



Earthquakes - A STEM lab

What I Will Be Learning In This Mastery Badge:

In this mastery badge we will learn about earthquakes, how they occur, the various types of faults found in the Earth's crust, and earthquake waves.

What This Packet Includes:

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

I. Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

Key Things We Will Learn In This Mastery Badge

Some of the most important things we will learn in this mastery badge:

- What is an earthquake?
- What causes earthquakes?
- Types of faults
- Types of earthquake waves
- Building structures to withstand earthquakes.

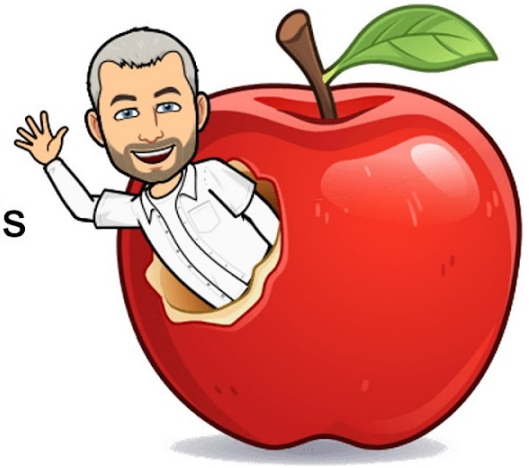
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Discovering Lab

Learning Through Hands On Activities



Activity: Discovering Vibrations Through Solids

Directions: Follow the steps below to discover how waves vibrate solid objects.



Video Instructions Available For This Assignment. Watch this video to learn how to do this assignment, and why it is important.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

Goal: To learn as much as you can about how earthquakes work

Vibrations create waves that travel through solid objects. You have probably experienced this, such as when a large truck drives by your house, or an adult walks down the stairs in your home. In this lab we will be experimenting with how waves move through solid objects.

Experiment 1: Waves Through Metal

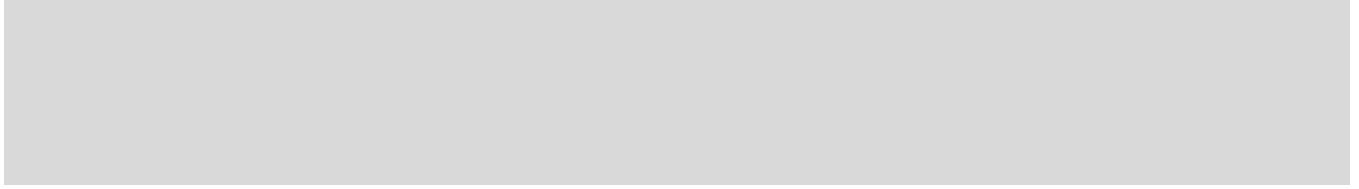
1. Place a metal pot upside down on a table.
2. Place your hands on the sides of the pot.
3. Have someone else tap the top of the pot with a spoon.

Describe what you felt in your hands as the other person tapped the top of the pot.

Experiment 2: Dominoes

1. Using the same pot stack dominoes or similar-sized objects onto the pot.
2. Using a spoon, clank the side of the pot.

Describe what you observed when you tapped the top of the pot. What did your dominoes do?



Explain why you think this occurred.

