X1.d 107

Physics 107 (Kaldon-22243) **Name** _____

WMU - Spring 2002 **Book Title** _____

Exam 1 - 100,000 points – SAMPLE EXAM

Rev. 5/11/00 Th.2

State Any Assumptions You Need To Make – Show All Work – Circle Any Final Answers
Use Your Time Wisely – Work on What You Can – Be Sure to Write Down Equations
Short Answers Should Be Short! – Feel Free to Ask Any Questions

"Truth or Dare" (25,000 points) ***Multiple-Guess-Fill-In-The-Bubbles***

mph	sec
25	144.0
30	120.0
35	102.9
40	90.0
45	80.0
50	72.0
55	65.5
60	60.0
65	55.4
70	51.4
75	48.0
80	45.0
85	42.4
90	40.0
95	37.9
100	36.0
105	34.3
110	32.7
115	31.3
120	30.0
125	28.8
130	27.7
135	26.7
225	16.0

1.)(a) It is 4.00 miles from Bill's house to Wackie Weenie World where Bill works. On Monday Bill drives at a constant 60.0 mph. How many seconds does it take to travel this distance? *The handy chart at left may be useful.*

A = 60.0 sec B = 120. sec C = 240. sec D = 360. sec
E = 480. sec F = None of these

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

(b) On Tuesday Bill drives the 4.00 miles by constantly accelerating from rest to 120. mph. How many seconds does it take to travel this distance?

A = 60.0 sec B = 120. sec C = 240. sec D = 360. sec
E = 480. sec F = None of these

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

(c) On Wednesday Bill drove 2.00 miles accelerating from rest to 120. mph and then 2.00 miles decelerating from 120. mph back down to zero. How many seconds does it take?

A = 60.0 sec B = 120. sec C = 240. sec D = 360. sec
E = 480. sec F = None of these

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

(d) On Thursday Bill drives 2.00 miles at 120. mph, stops for 2.00 minutes, then drives the last 2.00 miles also at 120. mph. How many seconds does it take?

A = 60.0 sec B = 120. sec C = 240. sec D = 360. sec
E = 480. sec F = None of these

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

(e) Terry is having a bad day at his physics test. When he steps outside, he throws his calculator straight up in the air at $v_0 = +15.0$ *m/s*. What is the acceleration of the calculator as it goes up?

A = +9.8 m/s² B = -9.8 m/s² C = +1.0 m/s² D = -1.0 m/s² E = 0 m/s²
F = None of these

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

(f) What is the acceleration of the calculator at the top of its travel?

A = +9.8 m/s² B = -9.8 m/s² C = +1.0 m/s² D = -1.0 m/s² E = 0 m/s²
F = None of these

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

"You have the right to remain silent. You have the right to an attorney." (25,000 points)

2.) In class you were shown the classic pursuit problem where a speeding car undergoing Uniform Motion passes by a stopped police car which then begins Constant Acceleration. (a) To "catch" the speeder, the cop and the speeder have to be in the same place at the same _____. *(Fill in the blanks for (a) and (b).)*

(b) One problem with this classic pursuit is that the cop ends up traveling _____ as fast as the speeder, because the cop was accelerating.

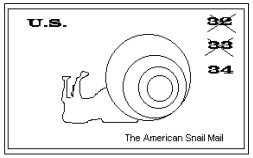
(c) Here is a different kind of pursuit problem: A crook and a cop spot each other on the street at the same time, but the cop is at $x = 0.00$ *m* and the crook is at $x = 20.0$ *m*. At time $t = 0$, the crook starts running away from the cop at *6.55 m/s* and the cop starts chasing him at *7.55 m/s*. *VERY* briefly explain why it is reasonable that the cop will catch the crook in *20.0 seconds*.

(d) Write an equation for x for the crook and solve it for $t = 20.0$ *sec.*

(e) Write an equation for x for the cop and solve it for $t = 20.0$ *sec.* Do you get the same x as in (d)?

Neither Rain Nor Sleet Nor Snow Nor Gloom of Night… (25,000 points)

3.) A letter starts on its way into the United States Postal Service by passing through a slot and falling into a mailbox, starting from rest. If the height that it fell was 0.504 meters, (a) how long (time) did the letter take to fall?



(b) How fast was the letter going just before it hit the bottom of the mailbox? *You do not need the answer to (a) to solve this.*

(c) A sorting machine needs to get the letter from *rest* to *11.0 m/s* in a distance of *45.0 cm*. What is the acceleration of the letter in this machine?

(d) The letter is sent on a truck for 500. miles. Which would get there faster: (I) Traveling half the distance at 55.0 mph and half the distance at 70.0 mph or (II) Traveling half the time at 55.0 mph and half the time at 70.0 mph? *BRIEFLY explain your answer. You may not need to calculate anything to answer this.*

(e) The letter was mailed at 8:00:00 am on Tuesday and delivered at 10:00:00 am on Thursday (50.0 hours) and traveled some 518.7 miles (834.6 km). What was its average speed? *Give answer in m/s, of course.*

"He's at the 50… the 40… the 30… he… could… go… all… the… way…" (25,000 points)

4.) It's fourth down and a football player kicks a football to the other team. The football travels 45.0 meters in the horizontal and 22.2 meters at its highest point in the vertical. (a) How long (time) was the football in the air?

(b) What was the initial v_{0y} of the football right after it was kicked? *Note: this can be solved without (a).*

(c) What is v_y at the top of the arc, at $y = 22.0\ m$?

(d) What is the acceleration of the ball in the *x*-direction, a_x ?

(e) Find the initial v_{0x} of the football right after it was kicked. *If you didn't get an answer to (a), then use t = 5.50 seconds.*