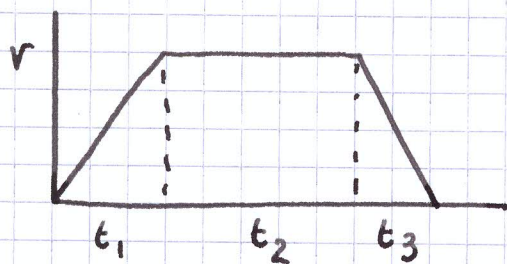


1998

Question 1.

a.



whole distance = $v \left(\frac{1}{2}t_1 + t_2 + \frac{1}{2}t_3 \right)$

average speed = $\frac{\text{distance}}{\text{time}} \Rightarrow \frac{5v}{6} = \frac{\left(\frac{1}{2}t_1 + t_2 + \frac{1}{2}t_3 \right) v}{t_1 + t_2 + t_3}$

$\Rightarrow \frac{1}{2}t_1 + t_2 + \frac{1}{2}t_3 = \frac{5}{6} (t_1 + t_2 + t_3)$

$3t_1 + 6t_2 + 3t_3 = 5t_1 + 5t_2 + 5t_3$

$t_2 = 2(t_1 + t_3)$

$t_2 = \frac{2}{3}(t_1 + t_2 + t_3)$

fraction = $\frac{t_2}{\left(\frac{1}{2}t_1 + t_2 + \frac{1}{2}t_3 \right)}$ $\Rightarrow \frac{\frac{2}{3}(t_1 + t_2 + t_3)}{\frac{5}{6}(t_1 + t_2 + t_3)}$

$= \frac{4}{5}$

b. Car A

u	9u
v	5.4
a	3b/20
s	?
t	t

Car B

u	5u
v	6.5
a	2b/9
s	?
t	(t-3)

find u+b use $v^2 = u^2 + 2as$

$5.4^2 = 81u^2 + \frac{3bs}{10}$

$6.5^2 = 25u^2 + \frac{4bs}{9}$

(A) $291.6 = 810u^2 + 3bs$ x 4
 $380.25 = 225u^2 + 4bs$ x -3

$1166.4 = 3240u^2 + 12bs$
 $- 1140.75 = -675u^2 - 12bs$

 $25.65 = 2565u^2$
 $0.01 = u^2$

$u = 0.1$

use $v = u + at$

$5.4 = 0.9 + \frac{3bt}{20}$

$4.5 = \frac{3bt}{20}$ $t = \frac{30}{b}$

$6.5 = 0.5 + \frac{2b(t-3)}{9}$

$6.5 = 0.5 + \frac{2b\left(\frac{30}{b} - 3\right)}{9}$

$54 = 2b\left(\frac{30}{b} - 3\right)$ $27 = 30 - 3b$

$b = 1$
 $t = 30$

distance travelled: (from A) $291.6 = 810(0.1)^2 + 3(1)s$

$s = 94.5$