Your Name: _____

PHY203
Final Exam
12/15/08

Lecture Time: **9 a.m** **1p.m.** **2p.m.** **3p.m.** **Honors**

Part 1

1-10 _____ **(out of 70)**

11 _____ **(out of 30)**

Total _____

Multiple choice answer sheet-shade in correct answers below
(one choice per problem):

	1	2	3	4	5	6	7	8	9	10
a										
b										
c										
d										
e										

For problems 1 and 2 consider two trains running in the same direction on parallel tracks. Train 1 passes the station at time, t = 0, with a constant speed of 100 m/s.

1. Train 2 passes the station 10 seconds later than train 1 at a constant speed of 120 m/s. Find the time, t (measured from t=0 as above), at which the trains are exactly side-by-side:

a. 5.45 sec.
b. 10.9 sec.
c. 60 sec.
d. 120 sec.
e. None of the above

2. Train 2 leaves the station 10 seconds later than train 1 at an initial speed of 0 m/s but an acceleration of 20 m/s^2. Find the time, t, at which the trains are exactly side-by-side:

a. 3.8 sec.
b. 13.1 sec.
c. 16.2 sec.
d. 26.2 sec.
e. 33.0 sec.

For problems 3-5, Let $\mathbf{A} = 4\mathbf{i} - 9\mathbf{j}$, $\mathbf{B} = 3\mathbf{i} - 5\mathbf{j}$, $\mathbf{C} = 2\mathbf{A} - 3\mathbf{B}$

3. Find the magnitude of the vector **A**:

a. -5.0
b. 5.0
c. -8.1
d. 8.1
e. None of the above

4. Find the angle that vector **B** makes with the positive x-axis (measured from the positive x-axis in a counterclockwise direction):

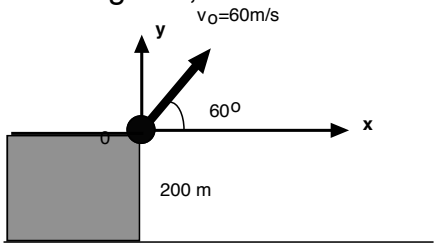
a. 121^o
b. 239^o
c. 301^o
d. 329^o
e. None of the above

5. Find the magnitude of the vector **C**:

a. 2.1
b. 3.2
c. 6.3
d. 37.1
e. None of the above

For Questions 6-10:

A missile is shot from a cliff with height 200m and initial speed of 60m/s and an angle of 60 degrees, as shown below. (Use g = 9.81 m/s^2.)



6. What is the initial velocity vector, $\mathbf{v_o}$, in vector notation?

a. (30**i** - 52**j**)m/s
b. (52**i** - 30**j**)m/s
c. (30**i** + 52**j**)m/s
d. (52**i** + 30**j**)m/s
e. None of the above

