(17) 2 Segment problem

I	II
$V_i = 31\ m/s$	$V_i = V_f$ of $1 = x$
$a = a_1$	$a = a_2$
$V_f = ? = x$	$V_f = 24.5\ m/s$
$t = 10\ s$	$t = 5\ s$

$$a = \frac{V_f - V_i}{t}$$

$$a_1 = \frac{x - 31\ m/s}{10\ s} \qquad a_2 = \frac{24.5 - x}{5\ s}$$

$$\frac{a_1}{a_2} = 1.67 = \frac{\frac{(x-31)}{10}}{\frac{(24.5-x)}{5}}$$, Solve for x

(18) 2 object Problem

(A)		(B)
$V_i = V_A$	different	$V_i = V_B$
$V_f = V_f$	same	$V_f = V_f$
$a = 2\ m/s^2$		$a = 4\ m/s^2$
$t = 4\ sec$		$t = 4\ s$

Want to find the difference of V_i's is $V_A - V_B$

So we know $V_f = V_i + at$ or $V_f - at = V_i$

So $V_A = V_f - 2(4)$ & $V_B = V_f - 4(4)$

$$V_A - V_B = V_f - 8 - (V_f - 16) = 8\ m/s$$

(19) $v_i = 0$

(A) $v_f = 60\ mi/hr$ } convert to m/s (math)
$a = 2.35\ m/s^2$
$t = ?$ $\quad v_f = v_i + at$

(B) $v_i = 0$
$v_f = 60\ mi/hr$
$a = t$ } convert to m/s.
$t = 0.6\ s$ $\quad v_f = v_i + at$

(20) (A) $v_i = -27.0\ m/s$
$t = 5\ s$
$v_f = -29.\ m/s$
$a = ?$
$a = \frac{v_f - v_i}{t} = -0.4\ m/s^2$ in same direction as motion

(B) $v_i = -27.0\ m/s$
$t = 5\ s$
$v_f = -23.\ m/s$
$a = ?$
$a = \frac{v_f - v_i}{t} = +0.4\ m/s^2$ in opposite direction

(21) $v_i = 0\ m/s$
$v_f = 6\ m/s$
$t = 1.5\ s$
$\Delta x = ?$
use $\Delta x = \frac{1}{2}(v_i + v_f)t$

(22) $v_i = 0$

$v_f = 8.0\ m/s$

$t = 5\ s$

$a = ?$

$\Delta x = ?$

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

$a = \frac{v_f - v_i}{t}$

(23) $v_i = 69\ m/s$

$\Delta x = 750\ m$

$v_f = 6.1\ m/s$

$a =$

~~$a = \frac{v_f - v_i}{t}$~~ $a = \frac{v_f^2 - v_i^2}{2\Delta x}$

(24) $v_i = 0$

$v_f = 26\ m/s$

$\Delta x = +20\ cm$

$a = ?$

$t = ?$

(A) $v_f^2 = v_i^2 + 2a\Delta x$

(B) $t = \frac{v_f - v_i}{a}$

(25) $\Delta x = 1.2\ m$

$v_i = 0\ m/s$

$v_f = 14\ m/s$

$t =$

$\Delta x = \frac{1}{2}(v_f + v_i)\, t$

(28) 2 Segment Problem

I	II
$v_i = 0\ m/s$	$v_f = ?$
$\Delta x = 402\ m$	$\Delta x = 3.5 \times 10^2\ m$
$a = 17.0\ m/s^2$	$a = -6.10\ m/s^2$
$v_f = ?$	$v_i = ?$

Solve for v_f in I & plug into II

(29) Comparison ...

Dry road	Icy road
$v_i = 32.0\ m/s$	$v_i = 32.0\ m/s$
$v_f = 0\ m/s$	$v_f = 0\ m/s$
$a = -8.0\ m/s^2$	$a = -3.0\ m/s^2$
$\Delta x = ?$	$\Delta x = ?$

Compare these

(30) the segments

I	II	III
$v_i = 0\ m/s$	$v_i = ?$	$v_i = ?$
$v_f = ?$	$v_f = ?$	$v_f = ?$
$t = 7.0\ s$	$a = +0.518\ m/s^2$	$a = -.49\ m/s^2$
$a = 2.01\ m/s^2$	$t = 6.0\ s$	$t = 8\ s$

All three use $v_f = v_i + at$

use v_f in I as v_i in II & v_f in II as v_i in III

(32) ~~$\Delta x = 2.0\ km$~~

(31) Two segment Problem

I	II
$\Delta x = x_1$	$\Delta x = x_2$
$v_i = 0\ m/s$	$v_i = X$
$v_f = X$	$v_f = 0$
$a = a$	$a = .3a$

