Northeastern University
College of Engineering

Weekly STEM Newsletter 3 (April 3 - April 10, 2020)

Introduction to Science Disciplines

Introduction

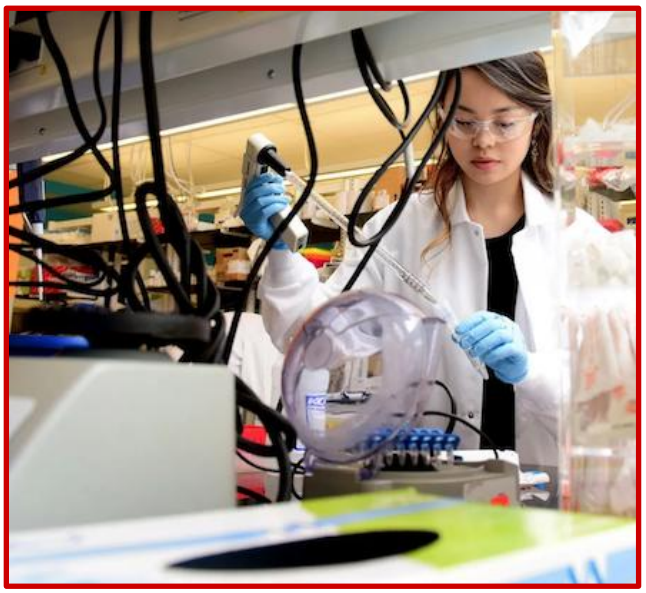
This week, we will be learning about different types of work that scientists do. When you hear the word scientist what do you picture? Maybe somebody in a lab coat holding a test tube? This is one kind of scientist, but there are so many more too. Many scientists, such as biologists or chemists, do work in a lab, but scientists can also work in nature and in space! When thinking about science, it is important to remember that it is a very broad category with endless possibilities. The main difference between science and engineering, which you learned about in last week's newsletter, is scientists tend to observe while engineers create.

When science students graduate college, they will graduate with a Bachelor of Science. Many scientists go on to get their master's or doctoral degree. These degrees allow scientists to work in certain positions in a company or run their own labs based on what they are interested in rather than working for someone else.

Science is not just one thing. Just like there are different types of engineering, there are numerous different types of sciences that people can study or specialize in. The science you learn at school can fall under the **natural sciences** category, such as physics or biology. This is the study of the physical world around us, and is based on observation and experimentation. Another branch is the **formal sciences**, which is where mathematics, robotics, and computer science can be found. History, geography, political science and economics are also sciences! They fall under the **social sciences** branch because they study how societies function.
Find out more about scientists in our prezi: https://prezi.com/-z_4kozrknv_/intro-to-science/

Northeastern Connection

Here at Northeastern, people can come to learn about science to be able to work as a scientist. Students work in labs, conducting experiments and learning about the field that they are in. In college, students choose a major, which is the field of study they are most interested in learning about. A psychology major might conduct social experiments, to learn about how humans think. A mathematics major would study the origins of different formulas.



Since there are different types of science you can specialize in, Northeastern has many different schools, called colleges, within the university that focus on the different types of science. There is the College of Science, where you can study topics such as chemistry or environmental science. The Khoury College of Computer Sciences allows students to study computer science, data science or cybersecurity. Northeastern also has a Bouvé College of Health Sciences, where students can study to become nurses, pharmacists, physical therapists or any other health care professional you can think of! Finally, Northeastern has the College of Social Sciences and Humanities, which includes majors such as history, sociology and psychology. Also, if students have more than one interest, they can choose to pursue two majors, combine majors or get a minor in a different field of study.

Do Now

Because science is all about the process of discovery, scientists have to **document** everything that happens before, during, and after an experiment. This way, if other scientists need to check if the results of another scientist's experiment are accurate, they can make sure they know all of the important details about the other scientist's process! Additionally, when scientists want to share their results with the world, they need to make sure that they do not forget to include any part of their process, otherwise people may not believe their results. Scientists usually do this in a scientific notebook that they keep in their lab or at their work station. As they are working, they can then write down important details regarding what happened with the experiment on any given day. **For this activity, you will be creating your own scientific notebook!**

First, find any notebook. It could be lined, gridded, or blank. As long as there is space to write, it will work! If you don't have a notebook, here is a tutorial for making your own: https://www.youtube.com/watch?v=BysUiyjB0jY. Once you have a notebook, write your name on the cover with a title (something like "My Scientific Journal").

