Math 3

1.3 Factoring Review

Unit 1

SWBAT factor expressions using difference of squares, trinomial factoring, GCF, and grouping.

Factoring #1: Greatest Common Factor

All expressions have the potential of being factored using GCF. Check for it every time!

1. $3ab^2 - 6a^2b$

   $3ab$ $3ab$

   $3ab(b-2a)$

2. $5x^3 + 6xy$

   x x

   $x(5x^2+6y)$

3. $xyz + 3x^2y^2z^2$

   xyz xyz

   $xyz(1+3xyz)$

Factoring #2: Grouping (4-term polynomials)

Factor by grouping the first two terms together, the second two terms together, and removing a GCF.

4. $(30b^4 - 45b^3 - 10b^2 + 15b)$

   $15b^3$ $15b^3$ $-5b$ $-5b$

   $15b^3(2b-3) - 5b(2b-3)$

   $(15b^3 - 5b)(2b-3)$

   $5b$ $5b$

   $5b(3b^2-1)(2b-3)$

5. $(6x^3 + 9x^2 + 2x + 3)$

   $3x^2$ $3x^2$ 1 1

   $3x^2(2x+3) + 1(2x+3)$

   $(3x^2+1)(2x+3)$

6. $(8t^3 + 36t^2 + 2t + 9)$

   $4t^2(2t+9) + 1(2t+9)$

   $(4t^2+1)(2t+9)$

Factoring #3: Factoring trinomials ($ax^2 + bx + c$)

X-Factor (what multiplies to "ac" that adds to "b"), split into four terms, and continue by grouping.

7. $x^2 + 6x + 8$

   Multiplies: 8; Adds: 6; factors: 4, 2

   $(x^2+4x)(+2x+8)$

   $x(x+4)\,2(x+4)$

   $(x+2)(x+4)$

8. $3x^2 - 18x + 24$

   72; -6, -12; -18

   $(3x^2-6x)(-12x+24)$

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

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

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

9. $2x^3 - 2x^2 - 12x$

   -24; -6, 4; -2

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

   $2x^2(x-3)\,4x(x-3)$

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

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

Factoring #4: Difference of Squares $a^2 - b^2 = (a-b)(a+b)$

There must be a subtraction sign and two perfect square binomials in order for this to work!

10. $y^2 - \frac{9}{25}$

    $\left(y - \frac{3}{5}\right)\left(y + \frac{3}{5}\right)$

11. $3x^2 - 75$

    $3(x^2-25)$

    $3(x-5)(x+5)$

12. $x^4 - 81$

    $(x^2-9)(x^2+9)$

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

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SWBAT factor expressions using sum and difference of cubes.

Sum of Cubes	Difference of Cubes
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$	$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$a = \sqrt[3]{a^3}$

$b = \sqrt[3]{b^3}$

Just remember to use SOAP

Same – Opposite – Always Positive

(a	b)	(a²	ab	b²)

$\sqrt[3]{27x^3} = 3x$

$\sqrt[3]{y^3} = y$

a) $x^3 - 1$

a	b	a^2	ab	b^2
x	1	x^2	1x	1

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

same – opposite – Always positive

b) $x^3 + y^3$

a	b	a^2	ab	b^2
x	y	x^2	xy	y^2

$(x+y)(x^2-xy+y^2)$

c) $27x^3 - y^3$

a	b	a^2	ab	b^2
3x	y	$9x^2$	3xy	y^2

$(3x-y)(9x^2+3xy+y^2)$

d) $m^3 - 216$

a	b	a^2	ab	b^2
m	6	m^2	6m	36

$(m-6)(m^2+6m+36)$

e) $27 - y^3$

a	b	a^2	ab	b^2
3	y	9	3y	y^2

$(3-y)(9+3y+y^2)$

f) $125x^3 + 8a^3$

a	b	a^2	ab	b^2
5x	2a	$25x^2$	10ax	$4a^2$

$(5x+2a)(25x^2-10ax+4a^2)$

g) $1000 + 27a^3$

$(10+3a)(100-30a+9a^2)$

h) $s^3 - 64$

$(s-4)(s^2+4s+16)$

i) $y^3 + 125$

$(y+5)(y^2-5y+25)$