Review Test Submission: 3 CHAPTER QUIZ

User	Wenyin San
Course	1501_Stars Galaxies and the Universe [1501_ASTR_1960_00]
Test	3 CHAPTER QUIZ
Started	2/5/15 10:06 PM
Submitted	2/5/15 10:24 PM
Due Date	2/20/15 10:00 AM
Status	Completed
Attempt Score	25 out of 26 points
Time Elapsed	17 minutes.
Instructions	

Question 1

1 out of 1 points

Copernicus is famous for reviving what ancient Greek idea?

Selected Answer: d. The Earth orbits the Sun.

Answers:
a. The Earth is round.
b. the idea of gravitation
c. The planets wander differently than stars do.
d. The Earth orbits the Sun.

Response Feedback: FEEDBACK: This revival of the heliocentric model, re-proposed to better explain the retrograde motion of Mars, is often credited as one of the major starting points of the scientific revolution of the 16th century (page 65).

Question 2

1 out of 1 points

"Empirical science" seeks to

Selected Answer: a. describe nature using observation.

Answers:
a. describe nature using observation.
b. describe nature using photosynthesis.
c. use mathematics.
d. describe nature using gravitation.

Response Feedback: FEEDBACK: Empirical science seeks to accurately describe patterns in nature (page 69).

Question 3

1 out of 1 points

What was Tycho Brahe's major role in the history of modern astronomy?

Selected Answer: c. He gathered a vast amount of accurate planetary observations.

Answers:
a. He was Kepler's teacher.
b. He invented and used a new telescope.
c. He gathered a vast amount of accurate planetary observations.
d. He disproved Copernicus.

Response Feedback: FEEDBACK: Tycho Brahe collected much observational data before telescopes were used in astronomy. Kepler used Tycho's data to discover his laws (page 70).

Question 4

1 out of 1 points

The eccentricity of most planets in our Solar System is

Selected Answer: a. close to 0, nearly circular.

Answers:
a. close to 0, nearly circular.
b. close to 0, very eccentric.
c. close to 1, very eccentric.
d. close to 1, nearly circular.

Response Feedback: FEEDBACK: All planets orbit the Sun in elliptical orbits, but in our Solar System these orbits have small eccentricities, so they are almost circular (page 72). See also, *Kepler's Law and Planetary Orbit Simulator.*

Question 5

1 out of 1 points

Kepler's second law, the law of equal areas, states that

Selected Answer: c.

a planet moves most rapidly when it's closest to the Sun.

Answers:

a. planets orbit the Sun.

b. Jupiter moves faster than Saturn.

c. the area swept by Jupiter is equal to the area swept by Saturn.

d. a planet moves most rapidly when it's closest to the Sun.

Response Feedback: FEEDBACK: In order for a line between a planet and the Sun to trace out equal areas in equal time intervals, the planet must move faster when nearer the Sun. When the distance to the Sun is smaller, the speed of the planet must be greater (page 73). See also, *Kepler's Law and Planetary Orbit Simulator.*

Question 6

1 out of 1 points

The time it takes a planet to complete its orbit around the Sun is determined by its

Selected Answer: c. distance from the Sun.

Answers:

a. distance from the Sun.

b. distance from Earth.

c. synodic period relative to Earth.

d. mass.

Response Feedback: FEEDBACK: While one can *find* the time it takes a planet to complete its orbit around the Sun (the sidereal period) from its synodic period relative to Earth, according to Kepler's third law it is *determined* by its distance from the Sun (page 73–74). See also, *Kepler's Law and Planetary Orbit Simulator.*

Question 7

0 out of 1 points

According to Newton's first law, a space probe traveling through interplanetary space will

Selected Answer: b. require occasional rocket thrusts to maintain its motion.

Answers:
- a. maintain its motion without any outside force.
- b. require occasional rocket thrusts to maintain its motion.
- c. require constant rocketry to maintain its motion.
- d. naturally move in circles.

Response Feedback: FEEDBACK: Unless acted upon by an outside unbalanced force, Newton's first law states that an object at rest will remain at rest, and an object in constant straight line motion will remain on that path (page 77). See also, *Velocity, Acceleration, Inertia.*

Question 8

1 out of 1 points

Which of the following objects is accelerating?

Selected Answer: a. a ball moving at a constant rate around a circular hoop

Answers:
- a. a car moving constantly at 60 miles per hour down the highway
- b. a ball moving at a constant rate around a circular hoop
- c. a book at rest on a table, which is being both pulled by gravity and pushed by the table top
- d. None of the possible answers are correct.

Response Feedback: FEEDBACK: A ball in circular motion is being accelerated toward the center of the circle by the force of the hoop. Acceleration is a change of speed and/or direction. In this case, speed doesn't change but direction is constantly changing (page 78). See also, *Velocity, Acceleration, Inertia.*

Question 9

1 out of 1 points

A measurement of an object's inertia is made via its

Selected Answer: a. mass.

