

QUESTION ONE

u	u	u	u
v	v	v	v
a	-9.8	a	-9.8
s	70	s	120
t	t	t	2t

① $70 = ut - \frac{1}{2} \cdot 9.8 \cdot t^2 \Rightarrow$

$u = \frac{-70 - 4.9t^2}{t}$

② $120 = 24t - \frac{1}{2} \cdot 9.8 (2t)^2 \Rightarrow$

$u = \frac{-120 - 19.6t^2}{2t}$

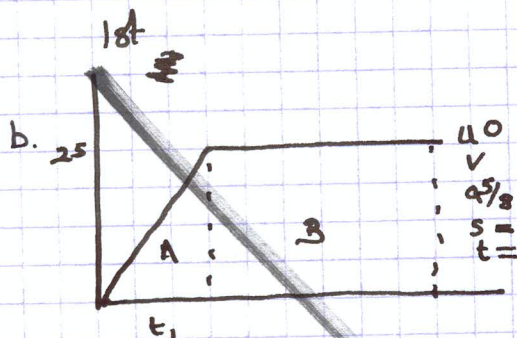
$\frac{-120 - 19.6t^2}{2t} = \frac{-70 - 4.9t^2}{t}$

$+120 + 19.6t^2 = 140 + 9.8t^2$

$u = \frac{-70 + 4.9(1.43)^2}{1.43}$

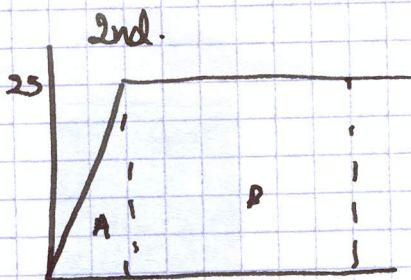
$9.8t^2 = 20$
 $t^2 = 2.04$
 $t = 1.43$

$u = 56 \text{ms}^{-1}$



$A = 500 \text{m}$

$B = 9500 \text{m}$



$A = 250$

$B = 9750$

u	0
v	25
a	
s	500
t	t

u	0
v	25
a	
s	250
t	t

$s = \left(\frac{u+v}{2}\right)t$

$t = \frac{2s}{u+v}$

$t = \frac{1000}{25} = 40 \text{s}$

$v = u + at$
 $\frac{v-u}{t} = a$

$\frac{25}{40} = a$

$\frac{5}{8} = a$

$t = \frac{500}{25} = 20 \text{secs.}$

$\frac{1}{2} \cdot 25 \times 195 = 4875$

$\frac{1}{2} \cdot 25 \times 195$

9750

$a = \frac{v-u}{t}$

$a = \frac{25}{20}$

$a = \frac{5}{4}$

$0.86 \frac{313}{4424}$

meeting at $\frac{s}{t}$ 1st: $s = 0t + \frac{1}{2} \cdot \frac{5}{8} \cdot t^2$ 2nd: $s = 0t + \frac{1}{2} \cdot \frac{5}{4} \cdot t^2$

$S_1 =$ distance travelled by p at constant accel

$S_2 =$ distance travelled by q constant

$S_1 + 500 + S_2 + 250 = 10000$ when they meet.

$S_1 + S_2 = 9250$

$S_1 = 9250 - S_2$

constant	u	25
	v	25
	a	0
	s	$9250 - S_2$
	t	$t - 40$

$9250 - S_2 = 25(t - 40)$

$S_2 = 25t - 1000$

$-25t + 1000$

$+9250$

$S_2 = 10250 - 25t$

$S_2 = 25(t - 20) + \frac{1}{2} \cdot 0$

$S_2 = 25t - 500$

$10250 - 25t = 25t - 500$

$9750 = 50t$

$92.5 \text{ sec} = t$