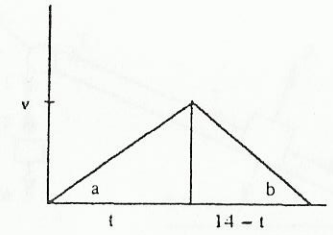
1(a)



$\tan a = \frac{v}{t} \Rightarrow v = 0.6t$

$\tan b = \frac{v}{14-t} \Rightarrow v = 0.8(14-t)$

$0.6t = 0.8(14-t)$

$\Rightarrow t = 8$

$\Rightarrow v = 4.8$

distance $= 0.5(14)(4.8) = 33.6$ m.

(b) (i) upwards $98 - mg = mf$

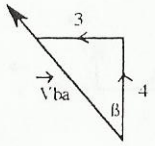
downwards $mg - 68.6 = 2mf$

$\Rightarrow mg = 88.2$ or $m = 9$ kg

(ii) $98 - 88.2 = 9f$

$\Rightarrow 2f = \frac{2g}{9}$

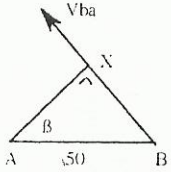
2(a) (i) $\vec{Vba} = \vec{Vb} - \vec{Va}$



$|\vec{Vba}| = 5$

$\tan ß = 3/4$

(ii)



After 10 seconds B is at p and A is $(80 - 3x10 =)$ 50 m from p. They are nearest together when B reaches X.

$\text{time} = \frac{BX}{Vba} = \frac{50 \sin ß}{5} = 6$ seconds

total time = 16 seconds

After 16 s A is $(80 - 3x16 =)$ 32 m from p

After 16 s B is $(40 - 4x16 =) -24$ m from p

i.e. 24 m past p

(b) (i) $\vec{Vba} = \vec{Vb} - \vec{Va}$

$= (4 - qt)\vec{j} - (3 + 0.1t)\vec{i}$

(ii) Find time it takes A to reach p

$3t + 0.5(0.1)t^2 = 80$

$\Rightarrow t = 20$

As they arrive together, the time for B to reach p is 20 s

$4t - 0.5qt^2 = 40$

$4(20) - 0.5q(400) = 40$

$\Rightarrow q = 0.2$