

ES12A Heating Earth's Air

Name: _____

Date: ___ / ___ / ___ Period ___ Room ___



Did you know?

- 1 Almost all energy on Earth comes from the Sun. The Sun's energy heats the planet and the air on it. The Sun's energy also powers photosynthesis and life on Earth.
- 2 The sky is blue because the light from the Sun is scattered by the atmosphere. All the colors are absorbed by the air except blue - so that is the color you see.

So, why is it important to me?

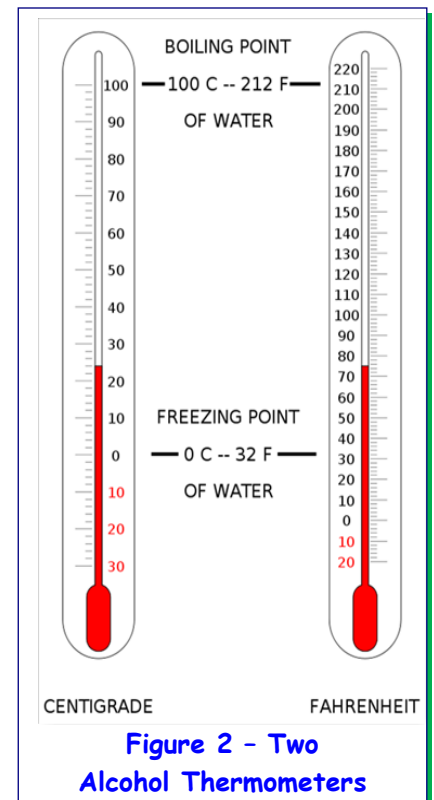
- 3 You and your friends are using the fire to heat soup in a pot (see Fig. 1). As the Sun goes down, the air gets chilly. You move closer to the fire. Heat from the fire warms you. Light from the fire allows you to see your friends. We can use this energy to see and keep us warm. Sunlight energy is stored in the wood and is released when it burns.



Figure 1 - Energy is released so we can use it.

What are the big ideas I need to know?

- 4 Heat and light are forms of energy. Other forms are chemical and electrical energy. Energy can't be created or destroyed. However, it can change form. For example, wood has chemical energy when it's not burning. The energy is stored in its molecules. When wood burns, the chemical energy changes to heat and light energy.
- 5 Energy can move from one place to another. It can travel through space or matter. That is why you can feel the heat of a campfire and see its light. This energy travels from the campfire to you as a form of radiation.
- 6 When light hits an object, some energy is reflected as light, but some energy is given to that object in the form of heat. The temperature or the amount of heat energy is measured with a thermometer (see Fig. 2).



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7 Radiation is the transfer of heat by waves. Energy can travel this way through the air or through empty space. This is how energy travels from the Sun to Earth. Radiant energy warms the Earth's surface. The surface then sends some of the heat back into the atmosphere.

