SUMMARY OF CHAPTER 9

THE HUMAN ORGANISM AND THE DIMENSIONS OF SPACE

ST PROGRAM ONLY

1. OBSERVATIONS OF THE SKY

- Until the 17th century, humans relied solely on phenomena they could see with their own eyes to help them situate our planet in the Universe (p. 274).
- Among the phenomena observed with the naked eye were Earth's rotation on its own axis, the round shape of Earth, the phases of the Earth's moon, the rotation of Earth around the Sun, the constellations, five planets, comets, eclipses, auroras polaris, shooting stars, falling meteorites, etc. (pp. 275–276).
- Since the 17th century, scientists have developed many instruments to locate and observe celestial objects more accurately. Examples include reflector and refracting telescopes, binoculars, radiotelescopes, radar, observatories, satellites, space probes, space rockets, space shuttles and space stations (pp. 276, 280).
- Among the events made possible through the development of technologically advanced tools are the discovery and observation of new planets, galaxies and nebulae; the calculation of the speed of light; the development of the big bang theory, etc. (p. 276).
- Many countries have established space programs dedicated to understanding the Universe (p. 277).
- The astronomical unit (AU) is equal to the average distance between Earth and the Sun, or about 150 million km (p. 281).
- On Earth, distance is most often expressed in kilometres (km). Within the solar system, the astronomical unit is the best unit of measurement to express distance. A light year is the most appropriate unit to express the distance between stars (p. 282).
- A light year (ly) is equal to the distance light travels in one year, about 9 500 billion km (p. 282).

2. THE EARTH IN THE UNIVERSE

- The Moon is Earth's only natural satellite. It is located an average distance of 384 000 km from Earth (p. 284).
- The solar system is made up of one star (the Sun), eight planets, three dwarf planets and many natural satellites, asteroids and comets (p. 285).
- Between the planets Mars and Jupiter is an asteroid belt that contains the dwarf planet Ceres (p. 285).
- The eight planets and the asteroid belt are located within a radius of 30 AU of the Sun (p. 287).
- Beyond Neptune's orbit lies a second comet and asteroid belt called the Kuiper belt. Dwarf planets Pluto and Eris are part of the Kuiper belt. It is thought to extend between from 40 AU to more than 120 AU from the Sun (p. 288).
- Much farther away, at more than 40 000 AU from the Sun, lies an immense collection of asteroids and comets called the Oort cloud. Its location corresponds to the farthest limits of our solar system (p. 289).
- Large clusters of stars are called galaxies. All galaxies also contain cosmic dust and celestial bodies similar to planets and asteroids (p. 290).
- Our solar system is part of the galaxy called the Milky Way. Its diameter is 100 000 ly. Our Sun is situated 26 000 ly from its centre (p. 290).
- Observations indicate that the Milky Way is among millions of galaxies dotting the Universe (p. 291).

SUMMARY OF CHAPTER 9 (*CONTINUED*)

- The Milky Way and the Andromeda galaxy are the two largest galaxies in a cluster of some 30 galaxies (p. 292).
- The Universe can be observed up to a distance of about 15 billion ly (p. 292).