Wave on a string lab answers

Waves Frequency Amplitude Original Sim and Translations Waves Frequency Amplitude Mute Discover the wonderful world of waves! Even observe the vibration of the string in slow motion. Swing the end of the string and make waves or adjust the frequency and amplitude of the oscillator. Example of learning goals Use a common vocabulary to discuss wave characteristics. Predict the behavior of waves through varying intervals and reflective endpoints. Harmonisation of standards Common core - Mathematics HSF-TF. B.5 Select trigonometry functions to model seasonal phenomena with a specific amplitude, frequency, and centerline.* Version 1.1.22 Overview of sim controls, model simplifications, and student thought insights (PDF). Log in to watch video primer Waves on a String (Inquiry Based) Trish Loeble's MSHSUG-Intro HWLabDemoRemoteMC MathematicsPhysics Concept questions physics using PhET (Inquiry Based) Trish Loeble's HSUG-Intro MC Physics Algebra-based Physics Semester one lesson, clicker questions, and schedule pdf (Survey based) Trish Loeblein UG-IntroHS DemoHWLab Physics Wave Unit (survey based) Trish Loeble's HSUG-Intro DemoLab Physics EM wave analogy tutorial Noah Podolefksy UG-Intro Lab Wave Physics demonstrations: water, sound, light (survey based) Trish Loeble's HSUG-Intro DemoCQs Physics Wave clicker questions (survey based) Trish Loeble's UG-IntroHS CQs Physics Speed of a Wave NGSS lined Susie Dykstra HS Lab Physics Waves on a String HTML5 PreAP Lesson Elyse Zimmer HS Lab Physics Sound and Wave Basics Dr. Wendy Adams and the Acoustical Society UG-IntroMSHS HW Physics Alignment of PhET sims with NGSS Trish Loeblein updated Diana López MSHS Other Earth ScienceChemistryBiologyPhysics How do PhET simulations fit into my middle school program? Sarah Borenstein MS Other BiologyChemistryEarth SciencePhysics Guided Discovery (Chinese/English) for freshman university physics: 6. Wave harassment Janet Chen (陳衫豫), Charity Grace White (白愛恩), Jonathon David White (白小明 UG-Intro GuidedLabRemote Physics Guided Discovery (Chinese/English) for freshman university physics: 5. Introduction to Waves Janet Chen (陳衫豫), Charity Grace White (白愛恩), Jonathon David White (白小明) UG-Intro LabGuidedRemote Physics MS and HS TEK sim alignment Elyse Zimmer MSHS Other PhysicsChemistryBiology Wave on a String, No end, pre/in/post-class spreadsheet Solmaz Khodaeifaal MSHS DemoHWGuidedLab Physics Speed Mechanical Wave Ferdinand Bautista MSHS GuidedLab Physics Properties of Virtual Lab Amy Mattes MS LabGuided Physics Guided Discovery for Waves on String Don Loving UG-IntroHSMS HWGuidedLab Physics Mapping PhET and IBDP Physics Jaya Ramchandani HS Other Physics Characteristics Waves - Lab Guide Ryan Aman MS LabGuided Physics Waves on a String and Wave Interference Virtual Jennifer Hamilton MSHS HWLabGuided Physics Waves on a string string Mcclurg UG-IntroHS Lab Fysiikka Toiminta: Aalto narulla Aaron Keller UG-IntroMSHS GuidedDiscussLab PhysicsAstronomyChemistry Speed of Wave Investigation David Garza HSMS Lab Physics Wave Properties and Interactions Lab Manual Fatih Gozuacik HSMS LabGuided Physics Waves on a String AP1 Sarah Cunningham HS GuidedLab Physics Energy waves digitaalinen laboratorio Martin Hofkamp HSMS LABHW Fysiikka PHET Digtial Wave Lab Martin Hofkamp HSMSK-5 LabHW Physics Standing Waves Lab Kristin Mandsager HS Lab Fysiikka Aalto häirintä Shawna Carter MSHS LabGuided Fysiikka Aallot jousi Charlotte Daniell HS HWLab Physics Lab- Aalto Simulaatio Kyle Bracchi MS LabGuided Physics Wave Investigation Chuck Faber MS Lab Physics Experiment määrittää aallonpituus, taajuus ja nopeus Mark Wilson MS Lab Physics Wave Basics keskikoululaisille Megan Elmore MS Guided Physics Waves merkkijonolla Kim Diate ja Jovelyn Ysa-al HS HWLab Physics Types of Waves ja sen osat Arnold Centural Jr. ja Mark Anduyan UG-IntroHS GuidedDiscuss Physics Serie de Labs virtuales de Ondas Trish Loeblein (traducción de Diana López) HSUG-Intro GuidedDiscussRemoteLabHW Physics SECUNDARIA : Alineación PhET con programas de la SEP México (2011 y 2017) Diana López HSMS Other BiologyMathematicsChemistryPhysics PREPARATORIA: Alineación de PhET con programas de la DGB México (2017) Diana López HSUG-Intro Other ChemistryMathematicsPhysics PRIMARIA: Alineación con programas de la SEP México (2011 y 2017) Diana López MSK-5 HWDiscussLabDemoGuided AstronomyMathematicsPhysicsChemistry Preguntas de razonamiento para todas las simulaciones HTML5 Diana López MSUG-AdvK-5GradUG-IntroHS HWDiscuss MathematicsPhysicsChemistryAstronomy 大一物理引導式自我發現 (中文/英文): 干涉和衍射 Janet Chen (陳衫豫), Charity Grace White (白愛恩), Jonathon David White (白小明 UG-Intro LabGuidedRemote Physics 大一物理引導式自我發現 (中文/英文): 波浪介紹 Janet Chen (陳衫豫), Charity Grace White (白愛恩), Jonathon David White (白小明) UG-Intro LabRemoteGuided Physics Brzina vala Karmen Prugovečki MS Guided Physics Stehende