Acc # 5 - worked out Mixed Review for Test

1) $v_i = 4 \text{ m/s}$

$a = 3.5 \text{ m/s}^2$

$t = 9 \text{ s}$

$v_f = ?$

$v_f = v_i + at$

$v_f = 4 + (3.5)9$

$v_f = 35.5 \text{ m/s}$

2)

$d = ?$

$a \neq 0$	$a = 0$
$v_i = 0$ (inferred)	$v = d/t$
$t = 16 \text{ s}$	$t = 20 \text{ min} = 1200 \text{ s}$
$a = 3 \text{ m/s}^2$	$v = 48 \text{ m/s}$ (need to calculate in 1st part)
$d_f = d_i + v_i t + 1/2 at^2$	$d = vt = (48)(1200)$
$d = 1/2 (3)(16)^2$	$d = 57600 \text{ m}$
$d = 384 \text{ m}$	
need to calculate v_f for 2nd part ...	
$v_f = v_i + at$	
$v_f = (3)(16) = 48 \text{ m/s}$	

$d_{Total} = d_{part\ 1} + d_{part\ 2}$

$d_{Total} = 384 \text{ m} + 57600 \text{ m}$

$d_{Total} = 57984 \text{ m}$

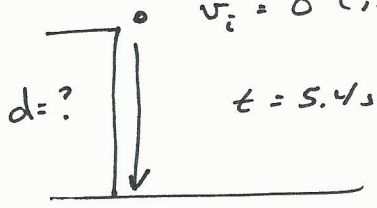
Acc # 5

$d_i = 0$ (inferred)

$a = 9.8\ m/s^2$ (inferred)

$v_i = 0$ (inferred)

3)

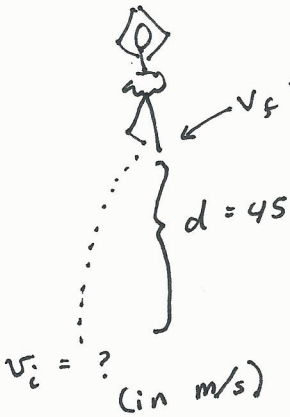


$$d_f = d_i + v_i t + \tfrac{1}{2} a t^2$$

$$d = \tfrac{1}{2}(9.8)(5.4)^2$$

$$d = 142.88\ m$$

4)



$v_f = 0$ (inferred)

$a = -9.8\ m/s^2$ (inferred)

↑ since v_i is up (different direction) you must use negative sign

keep full conversion number in calculator! Round @ the final answer!

45 in	1 cm	1 m	
	0.394 in	100 cm	

$$v_f^2 = v_i^2 + 2ad$$

$$0 = v_i^2 - 2(9.8)(1.14)$$

$$v_i = \sqrt{2(9.8)(1.14)}$$

$$v_i = 4.73\ m/s$$

$d_i = 0$ (inferred)

5) $v_i = 23 \text{ mph} = 10.30 \text{ m/s}$ (keeps full answer in calculator!)

$a = 13 \text{ m/s}^2$

$t = 8 \text{ s}$

$d = ?$

$$\frac{23 \text{ mile}}{\text{hr}} \left| \frac{1 \text{ km}}{.62 \text{ mile}} \right| \frac{1000 \text{ m}}{1 \text{ km}} \left| \frac{1 \text{ hr}}{3600 \text{ sec}} \right.$$

$$d_f = d_i + v_i t + \tfrac{1}{2} a t^2$$

$$d = (10.30)(8) + \tfrac{1}{2}(13)(8)^2$$

$$d = 498.44 \text{ m}$$

6)

$d_f = 43 \text{ in} = 1.09 \text{ m}$

$d_i = 0$ (inferred)

$V_f = 570 \text{ fps} = 173.60 \text{ m/s}$

$V_i = 0$ (inferred)

$a = ?$ (in m/s^2)

43 in	1 cm	1 m
	.394 in	100 cm

570 ~~ft~~	12 ~~in~~	1 ~~cm~~	1 (m)
(s)	1 ~~ft~~	.394 ~~in~~	100 ~~cm~~

$$V_f^2 = V_i^2 + 2ad$$

$$(173.6)^2 = 2(a)(1.09)$$

$$a = 13{,}807.58 \text{ m/s/s}$$

or $1.38 \times 10^4 \text{ m/s}^2$

(enter into moodle as 1.38e4 m/s/s

7) $d = 38$ miles $= 61290$ m } use to find v_i — during this time, $a = 0$ (inferred)

t to travel $d = 32$ min $= 1920$ s

$a = 0.6\ m/s^2$

$t_{(acceleration\ time)} = 8$ s

$v_f = ?$

$v_i = 31.92\ m/s$ (calculated)

