

Math 10 Chp 5 Reference/Review

Note Title

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Polynomial means many terms. Terms consist of factors and terms are separated by plus or minus.

eg) $x^2 + 3$, $x^3 - y^2$, $2x^2$, $3x^2 + 4x + 8$

binomial binomial monomial trinomial

When multiplying a binomial with a binomial, we have a special name FOIL (first, outer, inner, last).

eg) $(x+2)(x-3) = x \cdot x - 3x + 2x - 2 \cdot 3$
 $= x^2 - 3x + 2x - 6$

$x \cdot x$ is not $2x$! ———— | / combine like terms.
 $= x^2 - x - 6$

eg) (Trinomial)(Trinomial) needs 9 terms

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

$$(2x^2 - 3x + 4)(3x^2) = 6x^4 - 9x^3 + 12x^2$$

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

$$(2x^2 - 3x + 4)(2) = \quad \quad \quad + 4x^2 - 6x + 8$$

line up to add like terms $6x^4 - 11x^3 + 19x^2 - 10x + 8$

Common Factors - As I have mentioned, we do 3 things with many math problems: algebra, substitution and factoring. We do factoring to help us find the GCF (greatest common factor) and the LCM (lowest common multiple).

eg) Find the GCF of $48a^3b^2 + 36a^2b^5 - 18a^5b^4$ and write in factored form

$$\begin{aligned} 48a^3b^2 &= 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot a \cdot a \cdot a \cdot b \cdot b \\ 36a^2b^5 &= 2 \cdot 2 \cdot 3 \cdot 3 \cdot a \cdot a \cdot b \cdot b \cdot b \cdot b \cdot b \\ 18a^5b^4 &= 2 \cdot 3 \cdot 3 \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b \cdot b \end{aligned}$$

$$\text{GCF} = 2 \cdot 3 \cdot a^2 \cdot b^2 = 6a^2b^2$$

$$\text{Factored Form: } 6a^2b^2(8a + 6b^3 + 3a^3b^2)$$

Factoring Polynomials into binomials - it's all about seeing patterns.

eg) $6x(3a-b) - 7y(3a-b)$
 $= (6x-7y)(3a-b)$

eg) $12x^2 - 9xy + 28xy - 21y^2$
 $= 3x(4x-3y) + 7y(4x-3y)$
 $= (3x+7y)(4x-3y)$

Factoring in the form $x^2 + bx + c$ - we must find factor pairs of c that sum to b .

eg) Factor $x^2 - 6x + 8$
 $= (x-4)(x-2)$

$-8 - 1 = -9$
 $-4 - 2 = -6 \checkmark$

Product, Factor, Sum Method for $ax^2 + bx + c$

eg) $5x^2 - 27x - 18$
 $= 5x^2 - 30x + 3x - 18$
 $= 5x(x-6) + 3(x-6)$
 $= (5x+3)(x-6)$

Product = $a \cdot c = 5(-18) = -90$

Factors	Sum
$-90 \cdot 1$	$-90 + 1 = -89$
$-30 \cdot 3$	$-30 + 3 = -27 \checkmark$

Other Problems

eg) Find all values of n that makes $x^2 + nx + 12$ factorable.

$12 + 1 = 13$	$-12 - 1 = -13$
$6 + 2 = 8$	$-6 - 2 = -8$
$4 + 3 = 7$	$-4 - 3 = -7$

Difference of Squares

Note: it doesn't matter if a^2 or b^2 is a perfect square, just use the formula.

eg) Factor $49x^2 - 16y^2 = (7x+4y)(7x-4y)$
 eg) Factor $5d^2 - 7e^2 = (\sqrt{5}d + \sqrt{7}e)(\sqrt{5}d - \sqrt{7}e)$

Squaring a binomial

eg) Factor $4x^2 + 12xy + 9y^2$
 $= (2x+3y)^2$

eg) Factor $4x^2 - 12xy + 9y^2 = (2x-3y)^2$

$2 \cdot \sqrt{4x^2} \cdot \sqrt{9y^2}$
 $2 \cdot 2x \cdot 3y = 12xy \checkmark$