Journal Activity #1: Cooking with Parents

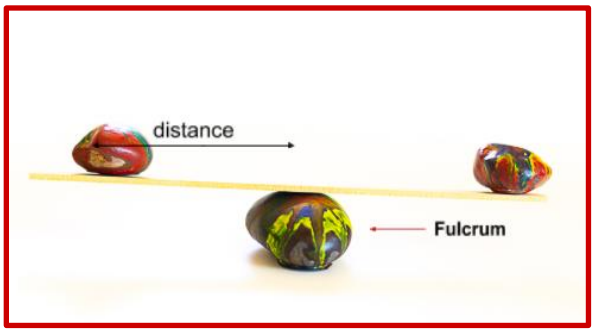
The next time your parent or guardian cooks a meal, ask them if you can observe and document their process using your scientific journal! Open to a new page and use the format at the end of this newsletter to document the process. Feel free to sketch pictures of the finished dish or the process as well!

Journal Activity #2: What Makes You Wonder?

Have you ever been going about your daily life and been suddenly struck with curiosity about something you observe? Examples may include"Why is the sky blue?", "How long would it take to travel to the moon?", or "Why do birds chirp?". For the next week, keep your scientific journal near you at all times. Any time you are struck by a moment of wonder that makes you ask "why?", document your question in your journal. Once you've asked the question, use the internet or ask an adult who may know the answer to search for answers. If you find an answer, make sure to document it too! Use the format at the end of this newsletter to get you started.

Activity

For this activity, you are going to have to think about forces and balance. You'll also have to think about the different states of matter when getting to the creative part of this activity!



How do rocks balance?

The simple machine seen above is known as a lever. A **lever** is a rigid body that is capable of rotation. The point of rotation is known as a **fulcrum.** Levers can make hard jobs in lifting easier as it reduces the force needed to move an object. The larger the distance between the object and the fulcrum, the less **force** is needed. The rocks balance because they are the right distance from the fulcrum, meaning that they are able to be supported and they act in equal and opposite directions, so there is no overall movement. To balance the rocks, the ruler's **center of**

mass must be above the fulcrum. The center of mass is the point where all of an object's mass is focused. See-saws and even our arms are examples of levers!

Now try mimicking the photo above with three rocks and a ruler. Try to balance them! *Activity Source*

Topics of Discussion:

- Where would scientists need to use this concept?
- Why and how could this be used?
- Does the position of the rocks matter? How does it change if the rock is heavier or lighter?
- Can you think of any levers from your day to day life?
- What problems could levers solve?

Materials needed

- **Rocks** of different sizes (smooth)
- **Crayons** (Be creative with the colors!)
- **Baking sheet**
- **Aluminum foil** or parchment paper
- **Spoon** or tongs
- **Oven mitt**
- **Oven** (or **candle warmer** depending on the method you choose)
- **Ruler** or paint stick
- Optional: Mod Podge Outdoor or other sealer

Method (Choose one to follow):

Oven:	Candle Warmer:
• Preheat oven to 300F • Line a baking sheet with aluminum foil and place all the rocks on it. • Heat the rocks for 10 minutes • Remove the rocks from the oven and place on hot pads • To add the color to the rock, gently push a crayon of your choice on the hot top surface of the rock. Do this with as many as you want • Remove the rocks with the spoon and allow them to dry • Optional: You can use the sealer on the rocks	• Set aside a tray with aluminum foil on it • Plug in the candle warmer and place the rocks on it (do not pile the rocks on top of each other) • Heat the rocks for 5 minutes • To add the color to the rock, gently push a crayon of your choice on the hot top surface of the rock. Do this with as many as you want • Remove the rocks with the spoon and allow them to dry • Optional: You can use the sealer on the rocks

Share Your Results

We'd love to know how the activity and/or the "do now" turned out! What worked and what didn't work? Please share pictures of your rainbow rocks or entries in your science journal! Email us at stem@northeastern.edu.

