Unit Review Answers (Student textbook pages 234–237)

Connect to the Big Ideas

1. Students' time lines should include information about all of Canada's contributions to space, including space technology and engineering, astronauts, and research. More information about Canada's space contributions can be found at **www.scienceontario.ca**.

2. Students should make reference to space spinoffs, as well as research that has explained more about the origin and existence of humans and planet Earth.

Knowledge and Understanding

3. Students' sketches should be similar to Figure 3.2 on page 71, showing that a constellation is a pattern of stars.

4. Students' drawings should be similar to Figure 3.3 on page 71, showing Ursa Minor moving in a counterclockwise motion around the North Star, Polaris.

5. Our Sun's gravitational pull keeps the planets in our solar system orbiting around it.

6. billions of stars held together, masses of gas and dust, empty space

7. **a)** kilometres or astronomical units
b) astronomical units
c) light-years
d) light-years

8. The Sun produces solar wind, which is charged particles that travel through the solar system very quickly and are deadly to Earth. Earth is protected from these particles because of its magnetosphere, which is a field of magnetic force surrounding Earth that deflects the solar wind and prevents much of it from getting into the atmosphere. When charged particles do enter the atmosphere at the poles, however, they interact with atoms in the upper atmosphere to create beautiful light displays called auroras. In the northern hemisphere, these lights are called the aurora borealis, or the Northern Lights.

9. **a)** C
b) A
c) D. For a lunar eclipse to occur, the Moon must pass through Earth's full shadow.
d) B. For a solar eclipse to occur, the Moon must pass between the Sun and Earth.

10. rocky, cratered surface; smaller than the other planets in the solar system; orbits bring them close to the Sun; no moons or very few moons

11. gassy atmosphere and no solid surface; very large; orbits keep them far from the Sun; rings; numerous moons

12. Earth, Mars, Jupiter, Saturn, Uranus, Neptune

13. Meteoroids are chunks of rock, metal, or both that break apart from asteroids or comets. When a meteoroid enters Earth's atmosphere and burns up, it makes a streak of light called a meteor. A meteor that lands on Earth's surface is called a meteorite.

14. The NEOSSat (Near-Earth Object Surveillance Satellite) is monitoring asteroids that may get too close to Earth. The impact of an asteroid on Earth would be devastating to life.

15. Canadarm2 and Dextre

16. A spinoff is a product or a technology that is originally developed for one use but is modified for other uses. Students' examples may include the following:

- quartz crystal clocks
- shock-absorbing materials for moon boots used in running shoes
- miniature components in cellphones, which were originally created for the shuttle program to save space and weight
- bar codes to keep track of the components of space shuttle now used to track inventory and in cash registers.
- heat-resistant materials used in space material now used as brakes in motor vehicles
- scratch-resistant glass now used in sunglasses
- robots designed for space now used in factories, by police, and by the military

Thinking and Investigation

17. Since Earth is the closest planet to the Sun, Jupiter would be closer to Earth than Saturn is, because Jupiter is closer to the Sun than Saturn is.

18. **a)** red
b) yellow-orange
c) red
d) white
e) yellow-white

19. Meteoroids are chunks of rock that break off from Comet Swift-Tuttle and remain in space. When Earth passes through this debris, the meteoroids enter Earth's atmosphere and burn up, making a streak of light called a meteor shower.

Communication

20. Ancient people used the changing night sky to keep track of time, and the Pyramid of Kukulkan in Mexico was likely used for the same purpose: to keep track of the days in a year.

21. Students may mention that sending humans to Mars is dangerous because of the potential risk to human life, and that it is also costly. However, students may also say that space exploration is important to find out more about Earth and for the protection and safety of humans in the future.

Application

22. Students' diagrams should show the following comparison:

Earth	Greenhouse
• Earth's atmosphere traps some of the energy from the Sun and redirects it back to Earth's surface. • Some of the Sun's energy that is absorbed escapes into space. • Some of the Sun's energy is reflected by the atmosphere.	• The greenhouse glass traps some of the energy from the Sun and redirects it to the plants inside. • Some of the Sun's energy that is absorbed into the greenhouse is given off by the ground and plants as heat. • Most of the heat in the greenhouse does not escape through the glass, but some does.

23. It would take a lot of time for the scientists to communicate with the probe, since Eros is so far away from Earth. The probe would have to send back enough information for the scientists to be able to successfully land the probe on such a small and rocky surface. The probe would have to be going at an appropriate speed to ensure it would survive the landing and not crash or be damaged.

24. water, atmosphere, appropriate temperature

25. Scientists explain the Northern Lights as the charged particles from the Sun's solar wind entering Earth's atmosphere at the poles and interacting with atoms.

26. **a)** pages 198, 199, 200, 201
b) Students' answers will vary. Possible examples include the following:
Mercury: squash ball
Earth: tennis ball
Jupiter: basketball
Uranus: baseball

27. Students' answers will vary. Possible answers may include the following:

a) an image from the movies *Star Trek* or *Star Wars*
b) "Across the Universe" by the Beatles, or "Twinkle Twinkle Little Star"
c) Students' explanations should appropriately support their choices.

Literacy Test Prep

Multiple Choice

28. d)

29. a)

30. b)

31. c)

32. d)

Written Answer

33. Students' newspaper articles should reflect their understanding of the MOST space telescope. You might have them review the format of a news report by referring to the news reports they created in Activity 3.10 (on page 204).