Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_

**Heat Transfer WS**

In each of the following situations, identify the type of energy transfer taking place as conduction (CD), convection (CV), or radiation (R). (Note: More than one process may be occurring.) Write your answer in the blank.

\_\_\_\_\_ 1. Hot coffee is stirred with a spoon, the spoon gets hot due to \_\_\_\_.

\_\_\_\_\_ 2. A chair is placed several feet from a fire in a fireplace The fireplace has a glass screen. The side

of the chair facing the fireplace gets warm because of \_\_\_.

\_\_\_\_\_ 3. A lava lamp contains colored liquids. These liquids form globs that break off and rise to the top

of the liquid container. The liquid rises because of \_\_\_\_.

\_\_\_\_\_ 4. Near the ceiling of a room the air is warmer. The warm air rises because of \_\_\_\_.

\_\_\_\_\_ 5. A college student holds the back of his hand near an iron to see if it is hot. Heat is transferred to

his hand by \_\_\_\_.

\_\_\_\_\_ 6. A certain type of stainless steel cookware has a layer of copper applied to the bottom to help it

heat evenly. The copper transfers heat to the pan by \_\_\_\_\_.

\_\_\_\_\_ 7. A heater is placed under one corner of a water bed mattress. Warm water moves throughout the

mattress because of \_\_\_\_\_.

\_\_\_\_\_ 8. In a swimming pool, the water near the surface is slightly warmer. The warm water rises

because of \_\_\_\_\_.

\_\_\_\_\_ 9. One end of a copper rod is placed in the flame of a Bunsen burner. Small pieces of wax placed

along the rod melt at progressively larger distances from the flame. Heat is transferred through the rod by \_\_\_\_\_.

\_\_\_\_\_ 10. A house burns down. On the house across the street, all of the vinyl siding is twisted and

warped by heat. The heat was transferred across the street by \_\_\_\_\_.

An insulator blocks the type of energy transfer that we call heat. In each of the following situations, describe what method or methods of energy transfer are being blocked.

\_\_\_\_\_ 1. As a house is being built, special foam is used to fill in the spaces around the windows. This is

to prevent heat transfer by \_\_\_\_\_.

\_\_\_\_\_ 2. A laboratory worker puts on a heavy glove before picking up a hot beaker to prevent heat being

transferred to his hand by \_\_\_\_\_.

\_\_\_\_\_ 3. A welder wears a long sleeved shirt while doing electric arc welding. The shirt helps to prevent

heat transfer by \_\_\_\_\_.

\_\_\_\_\_ 4. A backpacker sleeps in a down filled sleeping bag, while lying on a closed cell foam pad. The

sleeping bag prevents heat transfer by \_\_\_\_\_ and the foam pad prevents heat transfer by

\_\_\_\_\_ \_\_\_\_\_.

\_\_\_\_\_ 5. A hiker in the desert in the summer time wears' a long sleeved shirt and a wide brimmed hat to

protect from heat transfer by \_\_\_\_\_.

The following statements describe a situation in which an insulator is needed. In each case describe the types of energy transfer to be insulated against.

\_\_\_\_\_ 6. A scientist needs clothing to allow her to approach flowing lava close enough to take a sample.

\_\_\_\_\_ 7. An architect wants to protect an office from heat from the sun through a large window.

\_\_\_\_\_ 8. A container needs to be designed to keep a liquid very cold while being transported a short

distance.

\_\_\_\_\_ 9. The tinted windows on an automobile protect against.

\_\_\_\_\_ 10. A Styrofoam coffee cup helps prevent heat loss by

\_\_\_\_\_ 11. A hot pad placed on a table before putting a heated dish on the table protects the table from

damage caused by energy transfer by

Identify the direction of heat flow in each of these cases:

a. An ice cube is placed in a glass of tap water.

b. A warm turkey is placed in the center of a table.

c. An ice cube at –10 oC is placed on a block of frozen carbon dioxide (dry ice) at –80 oC.

d. A log is placed into a roaring fire.

e. A large parabolic mirror reflects radiation from the sun onto a small solar furnace.

f. A small glass of tap water at room temperature is emptied into a 50-gallon aquarium filled with

water at room temperature.

g. A small boy consumes an ice cream cone.

h. A test tube of lead shot is removed from a beaker of boiling water and poured into a Styrofoam

cup of room temperature water.

i. An explorer is placed into a large tub of very warm water by a tribe of hungry natives.

**Specific heats (in calories/g•˚C) of selected substances:**

Water 1.00 Silver 0.06 Aluminum 0.23 Lead 0.03 Iron 0.11

Alcohol 0.55 Zinc 0.09

Using this table, answer the following questions:

1. Two identical beakers are placed side by side on a hot plate. One contains 100 g of alcohol, and the

other contains 100 g of water, both at 20oC. Which will reach a temperature of 50oC first?

2. Two blocks of metal, each weighing 1 kg, are placed in a furnace for 10 seconds. When removed one

block is felt to be much warmer than the other. Which of the blocks is zinc and which is

aluminum?