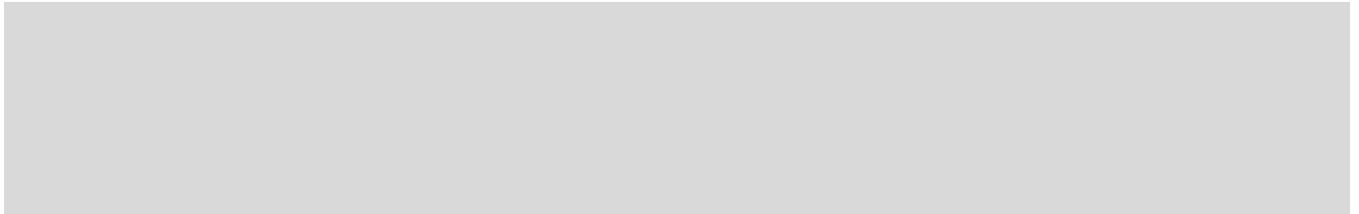


Experiment 3: Detecting Waves

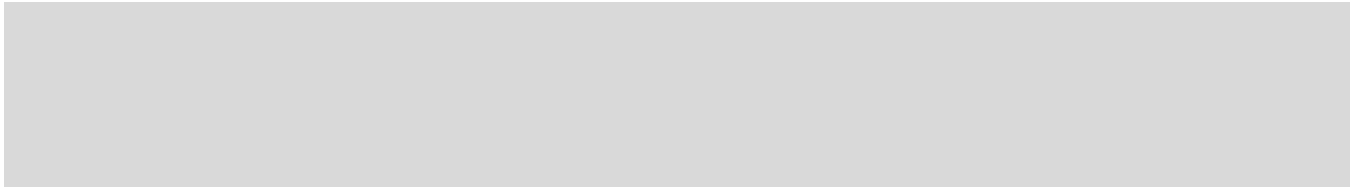
Scientists use sensitive machines called seismographs to detect earthquake waves as they travel through the Earth's crust. These waves can be very difficult to feel with your hands, but seismographs are designed to be able to sense them. We can create our own very rudimentary seismograph using a cup of water.

1. Fill a glass with water, and place it on a table in the middle of the room.
2. Observe the water in the glass.
3. Tap the table and observe what happens to the water.
4. Walk around the room and observe what happens to the water.

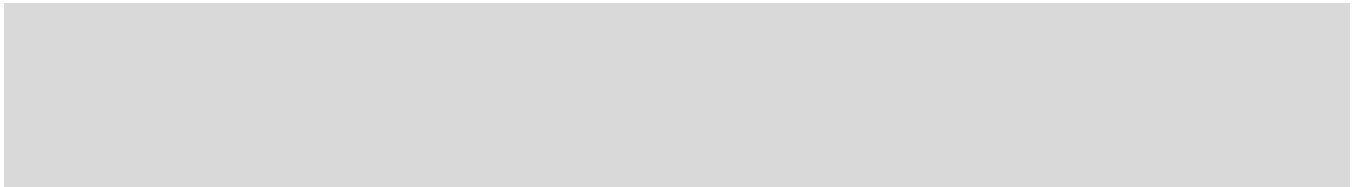
What does the water do when you tap on the table?



What does the water do when you walk around the room?



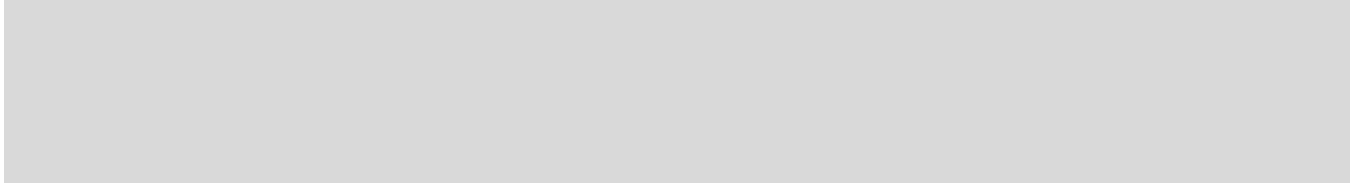
Why does the water move the way it does? What is causing the water to move?



Final Questions:

Answer each of the following questions using complete sentences.

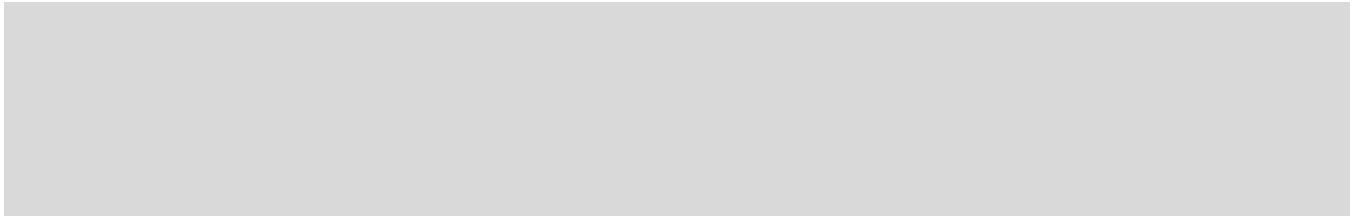
1. In your own words, explain what an earthquake is.



