Physics 1130 | Quiz 1 (66 points) | Name SOLUTION
Physics for Poets | September 22, 2009 | Lab Section: A1, A2, A3 (Please circle)
Campus Mail Box # _____

Instructions: This test is divided into two parts. Part A is entitled short answer questions where you are to pick the *best* word, phrase or choice of answers which best answers or, in some cases, defines the statement. Part B is entitled 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 write "over" on the test. For problems, it is the procedure that will be checked, not only the answer so please try to make it clear. Be sure to include units in answering problems (such as we've done in class). For problems that include underlined precision digits, be sure to use the corresponding precision rule or significant figure rule, accordingly. Point weighing is indicated in parentheses. So for this, the first quiz of the fall poets' course, Good Luck!

A. Short Answer Questions (1 Point each question except as marked. Questions 1 through 11 are multiple choice.)

d 1. Bode's law giving the sizes of the orbits of the planets is no longer considered to be a physical law because it (a) did not agree with the data known at the time it was proposed. (b) did not make any predictions that could be tested. (c) was actually proposed by Titus of Wittenburg. (d) was not based on physical principles.

a 2. Besides the United States, which of the following major countries has *not* adopted the metric system of units? (a) No other. (b) Great Britain. (c) Australia. (d) Russia

d 3. How many millimeters are there in one kilometer? (a) 10 (b) 100 (c) 1000 (d) 1,000,000

c 4. A meter is about the same length as (a) a mile (b) a foot (c) a yard (d) an inch

C 5. Which of the following is equal to 86,400 s? (a) $8.64 \times 10^2$ s (b) $8.64 \times 10^3$ s (c) $8.64 \times 10^4$ s (d) $8.64 \times 10^5$ s (e) $8.64 \times 10^6$ s

b 6. The diameter of a typical atom is approximately 0.000 000 000 1 m. This can also be written as (a) $1 \times 10^{-9}$ m (b) $1 \times 10^{-10}$ m (c) $1 \times 10^{-11}$ m (d) $1 \times 10^{-12}$ m (e) $1 \times 10^{9}$ m (f) $1 \times 10^{10}$ m

c 7. Which of the following could be a velocity? (a) 5 m west (b) 5 m/s (c) 5 m/s west (d) 5 m/s/s

c 8. In the strobe diagram below, the ball is moving from left to right. Which statement best describes the motion? The ball is (a) moving with a constant speed. (b) speeding up. (c) slowing down. (d) not accelerating.

O O O O O O

C 9. For our laboratory, an error (that we must be careful that we do not commit) results from the relative positions of the observer, the measuring instrument, and the object that is to be measured. This error is referred to as (a) inherent (b) instrumental (c) parallax (d) systematic (e) random (f) Gaussian

b 10. For our laboratory, error results from the precision limitations of our measuring instruments. This error is referred to as (a) inherent (b) instrumental (c) parallax (d) systematic (e) random (f) Gaussian.

a 11. For our laboratory, error results from the experiment itself. For our last lab, human reaction time was a typical example. This error is referred to as (a) inherent (b) instrumental (c) parallax (d) systematic (e) random (f) Gaussian.

→ 12. (12)Choose from the list of physical quantities listed in question 13 to identify the quantities listed below taken from various problems.

Speed a) 6.3 ft/sec
length e) 9.8 ft
mass l) 3.9 slug
force b) 5.2 N
acceleration f) 2.75 (m/sec)/sec
acceleration j) 2.7 m/sec$^2$
area c) 2.92 ft$^2$
volume g) 4.7 m$^3$
mass k) 2.77 kg
time d) 3.62 sec
force h) 3.63 lb
time l) 2.25 H

13. (6) Choose from the physical quantities which we have discussed—*length, area, volume, time, mass, force, speed, acceleration*—to answer the following:

force a) A measure of a push or a pull is called ?.

volume b) The amount of space occupied by an object is a 3 dimensional measurement called ?.

area c) The amount of surface is a 2 dimensional measurement called ?.

acceleration d) The *change* in velocity of an object divided by the time it takes is called ?.

speed e) The distance an object travels divided by the time that it takes is called ?.

force f) Weight is a ?.

14. (3) Write the following in Scientific Notation.

$2.7811 \times 10^{-4}$ kg a) 0.00027811 kg

$2.1 \times 10^{6}$ mi b) 2,100,000 miles

$5.02 \times 10^{-1}$ m c) 0.502 m

15. (3) Write the following in ordinary notation.

.000321 m a) $3.21 \times 10^{-5}$ m

521,000 m b) $5.21 \times 10^{5}$ m

.07002 kg c) $7.002 \times 10^{-2}$ kg

48 ft$^3$ 16. (2) A box measuring 2.5 ft by 5.5 ft by 3.5 ft contains ? ft$^3$ and ? in$^3$.

$30\text{in} \times 66\text{in} \times 42\text{in} = 83{,}000\text{in}^3$

83,000 in$^3$

420 mi 17. (1) At an average speed of 60 mi/H, how far will a motorist travel in 7.0 hours?

