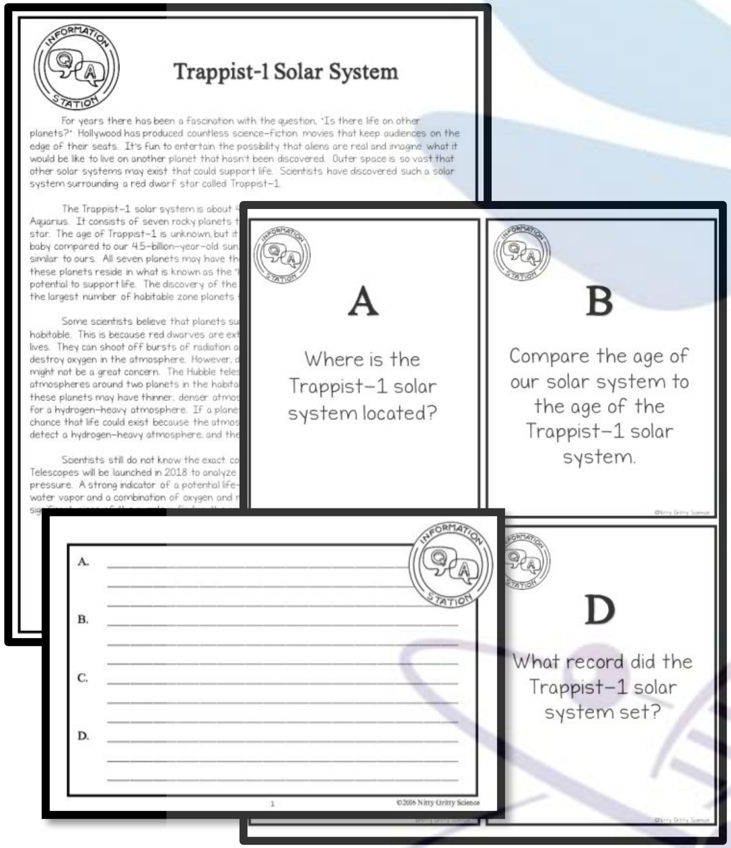
Part B: Test the Thermal Space Suits

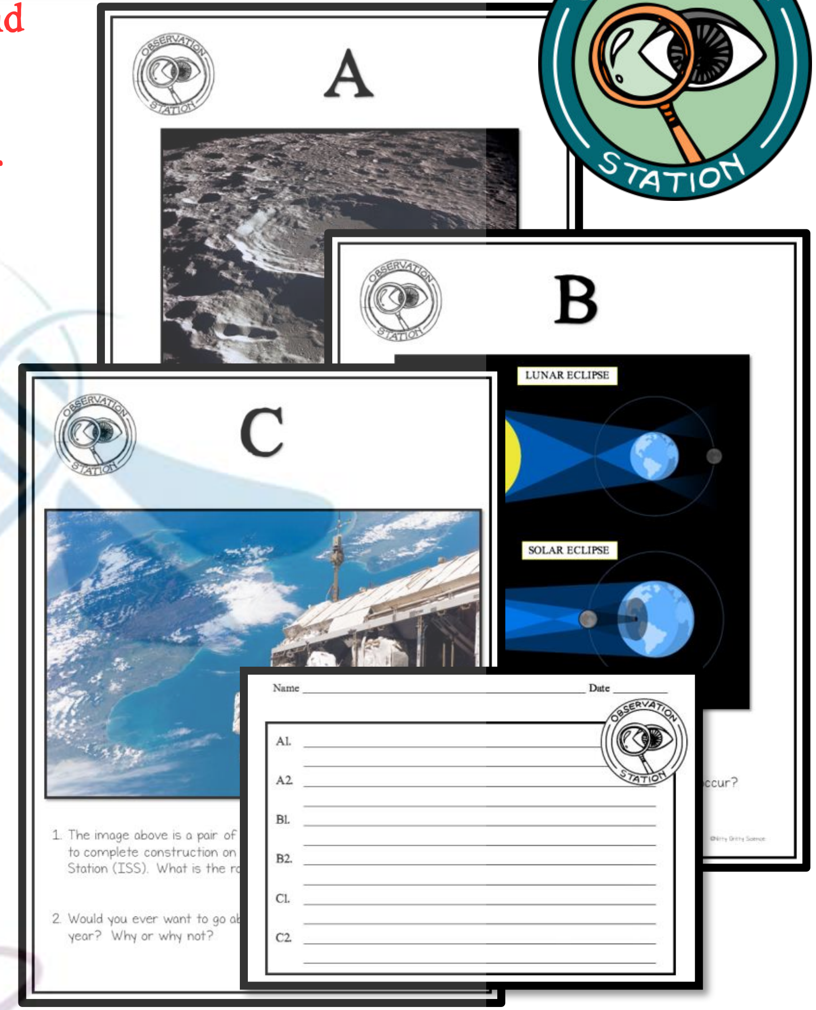
3. Add ice water to the cake pan until it reaches 2 inches high.
4. Place the insulated and non-insulated can in the ice water. Put w… firmly on the bottom of the pan.
5. The teacher will fill each can with approximately 100 mL of…
6. Immediately put a thermometer in each can and record t… thermometers in the data table.
7. Allow the cans to sit in the ice water bath for 10 minut… temperature and record the results in the data table.
8. Calculate the total temperature change for each can a…