$v_i = d/t$

$v_i = \frac{61290\ m}{1920\ s}$

$v_i = 31.92\ m/s$

38 miles	1 km	1000 m
	.62 miles	1 km

$v_f = v_i + at$

$v_f = 31.92 + (.6)(8)$

$v_f = 36.72\ m/s$

8) $v_i = 26\ m/s$

$v_f = 0$

$d = 256$ m

$t = ?$

$d = \frac{1}{2}(v_i + v_f)t$

$256 = \frac{1}{2}(26)t$

$t = 19.69$ s

$d_{Total} = ?$

9)

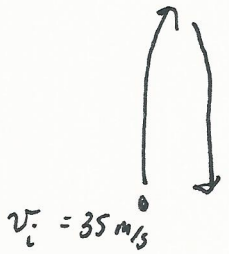
$a = 0$	$a \neq 0$	$a = 0$
$v = d/t$	$a = 0.6\ m/s^2$	$v = d/t$
$v = 6\ m/s$	$t = 10\ s$	$t = 18\ min. = 1080\ s$
$t = 7\ min = 420\ s$	$v_i = 6\ m/s$ (inferred)	need v! calculate it from part 2
$d = 6(420)$	$d_i = 0$ (inferred)	$v = 12\ m/s$
$d_1 = 2520\ m$	$d_f = d_i + v_i t + \frac{1}{2} a t^2$	$d = (12)(1080)$
	$d = (6)(10) + \frac{1}{2}(.6)(10)^2$	$d_3 = 12960\ m$
	$d_2 = 90\ m$	
	calculate v_f for part 3	
	$v_f = v_i + at$	
	$v_f = 6 + (.6)(10)$	
	$v_f = 12\ m/s$	

$$d_T = d_1 + d_2 + d_3$$

$$d = 2520 + 90 + 12960$$

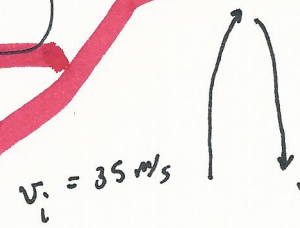
$$d_T = 15,570\ m$$

10)



two ways to do problem

method 1)



$a = -9.8\ m/s^2$ (inferred)

} note → 2 different directions, so you must use negative sign.

$V_f = v_i + at$

$-35 = 35 - (9.8)t$

$-70 = -9.8\,t$

$t = 7.14\ s$

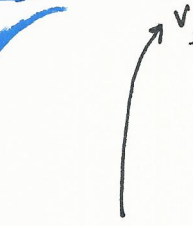
method 2)

V_f for t_T only

$V_f = 0$ (inferred)

$a = -9.8\ m/s^2$ (inferred)

} note - still, v_i is a different direction than a, so you still must use negative sign!



$V_f = v_i + at$

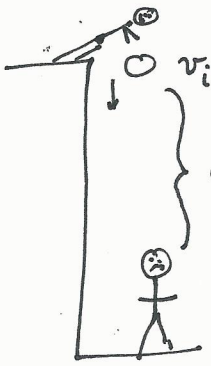
$0 = 35 - 9.8\,t_T$

$t_T = 3.57\ s$

$\therefore\ t_{T\downarrow} = 2(3.57) = 7.14\ s$

Acc 5

11)



keep full number in calculator – round @ the end!

$v_i = 34.3 \text{ mph} = 15.37 \text{ m/s}$

$a = 9.8 \text{ m/s}^2$ (inferred)

since v_i, a are in the same direction, you don't have to use negative signs!

$d = ?$ (in m) $t = 0.98$ s

$d_i = 0$ (inferred)

$\frac{34.3 \text{ mile}}{\text{hr}}$	$\frac{1 \text{ km}}{0.62 \text{ mile}}$	$\frac{1000 \text{ m}}{1 \text{ km}}$	$\frac{1 \text{ hr}}{3600 \text{ s}}$

$$d_f = d_i + v_i t + \tfrac{1}{2} a t^2$$

$$d = (15.37)(0.98) + \tfrac{1}{2}(9.8)(0.98)^2$$

$$d = 15.06 + 4.71$$

$$d = 19.77 \text{ m}$$