## **Modelling with Linear Equations**

Feb 18/2016

The purpose of today's lesson is to create a <u>system of linear equations</u> 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.

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## Modelling with Linear Equations

add

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

1. The sum of two numbers is 72. Their difference is 48. Find the numbers.

Let x and y represent the two numbers.

$$x + y = 72$$
 (1)  
 $x - y = 46$  (2)

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?

$$12w + y = 117$$
  
 $10w + y = 110$   
 $w = howly rate$   
 $y = +i\infty$ .

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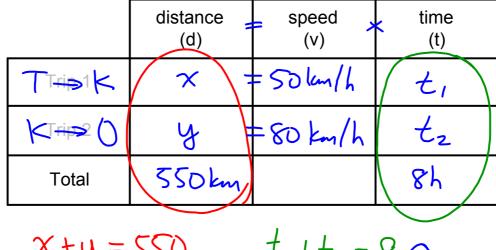
3. Ernie drove at a speed of 50 km/h from Toronto to Kingston. From Kingston to Ottawa, he drove 80 km/h. If the whole trip was 550 km and it took 8h, what is the distance from Ottawa to Kingston?

$$V = \frac{d}{t} \frac{km}{h}$$

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

$$v = d$$
 $d = nt$ 

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?



$$50t_1 + 80t_2 = 550$$
 $t_1 + t_2 = 80$ 

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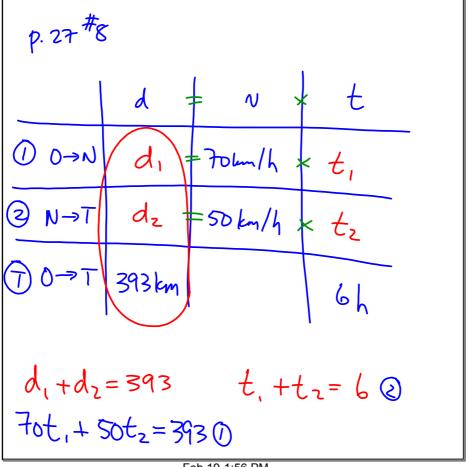
4. One lawn fertilizer is 24% nitrogen, and another is 12% nitrogen. How much of each fertilizer should be mixed to obtain 100kg of fertilizer that is 21% nitrogen?

## Assigned Work:

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

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

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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% compand
Let  $y$  be the mass of 66% compand.

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14. 
$$6.005x + 0.14y = 50$$
 (carbs)

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

Let  $x$  rsp. mass of soy milk Let  $y$  rsp. mass of veg.

15. Let P rep. pay per week

Let 
$$t$$
 rep total sales

$$P = 500 + 0.05t \quad 0$$

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

$$P = 400 + 0.075t \quad 2$$

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

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p.55 #8.

Let 
$$x$$
 rep. Lori's distance

Let  $y$  rep. Midwas' distance

 $x+y=72.7 \ 0 \ x=y+8.9$ 

or

 $x-y=8.9$ 

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