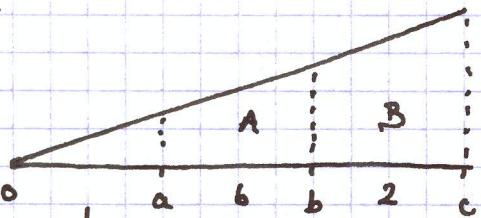
TEST - 1996 Paper Question one.

a.



i.

	a-b	a-c
u = 0	u = u	u = u
v =	v	v
a = a	a = a	a = a
s =	s = 105	s = 168
t =	t = 6	t = 8

do not consider

This part of journey - not enough info.

NB

we can make up 2 equations with 2 unknowns which are the same.

use: $s = ut + \frac{1}{2}at^2$ (10)

$105 = 6u + \frac{1}{2}.a(6)^2$ $\quad 105 = 6u + 18a$

$168 = 8u + \frac{1}{2}.a.(8)^2$ $\quad 168 = 8u + 32a$ (10)

Solving simultaneous equations

$u = 7$ $\quad \boxed{a = 3{\cdot}5}$ (5)

ii. 1st part:

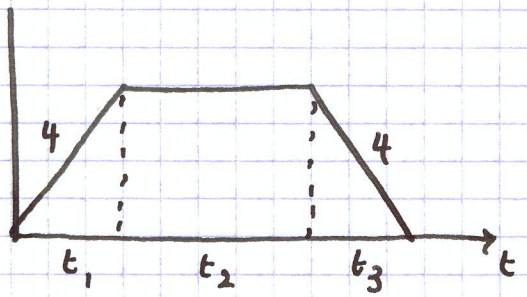
$u = 0$
$v = 7$
$a = 3{\cdot}5$
$s =$
$t =$

$v^2 = u^2 + 2as$

$\frac{v^2 - u^2}{2a} = s$

$s = \frac{7^2}{2(3{\cdot}5)}$ $\quad \boxed{s = 7}$ (5)

b.



ii. Examine the question carefully before you begin.
You are looking for t_2 and must have t and d in your equation
⇒ try and put everything else in terms of these. (5)

(a) SORT OUT those t's!

$t = t_1 + t_2 + t_3$ but $t_1 = t_3$ (same rate of acceleration/deceleration)

$\Rightarrow t = 2t_1 + t_2$

$\Rightarrow \frac{t - t_2}{2} = t_1$

(b) equation in d: $d = \frac{1}{2}.t_1.v + t_2.v + \frac{1}{2}t_3.v$

(c) can replace t_1/t_3; need to replace v.

acceleration

u	0
v	
a	4
s	
t_1	$\frac{t - t_2}{2}$

$v = 0 + 4.\left(\frac{t - t_2}{2}\right)$

$v = 2(t - t_2)$

(d) $\Rightarrow d = \frac{1}{2}.\left(\frac{t-t_2}{2}\right)\left(t-t_2\right)2 + 2t_2(t-t_2) + \frac{1}{2}\left(\frac{t-t_2}{2}\right)\left(t-t_2\right)2$

$d = (t-t_2)(t-t_2) + 2t_2(t-t_2)$

$= (t-t_2)(t-t_2+2t_2)$

$= (t-t_2)(t+t_2)$

$d = t^2 + t_2^2$

$\Rightarrow t_2 = \sqrt{t^2 - d}$