

General Physics Chapter 1 & 2 Pre-Test

Please show work and **include units when available**. **Consider significant figures** when making your final answer. Please use a calculator.

1.) (3 pts total, 1 pt each) Provide the abbreviation and power of each prefix:

- a) milli
- b) kilo
- c) centi

2.) (3 pts) What is the density of a metal with a mass of 98.2 g and a volume of 12.4 L?

3.) (3 pts) How much of a compound do you have if it has a volume of 78.5 mL and a density of 14.1 g/mL?

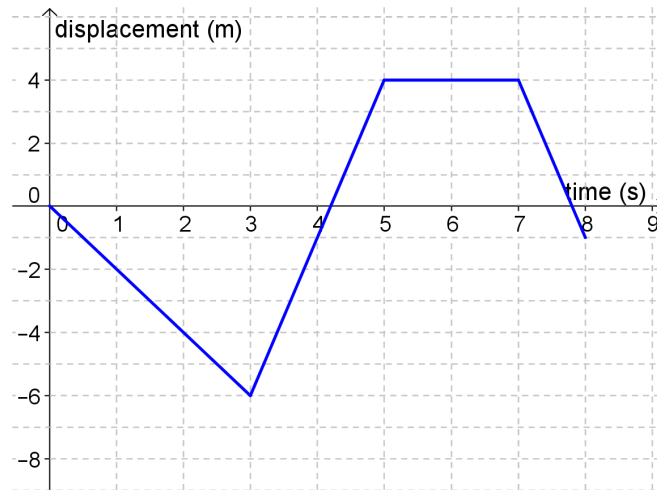
4.) (3 pts) Use your knowledge of units to answer the following.

**R** represents the universal gas constant. Its units are  $\frac{atm \cdot L}{mol \cdot K}$ . If **P** corresponds to *atm*, **V** measured in *L*, **n** representing *mol*, and **T** corresponds to *K*. Each of these values are utilized within the ideal gas law. With this information, along with some algebra, Find what **P** is equivalent to.



6.) (3 pts) The Daytona 500 is a stock car race in which drivers complete 200 laps around a 2.5 mile oval track. What is the distance travelled by each stock car? What is the displacement? Explain your reasoning.

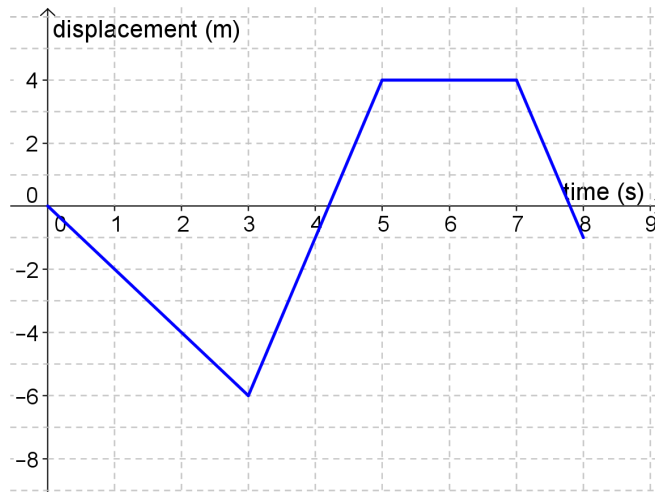
7.) (16 pts total, 2 pts each) Use the graph to answer the following. Assume three significant figures.



a) What is the displacement at time = 5.00 s?

b) What is the distance at time = 5.00 s?

c) What is the average velocity at time = 6.00 s?



d) What is the average speed at time = 6.00 s?

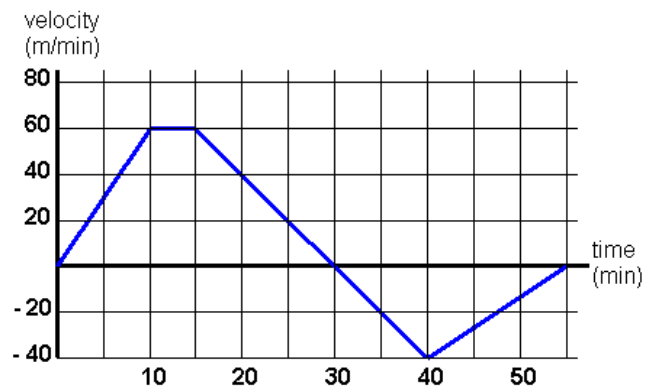
e) What is the instantaneous velocity at time = 6.00 s?

f) What occurred at time = 3.00 s?

g) What is the average velocity at time = 3.00 s?

h) What is the instantaneous velocity at 2.00 s?

8.) (15 pts total, 3 pts each) Use the graph to answer each of the following. Assume 3 significant digits.



a) Indicate on the graph where acceleration is positive, negative, and constant.

