Quiz 1--PHYS 201--Fall 2013

Multiple Choice  (30 points)  
Identify the choice that best completes the statement or answers the question.

1. Which of these is the answer considering appropriate use of significant figures:

\[
\frac{4.52 + 2.5}{0.50 \times 14}
\]

a. 1.000  
b. 1.00  
c. 1.0  
d. 1

2. In square millimeters, estimate the area of this box.

a. 0.4 mm\(^2\)  
b. 4 mm\(^2\)  
c. 40 mm\(^2\)  
d. 400 mm\(^2\)  
e. 4,000 mm\(^2\) 

3. What must the units of Q be so this equation is dimensionally correct?

\[
\frac{xt}{v} = \frac{Q}{a}
\]

a. meters  
b. meters-seconds  
c. meters-seconds\(^2\)  
d. 1/seconds

4. Which of these is the current standard for the kilogram?

a. the mass of a silicon atom  
b. the mass of a particular cylinder  
c. the mass of 3x10\(^8\) light photons  
d. 1 billionth the mass of the earth
5. Consider this graph. What is the sign of the acceleration?

![X vs t graph]

a. positive  
b. negative  
c. zero  
d. not enough information to tell

6. This graph shows the velocity versus time graph for 3 separate cars: A, B, and C. Which of these statements is false?

![V vs t graph]

a. Cars A, B, and C all reach the same final velocity.  
b. Car A initially has a larger acceleration than Car B  
c. Cars A, B, and C all travel the same distance.  
d. Car C finishes with a larger acceleration than Car A.

7. When throwing a ball straight up, which of the following is true about its velocity v and its acceleration a at the highest point in its path?

a. both \( v = 0 \) and \( a = 0 \)  
b. \( v \neq 0 \), \( a = 0 \)  
c. \( v = 0 \), \( a \neq 0 \)  
d. both \( v \neq 0 \) and \( a \neq 0 \)
Problems. Please show your work on all problems. (Total: 70 points)

8. (40 points) An object is in motion as described by this function and the associated graph. Please label and circle each answer (label parts a-g).

\[ x(t) = 2t^2 + 4t \]

a) What is the average velocity between 1 and 3 seconds?
b) What is the magnitude and direction of the acceleration for this object at \( t=3 \) seconds?
c) What is the initial velocity of this object?
d) What is the velocity of this object at \( t=3 \) seconds?
e) Show, graphically, how to find the velocity at \( t=3 \) seconds?
f) Calculate the total distance traveled (ie., with calculus).
g) Sketch the velocity versus time graph for this function. Be sure to show the appropriate signs (+/-) for the velocity axis.
9. (15 points) A house is 40.0 ft long and 22 ft wide and has 10.0-ft-high ceilings. What is the volume of the interior of the house in cubic centimeters? Use appropriate significant figures. (1 meter = 3.28 feet)

10. (15 points) Complete the derivation of this equation, \( V = V_o + at \)

Begin with the definition for acceleration:

\[ a = \frac{dv}{dt} \]