

Chapter 18 The Electromagnetic Spectrum and Light

Section 18.1 Electromagnetic Waves

(pages 532–538)

This section describes the characteristics of electromagnetic waves.

Reading Strategy (page 532)

Comparing and Contrasting As you read about electromagnetic waves, fill in the table below. If the characteristic listed in the table describes electromagnetic waves, write E in the column for Wave Type. Write M for mechanical waves and B for both. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Electromagnetic and Mechanical Waves	
Travels through a vacuum	E
Travels through medium	
Fits wave model	B
Fits particle model	
Transverse wave	
Longitudinal wave	

What Are Electromagnetic Waves? (page 533)

1. What are electromagnetic waves? _____

2. Electric fields are produced by electrically charged particles and by changing _____.
3. Magnetic fields are produced by magnets, by changing _____, and by vibrating charges.
4. Electromagnetic waves are produced when a(n) _____ vibrates or accelerates.
5. Circle the letter of each sentence that is true about electric and magnetic fields.
 - a. An electromagnetic wave occurs when electric and magnetic fields vibrate at right angles to each other.
 - b. A magnetic field is surrounded by an electric current.
 - c. Changing electric and magnetic fields regenerate each other.
 - d. Electromagnetic waves are produced when an electric charge vibrates.
6. Is the following sentence true or false? Electromagnetic waves need a medium to travel through. _____
7. The transfer of energy by electromagnetic waves traveling through matter or across space is called _____.

Chapter 18 The Electromagnetic Spectrum and Light**The Speed of Electromagnetic Waves (page 534)**

8. As a thunderstorm approaches, you see the lightning before you hear the thunder, because light travels _____ than sound.
9. Is the following sentence true or false? All electromagnetic waves travel at the same speed through a vacuum. _____
10. Circle the letter that gives the correct speed of light in a vacuum.
 - a. 3.00×10^8 kilometers per second
 - b. 3.00×10^8 meters per hour
 - c. 3.00×10^8 meters per second
 - d. 3.00×10^8 kilometers per hour

Wavelength and Frequency (page 535)

11. Circle the letter of each sentence that is true about electromagnetic waves.
 - a. Different electromagnetic waves can have different frequencies.
 - b. Wavelength is directly proportional to frequency.
 - c. Electromagnetic waves always travel at the speed of light.
 - d. All electromagnetic waves travel at the same speed in a vacuum.
12. As the wavelengths of electromagnetic waves increase, the frequencies _____, for waves moving in a(n) _____.

Wave or Particle? (pages 536–537)

13. Electromagnetic radiation behaves sometimes like a(n) _____ and sometimes like a stream of _____.
14. Interference only occurs when two or more waves overlap, so _____ experiment showed that light behaves like a _____.
15. The emission of electrons from a metal caused by light striking the metal is called the _____ effect.
16. Blue light has a higher frequency than red light, so photons of blue light have _____ energy than photons of red light.

Intensity (page 538)

17. The closer you get to a source of light, the _____ the light appears.
18. Intensity is the _____ at which a wave's energy flows through a given unit of area.
19. As photons travel farther from the source, the _____ of light decreases.