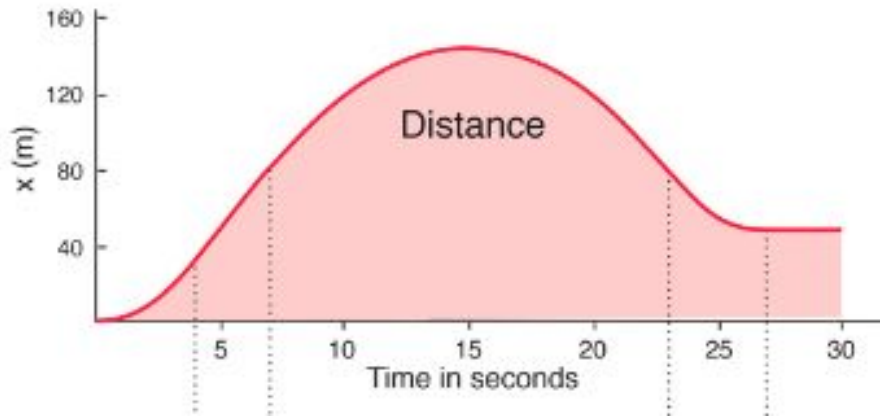
b) Find the average acceleration at  $t = 15$  min.

c) Find the instantaneous acceleration at  $t = 30$  min.

d) Find the instantaneous acceleration at  $t = 40$  min.

e) Find the average acceleration at  $t = 25$  min.

- 9.) (3 pts) Evaluate the graph. Label where velocity and acceleration are either positive or negative.



- 10.) (20 pts total, 4 pts each) Solve each. For each scenario, assume acceleration is constant. *Term breakdown will not appear on actual exam!*

- a) An ambulance is 40.0 m from the hospital and heading away from it. If it starts at 3.50 m/s and accelerates at a rate of 2.80 m/s<sup>2</sup>, how far away from the hospital will it be in 55.0 s?

$$x_i = 40.0 \text{ m} \quad v_i = 3.50 \text{ m/s} \quad a = 2.80 \text{ m/s}^2 \quad t = 55.0 \text{ s}$$

- b) A helicopter starts 125 m away from base at 6.60 m/s. How fast is it traveling when it reaches its destination 795 m away from base if it experienced a constant acceleration of 1.35 m/s<sup>2</sup>?

$$x_i = 125 \text{ m} \quad x_f = 795 \text{ m} \quad v_i = 6.60 \text{ m/s} \quad a = 1.35 \text{ m/s}^2$$

- c) A train is travelling within an initial velocity of 32.0 m/s. If it accelerates at 1.50 m/s<sup>2</sup>, what is its final velocity in 24.0 s?

$$v_i = 32.0 \text{ m/s} \quad a = 1.50 \text{ m/s}^2 \quad t = 24.0 \text{ s}$$

- d) A jet takes off 300. m away from the launch site travelling in the opposite direction at 85.0 m/s. In 38 seconds, the jet is now moving at 112 m/s. How far away from the launch site is it now?

$$v_f = 112 \text{ m/s} \quad v_i = 85.0 \text{ m/s} \quad x_i = 300 \text{ m} \quad t = 38.0 \text{ s}$$

- e) A car passes the first check point traveling 65.0 mi/hr. If it passes the second check point at 83.0 mi/hr, what is its average velocity if acceleration is constant?

$$v_i = 65.0 \text{ mi/hr} \quad v_f = 83.0 \text{ mi/hr}$$

11.) (20 pts total, 4 pts each) A penny is thrown straight *upward* from the top of a building at a velocity of 16.0 m/s. If the building is 264 m tall, find each of the following. (Use  $t = 0$  as the time the penny leaves the thrower's hand. Also, there is no need to include thrower's height.)

a) What is the maximum height?

b) At what time does the penny reach its maximum height?

c) At what time does the penny return to the height from which it was thrown?

d) What is the velocity of the penny just prior to impact?



e) What is the velocity and position of the penny at  $t = 3.00$  s.

12.) (12 pts total, 4 pts each) While being chased by the authorities, Jackson drives his car off a 76 m tall cliff. If he is traveling at 7.50 m/s at the time he drives off the cliff, find each of the following. (Assume  $v_{iy} = 0$  m/s and no air resistance.)

a) How long until the car impacts the cushiony ground below? (No Jacksons were harmed in the making of this problem.)

b) How fast is the car traveling in the y direction after 2.50 s?

c) How far from the base of the cliff will the car land?

With constant acceleration

$$v_{xf} = v_{xi} + a_x t$$

$$Av \ v_x = \frac{v_{xi} + v_{xf}}{2}$$

$$x_f = x_i + \frac{1}{2}(v_{xi} + v_{xf})t$$

$$x_f = x_i + v_{xi}t + \frac{1}{2}a_x t^2$$

$$v_{xf}^2 = v_{xi}^2 + 2a_x(x_f - x_i)$$

1 inch = 2.54 inches