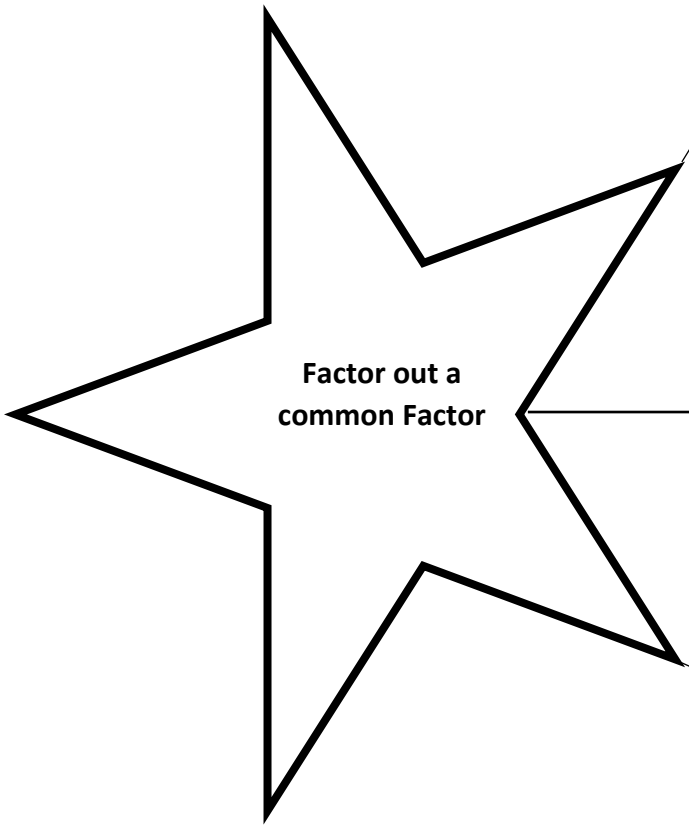

Two Terms

Sum of Two Squares (Prime)

Difference of Two Squares

$A^2 - B^2 = (A - B)(A + B)$

Sum and Difference of Two Cubes

$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$

$A^3 + B^3 = (A + B)(A^2 - AB + B^2)$

Three Terms

$x^2 + bx + c$

Find two numbers such that:

_____ × _____ = c

_____ + _____ = b

$x^2 + bx + c$ = $(x + \_\_\_)(x + \_\_\_)$

$ax^2 + bx + c \; with \; a \neq 1$

Use the **AC Method.** See back.

Four Terms

Factoring by Grouping, EX:

$$x^3 + 2x^2 + 5x + 10$$

$$= x^2(x + 2) + 5(x + 2)$$

$$= (x + 2)(x^2 + 5)$$

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AC Method

To factor $ax^2 + bx + c \; with \; a \neq 1$, begin by multiplying *a* and *c*. Then, find two numbers such that the following is true:

_____ × _____ = *ac* AND _____ + _____ = *b*

Example

Factor: $6x^2 - x - 15$

In this case, *a* = 6, *b* = -1, and *c* = -15. Thus, *ac* = (6)(-15) = -90. So, find two number such that

_____ × _____ = -90 AND _____ + _____ = -1

Notice that, the two numbers we're looking for, have a negative product. Thus, one of the factors will be negative and one will be positive.

TIP: One fast way to find these numbers is to use a graphing calculator. Plug $y_1 = \frac{-90}{x}$ and $y_2 = \frac{-90}{x} + x$ into the *y*-editor of your graphing calculator. Then, access your table. *(Make sure that TBLSET has the independent variable set to auto and that the table is starting at 1.)* The first two columns give you the factors of 90, while the last column gives you their difference.

Since -10 × 9 = -90 and -10 + 9 = -1, -10 and 9 are our numbers. To complete the factoring process, we rewrite the given polynomial with four terms instead of three. Thus the -*x* in the middle of the given polynomial becomes -10*x* + 9*x* or 9*x* + -10*x*. You may write these new terms in any order. Then, factor by grouping.

$$6x^2 - x - 15 = \; 6x^2 - 10x + 9x - 15 = (6x^2 - 10x) + (9x - 15) = \; 2x(3x - 5) + 3(3x - 5) = \; (3x - 5)(2x + 3)$$

OR

$$6x^2 - x - 15 = \; 6x^2 + 9x - 10x - 15 = (6x^2 + 9x) + (-10x - 15) = \; 3x(2x + 3) - 5(2x + 3) = \; (2x + 3)(3x - 5)$$