7. Find the time in sec. that it will take for the missile to reach its highest point:

a. 3.06 sec.
b. 5.3 sec.
c. 6.1 sec.
d. 10.6 sec.
e. None of the above

8. Find the y distance above the cliff at which the missile reaches its highest point:

a. 2.65 m
b. 45.9 m
c. 138 m
d. 276 m
e. None of the above

9. Find the time in sec. that it will take for the missile to hit the ground:

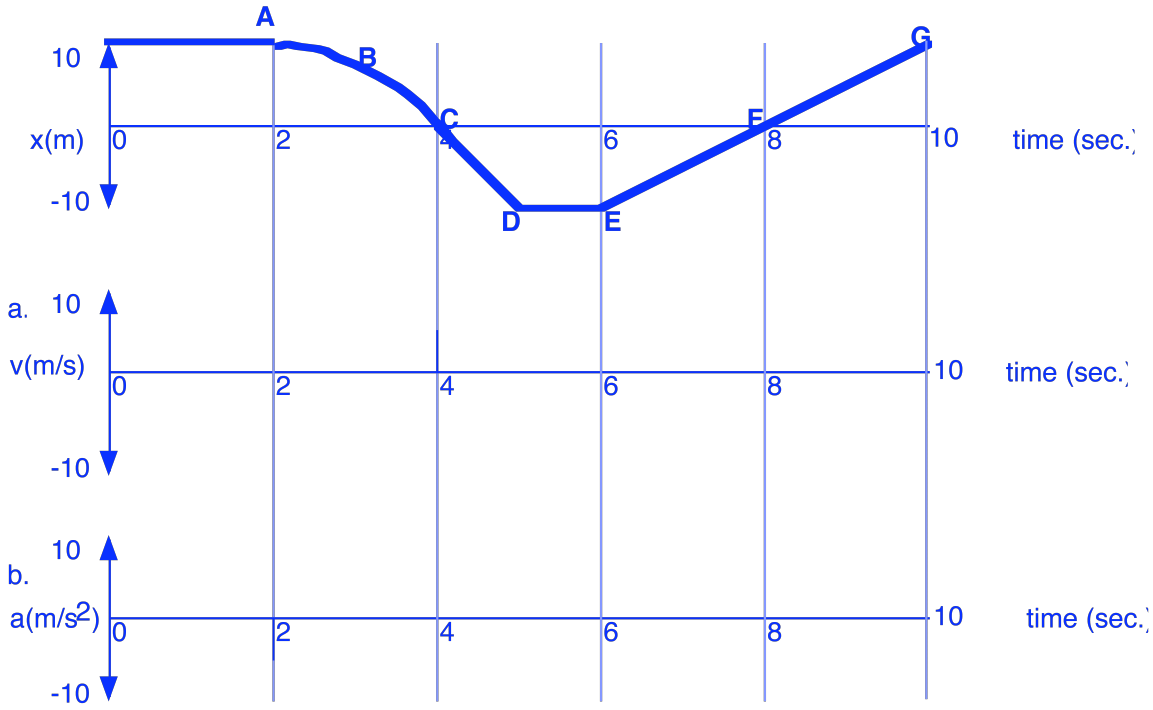
a. 3.0 sec.
b. 8.86 sec.
c. 13.6 sec.
d. 27.2 sec.
e. None of the above

10. Find the horizontal distance beyond the cliff at which the missile hits the ground:

a. 266 m
b. 408 m
c. 461 m
d. 707 m
e. 816 m

See other side for Problem #11

11. For the displacement curve of a car on a 1D track, plot the corresponding curves for velocity, a., and acceleration, b., (the displacement, x, is in straight line segments except for the curve A-B-C, which is a **parabola**). (Note: The acceleration is not constant for the entire graph so constant acceleration equations can *not* be correctly used below.)



c. Calculate the total distance traveled from points C-F.

d. Calculate the average speed from points C-F.

e. Calculate the average velocity from points C-F.

f. Calculate the average acceleration from points B-F.

PHY203
Exam #1 Crib Sheet
Chapters 1-3

$\Delta\mathbf{r} = \mathbf{r}_2 - \mathbf{r}_1$ (displacement)

$\mathbf{v}_{av} = \Delta\mathbf{r}/\Delta t$ $\quad$ speed_{av} = distance/time

$\mathbf{a}_{av} = \Delta\mathbf{v}/\Delta t$ $\quad$ speed_{inst} = magnitude of vel.

$\mathbf{v}_{Inst} = d\mathbf{r}/dt$

$\mathbf{a}_{Inst} = d\mathbf{v}/dt$

<u>For constant acceleration</u>:

$x_f = x_o + v_o t + (1/2)at^2$

$v_f = v_o + at$

$V_f^2 = v_o^2 + 2a(x_f - x_o)$

For a vector **A** with magnitude A and direction θ (measured with respect to the x-axis):

$A_x = A\cos(\theta)$

$A_y = A\sin(\theta)$

$A = (A_x^2 + A_y^2)^{1/2}$

$\tan(\theta) = A_y/A_x$

quadratic eq. sol.: If $ax^2 + bx + c = 0$; then $x = -b\pm(b^2-4ac)^{1/2}/(2a)$

TABLE 1-1

Prefixes for Powers of 10†

Multiple	Prefix	Abbreviation
10^{18}	exa	E
10^{15}	peta	P
10^{12}	tera	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{2}	hecto	h
10^{1}	deka	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

† The prefixes hecto (h), deka (da), and deci (d) are not multiples of 10^3 or 10^{-3} and are rarely used. The other prefix that is not a multiple of 10^3 or 10^{-3} is centi (c). The prefixes frequently used in this book are printed in red. Note that all prefix abbreviations for multiples 10^6 and higher are uppercase letters; all others are lowercase letters.