



Frequency vs Amplitude of A Wave

What I Will Be Learning In This Mastery Badge:

This mastery badge builds on our knowledge and understanding of waves by looking at how energy alters the shape (amplitude) of a wave. By the time you complete this mastery badge you will have a good understanding of how increasing the energy of a wave changes it. We will also explore the difference between amplitude and frequency.

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 does amplitude refer to?
- How does energy affect amplitude?
- What does frequency refer to?
- How does frequency affect a wave?
- Use basic math skills to analyze amplitude

Name: _____

Date: _____



Discovering Lab

Learning Through Hands On Activities



Activity: Discovering Amplitude

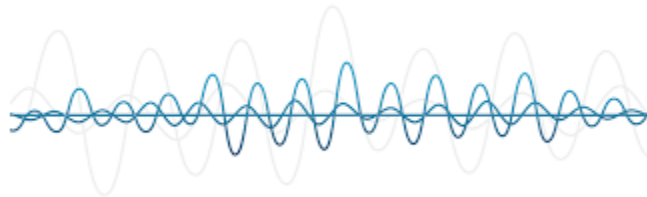
Directions: Follow the steps below, to learn about wave energy.



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 changes in energy impact waves.



A Note About This Lab:

For this lab, you will be making sounds and observing the waves that result. To do this, you will need to download an app that records your voice and then generates sound waves from it. It is impossible for us to recommend such an app without this book becoming dated since new apps are constantly being released. However, there are many good apps available with this functionality.

Part 1: Measuring Quiet Deep Sounds

Question: What do soft (quiet) low-pitch (deep voice) sound waves look like?

To find out, you will need to experiment, by making these sounds with your voice and looking at the waves that result.

Record The Sound Waves Below

Draw a picture of your sound waves below as best as you can. It doesn't have to be perfect, just close.

Use words to describe what low-pitched soft sound waves look like.

Part 2: Measuring Loud Deep Sounds

Question: What do loud, low-pitch (deep voice) sound waves look like?

To find out, you will need to experiment, by making these sounds with your voice and looking at the waves.

Record The Sound Waves Below

Draw a picture of your sound waves below as best as you can. It doesn't have to be perfect, just close.

Use words to describe how these waves look.

How is it different from your last sound wave?

Part 3: Measuring Soft High-Pitched Sounds

Question: What do soft (quiet) high pitch (high voice) sound waves look like?

To find out, you will need to experiment, by making these sounds with your voice and looking at the waves.

Record The Sound Waves Below

Draw a picture of your sound waves below as best as you can. It doesn't have to be perfect, just close.

Use words to describe how these waves look.

How is it different from your last sound wave?

Part 4: Measuring Loud High-Pitched Sounds

Question: What do loud high pitch (high voice) sound waves look like?

To find out, you will need to experiment, by making these sounds with your voice and looking at the waves.

Record The Sound Waves Below

Draw a picture of your sound waves below as best as you can. It doesn't have to be perfect, just close.

Use words to describe how these waves look.

How is it different from your last sound wave?

Final Questions:

Remember to answer your final questions using complete sentences.

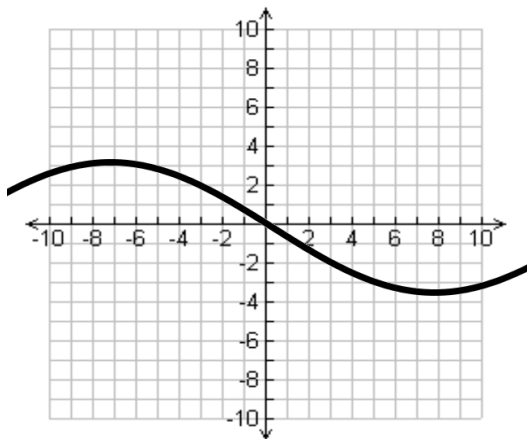
1. What is amplitude?

