

Name: _____ Date: _____

Density and Pitch Worksheet Answers

Design problem: Create a xylophone using liquids and beakers.

Write down an investigation question that could give you some helpful background information for the above design problem:

Example answer:

“How does the type of liquid in the beaker affect the sound (pitch) that the beaker makes when I strike it?”

Materials

- 4 – 250 ml beakers of the same size
- 50 ml of water
- 50 ml of maple syrup
- 50 ml of ketchup
- 50 ml of vegetable oil
- Glass stirrer or pen/pencil

Instructions

1. Make sure you have 50 ml each of four different substances in separate identical beakers.
2. Use a glass stirrer to tap the lower side of the beaker containing water; listen to the pitch it produces.
3. Tap (at the same height as the previous beaker) the beaker containing syrup; listen to the pitch it produces.
4. Compare the two pitches by repeating steps 2 and 3, as needed, to determine if there is a difference.
5. Record your data.
6. Use a glass stirrer to tap the lower side of the beaker containing oil; listen to the pitch it produces.
7. Compare the sounds of the oil, water and syrup beakers; put the three beakers in order from highest to lowest pitch.
8. Record your data.
9. Tap (at the same height as the previous beakers) the beaker containing ketchup; listen to the pitch it produces.
10. Compare the pitch of the ketchup beaker with the pitches produced from the beakers of other liquids.
11. Record the data
12. Place the four liquids in order from highest to lowest pitch. Record the order under Observations, on the next page of this worksheet.



Before you go on, have the teacher check your results.

13. Pour all of the liquids into the large beaker, in any order, and allow substances to settle.
14. Record your observations.
15. After the liquids have mostly settled, draw and label your observations in the density graph below.

Observations

Order the substances by pitch:

Highest Pitch

1. vegetable oil

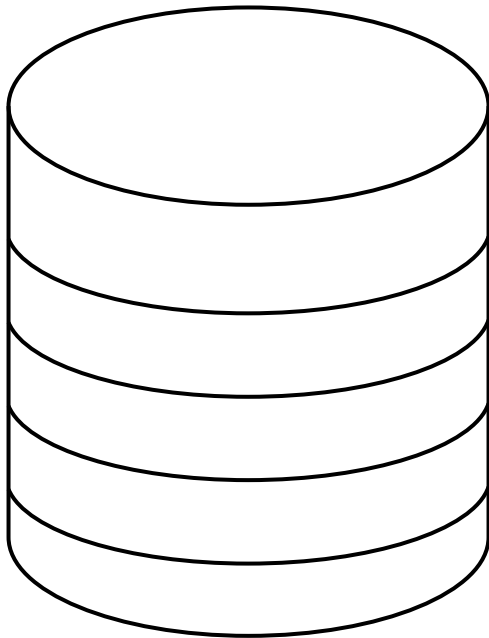
2. water

3. maple syrup

Lowest Pitch

4. ketchup

Density Graph



vegetable oil (least dense on top)

water

maple syrup

ketchup (most dense on bottom)

Analysis

Compare the order of the pitches produced and the order of the densities of the substances. What is the general relationship between the pitch and density? Explain your reasoning.

Example answer:

“The relationship between pitch and density is that the higher the density, the lower the pitch.”

This is a general relationship that does not apply to every substance in the world, but generally applies. Thus, vegetable oil provides the highest pitch and ketchup provides the lowest pitch.

Design Problem Revisited

What have you learned from this investigation that can be applied to designing your own liquid xylophone?

Example answer:

“To design my own liquid xylophone, I would research and experiment with liquids of various densities, to find the right series of sounds/pitches from which to provide the range of musical notes to make an instrument.”