Discussion questions and teacher set-up included!



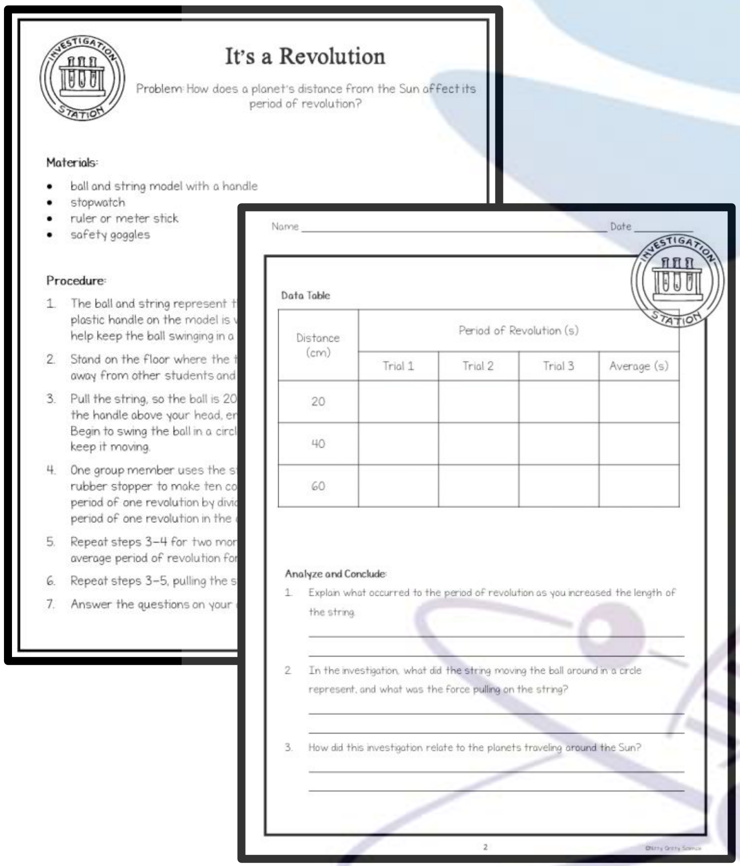
Group members will read a passage and then complete a task to help increase science literacy and deepen their understanding of the science concept.

