

Perfect Pitches

with a Rubber Band Guitar

Student quiz — *Answer key*

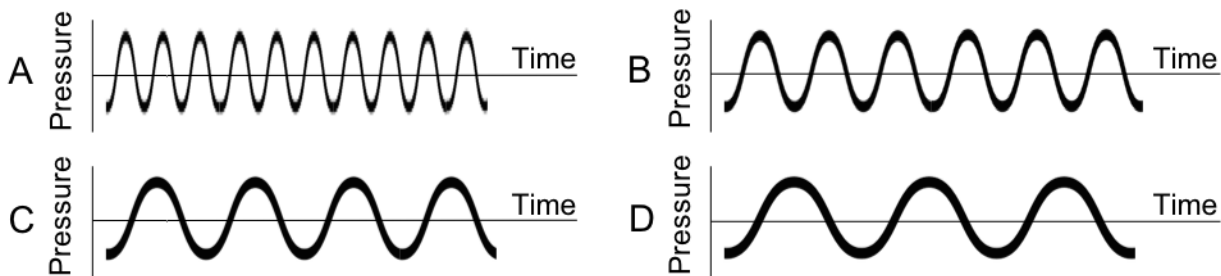
Word Bank (when appropriate, use these words in your short answers):

Amplitude	Longitudinal wave	Sound volume	Vibrations
Frequency	Pitch	Sound wave	
Hertz	Sound intensity	Transverse wave	

1. Explain in your own words how a guitar string makes a sound that we can hear. You can draw a picture if it helps with your explanation. Where relevant, use the terms from the Word Bank above.

When you pluck the guitar string, vibrations are created in form of transverse waves. The vibrations of the guitar string cause air particles next to the string to vibrate, which causes a longitudinal pressure wave (sound wave). This sound wave travels from the guitar string to our ears, where the sound waves are translated into a sound that we hear.

2. The figure below shows a representation of four different sound waves. Which of these sound waves generates the sound with the highest pitch?

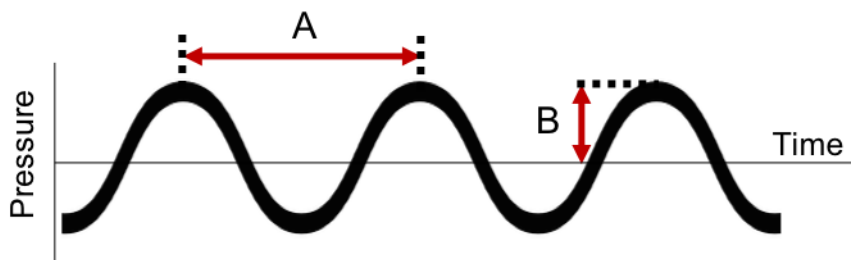


- a. Sound wave A
- b. Sound wave B
- c. Sound wave C
- d. Sound wave D

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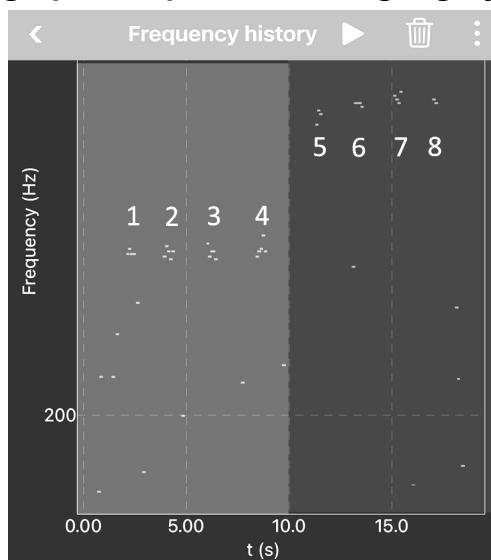
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3. Every wave can have different properties. Which wave characteristics are represented by A and B in the diagram shown below?



"A" represents the period of the wave. "B" represents the amplitude of the wave.

4. The graph below shows data recorded with the phyphox app during a rubber band guitar experiment in which a guitar string was plucked 8 times in total (see numbers in graph). What did the experimenter do to increase the pitch of the sound in the dark grey section of the graph compared to the light grey section?



- a. The experimenter plucked the rubber band harder
- b. The experimenter decreased the space between the two markers
- c. The experimenter plucked the rubber band less hard
- d. The experimenter increased the space between the two markers

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Student quiz — *Answer key*

5. Alex plucks a guitar string to generate a musical note. What can Alex do to produce a sound wave with a higher amplitude for the next note? What effect does a higher amplitude have on the sound the string makes? Explain in your own words below, using relevant terms from the Word Bank on the first page.

Alex needs to pluck the guitar string harder, which increases the amplitude of the guitar string vibration. When the amplitude of a sound wave is increased, the sound the string makes becomes louder.

Optional: The amplitude of the vibration increases because Alex puts more energy into the guitar string as the amplitude of a wave and its energy are directly related.