Answers:
- a. mass.
- b. velocity.
- c. acceleration.

d. force.

Response Feedback: FEEDBACK: Mass is the property of matter, which is the degree to which an object resists changes in its motion (page 76). See also, *Velocity, Acceleration, Inertia.*

Question 10 1 out of 1 points

Forces *always* occur

Selected Answer: a. simultaneously in pairs.

Answers:
a. as a result of mass.
b. singularly, unrelated to other forces.
c. simultaneously in pairs.
d. as a result of acceleration.

Response Feedback: FEEDBACK: Every time an object exerts a force on another, an equal and opposite force is exerted by the second object on the first (page 80).

Question 11 1 out of 1 points

The geocentric model of the solar system was considered correct for about how many years?

Selected Answer: a. 1,500

Answers:
a. 150
b. 15,000
c. 15
d. 1,500

Response Feedback: FEEDBACK: The Alexandrian astronomer Ptolemy summarized the geocentric model in 150 CE and was considered correct until Copernicus re-presented the heliocentric model about 1,500 years later. Harvard University, founded in 1636, is on record as having taught the geocentric model to students for a while (page 64).

Question 12 1 out of 1 points

When a planet exhibits retrograde motion, it moves in which direction relative to the stars?

Selected Answer: d. westward

Answers:
a. eastward
b. southward
c. westward
d. northward

Response Feedback: FEEDBACK: It was specifically the retrograde motion of Mars that was observed, studied, and explained by Tycho, Kepler, and Newton, respectively, that sparked the scientific revolution during the Renaissance (page 64). See also, *Ptolemaic Orbit of Mars* and *Retrograde Motion*.

Question 13

1 out of 1 points

In order to account for retrograde motion, Ptolemy had to resort to what embellishment to his geocentric model for the solar system?

Selected Answer: c. that planets would travel on smaller circles that were superimposed onto their larger, circular orbits around the Earth

Answers:
a. that planets would travel on smaller circles that were superimposed onto their larger, circular orbits around the Earth
b. a magnetic attraction between the planets and the Sun
c. a periodic “stopping” of motion around Earth by the Sun and the planets
d. that the celestial sphere of stars surrounding the planets and Sun would occasionally reverse direction

Response Feedback: FEEDBACK: The smaller circles are called *epicycles*; eventually, the Ptolemaic model became very complicated with planets traveling on epicycles on epicycles on epicycles (page 65). See also, *Ptolemaic Orbit of Mars.*

Question 14

1 out of 1 points

Copernicus’s heliocentric model provided

Selected Answer: c. All the possible answers are correct.

Answers: a.

a way to estimate the planet–Sun distances in terms of the Earth–Sun distance.

b. All the possible answers are correct.

c. a simpler explanation of retrograde motion.

d. a way to estimate how long it took each planet to orbit the Sun.

Response Feedback: FEEDBACK: The Copernican model was easily understandable, which made its predictions testable by a wide range of people. The Ptolemaic model became so complicated that only a few could actually understand it well enough to test its validity (page 65).

Question 15

1 out of 1 points

Which planet is the only one that could be in opposition?

Selected Answer: a. Mars

Answers:
a. Mars
b. Earth
c. Venus
d. Mercury

Response Feedback: FEEDBACK: Only planets superior to Earth, such as Mars, can periodically be in opposition (located in the opposite side of the sky as the Sun) (page 62). See also *Planetary Configurations Simulator*.

Question 16

1 out of 1 points

Which planet has a synodic period relative to Earth that is longer than its sidereal period?

Selected Answer: d. None of the possible answers are correct.

Answers:
a. Neptune
b. Mars
c. Jupiter
d. None of the possible answers are correct.

Response Feedback: FEEDBACK: For superior planets, the sidereal period is longer than its synodic period relative to Earth (page 67). See also *Planetary Configurations Simulator* and *Synodic*

Period Calculator.

Question 17

1 out of 1 points

Ceres, the largest asteroid in the asteroid belt between Mars and Jupiter, has a sidereal period of 4.6 years. What is its synodic period relative to Earth?

Selected Answer: d. 1.3 years

Answers: a. 1.3 years

b. 4.6 years

c. 0.8 years

d. 3.6 years

Response Feedback: FEEDBACK: For objects orbiting the Sun superior to Earth, use $1/P = 1/E - 1/S$, where P is the sidereal period of the object, E is the sidereal period of the Earth, and S is the synodic period of the object relative to the Earth (page 68). See also, *Synodic Period Calculator*.

Question 18

1 out of 1 points

Which model of the Earth, planets, and Sun did Tycho create?

Selected Answer: b. The planets orbit the Sun while the Sun orbits the Earth.

Answers: a. The planets, Sun, and Earth orbit a point in space between Mars and Jupiter.

b. The planets orbit the Sun while the Sun orbits the Earth.

c. None of the possible answers are correct.

d. The planets orbit the Earth while the Earth orbits the Sun.

