Math 2 **U1.3 Factoring Polynomials** (Review)

❖ Sometimes polynomials cannot be factored. These types of polynomials are PRIME because the polynomial has only two factors; one and itself.

Ex 1: Factor out a GCF

a) $-6b^4 - 12b^2$
GCF: $-6b^2$
$-6b^2(b^2+2)$

b) $-7n^6m + 2n^6 + 3n^5$
GCF: n^5
$n^5(-7nm+2n+3)$

c) $72y^5z^2x^2 - 80y^2zx^3 + 16y^3z^2$
GCF: $8y^2z$
$8y^2z(9y^3zx^2 - 10x^3 + 2yz)$

Ex. 2: Factor by Grouping

a) $(2m^3 + 6m^2 + 3m + 9)$
$2m^2(m+3) + 3(m+3)$ must be the SAME!
$(2m^2+3)(m+3)$

b) $(5x^4 - 20x^3 + 6x - 24)$
$5x^3(x-4) + 6(x-4)$
$(5x^3+6)(x-4)$

c) $(24a^2 - 15a + 40a - 25)$
$3a(8a-5) + 5(8a-5)$
$(3a+5)(8a-5)$

d) $(27b^2 + 45b - 3b - 5)$
$9b(3b+5) - 1(3b+5)$
$(9b-1)(3b+5)$

e) $12x^3 + 10x^2 - 36x - 30$
*Always look for a GCF that goes into all first! *
$2[6x^3+5x^2-18x-15]$
$(6x^3+5x^2-18x-15)$
$x^2(6x+5) - 3(6x+5)$
$2(x^2-3)(6x+5)$

f) $45m^4 - 9m^3 + 30m^2 - 6m$
$3m[15m^3 - 3m^2 + 10m - 2]$
$(15m^3 - 3m^2 + 10m - 2)$
$3m^2(5m-1) + 2(5m-1)$
$3m(3m^2+2)(5m-1)$

TAKE OUT A SEPARATE SHEET OF PAPER TO WORK OUT THE FOLLOWING EXAMPLES

Ex. 3: Factor each trinomial or binomial completely

a) $b^2 + b - 156$ $(b-12)(b+13)$	b) $2n^2 - 7n - 9$ $(2n-9)(n+1)$	c) $3x^2 - 8x - 60$ $(x-6)(3x+10)$
d) $16k^2 - 108k + 72$ $4(k-6)(4k-3)$	e) $12p^2 + 51p - 126$ $3(p+6)(4p-7)$	f) $96p^2 - 54$ $6(4p+3)(4p-3)$
g) $x^2 - 8x + 16$ $(x-4)^2$	h) $9m^2 - 24m + 16$ $(3m-4)^2$	i) $9x^2 - 25y^2$ $(3x+5y)(3x-5y)$

Ex. 3

a) $b^2+b-156$ — NO GCF! — NO FACTOR BY GROUPING!

$a=1$ b c

Guess-and-Check

$-1 \cdot 156$ $\quad -6 \cdot 26$

$-2 \cdot 78$ $\quad -12 \cdot 13$

$-3 \cdot 52$

$(b-12)(b+13)$

g) $x^2-8x+16$

$a=1$ Guess-and-Check

$(x-4)(x-4)$

$(x-4)^2$

i) $\sqrt{9x^2}-\sqrt{25y^2}$ Difference of Squares!

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

Binomial w/ − and both terms are perfect squares!

f) $96p^2-54$

$6(16p^2-9)$ Difference of Squares

$6(4p+3)(4p-3)$

b) $2n^2-7n-9$

a b c

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

bx	$a \cdot c$
$-7n$	-18
	$+1 \cdot -18$
$2n-9n$	$+2 \cdot -9$

List factors that make $a \cdot c$

$2n(n+1)-9(n+1)$

$(2n-9)(n+1)$

c) $3x^2 - 8x - 60$
$a \quad b \quad c$

$a \cdot c$
$-8x$ | -180
$1 \cdot -180$
$2 \cdot -90$
$3 \cdot -60$
$4 \cdot -45$
$10x - 18x$ | $10 \cdot -18$

$(3x^2 + 10x)(-18x - 60)$

$x(3x+10) - 6(3x+10)$

$(x-6)(3x+10)$

d) $16k^2 - 108k + 72$

bx	$a \cdot c$
$-27k$	72
	$-1 \cdot -72$
	$-2 \cdot 36$
$-3k - 24k$	$-3 \cdot -24$

$4(4k^2 - 27k + 18)$

$(4k^2 - 3k)(-24k + 18)$

$k(4k-3) - 6(4k-3)$

$4(k-6)(4k-3)$

e) $12p^2 + 51p - 126$

bx	$a \cdot c$
$17p$	-168
	$-1 \cdot 168$
$-7p + 24p$	$-7 \cdot 24$

$3(4p^2 + 17p - 42)$

$(4p^2 + 24p)(-7p - 42)$

$4p(p+6) - 7(p+6)$

$3(4p-7)(p+6)$

n) $9m^2 - 24m + 16$

$(3m-4)(3m-4)$ Perfect Square Trinomial

$(3m-4)^2$