a)   car A

$u = 20$
$a = -6$
$v = 0$
$s =$
$t =$

$v^2 = u^2 + 2as$
$0 = 20^2 + 2(-6)(s)$

$s = \dfrac{100}{3}$ or $33\frac{1}{3}$ m

·5 sec later , B has already travelled

$v^2 = u^2 + 2as$
$20^2 = 20^2 + 2(0)(s)$
        ↑ no accel. yet

$s =$ speed × time
$= 20(·5)$
$= 10$ m.

Car B : hits brakes : $u = 20$
                            $v = 0$
                            $a = -3$
                            $s =$
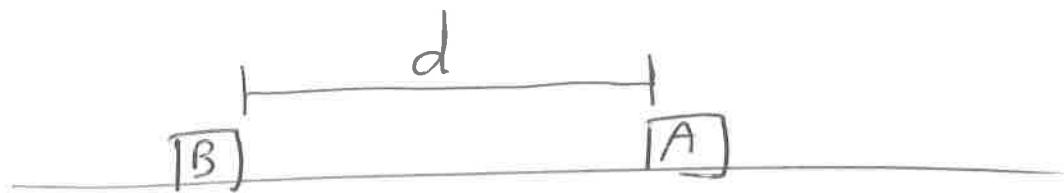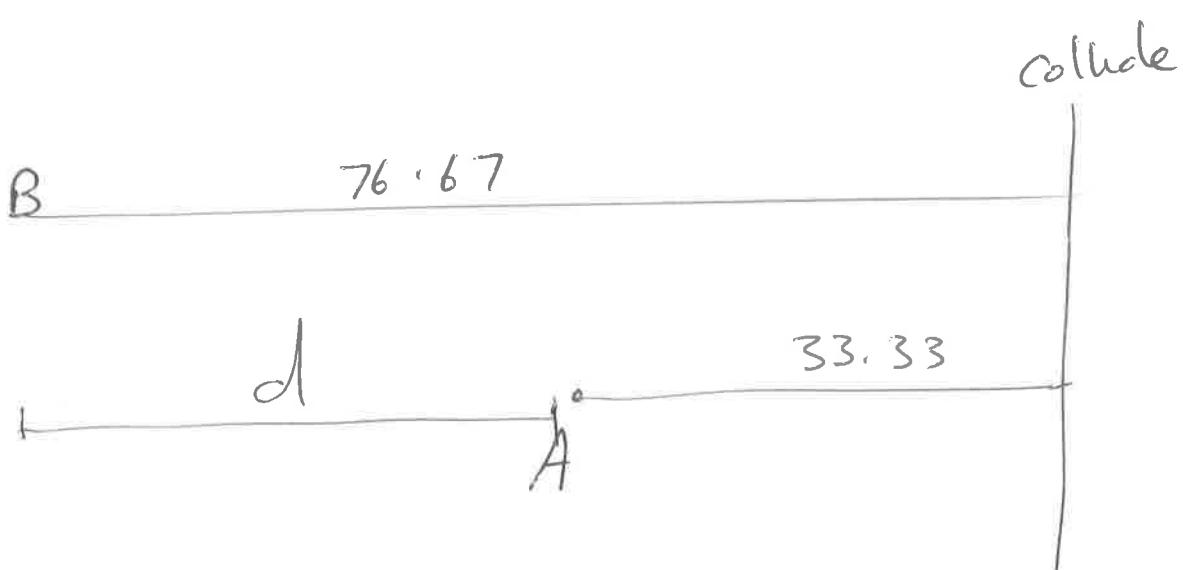
$v^2 = u^2 + 2as$
$0 = 20^2 + 2(-3)(s)$

$s = \dfrac{200}{3}$ or 66.67 m

B travels : $10 + \dfrac{200}{3} = \dfrac{230}{3}$ $\left(= 76.67\right)$

d

| B | | A |

minimum d for B <u>Not</u> collide with A

collide

B ——————— 76·67 ———————

d ——————— 33. 33 ———————

A

for collide : $S_B = d + S_A$

$43.3 = d$ for collide

$\downarrow$ min

if $d > 43.3$ B wont hit

      $d < 43.3$ B will hit

LCH   05   1.b

m = 8   easy
u = 0
a = g

t = 5   —   hits sand
                    v = 0
                    t = 0.01
                    Resistance = ?

in air   :   u = 0
               a = g
               t = s   v = u + at
               v = ?   v = 0 + g(s)
                              v = 49

in sand   :   u = 49
               v = 0
    ↑ Friction, R   a = ?   v = u + at
    ⊡   s = ?   0 = 49 + a (.01)
    ↓ mg mg   t = 0.01   a = − 4900

mg − R = ma

8(9.8) − R = 8(−4900)   ←

R = 39278.4 N

                    → u = 49
                       v = 0   v² = u² + 2as
                       a = −4900   0 = 49² + 2(−4900)(s)
                       t = 0.01
                       s = ?   s = .245 m

$u = 0$
$a = f$
$a = -3f$
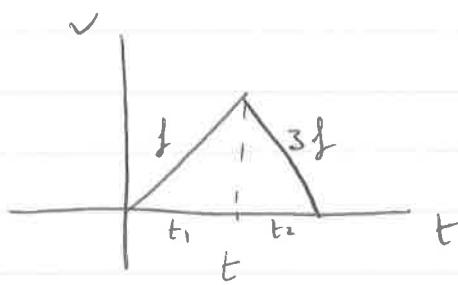
Area = d

$t_1 : t_2$ is $d : a$

$$3f : f$$

$$\frac{3f}{4f} : \frac{f}{4f}$$

$$t_1 = \frac{3}{4}t \qquad t_2 = \frac{1}{4}t$$

$v = u + at$

$v = 0 + 3f\left(\frac{3}{4}t\right)$

$v = \frac{3}{4}ft$
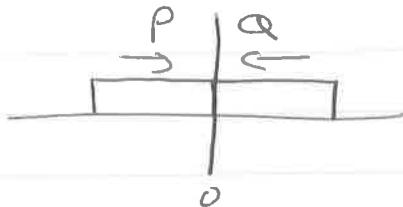
Area $= d = \frac{1}{2}(t)\left(\frac{3}{4}ft\right)$

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

Easy

P   Q

$l_1 = 79.5$ $l_2 = 79.5$

$u = 15$ $\longrightarrow$ $\longleftarrow$ $u = 10$

$a = 0.3$ $a = 0.2$

t sec. to pass each other

(1)

to pass each other $S_P + S_Q = l_P + l_Q$

(i)

$\left[15t + \frac{1}{2}(0.3)t^2\right] + \left[10t + \frac{1}{2}(0.2)t^2\right] = 2(79.5)$

$15t + .15t^2$
$10t + .1t^2$

$30t + 0.3t^2 + 20t + 0.2t^2 = 318$

$.5t^2 + 50t - 318 = 0$
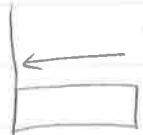
$t^2 + 100t - 636 = 0$

$(t + 106)(t - 6) = 0$

(ii) $t = 6$ sec

(iii) $t = ?$

$\frac{2}{5}$ of $79.5 = 31.8$

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

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

$31.8 = 10t + \frac{1}{2}(.2)t^2$

$318 = 100t + t^2$

$t^2 + 100t - 318 = 0$

$(t\quad)(t\quad) = 0$

$\frac{-100 \pm \sqrt{100^2 - 4(-318)}}{2} = \frac{-100 \pm 106.1697}{2}$

$t = 3.0849$ or -103.0849