Note: All Problems are from *The Cosmic Perspective* (6ed)

Chapter 3

**Review Problems**

1. In what way is scientific thinking natural to all of us? How does modern science differ from this everyday type of thinking?

2. Why did ancient peoples study astronomy? Describe astronomical achievements of at least three ancient cultures.

3. How are the names of the 7 days of the week related to astronomical objects?

4. Describe at least three ways ancient peoples determined either the time of day or the time of year.

7. Summarize the development of the Greek geocentric model.

10. Why wasn’t the Copernican model immediately accepted? Describe the roles of Tycho, Kepler, and Galileo in the eventual triumph of the Sun-centered model.

12. State each of Kepler’s laws of planetary motion. Describe the meaning of each law in a way that anyone could understand.

14. What is the difference between a hypothesis and a theory in science?

**Test Your Understanding**

_Each of the following statements makes some type of claim. Decide in each case whether the claim could be evaluated scientifically or whether it falls into the realm of non-science. Explain clearly; not all of these have definitive answers, so your explanation is more important than your chosen answer._

17. The Yankees are the best baseball team of all time.

18. Several kilometers below its surface, Jupiter’s moon Europa has an ocean of liquid water.

19. My house is haunted by ghosts who make the creaking noises I hear each night.

20. There is no liquid water on the surface of Mars today.

21. Dogs are smarter than cats.

22. Children born when Jupiter is in the constellation Taurus are more likely to be musicians than other children.

23. Aliens can manipulate time so that they can abduct and perform experiments on people who never realize they were taken.

24. Newton’s law of gravity works as well for explaining the orbits of planets around other stars as it does for explaining the orbits of planets in our own solar system.

25. God created the laws of motion that were discovered by Newton.

**Quick Quiz**

*Choose the best answer to each of the following. Explain your reasoning with one or more complete sentences.*

34. Which of the following is *not* true about scientific progress? (a) Science progresses through the creation and testing of models of nature. (b) Science advances only through the scientific method. (c) Science avoids explanations that invoke the supernatural.

35. Which of the following is *not* true about a scientific theory? (a) A theory must explain a wide range of observations or experiments. (b) Even the strongest theories can never be proved true beyond all doubt. (c) A theory is essentially an educated guess.

**Chapter 4**

**Review Problems**

6. What are the laws of conservation of momentum, conservation of angular momentum, and conservation of energy? For each, give an example of how it is important in astronomy.

7. Define kinetic energy, radiative energy, and potential energy. For each type of energy, give at least two examples of objects that either have it or use it.

**Test Your Understanding**

*Decide whether the statement makes sense (or is clearly true) or does not make sense (or is clearly false). Explain clearly; not all of these have definitive answers, so your explanation is more important than your chosen answer.*

20. Suppose you could enter a vacuum chamber (on Earth), that is, a chamber with no air in it. Inside this chamber, if you dropped a hammer and a feather from the same height at the same time, both would hit the bottom at the same time.

22. I used Newton’s version of Kepler’s third law to calculate Saturn’s mass from orbital characteristics of its moon Titan.

23. If the Sun were magically replaced with a giant rock that had precisely the same mass, Earth’s orbit would not change.

25. Venus has no oceans, so it could not have tides even if it had a moon (which it doesn’t).

**Quick Quiz**

*Choose the best answer to each of the following. Explain your reasoning with one or more complete sentences.*

29. Which one of the following describes an object that is accelerating? (a) a car traveling on a straight, flat road at 50 miles per hour (b) a car traveling on a straight uphill road at 30 miles per hour (c) a car going around a circular track at a steady 100 miles per hour.

30. Suppose you visited another planet: (a) Your mass and weight would be the same as they are on Earth. (b) Your mass would be the same as on Earth, but your weight would be different. (c) Your weight would be the same as on Earth, but your mass would be different.
37. According to the law of universal gravitation, what would happen to Earth if the Sun were somehow replaced by a black hole of the same mass? (a) Earth would be quickly sucked into the black hole. (b) Earth would slowly spiral into the black hole. (c) Earth’s orbit would not change.