

# Factoring

Always look for GCF 1st

1.  $12x^3 + 16$

$4(3x^3 + 4)$

2.  $9x^3 - 27x^2 + 36x$

$9x(x^2 - 3x + 4)$

3.  $2x + 5$

not factorable

## Factoring quadratic trinomials $ax^2 + bx + c$

1.  $x^2 + 10x + 24$

$(x + 6)(x + 4)$

2.  $x^2 - 5x - 14$

$(x - 7)(x + 2)$

3.  $5x^2 + 35x + 60$

$5(x^2 + 7x + 12) = 5(x + 4)(x + 3)$

4.  $2x^2 + 11x + 12$

$a \neq 1$  so Guess + check or use grouping method

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

5.  $8x^2 + 2x - 3$

- multiply  $a + c$
- determine 2 #s that mul to "ac" and sum to "b"
- rewrite so you have 4 terms + use grouping method
  - group 1st 2 terms + last 2 terms
  - Factor out GCF from each
  - Rewrite (GCF) (leftover)

$$\begin{array}{r} -24x^2 \quad | \quad 2x \\ \hline 6x \cdot -4x \end{array}$$

$8x^2 + 6x - 4x - 3$

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

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

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

6.  $-5x^2 - 7x + 6$

$-1(5x^2 + 7x - 6)$

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

## Special Binomials : Difference of Squares

$a^2 - b^2$  2 terms, 1 minus sign, coefficients + constants are perfect squares, variables have even exponents

Take square root of each term & write as  $(a+b)(a-b)$

1.  $x^2 - 25$

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

2.  $4x^2 - 49y^2$

$$(2x+7y)(2x-7y)$$

2.  $9x^2 + 4$

not factorable

3.  $169v^8 - 1$

$$(13v^4+1)(13v^4-1)$$

## Special Binomials : Sum + Difference of Cubes

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

Same sign

Opp. sign

APPLY lucy's

1.  $x^3 + 125$

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

2.  $8x^3 - 27$

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

3.  $2x^3 + 128y^3$

$$2(x^3 + 64y^3)$$

$$2(x+4y)(x^2-4xy+16y^2)$$

4.  $x^6 - y^6$

not final

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

$$*(x+y)(x-y)(x^4+x^2y^2+y^4)$$

$$a = x^2$$

$$b = y^2$$

## 4 Terms : Grouping method

1.  $2x^3 - 8x^2 - 3x + 12$

$$(2x^3 - 8x^2) (-3x + 12)$$

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

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

2.  $28mn + 70m + 2n + 5$

$$(28mn + 70m) + (2n + 5)$$

$$14m(2n+5) + 1(2n+5)$$

$$(14m+1)(2n+5)$$