

YouTube : "Pre-Algebra 7 – Associative and Distributive Properties"

Recall Expand.

a) $3(2x + 1) = 6x + 3$

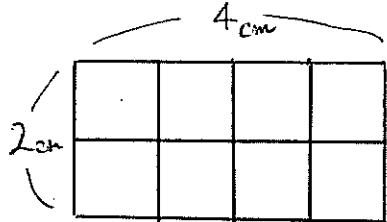
b) $4x(3x + 6) = 12x^2 + 24x$

Hint: Recall exponent laws!

① Course outline

② Getting to know you
(at the end)

How can we represent multiplication? Area



$$2 \times 4 = 8 \text{ cm}^2$$

Definitions:

e.g.) $x^2 \times y \times 3 \Rightarrow$ one term because $3x^2y$ is *one term.

Binomial is a polynomial with 2 terms. Example: $x^2 + y$

Trinomial is a polynomial with 3 terms. Example: $x^2 + y^2 + 2x$

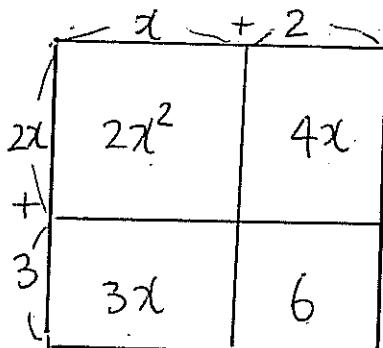
Example 1 Model a Binomial Product $(x + 2)(2x + 3)$

Method 1: Use Algebra Tiles

* Remember $(x)(x) = x^2$

$$x + x = 2x$$

Method 2: Use a diagram



$$\begin{aligned} (x+2)(2x+3) &= 2x^2 + (4x) + (3x) + 6 \\ &= 2x^2 + 7x + 6 \end{aligned}$$

Example 2 Use the Distributive Property. There are many ways to multiply binomials!

Find each binomial product (3 different methods):

a) ~~$(x+2)(x+5)$~~

~~$= x(x+5) + 2(x+5)$~~

Distributive property twice

b) ~~$(x-2)(x+4)$~~

FOIL

Stands for:

First

O

c) ~~$(3x+7)(x-5)$~~

"Claw" Method

$= (3x^2 \cdot x) + (3x \cdot -5) + 7x - 35$

$= 3x^2 + (-15x) + 7x - 35$

$= 3x^2 - 8x - 35$

Natural Extension of "Claw method":

Example 3 Expand

a) ~~$(2x+1)(x^2+3x+5)$~~

$= (2x^1 \cdot x^2) + (2x)(3x) + (2x) \cdot 5 + x^2 + 3x + 5$

$= 2x^3 + (6x^2) + 10x + (x^2) + 3x + 5$

$= 2x^3 + 7x^2 + 13x + 5$

b) ~~$(x^2+4x-3)(2x^2-6x+7)$~~

$= 2x^4 - 6x^3 + 7x^2 + (8x^3) - 24x^2 + 28x - 6x^2 + 18x - 21$

$= 2x^4 + 2x^3 - 23x^2 + 46x - 21$

* Exponent Rule

$$x^a \cdot x^b = x^{a+b}$$

$$(x^a)^b = x^{a \cdot b}$$

$$x^a \div x^b = x^{a-b}$$

We can keep putting more terms in the brackets! (You do not have to do this one)

$$(x^3 - x^2 + x + 7)(x^3 + 6x^2 + 2x - 5)$$

What does it mean to square a number? Cube a number?

Example 3 Expand.

$$(x - 3)^2 = (x - 3)(x - 3)$$

$$= x^2 - 3x - 3x + 9$$

$$= x^2 - 6x + 9$$

The most common mistake:

$$(x + 2)^2 \neq \cancel{x^2 + 4}$$

$$(x+2)(6x+2)$$

$$(x + 1)^3 = (x + 1)[(x + 1)(x + 1)]$$

$$= (x + 1)(x^2 + x + x + 1)$$

$$= (x + 1)(x^2 + 2x + 1)$$

$$= x^3 + 2x^2 + \cancel{x} + x^2 + 2\cancel{x} + 1$$

$$= x^3 + 3x^2 + 3x + 1$$

Example 4 Let's get more complicated! Expand and Simplify

***Ms. Kueh will be picky about form! Do not write your calculations all over the page, they should be written in lines, with each line following from the line before!

a) $-2[(4x - 5)(7x - 6)]$

$$= -2[28x^2 - 24x - 35x + 30]$$

$$= -2[28x^2 - 59x + 30]$$

$$= -56x^2 + 118x - 60$$

A \times B \times C

$$-2(4x - 5)$$

$$=(-8x + 10)(7x - 6)$$

$$= -56x^2 + 48x + 70x - 60$$

$$= -56x^2 + 118x - 60$$

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

$$= (2x + 14)(x - 3) - [(4x + 3)(2x - 1)]$$

$$= 2x^2 - 6x + 14x - 42 - [8x^2 - 4x + 6x - 3]$$

$$= \cancel{2x^2} + \cancel{(8x)} - 42 - \cancel{8x^2} + \cancel{4x} - \cancel{6x} + 3$$

$$= + 6x - 39$$

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

$$= 2(x + 7)(x + 7) - [(4x + 3)(2x - 1)]$$

$$= 2(x^2 + 7x + 7x + 49) - [8x^2 - 4x + 6x - 3]$$

$$= 2x^2 + 14x + 14x + 98$$

$$\begin{aligned}
 \text{d)} \quad & 4x(x-2)^2 + (5x-6)(6x^2+7x-5) \\
 = & 4(x^2-4x+4) + [30x^3+35x^2-25x-36x^2-42x+30] \\
 = & (4x^2-16x+16) + [30x^3-(36x^2)-32x+30] \\
 = & 30x^3 - 32x^2 - 48x + 46
 \end{aligned}$$

$$\begin{aligned}
 \text{e)} \quad & (x+2)^3 \\
 = & (x+2)(x+2)(x+2) \\
 = & (x^2+4x+4)(x+2) \\
 = & x^3 + 2x^2 + 4x^2 + 8x + 4x + 8 \\
 = & x^3 + 6x^2 + 12x + 8
 \end{aligned}$$

$$\begin{aligned}
 \text{f)} \quad & (x+1)^4 \\
 = & (x+1)(x+1)(x+1)(x+1) \\
 = & (x^2+2x+1)(x^2+1+2x) \\
 = & x^4 + 2x^3 + 2x^3 + 2x^3 + 2x + 4x^2 + x^2 + 1 + 2x \\
 = & x^4 + 4x^3 + 6x^2 + 4x + 1
 \end{aligned}$$