#2.

1. G:

#1	#2	#3
$a = 3.0\ m/s^2$	$a = 0$	$a = ?$
$V_1 = 0$	$V_1 =$	$V_1 =$
$V_2 = ?$	$V_2 =$	$V_2 = 0$
$\Delta t = 4.0\ s$	$\Delta t = 7s$	$\Delta t = 5.0\ s$
$\Delta d = ?$	$\Delta d = ?$	$\Delta d = ?$

R: Δd Δd Δd

V_{avg}

S: Part 1 $\Delta d = V_1 t + \frac{1}{2} a t^2$

$= \frac{1}{2} (3.0)\ m/s^2 \times (4.0\ s)^2$

$= 24\ m$

also need V_2 for part 2.

$a = \frac{V_2 - V_1}{\Delta t}$ — $V_2 = V_1 + a\Delta t$

$= 3.0\ m/s^2 \times 4.0\ s.$

$= 12.0\ m/s$

Part 2: $V_1 = V_2 = 12.0\ m/s$

$\Delta d = V \Delta t$

$= 12.0\ m/s \times 7s$

$= 84.0\ m$

Part 3 $V_1 = 12.0\ m/s$

$V_2 = 0$

$\Delta d = \left(\frac{V_1 + V_2}{2}\right) \Delta t$

$= \frac{(12.0\ m/s + 0\ m/s)}{2} 5.0\ s$

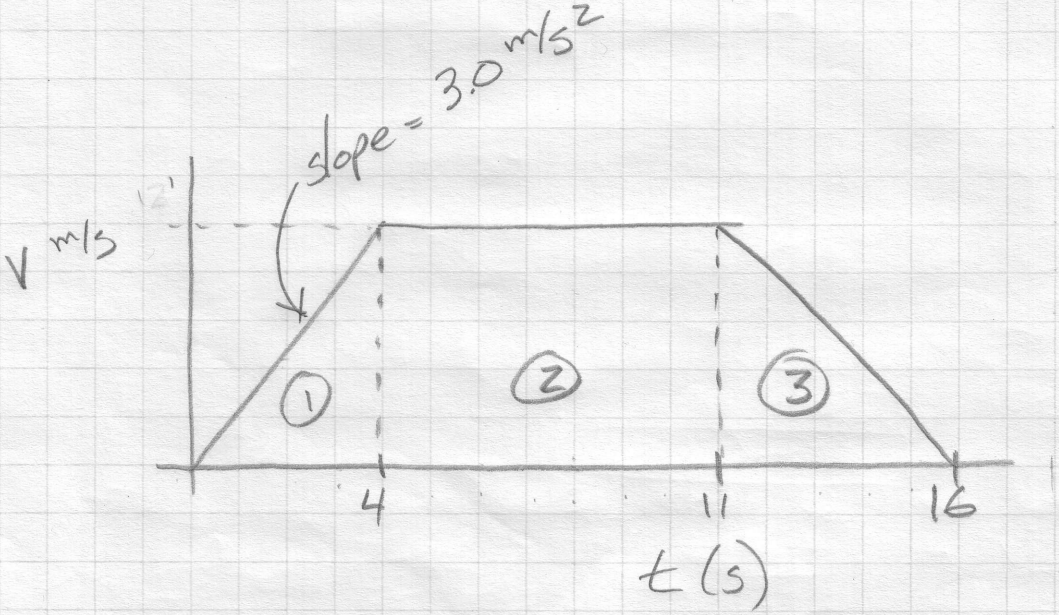
$= 30.0\ m$

total distance $= 24\ m + 84.0\ m\ 30.0\ m$

$= 138\ m$

$V_{avg} = \Delta d / \Delta t = 138\ m / 16\ s = 8.6\ m/s$

#1. Graphically.



distance = area ① + area ② + area ③

$= \frac{1}{2}(4s)(12\,m/s) + (7s)(12\,m/s) + \frac{1}{2}(5s)(12\,m/s)$

$= 138\,m$

$V_{avg} = \frac{138\,m}{16\,s} = 8.6\,m/s$

Part 1: (0–10 s)

2a. G: $v_1 = 0$, $a = 9.8\ m/s^2$, $\Delta t = 10\ s$

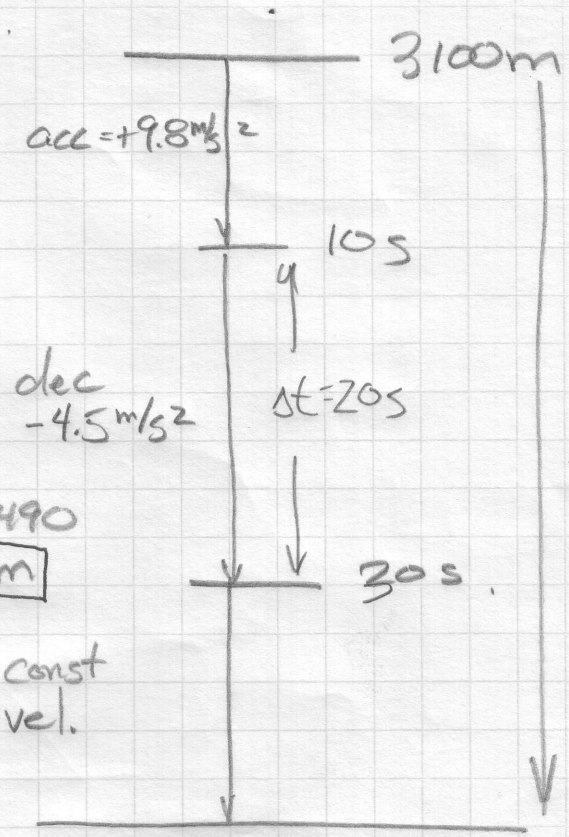
R: v_2, Δd.

