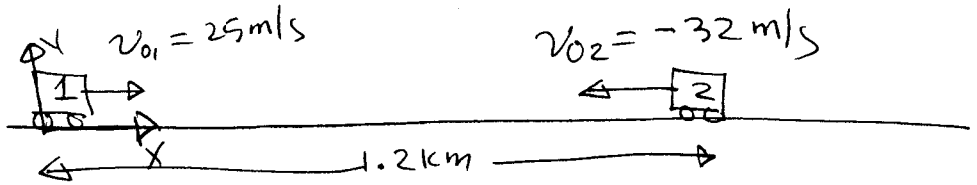
Name: KEY
Physics 50/Winter 2011
Quiz 3

Make sure to show all work in complete detail. NO CREDIT will be given if no work is shown!!!

1. Two cars drive on a straight highway. At time t = 0, car 1 passes the mile marker 0 traveling due east with a speed of 25.0 m/s. At the same time, car 2 is 1.2 km east of the mile marker 0 traveling at 32.0 m/s due west. Car 1 is speeding up at with an acceleration of magnitude 2.7 m/s^2, and car 2 is slowing down with an acceleration of magnitude 3.3 m/s^2.

a) Calculate when the cars pass by each other.
b) How fast is each car moving when they pass by each other?
c) What is the position of each car when they pass each other?
b) Draw a graph of x vs. t for each car on the same graph.



$x_{01} = 0$
$v_{01} = +25$ m/s
$a_1 = +2.7$ m/s^2

$x_{02} = 1200$ m
$v_{02} = -32$ m/s
$a_2 = +3.3$ m/s^2

a) Car pass by each other when:

$x_1 = x_2$

$x_{01} + v_{01}t + \frac{1}{2}a_1t^2 = x_{02} + v_{02}t + \frac{1}{2}a_2t^2$

$25t + 1.35t^2 = 1200 - 32t + 1.65t^2$

$0 = 1200 - 57t + 0.3t^2$

$t_1 = 24.1$ s
$t_2 = 1663$

b) $v_1 = v_{01} + a_1t_1 =$ 90.1 m/s (wow fast car!!)

$v_2 = v_{02} + a_2t_1 =$ 47.5 m/s

c) $x_1(t_1) = x_2(t_1) =$ 1387 m

d)