2. Explain what happens when waves move through solid objects.

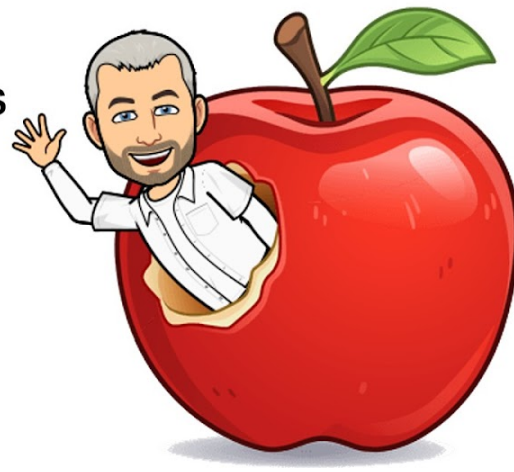


3. What do you think might cause or create waves in the Earth's crust?



Video Instruction

Reviewing The Teacher's Instruction At My Own Pace



Handsome Science Teacher One Take Videos

Now that you have completed the Discovering Lab let's watch the video that goes with it. In this video Mr. Bertoch will help connect the discoveries that you made during the lab to the broader concepts covered under this badge, and will also introduce the vocabulary that goes with these concept.

Take Your Time, Pause And Rewind As needed

You are not in a hurry! It is more important that you understand the concepts in this video than that you finish it quickly. Take your time. If you don't understand something, pause the video and use the Internet or other resources to look up the concept that has you confused.

When you finish this video, you should have a good understanding of the concepts that have been taught. If you find yourself confused, rewind, and rewatch.

The Video For This Mastery Badge Can Be Opened Using This QR Code

This Mastery Badge includes one video:



Watch The Assigned Science Video

Scan This QR Code To Open And Watch The Assigned Video For This Mastery Badge

Check Point

Let's make sure that you really did take your time and watch the video carefully! Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I watched the video carefully, and paused to look up anything I didn't understand.

Recording Your Learning

On the next page, you will record your learning and connect it to things you already know.

Ten Things I Learned From This Video

A powerful tool to help you retain what you learn is to take notes. Notes give you something that you can look back at later, to quickly remind your brain reinforcing the memories for the concepts you have learned. Record ten things that you learned or that you perhaps already knew that were discussed in this video.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

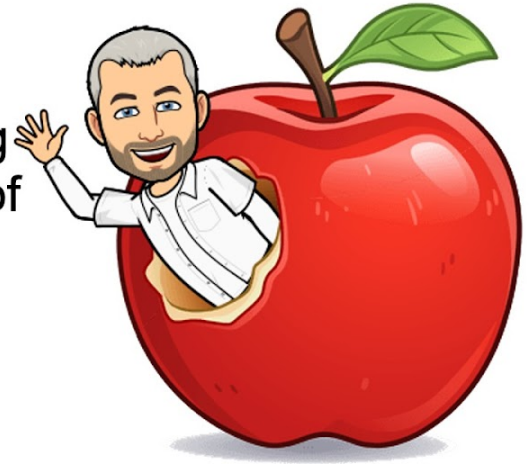
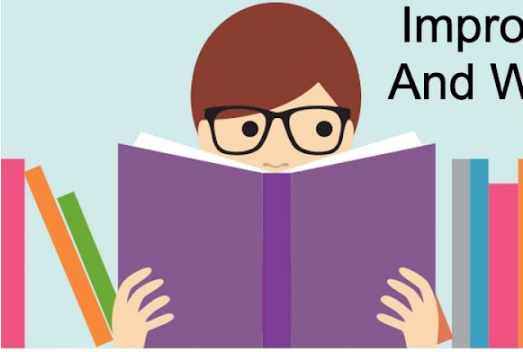
Now, Let's Connect These New Concepts To Things You Already Knew

Another great way to help your brain retain new things is to connect these new concepts to other things that you already know. This gives your mind a place to store the new knowledge. Imagine that you are placing the new knowledge on a shelf in your brain next to facts that are already in there.

Write a paragraph explaining how the concepts taught in this video relate to things you already knew. There are no wrong answers. What are some things that you already knew that this video reminded you of?

Literacy Practice

Improving Our Reading
And Writing In Search of
Knowledge



Activity: Reading And Writing

Directions: Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Video Instructions Available For This Assignment. Watch this video to learn how to do this assignment, and why it is important.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it**.

2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.

Article:



Read The Assigned Article Carefully For Understanding.

<https://handsomescienceteacher.com/Online-science-classes-kids/earthquakes/>

Scan This QR Code To Open And Read The Article That Goes With This Mastery Badge

Check Point

Let's make sure that you really did read for understanding! Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

Quiz Time

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

Now Let's Write To Communicate

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your paragraphs will understand them easily.

Writing Prompt: Write three paragraphs in your own words describing what earthquakes are, and how they occur. Discuss some of the types of waves that are created during an earthquake.

Name: _____

Date: _____



Applying Lab

Proving That We Can Do It Ourselves



Activity: Building An Earthquake Compliant Structure

Directions: Create an earthquake proof structure following the directions below.



