EXPRESSIONS AND EQUATIONS VOCABULARY AND TRANSLATING

- ***Term***: either *a* single number or variable, *or* numbers and variables multiplied together.

  Terms *are separated* by + or − signs, or sometimes by division.

- ***Expression:*** *a* group of terms (the terms *are separated* by + or − signs).

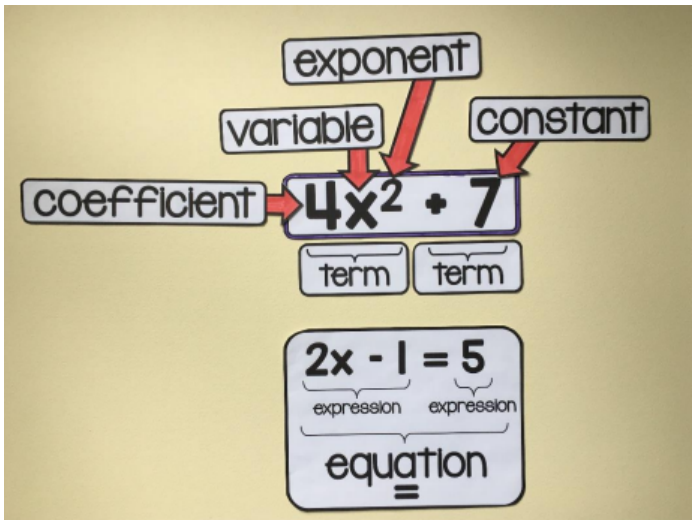
- ***Equation:*** says that two things are equal.
  - It will have an ***equals*** sign " **=** " like this: x + 2 **=** 6.
    - That equation says: **what is on the left (x + 2) is equal to what is on the right (6)**
      - An equation is like *a* **statement** "*this* equals *that*"

- ***Constant:*** *a* number *on its own*, *a* fixed value.
  - Example: in " x + 5 = 9 ", **5** and **9** *are* **constants**.

★ ***Variable***: A *symbol* for *a number we don't know yet*. It is usually *a* letter like x or y, but it can be any symbol that represents an *unknown*.
  - *Example*: in x + 2 = 6, x is the variable.
  - *Example*: in 4 + 🖤 = 12, 🖤 is the variable

- ***Coefficient:*** A number used to multiply *a* variable.
  - Example: ***6z*** means ***6 times z***, and ***"z"*** *is a* ***variable***, so ***6*** *is a* ***coefficient***.
    - *Variables on their own (without a number next to them)* actually have *a* ***coefficient of 1*** (x is really 1x)
  - Sometimes *a* coefficient is *a* letter like *a* or b instead of *a* number:
    - Example: In $ax^2 + bx + c$, "x" is *a* variable, and "a" and "b" *are* coefficients.

- ***Operator:*** *a* symbol (such as +, ×, etc) that shows an operation (what we want to do something with the values).



Writing Expressions and Equations

- To translate statements into expressions and equations:

Step 1. Identify **key words** that indicate the *operation*.

Step 2. Write the *numbers* and/or *variables* in the **correct order**.

LESS THAN and MORE THAN

→ mean → **SWITCH or FLIP THE ORDER OF THE TERMS**

1. Eight **more than** x (the first number is *added* ***to*** the second!!!) **X+8**

2. Six less than p (the first number is *subtracted* ***from*** the second!!!) **P-6**

3. Write the phrase ***five dollars less than Jennifer earned*** as an algebraic expression.

Key Words	five dollars ***less than*** Jennifer earned
Variable	Let **d** represent amount of money Jennifer earned
Expression	**d - 5**

- **TWICE = DOUBLE = 2 times a number = multiply by 2**

- When there is no operation sign between two letters, or between a letter and a number, it always means multiplication. 2x means "2 times x". Think of it as the rhyme: side by side means multiply.

Multiplication Phrases	Expression
• **Twice** a number • The **product** of 2 and n • 2 **multiplied by** a number • 2 **times** a number	2n

TRANSLATING KEY WORDS AND PHRASES INTO ALGEBRAIC EXPRESSIONS

- To write **algebraic expressions** and **equations**, assign a **variable** to represent the *unknown number*. In the table below, the letter "x" is used to represent the unknown.
- In translation problems, the words **sum**, **total**, **difference**, **product** and **quotient** imply at least two parts - use *parentheses* when a **sum** or **difference** is *multiplied*.
    - "the **sum** of three TIMES a number and five" translates to "3x + 5"
    - "**three TIMES the sum** of a number and five" translates to "3(x + 5)"

OPERATION	KEYWORD / PHRASE	EXAMPLE	TRANSLATION
Addition (+)	plus	A number plus three	x + 3
	more than	Ten more than a number	x + 10
	the sum of	The sum of a number and five	x + 5
	the total of	The total of six and some number	6 + x
	increased by	A number increased by two	x + 2
	added to	Eleven added to a number	x + 11
Subtraction (−)	minus	A number minus seven	X - 7
	less than	Four less than a number	X - 4
	the difference of	The difference of a number and three	X - 3
	less	Nine less a number	9 - X
	decreased by	A number decreased by twelve	X - 12
	subtracted from	Six subtracted from a number	X - 6
Multiplication (x)	times	Eight times a number	8x
	the product of	The product of fourteen and a number	14x
	twice; double	Twice a number; double a number	2x
	multiplied by	A number multiplied by negative six	−6x
	of	Three fourths of a number	$\frac{3}{4}x$

Division (÷)	the quotient of	The quotient of a number and seven	$\frac{x}{7}$
	divided by	Ten divided by a number	$\frac{10}{x}$
	the ratio of	The ratio of a number to fifteen	$\frac{x}{15}$
Equals (=)	equals	Seven less than a number equals ten.	x − 7 = 10
	is	Three times a number is negative six.	3x = −6
	is the same as	Eight is the same as twice a number.	8 = 2x
	yields	Twelve added to a number yields five.	x + 12 = 5
	amounts to	Seven less than a number amounts to 15	n - 7 = 15
Powers (x^n)	the square of; squared	The square of a number; a number squared	x^2
	the cube of; cubed	The cube of a number; a number cubed	x^3

Addition Phrases	Expression	Subtraction Phrases	Expression
• 8 **more than** a number • The **sum** of 8 and a number x **increased by** 8 • the **total** of x and 8	x + 8	• The **difference** of r and 6 r **decreased by** 6 • 6 **less than** a number • 6 **subtracted from** a number	r - 6
Multiplication Phrases	**Expression**	**Division Phrases**	**Expression**
• **Twice** a number • The **product** of 2 and n • 2 **multiplied by** a number • 2 **times** a number	2x	• The **quotient** of z and 3 • A number **divided by** 3 • The **ratio** of z and 3	$\frac{z}{3}$