



# Pioneer Cornell Notes Page

Topic: Heat Energy

Name:	Date:
Class:	Period:
Subject:	Teacher:

Main ideas/Questions:	Note Taking Column
<p><b>Write your own every day example that shows how heat is motion.</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p>I. Molecules in Motion</p> <p>A. James Prescott <b>Joule</b> investigated the relationship between heat and motion.</p> <ol style="list-style-type: none"> <li>1. He performed a series of inquiries that supported the idea that objects in <b>motion produce heat</b>.</li> <li>2. Rub your hands together quickly. Your hands feel warmer. By sliding down a rope too quickly can cause a “rope burn”.</li> </ol> <p>B. Other scientists working at the same time as Joule knew that <b>energy</b> is needed to set an object in <b>motion</b>.</p> <ol style="list-style-type: none"> <li>1. They also knew that matter is made up of tiny particles called <b>molecules</b> which are always in <b>motion</b>.</li> <li>2. They realized then that heat energy is caused by the <b>internal motion</b> from moving molecules.</li> </ol>
<p>How can a refrigerator make objects cold?</p> <p>Write down an everyday example of conduction. _____</p> <hr/> <hr/> <hr/>	<p>II. Heat Transfer</p> <p>A. The movement of heat from a warmer object to a <b>cooler</b> one is called <b>heat transfer</b>.</p> <ol style="list-style-type: none"> <li>1. After holding a ice cube for several seconds your hands begin to feel cold and the ice cube begins to melt.. You might think that the ice cube is moving coldness into your hands. But there is <b>no such thing as “coldness”</b>.</li> <li>2. <b>Coldness</b> is simply the <b>lack of heat</b>. The heat from your hands is moving to the ice cube causing it to melt.</li> </ol> <p>B. There are three ways in which heat can transfer: through conduction, convection, and radiation.</p> <p><b>1. Conduction-</b> Heat is transferred <b>through</b> substances from one substance to another by the <b>direct</b> contact of <b>molecules</b>.</p> <ol style="list-style-type: none"> <li>a. When fast moving particles <b>collide</b> with slow moving particles heat energy is transferred causing the slower molecules to <b>move faster</b>.</li> <li>b. Because all matter is made of molecules, <b>conduction</b> can take place in solids, <b>liquids</b>, and gases.</li> </ol> <p><b>2. Convection-</b> Takes place <b>only</b> in liquids and gases. Heat energy is transferred by the means of <b>up-and down-</b> movement called convection <b>currents</b>.</p> <ol style="list-style-type: none"> <li>a. When a liquid or gas is <b>exposed</b> to heat energy the molecules begin to move faster and move <b>farther</b> apart.</li> <li>b. This means that the liquid or gas is less dense than the surrounding liquid or gas. <ol style="list-style-type: none"> <li>1. The less dense liquid or gas <b>rises</b> carrying the heat energy with it.</li> <li>2. Hang gliders rely on <b>updrafts</b> of warm air (convection currents) to keep them aloft.</li> </ol> </li> <li>c. Because cool air is <b>denser</b> than warm air, it tends to <b>sink</b>.</li> </ol>

<p>Draw a diagram of a <b>convection</b> current rising and <b>sinking</b> in the space provided.</p>	<p>d. These currents transfer heat throughout the Earth's atmosphere and cause winds.</p> <p><b>3. Radiation-</b> Heat energy is <b>transferred</b> through <b>empty</b> space like how the sun's heat reaches Earth.</p> <p>a. Another form of heat transfer by radiation occurs when your hands are warmed by a <b>camp fire</b></p> <p>b. Heat given off by an electric heater is another example.</p>
<p>No summary this time!!</p> <p>Here is a basic question:</p> <p>This is a little more advanced... Go for it!</p> <p>It will help you think through questions 3,4, and 5 if you draw them out as you work on your answers.</p> <p>How can the heat loss in each case be reduced?</p>	<p><i>Think about it: Please discuss the questions with your table members and answer the following questions before moving on.</i></p> <ol style="list-style-type: none"> <li>1. Identify the method of heat transfer in each of the following examples.       <ol style="list-style-type: none"> <li>a. An egg cooking in a frying pan _____</li> <li>b. A kite soaring _____</li> <li>c. The wire of an electric appliance becoming hot _____</li> <li>d. Heat from a fireplace warming a room _____</li> <li>e. A hot air balloon flying in the sky _____</li> </ol> </li> <li>2. Sometimes on hot days in the summertime the air is just too hot for planes to get off the ground. Why is that? ( <b>Hint:</b> When a plane is moving fast enough to take off, air moving past the plane's wings normally provide enough "lift" for the plane to get off the ground, but what happens when air is heated?)</li> <li>3. Suppose you want to let air into a stuffy room. Should you open the window from the top or the bottom if the outside temperature is warmer than the room? Why?</li> <li>4. What about if the room is colder than the outside? Draw a diagram to explain your answer.</li> <li>5. Think of 3 places at school where heat may be escaping from outside. Is the heat loss due to convection, conduction or radiation?       <ol style="list-style-type: none"> <li>1.</li> <li>2.</li> <li>3. .</li> </ol> </li> </ol>