I want to find a ratio of $\frac{x_1}{x_2}$ which will tell me WHAT part of 2 km are in EACH

(OVER)

(I)

$v_f^2 = v_i^2 + 2a\Delta x$ $\qquad$ $v_f^2 = v_i^2 + 2a\Delta x$

plug in

$X^2 = (0)^2 + 2(a)X_1$ $\qquad$ $(0)^2 = X^2 + 2(-3a)X_2$

$X_1 = \frac{X^2}{2a}$ $\qquad$ $X_2 = \frac{X^2}{6a}$

$\frac{X_1}{X_2} = \frac{X^2/2a}{X^2/6a} = 3$, $X_1 = 3X_2$

So X_1 is 3 times longer than X_2

$X_1 = 1.5\,km$ & $X_2 = 0.5\,km$

(32) 2 objects

I	II
$v_i = 27\,m/s$	$v_i = 0\,m/s$
~~$v_f = 27\,m/s$~~ — I dont care — ~~$v_f = ?$~~	
$a = 0\,m/s^2$	$a = ?$
$\Delta x = 1.8\,km$	$\Delta x = 1.8\,km$
$t = ?$	$t = ?$

Same

$\Delta x = v_i t + \frac{1}{2}(0)t^2$ $\qquad$ $\Delta x = 0t + \frac{1}{2}(a)t^2$

$\Delta x = 27\,m/s\ t$

$t = \Delta x/27$ $\qquad$ $t^2 = \frac{2\Delta x}{a}$

$t^2 = (\Delta x)^2/(27^2)$ ← combine & solve for a

(36) Two segments

I	II
$V_i = 0\ m/s$	$V_i = V$
$V_f = V$	$V_f = V$
$a = 2.68\ m/s^2$	$a = 0\ m/s^2$
$t = t_1$	$t = t_2$
$\Delta x = x_1$	$\Delta x = x_2$

$t_1 + t_2 = 12\ s$

$x_1 + x_2 = 100\ m$

$\frac{V_f - V_i}{t} = a$

~~2~~ Equations & ~~4~~ unknowns.

$V = \frac{x_2}{t}$

$2.68 = \frac{V-0}{t_1}$ $\quad t_1 + t_2 = 12$

$x_1 + x_2 = 100$ $\quad V = x_2/t$

} combine these 4 equations to find x_1

(37) $\Delta x = -99.4\ m$ (−) because it's down

$a =$ ~~9.8 m/s²~~ ?

$V_f = 39\ m/s$

$V_i = 0\ m/s$

$V_f^2 = V_i^2 + 2a\Delta x$, find a & compare with $9.8\ m/s^2$

(38) $V_i = -9.0\ m/s$ (down)

$a = -9.8\ m/s^2$

$t = 0.50\ s$

@ No, it's speeding up.

$\Delta x = ?$

Solve for Δx

(39) $V_i = 0\ m/s$

$a = -9.8\ m/s^2$

$t = 60.0 \times 10^{-3}\ s$ (a), $120 \times 10^{-3}\ s$ (b), $180 \times 10^{-3}\ s$ (c)

$\Delta x = x_a$, x_b, x_c

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

(40) $V_i = 15\ m/s$

$t = 20.0\ s$

$\Delta x = 0\ m$

$a = ?$

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

(47) I (to the top)

$\Delta x = 16\ m$

$V_f = 0\ m/s$

$V_i = V$

$a = -9.8\ m/s^2$

II (to halfway)

$\Delta x = ?$

$V_f = \frac{1}{2} V$

$V_i = V$

$a = -9.8\ m/s^2$

~~$V_f^2 = V_i^2 + 2a\Delta x$~~ : find V from I & plug into II

(48) I Stone

$\Delta x = -90\ m$

$V_i = 0\ m/s$

$a = -9.8\ m/s^2$

$t = ?$

II Rest

$\Delta x = 6.00\ m - 2.00\ m = 4.00\ m$

$a = 0$ → Constant Speed

$V_i = V_f = V$

$t = ?$ (Same)

find t in I & plug into II

(49)

Arrow I	Arrow II
$\Delta y = h_1$	$\Delta x = h_2$
$t = t_{h_1}$	$t = t_{h_2} t + 1.20\ s$
$a = -9.8\ m/s^2$	$a = -9.8\ m/s^2$
$V_i = 25.0\ m/s$	$V_i = ? = V$
$V_f = 0\ m/s$	$V_f = 0\ m/s$

find t in I, then plug into II to find V_f

(50)

