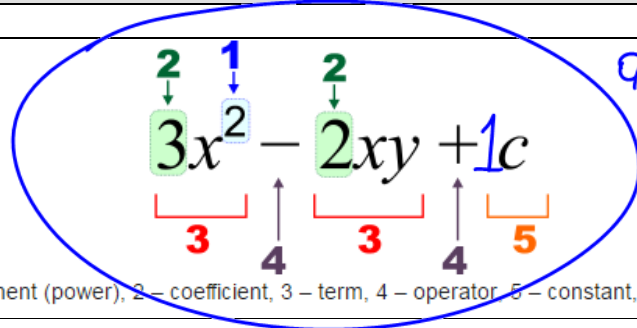


ALGEBRA

The word "algebra" is derived from the Arabic word **al-jabr** which means *the reunion of the broken parts*. Algebra is a branch of mathematics that substitutes letters for numbers. Algebraic expressions often look like long lines of numbers and letters:

1st term = $3x^2$
 2nd term = $-2xy$
 3rd term = $+c$



algebraic expression

algebraic equation
 $x + 2 = 4$
 expression

1 - Exponent (power), 2 - coefficient, 3 - term, 4 - operator, 5 - constant, x, y - variables

- This expression has 3 distinct parts. Each of these parts is called a terms and they are separated by + or - signs.
- As you can see, there are two distinct parts to every term, the 'number part' and the 'letter part'.
- The coefficient refers to the number (with its sign). It is always written to the left of the letters. Note that the term 'c' has no number. When a variable is written with no coefficient, the coefficient is always '1'. A '+c' has a coefficient of '+1'.
- The variable refers to the letter(s) and their respective exponent. It is written to the right of the coefficient, usually in alphabetical order.

constant

$$x^2 + 2x + 1$$

general term

MONOMIAL	BINOMIAL	TRINOMIAL	POLYNOMIAL
xyz a or x	a(-1) xyz(+1) x + y	3x ² - 2xy + c a + b(+1)	x ⁴ - 2x ³ + 4x ² - 1

TERM	4x	-3c ² d ⁴	-6ba ³	9	-y	a
COEFFICIENT	4	-3	-6		-1	+1
VARIABLE(S)	x	c ² , d ⁴	b, a ³		y	a

Of the above terms, five are 'variable' terms and only one is a 'constant' term. The term, 9, is called a constant term because 9 is constantly 9.

area

length

YOU WILL ONLY ADD OR SUBTRACT LIKE TERMS	
LIKE TERMS <i>have exact same</i>	UNLIKE TERMS
<ul style="list-style-type: none"> ✓ 2x, -121x, 5x, x, and -2x are like terms because they have the same variable x. ✓ $\frac{1}{2}a$, $\frac{4}{5}a$ and $\frac{3a}{4}$ are also like terms since a is the common variable. ✓ y^2, $-3y^2$ and $\frac{1}{2}y^2$ are like terms because y^2 is the common variable. ✓ $9xy^2$, $5y^2x$, $-10xy^2$, xy^2, $-y^2x$ are ALSO like terms because their variables are all <u>same</u> (when put in alphabetical order) 	<ul style="list-style-type: none"> ✓ $2x^2$ and $4x$ are 'UNLIKE TERMS' because the variables <u>x^2</u> and <u>x</u> are not the same. ✓ $\frac{1}{2}a$ and $\frac{1}{2a}$ are also unlike terms. $\frac{a}{2}$, $\frac{1}{2a}x$ ✓ $9xy^2$, $5yx^2$, $-10xy$ are unlike terms.

$$\frac{1}{2} \cdot \frac{a}{1} = \frac{1 \cdot a}{2 \cdot 1} = \frac{a}{2}$$

have the exact same variable

$$5y^2x = 5xy^2$$

$$5 \cdot 1 \cdot 2 = 5 \cdot 2 \cdot 1$$

x^1, x^2

MATCH THE FOLLOWING

- Using a line, connect the like terms (one from list A and one from list B).
- Remember, like terms have the exact same **variables** with the exact same **exponents**. Only the **coefficients** can be different.

