Ch. 4 acc. Review - 2015

Worked out answers.

1) $a = 4\ m/s^2$

$v_i = 0$

a) $v_f = ?$ @ $t = 5$ sec

$v_f = v_i + at$

$v_f = 0 + (4\frac{m}{s^2})(5s)$

$v_f = \underline{20\ m/s}$

b) $d_f = ?$ @ $t = 1$ min $= 60$ s

$d_f = d_i + v_i t + \frac{1}{2}at^2$

$d = 0 + 0 + \frac{1}{2}(4\frac{m}{s^2})(60s)^2$

$d = 7{,}200\ m = \underline{7.2 \times 10^3\ m}$

Ch. 4 acc. Review - 2015

30 ft	12 in	2.54 cm	1x10^-2 m
	1 ft	1 in	1 cm

2) $v_1 = 5\ m/s$

$a = -0.25\ m/s^2$

$v_f = ?$

$d_f = 30\ ft = 9.14\ m$

$$v_f^2 = v_i^2 + 2a(d)$$

$$v_f^2 = (5\ m/s)^2 + 2(-.25\ \tfrac{m}{s^2})(9.14\ m)$$

$$v_f^2 = 20.43$$

~~$v_f = 4.52\ m/s$~~

$$v_f = 4.52\ m/s$$

3) $d = 1$ mile = 1612.9 m

$v_f = 80\ m/s$

$v_i = 0$

$a = ?$

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

$$80^2 = 0^2 + 2(a)(1612.9)$$

$$a = 1.98\ m/s^2$$

1 mile	1 km	1x10^3 m
	.62 mile	1 km

Ch. 4 acc. Review

4) $v_i = 0$ $a = -9.8\ m/s^2$ ⇦ inferred

$t = 5\ s$

a) $d_f = ?$) ~~need to find either~~ v_f or t

$d_i = 0$

~~$d_f =$~~ ~~Δd~~ =

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

$d = 0 + 0 + \frac{1}{2}(-9.8)(5)^2$

$d = -122.5\ m$ relative to top

or $d = 122.5\ m$ relative to bottom

b) $v_f = ?$

$v_f = v_i + at$

$v_f = 0 + (-9.8)5$

$v_f = -49\ m/s$

Ch. 4 acc. review

5) a) $v_i = 16$ mph $= 7.17$ m/s

$a = -9.8$ m/s^2

$d_{\uparrow} = ?$

$v_f = 0$ at top

16 mile / hr	1 km / .62 mile	1×10^3 m / 1 km	hr / 3600 s

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

$0 = (7.17)^2 + 2(-9.8)\,d$

$0 = 51.39 - 19.6d$

$d = 2.62$ m

b) symmetry tells you that the $v_f = v_i$, only in the opposite direction,

$\therefore v_f = -7.17$ m/s

~~or d from starting point = 0~~

~~$d_f = d_i + v_i t$~~

~~or d from starting point~~ $d = 0$

$v_f^2 = v_i^2 + 2ad$ ← this also works, but you must ~~use~~ watch $\sqrt{\ }$ and include (−)

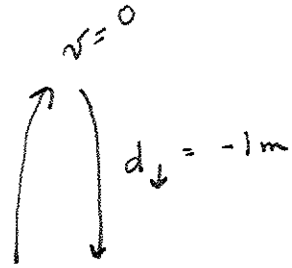
$d_{from\ start} = 0$

$\therefore v_f^2 = v_i^2 + (0)2(-9.8)$

6) $t_{\uparrow\downarrow} = ?$

$d_{\uparrow} = 1m$

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



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

$$-1 = 0 + 0(t) + \tfrac{1}{2}(-9.8)t^2$$

$$t^2 = 0.204$$

$$t_{\downarrow} = 0.45\ s$$

$$t_{\uparrow\downarrow} = 0.90\ s$$

7) This would only show up on the test as extra credit, $\therefore$ I'm not posting the solution.

