Thought Questions: (answers on back)

1. Try the activity with two different containers and then touch the containers to see how warm they are. Which container feels warmer and why?

2. Why might you put soup in a bowl and hot chocolate in a cup?

3. Why do we stir or blow on our soup when it is too hot?

4. Can you think of any more examples of heat transfer in everyday life?

MAKING ICE CREAM (A Fun Heat Transfer Activity !!!)

Materials:

Strong zip-loc freezer bags, pint and quart size
Salt
Whole Milk
Vanilla
Sugar
Ice

Directions:

Add 1/2 cup milk, 1 tablespoon sugar, and ½ tablespoon vanilla to smaller zip-loc bag. (Double bag!). Place the sealed zip-loc bag in the larger bag, half fill the larger bag with ice and add six tablespoons salt. Seal the large bag and shake for 10 minutes. Open and enjoy (careful not to get salt from the outer bag on your ice cream!). Feel free to get creative and add fruit, chocolate chips, nuts, etc.

Some questions for you

1. What state of matter was the milk when you began?
2. What state of matter was the milk when you were done?
3. In order to change the phase of the milk, what had to be removed?
4. What happened to the heat energy that left the milk?
5. What types of heat transfer are involved in ice cream making?

Thought Question Answers

1. The container with the cooler water absorbed more heat form the water and will feel warmer. *So the container with the colder water feels warmer and the container with hotter water feels cooler!!*

2. By putting soup in a bowl, there is more surface area, or soup, exposed to the air. This allows the heat to move from the soup to the air quicker than a cup would. The quicker the soup loses heat, the quicker you can eat it!

Since we like to melt marshmallows in our hot chocolate, we do not want the hot chocolate to become cool, or lose too much heat too quickly. So, we put the hot chocolate into a cup which does not expose too much of the hot chocolate to the cooler air. The hot chocolate loses less heat and we can use that heat to melt our marshmallows!

3. Blowing on our soup moves the warm air above it. This is convection and helps to cool the soup. Stirring moves the warmest water to the surface so that it can be cooled by the air above. (This is the same reason your bathwater gets cool faster if you play in it!)

4. There are an endless number of possibilities…try making a list of examples of radiation, conduction and convection that you find around you.

Ice Cream Activity Answers

1. The milk started out liquid
2. At the end it was solid – frozen
3. Heat had to be removed
4. The milk mixture in the inner bag was at a higher temperature than the ice, so heat had to move down the temperature gradient. Heat was transferred to the ice from the inner bag by conduction since the bag and the ice were directly touching. As the heat was transferred the ice began to increase in temperature and melt, meanwhile the contents of the inner bag lost heat and got colder and began to freeze.
5. Conduction and convection

SOMETHING TO REMEMBER

When you use ice to make something cold, you are NOT adding cold, you are removing HEAT. Because the ice is colder than the ice cream mixture (or your drink), heat moves from the mixture (or your drink) to the ice. This causes the ice cream mixture (or your drink) to lose heat and become colder.