Wellen mit der Simulation Seilwelle erforschen Vroni Retzer HS Guided Physics Percobaan gelombang pada tali khairul jalil HSMS LabGuided Physics Siimulação PhET_Guia de Exploração_Onda numa corda Teresinha Patrício MS GuidedMC Physics Atividade : Vales, Cristas e Ciclos Lisboa Coutinho MSHSUG-Intro Ohjattu fysiikka Velocidade do Pulso de Onda no Wave on a String (HTML5) Artur Araújo Cavalcante e Gilvandenys Leite Sales HSMSMuuHWOhded PhysicsMathematicsMuuEarth Science Ondas Mecânicas (em corda) ei Wave on a String (HTML5) Artur Araújo Cavalcante e Gilvandenys Leite Sales OtherHSMS OtherGuidedHW Earth ScienceMathematicsOtherPhysics Hoja de predicciones Heriberto Cota V. UG-Intro EtäfysiikkaToin laboratorio de ondas Manuel Trujillo Yaipen HSMSUG-IntroToi other chemistryTotherAstronomyEarth Science UNIDAD 1 S3 L1 MOVIMIENTO ONDULATORIO (ONDAS MECÁNICAS) FRANCISCO CRUZ CANTU HS LabHWGuided Physics Guia katherine vergara MS Physics Guided Browse old activities. Share the activity! HTML5 Sims can use iPads and Chromebooks, as well as PC, Mac, and Linux systems. iPad: iOS 12+ SafariiPad Compatible Sims Android: Not Officially Supported. If you use HTML5 Sims on Android, we recommend using the latest version of Google Chrome. Chromebook: The latest version of Google Chrome HTML5 and Flash PhET Sims is supported on all Chromebooks.Chromebook-compatible sim-sim sim systems Windows Systems: Microsoft Edge, the latest version of Firefox, the latest version of Google Chrome. Macintosh Systems:macOS 10.13+, Safari 13+, the latest version of Chrome. Linux systems: Not officially supported. Contact your phethelp@colorado.edu troubleshooting issues. Back to the top • Measuring the speed of a transverse wave travelling in Slinky • Confirming the relationship between frequency and antinodes in a standing wave • Testing the transverse wave frequency/tension relationship in a large Slinky string, stopwatch, 30 m measuring tape, spring scale, PASCO vibrator powered by variable frequency function generator, string with known linear density of a set of masses 50 g to 1000 g, 50 g weight hanger, pulley, instrument pin Waves are one of the most important concepts of physics. They are waves with springs, sound in the air and solids, light, radio waves, microwaves, X-rays and substance waves. Material waves are the basis of advanced field theory called quantum mechanics. All these waves have a lot in common. Stretched string is a very visual indication of wave phenomena in general. In this laboratory, we are going to study how waves travel with strings similar to those used in many stringed instruments, such as violin, guitar and piano. Unlike longitudinal sound waves, string waves are transverse waves. This means that the wave's displacement is perpendicular to its direction of progression. The transverse wave speed in the string is (1) v = where T is the tension of the string measured in newtons (N), ρ is the linear density or mass of the string per unit length: ρ = measured in kg/m. It turns out that there is some such equation in the speeds of all elastic waves: (2) v = stiffness linear density. We can have two kinds of waves: travel waves and standing waves. A standing wave develops when we have two waves with the same frequency that go in opposite directions. String waves can be any mathematical format. In many cases, the waves get excited about the simple harmonic oscillator, which takes shape These waves multiply in the medium having the same frequency, frequency, oscillator, and they multiply in sine waves. They can be described in mathematical form (4) y = y0 sin2πft ± , where λ is the wavelength, and the – symbol refers to waves that travel in the direction of +x (right) and the + symbol refers to waves that travel in the direction –x (left). These waves increase at speed By combining equation 1v = and equation 5 we can describe the wavelength is (6) λ = , and since in this exercise the wavelength is (7) λ = . If we study, the waves are reflected back and forth with the end of the string, which leads to standing waves forming with a pattern shown in Figure 3. Places where the amplitude of the tin is zero are called a knot. Amplitude sites are at most antinedides (Fig. 3). The distance between the nodes is half the wavelength level. If the distance between the end-support of the string is L, a standing wavelength is only possible when the wavelength λ meets the following ratio: (8) L = n, where n = 1, 2, 3, 4, ... and equals the number of antinodins. Watch the video below before the lab starts. Print the worksheet for this lab. Answer all questions in the lab spreadsheet before sending Inlab in WebAssign. Checkpoint: Make sure TA signs the lab spreadsheet, printed Inlab, and all printable charts after each section is completed. Make sure the data is displayed in the charts. Part 1: Travelling on the waves with Slinky Caution: Handle Slinky very carefully to prevent Slinky from permanently damaging or distorting. Pulse 1 1 Store the mass of Slinky given on the attached label in Part 1 of Inlab. 