

Names \_\_\_\_\_

### **What is Heat?**

What is heat? How would you define or describe it?

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### **Heat:**

- Heat is thermal energy flowing from warmer to cooler objects.
- Thermal energy is the total energy of the particles of matter.
- Heat energy is produced by the internal motion of particles of matter.
- Matter is made of particles called molecules.
- The faster they move = the object is getting hotter.
- The slower they move = the object is getting colder.

### **Activity:**

1. Touch your hands to your cheeks. What do you feel? \_\_\_\_\_
2. Rub your hands SLOWLY back and forth for 10 seconds.
3. Touch your hand to your cheeks. What do you feel? \_\_\_\_\_
4. Rub your hands QUICKLY back and forth for 10 seconds.
5. Touch you hand to your cheeks. What do you feel? \_\_\_\_\_
6. Why do you think the temperature changed? \_\_\_\_\_

### **Friction:**

- Friction is the resistance between two objects rubbed together.
- More Motion = More Friction = More Heat
- The energy of motion is called Kinetic Energy.

### **Temperature:**

- Temperature is the measure of the average kinetic energy of the molecules or particles of matter.
- The higher temperature, the faster the molecules are moving.

- The lower the temperature, the slower the molecules are moving.
- Temperature can be changed.
- To increase the temperature, heat is added.
- To decrease the temperature, heat is removed.

### Measuring Heat:

- We can measure the amount of heat in an object using the unit calorie.
- Calorie (food) vs. calorie (heat)
- 1 calorie raises the temperature of 1 gram of water 1 degree Celsius.
- Which would boil faster – a small or a large pan of water? Why?

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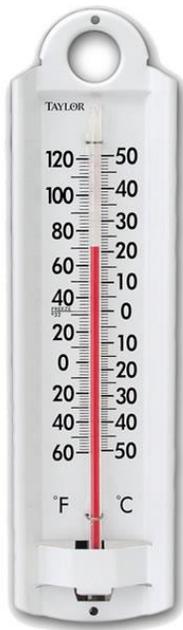
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### Thermometers:

- Draw a picture of a thermometer.



## How a thermometer works:

- A thermometer contains a special liquid such as Mercury or alcohol that has been dyed red.
- The liquid expands (gets bigger) when it gets hot.
- The liquid contracts (gets smaller) when it gets cold.
- The liquid has been trapped inside a glass tube so it can only expand and contract up and down.
- Scientists know exactly how big or small the liquid will be at a given temperature so they label or calibrate the thermometer.
- We can watch the level of the liquid inside the tube to know the temperature of a location or substance we are testing.
- The thermometer was invented by Gabriel Fahrenheit in 1724.
- Fahrenheit's scale is 32°F = Freezing and 212°F = Boiling
- A new scale was developed by Anders Celsius in 1742.
- Celsius scale is 0°C = Freezing and 100°C = Boiling.

## Thermostat:

- A thermostat is a device used to control the temperature of a room.
- The thermostat is set at the desired temperature. Ex: 70° F
- In the summer if the room temperature rises above 70° F, the air conditioner turns on to cool the room.
- In the winter if the room temperature falls below 70° F, the furnace turns on to heat the room.

## Your Body's Temperature

- Your body also has a thermostat.
- A healthy body stays very close to 98.6 °F.
- If you become too hot you sweat. This cools down your body.
- If you become too cold you shiver. This heats up your body.
- This balancing act of keeping your body at the right temperature is known as homeostasis. It helps keep you healthy.

## Insulators and Conductors

Have you ever roasted marshmallows? What did you place the marshmallows on to hold them over the fire? Why?

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- Heat energy can move through many objects.

### Insulator:

- An insulator is an object through which heat does not move through easily.
- The molecules are far apart.
- Examples: glass, wood, plastic, rubber, air, Styrofoam, etc.

### Conductors:

- A conductor is an object through which heat moves easily.
- The molecules are very close together.
- Examples: metal, asphalt, etc.

## Conduction

What did you do to melt the ice cube? What worked best?

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### Conduction:

- Heat transfer is the movement of heat from warmer to cooler objects.
- There are three methods of heat transfer. The first is conduction.
- Conduction is the transfer of heat by direct contact between molecules of a solid.

## Convection

- Heat transfer is the movement of heat from warmer to cooler objects.
- There are three methods of heat transfer. The second is convection.

- Convection is the transfer of heat in liquids and gases through currents.
- Hot air always rises and cold air always falls. Why?
- When air is heated, the molecules begin to move faster and they take up more space. When the molecules begin to take up more space the air becomes less dense. This makes the warmer air rise and the cooler air fall. The cycle is known as a convection current.

## **Radiation**

What are some things that give us heat? How many can you think of?

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- Heat transfer is the movement of heat from warmer to cooler objects.
- There are three methods of heat transfer. The third is radiation.
- Radiation is the transfer of heat through space in the form of waves.