

**Notice:** The notes are the same as before, but the questions in class and homework are different.

## Word Problems 2

### 1. How to do word problems:

**There are two steps to solving math word problems:**

- 1) Translate the wording into a numeric equation that combines smaller "expressions"
- 2) Solve the equation!

| <b>Math expressions (examples): after you review the keywords, <b>test yourself</b></b>                              |                                      |
|--|--------------------------------------|
| <b>addition: <math>5+x</math></b>  | <b>subtraction: <math>5-x</math></b> |
| <b>multiplication: <math>5x</math></b>   | <b>division: <math>5/x</math></b>    |
| <b>Key words for addition + :</b><br>increased by; more than; combined together; total of; sum; added to             |                                      |
| What is the sum of 8 and y?  | $8 + y$                              |
| Express the number (x) of apples increased by two  | $x + 2$                              |
| Express the total weight of Alphonse the dog (x) and Cyrus the cat (y)   | $x + y$                              |
| <b>Key words for Subtraction - :</b><br>less than, fewer than, reduced by, decreased by, difference of               |                                      |
| What is four less than y?  | $y - 4$                              |
| What is nine less than a number (y)?   | $y - 9$                              |
| What if the number (x) of children was reduced by 6?   | $x - 6$                              |
| What is the difference of my weight (x) and your weight (y)?   | $x - y$                              |
| <b>Key words for multiplication * x</b><br><b>or integers next to each other (5y, xy) :</b> of, times, multiplied by |                                      |
| What is y multiplied by 13?  | $13y$                                |
| Three runners averaged "y" minutes. Express their total running time:  | $3y$                                 |

|   |        |
|---|--------|
| I drive my car at 55 miles per hour. How far will I go in "x" hours?                              | $55x$  |
| <b>Key words for division /</b><br>per, a; out of; ratio of; quotient of; percent (divide by 100) |        |
| What is the quotient of y and 3?  | $y/3$  |
| Three students rent an apartment for \$ "x" /month. What will each have to pay?                   | $x/3$  |
| "y" items cost a total of \$25.00. Express their average cost:                                    | $25/y$ |

## 2. Word problems are a series of expressions that fits into an equation

An equation is a combination of math expressions.

### Suggestions:

- **Read the problem entirely**  
Get a feel for the whole problem
- **List information** and the variables you identify.  
Attach units of measure to the variables (gallons, miles, inches, etc.)
- **Define what answer you need,**  
as well as its units of measure
- **Work in an organized manner**  
Working clearly will help you think clearly
  - Draw and label all graphs and pictures clearly
  - Note or explain each step of your process; this will help you track variables and remember their meanings
- **Look for the "key" words** (above)  
Certain words indicate certain mathematical operations:

### More vocabulary and key words:

- **"Per" means "divided by"**  
as "I drove 90 miles on three gallons of gas, so I got 30 miles per gallon" (Also 30 miles/gallon)

- **"a" sometimes means "divided by"**  
as in "When I tanked up, I paid \$3.90 for three gallons, so the gas was 1.30 a gallon, or \$1.30/gallon
- **"less than"**  
If you need to translate "1.5 less than x", the temptation is to write " $1.5 - x$ " DON'T! Put a "real world" situation in, and you'll see how this is wrong:" He makes \$1.50 an hour less than me." You do NOT figure his wage by subtracting your wage from \$1.50. Instead, you subtract \$1.50 from your wage.
- **"quotient/ratio of" constructions**  
If a problems says "the ratio of x and y", it means "**x divided by y**" or  $x/y$
- **"difference between/of" constructions**  
If the problem says "the difference of x and y", it means " $x - y$ "

**Examples:**

|  |                       |
|--|-----------------------|
| What if the number (x) of children was reduced by six, and then they had to share twenty dollars? Form an equation if each gets \$5. | $20/(x - 6) = 5$      |
| 5 is 9 more than y   | $5 = y + 9$           |
| The ratio of 9 more than y to y is 3/4.  | $(y + 9)/y = 3/4$     |
| Nine less than the total of a number (y) and two is 15.  | $(y + 2) - 9 = 15$    |
| The length of a football field is 30 yards more than its width "y". Perimeter is 100 yards.  | $2(y + 30 + y) = 100$ |

**Example:** Constable Bob is driving along the Trans-Canada Highway at 100 km/h. He is passed by Melissa who is driving in the same direction at a constant speed. Ten seconds after Melissa passed Bob, their cars are 100m apart. What is the speed of Melissa's car in km/h?

