

**Goal** • Check your understanding of Chapter 4.

### What to Do

Circle the letter of the best answer.

1. Why do you see lightning before you hear thunder?
  - A. Lightning always occurs first, followed by thunder.
  - B. The speed of light is much faster than the speed of sound.
  - C. The speed of light is much slower than the speed of sound.
  - D. none of the above
2. What does “amplitude” mean?
  - A. the distance from one point on a wave to the same point on the next wave
  - B. the height of a wave crest above the rest position of the wave
  - C. the height of a wave crest above the wave trough
  - D. the number of times per second that the crest of a wave passes a fixed point
3. What happens as the wavelength of a wave decreases?
  - A. Amplitude decreases.
  - B. Amplitude increases.
  - C. Frequency decreases.
  - D. Frequency increases.
4. The range of colours of light that we can see is called which of the following?
  - A. the electromagnetic spectrum
  - B. the invisible spectrum
  - C. the Newtonian spectrum
  - D. the visible spectrum
5. Why does a yellow shirt look yellow in the bright sunlight?
  - A. The shirt absorbs yellow wavelengths of sunlight while reflecting other wavelengths.
  - B. The shirt adds yellow wavelengths of light to the sunlight that falls on it.
  - C. The shirt changes all wavelengths of sunlight that strike it into yellow wavelengths.
  - D. The shirt reflects yellow wavelengths of sunlight while absorbing other wavelengths.
6. A prism can separate sunlight into a band of different colours in which of the following processes?
  - A. absorption
  - B. diffusion
  - C. reflection
  - D. refraction

7. The visible spectrum is part of the electromagnetic spectrum. It occurs between which of the following?
- infrared rays and ultraviolet rays
  - microwaves and infrared rays
  - radio waves and microwaves
  - ultraviolet rays and X rays
8. Infrared rays are electromagnetic rays connected with which of the following?
- heat
  - light
  - radar
  - radio
9. Microwaves have the shortest wavelength of all radio waves. This result means that compared to other kinds of radio waves, they have which of the following?
- the highest frequency
  - the largest amplitude
  - the lowest energy
  - the lowest frequency
10. Which of the following is **not** a typical use for X rays?
- detecting breaks in bones
  - detecting cavities in teeth
  - detecting the speed of vehicles in traffic
  - screening luggage at airport security

**Match the Term on the left with the best Descriptor on the right.**  
**Each Descriptor may be used only once.**

Term	Descriptor
_____ 11. electromagnetic spectrum	A. change in direction of light as it passes into a prism
_____ 12. energy	B. distance from a point on one wave to the same point on the next wave
_____ 13. infrared rays	C. lowest part of a wave
_____ 14. refraction	D. the ability to apply a force over a distance
_____ 15. trough	E. the complete range of wavelengths of radiation
_____ 16. wavelength	F. the highest part of a wave
	G. used by observation satellites

**Short Answer Questions**

17. A light beam that is composed of blue light and red light is passed through a blue coloured filter.

(a) What is the colour of light that passes through the filter?

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(b) What colour is absorbed by the filter?

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(c) If the blue coloured filter is placed over a red apple, what effect will it have on the appearance of the apple?

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18. Ultraviolet waves carry a lot of energy, relative to visible light rays.

(a) List one reason why it is essential for our health to have some ultraviolet waves shine on our skin.

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(b) List two reasons why over-exposure to ultraviolet waves on our skin is harmful.

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19. Calculate the frequency, in hertz, of each of the following:

(a) the pendulum of a grandfather clock that swings back to the same spot 6 times in 12 s

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(b) a runner's heart rate in which the heart beats 180 times in 60 s

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(c) the frequency of a skipping rope in which the rope touches the ground 15 times in 10 s

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