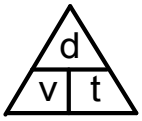
Applications of Linear Systems: dvt Problems

Some strategies:

1. Identify what the question wants. This may tell you one or both of your variables.
2. Remember (a) d = v t or (b) 

3. Use a table to fill in known and unknown values to help form your equations.
4. Make sure your units are all consistent.

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Ex.1. Alex drove 500 km from Ottawa to Toronto in 5 1/2 h. He drove part of the way at 100 km/h, and the rest of the way at 80 km/h. How far did he drive at each speed?

	distance (d)	speed (v)	time (t)
Trip 1	d_1	$= 100$ km/h $\times$	t_1
Trip 2	d_2	$= 80$ km/h $\times$	t_2
Total	500 km		5.5 h

$0 \to T$

$d_1 + d_2 = 500$ $\quad t_1 + t_2 = 5.5$ ②

$\frac{100t_1}{10} + \frac{80t_2}{10} = \frac{500}{10}$ ①

$\frac{10t_1}{2} + \frac{8t_2}{2} = \frac{50}{2}$

$5t_1 + 4t_2 = 25$ ③

②×4: $4t_1 + 4t_2 = 22$ ④

③-④: $t_1 = 3$

sub $t_1 = 3$ into ②

$t_1 + t_2 = 5.5$

$3 + t_2 = 5.5$

$t_2 = 2.5$

$d_1 = 100t_1$ $\quad d_2 = 80t_2$

$= 100(3)$ $\quad = 80(2.5)$

$= 300$ $\quad = 200$

∴ part 1 was 300 km and part 2 was 200 km

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Ex.2 Emily travelled 95 km from Oakville to Oshawa by car and GO train. The car averaged 60 km/h, and the train averaged 90 km/h. The whole trip took 1.5 hours. How long was she in the car?

	distance (d)	speed (v)	time (t)
Car	d_1	60km/h	t_1
GO	d_2	90km/h	t_2
Total	95km		1.5h

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Ex.3 A boat took 2 h to travel 24 km down a river with the current and 3 h to make the return trip against the current. Find the speed of the boat in still water and the speed of the current.

	distance (d)	speed (v)	time (t)
down	24km	$= x+y$	2h
up	24km	$= x-y$	3h
Total	48km		5h

p.27 # 8
p.55 # 13
p.64 # 7

Let x be the speed of boat in still water

Let y be the speed of the current.

$24 = (x+y)(2)$ $24 = (x-y)(3)$

$24 = 2x + 2y$ ① $24 = 3x - 3y$ ②

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Assigned Work:

p.27 # 8
p.55 # 13
p.64 # 7

8.

	d	$=$	v	$\times$	t
$O \rightarrow NB$	d_1	$=$	$70\ km/h$	$\times$	t_1
$NB \rightarrow T$	d_2	$=$	$50\ km/h$	$\times$	t_2
total	$393\ km$				$6\ h$

$d_1 + d_2 = 393$ ① $\quad t_1 + t_2 = 6$ ②

$70t_1 + 50t_2 = 393$ ③

② $\times 50$: $50t_1 + 50t_2 = 300$ ④

③ − ④: $\frac{20t_1}{20} = \frac{93}{20}$

$t_1 = \frac{93}{20}$

$t_1 = 4.65$

Sub $t_1 = 4.65$ into ②

$t_1 + t_2 = 6$

$(4.65) + t_2 = 6$

$t_2 = 1.35$

$d_2 = 50t_2$

$= 50(1.35)$

$= 67.5$

∴ the distance from NB to T is 67.5km

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p. 55 #13

	d	v	t
paved trails	d_1 or $10t_1$	$10\ km/h$	t_1
rough terrain	d_2 or $5t_2$	$5\ km/h$	t_2
total	$12\ km$		$1.5\ h$

$10t_1 + 5t_2 = 12$ ① $\quad t_1 + t_2 = 1.5$ ②

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p. 64 #7.

	d	= v	× t
paved	$d_1 = 25t_1$	25 km/h	t_1
off road	$d_2 = 10t_2$	10 km/h	t_2
total	41 km		2 h

$25t_1 + 10t_2 = 41$ (1) $t_1 + t_2 = 2$ (2)

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