

Factor Completely

Factor Out The GCF

Answers will look like **distributive** problems

$$\begin{array}{lll}
 10x^3 - 25x^2 + 15x & 27x^3 - 9x^2 & 4x^2y - 18y \\
 = 5x(2x^2 - 5x + 3) & = 9x^2(3x - 1) & = 2y(2x^2 - 9)
 \end{array}$$

Second Degree Trinomials

$$\begin{array}{c}
 Ax^2 \pm Bx + C \\
 \text{with } A > 1
 \end{array}$$

Second Degree Trinomials

$$\begin{array}{c}
 Ax^2 \pm Bx + C \\
 \text{with } A = 1
 \end{array}$$

Second Degree
Binomials
Perfect Squares

Trinomials with
POSITIVE LAST term

$$Ax^2 \pm Bx + C \text{ with } A > 1$$

= (first $x_1 \pm$ last $_1$) (first $x_2 \pm$ last $_2$)

the 2 FIRST terms MULTIPLY to Ax^2
the 2 LAST terms MULTIPLY to C
and the outer and inner products
ADD to Bx

$$\begin{array}{ll}
 2 \bullet 3 & (2) \cdot 5 \\
 (6) \bullet 1 & 10 \cdot 1 \\
 6x^2 - 17x + 10 & \\
 \end{array}$$

the 2 FIRST terms multiply to 6
the 2 LAST terms multiply to 10

$$= (6x - 5)(1x - 2)$$

the outer product is $-12x$
the inner product is $-5x$

Trinomials with a
POSITIVE LAST term

$$1x^2 \pm Bx + C$$

= (x \pm last $_1$) (x \pm last $_2$)

the 2 last terms MULTIPLY to C
the 2 last terms ADD to B

$$\begin{array}{c}
 7 \cdot 2 \\
 14 \cdot 1 \\
 x^2 - 15x + 14 \\
 \text{the 2 last terms multiply to 14} \\
 \text{the 2 last terms add to } -15 \\
 = (x - 14)(x - 1)
 \end{array}$$

The Difference of Two
Perfect Squares

$$a^2 - b^2$$

$$= (a + b)(a - b)$$

$$\begin{array}{c}
 4x^2 - 49 \\
 = (2x + 7)(2x - 7) \\
 \\
 36x^2y^2 - 25 \\
 = (6xy + 5)(6xy - 5)
 \end{array}$$

Trinomials with $A > 1$
and a NEGITIVE LAST term
are factored like the ones above
but the outer and inner products
SUBTRACT to Bx

Trinomials with a
NEGITIVE LAST term

$$1x^2 \pm Bx - C$$

= (x \pm last $_1$) (x \pm last $_2$)

the 2 last terms MULTIPLY to C
the 2 last terms SUBTRACT to B

$$\begin{array}{c}
 2 \bullet 5 \\
 1 \bullet 10 \\
 x^2 - 3x - 10 \\
 \text{the 2 last terms multiply to } -10 \\
 \text{the 2 last terms subtract to } -3 \\
 = (x + 2)(x - 5)
 \end{array}$$

The Sum of Two
Perfect Squares
Does Not Factor

$$x^2 + 4$$

does not factor

$$\begin{array}{c}
 4x^2 + 25 \\
 \text{Prime} \\
 \\
 16x^2 + 1 \\
 \text{DNF}
 \end{array}$$