

Temperature and Kinetic Energy Web Quest

6th Grade PSI Science

Classwork

Name _____

Part I- Review how the molecules for a solid, liquid and gas differ at a constant temperature.

1. Follow this link:

<http://www.middleschoolchemistry.com/multimedia/chapter1/lesson5> . Scroll down and click on the “Comparing Solids, Liquids and Gases” applet. Use the applet to describe the characteristics of each state in the following table.

State	Attraction between molecules	Movement between molecules	Volume	Shape
Solid				
Liquid				
Gas				

2. Based on your table. Label whether each statement describes a Solid (S), Liquid (L) or Gas (G)

_____ There is a lot of free space between molecules as they are spread out all over the place.

_____ It retains a fixed volume and shape.

_____ Molecules are not attracted to each other much at all.

_____ Molecules can move/slide past one another, yet still remain close together due to their attraction to each other.

_____ Molecules are strongly attracted to one another.

_____ Does not have a definite shape or volume.

_____ It has a definite volume but can change its shape to fit the container that it is held in.

_____ Particles stay in fixed positions and vibrate in place.

Part II- Describe how the motion of molecules in various states compare when substances are heated and cooled.

3. Let's start by looking at a GAS. On the same webpage (<http://www.middleschoolchemistry.com/multimedia/chapter1/lesson5>), scroll down and click on "Heating Molecules of a Gas". Use the applet to describe **what happens to the balloon** when the air inside is heated and cooled. Use pictures and words.

Heated (word description)	Heated (picture)
Cooled (word description)	Cooled (picture)

Why does this happen?

4. Now let's look at a LIQUID.

Go to <http://www.middleschoolchemistry.com/multimedia/chapter1/lesson2> . Scroll down and click on "Heating and Cooling a Liquid". Use the applet to describe **what happens to the water molecules** when heated in pictures and words.

Heated (word description)	Heated (picture)
Cooled (word description)	Cooled (picture)

Describe differences between what you saw in the liquid molecules compared to the gas molecules:

5. Go to <http://www.middleschoolchemistry.com/multimedia/chapter1/lesson4> . Scroll down and click on “Heating and Cooling a Solid”. Use the applet to describe **what happens to the solid particles** when heated in pictures and words.

Heated (word description)	Heated (picture)
Cooled (word description)	Cooled (picture)

Describe how the motion of the solid molecules differs from the motion of the gas molecules (from #2) and the liquid molecules (from #3) when heated.

6. Circle the correct word or phrase in parentheses that will make the statement true.
- a. The molecular motion will (increase, decrease) when a substance is heated.
 - b. The molecular motion will (increase, decrease) when a substance is cooled.
 - c. When a substance is cooled, the kinetic energy of its molecules will (increase, decrease).
 - d. The space between molecules gets (smaller, bigger) when a substance is heated.
 - e. If the kinetic energy of a substance's molecules decreases, then the substance is being (heated, cooled) and the space between molecules gets (smaller, bigger).
 - f. Though molecules in a solid and a liquid will both experience a(n) (increase, decrease) in kinetic energy when heated, the molecules in a (solid, liquid) will always be (closer to, further from) one another when compared to the molecules in a (solid, liquid) due to their strong attraction for one another.

Part III- Getting a “feel” for different temperature scales

7. Go to <http://funphysics.jpl.nasa.gov/adventures/temperature-game.html>
Read the instructions and then start by clicking on “Fahrenheit”. When you get a match, fill in the temperature in Fahrenheit in the table below.

Once you’ve solved the puzzle, “close” the popup box. Click on Celsius and write down the corresponding temperatures in the table below. Do the same thing for Kelvin.

Icon	Temperature (Fahrenheit)	Temperature (Celsius)
Saturn		
Death Valley		
Freezing		
Boiling Point		
Space		
Mars		
Antarctica		
Superfluid Helium		
Room Temperature		
Human Body		

- a. What is the coldest item on your table? _____
- b. What is the hottest item on your table? _____

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Fill in the blanks.

1. _____ is directly proportional to the average kinetic energy of molecules in matter.
2. If a substance is heated, its molecules _____ up. Whereas if it is cooled its molecules will _____ down.
3. Hot water molecules have _____ kinetic energy than cold water molecules.
4. Molecules in a solid _____ faster in position when heated.
5. The spacing between molecules in matter _____ when the matter is heated.
6. Materials _____ when their temperatures increase and _____ when their temperatures decrease.
7. On the Celsius scale, the freezing point is _____ and the boiling point is _____.
8. On the Fahrenheit scale, the freezing point is _____ and the boiling point is _____.

Answer the following in complete sentences.

9. Describe the differences in the attraction between molecules for a solid, liquid and a gas.
10. How will the motion of water molecules in hot soup differ from the motion of water molecules in iced water?

11. If a substance has a temperature of absolute zero, what can you say about the kinetic energy of the substance's particles?

12. Describe how a thermometer uses thermal expansion/contraction to measure temperature.

13. Explain how the liquid level of an alcohol-based thermometer will be different than the liquid level of a mercury based thermometer when heated. Why do the liquid levels differ?