

Chapter 02

The Rise of Astronomy

Multiple Choice Questions

1. The moon appears larger when it rises than when it is high in the sky because
 - A. You are closer to it when it rises (angular-size relation).
 - B. You are farther from it when it rises (angular-size relation).
 - C.** It's an illusion from comparison to objects on the horizon.
 - D. It's brighter when it rises.

2. Kepler's third, or harmonic, law states that the
 - A. Period of an orbit cubed equals the semi-major axis squared.
 - B.** Semi-major axis of an orbit cubed equals the period squared.
 - C. Planets move fastest when they are closest to the Sun.
 - D. Semi-major axis of an orbit is inversely proportional to the period.

3. The paths of the planets on the sky are tilted with respect to the celestial equator by about
 - A. 5 degrees.
 - B.** 23 degrees.
 - C. 45 degrees.
 - D. 90 degrees.

4. Copernicus' heliocentric model failed to work as well as it might to predict the positions of planets because Copernicus insisted the orbits were
 - A.** Circular.
 - B. Elliptical.
 - C. Circular, mounted on epicycles.
 - D. Hyperbolic.

5. One of Tycho Brahe's major contributions to astronomy was to prove that _____ was _____.

- A. A supernova (exploding star); much farther away than the planets.
- B. A comet; outside the Earth's atmosphere.
- C. The Sun; the center of the solar system.
- D.** Both A; and B were accomplishments of Tycho Brahe.
- E. A; B and C were accomplishments of Tycho Brahe.

6. _____ was the first person to measure the circumference of the Earth.

- A. Ptolemy
- B. Copernicus
- C.** Eratsothenes
- D. Galileo
- E. Aristarchus

7. One of the methods used to date supernova remnants (the remains of exploded stars) today is by using

- A. The notebooks of Galileo.
- B.** The records of ancient Chinese, Japanese, and Korean astronomers.
- C. The works of Ptolemy.
- D. Kepler's laws.

8. Which of the following objects passes through the zodiac?

- A. Sun
- B. Planets
- C. Earth and Moon
- D.** All of the above
- E. None of the above

9. When was it first known that the Earth was spherical in shape?

- A. It was always known to be spherical.
- B.** At the time of the Greeks.
- C. At the beginning of the Renaissance.
- D. Only after Galileo used a telescope to study other planets.
- E. Only recently within the last 100 hundred years.

10. What is retrograde motion?

- A. East to west motion of the Sun over many successive nights.
- B. East to west motion of the Moon relative to the stars over many successive nights.
- C.** Occasional east to west motion of the planets relative to the stars over many successive nights.
- D. Occasional west to east motion of the planets relative to the stars over many successive nights.

11. What is the size of an object located at a distance of 1000 meters and that has angular size $A = 4$ degrees?

- A. About 11 meters.
- B. About 35 meters.
- C.** About 70 meters.
- D. About 4000 meters.

12. The general heliocentric model proposed by Copernicus was appealing, and eventually became preferred, because

- A. it explained why we do not observe stellar parallax.
- B. it replaced the Earth with the Sun as the center of the solar system.
- C.** it was more aesthetically pleasing than the complicated Ptolemaic model.
- D. It made more accurate predictions than the Ptolemaic model.

13. In _____ models, the Sun is assumed as the center of the solar system.

- A.** Heliocentric
- B. Geocentric

14. During retrograde motion, a planet moves from _____ to _____ relative to the stars.

- A. East; west (moves westward)
- B. West; east (moves eastward)

15. Retrograde motion is discernible by watching a planet over the course of

- A. A few minutes.
- B. Many hours.
- C. Many nights.
- D. Many years.

16. During the course of a single night, a planet that is moving in retrograde motion will move

- A. East to west.
- B. West to east.
- C. Not at all.
- D. Randomly about the sky.

17. Galileo was the first to observe the phases of _____.

- A. The Moon
- B. Venus
- C. Earth

18. In Copernicus' model of the solar system, the planets orbited the _____ in _____ orbits.

- A. Earth; circular
- B. Sun; elliptical
- C. Sun; circular

19. _____ major contribution to astronomy is his extensive series of measurements of planetary positions.

- A. Tycho Brahe's
- B. Galileo's
- C. Kepler's

20. _____ used the extensive records of planetary positions measured by _____ to discover that the orbits of the planets are _____.

- A. Tycho; Kepler; circular
- B. Tycho; Kepler; elliptical
- C. Kepler; Tycho; elliptical
- D. Kepler; Galileo; elliptical

21. Kepler's _____ law states that the orbits of planets are elliptical, with the Sun at one focus.

- A. First
- B. Second
- C. Third

22. From Kepler's _____ law, we conclude that the planets do not move with constant speed.

- A. First
- B. Second
- C. Third

23. From Kepler's _____ law, we conclude that Mars completes a full orbit much faster than Pluto.

- A. First
- B. Second
- C. Third

24. Observations indicate that it takes Saturn longer than Jupiter to complete one orbit about the Sun. This is in agreement with which of Kepler's laws?

- A. First
- B. Second
- C.** Third

25. The time between the vernal equinox and the autumnal equinox is somewhat greater than the time between the autumnal equinox and the vernal equinox. This is a result of Kepler's _____ law.

- A. First
- B.** Second
- C. Third

26. Imagine the much more massive Jupiter were to switch places with the less massive Mercury. Which of the following would accurately describe the outcome?

- A.** Jupiter would orbit the Sun in less time than it did before.
- B. Mercury would orbit the Sun in less time than it did before.
- C. The orbital time for each of the planets would not change.

True / False Questions

27. The paths of the planets' orbits lie in all different directions on the sky.

FALSE

28. Copernicus' model was significantly better at predicting future positions of planets than Ptolemy's.

FALSE

29. Galileo deduced many empirical laws of motion before Newton was even born.

TRUE

30. The inability to observe parallax of stars contributed to the ancient Greek astronomers rejection of the idea that the Earth revolves around the Sun.

TRUE

31. The motion of the Sun with respect to the stars is retrograde, i.e., east to west relative to the stars.

FALSE

32. During the month of January, the Earth goes through the point of closest approach to the Sun. Using Kepler's Second law we can conclude that the Earth moves faster in January than in July.

TRUE

33. During retrograde motion, the planet Mars rises in the West and sets in the East.

FALSE

34. Parallax is the shift in a star's apparent position due to the Earth's motion around the Sun.

TRUE

35. In geocentric theories, the Earth is assumed to be the center of the solar system.

TRUE

36. The Sun is located at the center of the Earth's elliptical orbit.

FALSE

37. According the Kepler's Laws the Sun is located at one of the foci of the Earth's orbit.

TRUE

38. The angular size of an object increases as the distance to the observer increases.

FALSE

39. The angular size of the Sun as observed from Earth is about 0.5 degrees.

TRUE

40. The angular size of the Moon as observed from Earth is about 0.5 degrees.

TRUE

41. The concept of the epicycle was introduced in the heliocentric model to explain the retrograde motion of the planets.

FALSE

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42. In the heliocentric model, the retrograde motion of the planets was explained as the consequence of the different orbital speeds of the planets, without the use of epicycles.

TRUE

43. Tycho Brahe relied on the use of telescopes to record his accurate positions for the planets.

FALSE

44. Copernicus was able to calculate the distances to the observed planets relative to the Earth's distance from the Sun.

TRUE