

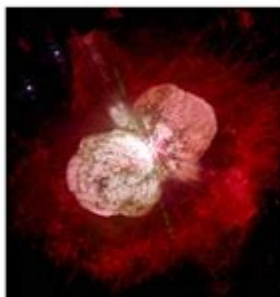
Longitudinal Waves Gizmo Answer Key



Name: Donovan Milsap

Student Exploration: Longitudinal Waves

Vocabulary: antinode, compression, displacement, frequency, interference, longitudinal wave, medium, node, rarefaction, standing wave



Prior Knowledge Question (Do this BEFORE using the Gizmo.)

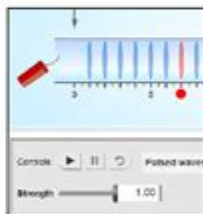
In many science fiction movies, an evil alien spaceship explodes with an enormous KABOOM!!

Suppose you were floating in space at a safe distance from a large explosion such as the supernova at left. Do you think you would hear anything? Explain.

I don't think so, the sound doesn't have anything to vibrate to make the noise in space.

Space because sound waves require a **medium**, such as air, to travel through. Sound waves are examples of **longitudinal waves**, or waves in which particles move back and forth in the same direction as the wave.

You can use the *Longitudinal Waves* Gizmo to explore the behavior of sound waves. In the Gizmo, an air-filled tube contains 24 evenly-spaced, airtight dividers. To begin, select the **Pulsed waves** setting and the **Open tube**. Set the **Strength** to 1.00. Deselect the graph options at lower right.



1. Click **Play** (▶) to set off the firecracker by the left end of the tube. What do you see? The wave moves left and right and then back. Also, it also dips below 0 on the second round and every other one after.
2. Do any individual air molecules travel the length of the tube? I think they do.

How do you know? The airtight dividers didn't block the air molecules from travelling through.

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Longitudinal Waves Gizmo Answer Key: Mastering Wave Properties

Are you struggling to understand longitudinal waves? Feeling frustrated with the complexities of compression and rarefaction? This comprehensive guide provides a detailed walkthrough of the popular Longitudinal Waves Gizmo, offering not just the answers but a deeper understanding of the underlying concepts. We'll unravel the mysteries of wave properties, providing you with the tools to confidently navigate this essential physics topic. This isn't just an answer key; it's your key to mastering longitudinal waves.

Understanding the Longitudinal Waves Gizmo

Before diving into the answers, let's briefly review what the Longitudinal Waves Gizmo is all about. This interactive simulation allows students to explore the properties of longitudinal waves, including wavelength, frequency, amplitude, and speed. By manipulating variables within the Gizmo, you can observe how these properties interact and affect the wave's behavior. Understanding how to interpret the Gizmo's data is key to grasping the concepts of longitudinal wave motion.

Key Concepts: Before You Start

Before we tackle specific Gizmo questions, let's solidify our understanding of fundamental terms:

H2: What are Longitudinal Waves?

Unlike transverse waves (like those on a string), longitudinal waves propagate by compressing and expanding the medium they travel through. Imagine pushing and pulling a slinky – the compression (areas of high density) and rarefaction (areas of low density) represent the wave. Sound waves are a prime example of longitudinal waves.

H2: Key Terms in Longitudinal Wave Analysis:

Wavelength (λ): The distance between two consecutive compressions (or rarefactions).

Frequency (f): The number of wave cycles passing a point per unit time (usually measured in Hertz, Hz).

Amplitude: The maximum displacement of particles from their equilibrium position. In longitudinal waves, this relates to the density difference between compressions and rarefactions.

Speed (v): How fast the wave travels through the medium. The relationship between speed, frequency, and wavelength is given by the equation: $v = f\lambda$

Navigating the Gizmo: A Step-by-Step Approach

The specific questions in the Longitudinal Waves Gizmo can vary depending on the version. However, the core concepts remain consistent. Instead of providing direct answers to specific questions (as those can change), let's focus on problem-solving strategies:

H2: Analyzing Wavelength:

To measure wavelength, identify two consecutive compressions (or rarefactions) on the Gizmo's representation of the wave. Use the measuring tool provided (if available) to determine the distance between these points.

H2: Determining Frequency:

The Gizmo often provides a visual or numerical representation of the frequency. If not directly given, you might need to count the number of wave cycles passing a point within a specific timeframe, and then calculate the frequency.

