1993

1(a) (i) $s = ut + \frac{1}{2}ft^2$

1993

Stage ab $30 = u(4) + \frac{1}{2}f(16)$
$= 4u + 8f$

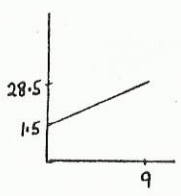
Stage ac $84 = u(7) + \frac{1}{2}f(49)$
$= 7u + 24.5f$

$u = 1.5$ m/s and $f = 3$ m/s

Stage ad $s = ut + \frac{1}{2}ft^2$
$= 1.5(9) + \frac{1}{2}(3)(81)$
$= 135$ metres

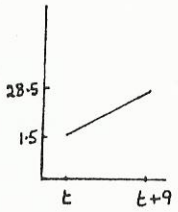
(ii) Any two of the following points

0,1.5
4,13.5
7,22.5
9,28.5



OR

t,1.5
t+4,13.5
t+7,22.5
t+9,28.5



(b) (i) $s = ut + \frac{1}{2}ft^2$

P $s = 47(t+2) - 4.9(t+2)^2$

Q $s = 64.6t - 4.9t^2$

$s_P = s_Q$

$\rightarrow$ $t = 2$ seconds

(ii) $s = ut + \frac{1}{2}ft^2$
$= 64.6t - 4.9t^2$
$= 64.6(2) - 4.9(4)$
$= 129.2 - 19.6$
$= 109.6$ metres

1993

2(a) Let $\vec{Vw} = a\vec{i} + b\vec{j}$

1993

$\vec{Vwg} = \vec{Vw} - \vec{Vg}$

from east $-x\vec{i} = a\vec{i} + b\vec{j} - (-11\vec{j})$

from south east $-y\vec{i} + y\vec{j} = a\vec{i} + b\vec{j} - (-22\vec{j})$

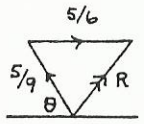
$b = -11$ and $a = -11$

$\vec{Vw} = -11\vec{i} - 11\vec{j}$

magnitude $= 11\sqrt{2}$ or 15.56 m/s

direction South West

(b) (i)



cross as quickly as possible when

$\frac{5}{9}\sin\theta$ is a maximum

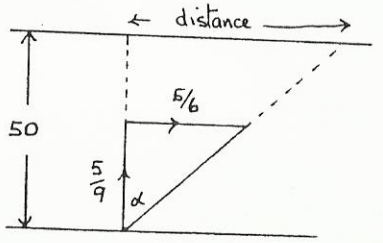
i.e. when $\sin\theta = 1$ or $\theta = 90°$

(ii) time to cross = distance / speed

$= \frac{50}{5/9}$ or $\left(\frac{90.139}{1.0015}\right)$

= 90 seconds

(iii)



$\tan\alpha = 5/6 \div 5/9$

$= 1.5$

distance $= 50\tan\alpha$

= 75 metres

OR distance $= \frac{5}{6} \times 90 = 75$ m.