Final exam
Heat is weighed heavily

phys 1080 — Lecture 1
Study guide : 9, textbook : 7.1-7.5

1D Kinematics Equations.

Constant a

$V = V_0 + at$

$X = X_0 + V_0 t + \frac{1}{2} a t^2$

$V^2 = V_0^2 + 2a(x - X_0)$

$X - X_0 = \left(\frac{V_0 + V}{2}\right) t$

If $a = 0$

$V = V_0$

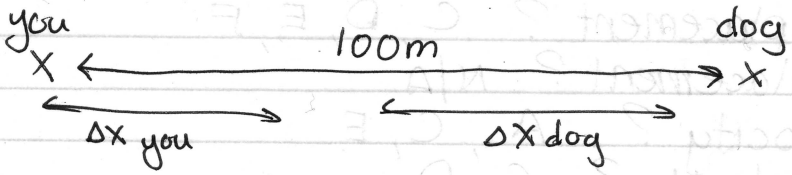
$\Delta X = V_0 t$

$\frac{\Delta X}{t} = V$

Handling Kinematic Questions
- break up problem into parts.
∴ each type of motion as a separate portion,
- list what you know about each part (i.e, Δx, V_0, a, t, etc).

Ex 1. Dog runs at you at a constant 5m/s. At 100m away, you start running at constant acceleration. You meet her when your speed is 6 m/s. How long does it take for you to catch up?

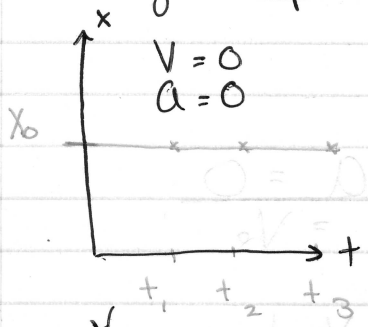
You	Dog
$V_0 = 0$ m/s	$V_0 = 5$ m/s
$V = 6$ m/s	$V = 5$ m/s
$a = ?$	$a = 0$ (constant)
$\Delta t = ?$ ← same →	$\Delta t = ?$

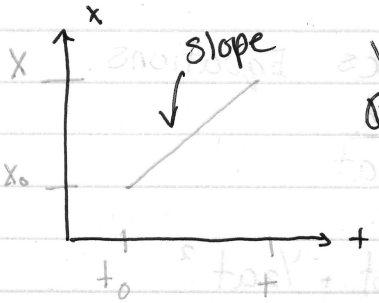


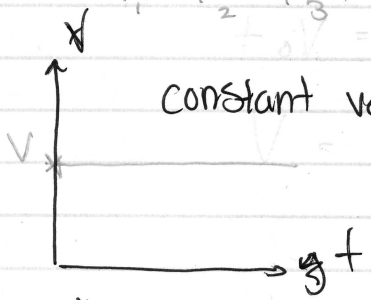
$\Delta X_{you} + \Delta X_{dog} = 100m$

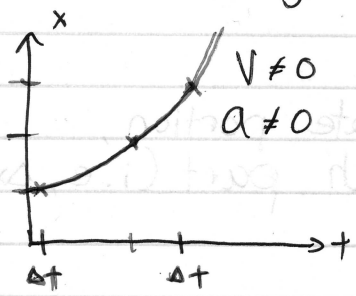
$t = 12.5s$

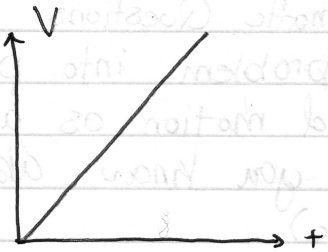
Reading Graphs.



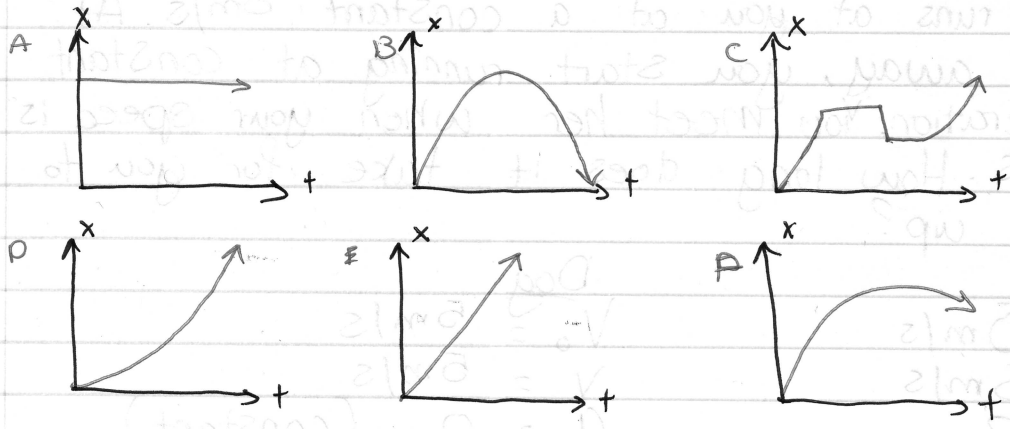








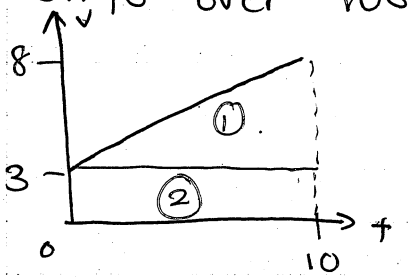
Ex. 2



1. Zero displacement? A, B
2. Net (+) displacement? C, D, E, F
3. Net (-) displacement? N/A
4. Constant velocity? A, C, E
5. Increase in velocity? C, D
6. Decrease in velocity? B, C, F
7. Negative velocity? B, C

Δx = integral of $v \cdot t$

Ex. 3 Initial speed of 3 m/s. You accelerate to 8 m/s over 10s. How far did you travel?



$A_2 = b \cdot h$
$= \Delta t \cdot v_0$
$A_1 = \frac{1}{2} b \cdot h$
$= \frac{1}{2}(\Delta t \cdot \Delta v)$

tot A : $A_1 + A_2$ → $\Delta v = a \Delta t^2$

$= V_1 \cdot \Delta t + \frac{1}{2}(\Delta t \cdot \Delta v)$

$= V_1 \cdot \Delta t + \frac{1}{2} a \Delta t^2 = \Delta x$

8 m/s − 3 m/s = 5 m/s. $a_{av} = \frac{\Delta v}{\Delta t} = \frac{5 \text{ m/s}}{10 \text{ s}} = \frac{1}{2} \text{ m/s/s}$

tot A $= V_1 t + \frac{1}{2} a t^2$

$= (3)(10) + (\frac{1}{2})(\frac{1}{2})(10)^2$

$= 30 + (\frac{1}{4})(100)$

$= 30 + 25$

$= 55$ m.

OR

$V^2 = V_0^2 + 2ad$

$8^2 = 3^2 + 2(\frac{1}{2})d$

$64 - 9 = d$

$55 = d$

Ex. 1 (continued)

You

$\Delta x_y = 100 - 5t$, since $5t = \Delta x_d = V_d \cdot t$.

$\Delta x = \frac{1}{2}(V - V_0)t$

$100 - 5t = \frac{1}{2}(6)t$

$100 = 5t + 3t$

$100 = 8t$

$t = 12.5$s.

∴ Since time is the same for you/dog, $t = 12.5$s