8)

$t_t = ?$

$d_T = 100\,m$

$t = 1.8\,s$	$v = 6.4\,m/s$
$v_i = 0$	$a = 0$
$v_f = 6.4\,m/s$	$t = d/t$
$\Delta d = \frac{1}{2}(v_i + v_f)\,t$	must find d traveled in part 2
$d = \frac{1}{2}(0 + 6.4)\,1.8$	
$d = 5.76\,m$ d traveled while accelerating →	$\therefore$ d @ constant $v = 100 - 5.76$
	$d_2 = 94.24\,m$

$$t_2 = \frac{94.24\,m}{6.4\,m/s} = 14.73\,s$$

$$t_{total} = t_1 + t_2$$

$$= 1.8 + 14.73$$

$$t_{total} = \underline{16.53\,s}$$

9)

$v = 50\ mph = 22.4\ m/s$

$d_T = ?$ does it hit the deer? $v_f = 0$

deer 50m ahead

$t = 0.5\ s$	$a = -10\ m/s^2$
$a = 0$	$v_i =$ ~~22.4 m/s~~ $22.40\ m/s$
$v = 22.4\ m/s$	$v_f = 0$
$d_1 = ?$	$d_2 = ?$
$d = vt$	$v_f^2 = v_i^2 + 2ad$
$d = (22.4 \frac{m}{s})(0.5s)$	$0 = (22.4)^2 + 2(-10)\ d$
$d_1 = 11.2\ m$	$d_2 = 25.09\ m$

$$\frac{50\ \text{miles}}{\text{hr}} \cdot \frac{1\ \text{km}}{.62\ \text{mile}} \cdot \frac{1\times10^3\ \text{m}}{1\ \text{km}} \cdot \frac{1\ \text{hr}}{3600\ \text{s}} = 22.40\ m/s$$

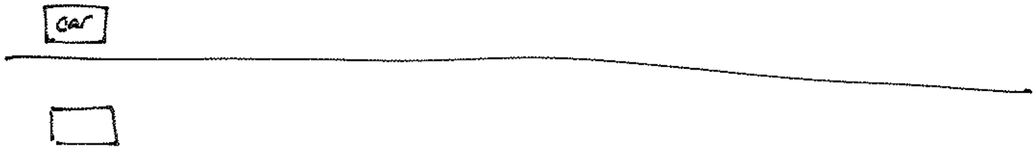
$d_T = 36.29\ m$

no, the car does not hit the deer. Bambi is safe!

10)

this looks like an extra-credit type problem also.

$v_c = 65 \text{ mph} = 29.12 \text{ m/s}$



Police car

$v_i = 0$

$a = 7 \text{ m/s}^2$

$V_f = ?$ when it catches car?

for police car to catch the other car, they must travel the same distance, and the same time

$d_{car} = d_{pc}$

$t_{car} = t_{pc}$

$d_{pc} = d_i + v_i t + \frac{1}{2} a t^2$

$d_{pc} = 0 + 0 + \frac{1}{2}(7)t^2$

$d_{pc} = \frac{1}{2}(7)t^2$

$a_{car} = 0$

$\therefore$

$v_{car} = \frac{d_{car}}{t_{car}} = \frac{d_{pc}}{t_{pc}}$

$d_{car} = v_{car}\, t_{car}$

$d_{car} = (29.12)\,t$

Substituting in d_{car} for d_{pc}, understanding that $t_{car} = t_{pc} = t$

↓

$29.12\,t = \frac{1}{2}(7)t^2$

$t = 8.32 \text{ s}$

$\therefore$

$v_f = v_i + a t$

$v_f = 0 + (7)(8.32)$

$v_f = 58.24 \text{ m/s}$

$\frac{65 \text{ miles}}{\text{hour}} \cdot \frac{1 \text{ km}}{.62 \text{ mile}} \cdot \frac{1 \times 10^3 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ hour}}{3600 \text{ s}} =$