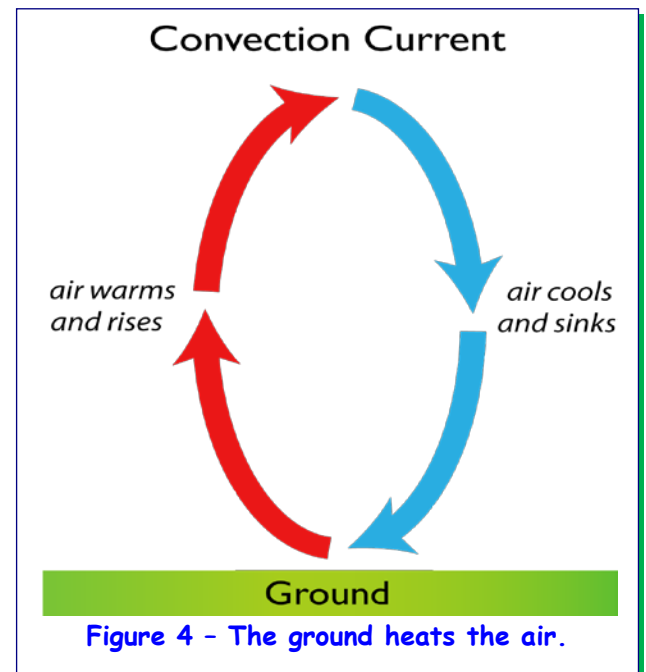
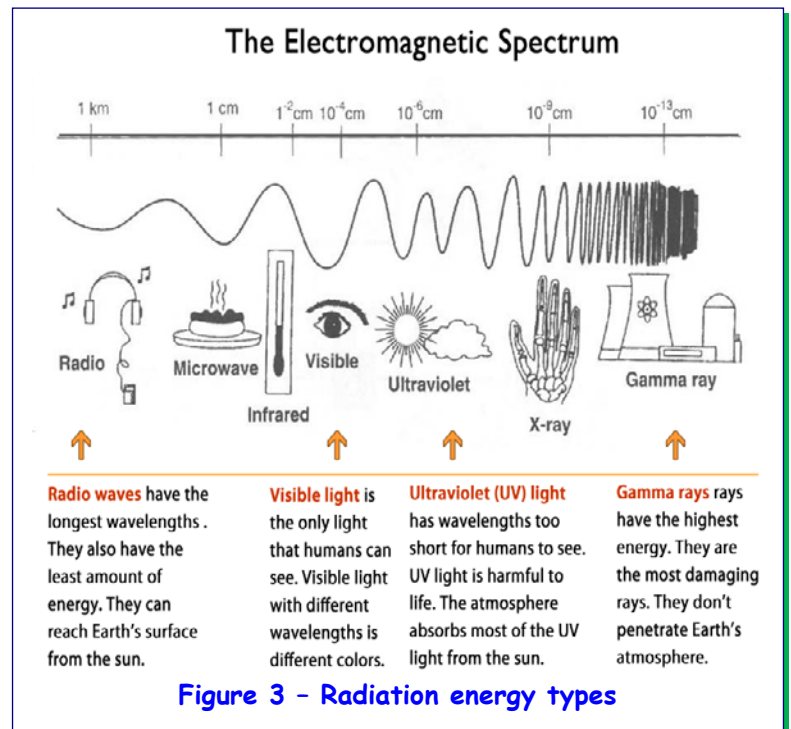
8 Visible light is the only light that humans can see (see Fig. 3). Visible light with different wavelengths makes different colors. The color red has a long wave length and violet has a shorter wavelength.

9 Infrared light has wavelengths too long for humans to see, but we can feel them as heat. The atmosphere absorbs the infrared light. Lamps that keep food warm at some restaurants give off Infrared light.

10 Ultraviolet (UV) light has wavelengths too short for humans to see. UV light is harmful to life. The atmosphere absorbs most of the UV light from the Sun. UV lights are used to get a tan.

11 The transfer of heat when one molecule actually touches another is called conduction. Warmer molecules vibrate faster than cooler ones. They bump into the cooler molecules and give them some of their heat. This way of transferring heat happens mainly in the lower atmosphere.

12 Convection is the transfer of heat through a fluid like air or water by a current. Air near Earth's surface is warmed by heat radiating from the surface. The warm air is light, so it rises. As it rises, it cools. The cool air is dense, so it sinks to the surface. This creates a convection current (see Fig.4). Convection is the most important way that heat travels in the atmosphere.



What about?

13 ROY G BIV is not a person - but the order of colors in the visible spectrum, the colors we can see, Red, Orange, Yellow, Green, Blue, Indigo and Violet. Red has the longest wavelength and violet has the shortest - remember the long red light.

14 When water is heated by the sun, the heat energy changes the liquid water into water vapor - this is evaporation. When water vapor gives up its heat - it turns back to a liquid - this is condensation.