

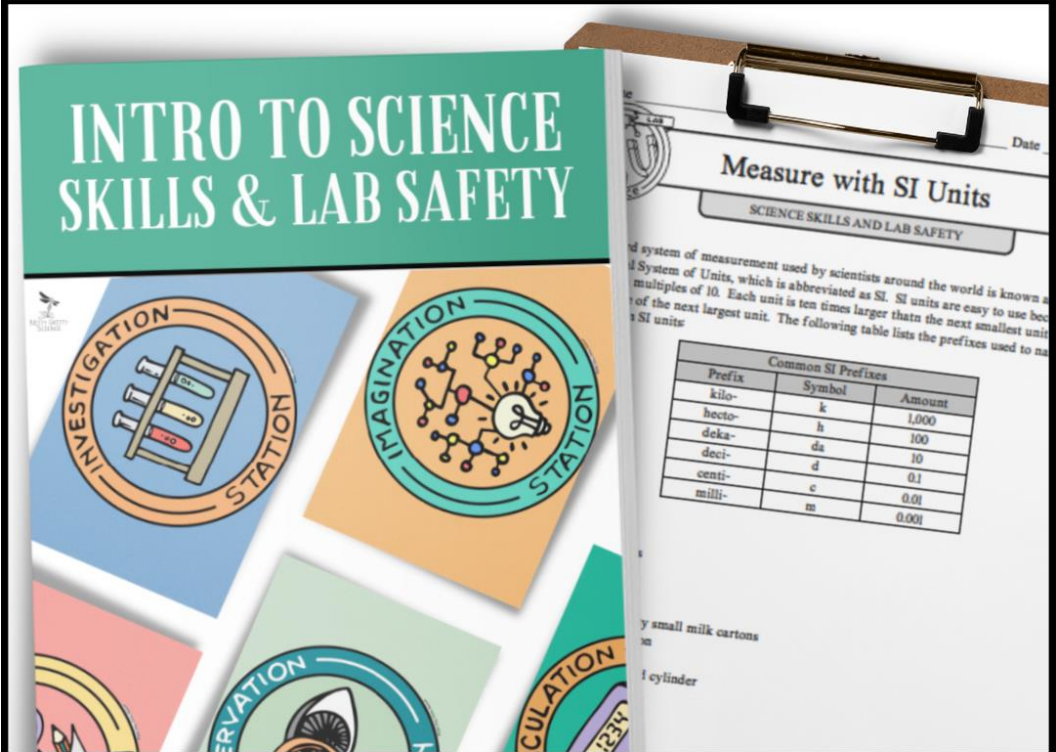


Demos, Labs, & Science Stations
Feature:

