Chapter 14 Review

Vocabulary review

Match the following terms with the correct definition. There is one extra definition in the list that will not match any of the terms.

Set One

1. light	a. A property of electrons inside atoms
2. electromagnetic spectrum	b. A wave we see with our eyes
3. energy level	c. Heating something up so hot it gives off light
4. incandescence	d. Stimulating atoms to emit light using light of another energy
5. fluorescence	e. The range of waves that includes radio waves, light, and X rays
	f. The interaction of two or more waves with each other

Set Two

1. radio waves	a. Electromagnetic waves that we feel as heat
2. infrared	b. Electromagnetic waves that have very high energy and come from nuclear reactions
3. ultraviolet	c. Electromagnetic waves that have very low energy and wavelengths of many meters
4. X rays	d. Electromagnetic waves that can pass through skin and make images of the body
5. gamma rays	e. Electromagnetic waves with more energy than visible light and that cause sunburns
	f. Electromagnetic waves that we see with our eyes

Set Three

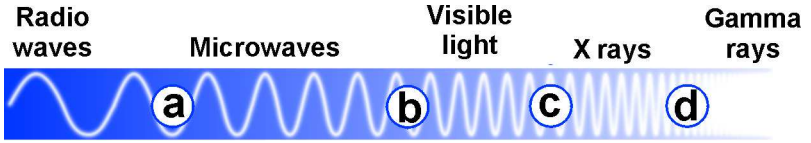
1. polarization	a. How we perceive different frequencies of light within the visible range
2. color	b. Making all colors as mixtures of red, green, and blue light
3. photoreceptors	c. Red, green, and blue
4. primary colors	d. A way of aligning the direction of light wave vibration by blocking some of the waves
5. RGB model	e. Nerves in the eye that are sensitive to light
	f. The wavelength of X rays

Set Four

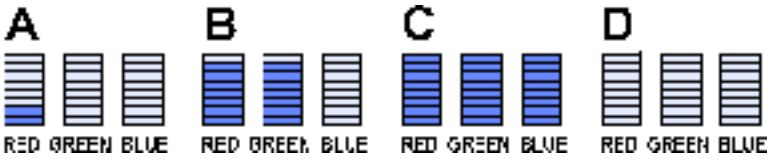
1. magenta	a. A dye that absorbs red light
2. yellow	b. A dye that absorbs green light
3. cyan	c. Making all colors with cyan, magenta, yellow, and black pigments
4. photosynthesis	d. The process plants use to get energy from light
5. CMYK model	e. A dye that absorbs blue light
	f. A wavelength absorbed by the ozone layer

Concept review

1. What does photoluminescence mean?
2. What does incandescence mean?
3. What must happen to the electron in order for an atom to emit light?
   a. Move from a low energy level to a high energy level.
   b. Stay in a high energy level.
   c. Move from a high energy level to a low energy level.
   d. Stay in a low energy level.
4. Identify which of the following produces electromagnetic waves in the gamma ray part of the spectrum.
   a. A nuclear reaction
   b. A cell phone
   c. A radio transmitter
   d. A flashlight
5. Identify which of the following devices uses microwaves. You may choose more than one.
   a. an oven for heating food
   b. a cell phone
   c. a satellite transmitter
   d. a small flashlight
6. A polarizer is:
   a. A filter that separates light.
   b. An ink that absorbs green light.
   c. A sensor in the eye that detects blue light.
   d. A device for creating diffraction.
7. Infrared radiation belongs where in the electromagnetic spectrum diagram below? (Choose a, b, c, or d)



8. Which of the following would produce the sensation of white light?



9. Which of the following would produce the sensation of yellow light?

10. What are the three primary colors of light?
    a. red, green, and blue
    b. red, yellow, and blue
    c. magenta, cyan, and yellow
    d. orange, green, and violet
11. What are the three primary colors of pigments?
    a. red, green, and blue
    b. red, yellow, and blue
    c. magenta, cyan, and yellow
    d. orange, green, and violet