Response Feedback: FEEDBACK: His geo-heliocentric model was met with limited acceptance for philosophical and religious reasons (page 70).

Question 19

1 out of 1 points

The perihelion distance is the closest distance a planet is to the Sun during its elliptical orbit around the Sun. If a fictitious planet has

semi-major axis of 10 AU and an eccentricity of 0.2, what is its perihelion distance?

Selected Answer: a. 8 AU

Answers: a. 8 AU
b. 11 AU
c. 12 AU
d. 9 AU

Response Feedback: FEEDBACK: Look closely at Figure 3-10a. Note how the perihelion distance would be equal to A – eA = A(1– e) (page 72). See also, *Kepler's Laws* and *Eccentricity Demonstrator.*

Question 20 1 out of 1 points

The aphelion distance is the furthest distance a planet is to the Sun during its elliptical orbit around the Sun. If a fictitious planet has semimajor axis of 10 AU and an eccentricity of 0.2, what is its aphelion distance?

Selected Answer: d. 12 AU

Answers: a. 11 AU
b. 8 AU
c. 9 AU
d. 12 AU

Response Feedback: FEEDBACK: Look closely at Figure 3-10a. Note how the aphelion distance would be equal to A + eA = A(1+ e) (page 72). See also, *Kepler's Laws* and *Eccentricity Demonstrator.*

Question 21 1 out of 1 points

If a fictitious planet has semimajor axis of 10 AU and an eccentricity of 0.2, what is its sidereal period?

Selected Answer: d. 31.6 years

Answers: a. 10.0 years
b. 14.1 years
c. 100.0 years
d. 31.6 years

Response Feedback: FEEDBACK: According to Kepler's third law, $P^2 = A^3$, so P = ?0v(1000 AU) = 31.6 years; eccentricity is not a factor (page 74). See also, *Kepler's Laws*. and *Kepler's Third Law.*

Question 22

1 out of 1 points

With his telescope, Galileo provided the first observational evidence that some objects in the sky do not orbit Earth. One piece of evidence was observing a full set of Venus phases (just like our Moon), which he claimed could have been seen only if Venus orbited the Sun at a closer distance than Earth. If Venus and the Sun did actually orbit Earth, what would Galileo have observed?

Selected Answer: c. He would have observed only the new and crescent Venus phases.

Answers:

a. He would have seen a bright, full Venus phase all the time.

b. He would have observed only the gibbous and full Venus phases.

c. He still would have observed a full set of Venus phases.

d. He would have observed only the new and crescent Venus phases.

Response Feedback: FEEDBACK: Remember that Venus would have an epicycle as it orbited Earth, where the Sun would not; these conditions allow only new and crescent Venus phases (page 75). See also, *Ptolemaic Phases of Venus.*

Question 23

1 out of 1 points

Why was Galileo considered the "first modern scientist?"

Selected Answer: b. He actually performed experiments to either validate or invalidate his thoughts about how nature worked.

Answers:

a. He was the first to use a telescope.

b. He actually performed experiments to either validate or invalidate his thoughts about how nature worked.

c. The "modern era" started in the year 1500 CE.

d.
His work was supported and endorsed by the Catholic Church.

Response Feedback: FEEDBACK: Galileo was a true “renaissance man” who pioneered the scientific method (pages 75–76).

Question 24

1 out of 1 points

Which of following would NOT be considered an inertia frame of reference?

Selected Answer: d. inside a car making a turn at constant speed

Answers:
a. inside your bedroom
b. inside a rocket ship headed for Jupiter moving at constant speed
c. inside a train rolling down the track at constant speed
d. inside a car making a turn at constant speed

Response Feedback: FEEDBACK: According to Newton’s First Law, an inertial frame of reference must be at rest or moving at constant speed in a straight line. Note: Technically, any location on Earth is a noninertial frame of reference because Earth rotates, but since we cannot feel this motion due our small size compared to Earth, these locations are considered very reasonable approximations of inertial frames of reference (page 77). See also, *Velocity, Acceleration, Inertia.*

Question 25

1 out of 1 points

A force F causes an object of mass M to accelerate. If you triple the mass, by what factor would the force have to change in order to maintain the same acceleration?

Selected Answer: a. 3 F

Answers:
a. 2 F
b. ½ F
c. 3 F
d. 1/3 F

Response Feedback: FEEDBACK: According to Newton’s Second Law, if acceleration is a constant, force is directly proportional to

mass (page 78).

Question 26

1 out of 1 points

Which characteristic of Earth's orbit around the Sun is considered "just right" for water to be a liquid?

Selected Answer: c. its semimajor axis

Answers:
a. its perihelion
b. its semimajor axis
c. its inclination
d. its aphelion

Response Feedback: FEEDBACK: Earth also has the added benefit of an atmosphere that maintains a sufficient pressure so that water can maintain its liquid state (page 82).

Tuesday, February 17, 2015 12:22:41 PM EST

← OK