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

ES · LS · PS - 5E

NGSS · TEKS



DEMOS, LABS, & SCIENCE STATIONS

HANDS-ON · STEM · CRITICAL THINKING

**ENGAGING
READING!**

**GRAPHING,
WORD
PROBLEMS &
MEASUREMENT!**

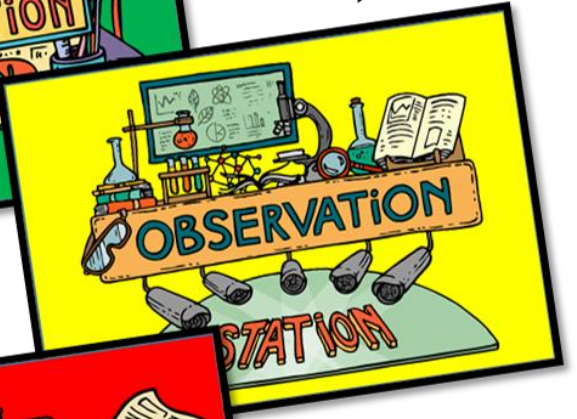
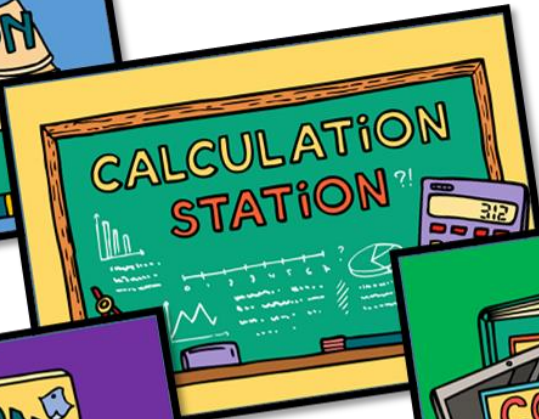
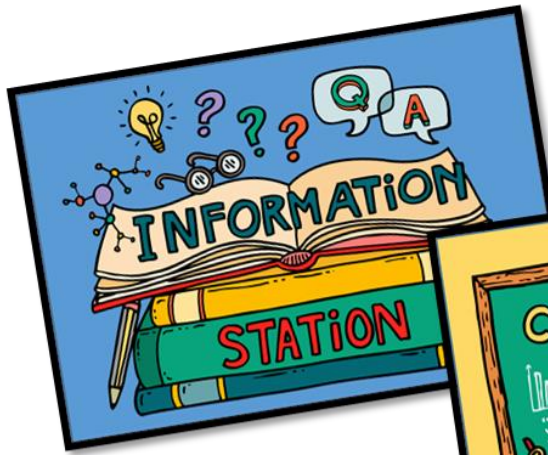
**INQUIRY
SKILLS &
PROCESSES!**

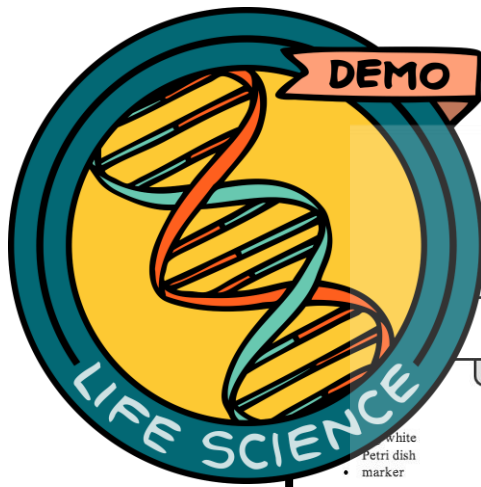
**HANDS-ON
INVESTIGATIONS!**

STEM CHALLENGES!

ALL Station Signage Included!!

Color & Black and White





Teacher guide and answer key offered for every lab!

Easy-to-get materials!



Eye Safety

SCIENCE SKILLS AND LAB SAFETY

- white
- Petri dish
- marker
- projector
- strong acid (HCl or acetic acid)
- eye dropper
- water

Procedure

1. Draw an eye on the underside of the Petri dish and display for class using the projector.
2. Crack open the egg and place the egg white only in the Petri dish.
3. Explain that the proteins in egg whites are similar to those found in the protective layer of the eye.
4. Tell them that someone was not being cautious and has splashed acid into their eye – add drops of acid to the egg whites.
5. Ask students to make observations of what is happening to the egg whites.
6. Try adding water to reverse the effects. Have students make observations.

What's Happening?

The proteins in the egg white become cloudy since the acid is causing a denaturation of the proteins. This is an irreversible chemical reaction and students need to understand that a chemical can cause severe damage to their eyes or skin if not used properly. Students must be made aware of the safety precautions scientists take, such as wearing goggles, gloves and aprons. Make sure they are aware of safety equipment – eye wash station, shower, fire blanket, etc.

Discussion:

Q: What happened to the “eye”?

A: The protective layer became cloudy and damaged the eye.

Q: What type of safety equipment must be worn when doing labs?