Problems

1. Arrange the following in order of speed from fastest to slowest:

   a. Sound waves b. Light waves c. Water waves

2. What color is obtained when the three primary colors of light are combined in equal strengths?

3. Which photochemical receptors in our eyes are stimulated when we see the color yellow?

4. If you wanted to make green paint, you would use which combination of dyes?

   a. cyan and magenta c. magenta and yellow

   b. cyan and yellow d. magenta only

5. What does a piece of blue cloth do to the colors in white light that falls upon it?

   a. It absorbs blue light and reflects all the rest of the colors to our eyes.

   b. It absorbs all the colors except blue and reflects only blue light to our eyes.

   c. It absorbs all of the colors in the white light.

   d. It absorbs none of the colors in the white light.

6. What happens to the light energy that is shined upon a black object?

7. Name the four colors used by color computer printers?

8. What are the primary colors used to construct the image on a color TV monitor?

9. When a store clerk adds more colorants (pigments) to a can of white paint, what will be the result?

   a. More colors are taken away from the light we use to view the paint.

   b. More colors are added to the light we use to view the paint.

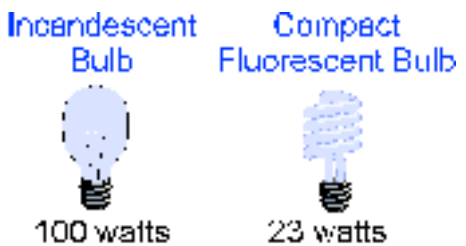
   c. Fewer colors are taken away from the light we use to view the paint.

   d. No change occurs in the light we use to view the paint.

10. Describe wavelength and frequency of green light and why using only green light would not allow plants to grow.

11. Arrange the following in order from LOWEST energy to HIGHEST energy: Gamma rays, visible light, X rays, microwaves, radio waves, infrared light, ultraviolet light.

12. Calculate how much money you would save in one year by changing from an incandescent bulb to a fluorescent bulb. Assume electricity costs 10 cents per kilowatt hour and that the bulb is on all the time for the whole year. The two bulbs in the picture produce the same amount of light.



Applying your knowledge

1. Why does fire give off light?
2. Why would putting out a fire with water stop it from giving off light?
3. How many different kinds of photochemical receptors are found in the eyes of most people? What colors of light do these photochemical receptors respond to? To what location does a photochemical receptor send its signal?
4. What is different about the photochemical receptors in the eyes of people with color blindness?
5. What may be different about the photochemical receptors in the eyes of other animals?
6. Research color blindness using your library or the Internet. How many different kinds of color blindness are there? Find out what kinds of receptors are missing in the eyes of people with the various kinds of color blindness. Find out which tasks are more difficult for them and which ones are actually easier.
7. Design an improvement to a common product to make it easier for color blind people to use. Suggest ways that people with normal color vision can avoid making life unnecessarily difficult for people with color blindness.
8. How do we know anything about the color vision of animals? Look up the studies done on honeybees and report on the experimental methods. Design your own study to find out if dogs or cats can tell one color from another.
9. What makes the colors on a computer screen different from the colors in paint? How can you get red, green, and blue from both?
10. Computer graphic artists use two different color models to represent color. The RGB model has three numbers that represent the strengths of red, green, and blue. The CMYK model uses four numbers that represent the strength of cyan, magenta, yellow, and black.
    a. What are the maximum and minimum values for the numbers that determine color on a computer?
    b. Find a table of colors and identify the numbers you need to make orange in both RGB and CMYK systems.
    RBG: R = _____ B = _____ G = _____
    CMYK: C = _____ M = _____ Y = _____ K = _____
    c. If a picture contains 1,000 pixels, or dots, how much computer memory is needed to store the picture in RGB and CMYK models? Assume that each number takes 8 bits of memory to store.
11. Why is ice sometimes clear and sometimes cloudy white? Experiment with freezing ice in your home freezer. Find out how you can control the transparency of ice.