Assignment 1

1\. (b) What is the ~~maximum~~ height when velocity equals zero?

(c) What is the time used when velocity equals zero?

(d) What is the value of time when $x=h$, $V=V_0-gt$? $(V>0)$

(e) What is the value of time when $x=h$, $V=V_0-gt$? $(V<0)$

(f) What is the value of velocity when $x=h$, $V=V_0-gt$? $(V>0)$

first time or second time.

(g) What is the value of ~~velocity when $x=h$, $V=V_0-gt$? $(V<0)$~~ V_0 in order for $x=h$, and go no higher

2\. $V_t^2 - V_0^2 = 2ax$;

because the direction of velocity is different — one points upward, another one points downward;

No, if $V_0^2+2ax=0$, there will be one answer; And if $V_0^2+2ax<0$, the answer doesn't exist;

~~t calculated in (g) would larger than that calculated in (f).~~

This relates to (g) because it only gives one answer of V_0 using quadratic formula.

3\. (a) to calculate the accelaration of driver, we need these data.

$V_0 = 110\ km/hr$ — initial velocity

$t = 50\ ms$ — time.

(b) $V(t) = V_0 + at$

when $t=0$, $V(t) = V_0 = 110\ km/hr$

(c) What is the value of accelation (a) such that velocity (V_t) is equal to zero at time $t = 50$ milliseconds ?

(d) $V_t = V_0 + at$

(e) $0 = 110\ km/hr + a \times 50\ ms \Rightarrow a = -611.11\ m/s^2$

(f) it means that this is a decelaration problem.

4\. $V_t = V_0 + gt$

$0 = 110\ km/hr - 9.81\ m/s^2 \times t$

$t = 3.115\ s = 3114.74\ ms$

ratio $= \frac{3114.74\ ms}{50\ ms} = 62.3$

5.(a) $h = x_0 + V_0 t + \frac{1}{2}at^2$

$= 0 + 0\times(44-30)s + \frac{1}{2}\times(-9.81\,m/s^2)\times[(44-30)s]^2$

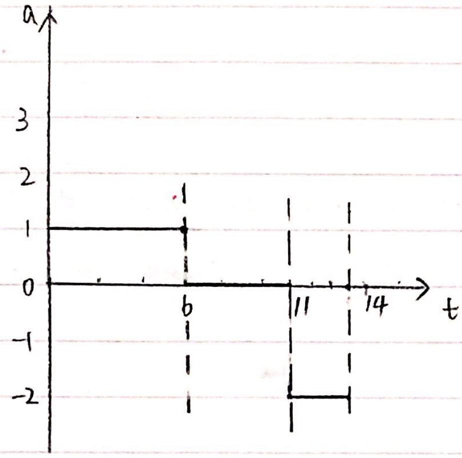
$= -961.38m$

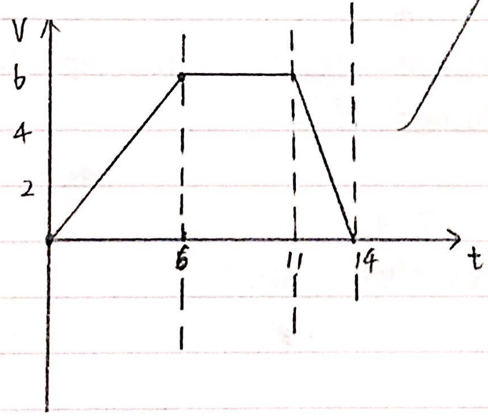
$|h| = 961.38\,m$

(b) Yes, because we assume the ground level $x=0$, and the direction upward is positive, so the negative depth means the well is 961.38m depth under the ground

6.

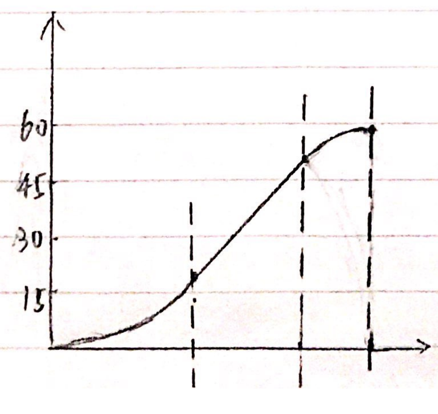
(a)



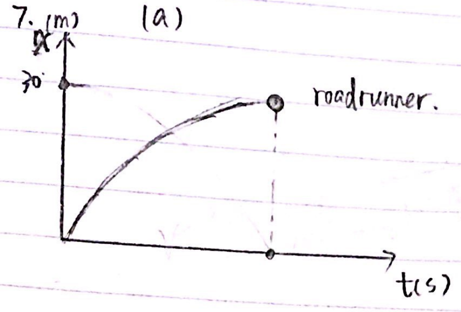


(b) $x = 18m + 30m + 9m = 57m$

(c)



7. (a)



(b) $x = x_0 + V_0 t + \frac{1}{2}at^2$

$30m = 0 + 110 \, km/hr \cdot t + \frac{1}{2} \times (-9 \, m/s^2)\, t^2$

$-\frac{9}{2} m/s^2 \, t^2 + 110 \times \frac{1000m}{3600s}\, t - 30m = 0$

$-4.5t^2 + \frac{110}{3.6} t - 30 = 0$

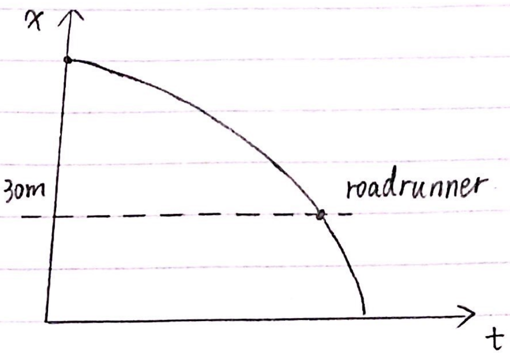
$t = \frac{-\frac{110}{3.6} \pm \sqrt{\left(\frac{110}{3.6}\right)^2 - 4 \times 4.5 \times 30}}{-9} = 1.19s$ or $5.60s$

(c) the physically meaningful answer is 1.19s.

the other solution means that how long does it take when the position is 30 m and the velocity is $-71.44 \, km/hr$ (coming back or move on the opposite direction compared with initial status)

Comment:

7. Students' work

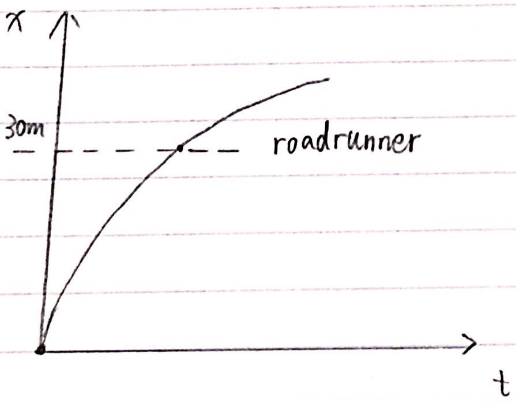


so $x = x_0 + V_0 t + \frac{1}{2}at^2$

$0 = 30m + 110\,{}^{km}/_{hr} \cdot t + \frac{1}{2}(-9\,{}^{m}/_{s^2}) \cdot t^2$

$t = 7.66s$ or $-\cancel{0.86}s$.

My work



so $x = x_0 + V_0 t + \frac{1}{2}at^2$

$30m = 0 + 110\,{}^{km}/_{hr} \cdot t + \frac{1}{2}(-9\,{}^{m}/_{s^2})\, t^2$

$t = 1.19s$ or $\underline{5.6s}$

make sense