

Vocabulary

Zero Product Property - If the product of 2 factors is 0, then one of the two factors must be 0. If $ab = 0$, then either $a = 0$ or $b = 0$.

$$(x + 2)(x - 3) = 0$$

$x + 2 = 0$ $x - 3 = 0$
or both

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Solving Polynomials by Factoring

MGSE9-12.A.REI.4 Solve quadratic equations in one variable.

MGSE9-12.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, factoring, completing the square, and the quadratic formula, as appropriate to the initial form of the equation (limit to real number solutions). Build a function that models a relationship between two quantities.

What am I learning today?

How to solve a quadratic once it's in factored form

How will I show that I learned it?

Factor a quadratic and find the solutions based on its factors

Zero Product Property - If the product of 2 factors is 0, then one of the two factors must be 0.

If $ab = 0$, then either $a = 0$ or $b = 0$. both = 0

Looking at the factored form of a quadratic, how can we find the solutions?

$2x^2 - 7x - 4 = 0$ S.F.

Factored form: $(x - 4)(2x + 1) = 0$

$$\begin{array}{r} x - 4 = 0 \\ +4 \quad +4 \\ \hline x = 4 \end{array} \qquad \begin{array}{r} 2x + 1 = 0 \\ -1 \quad -1 \\ \hline 2x = -1 \\ \frac{2x}{2} = \frac{-1}{2} \\ x = -\frac{1}{2} \end{array}$$

$y_1 = (x - 4)(2x + 1) = 0$

Solving by Factoring

1. Set the quadratic equal to 0. (Move everything to one side of the equation.)
2. Fully factor the quadratic using GCFs, grouping, and special products.
3. Set each factor equal to 0 and solve for x.
4. Check your solutions!

Ex. 1 $21x^2 + 28x = 0$

$(7x)(3x + 4) = 0$

$x = -\frac{4}{3}$

$\frac{7x}{7} = \frac{0}{7}$
 $x = 0$

$\frac{3x + 4}{-4 -4} = \frac{0}{-4 -4}$
 $\frac{3x}{3} = \frac{-4}{3}$

Ex. 2 $40x^2 = 10x$
 $-10x -10x$

$40x^2 - 10x = 0$

$10x(4x - 1) = 0$

$x = \frac{1}{4}$

$\frac{10x}{10} = \frac{0}{10}$
 $x = 0$

$\frac{4x - 1}{+1 +1} = \frac{0}{+1 +1}$
 $\frac{4x}{4} = \frac{1}{4}$

Ex. 3 $-12x^2 = 18x$
 $-18x -18x$

$-12x^2 - 18x = 0$

$x = -\frac{3}{2}$
 -1.5

$-6x(2x + 3) = 0$

$\frac{-6x}{-6} = \frac{0}{-6}$ $x = 0$ $\frac{2x + 3}{-3 -3} = \frac{0}{-3 -3}$
 $\frac{2x}{2} = \frac{-3}{2}$

Ex. 4 $x^2 + 5x = 6$
 $-6 -6$

shortcut $x^2 + 5x - 6 = 0$

$\frac{-6}{6} \mid \frac{+5}{6 + (-1)}$ $(x + 6)(x - 1) = 0$

$\frac{x + 6}{-6 -6} = \frac{0}{-6 -6}$ $\frac{x - 1}{+1 +1} = \frac{0}{+1 +1}$
 $x = -6$ $x = 1$

Ex. 5 $3x^2 - 6x = -2x + 4$

$$3x^2 - 6x + 2x - 4 = 0$$

$$(3x^2 - 6x) + (2x - 4) = 0$$

$$3x(x - 2) + 2(x - 2) = 0$$

$$(3x + 2)(x - 2) = 0$$

$$3x + 2 = 0 \quad x - 2 = 0$$

$$x = -\frac{2}{3} \quad x = 2$$

$$\begin{array}{r} -12 \quad | \quad -4 \\ -6 \cdot 2 \quad | \quad -6 + 2 \end{array}$$

Ex. 6 $3x^2 - 27 = 0$

$$3(x^2 - 9) = 0$$

$$3(x - 3)(x + 3) = 0$$

$$x - 3 = 0 \quad x + 3 = 0$$

$$x = +3, -3$$

Ex. 7 $-2x^2 = -24$