Sound is Energy in Motion

Sound is energy in motion, wave motion. The energy is passed on from one piece of matter to another.
This demonstration can be done to show that energy transfer can have different speeds. It can also be done, without the measuring, to show energy transfer.

Purpose: This investigation will determine whether the speed of sound is affected as it travels through a solid, liquid, or gas.

(In this experiment, think of the dominoes as molecules that make up a solid, liquid, or gas. Sound travels in waves or moving molecules.)

Materials

- box of dominoes
- smooth surface
- ruler or yardstick
- stopwatch or a watch with a second hand

Procedure

1. Line up dominoes approximately 2 cm apart, stretched out over a 100-cm length.
2. Measure the time it takes for all the dominoes to fall. Be sure to start the timer just as you knock over the first and stop it just as the last domino hits the surface.
3. Record the amount of time it took for all the dominoes to fall.
4. Line up the dominoes again, this time 4 cm apart, stretched over a 100-cm length.
5. Predict the amount of time it will take the dominoes to fall and record your prediction.
6. Measure the time it takes for all the dominoes to fall. Be sure to start the timer just as you knock over the first and stop it just as the last domino hits the surface.
7. Record the amount of time it took for all dominoes to fall. How close was your prediction to the actual time?
8. Set up both lines of dominoes so that they each stretch to 100 cm, but one line should be placed 2 cm apart and the other line 4 cm apart. Lines should be parallel to each other.

9. Knock the first domino of each line over at the same time. What do you notice?
10. Answer the following questions:
    1. Which dominoes traveled faster, the ones 2 cm or the ones 4 cm apart?
    2. Think of dominoes as molecules. Which line of dominoes (molecules) represented a solid (2 cm or 4 cm)? Which line represented a liquid (2 cm or 4 cm)? Think about the three states of matter: How do the molecules behave in a solid, liquid, and gas?
    3. How would you explain the results of your findings to someone else by using these words: chain reaction, wave, solid, liquid, and traveling
    4. How far apart would you place the dominoes if you wanted to investigate a wave moving through gas (like air)? (Base this decision on the two measurements already given.)
    5. Predict the amount of time (another hypothesis!) it would take for the dominoes representing gas to fall through a 100-cm line.

What's Happening?

Matter consists of tiny particles called molecules, and these molecules are always moving around and bumping into each other. They react as the dominoes did when the first one fell into the second. Sound energy in the form of vibration is transferred from one molecule to another. Energy is transferred from one domino to another as they fall to the table. In the first activity, the dominoes are placed closer together, and the sound travels faster through the particles, much as in a solid (molecules are close together). In the second activity, the dominoes are placed farther apart and the sound travels slower through the particles, much as they do in a liquid (molecules are farther apart than in a solid)

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