The Distributive Property

Level 1 - Multiply a binomial by a monomial

Level 2 - Multiply a trinomial by a monomial using fractions
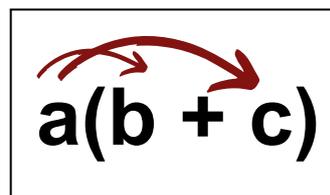
Level 3 - Multiply polynomials using fractions and fractional exponents

Math Ketchup

The **Distributive Property** is a method used to multiply a number or term outside parentheses by each term inside the parentheses.

In algebra, this often means multiplying a monomial (a single term) by a polynomial (a binomial, trinomial, etc.).

The basic idea looks like:

$$a(b + c) = ab + ac$$

$$a(b + c)$$

You just multiply the term outside the parentheses with every term inside.

Example #1	Example #2	Example #3
$3(2x + 4)$	$\frac{1}{2}x(4x^2 + 2x - 6)$	$\frac{1}{4}x^{\frac{1}{2}}\left(8x^2 + 4x + 12x^{\frac{1}{2}}\right)$
$3 \times 2x = 6x$ $3 \times 4 = 12$	$\frac{1}{2}x \times 4x^2 = 2x^3$ $\frac{1}{2}x \times 2x = x^2$ $\frac{1}{2}x \times -6 = -3x$	$\frac{1}{4}x^{\frac{1}{2}} \times 8x^2 = 2x^{\frac{5}{2}}$ $\frac{1}{4}x^{\frac{1}{2}} \times 4x = x^{\frac{3}{2}}$ $\frac{1}{4}x^{\frac{1}{2}} \times 12x^{\frac{1}{2}} = 3x$ $\left(since \; x^{\frac{1}{2}} \times x^{\frac{1}{2}} = x^1\right)$
$6x + 12$	$2x^3 + x^2 - 3x$	$2x^{\frac{5}{2}} + x^{\frac{3}{2}} + 3x$

Remember:
- Distribute to every term inside the parentheses.
- Watch your signs! Negative times a negative equals a positive.
- When multiplying exponents with the same base, add the exponents:
  Example: $x^m \times x^n = x^{m+n}$