Video Instructions Available For This Assignment. Watch this video to learn how to do this assignment, and why it is important.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

Goal: To demonstrate your understanding of how earthquakes affect structures.

Build an earthquake-proof structure:

For this lab, you will need some basic building supplies. You could use things like toothpicks and marshmallows, popsicle sticks and rubber bands, etc. You are not allowed to use glue, or other more permanent solutions.

Goal: Build a tower as tall as you possibly can that can withstand an earthquake.

Using your supplies construct a tower that you think will withstand an earthquake. You want your tower as tall as possible, but that will not fall over during an earthquake.

Test Your Design

After your tower is completed, test it by placing it in the middle of a table, and having someone else shake the table back and forth for 30 seconds.

Improve Your Design

If it fell over or broke, how can you improve your design?

If it did not fall over, can you make it taller?

Test/Redesign

Continue testing and redesigning your structure until you are confident that it is as good as you can possibly make it.

Draw a picture of your original tower design.



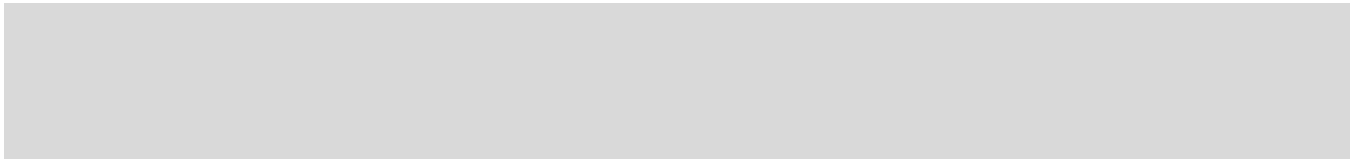
Draw a picture of your final tower design, after going through the engineering process and improving it.



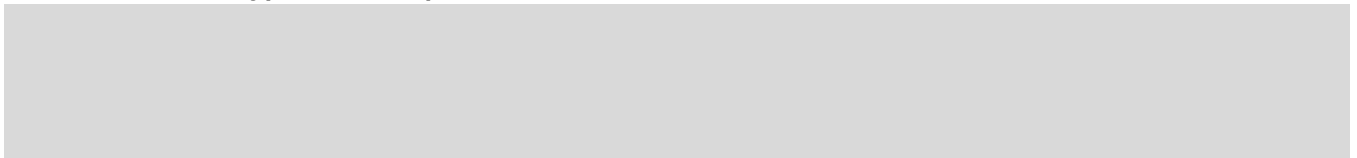
Final Questions:

Answer each question using complete sentences.

1. **What are the main types of waves that travel through the Earth during an earthquake?**



2. **What are the main types of earthquake faults?**





Congratulations! You Have Completed The Entire Mastery Badge

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

Time To Evaluate Your Work

Check each of the following to evaluate your work:

1. Did you do every assignment?
2. Did you read the assigned article?
3. Did you watch the assigned video?
4. Did you answer all the questions using complete sentences?
5. Are your answers accurate?

My Self-Evaluation:

Based on the criteria listed above, I believe I have passed off this Mastery Badge because...
(Be detailed and specific)

Mastery Badge Counselor Evaluation:

I have reviewed this student's work. Based on the criteria listed above I hereby certify that they have passed off the Mastery Badge because... (Be detailed and specific) Note: Any adult may serve as a Mastery Badge Counselor, so long as they are committed to ensuring the highest standards of excellence.

Student's Signature

Date

**Signature of Mastery
Badge Counselor**

Date

Certificate For Your Homeschool Records

The following certificate which has been awarded through self-evaluation by the student, and also certified by a mastery badge counselor proves that the student listed thereon has completed all the work and has mastered all the concepts for the specified topic.

Keep this on file as evidence of your successful completion of this topic.

If audited by the State, these certificates stand as evidence that you have worked on and successfully completed a rigorous science curriculum.



The certificate features a decorative border with a repeating floral pattern. On the left side, there is a circular logo with a cartoon teacher's face and the text "Handsome Science Teacher Industries". The main title "Mastery Badge Certificate" is centered in a large, bold font. Below the title, the topic "Earthquakes" is written in a purple font. A line for the student's name is provided. The central text certifies the student's completion of requirements. At the bottom, there are two lines for the counselor's signature and the date awarded, with a small version of the logo on the right.

Mastery Badge Certificate

Topic: Earthquakes

Student Name: _____

This certificate certifies that the person named above has completed all of the requirements to earn this Mastery Badge.

MASTERY BADGE COUNSELOR SIGNATURE

DATE AWARDED

