

## Modelling with Linear Equations

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.

$$\begin{aligned}x + y &= 19 & \textcircled{1} \\5x + 10y &= 100 & \textcircled{2}\end{aligned}$$

Feb 18-10:58 PM

## Modelling with Linear Equations

Sept 20/2011

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

1. The <sup>(+)</sup>sum of two numbers is 72. Their <sup>(-)</sup>difference is 48. Find the ~~numbers~~ equations.

Let  $x$  represent the first number  
Let  $y$  represent the second

$$\begin{aligned}x + y &= 72 \\x - y &= 48\end{aligned}$$

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?



$$\text{1st week: } 117 = 12x + y$$

$$\text{2nd week: } 110 = 10x + y$$

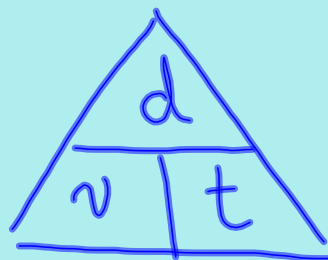
Let  $x$  represent hourly wage  
Let  $y$  represent tips

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?

$$\frac{\text{km}}{\text{h}}$$

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



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)
Tor → King	$x$	50	$\frac{x}{50}$
King → Ott	$y$	80	$\frac{y}{80}$
Total Tor → Ott	550	<del>          </del>	8

$$\begin{array}{|c|} \hline d \\ \hline v | t \\ \hline \end{array} \quad t = \frac{d}{v}$$

$$x + y = 550$$

$$\frac{x}{50} + \frac{y}{80} = 8$$

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?

mass?

$$\begin{array}{ccc} x + y = 100 \\ \downarrow \quad \downarrow \quad \downarrow \\ \text{mass} \quad \text{mass} \quad \text{mass} \\ 24\% \quad 12\% \quad 21\% \end{array}$$

$$0.24x + 0.12y = 0.21(100)$$

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.40 #15

\$500/week + 5% commission

\$400/week + 7.5% commission

compare 1 week of each job

let  $x$  represent sales

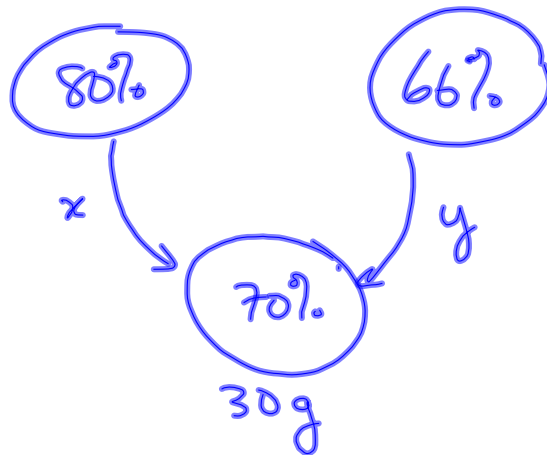
let  $y$  represent weekly income

$$y = 500 + 0.05x$$

$$y = 400 + 0.075x$$

Sep 21-9:33 AM

p.39 #11



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

Let  $x$  represent mass of 80%.  
Let  $y$  rep. mass of 66%.

Sep 21-9:38 AM

p.40 #14

Let  $x$  rep. # of grams of soy  
Let  $y$  rep # of grams of veg.

$$\text{Carbs: } \underbrace{50}_{\text{total carbs}} = \underbrace{0.005x}_{\text{carbs from soy}} + \underbrace{0.14y}_{\text{carbs from veg}}$$

$$\text{protein: } 20 = 0.030x + 0.030y$$

Sep 21-9:43 AM