NAME: KEY

Test x: *Astronomy*

Equations: $T = \frac{S}{S \pm 1}$ $e = \frac{c}{R}$ $\frac{T^2}{R^3} = k$

Constants: 1 year = 365 days Tropic of Cancer = 23.5°

Identify: *2 points each.*

1. Equinox — When the sun is directly over the equator.
2. Equant — The most radical component of Ptolemey's model of the solar system.
3. stellar parallax — The lack of this observation was a root cause of geocentrism.
4. Synodic — The period between one opposition to the next.
5. Aristotle — He really messed up physics for over a thousand years.
6. Hipparchus — Often called the first astronomer for his observations and calculations.
7. Eudoxus — Who first came up with an idea using spheres that could explain retrograde motion?
8. Kepler — He wrote a book "explaining" why there are only 6 planets based on the Platonic solids.
9. Eratosthenes — He was the first person to accurately measure the size of the earth.
10. Ecliptic — The path of the sun on the celestial sphere.

Multiple Choice: *2 points each.*

11. B Copernicus used all of the following in his model of the solar system EXCEPT
    a. epicycle. b. equant. c. deferent. d. eccentric.
    e. all of the above.

12. C Which of the following lists is in chronological order?
    a. Thales, Aristotle, Ptolemy, Hipparchus.
    b. Aristotle, Hipparchus, Ptolemy, Thales.
    c. Thales, Aristotle, Hipparchus, Ptolemy.
    d. Hipparchus, Aristotle, Thales, Ptolemy.

13. B What was the significance of the discovery that Venus went through all the phases?
    a. It proved the Copernican model was correct.
    b. It proved the Ptolemeic model was incorrect.
    c. It proved that the earth didn't move.
    d. It showed that the heavens weren't perfect.

14. D Which of the following has an Angle of Greatest Elongation?
    a. the Moon. b. Mars. c. Saturn. d. Venus.

15. B Why are there not solar eclipses once a month?
    a. There are, but the shadow of the moon is small, so not many people can see it.
    b. Because the moon's orbit is inclined with respect to the earth's orbit.
    c. Because the earth's axis is tilted with respect to the plane of the earth's orbit.
    d. Because the moon's rotation matches its orbit around the earth.
    e. Because of erratic sunspot activity that interfers the phases of the moon.

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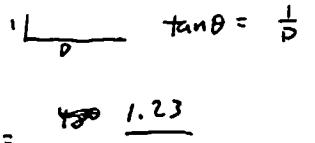
16. D The parallax of 61 Cygni is about 1/3 of a second. How far away is the star?
a. 10,300 AU. b. 20,600 AU. c. 309,000 AU. d. 619,000 AU e. 1,240,000 AU.

17. E What is the phase of the moon if it is rising at sunset?

a. b. c. d. e.



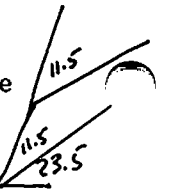
18. C The synodic period of some asteroid is 450 days. What is its sidereal period if it is outside the earth's orbit?
a. 0.55 years. b. 1.23 years. c. 5.29 years. d. None of those.

19. A If because of bad luck or reality TV, you are lost on a strange island, and see the North Star 30° above the horizon, what latitude are on?
a. 30°. b. 36.5°. c. 53.5°. d. 60°.

20. D If a planet has a semi-major axis of 0.8 AU, what is its angle of greatest elongation?
a. 37°. b. 39°. c. 51°. d. 53°.

21. B What was the Catholic Church's reaction to *Sidereus Nuncius*?
a. Galileo was charged with heresy for teaching that the earth moved.
b. Galileo's observations were confirmed by Jesuit astronomers.
c. The book was deemed heretical and placed on the banned book list.
d. The book was rejected as false and misleading.

22. E If you lived at a latitude of 35°, what would be the highest possible height of the sun in the sky on the Summer Solstice?
a. 11.5°. b. 36.5°. c. 53.5°. d. 58.5°. e. 78.5°.



Short Answer:

23. In class, I kept writing PUCM on the board. What does that stand for and what was it? (*6 points*)

24. What (correct) observational evidence is there that the earth is a sphere? Give at least two reasons. (*6 points*)

25. In the end of the sixteenth century, there was a debate on whether the earth or the sun was at rest in the solar system.
    a. Give four reasons why many people rejected the heliocentric hypothesis. Two must be "scientific" reasons, and the other two can be anything. (*6 points*)

    b. Why did some people prefer the heliocentric hypothesis? (*6 points*)

26. What did Galileo discover in *Sidereus Nuncius* and why was it important? (*10 points*)

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Problem Solving: *Show all work.*

27. Imagine a 5 meter flagpole in the ground has a shadow that is 1 meter long. At the exact same time, in a city 1500 km to your south, a flagpole doesn't have any shadow at all. What is the radius of your planet? (*6 points*)

$\tan\theta = \frac{1}{5}$

$\theta = 11.31°$

$= 0.2$ rad

$S = r\theta$

$1500 = r(.2)$

$r = 7599$ km

28. If a superior planet has a synodic period of 400 days and an eccentricity of 0.1, what is its aphelion distance? (*8 points*)

$S = \frac{400}{365} = 1.1$ years

$T = \frac{1.1}{1.1 - 1}$

$T = 11.43$ yrs.

$\frac{T^2}{R^3} = 1$ $\quad R^3 = (11.43)^2 = 130.6$

$R = 5.07$ AU

$e = \frac{c}{R}$

$c = (.1)(5.07)$

$c = .507$

$a = R + c$

$= 5.07 + .507$

$a = 5.58$ AU

29. What is the synodic period (in days) of an object that has a perihelion of 0.3 AU and an aphelion of 0.4 AU? (*8 points*)

$R = \frac{p+a}{2} = \frac{.3+.4}{2} = .35$ AU

$\frac{T^2}{1^3} = 1$ $\quad T^2 = (.35)^3 = .04$

$T = .21$ AU

$.21 = \frac{S}{S+1}$

$(.21)(S+1) = S$

$.21S + .21 = S$

$.21 = .79S$

$S = .27$ yrs.

$= 97$ days

.26

$= 95.3$