A: goggles, aprons, hair ties, gloves

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Name _____ Date _____

Measure with SI Units

SCIENCE SKILLS AND LAB SAFETY

The standard system of measurement used by scientists around the world is known as the International System of Units, which is abbreviated as SI. SI units are easy to use because they are based on multiples of 10. Each unit is ten times larger than the next smallest unit and one-tenth the size of the next largest unit. The following table lists the prefixes used to name the most common SI units:

Common SI Prefixes		
Prefix	Symbol	Amount
kilo-	k	1,000
hecto-	h	100
deka-	da	10
deci-	d	0.1
centi-	c	0.01
milli-	m	0.001

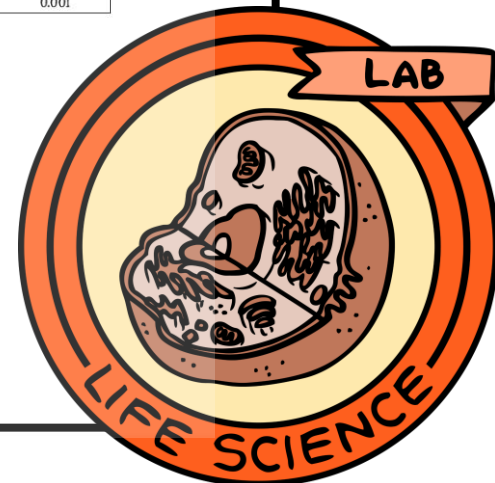
Materials:

- assorted seeds
- tape
- balance
- potting soil
- cups/pots/empty small milk cartons
- fertilizer solution
- metric ruler
- 50-mL graduated cylinder
- colored pencils

Safety:



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.



Using Models in Science

In science, a model is a representation of an idea, an object or even a process or a system that is used to describe and explain phenomena that cannot be experienced directly. Models are central to what scientists do, both in their research as well as when communicating their explanations.

A model can be a picture, diagram, computer image, or a physical representation of a complex object or process. Many times, models represent things that are very large, such as the solar system, or very small, such as the parts of an atom.

Models are often made for a particular purpose and to represent a specific characteristic of an object or a process. Characterizing the purpose and the purpose are not included, which is why when communicating, take for instance the two models pictured here.

Model A

Model B

Both are models of the mighty dinosaur Tyrannosaurus Rex, a large predator. Despite the similarities, the two models were made with different purposes in mind. The purpose of Model A is to show the physical characteristics of the T-rex, such as short arms, sharp teeth, and dry, scaly skin. The purpose of Model B is to show the climate and biome the T-rex may have lived in. Model B lacks a lot of the information for a model of a T-rex. Model A provides a great deal of information about the Tyrannosaurus Rex.

A

What is a scientific model?

B

Why do scientific models often lack some information?

C

to

D

Is either model better than the other? Explain your answer.

A. _____

B. _____

C. _____

D. _____

B

Chicken Anatomy

1. Scientists use diagrams, photographs, maps, and illustrations to help clarify what they are studying. By using these illustrations, scientists can learn from different perspectives.

Name _____ Date _____

A1. _____

A2. _____

B1. _____

B2. _____

C1. _____

C2. _____

C

One thing this person is doing right in the lab and one thing this person is doing wrong.

Why should you never drink or eat anything in a lab.

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

Making Observations

Problem: Can you make careful and accurate observations in the science lab?

Scientists must have the ability to make careful and accurate observations when performing an investigation. Observations are often used as data and can help make inferences. Inferences are interpretations of observations.

Materials:

- 2 – petri dish labeled A and B
- ruler
- 10 mL graduated cylinder
- water
- vegetable oil

Procedure:

1. Add water to petri dish A to a height of 0.5 cm.
2. To petri dish A, add 1 mL of vegetable oil.
3. Dip the end of a toothpick in liquid dish soap and water/vegetable oil mixture at the center of the observations in the space provided.
4. To petri dish B, place ONE drop each of the four areas on the surface of the milk. Try to NOT pierce the petri dish.
5. Dip the end of a toothpick in liquid dish soap and water/vegetable oil mixture at the center of the milk of petri dish B. Draw and record your observations in the space provided.
6. Answer any questions on your answer sheet.

Name _____ Date _____

Directions: Make accurate observations and complete the questions below.

Observations of Petri Dish A:

Observations of Petri Dish B:

Safety Observations – Look around at your work area and identify any spills, human errors, etc. What do you need to think of for future investigations?

Explain why observation skills are important in science investigations.

