Essential Question: How do we simplify polynomial expressions with multiple operations?

Do Now: Consider the two expressions below. Do you see any commonality?
Think about this: How would you simplify expression A? How would you simplify expression B?

a) $(4)(5)+(7)(10)$

$20+70$

90

b) $(x+1)(x-1)+(2x-5)(x+6)$

$(x^2+1x-1x-1)+(2x^2+12x-5x-30)$

$x^2-1+2x^2+7x-30$

$3x^2+7x-31$

yes, distribute first and then add results

Simplifying Polynomial Expressions

P
E
M *or* D
A *or* S

1) $3x(5-4x)+6(3-2x)$

$(15x-12x^2)+(18-12x)$

$15x-12x^2+18-12x$

$-12x^2+3x+18$

2) $3(y^3+8y)-2(y^3+5)$

$(3y^3+24y)-(2y^3+10)$

$3y^3+24y-2y^3-10$

$y^3+24y-10$

3) $(x-4)(x+4)+(x+6)(2x+5)$

$(x^2+4x-4x-16)+(2x^2+5x+12x+30)$

$x^2-16+2x^2+17x+30$

$3x^2+17x+14$

4) $-\frac{3}{2}(8a+2a^2)(a^2-a-9)$

$(-12a-3a^2)(a^2-a-9)$

	$-12a$	$-3a^2$
a^2	$-12a^3$	$-3a^4$
$-a$	$12a^2$	$3a^3$
-9	$108a$	$27a^2$

$-3a^4-9a^3+39a^2+108a$

5) $(x^2 + 5x - 10) - (x + 2)^2$

$(x^2+5x-10) - (x+2)(x+2)$

$(x^2+5x-10) - (x^2+2x+2x+4)$

$x^2+5x-10 - (x^2+4x+4)$

$x^2+5x-10-x^2-4x-4$

$x-14$

6) Find the result when the sum of $x^2 - 2x + 7$ and $6x - 9$ is multiplied by $\frac{1}{2}x^3$.

$\frac{1}{2}x^3(x^2-2x+7+6x-9)$

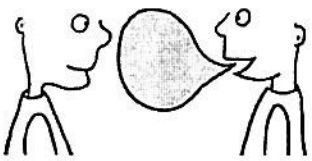
$\frac{1}{2}x^3(x^2+4x-2)$

$\frac{1}{2}x^5+2x^4-x^3$

The TAKE AWAY

Always follow the order of operations **when simplifying polynomial expressions.**

Turn and Talk



1) Subtract $(3x - 1)^2$ from $12x$. Represent your final answer as a simplified polynomial expression written in standard form.

$12x - (3x-1)^2$

$12x - [(3x-1)(3x-1)]$

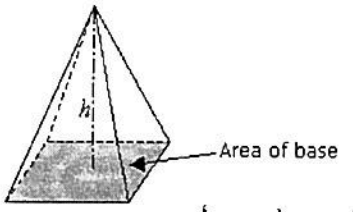
$12x - (9x^2-3x-3x+1)$

$12x - (9x^2-6x+1)$

$12x - 9x^2 + 6x - 1$

$-9x^2 + 18x - 1$

2) The volume of a rectangular pyramid is one-third the product of the area of its base and height Represent the volume of a rectangular pyramid as a polynomial expression in simplest standard form whose base has an area of $3x^2 + 12x + 9$ square feet and whose height is $x + 3$ feet. *Use appropriate units in your final answer.*



	x^2	$4x$	$+3$
x	x^3	$4x^2$	$3x$
$+3$	$3x^2$	$12x$	9

$V = \frac{1}{3}Bh$ ← height, B ← area of base

$V = \frac{1}{3}(3x^2+12x+9)(x+3)$

$V = (x^2+4x+3)(x+3)$

$V = x^3+3x^2+4x^2+12x+3x+9$

$V = x^3+7x^2+15x+9$ $feet^3$

3) Celina says that each of the following expressions below is actually a *binomial* in disguise. Do you (1) agree or disagree? Justify your response. (2) ← (You must have two responses.)

a) $\underline{5abc} - 2a^2 + \underline{6abc}$

$11abc - 2a^2$

yes, I agree that these expressions, when simplified, become binomials.

b) $5(a-1) - 10(a-1) + 100(a-1)$

$5a - 5 - 10a + 10 + 100a - 100$

$95a - 95$

c) $(2\pi r - \pi r^2)(r) + (2\pi r - \pi r^2)(r)$

$2\pi r^2 - \pi r^3 + 2\pi r^2 - \pi r^3$

$4\pi r^2 - 2\pi r^3$