

Lesson 31 Solve Quadratic Equations by Factoring

Zero Product Property:

For every real number a and b , if $a \cdot b = 0$, then $a = 0$ or $b = 0$.

Steps to Follow:

1. Move all x - terms and numbers to one side of the equation using opposite operations.
(The equation should now equal zero)
2. Put the terms in standard form. (Largest exponent to smallest exponent)
3. Combine all like terms. (Same variable with the same exponent)
4. Factor the polynomial
5. Set the individual factors equal to zero
6. Solve for x in each equation

Examples: Use the zero product property to solve the equation.

1. $(x + 5)(2x - 6) = 0$

$$\begin{array}{r} x+5=0 \\ -5 \quad -5 \\ \hline x=-5 \end{array} \quad \begin{array}{r} 2x-6=0 \\ +6 \quad +6 \\ \hline 2x=6 \\ \frac{2x}{2}=\frac{6}{2} \\ x=3 \end{array}$$

2. $(x + 7)(x - 4) = 0$

$$\begin{array}{r} x+7=0 \\ -7 \quad -7 \\ \hline x=-7 \end{array} \quad \begin{array}{r} x-4=0 \\ +4 \quad +4 \\ \hline x=4 \end{array}$$

Examples: Solve by factoring.

3. $x^2 + 6x + 8 = 0$

$$\begin{array}{r} +8 \\ 1 \quad 8 \\ \hline (x+2)(x+4)=0 \\ +2 \quad +4 \end{array}$$

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

4. $x^2 - 8x = 48$

$$\begin{array}{r} -48 \quad -48 \\ \hline x^2-8x-48=0 \end{array}$$

$$\begin{array}{r} -48 \\ 1 \quad 48 \\ 2 \quad 24 \\ 3 \quad 16 \\ +4 \quad -12 \\ 6 \quad 8 \end{array}$$

$$(x+4)(x-12)=0$$

$$\begin{array}{r} x+4=0 \\ -4 \quad -4 \\ \hline x=-4 \end{array} \quad \begin{array}{r} x-12=0 \\ +12 \quad +12 \\ \hline x=12 \end{array}$$