

FACTORING ALGEBRAIC EXPRESSIONS

58. FACTORING OUT A COMMON DIVISOR

A factor common to all terms of a polynomial can be **factored out**. All three terms in the polynomial $3x^3 + 12x^2 - 6x$ contain a factor of $3x$. Pulling out the common factor yields $3x(x^2 + 4x - 2)$.

59. FACTORING THE DIFFERENCE OF SQUARES

One of the test maker's favorite factorables is the **difference of squares**.

$$a^2 - b^2 = (a - b)(a + b)$$

$x^2 - 9$, for example, factors to $(x - 3)(x + 3)$.

60. FACTORING THE SQUARE OF A BINOMIAL

Learn to recognize polynomials that are squares of binomials:

$$a^2 + 2ab + b^2 = (a + b)^2$$

$$a^2 - 2ab + b^2 = (a - b)^2$$

For example, $4x^2 + 12x + 9$ factors to $(2x + 3)^2$, and $n^2 - 10n + 25$ factors to $(n - 5)^2$.

61. FACTORING OTHER POLYNOMIALS— FOIL IN REVERSE

To factor a quadratic expression, **think about what binomials you could use FOIL on to get that quadratic expression**. To factor $x^2 - 5x + 6$, think about what **F**irst terms will produce x^2 , what **L**ast terms will produce $+6$, and what **O**uter and **I**nnner terms will produce $-5x$. Common sense—and trial and error—lead you to $(x - 2)(x - 3)$.

62. SIMPLIFYING AN ALGEBRAIC FRACTION

Simplifying an algebraic fraction is a lot like simplifying a numerical fraction. The general idea is to **find factors common to the numerator and denominator and cancel them**. Thus, simplifying an algebraic fraction begins with factoring.

To simplify $\frac{x^2 - x - 12}{x^2 - 9}$ first factor the numerator and denominator: $\frac{x^2 - x - 12}{x^2 - 9} = \frac{(x - 4)(x + 3)}{(x - 3)(x + 3)}$

Canceling $x + 3$ from the numerator and denominator leaves you with $\frac{x - 4}{x - 3}$.