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 A Name five skills that are important in scientific thinking.	 B Name five skills that are important in scientific thinking.
 C Identify two steps you should take before a lab.	 D Identify two steps you should take before a lab.

Name _____ Date _____

plant safety; B – goggles safety; C – eye safety; D – glassware safety

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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.

Experimental Procedure

Directions
Read the following experimental procedure carefully and answer the questions on the back of this sheet.

Procedure:

1. Fill 3 450-mL beakers with 300 mL of water.
2. Label the beakers 1, 2 and 3.
3. Add 10 grams of salt to Beaker 1 and 20 grams to Beaker 2.
4. Add 20 grams of salt to Beaker 2 and 40 grams to Beaker 3.
5. Add no salt to Beaker 1.
6. Repeat steps 1-5, this time using hot water.
7. Place all beakers in the freezer for one hour. Record your observations.

Name _____ Date _____

COMMUNICATION STATION

1. Create a list of materials that you would need for this experiment?

2. How much salt will you need?

3. How much water will you need?

4. Why is it important to read procedures carefully?



Planning an Investigation

Challenge: Design a controlled experiment to investigate a problem.

Materials:
none

Procedure:

1. As a group you will plan and write an experimental procedure to answer the question:
Is a ball's bounce affected by the height it is dropped from?
2. The final draft must be written and include the following:
 - Material list
 - Safety reminders
 - Control
 - Independent and dependent variables
 - Method to organize data (i.e., graph)
3. Give a final draft to the teacher.

Testing:
In order to test, groups will swap their drafts and now conduct the experiment given the safety reminders. Make sure to note and record your observations.

Name _____ Date _____

Plan your investigation:

What challenges did you face with designing your own experiment or trying to complete another groups?

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!



A Perfect Candidate


Directions: Use your imagination to answer the statement below.

IMAGINE you are interviewing for a forensic scientist job.



Describe the

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Drip, Drop, Splat!

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

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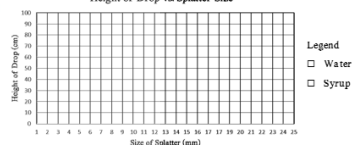
Date _____



Hypothesis _____

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

Height of Drop vs. Splatter Size



Legend

Water

Syrup

Analyze and Conclude:

1. _____
2. _____

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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: Intro to Science (Life, Physical, Earth)	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
Eye Safety	X	X	X			X		X	X	X			X	
Measure with SI Units		X	X	X	X		X		X		X	X		X
Information Station: Using Models in Science					X	X		X						
Observation Station: Images & Questions	X		X		X	X		X					X	
Investigation Station: Making Observations	X		X		X		X		X		X		X	
Calculation Station: Experimental Procedure					X		X			X		X		
Communication Station: Questions	X	X				X				X				
Creation Station: Planning Investigation		X		X	X				X	X	X	X	X	X
Imagination Station: Perfect Candidate		X		X						X				X

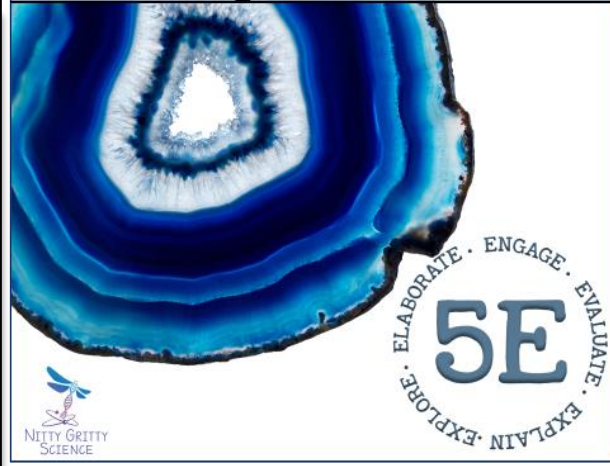
NGS promotes scientific inquiry throughout the curriculum. Students become more confident and effective learners while developing problem-solving and critical thinking skills. Process skills, such as planning, organizing and evaluating, help students to complete projects and assignments. These skills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

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