2. Based on your own observations what had a greater amplitude, quiet sounds or loud sounds?

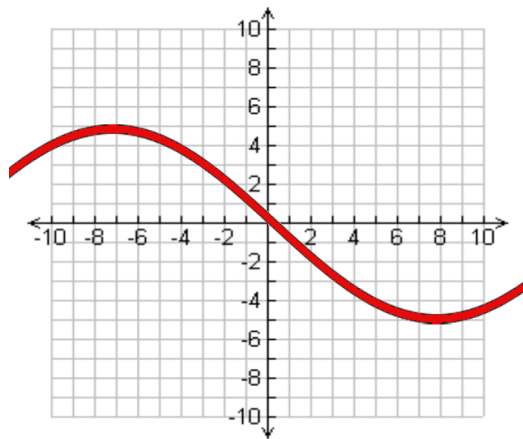
3. Based on your own observations what had a greater amplitude, low-pitched sounds or high-pitched sounds?

Using Math To Solve Amplitude Problems

1. What is the amplitude of this wave?



2. What is the amplitude of this wave?



3. Look at the waves from questions 1 and 2. Which has the highest amplitude?

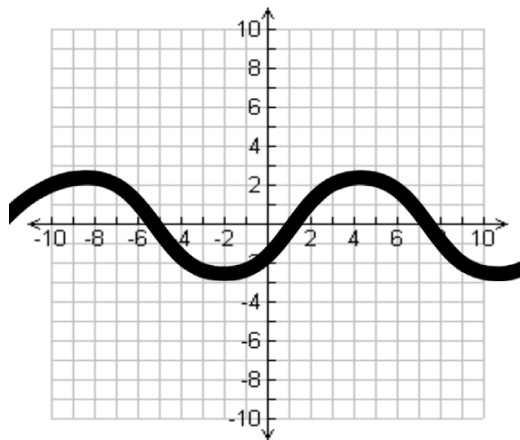
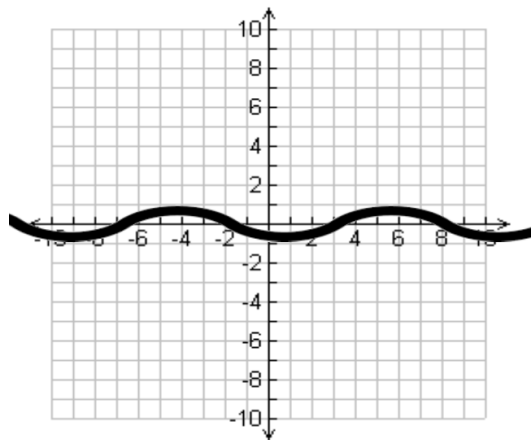
4. Look at the waves from questions 1 and 2. Calculate the difference between the two waves.

5. Look at the waves from questions 1 and 2. Which has the greatest amount of energy?

6. Look at question 2. Where is the crest? Where is the trough?

7. What is the amplitude of this wave?

8. What is the amplitude of this wave?



9. Look at the waves from questions 7 and 8. Which has the highest amplitude?

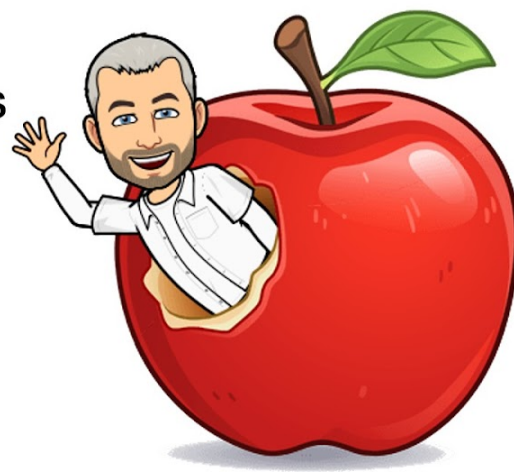
10. Look at the waves from questions 7 and 8. Calculate the difference between the two waves.

11. Look at the waves from questions 7 and 8. Which has the greatest amount of energy?

12. Look at question 8. Where is the crest? Where is the trough?

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.

