Checking Concepts Pg 168

4. (a) F: crest
(b) G: amplitude
(c) H: trough
(d) J: wavelength

5. As wavelength increases, frequency decreases, and vice versa. Another way to say this fact is that they are inversely related.

6. Light waves and sound waves both carry energy. Their waves both can be characterized by frequency, wavelength, and amplitude.

8. (a) All colours of light have waves with the same general shape as that of a transverse wave. Also, the light waves move at the same speed in a vacuum, regardless of colour.
(b) Different colours of light have waves with different wavelengths and frequencies.

9. Hertz (Hz) is the unit used to measure frequency.
1 hertz means one vibration or cycle per second.

10. Wavelength measures the distance from crest to crest, or trough to trough (or any place on a wave to the same place on the next wave).
Wave amplitude measures the distance from the crest (or trough) to the equilibrium position, which in a water wave is the position of the surface of the water when there is no wave.

14. A shirt can appear blue in white light because the pigment in the blue shirt absorbs non-blue colours such as red and green, while at the same time reflecting blue.

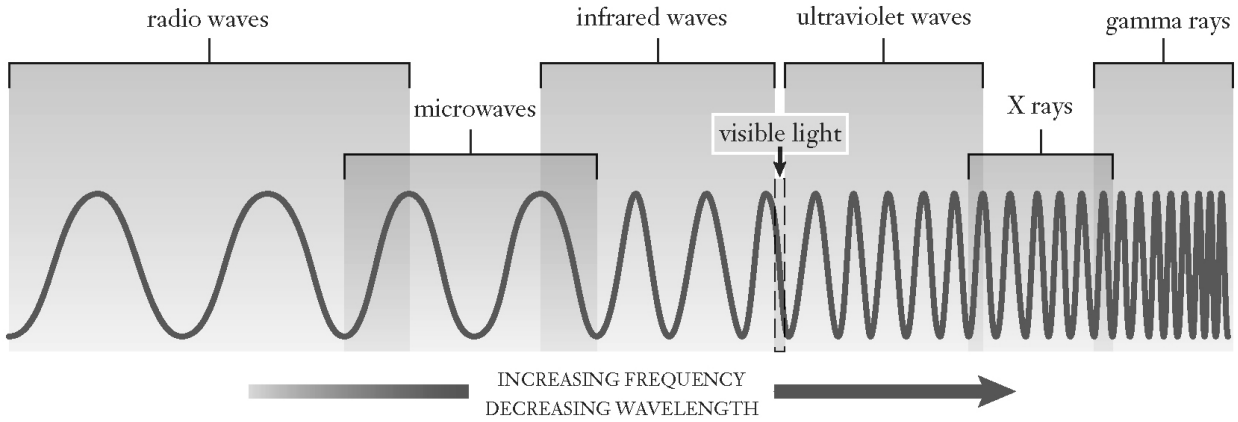
15. Radio waves and infrared waves have waves that are longer than visible light, while ultraviolet waves, X rays, and gamma rays have waves that are shorter than visible light.

16. Radio waves are used in MRI technology to form an image of soft tissues such as those in the brain. The person is placed in a very strong magnetic field. The atoms that make up the tissue behave like little magnets. When stimulated with a small amount of radio waves, the magnets can flip. This action causes a radio signal to be released, which is detected by the MRI machine. These signals represent information about the tissues that can be converted into pictures.

BLM 2-3, Chapter 4 Key Terms

1. The following uses for each type of radiation are acceptable answers:
    a. gamma rays: radiation therapy to kill cancer cells
    b. infrared rays: television remote control, using a computer to read CD-ROMS, heat lamps, detecting disease at airports, observation satellites
    c. microwaves: telecommunications satellites, heating food, radio telescopes, remote sensing, radar
    d. radio waves: radio and television broadcasting, magnetic resonance imaging
    e. ultraviolet waves: the body's production of vitamin D, fluorescent powder to study fingerprints
    f. visible light: vision
    g. X rays: diagnostic imaging (teeth, bones, organs), X-ray screening at airports

Electromagnetic Spectrum



2. The frequency of a wave describes the number of waves that occur in a certain time, and is often measured in cycles per second, or hertz (Hz).
The highest point of a wave is the crest and the lowest is the trough.
The amplitude of a wave describes the distance from the highest point to the rest position. The wavelength of a wave describes the distance from one crest to the next.
Matter in a transverse wave moves up and down perpendicular to the direction the wave travels. Matter in a compression wave moves back and forth along the same direction that the wave travels.
Reflection describes light hitting an object and bouncing off. Refraction describes light changing direction as it passes through a medium.
A microscope helps us see things too small for our eyes alone to see. A telescope helps us see things too far away for our eyes alone to see.

BLM 2-4, Chapter 4 Key Terms

1. Amplitude
2. Frequency
3. Wave
4. Energy
5. Trough
6. Wavelength
7. Refraction
8. Pythagoras
9. Reflection
10. Microwaves

BLM 2-19, Chapter 4 Review

1. B
2. B
3. D
4. D
5. D
6. D
7. A
8. A
9. A
10. C
11. E
12. D
13. G
14. A
15. C
16. B
17. (a) Blue
(b) Red
(c) The apple will appear darker and bluish, and there will be no red. It will be difficult to see the apple.
18. (a) Ultraviolet waves enable our body to make vitamin D, needed for healthy bones and teeth.
(b) Over-exposure to ultraviolet waves can result in sunburn and skin cancer.
19. (a) 0.5 Hz
(b) 3 Hz
(c) 1.5 Hz