

**Instructions:** This test has the same format as before. Part A consists of short answer questions where you are to pick the best work, phrase, or choice of answers which best answers or, in some cases, defines the statement. Part B consists of longer answer questions. Make your answers clear and concise. If you need more room turn over the test paper and continue on the back but please indicate on front. For problems it is the procedure that will be checked, not only the answer, so please try to make it clear. So for this, the third poets' test of the term, Good Luck!

**Declaration:** I elect to do a (term paper, lab project). Please circle. The title is \_\_\_\_\_ and it (has, has not) been approved.

A. Short Answer Questions (1 1/2 points each question except where noted).

- Jupiter 1. (2) A planet in our solar system which is characterized by a great red spot is called ? while a planet in our solar system which is characterized by its rings is called ?
- Saturn
- Polaris or North Star 2. (2) The two stars that form the front part of the bowl of the Big Dipper point toward a star named ? which does not move in the sky as night progresses (All the stars rotate around it!). This star also forms the end of another constellation called ?
- Little Dipper
- 6 3. (3) The molecule  $C_6H_{12}O_6$  consists of ? carbon atoms, ? hydrogen atoms, and ? oxygen atoms.
- 12
- 8

90-38

- 38, 52, 38 6. (4) The atom  $^{90}\text{Sr}$  has ? protons and ? neutrons in the nucleus and ? electrons total for an electrically neutral atom. Of these electrons; there are ? in the first shell, ? in the second shell, ? in the third shell, ? in the fourth and shell, and ? in the fifth shell.
- 2, 8
- 8, 18, 2

- (b) & (d)  
Na & Cs 5. (2) From the periodic table, pick all of the following elements that have one electron in its outer shell (a) Mg, (b) Na, (c) Sr, (d) Cs, (e) Cl, (f) S.

- atomic mass (or atomic weight) 6. The weighted-average mass numbers of all naturally occurring isotopes of a particular element is called ? for that element.

- false 7. Knowing the name of an element still does not allow us to know the number of protons in its nucleus (true, false).

- wavelength "λ" 8. (2) A wave travels a distance of one ? in a time of one ? (fill in the appropriate physical quantities).
- period "T"

- sec/cycle 9. (2) REVIEW QUESTION: A physical quantity designating the time required for a wave to undergo one complete oscillation is called ?, and is in units of ?.

longitudinal 10. The "domino" effect is an example of what kind of wave--transverse or longitudinal?

- 2200 ft or 700m 11. (2) A flash of lightning is seen but the thunder is not heard until 2 seconds later. The lightning struck ? away.  $c = 1100 \frac{\text{ft}}{\text{s}}$   $d = vt = (1100 \frac{\text{ft}}{\text{s}})(2\text{s}) = 2200 \text{ft}$

- frequency 12. (2) A physical quantity designating the number of waves hitting an observer per second is called ? and is in units of ?. (Note: This same physical quantity is also the number of cycles per sec emitted by a source.)
- Hertz (#z)

(a) higher than 13. At a condensation (or compression) the air pressure, as well as density, is ? it would be in the absence of the condensation, (a) higher than; (b) lower than; (c) the same as.

density 14. The mass of an object per unit volume is a description of a physical quantity called ?.

mass number 15. The number of protons plus neutrons is called ?.

2.8m 16. If the distance from a condensation of a sound wave to the next successive rarefaction is 1.4 meters, what is the wavelength of the wave?  $= \frac{1}{2} \lambda$

5  $\frac{m}{s}$  17. (2) A pulse travels the length of a 15-meter-long piece of string in 3 sec. The speed of the pulse is ?.  $v = \frac{d}{t} = \frac{15m}{3s} = 5 \frac{m}{s}$

frequency 18. One divided by the "period" gives another physical quantity called ?.  $f = \frac{1}{T}$

64 lb 19. (2) REVIEW QUESTION: A person weighing 160 lb here on the surface of the earth travels to planet X which has a radius of 5 times that of the earth and a mass 10 times that of the earth. The person's new weight on the surface of planet X is now ?.

$$F_2 = \frac{(1)(10^2)(160lb)}{(5 \times 5)} = 64lb.$$

(a) greater than 20. The orbital velocity of the planet Venus is (a) greater than (b) equal to (c) less than the orbital velocity of the planet Mars.

ellipse 21. (2) REVIEW QUESTION: All planets travel in a geometric path called an ? with the sun at one ?.

focus focal point  
both have atmospheric 22. (+2 BONUS POINTS!!) What accounts for the fact that both Venus and Mars are much warmer than one would expect? carbon dioxide which cause the greenhouse effect.

milky way 23. (2) Our galaxy is called ? and is one of 17 galaxies that make up the next astronomical unit which is called a ?.

black hole 24. (2) An astronomical curiosity that has an escape velocity so large that not even light can escape is called a ?.

512 Hz 25. (2) The fundamental frequency of a guitar string is 256 Hz. Its second harmonic frequency is ? and the frequency of its third overtone is ?.

