

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)

- What are electromagnetic waves? _____

- Electric fields are produced by electrically charged particles and by changing _____.
- Magnetic fields are produced by magnets, by changing _____, and by vibrating charges.
- Electromagnetic waves are produced when a(n) _____ vibrates or accelerates.
- Circle the letter of each sentence that is true about electric and magnetic fields.
 - An electromagnetic wave occurs when electric and magnetic fields vibrate at right angles to each other.
 - A magnetic field is surrounded by an electric current.
 - Changing electric and magnetic fields regenerate each other.
 - Electromagnetic waves are produced when an electric charge vibrates.
- Is the following sentence true or false? Electromagnetic waves need a medium to travel through. _____
- 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.