Astr 01 **HW 01: History** Name_____

Show ALL work for full credit. Each problem 2 pts unless otherwise noted.

1) According to Newton's third law, when the *Voyager* probes passed Jupiter in 1979, they exerted exactly the same force on Jupiter as the giant planet did on them.

2) According to Newton's second law, if you double the force acting on a body, the acceleration will double.

3) According to Newton's first law, an object traveling in a circle does not have a force acting on it.

4) According to Kepler's third law, if you know the planet's orbital period, you can find its average distance from the Sun.

5) Kepler relied heavily on the telescopic observations of Galileo in developing his laws of planetary motion.

6) Among Galileo's discoveries with his telescope were sunspots.

7) Galileo's observations of the entire phase cycle of Venus proved that Ptolemy's epicycles could not be correct in keeping Venus between us and the Sun.

8) Copernicus believed the Earth was the center of all celestial motion.

9) In Ptolemy's geocentric model, retrograde motion occurs when the planet is closest to us, on the inside portion of the
A) deferent. B) epicycle. C) equant. D) ellipse. E) ecliptic.

10) According to Copernicus, the retrograde motion for Mars must occur
A) at quadrature, when Mars lies exactly 90 degrees east or west of the Sun.
B) at greatest elongation, when Mars can get up to 47 degrees from the Sun.
C) at opposition, when the Earth overtakes Mars and passes between Mars and the Sun.
D) at inferior conjunction, when Mars laps the Earth and passes between us and the Sun.
E) at superior conjunction, when Mars lies on the far side of the Sun.

11) Which of these was NOT seen telescopically by Galileo?
A) Venus' phase cycle
B) sunspots
C) craters and mare on the Moon
D) four moons around Jupiter
E) stellar parallax

12) Tycho Brahe's contribution to Kepler's Laws of Planetary Motion were
A) his observations of Jupiter's moons.
B) his detailed and accurate observations of the planets' positions.
C) a mathematical explanation of epicycles.
D) a precise lunar calendar.
E) the correct explanation of lunar phases.

13) Kepler's first law worked, where Copernicus' original heliocentric model failed, because Kepler described the orbits as

A) elliptical, not circular.
B) being on equants instead of epicycles.
C) around the Sun, not the Earth.
D) much larger than Copernicus had envisioned.
E) complex, with epicycles to account for retrograde motions.

14) The force of gravity varies with the

A) inverse square of the distance separating the two bodies.
B) inverse of the distance separating the two bodies.
C) product of the two masses.
D) Both A and B are correct.
E) Both A and C are correct.

15) How much stronger is the gravitational pull of the Sun on Earth, at 1 AU, than it is on Saturn at 10 AU?

A) 5 B) 10 C) 25 D) 100 E) 250

16) The mean distance between the Earth and Sun is called the

A) Kepler
B) parsec
C) light–year
D) megameter
E) astronomical unit

17) According to Newton, the gravity of the _____ is needed to explain planetary orbits.

A) Venus B) Sun C) Moon D) Jupiter E) Earth

18) Because he failed to observe stellar _____, Aristotle wrongly concluded we could not be in orbit around the Sun.

19) Ptolemy's model was _____, with the Earth fixed in the center of the universe.

20) The time for a planet to revolve around the Sun is its _____.

21) When Earth overtakes Mars, the outer planet retrogrades near _____.

22) Galileo's discovery of four moons orbiting _____ provided new support for the ideas of Copernicus.

23) In Newton's first law, the _____ of a body causes it to resist changes in its motion

24) Newton found that gravity varied with the _____ of the distance between the two bodies pulling on each other.

25) How did Ptolemy explain the retrograde motion of Venus?

26) What "imperfections" on the Moon were visible to Galileo's telescopes?

27) How did Tycho's detailed observations of Mars' brightness help show that its orbit could not be circular?

28) Explain how the eccentricity describes the shape of an ellipse.

29) According to Newton's first law, if a body is moving in the absence of any net external force, describe the continuing motion of the object.

30) How would Ptolemy explain the rising of the Sun? Contrast this to Copernicus' explanation of the same event.

31) How can astronomers determine the mass of the Sun?

32) 10 pts) Summarize how the telescopic discoveries of Galileo could be used in support of Copernicus.