List A

3x

6ab

-8n²

m³n

-11p

4

16mnp

-4x³

-8a²b

3xy

List B

5n²

9

-4m³n

9mnp

-2yx

5x³

P

7a²b

7ab

-4x

Handwritten notes:

$3^3 \cdot n^2$ (with arrows pointing to 3 and n)

$b/c \ n^2, n^2$ (with arrows pointing to 6ab and -8n²)

$-4 \cdot m^3 \cdot n$ (with arrows pointing to -4m³n and 9mnp)

$-2xy$ (with arrow pointing to -2yx)

$x^2 = \text{area}$

$x^3 = \text{volume}$

GROUPING ACTIVITY B

- Circle all the monomials. Underline all the binomials. Draw a rectangle around the trinomials.

$3a + 4b - c$ (rectangle)

$n^2 - 3t$ (underline)

$t + 8 + ju + t^2$ (Poly)

$4m - k$ (underline)

$-a^2$ (circle)

$5xy^2$ (circle)

$r^2 - r - 12n^7$ (rectangle)

$1/2y$ (circle)

$5t - y + 6r$ (rectangle)

$3x + 3$ (underline)

$1 - 6y$ (underline)

xy (circle)

$0.9mn^2$ (circle)

$4m + 2n + 4k - 3 + r$ (Poly)

$2xy^2 - 3x + 5$ (rectangle)

COLLECTING / ADDING LIKE TERMS

To simplify an expression by collection like terms, you:

- ✓ 1. Determine which terms are like
- ✓ 2. Rearrange *remember the sign (+/-) stays with the term
3. Add the coefficients *remember the sign (+/-) stays with the term
4. Keep the variable the same

Simplify $3 + 2 - 1 \rightarrow 4$

$x = \text{apples}$

x^2 and x

Descending x^4, x^3, x^2, x order

Example A

$1x + 3x - 5 + 7x - 4x + 2$

$= 1x + 3x + 7x - 4x - 5 + 2$

$= 7x - 3$

→ \$

Example B

$(1x^2) + 3x + 7x - 2x^2 + 2 + 4$

$= 1x^2 - 2x^2 + 3x + 7x + 2 + 4$

$= -1x^2 + 10x + 6$

x^2 and x are UNLIKE; thus, I cannot further collect/simplify

Practice: Simplify the following expressions by collecting like terms

1) $3y + y^2 - 6y^2 + 7 - 4y + 3y - 2y - 1$

$= +y^2 - 6y^2 + 3y - 4y + 3y - 2y + 7 - 1$
 $= -5y^2 + 6$

y^2, y

2) $b - 3b + 7 - 4b - 3$

$= b - 3b - 4b + 7 - 3$
 $= -6b + 4$

3) $5h + 5h^2 - 5$

$= 5h^2 + 5h - 5$

4) $3 + 7 - 2 + 3d - 8d + 7 - 2d^2$

$= -2d^2 + 3d - 8d + 3 + 7 - 2$
 $= -2d^2 - 5d + 8$

5) $5x - 3x - 7x + 2x$

$= 2x - 7x + 2x$
 $= -5x + 2x$
 $= -3x$

6) $3x^2 + 5x - 7 - 4x^2 - 5x + 9$

$= 3x^2 - 4x^2 + 5x - 5x - 7 + 9$
 $= -x^2 + 2$

7) $5a^2 - 4a + a^2 - 8a - a$

$= 5a^2 + a^2 - 4a - 8a - a$
 $= 6a^2 - 13a$

8) $2a + b + 6c - 3a + 4b - c$

$= 2a - 3a + b + 4b + 6c - c$
 $= -a + 5b + 5c$

ANSWERS: a) $-5y^2 + 6$, b) $-6b + 4$, c) $5h^2 + 5h - 5$, d) $-2d^2 - 5d + 8$, e) $-3x$, f) $-x^2 + 2$, g) $6a^2 - 13a$ h) $-a + 5b + 5c$