H2: Understanding Amplitude:

Observe the difference in density between the compressions and rarefactions. A larger difference indicates a higher amplitude. The Gizmo might provide a scale or visual cue to help quantify this.

H2: Calculating Speed:

Once you've determined the frequency and wavelength, use the equation $v = f\lambda$ to calculate the wave speed. Remember to use consistent units.

Interpreting the Gizmo's Results and Drawing Conclusions

The Gizmo allows you to change variables like the medium's properties (e.g., stiffness) and observe the impact on the wave's properties. Analyze how changes in these factors affect wavelength, frequency, and speed. This hands-on experience solidifies your understanding of the relationships between these wave characteristics. Remember to meticulously record your observations and draw conclusions based on your data.

Conclusion

The Longitudinal Waves Gizmo is a powerful tool for understanding complex wave phenomena. By systematically working through the simulations and applying the principles discussed here, you can develop a robust understanding of longitudinal waves, their properties, and their behavior. Remember that the key is not just finding the answers, but understanding the why behind them.

Frequently Asked Questions (FAQs)

Q1: What if my Gizmo version is different? The core principles remain the same. Focus on understanding the concepts of wavelength, frequency, amplitude, and speed, and how they relate to each other.

Q2: Why is understanding longitudinal waves important? They are fundamental to understanding sound, ultrasound, and seismic waves - all crucial in various fields of science and engineering.

Q3: Can I use the Gizmo to simulate different mediums? Yes, many versions allow you to change the medium's properties, providing insights into how the medium influences wave propagation.

Q4: How do I interpret the graphical representation of the wave in the Gizmo? Pay close attention to the compression and rarefaction patterns. The closer the particles are, the higher the density (compression).

Q5: What if I get stuck on a specific question? Review the fundamental concepts, revisit the Gizmo's instructions, and try working through the problem step-by-step. If still stuck, seek help from a teacher or tutor.

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longitudinal waves gizmo answer key: **How Computers Work** Ron White, 2015 Take a trip through the neural pathways and vital organs of your personal computer with the newest edition of this long-standing bestseller. Glorious full color illustrations make even the most complex subjects easy to understand. Follow PC/Computing senior editor and computer expert Ron White as he shows you the cutting edge technologies, including the Internet, multimedia sound and video, Pentium processors, local bus architecture, Plug and Play, CD-ROM, digital cameras, color printing, and more in new chapters on the hottest, and coolest, PC components.

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up the impossible: an explanation of humor that is as thoughtful, fascinating, and entertaining as humor itself. Elisa Albert Author of ,The Book of Dahliaand How This Night is Different Dr. Earleywine's witty insight on this topic will make you funny, happy, and wise. Mitch has that rare ability to clearly explain something that is mysterious as it is magical: the power of laughter. Read this book and laugh while you learn. Brett Siddell Sirius/XM Satellite Radio Personality Dr. Earleywine has written the perfect guide to understanding humor. No one else has the unique combination of witty stage time, outstanding teaching expertise, and impressive scientific background. You'll love this book. Derrick Jackson Winner, Ultimate Laff-Down What makes something funny? How does humor impact health and psychological well-being? How can you incorporate humor into everyday life? A concise, reader-friendly introduction to an important but often underappreciated topic in modern psychology, *Humor 101* explains the role of comedy, jokes, and wit in the sciences and discusses why they are so important to understand. Psychology professor Dr. Mitch Earleywine draws from his personal experiences in stand-up comedy to focus on how humor can regulate emotion, reduce anxiety and defuse tense situations, expose pretensions, build personal relationships, and much more. He irreverently debunks the pseudoscience on the topic of humor and leaves readers not only funnier, but better informed. The Psych 101 Series Short, reader-friendly introductions to cutting-edge topics in psychology. With key concepts, controversial topics, and fascinating accounts of up-to-the-minute research, *The Psych 101 Series* is a valuable resource for all students of psychology and anyone interested in the field.

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Intended as a text for graduate or advanced undergraduate courses in research methods (design) in psychology, communication, sociology, education, public health, and marketing, an introductory undergraduate course on research methods is recommended.

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intelligent enemies, create event systems and GUIs, develop save-game states, and lots more. You'll understand and apply powerful programming concepts such as singleton classes, component based design, resolution independence, delegates, and event driven programming. By the end of the book, you will have a complete first person shooter game up and running with Unity. Plus you'll be equipped with the know-how and techniques needed to deploy your own professional-grade C# games. If you already know a bit of C# and you want to improve your Unity skills, this is just the right book for you.

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