

Name \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Where was the Sun in Ptolemy's model of the universe? 1) \_\_\_\_\_  
A) at the outer edge, beyond Saturn's orbit  
B) between the orbits of Venus and Mars  
C) slightly offset from the center  
D) between the earth and the Moon's orbit  
E) at the center
- 2) He discovered what we now call Newton's first law of motion. 2) \_\_\_\_\_  
A) Kepler  
B) Copernicus  
C) Ptolemy  
D) Galileo  
E) Tycho Brahe
- 3) The path that led to modern science emerged from ancient civilizations in which part of the world? 3) \_\_\_\_\_  
A) Central and South America  
B) the Mediterranean and the Middle East  
C) Southern Asia  
D) China  
E) North America
- 4) He discovered that Jupiter has moons. 4) \_\_\_\_\_  
A) Galileo  
B) Aristotle  
C) Ptolemy  
D) Kepler  
E) Tycho Brahe
- 5) When Copernicus first created his Sun-centered model of the universe, it did not lead to substantially better predictions of planetary positions than the Ptolemaic model. Why not? 5) \_\_\_\_\_  
A) Copernicus misjudged the distances between the planets.  
B) Copernicus placed the planets in the wrong order going outward from the Sun.  
C) Copernicus misjudged the speeds at which the planets orbit the Sun.  
D) Copernicus used perfect circles for the orbits of the planets.  
E) Copernicus placed the Sun at the center but did not realize that the Moon orbits the earth.

- 6) Scientific models are used to 6) \_\_\_\_\_
- A) prove that past paradigms no longer hold true.
  - B) present the solar system to the general public.
  - C) make miniature representations of the universe.
  - D) make specific predictions that can be tested through observations or experiments.
- 7) Which of the following statements about scientific theories is *not* true? 7) \_\_\_\_\_
- A) A theory can never be proved beyond all doubt; we can only hope to collect more and more evidence that might support it.
  - B) A theory cannot be taken seriously by scientists if it contradicts other theories developed by scientists over the past several hundred years.
  - C) If even a single new fact is discovered that contradicts what we expect according to a particular theory, then the theory must be revised or discarded.
  - D) A theory must make predictions that can be checked by observation or experiment.
  - E) A theory is a model designed to explain a number of observed facts.
- 8) Kepler's second law, which states that as a planet moves around its orbit it sweeps out equal areas in equal times, means that 8) \_\_\_\_\_
- A) planets have circular orbits.
  - B) a planet travels faster when it is nearer to the Sun and slower when it is farther from the Sun.
  - C) planets that are farther from the Sun move at slower average speeds than nearer planets.
  - D) a planet's period does not depend on the eccentricity of its orbit.
  - E) the period of a planet does not depend on its mass.
- 9) What do the structures of Stonehenge, the Templo Mayor, the Sun Dagger, and the Big Horn Medicine Wheel all have in common? 9) \_\_\_\_\_
- A) They were all places used for religious sacrifice.
  - B) They all can be used as lunar calendars.
  - C) They were all used by ancient peoples for astronomical observations.
  - D) They were all built on the orders of ancient kings.
  - E) all of the above
- 10) Which of the following is *not* part of a good scientific theory? 10) \_\_\_\_\_
- A) A scientific theory cannot be accepted until it has been proven true beyond all doubt.
  - B) A scientific theory must make testable predictions that, if found to be incorrect, could lead to its own modification or demise.
  - C) A scientific theory should be based on natural processes and should not invoke the supernatural or divine.
  - D) A scientific theory must explain a wide variety of phenomena observed in the natural world.

- 11) The controversial book of this famous person, published in 1543 (the year of his death), suggested that the earth and other planets orbit the Sun. 11) \_\_\_\_\_
- A) Tycho Brahe
  - B) Ptolemy
  - C) Copernicus
  - D) Kepler
  - E) Galileo
- 12) When did Copernicus live? 12) \_\_\_\_\_
- A) about 2000 years ago
  - B) about 5000 years ago
  - C) about 1000 years ago
  - D) about 500 years ago
  - E) about 100 years ago
- 13) Ptolemy was important in the history of astronomy because he 13) \_\_\_\_\_
- A) was the first to believe in an Earth-centered universe.
  - B) developed a model of the solar system that made sufficiently accurate predictions of planetary positions to remain in use for many centuries.
  - C) was the first to create a model of the solar system that placed the Sun rather than the earth at the center.
  - D) was the first to believe that all orbits are perfect circles.
  - E) developed the first scientific model of the universe.
- 14) Why did Ptolemy have the planets orbiting the earth on "circles upon circles" in his model of the universe? 14) \_\_\_\_\_
- A) to explain why the Greeks were unable to detect stellar parallax
  - B) to explain the fact that planets sometimes appear to move westward, rather than eastward, relative to the stars in our sky
  - C) to properly account for the varying distances of the planets from the earth
  - D) to explain why more distant planets take longer to make a circuit through the constellations of the zodiac
  - E) to explain why Venus goes through phases as seen from the earth
- 15) He was the first to prove that comets lie beyond the earth's atmosphere. 15) \_\_\_\_\_
- A) Kepler
  - B) Galileo
  - C) Aristotle
  - D) Tycho Brahe
  - E) Copernicus

