

4.1: Introduction to Word Problems

Translating English into Math

How do you translate English into math expressions?

Addition	Subtraction	Multiplication	Division	Equals
- ADD	- decreased by	- multiply	- divide	- is
- SUM	- minus	- times	- quotient	- are
- PLUS	- less	- of	- goes into	- was
- TOTAL OF	- fewer than	- multiplied by	- split equally	- will be
- COMBINED TOGETHER	- subtract	- product of	- per	- gives
- INCREASED BY	- difference		- out of	- yields
- MORE THAN	- between/of		- ratio of	- sold for
			- % (divide by 100)	

Note: Be careful with the **ORDER** of the expression when **SUBTRACTING** or **DIVISION**. It is often a good idea to check by substituting with numbers to check your work.

Ex 1) Write the following phrases as mathematical expressions or equations. Use x as the variable where a number is unknown.

- a) A number multiplied by 6. $6x$
- b) Five less than a number $x-5$
- c) Four times the difference of a number and 4. $4(x-4)$
- d) Four times the sum of a number and 3. $4(x+3)$
- e) Twice a number plus three is eleven. $2x+3=11$
- f) A quarter of a number is equals eight. $\frac{x}{4}=8$
- g) Sum of 3 consecutive integers is 93. $x+x+1+x+2=93$
- h) Three times a number is equivalent to twice that number increase by two. $3x=2x+2$

Steps to solve a word problem:

Step 1:

- Define your variables using **LET statements**.
- Determine what quantity you want to solve for and let the variable represent this quantity.
- If there is more than one quantity to solve for, then use the information in the question to create expressions to represent the second quantity using the same variable.

****NOTE:** Always let the variable represent the **SMALLER** quantity.

Step 2: Create an **equation**. Use the information in the question to create an equation. This is known as your algebraic model.

Step 3: **Solve** the equation. Show all your work. Be sure to solve for all the unknown quantities in the question.

Step 4: **Check** your answer. Use a LS/RS T-chart proof to do this. Include a LS/RS summary statement as part of your proof.

Step 5: Write a **conclusion**. Write a final statement in sentence form that summarizes the answer to the question. Be sure to include appropriate **units**.

Ex. 2) Twelve times a number, increase by 8, is eighty. Find the number

Let x represent the number

$$\therefore 2x + 8 = 80$$

$$2x = 72$$

$$x = 36$$

LS	RS
$2x + 8$	80
$3(36) + 8$	80
80	80
$LS = RS$	

\therefore The number is 36.

Ex. 3) Donya cannot decide whether to buy a DVD player or a CD player for her birthday. A DVD player costs \$75 more than a CD player. Together, they cost \$725. How much does each cost?

Let x represent the cost of CD player

$x + 75$ represents the cost of DVD

$$\therefore x + x + 75 = 725$$

$$2x + 75 = 725$$

$$2x = 650$$

$$x = 325$$

LS	RS
$x + x + 75$	725
$325 + 325 + 75$	725
725	725
$LS = RS$	

\therefore The CD player costs \$325 and DVD player costs \$400.