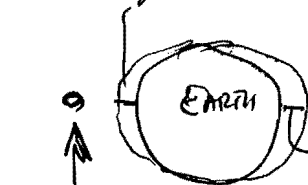
$$f_2 = 2f_1 = 2(256Hz) = 512Hz$$

Fund.	$f_1$
1st over.	$f_2$
2nd over.	$f_3$
3rd over.	$f_4 = 4f_1 = 4(256Hz) = 1024Hz$

B. Longer Answer Questions

1. (4) What causes ocean tides? Why are there two high (and two low) tides per day? The combination of both moon & sun exerting a gravitational force on the waters of the earth. The main attraction is the moon since it is so close.

High tide exists on side closest to moon.



High Tide exists on side furthest away from moon!  
Both Moon & Earth revolve about a common center of mass. There is insufficient centripetal force to hold the water close to surface on this side.

2. (3) Explain what you would see with a 1/4" drop of water if you
- (a) magnified it 2000 times. one would see biological curiosities such as paramecia
  - (b) magnified it another 2000 times. One would start to see division of water into particles
  - (c) magnified it another 250 times. One would see  $H_2O$  molecules



reproduced again + again in the drop.

3. (5) What are standing waves? What is necessary for them to be set up in a slinky? What then are nodes and antinodes?

Standing waves occur when you have a string, slinky, air column, or even a bridge AND some disturbing force such as a bow, moving hand, vibrating lips or fluttering wind. If you have two fixed supports, an integral number of half wavelengths is required to just fit in between the two supports. Then reflected waves constructively superimpose to oncoming waves to set up resonance  $\Rightarrow$

Nodes are points of no motion  
Antinodes are " " of maximum motion.

4. (4) Explain how one might find other planets that make up our solar system--namely, where should one look in the sky in order to see them? Also, why is it that at night, some planets aren't observable? Hint: In order to answer the first part of this question, THINK about what is special about the plane of the earth's orbit, the plane of our solar system, and the plane of the galaxy to which we are a part.

If the planets are in a plane, we on earth would see them along a path across the sky. This path would be the same that ~~the~~ the narrow sun follows during its daily march across the sky AND the same path that we observe the Milky Way. Some planets will not be observed when they are on the other side of the sun.

5. (4) Why are electron shells important in determining how molecules are formed from atoms? Give an example of a molecule formed from atoms by discussing the number of electrons of each in the outer shell.

6. (3) Define resonance and give an example.

7. (5) Define and distinguish between a longitudinal wave and a transverse wave and give two examples of each.

8. (4) Explain what is meant by the term "escape velocity." Use this concept to explain why it is that the moon has no atmosphere, why the earth has an atmosphere of oxygen and nitrogen but not hydrogen and helium, and finally why the atmosphere of Saturn retains hydrogen and helium.

9. Discuss, using the concepts of the revolution of the earth and the inclination of the earth on its axis, (a) (2) summer and winter for the northern hemisphere, (b) (1) the winter solstice, (c) (1) the summer solstice, and (d) (1) the fall or spring equinox.

(a)



Axis



SUMMER  
(Axis tilts  
toward  
sun)

(b) When axis points the most toward the sun, the longest day.

(c) When axis points the most away from the sun, the shortest day.

(d) When the sun falls equally on both northern + southern hemisphere (12H day + 12H night)



WINTER (Axis tilts away from Sun)

10. (4) REVIEW QUESTION: State two of Kepler's three laws and include a diagram and/or example of each case.

10. Please answer the following questions in this part by choosing your answer from the following list of possible choices: (½ point each blank.) (Note: Some terms may be used more than once and some not at all!)

Acropol  
Carbon Dioxide  
Earth  
Eccentricity  
Ecliptic  
Equatorial diameter

Helium  
Hydrogen  
Inclination of Axes  
Jupiter  
Mars  
Methane

Mercury  
Neptune  
Nitrogen  
Oblateness  
Orbital velocity  
Oxygen

Pluto  
Revolution  
Rotation  
Saturn  
Uranus  
Venus  
Xenon

- a) A term which can be used to best explain why we have night and day.
- b) The planet whose rings can be seen through telescopes here on earth.
- c) Is the closest planet to the sun.
- d) Is the most massive planet.
- e) Is the further-most planet from the sun.
- f) Two planets which turn on their axes backward ("retrograde") from every other planet known in our solar system.
- g) The planet having the greatest orbital velocity is?
- h) A planet whose moons were observed by Galileo.
- i) The planet with the hottest surface is?
- j) The planets which are known to have substantial amounts of hydrogen and helium in their atmosphere are?
- k) The term designating the time to make one complete cycle around the sun.
- l) The term designating the time a heavenly body takes to make one complete turn on its own axis.
- m) A term designating the plane of the earth's orbit.
- n) All other planets lie very nearly in the plane of the earth's orbit except for one. What planet is it?
- o) The planet with the greatest volume is?
- p) The planet with the least mass is?
- q) The most dense planet is?
- r) The planet having the largest surface gravity is?
- s) The planet which has the most moons (39 moons so far) is?
- t) The planet which has the second most moons (30 moons so far) is?
- u) A measure of how "pancake-like" a planet (or object) is?

Rotation

Saturn

Mercury

Jupiter

Pluto

{ Uranus  
~~Mars~~ Venus

Mercury

Jupiter

Venus

{ Jupiter  
Saturn  
Uranus  
Neptune  
revolution

Rotation

ecliptic

Pluto

Jupiter

Pluto

earth

Jupiter

Jupiter

Saturn

oblateness