Chapter 9 Summary

9.1 Galaxies

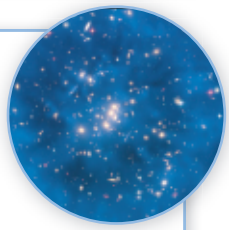
Key Concepts

- Galaxies are generally classified as spiral, elliptical, or irregular. They occur in clusters throughout the universe. These clusters form superclusters, which may contain 4 to 25 clusters.
- The Milky Way galaxy is a spiral galaxy, about 100 000 light-years in diameter. It is part of the Local Group of about 40 galaxies.
- Astronomers used improved technology, such as telescopes that were able to detect different parts of the electromagnetic spectrum, to learn more about the Milky Way galaxy and other galaxies.

9.2 The Universe

Key Concepts

- Edwin Hubble's observations of galaxies led to the discovery that the universe is expanding.
- Exploring space has generated valuable spinoff technologies.
- The most widely accepted theory of the beginning of the universe is called the big bang theory. According to this theory, an unimaginably tiny volume of space suddenly and rapidly expanded to an immense size about 14 billion years ago.



9.3 Unsolved Mysteries

Key Concepts

- The motions of stars and galaxies within clusters indicate that there are huge amounts of unseen matter, called dark matter, around each galaxy.
- Dark matter makes up about 23 percent of the universe—nearly six times more than visible matter.
- Dark energy makes up about 73 percent of the universe. Astronomers theorize that dark energy is responsible for the increased expansion of the universe.