

12. When force is exerted on a compressible fluid, its volume is reduced. What happens when force is exerted on an incompressible fluid? *The force is transmitted from one particle to another inside the substance. This phenomenon causes the fluid to flow out of its container or move through a tube or a conduit.*
13. Name one way in which the compressibility of particular fluids is useful in our lives today. *We can store large volumes of gas in small spaces, such as in compressed-air tanks. Other possible answers.*
- The Relationship Between Pressure and Volume of Compressible Fluids (pages 287 to 289)**
14. Describe the relationship between the volume of a compressible fluid and the pressure it exerts. *At a constant temperature, the pressure of a given quantity of gas varies inversely with the volume occupied by the gas and vice versa.*
15. a) Describe the change in volume of a gas when its pressure is quadrupled. *The volume will be four times smaller.*
 b) Describe the change in gas pressure when its volume is doubled. *The pressure will be half as strong when its volume is doubled.*
16. A compressed-air tank contains 15 L of air at a pressure of 20 000 kPa.
 a) If you wanted to compress this gas down to a volume of 5 L, how much pressure would you have to exert? *The volume would be three times smaller; therefore, the pressure exerted would have to be three times higher, or 60 000 kPa.*
 b) If you brought the quantity of air contained in the tank to a normal atmospheric pressure (around 100 kPa), what volume would the gas take up? *The pressure would be 200 times weaker; therefore, the volume would be 200 times larger, or 3000 L.*

Section 5 • Waves

Student textbook, pages 313 and 314

Types of Waves (pages 294 and 295)

1. True or false?
- a) A wave carries energy from one point to another. *True*
- b) A wave transports matter from one point to another. *False*
- c) Mechanical waves and electromagnetic waves can move through matter. *True*
- d) Mechanical waves and electromagnetic waves can move through a vacuum. *False; mechanical waves cannot move through a vacuum.*

The Characteristics of Waves (pages 296 to 298)

2. What am I?
- a) A wave with a deformation running parallel to the direction of its propagation *Longitudinal wave*
- b) The highest point in a wave *Crest*
- c) The distance between two identical deformations *Wavelength*
- d) The maximum height attained by a wave at its equilibrium point *Amplitude*

Sound (pages 298 to 300)

3. A singer's vocal cords vibrate 1320 times in 4 seconds as he sings a note. What is the frequency in hertz of the note?

$$f = \frac{\text{Number of cycles}}{\text{Total time}}$$

$$f = \frac{1320 \text{ cycles}}{4 \text{ seconds}}$$

$$f = 330 \text{ cycles/sec or Hz}$$

4. What is the threshold of audibility and what is its value in decibels? *The threshold of audibility is the lowest sound intensity that the human ear can perceive. It is 0 dB.*

The Electromagnetic Spectrum (pages 300 to 303)

5. Connect the types of electromagnetic waves in the list below with descriptions a) to g). The same answer can be used more than once.

Radio waves

Microwaves

Infrared rays

Visible light

Ultraviolet rays

X-rays

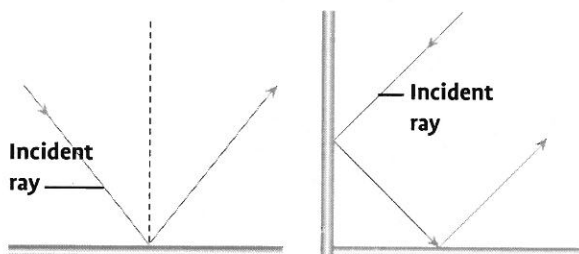
Gamma rays

- a) The electromagnetic waves that carry the greatest quantity of energy and are most dangerous to humans as a result *Gamma rays*
- b) The electromagnetic waves with the shortest wavelengths *Gamma rays*
- c) The electromagnetic waves with the lowest frequencies *Radio waves*
- d) The electromagnetic waves with wavelengths that correspond to particular colours *Visible light*
- e) The electromagnetic waves that are used in radiography *X-rays*

- f) The electromagnetic waves emitted by objects that are hotter than their surroundings *Infrared rays*
- g) The electromagnetic waves that make skin tan *Ultraviolet rays*

The Deviation of Light Waves (pages 303 to 310)

6. What are the following phenomena called?
- a) Phenomenon in which light rays bounce off an obstacle *Reflection*
- b) Phenomenon in which rays deviate when they pass through one translucent material into another that does not have the same density *Refraction*
7. What are the two laws of reflection?
1. *The incident ray, the normal ray and the reflected ray are all on the same plane.*
 2. *The angle of reflection is always equal to the angle of incidence.*
8. Trace the two following diagrams in your notebook. Draw the trajectory of the light rays.



9. Describe the characteristics of the virtual image produced by a plane mirror (the size, distance from the mirror and left-right orientation of the image). *The virtual image created in a plane mirror is the same size, has the same shape and appears to be the same distance behind the mirror as the real object in front of it. However, the left-right orientation is inverted in relation to the original object.*