$v = \frac{d}{t} \Rightarrow d = vt = \left(60\frac{\text{mi}}{\text{H}}\right)(7.0\text{H}) = 420\text{ mi}$

.25H = 15 min 18. (2) The distance from Hamline to downtown Minneapolis is 7.0 mi. How long will this trip take if you average 28 mi/hr? $v = \frac{d}{t} \Rightarrow vt = d \Rightarrow t = \frac{d}{v} = \frac{7.0\text{mi}}{28\text{mi/H}} = .25\text{H}$

150 ft 19. (1) If you're traveling at 50 ft/s and look to the side for 3.0 s, how many feet are traveled during this inattentive period? $v = \frac{d}{t} \Rightarrow d = vt = \left(50\frac{\text{ft}}{\text{s}}\right)(3.0\text{s}) = 150\text{ ft}$ (using "1" rule).

$10^{-3}$ g = .001 g 20. (1) One milligram (or 1 mg) is equal to ? gram.

4.0 ft/s = 4.0 ft/s$^2$ 21. (2) An object speeds up from 50 ft/s to 70 ft/s in 5.0 s. Its acceleration is ?. (Be sure to include units.) $\text{acc} = \frac{\text{change in } v}{\text{time}} = \frac{70\text{ft/s} - 50\text{ft/s}}{5.0\text{s}} = \frac{20\text{ ft/s}}{5.0\text{s}} = 4.0\ \frac{\text{ft/s}}{\text{s}}$

1,000,000 22. (1) There are ? cubic cm in one cubic m.

1.875 mi 23. (2) If 1.6 km = 1 mi, how far away in mi is 3000 m? $3000\text{m} = \left(\frac{3000\text{m}}{1}\right)\left(\frac{1\text{km}}{1000\text{m}}\right)\left(\frac{1\text{mi}}{1.6\text{km}}\right) = 1.875\text{m}$ using "1" rule

$25 24 (3) If expensive silk cost $4.00 per square ft, the *cost* of a 15.0 in wide by 5.0 ft long piece of silk is ?. (Caution: Watch units.)

$\text{Area} = 1.25\text{ft} \times 5.0\text{ft} = 6.3\text{ ft}^2$

$\text{Cost} = \$4/\text{ft}^2 (6.3\text{ft}^2) = \$25$

20.8 ft$^2$ 25. (2) 3,000 square in equals ? square feet. $3000\text{in}^2 = \left(\frac{3000\text{in}^2}{1}\right)\left(\frac{1\text{ft}^2}{144\text{in}^2}\right) = 20.8\text{ft}^2$

~~12 in = 1 ft~~ $144\text{in}^2 = 1\text{ft}^2$

0 26. (1) A car is going down the highway at constant speed. The acceleration of the car is ?.

B. Longer Answer Questions

1. (3) (a) (2) Explain the difference between weight and mass.
(b) (1) Construct a situation whereby the mass of an object does not change but its weight does.

(a) Weight is the force due to gravity pulling vertically down. Mass is a measure of quantity of matter contained by an object.

(b) An object taken from here to the moon would have the same mass (quantity of matter) but a different weight (gravitational pull).

2. (5) Convert 70 cm/s to mi/H. A string of conversion factors or a fraction is quite satisfactory; you need not multiply out the numbers to get full credit.

NOTE: 12 in = 1 ft
60 sec = 1 min
60 min = 1 H
5280 ft = 1 mi
1 mi = 1.6 km
2.54 cm = 1 in

$$\frac{70\ cm}{s} = \left(\frac{70\ cm}{1\ s}\right)\left(\frac{1\ in}{2.54\ cm}\right)\left(\frac{1\ ft}{12\ in}\right)\left(\frac{1\ mi}{5280\ ft}\right)\left(\frac{60\ s}{1\ min}\right)\left(\frac{60\ min}{1\ H}\right)$$

$$\frac{70\ cm}{s} = 1.57\ \frac{mi}{H}$$ using "1" rule.

3. An object travels at a constant velocity of 5.0 m/s to the right.
(a) (1 ½) Find the distance traveled after (i) t = 1.0 sec 5.0 m

(ii) t = 2.0 sec 10.0 m

(v) t = 3.0 sec 15.0 m

(b) (1) Make a sketch of the approximate *position* of the object at the above times.

t=0 1s 2s 3s

Equal distances Traveled in equal times

4. An object speeds up from rest with a constant acceleration of 4.0 m/s/s to the right.

(a) (1 ½) *how fast* is the object moving (i) after t = 1.0 s: 4.0 m/s

(ii) after t = 2.0 s: 8.0 m/s

(iii) after t = 3.0 s 12.0 m/s using "1" rule.

(c) (1) Make a sketch of the approximate *position* of the object at the above times.

t=0 1s 2s 3s

Unequal distances traveled in equal times.