- 16) How did Eratosthenes estimate the size of the earth in 240 B.C.? 16) \_\_\_\_\_
- A) by sending fleets of ships around the earth
  - B) by observing the duration of a solar eclipse
  - C) by measuring the size of the earth's shadow on the Moon in a lunar eclipse
  - D) by comparing the maximum altitude of the Sun in two cities at different latitudes
  - E) We don't know how he did it since all his writings were destroyed.
- 17) Historians trace the origins of a 24-hour day to 17) \_\_\_\_\_
- A) the ancient Egyptians.
  - B) the druids of Stonehenge.
  - C) the Mayans.
  - D) the Aztecs.
  - E) the Babylonian astronomer, Meton.
- 18) He discovered that the orbits of planets are ellipses. 18) \_\_\_\_\_
- A) Copernicus
  - B) Tycho Brahe
  - C) Ptolemy
  - D) Galileo
  - E) Kepler
- 19) Kepler's third law,  $p^2 = a^3$ , means that 19) \_\_\_\_\_
- A) planets that are farther from the Sun move at slower average speeds than nearer planets.
  - B) a planet's period does not depend on the eccentricity of its orbit.
  - C) all orbits with the same semimajor axis have the same period.
  - D) the period of a planet does not depend on its mass.
  - E) All of the above are correct.
- 20) From Kepler's third law, a hypothetical planet that is twice as far from the Sun as the earth should have a period of 20) \_\_\_\_\_
- A) 2 Earth years.
  - B) 1/2 Earth year.
  - C) more than 2 Earth years.
  - D) 1 Earth year.
  - E) It depends on the planet's mass.
- 21) Which of the following is *not* one of, nor follows directly from, Kepler's laws? 21) \_\_\_\_\_
- A) As a planet moves around its orbit, it sweeps out equal areas in equal times.
  - B) More distant planets move at slower speeds.
  - C) A planet travels faster when it is nearer to the Sun and slower when it is farther from the Sun.
  - D) The orbit of each planet about the Sun is an ellipse with the Sun at one focus.
  - E) The force of attraction between any two objects decreases with the square of the distance between their centers.

- 22) Compared with the standard *hour* of 60 minutes used today, the *hour* of ancient Egypt 22) \_\_\_\_\_
- A) divided the entire day into 12 equal parts.
  - B) was shorter than the *hour* used today.
  - C) was longer than the *hour* used today.
  - D) was longer than 60 minutes in the summer and shorter than 60 minutes in the winter.
  - E) differed in length depending on the pharaoh in power at the time.
- 23) When we see Venus in its full phase, what phase would the earth be in as seen by a hypothetical Venetian? 23) \_\_\_\_\_
- A) full
  - B) third quarter
  - C) new
  - D) waning crescent
  - E) first quarter
- 24) What is meant by a scientific *paradigm*? 24) \_\_\_\_\_
- A) a historical theory that has been proved inaccurate
  - B) a radical change in scientific thought
  - C) a generally well established scientific theory or set of theories
  - D) a pseudoscientific idea
  - E) a conundrum or unexplained set of facts
- 25) Earth is farthest from the Sun in July and closest to the Sun in January. During which northern hemisphere season is Earth moving fastest in its orbit? 25) \_\_\_\_\_
- A) summer                      B) winter                      C) fall                      D) spring
- 26) He developed a system for predicting planetary positions that remained in use for some 1,500 years. 26) \_\_\_\_\_
- A) Copernicus
  - B) Ptolemy
  - C) Kepler
  - D) Galileo
  - E) Tycho Brahe

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 27) What is pseudoscience? 27) \_\_\_\_\_
- 28) State Kepler's three laws of planetary motion. 28) \_\_\_\_\_
- 29) Describe one major accomplishment for each of the following people: Copernicus, Tycho Brahe, Kepler, Galileo, Newton. 29) \_\_\_\_\_
- 30) Describe how Eratosthenes first measured the size of the earth over 2000 years ago. 30) \_\_\_\_\_

31) Describe the Ptolemaic model of the solar system. How did Ptolemy account for the apparent retrograde motion of the planets?

31) \_\_\_\_\_

32) Why was a knowledge of the stars so important to Polynesians?

32) \_\_\_\_\_