**Solution**

Bob's speed:  $(100\text{km/h}) * (1\text{h}/3600\text{sec}) * (1000\text{m}/\text{km}) = 27.7778\text{m}/\text{sec}$   
In 10s Bob travels  $10\text{s} * 27.7778\text{m}/\text{sec} = 277.778\text{m}$

Therefore Melissa must have travelled  $277.778\text{ m} + 100\text{m} = 377.778\text{m}$

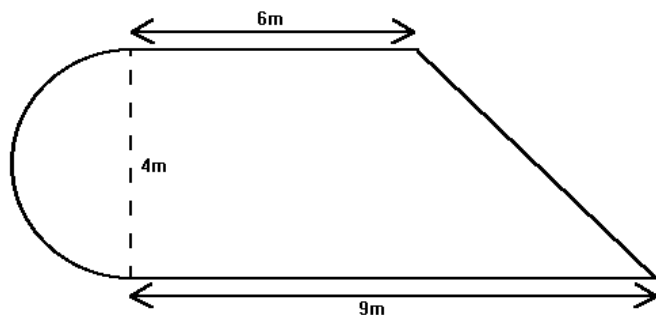
Melissa's speed is  $377.778\text{m}/10\text{s}=37.7778\text{m/s}$

$(37.7778\text{m/s}) * (1\text{km}/1000\text{m}) * (3600\text{s}/1\text{h}) = 136.00\text{km/h}$

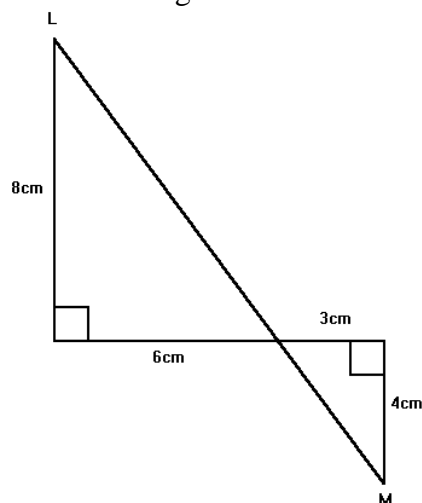
Melissa got a very big speeding ticket.

► **Questions in class**

1. My father is four times as old as me. In 20 years, he will be only twice as old as me. How old is my father and how old am I?
  
2. On a flight from Sydney, Nova Scotia to Saskatoon, Sask. the plane averaged  $760\text{km/hr}$ . On the return trip from Saskatoon to Sydney, the same plane averaged  $904\text{km/hr}$ . The distance from Sydney to Saskatoon is approximately  $4112\text{km}$ . How much longer was the trip West than the trip East? How long was each flight in minutes?
  
3. a) Bob is reading a 445 page book. He has already read 157 pages. If he reads 24 pages a day, how long will it take him to finish the book?  
  
b) Bob read 157 pages of a 445 page book. He finished the rest in 9 days. How many pages did he average each day while completing the book?
  
4. You, in your new red Porsche, decide to make a  $160\text{km}$  trip to Carolina Beach, travelling at  $80\text{km/hr}$ . You make the return trip travelling at a rate of  $48\text{km/hr}$ . What was your average speed for the entire trip?
  
5. Silver's Cleaners decided to raise the price of dry cleaning a sports coat from  $\$4.00$  to  $\$5.00$ . The same percentage increase was applied to dry cleaning a jacket. The old cost of dry cleaning a jacket was  $\$10.00$ . What is the new cost of dry cleaning a jacket?
  
6. Jane was walking the long way home from school. She started walking East. She walked  $3\text{ km}$  East when she met a dog. She ran back to the school and decided to take the alternative route. So she walked North  $4\text{ km}$  to her home. If she had walked straight home from where she met the dog, how far would it have been to her home?
  
7. The Gillis's house has a pool with the shape as shown. They want to make a cover for it for the harsh winter. How much to the nearest cent are they going to have to spend on material if it costs  $\$5.00/\text{m}^2$ ?



8. Lisa Simpson was in her math class. She was told to make a figure with four thumbtacks, an elastic band and a piece of wood. She made the following figure. Her math teacher measured some of the sides of her figure and told Lisa to find the length of the side LM in mm. Can you help her?



9. The Oland Center gym has 2kg and 5kg disks for weight lifting. Due to their budget this year they only have fourteen disks in all. The total weight of the 2kg disks is the same as the total weight of the 5kg disks. What is the total weight of all the disks?