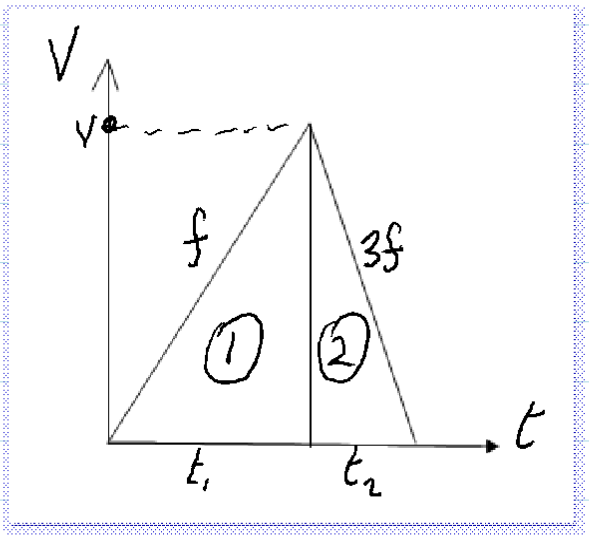
Title

Mon 1st March

Exam Papers 2006 1(a)

Total Dist = d



$\longleftarrow t \longrightarrow$

$$\frac{t_1}{t_2} = \frac{3f}{f}$$

$$t_1 = 3t_2$$

d = Area $= \frac{1}{2} t.v$

$$d = \frac{tv}{2}$$

$d = \frac{tV}{2}$

① $u = 0$

$a = f$

$V = ?$

$t = t_1$

$V = u + at$

$V = 0 + ft_1$

$d = \frac{tV}{2}$

$= \frac{t}{2}(ft_1)$

$= \frac{ft}{2} t_1$

$= \frac{ft}{2}\left(\frac{3}{4}t\right)$

$= \frac{3ft^2}{8}$

$t_1 = 3t_2$

$t_1 + t_2 = t$

$3t_2 + t_2 = t$

$4t_2 = t$

$t_2 = \frac{t}{4}$

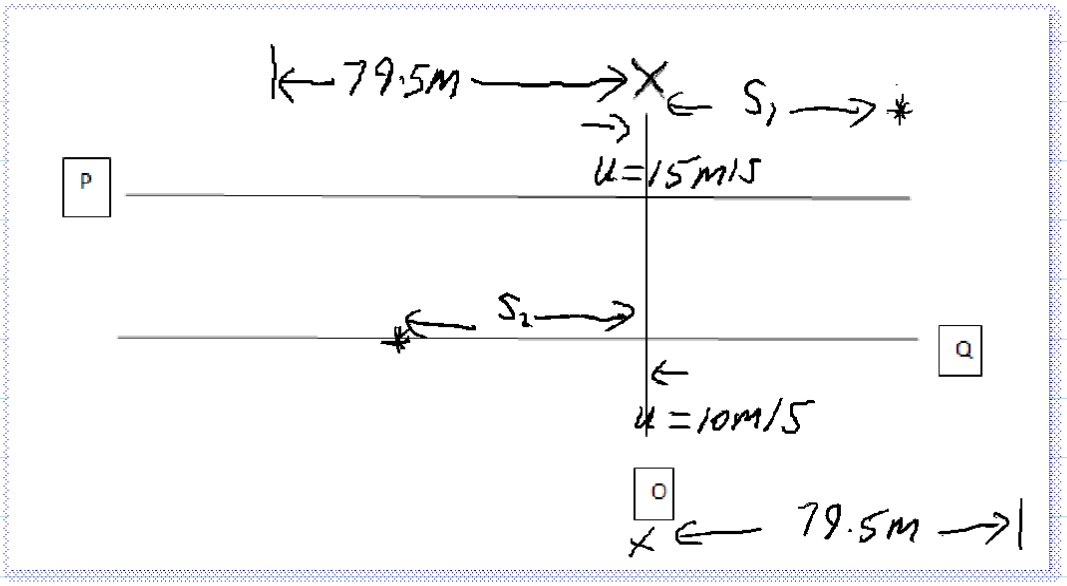
$t_1 = \frac{3}{4}t$

$V = ft_1$ $\quad t_1 = 3t_2$ *

$t_1 + t_2 = t$ $\quad d = \frac{tV}{2}$

*

(b)



(i)

P

$u = 15$

$a = 0.3$

$t = t$

Q

$u = 10$

$a = 0.2$

$t = t$

P

$s = ut + \frac{1}{2}at^2$

$s = 15t + \frac{1}{2}(0.3)t^2$

$s_1 = 15t + \frac{3}{20}t^2$

Q

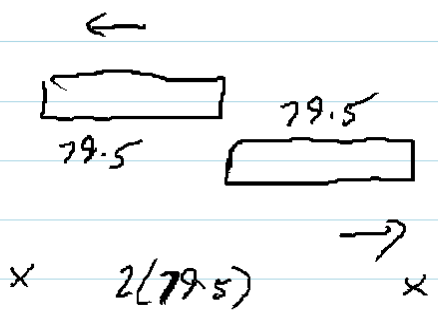
$s = ut + \frac{1}{2}at^2$

$s = 10t + \frac{1}{2}(0.2)t^2$

$s_2 = 10t + \frac{1}{10}t^2$

$S_1 + S_2 =$ length of 2 trains

$$\left(15t + \frac{3}{20}t^2\right) + \left(10t + \frac{1}{10}t^2\right) = 2(79.5)$$



$$\frac{t^2}{4} + 25t = 159$$

$$t^2 + 100t = 636$$

$$t^2 + 100t - 636 = 0$$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-100 \pm \sqrt{10000 - 4(-636)}}{2}$$

$$= \frac{-100 \pm \sqrt{10000 + 2544}}{2} = \frac{-100 \pm \sqrt{12544}}{2}$$

(ii) $t = \frac{-100 \pm 112}{2}$

$= \frac{12}{2}$ or $\frac{-212}{2}$

$= 6$ secs

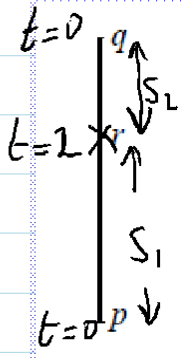
(iii) Length of Q $= 79.5$

$\frac{2}{5}$ of Length $= \frac{2}{5}(79.5) = \frac{159}{5} =$ 31.8m

$u = 10$
$a = 0.2$
$s = 31.8$
$t = ?$

$s = ut + \frac{1}{2}at^2$

2009 Q1. (a)



A particle is projected vertically upwards from the point p. At the same instant a second particle is let fall vertically from q.
The particles meet at r after 2 seconds.

The particles have equal speeds when they meet at r.

Prove that $|pr| = 3|rq|$.

(P)

$u = u$

$a = -g$

$t = 2$

$v = v$

(Q)

$u = 0$

$a = g$

$t = 2$

$v = v$

(P)

$v = u + at$

$v = u + (-g)(2)$

$v = u - 2g$

$2g = u - 2g$

Q

$v = u + at$

$v = 0 + 2g$

$v = 2g$

$u = 4g$

$s_1 = ut + \frac{1}{2}at^2$

$= u(2) + \frac{1}{2}(-9)(2)^2$

$s_1 = 2u - 2g$

$= 2(4g) - 2g$

$s_1 = 6g$

$s_2 = ut + \frac{1}{2}at^2$

$s_2 = 0(t) + \frac{1}{2}(9)(2)^2$

$s_2 = 2g$

$s_1 = 3s_2$