Part IV: Radiation

Have you ever warmed your hands by a campfire or a fire in a fireplace? The thermal energy from the fire is able to transfer to your hands even though you are not touching the fire. This type of thermal energy transfer is called radiation. Radiation is the transfer of thermal energy by electromagnetic rays. Radiation does not need matter for thermal energy transfer to take place as required by conduction and convection. Radiation can occur in empty space as it happens when the Sun's radiant energy travels through space toward Earth. Energy transfer by radiation occurs even when particles of matter are not touching.

In this activity, you will work with the radiometer and a lamp to test the effect of changing the distance between the light source and the radiometer.

First measurement.

1. Clamp the lamp in place. Position the light source so that it is level with the radiometer.
2. Place the radiometer so the bulb is 20 cm away. Use a thermometer to record the temperature near the radiometer.
3. Turn the lamp on.
4. Use a stopwatch to time for three minutes. Record whether or not the vanes move. If they did move, describe the motion.
5. Record the temperature near the radiometer after three minutes. Turn the lamp off.

Second measurement.

1. Place the radiometer 15 cm away from the bulb. Record the temperature near the radiometer.
2. Turn the lamp on.
3. Use a stopwatch to time for three minutes. Record whether or not the vanes move. If they did move, describe the motion.
4. Record the temperature near the radiometer after three minutes. Turn the lamp off.

Third measurement.

1. Place the radiometer 10 cm away from the bulb. Record the temperature near the radiometer.
2. Turn the lamp on.
3. Use a stopwatch to time for three minutes. Record whether or not the vanes move. If they did move, describe the motion.
4. Record the temperature near the radiometer after 3 minutes. Turn the lamp off.

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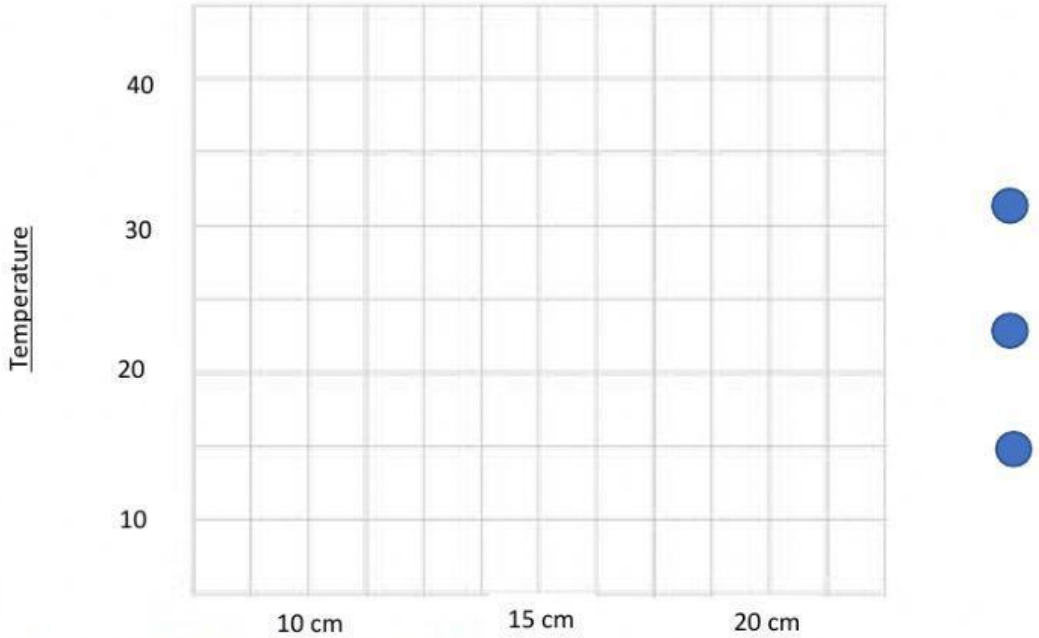
1. Record your data in the boxes below.

Radiometer at 20 cm	
Did the vane move?	
Beginning Temperature	
Temp. After 3 Minutes	

Radiometer at 15 cm	
Did the vane move?	
Beginning Temperature	
Temp. After 3 Minutes	

Radiometer at 10 cm	
Did the vane move?	
Beginning Temperature	
Temp. After 3 Minutes	

2. Graph the ending temperatures for each location of the radiometer.



3. Fill in the blanks using the data you recorded.

   a. As the distance increased the temperature _____.

   b. As the distance decreased the temperature _____.

4. In your own words, define radiation.

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