2 Slinky acts like a spring for the spread of transverse waves. Two lab partners should stretch Slinky to about 20 feet in the hallway. The squares of the sing-on are 1 ft2. Slinky gets to rest on the floor for much of his height. 3 One partner should initiate a transverse pulse that runs down Slinky, while the other partner measures the time it takes to reach the opposite end of the pulse. To get the hang of this, you need to do several experiments. Estimate the time of travel from three good runs. Record it in Table 1 of inlab. You need to find uncertainty in time using ga. 4's Statistics function Use the given string scale to measure Slinky's tension (in Newtons). Pulse 2 5 Repeat steps 2 to 4 for Slinky stretched to about 10 meters. Record time and uncertainty in Inlab. 6 You must calculate Slinky's experimental speed and its uncertainty. (Hint: where L is the length of the stretched Slinky and the tmean represents the time association of the trip.) Calculation of theoretical speed by means of an equation = . Since Slinky behaves like a perfect spring, the time to spread the wave down Slinky is the same in great action, regardless of length. Another thing you should notice from this experiment is that the reflected pulse is reversed in terms of event pulse. This is because the endpoint is fixed and therefore cannot move. You need to mention these features in your conversation. Part 2: Standing waves on a string The laboratory device consists of a string that is attached to one end and attached to the weight hanger on the pulley at the other end as shown in Figure 4. The string is controlled by a wave controller that excites the string in a direction perpendicular to the string. The Wave Controller is like a loudspeaker without a sound-emitting cone. The Aalto controller is connected to the function generator/power amplifier. The function generator can put out the sine wave with varying frequency and variable amplitude. Figure 4 L shows the distance between the top of the pulley and the wave controller. Both points are knots. Constant 1 Measure the length between the string end support. Record it in the inlab. 2 Place the mass of 200 g in the weight holder and tune in the function generator to find the resonance mode of one of the antins (a standing wave with the largest amplitude). 3 Calculate string tension. The weight holder has a mass of 50 g. (Tip: See force diagram figure 4.) Be sure to bring the weight clip mass. 4 Start the signal generator. Find resonance frequency n = 1. Then record the resonance frequency n = 1. 5 Now tune the function generator to a higher frequency level and find the resonant frequencies up to n = 4. 6 You need to calculate the wavelength for each case to check if it remains constant. 7 In GA, create two manual columns with frequency and antinode count. Draw a diagram of the frequency f vs. number of antinodes n. Use Linear Fit for the chart. Calculate the experimental wavelength of the slope of the regression line with equations 8L = n and 5. Calculate wave speed uncertainty based on slope uncertainty. The theoretical values of the wavelength shall be calculated on the basis of equation 1v = Compare the experimental and theoretical values of a string wavelength by finding a percentage difference. 8 Download the file with your charts. Take a screenshot and save the charts as a file with a maximum size of 1 1 B. Print TA's charts to sign and reference. Part 3: Standard wavelength Now you are making a series of measurements n = 1, which varies the tension of the string. 1 Measure the length between the string end support in case it changes. Record it in the inlab. 2 Place a mass of 100 g in the weight holder. Find resonance frequency n = 1. Masses between 100 and 1000 g (including weight holder), vary the tension of the string. For each new thrill value, find the resonance frequency n = 1. 3 Create two new manual columns in GA. Create two calculated columns: Tension and Square Root (also known as Sqrt(Tension)). Draw frequency chart vs. Sqrt(Tension). Apply a linear fit and store the slope and its uncertainty in Inlab. 4 Calculate the expected theoretical value of the slope, which may be calculated from equation 5 and equation 6λ = ,. Compare it to the slope of the regression line by calculating the percentage difference. 5 Predict which string tension is at the given frequency. The frequency is given in Inlab. You can predict the experimental value of the slope of the square root of the frequency and stress chart. Save the predicted value to Inlab. View calculations of how the value was obtained on the worksheet. Adapted from PASCO scientific pasco.com. pasco.com.