Modelling with Linear Equations

Feb 14/2011

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

1. Identify unknowns and declare them as variables.

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.

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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?

$\frac{21}{100} = 0.21$

Let x be mass of 24% mixture

Let y be mass of 12% mixture.

$$x + y = 100 \quad (1)$$

$$0.24x + 0.12y = (0.21)(100) \quad (2)$$

(0.21)(100): amount of nitrogen in final mixture

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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?

Let x be Bert's hourly wage.
Let y be tips.

$12x + y = 117$ $\quad$ $10x + y = 110$

Same each week

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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?

$d = v \times t$

	distance (d)	speed (v)	time (t)
Tor→King	$50x$	50km/h	x
King→Ott	$80y$	80km/h	y
Total	550 km	~~X~~	8h

Let x be time from T→K
Let y be time from K→O

$50x + 80y = 550$ $\quad$ $x + y = 8$

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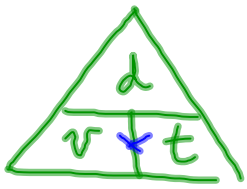
3. Ernie drove at a speed of 50 km/h from Toronto to Kingston. From Kingston to Ottawa, he drove 80 km/h. If the whole trip was 550 km and it took 8h, what is the distance from Ottawa to Kingston?

$d = vt$

distance, speed (velocity), time



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

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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 numbers

$x + y = 72$

$x - y = 48$ $x = 60, y = 12$

or $y - x = 48$ $x = 12, y = 60$

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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.

p.53

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p. 39 #14

x : 1g soy → 0.005g carbs → 0.030g protein

y : 1g veg → 0.14g carbs → 0.030g protein

carbs : $0.005x + 0.14y = 50$ (soy) (veg) (total)

protein : $0.030x + 0.030y = 20$ (soy) (veg) (total)

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p.39 #11

Let x be the mass of 80%

Let y be the mass of 66%

$x + y = 30$ (total mass)

$0.8x + 0.66y = 30(0.7)$ (mass of pure silver)

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