S: $v_2 = v_1 + a\Delta t$

$= 9.8\ m/s^2 \times 10\ s$

a. $= 98\ m/s$

velocity at 10 s.



$\Delta d = \frac{1}{2} a t^2$

$= \frac{1}{2}(9.8\ m/s^2)(10\ s)^2$

b. $= 490\ m$ ∴ $\Delta H = 3100 - 490$

$= 2610\ m$

Part 2: (10–30 s)

G: $v_1 = 98\ m/s$

$a = -4.5\ m/s^2$

$\Delta t = 20\ s$

R: v_2, Δd

$a = \frac{v_2 - v_1}{\Delta t}$

$v_2 = v_1 + a\Delta t$

$= 98\ m/s + (-4.5\ m/s^2)(20\ s)$

c. $= 8\ m/s$

$\Delta d = v_1 \Delta t + \frac{1}{2} a t^2$

$= (98\ m/s)(20\ s) + \frac{1}{2}(-4.5\ m/s^2)(20)^2$

$= 1060\ m$

Part 3: constant v after 30 s

G: $v_1 = 8\ m/s$, $a = 0$, $\Delta d = 3100\ m - 490 - 1060 = 1550\ m$

R: $\Delta t = \Delta d / v$

$= 1550\ m / 8\ m/s = 194\ s$.

d. ∴ time for whole descent = $10\ s + 20\ s + 194\ s =$ **224 s.**

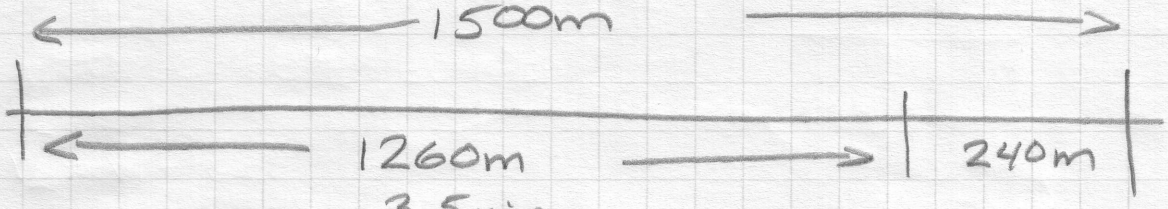
e) G: $a = 9.8\ m/s^2$, $v_1 = 0$, $v_2 = 8\ m/s$

R: Δd

S: $v_2^2 = v_1^2 + 2a\Delta d$

$\Delta d = \frac{v_2^2}{2a} = \frac{(8\ m/s)^2}{2 \times 9.8\ m/s^2} =$ **3.3 m**

3.



Part 1

G: $\Delta d = 1260\,m$
$\Delta t = 210\,s$
v = constant

R: V

S: $V = \Delta d/\Delta t = 1269/210 = 6\ m/s$.

Part 2: G: $V_1 = 6\ m/s$
$\Delta d = 240\,m$
$\Delta t = 30\,s$

R: a

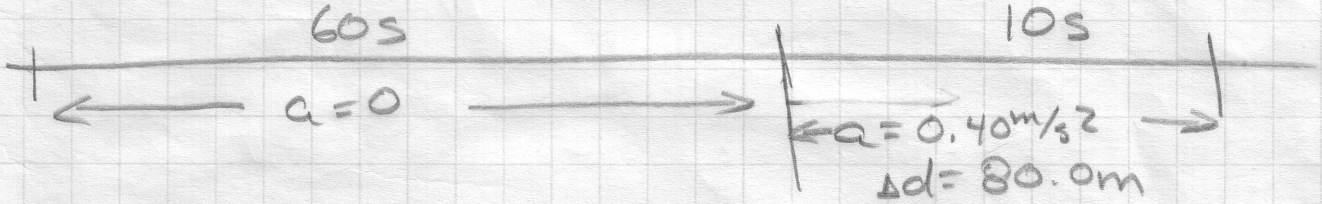
S: $\Delta d = V_1 t + \frac{1}{2} a t^2$

$$a = \frac{2\Delta d}{\Delta t^2} - \frac{2V_1}{\Delta t}$$

$$= \frac{2(240\,m)}{(30\,s)^2} - \frac{2(6\,m/s)}{30\,s}$$

$$= 0.13\ m/s^2$$

4.



a. G: $a = 0.40\ m/s^2$ $\Delta t = 10\,s$

b. $\Delta d = 80.0\,m$

R: V_2 V_1

S: $\Delta d = V_2 \Delta t - \frac{1}{2} a t^2$

$V_2 = \Delta d/\Delta t + \frac{1}{2} a t = 80.0\,m/10\,s + \frac{1}{2}(0.40\,m/s^2)(10\,s)$

$$= 10\ m/s.$$

$V_1^2 = V_2^2 - 2a\Delta d$

$V_1 = \sqrt{(10\,m/s)^2 - 2(0.40\,m/s^2)(80.0\,m)}$ $= 6\ m/s$.

c. Part 1 $\Delta d = V\Delta t = 6\,m/s \times 60\,s = 360\,m$ ∴ total dist. = 440m