Annie	Joanne
$\Delta x = 2x$ twice as high	$\Delta x = x$
$a = -9.8\ m/s^2$ <free fall>	$a = -9.8\ m/s^2$
t_A = time Annie in Air	t_J = time Joanne in air
$V_f = 0\ m/s$	$V_f = 0\ m/s$

We want t_A / t_J

use $\Delta x = V_f t - \frac{1}{2} a t^2$

for Annie $2x = 0t + 4.9 t_A^2$ Joanne $x = 0t + 4.9 t_J^2$

$$t_A^2 = \frac{2x}{4.9} \qquad t_J^2 = \frac{x}{4.9}$$

$$\frac{t_A}{t_J} = \left(\frac{2x/4.9}{x/4.9}\right)^{1/2} = \sqrt{2}$$

(56) As completed in class

(58) find the slopes at those points

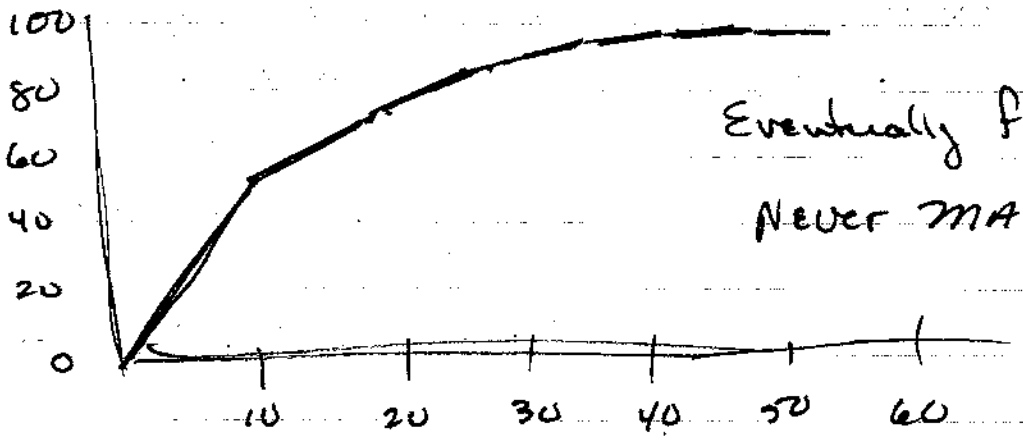
(59) Slopes again

(60) + slope = pos V
- slope = Neg V

(61) $\vec{a} = \frac{\Delta V}{t} = \frac{V_f - V_i}{t} = \frac{+27\ km/hr - 0\ km/hr}{3.5\ hr}$

$= 27/3.5\ \ km/hr^2$

(62)



Eventually flat & Never makes it.

have a good weekend.

(6) Total dist is the circumference of the Earth $= 2\pi r$

$$\text{dist} = 2\pi \left(6.38 \times 10^6 m\right)$$

$$=$$

$$\text{Speed} = \frac{\text{dist}}{\text{time}}$$

(8) This is a 2 part problem

I	II
$\Delta x = 625 m$	$\Delta x = 356 m$
$t = 15.0 s$	$t = 142 s$

$$\bar{V} = \frac{\text{disp}}{\text{time}} = \frac{625 m \text{ down} + 356 m \text{ down}}{15.0 s + 142 s.}$$

(*9) 1st figure out how long it will take the jogger to get to the river. Then since you know speed of Dog, you can find the dog's displacement.

Woman	dog
$\Delta x = 4 km$	$\Delta x = ?$
$\bar{V} = 2.5 m/s$	$\bar{V} = 4.5 m/s$
$t = (?)$	$t = ?$

$$\bar{V} = \frac{\Delta x}{t}$$

(10) A 3 Segment Problem

I	II	III
$\Delta x = 15\ km\ N$	$\Delta x = 32\ km$	$\Delta x = 13\ km$
$\bar{v} = 25\ km/hr\ N$	$\bar{v} = 62\ km/hr$	$\bar{v} = ?$
$t_1 = ?$	$t_2 = ?$	$t_3 = ?$

for entire trip $\bar{v} = 40\ km/hr$ & $\Delta x = 60\ km$

So find time total & find t_1 & t_2 from givens.

You know $t_1 + t_2 + t_3 =$ time total

(12) $\Delta x = ?$

$t = 3275\ s$

$v_i = 0$

$v_f = 26.8\ m/s$

$a = ?$

find equation w/o Δx

$$v_f = v_i + at$$

(13) (14) $a = 9\ \frac{m}{s \cdot day}$

$v_i = ?$ } $v_f - v_i = 2700\ m/s$

$v_f = ?$

$t = ?$

use $v_f = v_i + at \longrightarrow a = \frac{v_f - v_i}{t} = \frac{2700\ m/s}{t}$