**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_**

**Temperature, Thermal Energy, and Heat**

What determines the temperature of an object? How is thermal energy different from temperature? Recall that all moving objects have kinetic energy and that matter is made up of tiny particles (atoms) that are always moving. **Temperature** is a measure of the average kinetic energy of the particles in an object. *As an object heats up, its particles move faster. As a result, both the average kinetic energy of the particles and the temperature increase.*

Heat transfers occur around you all the time. Heat doesn’t transfer randomly. *It travels in one direction and by three different methods.* Heat transfer stops when all the objects are at the same temperature. **Convection** is a heat transfer from circulating gases or liquids (think of a bathroom after a shower). **Conduction** is a heat transfer within a single solid object, or between two touching solid objects (think of when you leave a spoon in a cup of hot chocolate or soup and come back to it; the spoon handle heats up). **Radiation** is the transfer of energy by electromagnetic waves and is the only form that does not require matter (think of the sun beaming down on a piece of ice). When heat or thermal energy is transferred it is always from the hot/warm to cold.

**Directions: 1) Read the paragraph above.**

**2) Read Chapter 10 lessons 2 & 3**

**3) Using the textbook, answer the following questions using complete sentences.**

**Part A**: Match the vocabulary word with the correct definition. Write the letter on the line provided.

1. \_\_\_\_\_\_ A measure of how hot or cold something is compared to a reference point A. Heat
2. \_\_\_\_\_\_The type of heat transfer that occurs only in fluids, such as water or air. B. Conduction
3. \_\_\_\_\_\_ The total energy of all the particles within an object. C. Temperature
4. \_\_\_\_\_\_ The transfer of thermal energy from a warmer object to a cooler object. D. Convection
5. \_\_\_\_\_\_ The transfer of energy by electromagnetic waves. Does not require matter. E. Thermal Energy
6. \_\_\_\_\_\_ The transfer of heat from one particle of matter to another within an object(s). F. Radiation
7. \_\_\_\_\_\_ The metric unit of measurement for temperature. G. Celsius
8. \_\_\_\_\_\_ The unit of measurement for heat energy. H. Joules

**Part B:** Determine if the scenario is an example of convection, conduction, or radiation. Label it accordingly.

1. Heating a pizza in the oven. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. A pot sitting on a hot burner. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. How the inside of a greenhouse works. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. A person placing their cold hands over a warm fire. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Laying out in the sun to get a tan \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part B Continued:** Determine if the scenario is an example of convection, conduction, or radiation. Label it accordingly.

1. Putting your wet shoes on a floor vent to dry them faster \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Picking up a hot cup of coffee. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Touching a metal spoon that is sitting in a pot of boiling water. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Using a heating blanket to get warm. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. A person placing their hands over a hot burner. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part C:** **Answer the following questions using complete sentences.**

1. Did you read the directions on the front page? Using complete sentences, explain what the difference is between convection, radiation, and conduction? Explain what happens when an object is heated (hint: you should include the words kinetic energy, increase, and particles).

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**Part D: In the boxes, illustrate/draw the three different types of heat transfer.**

|  |  |  |
| --- | --- | --- |
| Convection | Radiation | Conduction |
|  |  |  |