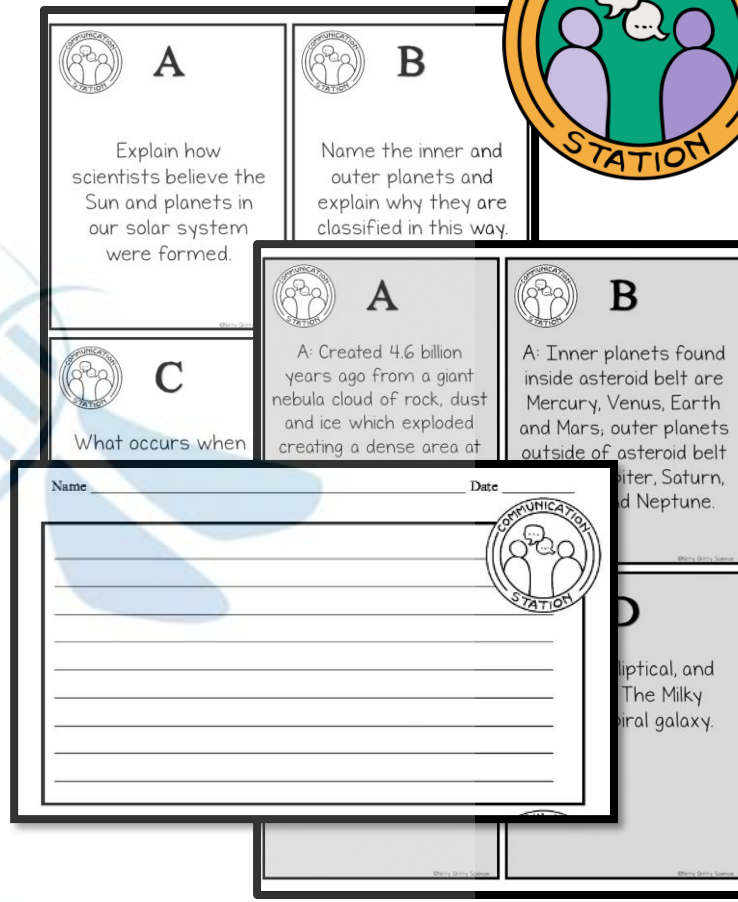




Group members will have images, illustrations, or actual samples at this station that show applications or processes of the science topic.

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.





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.

Happy Birthday

Every 365.24 days, you celebrate a special day – your birthday! Well, at least on Earth, that is. What if you were born on another planet? How many birthdays would you get to celebrate?

The Earth makes one revolution around the Sun every 365.24 days, which is a year. Therefore, your age is based on the total number of revolutions Earth has made since the day you were born. Since every planet is in a different orbit around the Sun, each planet's revolution takes a different amount of time than Earth. For example, using the chart below, you can see that Saturn takes ... to make one revolution around the Sun!

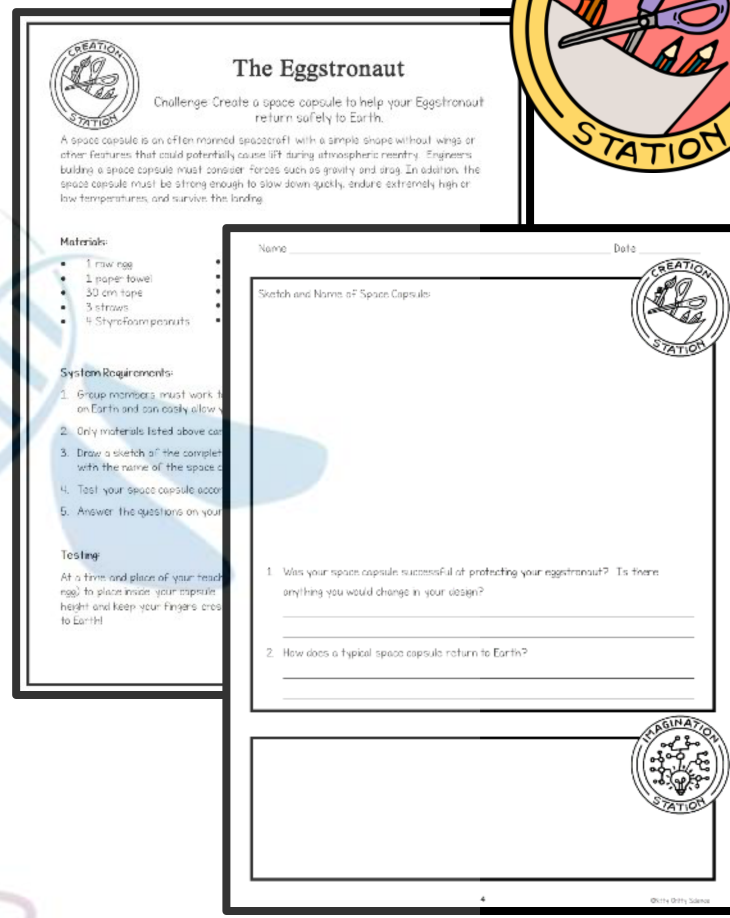
Procedure:

1. Write down yo...
2. Using the table abov... Use the formula below to ...

Current a... / Planet's period of revolution (in ...

Planet	Calculation	Age
Mercury		
Venus		
Earth		
Mars		
Jupiter		
Saturn		
Uranus		
Neptune		
Pluto		

Considering your data, would you consider having your birthday party on another planet? Why or why not?



The Eggstronaut

Challenge: Create a space capsule to help your Eggstronaut return safely to Earth.

A space capsule is an often manned spacecraft with a simple shape without wings or other features that could potentially cause lift during atmospheric reentry. Engineers building a space capsule must consider forces such as gravity and drag. In addition, the space capsule must be strong enough to slow down quickly, endure extremely high or low temperatures, and survive the landing.

Materials:

- 1 raw egg
- 1 paper towel
- 30 cm tape
- 3 straws
- 4 Styrofoam peanuts

System Requirements:

1. Group members must work ... on Earth and can easily allow ...
2. Only materials listed above ca...
3. Draw a sketch of the complet... with the name of the space c...
4. Test your space capsule acco...
5. Answer the questions on your...

Testing:

At a time and place of your teach... egg) to place inside your capsule ... height and keep your fingers cros... to Earth!

Name ______ Date ______

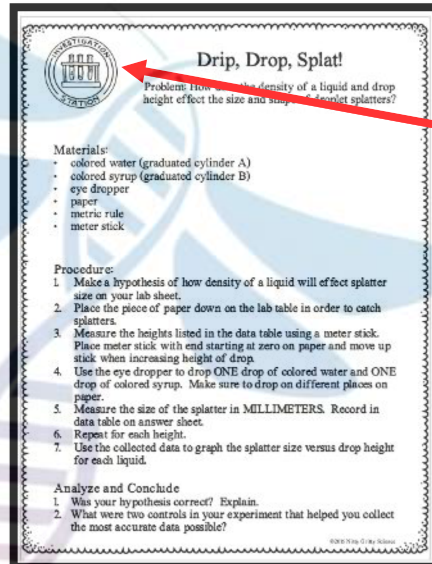
Sketch and Name of Space Capsule:

1. Was your space capsule successful at protecting your eggstronaut? Is there anything you would change in your design?
2. How does a typical space capsule return to Earth?

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!



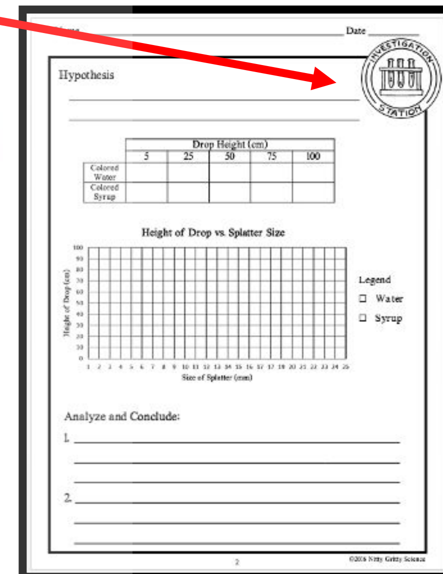
Drip, Drop, Splat!

Problem: How … the density of a liquid and drop height effect the size and sha… droplet splatters?

