Probing Sound Waves

Summary

Students are asked to determine what they must do to sound waves to change wavelength and amplitude.

Time Frame

1 class periods of 60 minutes each

Group Size

Small Groups

Materials

handheld technology (graphing calculator, CBL and microphone probe) In Jordan School District, the microphone probes can be borrowed by contacting Barbara Gentry) optional sound makers: tuning forks, musical instrument (students may bring their own)

Background for Teachers

This inquiry activity uses the power of handheld technology (graphing calculator, CBL and probe) to measure wavelength and amplitude. Students are asked to determine what they must do to sound waves to change wavelength and amplitude. The amount of energy needed to make the changes will the emphasized.

It is very important that students understand that they will have a very short amount of time that the sound waves are measured. The default time for the probes is .02 sec so the sound should not try to be "caught". Have the students make their sound, then hit start. If the results are odd, chances are that the frequency tested did not meet the resolution or size of the graph possible on the calculators. Have students try several times to see what sounds work best before they begin. Their results should clearly show that increasing the pitch or frequency shortens the wavelength and increasing the loudness increases the amplitude of sound waves. Students should also be asked to determine that waves with the most energy are short and have larger amplitude.

Instructional Procedures

Draw the wave pictured above and discuss its two parts. DO NOT TELL STUDENTS HOW THE WAVE COULD BE ALTERED BY CHANGING LOUDNESS OR PITCH.

Write three questions on the board for students to copy.

How can you make the amplitude change? (draw the waves you produce)

How can you make the wavelength change? (draw the waves you produce)

Which waves have the most energy or take the most energy to produce?

Show students the handheld and discuss their use. Tell them that the arrow keys can be used to trace the line and find coordinates for each point on the line.

Have students get the handhelds and try a practice wave or two before they begin. Remind them to make the sound before pushing "start".

Give students 15-20 minutes to work.

Have each student group share what they did and describe what they think changes the length of a wavelength and it's amplitude. They should describe which waves took the most energy to produce.

Students often miss the amplitude part. Since the graph rescales each time it is difficult to tell a loud wave from a quiet one unless they trace the line and see that it really is a higher number

when they make a louder sound.

Bibliography

Lesson Design by Jordan School District Teachers and Staff.

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