Related links/Extensions

Rock Cycle with chocolate rocks: https://leftbraincraftbrain.com/how-to-make-a-delicious-rock-cycle-with-chocolate-rocks/

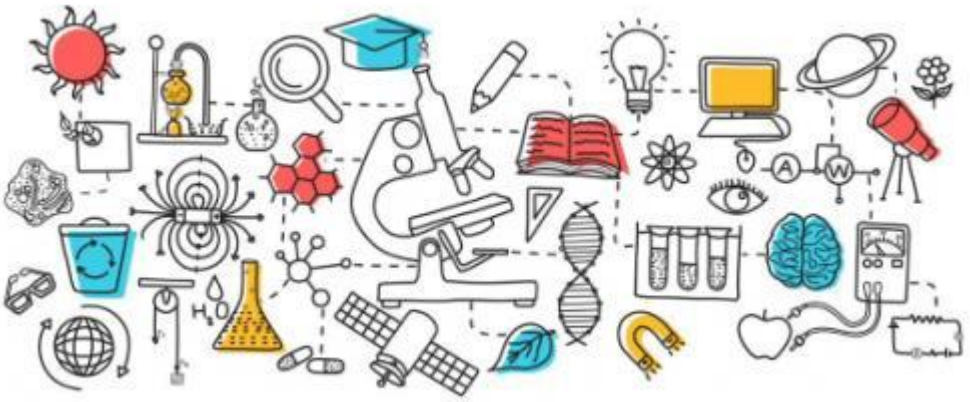
Science Crossword Puzzles:
https://crosswordhobbyist.com/Browse/Science

In your downtime, consider playing some Science games!

PBSkids' Science Games (free) or **Science-themed Games on Steam** (cost varies)

Or - Can you match these words to the right branch of science?

Wikipedia's list of branches of science -> over 650 different sciences!



Science Journal Activity #1:

YOUR NAME
DATE
NAME OF THE DISH BEING COOKED

INTRODUCTION:
WRITE A BRIEF DESCRIPTION OF WHAT DISH IS BEING COOKED AND WHY YOU ARE DOCUMENTING IT.

HYPOTHESIS:
WRITE WHAT YOU EXPECT THE RESULTS OF THE COOKING WILL BE. DO YOU THINK THE DISH WILL BE TASTY? WHY OR WHY NOT?

INGREDIENTS:
WRITE DOWN A LIST OF INGREDIENTS THAT YOU PARENT/GUARDIAN USED TO COOK THE MEAL. FOR EXAMPLE:

- DRIED PASTA
- SALT
- WATER

PROCESS:
CREATE A NUMBERED LIST HERE AND WRITE DOWN EACH STEP THAT YOUR PARENT/GUARDIAN DOES TO COOK THE MEAL. FOR EXAMPLE:

1. BOILED WATER
2. PUT SALT IN THE WATER
3. ADDED PASTA TO THE WATER
4. WAITED 7 MINUTES
5. DRAINED PASTA NOODLES

TOOLS USED:
CREATE A LIST OF EACH TOOL THAT YOUR PARENT/GUARDIAN USED TO COOK THE MEAL. FOR EXAMPLE:

- STOVE
- POT
- COLANDER

RESULTS:
WRITE DOWN THE RESULTS OF THE COOKING HERE. DID THE DISH TASTE GOOD? WHY OR WHY NOT? WAS YOUR HYPOTHESIS CORRECT? WHAT WOULD YOU DO DIFFERENTLY TO MAKE IT BETTER?

Science Journal Activity #2:

YOUR NAME
DATE

QUESTION
WRITE DOWN THE QUESTION THAT YOU HAVE

WHY DO I CARE:
WRITE DOWN WHY YOU WANT TO FIND THE ANSWER TO YOUR QUESTION AND WHAT MADE YOU THINK OF THE QUESTION

ANSWER I FOUND:
USE THE INTERNET TO SEARCH FOR ANSWERS OR ASK AN ADULT WHO MAY KNOW THE ANSWER. WRITE DOWN THE EXACT ANSWER THAT YOU FOUND

ANSWER IN MY OWN WORDS:
TAKE THE ANSWER YOU FOUND AND RE-WRITE IT IN YOUR OWN WORDS

FOLLOW-UP QUESTIONS:
DID FINDING THE ANSWER LEAD YOU TO ASK MORE QUESTIONS? IF YES, WHAT ARE THEY?