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

Procedure:
1. Make a hypothesis of how density of a liquid will effect splatter size on your lab sheet.
2. Place the piece of paper down on the lab table in order to catch splatters.
3. 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.
4. 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.
5. Measure the size of the splatter in MILLIMETERS. Record in data table on answer sheet.
6. Repeat for each height.
7. Use the collected data to graph the splatter size versus drop height for each liquid.

Analyze and Conclude
1. Was your hypothesis correct? Explain.
2. What were two controls in your experiment that helped you collect the most accurate data possible?



Date

Hypothesis

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

Analyze and Conclude:

1.

2.

TEACHERS SAVE TIME: Laminate station pages and reuse for each class and for years to follow!

Demo | Guided Inquiry Lab | Science Stations

Inquiry-Based Science Unit: Astronomy and Space	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
Orbtis of Inner Planets	X	X		X		X				X	X		X	
Gas Giants			X		X					X			X	
Space Suit Challenge		X		X	X		X		X	X	X	X		X
Information Station: Trappist-1 Solar System					X	X		X						
Observation Station: Images & Questions	X		X		X	X		X					X	
Investigation Station: It's a Revolution	X		X		X		X		X		X	X	X	
Calculation Station: Happy Birthday					X		X			X		X		
Communication Station: Questions	X	X				X				X				
Creation Station: The Eggstronaut		X		X	X				X	X	X	X	X	X
Imagination Station: Mission: Martian Habitat		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.

This download is part of the
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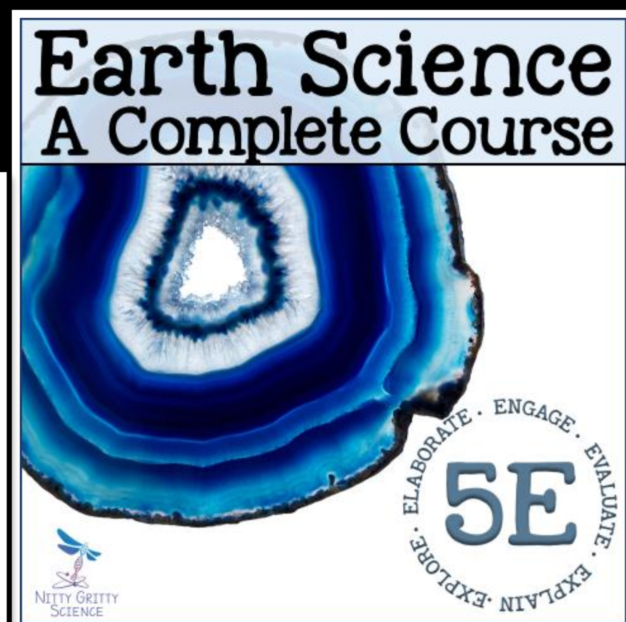
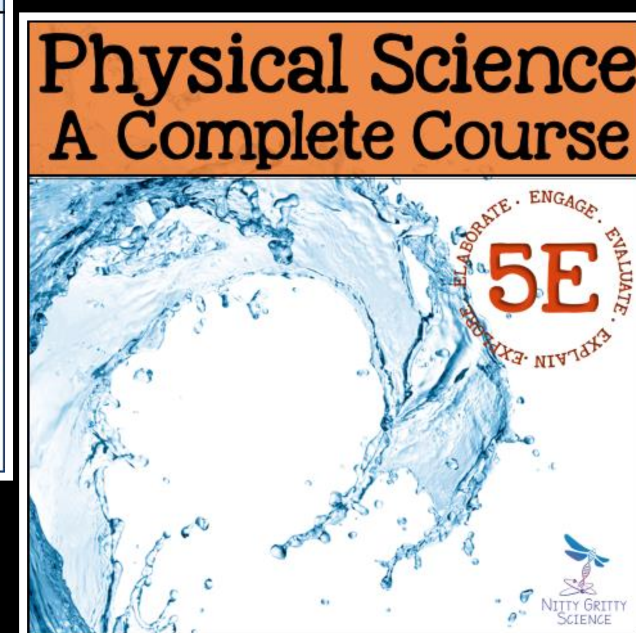
Click below to learn more.





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