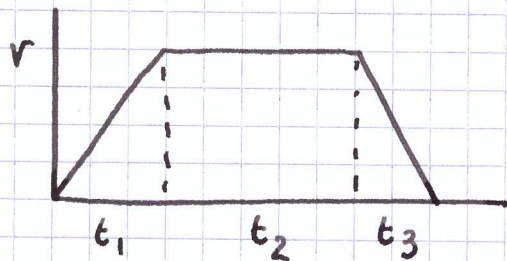


1998

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	$\frac{3b}{20}$
s	?
t	t

Car B

u	5u
v	6.5
a	$\frac{2b}{9}$
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

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


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

$u = 0.1$

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)  $291.6 = 810(0.1)^2 + 3(1)s$

$s = 94.5$