name_____ per_____

62 Quantifying Energy - Lab Analysis

Objective - to understand how variables affect the transfer of thermal energy in water and air.

Transfer the data from yesterday's lab.

Water temp. before ice (°C)	Water temp. after ice melts (°C)	Change in temp. (°C)	Energy released (calories)

WORD BANK

energy transfer	conduction
variable(s)	thermal energy
control variable	volume
molecules	calorie

1. Fill in the blanks with the correct answers. Use the words from the word bank.

1. The ice cube melts because _____ _____ is transferred to it.
2. The water molecules touch each other and transfer energy. This is called _____.
3. Water temperature and volume are examples of _____ in this experiment.
4. 100 milliliters (mL) is the _____ of water used in the experiment.

2. Conduction Demonstration

1. The water is cooling down without adding any ice. Thermal energy is being transferred from the water.
   1. Where is the energy transfer taking place? Where is the energy going?
   2. The temperature of the water is affecting transfer of energy. What other variable is affecting the transfer of energy?
   3. One beaker has 300 mL of water and the other has 500mL. If they are both the same temperature, which one has more thermal energy?
   4. How can we test the idea in #3?

3. **Conduction Experiment**
   1. Procedure - please work in your lab groups: one experiment per table
      1. **Mr. Wadnizak will fill one beaker with 200 mL of hot water and fill another with 400 mL of hot water.**
      2. **Take the temperature of both. Record the data below.**
      3. **Add an ice cube to each of the beakers. Stir until they are melted.**
      4. **While they are melting, predict which beaker will have a greater temperature change.**

      I think the beaker with _____ mL of water will have a greater temperature change because

      5. **Take the temperature right after you notice they are melted. Record the data below.**
      6. **Find the change in temperature of each.**
      7. **Work together to answer the questions.**

Volume of water	Water temp. before ice (°C)	Water temp. after ice melts (°C)	Change in temp. (°C)
200 mL			
400mL			

   2. Which volume of water had a greater temperature change? Was your prediction correct?

   3. Which variable are we changing?

   4. Which variable are we measuring?

   5. Both volumes of water started out at about the same temperature. Which amount (volume) do you think had more thermal energy at the beginning? What is the evidence for this? Explain.

I think the __larger / smaller__ volume of water has more energy because

Analysis Questions

Please answer the questions in as much detail as possible. Use all of your knowledge and data from all of the experiments including yesterday's lab. ***Use data where you can and use your words from the work bank.*** *Read through the rubric before you begin.*

1. Do you think all of the thermal energy lost by the hot water was transferred to the ice? Explain

2. Does volume affect temperature change, energy transfer or both? Please explain your answer.

Conservation of Energy and Energy Transfer - variables for temperature change

Highly Proficient	Proficient	Close to Proficient	Developing
☐ All energy in the system can be accounted for. ☐ The effect of volume change on thermal energy is correctly explained	☐ Energy transfer is used to explain the change in temperature. ☐ Volume and amount of thermal energy is understood ☐ Data is used as evidence.	☐ Energy transfer is not explained or contains errors. ☐ Relationship of thermal energy and volume is misunderstood. ☐ Data use is attempted	☐ Little to no knowledge of energy transfer is shown ☐ not attempted