Modelling with Linear Equations

Feb 18/2016

The purpose of today's lesson is to create a system of linear equations from a word problem.

1. Identify unknowns and declare them as variables. This may involve some trial and error.

2. Write at least two equations using the variables.

3. Solve using the method of your choice. Some choices are better than others, so choose carefully.

4. Write a concluding statement that answers the original question from the word problem.

Feb 18-10:58 PM

Modelling with Linear Equations

Write a system of equations to model each of the following situations (do not solve):

1. The sum (add) of two numbers is 72. Their difference (subtract) is 48. Find the numbers.

Let x and y represent the two numbers.

$x + y = 72$ (1)

$x - y = 48$ (2)

Feb 18-10:58 PM

2. Bert earns an hourly wage plus tips. One week he worked 12h and made a total of $117. The next week he worked 10h and earned the same amount in tips as the week before, for a total of $110. What is Bert's hourly wage?

$12w + y = 117$

$10w + y = 110$

$12w + y = 117$

$10w + y = 110$

w = hourly rate

y = tips.

Feb 18-10:59 PM

3. Ernie drove at a speed of 50 km/h from Toronto to Kingston. From Kingston to Ottawa, he drove 80 km/h. If the whole trip was 550 km and it took 8h, what is the distance from Ottawa to Kingston?

$$v = \frac{d}{t} \quad \frac{km}{h}$$

$$t \times v = \frac{d}{t} \times t$$

$$vt = d$$

$$d = vt$$

Feb 18-11:01 PM

3. Ernie drove at a speed of 50 km/h from Toronto to Kingston. From Kingston to Ottawa, he drove 80 km/h. If the whole trip was 550 km and it took 8h, what is the distance from Ottawa to Kingston?

	distance (d)	=	speed (v)	×	time (t)
T → K	x	=	50 km/h		t_1
K → O	y	=	80 km/h		t_2
Total	550 km				8 h

$x + y = 550$

$50t_1 + 80t_2 = 550$ ①

$t_1 + t_2 = 8$ ②

Feb 18-11:01 PM

4. One lawn fertilizer is 24% nitrogen, and another is 12% nitrogen. How much of each fertilizer should be mixed to obtain 100kg of fertilizer that is 21% nitrogen?

Sep 21-2:31 PM

Assigned Work:

write a system of equations for each of the following, but DO NOT SOLVE:

p.27 # 8, 12, 13
p.39 #10, 11, 14, 15
p.55 # 8, 9

Reading examples 1 & 2 p.33-35 will help.

Feb 16 - 2:27 PM

p. 27 #8

	d	$=$	v	$\times$	t
① O→N	d_1	$=$	70km/h	$\times$	t_1
② N→T	d_2	$=$	50 km/h	$\times$	t_2
ⓣ O→T	393km				6h

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

$70t_1 + 50t_2 = 393$ ①

Feb 19-1:56 PM

p. 39. 11, 14, 15

11. 30g 70% purity

$30(0.70) = 21$

$x + y = 30$ $0.8x + 0.66y = 0.70(30)$

Let x be the mass of 80% compound
Let y be the mass of 66% compound.

Feb 19-2:02 PM

14. $0.005x + 0.14y = 50$ (carbs)

$0.030x + 0.030y = 20$ (protein)

Let x rep. mass of soy milk

Let y rep. mass of veg.

Feb 19-2:11 PM

15. Let P rep. pay per week
Let t rep total sales

$P = 500 + 0.05t$ ①

$5\% = \frac{5}{100}$

$P = 400 + 0.075t$ ②

$7.5\% = \frac{7.5}{100}$

Feb 19-2:15 PM

p. 55 #8.

Let x rep. Lori's distance
Let y rep Nicholas' distance

$x + y = 72.7$ ① $x = y + 8.9$

OR ②

$x - y = 8.9$

Feb 19-2:20 PM

p. 39

#10.

Let C rep. cost per month

Let n rep. # of cheques

$C = 10 + 0.75n$ ① $C = 7 + 1.00n$

Feb 19-2:22 PM