

Anatomy of Waves

What I Will Be Learning In This Mastery Badge:

This mastery badge is the first in a series of badges that we will be doing that explore the properties and uses of waves. In this first wave mastery badge our goal is simply to understand the anatomy of a wave, including what a wave is, what causes waves, and what are the basic parts of a wave.

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 are waves?
- How does energy move through substances, or through empty space?
- What is actually moving in a wave?
- Wavelength
- Frequency
- Wave Crest
- Wave Trough

Discovering Lab Learning Through Hands On Activities

Date:

Activity: Discovering Waves

Directions: Using a slinky or rope try to learn as much as you can about how waves work. You are the scientist! You are making your own discoveries!



Name:

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 energy moves from one place to another in the form of waves.

Step 1: What do waves look like?

- Step 1: Get a slinky or a rope, and stretch it out about five feet between you and someone else. Don't stretch it too far or you will break it.
- Step 2: Carefully shake the slinky or rope back and forth to create waves.
- **Step 3:** Experiment with speed and energy. How does changing these factors affect what the waves look like?



Draw a picture of what your waves looked like when you moved the slinky or rope around.

How did changing the amount of force or energy impact your waves? How did changing the speed of your movements impact your waves?

Pretend that you are describing the waves that you created to a friend over the phone. Remember that they cannot see your waves. How would you describe them? Be detailed.

Step 2: How do waves move?

This step is very similar to what we just did. Except that this time we are trying to understand how waves move. Whereas in the last step we were trying to understand what they look like..

- Step 1: Get a slinky or a rope, and stretch it out about five feet between you and someone else. Don't stretch it too far or you will break it.
- **Step 2:** Carefully shake the slinky or rope back and forth to create waves.



• **Step 3:** Experiment with speed and energy. How does changing these factors affect how the waves move?

Draw a diagram showing how waves move from one end of a slinky or rope to the other.

Step 3: How do waves change?

- **Step 1:** Get a slinky, and stretch it out about five feet between you and a partner. Don't stretch it too far or you will break it.
- **Step 2:** Carefully shake it back and forth to create waves.
- Step 3: Observe how the waves move.
- Step 4: Increase the amount of energy applied to the slinky.
- Step 5: Decrease the amount of energy being applied to the slinky.

Draw a diagram showing how waves look when more energy is added to them.

Draw a diagram showing how waves look when **less** energy is added to them.



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 Videos For This Mastery Badge Can Be Opened Using These QR Codes

This Mastery Badge includes two videos:





Scan These QR Codes To Open And Watch The Assigned Videos 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?



Activity: Reading And Writing About Waves

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/all-about-waves/

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 two paragraphs in your own words explaining the parts of a wave.



Activity: Applying Waves To Solve A Problem

Directions: Using what you know about waves, you are going to move a ball from one side of a sheet or blanket to the other. You will then create a model illustrating what you learned.



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 create your own model of a wave

Problem: Get the ball to the other side of the blanket!

Hold a sheet or a blanket between your hands and the hands of another person. When you are both ready, try to get a small ball such as a tennis ball to move from your side of the blanket towards the other person's side without it bouncing more than a few inches high and without it falling off. Have them try to move the ball toward your side.

Set a timer for two minutes. When the timer goes off, the winner is the person who got the ball closest to the other person.

Round 1

Who won? Why did they win?

What kind of waves helped win? (big waves, small waves, fast waves, slow waves, etc)

Round 2

Who won? Why did they win?

What is amplitude? How does increasing energy/amplitude affect who wins?

Round 3

Who won? Why did they win?

What is wavelength? How does wavelength affect who wins?

Model: Draw a diagram showing what happened on each of the three trials (rounds) above. Make sure your diagrams are labeled, showing crest, trough, wavelength, and amplitude.





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 ans 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.