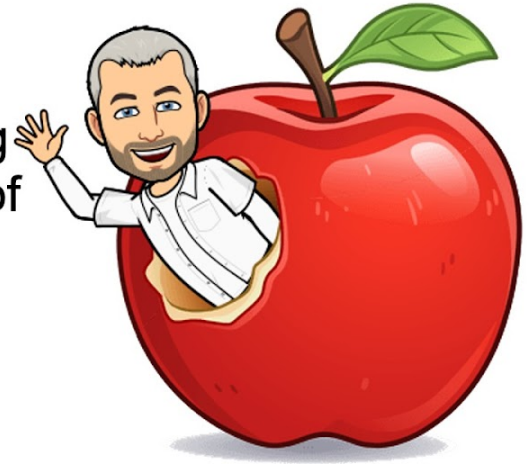
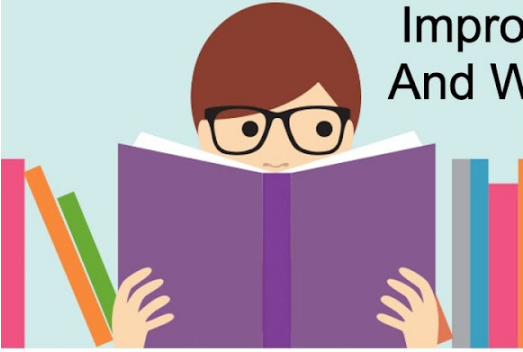
Now, Let's Connect These New Concepts To Things You Already Knew

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 About Amplitude

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/sound-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 what sound waves are and how they work.

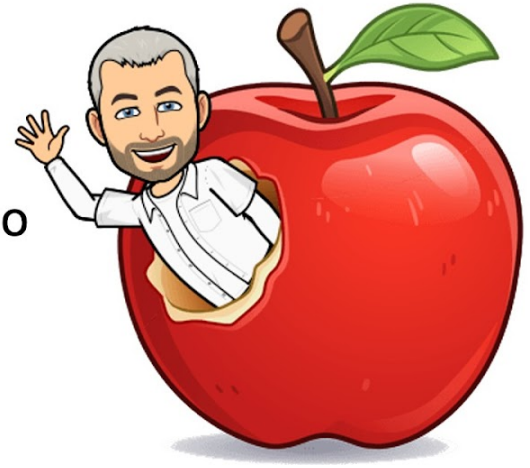
Name: _____

Date: _____



Applying Lab

Proving That We Can Do It Ourselves



Activity: Frequency Vs. Amplitude

Directions: In this lab you will use what you already know to change either the frequency or the amplitude of a sound wave.



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 and alter the frequency and amplitude of a wave.

1. What does frequency refer to? In other words, write a definition for frequency in your own words.

2. How do you think frequency affects sound? In other words, how do you think tones with higher frequencies sound? How do you think tones with lower frequencies sound? You might need to use the app from your discovering lab to figure this out.

- Using either your voice, or an instrument such as a piano or a guitar, create a tone that has a low frequency. Note: It is okay to download a piano app for this lab.

Now create a tone that has a high frequency, **but has the exact same amplitude as the first wave**. Use your sound wave app to track your progress.

- Draw these two waves below.

Low Frequency	High Frequency (Same Amplitude)
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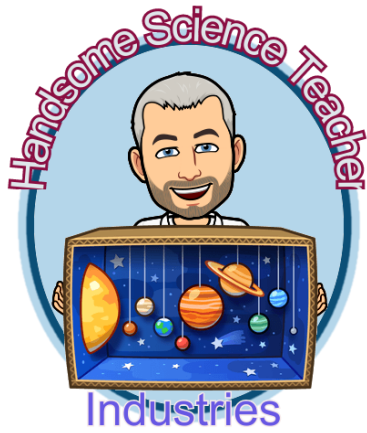
- What does Amplitude refer to? In other words, write a definition for amplitude in your own words.

- How do you think amplitude affects sound? In other words, how do you think tones with higher amplitudes sound? How do you think tones with lower amplitudes sound? You might need to use the Arudinu Science Journal App that we downloaded for the last lab to figure this out.

- Using either your voice, or an instrument such as a piano or a guitar, create a tone that has a low amplitude. Then create a tone that has a high amplitude **but that has the exact same frequency as the first wave**. Draw these two waves below.

Low Amplitude	High Amplitude (Same Frequency)
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- How are amplitude and frequency different from one another? Be detailed.



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.



Handsome Science Teacher Industries

Mastery Badge Certificate

Topic: Frequency & Amplitude

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

