



Heat and temperature are *not* the same.

This lab should help you understand the difference between heat and temperature.

Temperature is a measure of the vibrational energy of an average molecule. It is measured with a thermometer. The most commonly used units of temperature are °Celsius or °Fahrenheit, although °Kelvin (absolute) are also useful.

Heat is a quantity of energy. It depends upon both mass and temperature. Heat is commonly measured in calories. A calorie is the heat needed to raise the temperature of 1 gram of water by 1°C.

$$\text{Heat (calories)} = \text{Mass (grams)} \times \text{Temperature (}^{\circ}\text{C)} \times \text{Specific Heat}$$

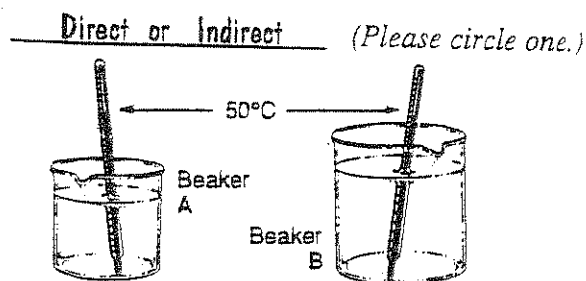
Materials: 2 Beakers (250 mL) Lab Burner Ring Stand
 Celsius Thermometer Wire Gauss Clock or Timer
 Safety Goggles Beaker Tongs

- Pour 50 mL of cool tap water into one beaker, and 200 mL into the second. Rest a thermometer in each beaker.
- Record the initial (starting) metric temperatures of both beakers below. (They should be equal.)
- Heat the first beaker for exactly 1 minute.
 Don't turn off or adjust the heat while you record the final temperature of the first beaker.
- Heat the second beaker 1 minute at the same heat level and record the data below.

	Mass of Water	Heating Time	Starting Temp.	Final Temp.	Temperature Change	Ratio
Data Table						

- Which beaker of water had the greater temperature change? _____
- Which one had the greatest mass of water? _____
- Which one had the most heat energy added by the flame? _____
Be careful in answering question C! The amount of heat added depended upon how long the beakers were heated. Since both were heated exactly one minute, both breakers received the same amount of heat energy. Does this agree with your answer to question C?

- What is the relationship between the mass of an object being heated and its change in temperature? _____
- In the diagram to the right, which of the two containers has the higher temperature? _____
- In the diagram to the right, which of the two containers has more heat energy? _____
- Why does B have more heat energy? _____



- The units of heat energy are _____ and the units of temperature are _____
- Make a list of the ideas you learned in doing this lab procedure. Number them 1, 2, 3,.... (One list per person.)

TEMPERATURE AND ITS MEASUREMENT

Name _____

Temperature (which measures average kinetic energy of the molecules) can be measured using three common scales: Celsius, Kelvin and Fahrenheit. We use the following formulas to convert from one scale to another. Celsius is the scale most desirable for laboratory work. Kelvin represents the absolute scale. Fahrenheit is the old English scale which is never used in lab.

$^{\circ}\text{C} = \text{K} - 273$	$\text{K} = ^{\circ}\text{C} + 273$
$^{\circ}\text{F} = \frac{9}{5}^{\circ}\text{C} + 32$	$^{\circ}\text{C} = \frac{5}{9}(\text{F} - 32)$

NOT ON TESTS

Complete the following chart. All measurements are good to 1° C or better.

	°C	K	°F
1	0° C		
2			212° F
3		450 K	
4			98.6° F
5	-273° C		
6		294 K	
7			77° F
8		225 K	
9	-40° C		