

Solve a Quadratic Equation by Factoring

$$ax^2 + bx + c = 0$$

Zero Product Property

If $(a)(b)=0$, then $a=0$ or $b=0$

Steps to solve:

1. Move all terms to ^{one} side of the equation. Make it set equal to zero.
2. Factor Completely $(x+\#)(x+\#) = 0$
3. Apply zero-product property by setting each factor = 0. Solve for x. $x+\# = 0$ $x+\# = 0$

Examples: Solve by factoring

1. $x^2 + 18 = 9x$
 $\quad \quad \quad \underline{-9x} \quad \underline{+9x}$

$$x^2 - 9x + 18 = 0$$

$$\begin{array}{r} 18 \\ \times 6 \\ \hline -18 \\ \hline -9 \end{array} \quad (x-6)(x-3) = 0$$

$$\begin{array}{r} x-6=0 \\ \underline{+6} \quad \underline{+6} \\ x=6 \end{array}$$

$$\begin{array}{r} x-3=0 \\ \underline{+3} \quad \underline{+3} \\ x=3 \end{array}$$

2. $2x^2 + 6x = -4$
 $\quad \quad \quad \underline{+4} \quad \underline{+4}$

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

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

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

$$2 \neq 0 \quad \begin{array}{r} x+2=0 \\ \underline{-2} \quad \underline{-2} \\ x=-2 \end{array} \quad \begin{array}{r} x+1=0 \\ \underline{-1} \quad \underline{-1} \\ x=-1 \end{array}$$

$x = -2 \quad x = -1$

3. $6x^2 = 8x$
 $\quad \quad \quad \underline{-8x} \quad \underline{-8x}$

$$6x^2 - 8x = 0$$

$$2x(3x-4) = 0$$

$$\begin{array}{r} 2x=0 \\ \underline{\div 2} \\ x=0 \end{array}$$

$$\begin{array}{r} 3x-4=0 \\ \underline{+4} \quad \underline{+4} \end{array}$$

$$\begin{array}{r} 3x=4 \\ \underline{\div 3} \\ x=4/3 \end{array}$$

Solve by Factoring - CW

Date _____ Period _____

Solve each equation by factoring.

1) $(3v-1)(v-6)=0$

$$\begin{array}{r} 3v-1=0 \\ +1 \quad +1 \\ \hline 3v=1 \\ v=\frac{1}{3} \end{array} \quad \begin{array}{r} v-6=0 \\ +6 \quad +6 \\ \hline v=6 \end{array}$$

3) $(n+2)(n+1)=0$

$$\begin{array}{r} n+2=0 \\ -2 \quad -2 \\ \hline n=-2 \end{array} \quad \begin{array}{r} n+1=0 \\ -1 \quad -1 \\ \hline n=-1 \end{array}$$

5) $x^2 - 7x + 6 = 0$

$$\begin{array}{r} 6 \\ \times \\ -6 \\ \hline -1 \\ \hline -7 \end{array} \quad (x-6)(x-1)=0$$

$$\begin{array}{r} x-6=0 \\ +6 \quad +6 \\ \hline x=6 \end{array} \quad \begin{array}{r} x-1=0 \\ +1 \quad +1 \\ \hline x=1 \end{array}$$

7) $9x^2 - 9x + 2 = 0$

$$\begin{array}{r} 18 \\ \times \\ -6 \\ \hline -9 \end{array} \quad \begin{array}{r} 3x \quad -1 \\ 9x^2 \quad -3x \\ -2 \quad -6x \quad 2 \end{array}$$

$(3x-1)(3x-2)=0$

$$\begin{array}{r} 3x-1=0 \\ +1 \quad +1 \\ \hline 3x=\frac{1}{3} \\ x=\frac{1}{3} \end{array} \quad \begin{array}{r} 3x-2=0 \\ +2 \quad +2 \\ \hline 3x=\frac{2}{3} \\ x=\frac{2}{3} \end{array}$$

8) $3a^2 - 22a + 7 = 0$

$$\begin{array}{r} 21 \\ \times \\ -21 \\ \hline -2 \end{array} \quad \begin{array}{r} 3a \quad -1 \\ 3a^2 \quad -1a \\ -7 \quad -21a \quad 7 \end{array}$$

$(3a-1)(a-7)=0$

$$\begin{array}{r} 3a-1=0 \\ +1 \quad +1 \\ \hline 3a=\frac{1}{3} \\ a=\frac{1}{3} \end{array} \quad \begin{array}{r} a-7=0 \\ +7 \quad +7 \\ \hline a=7 \end{array}$$

9) $5x^2 + 13x + 1 = 7$

$$\begin{array}{r} -30 \\ \times \\ 15 \\ \hline -2 \end{array} \quad \begin{array}{r} 5x \quad -2 \\ 5x^2 \quad -2x \\ 3 \quad 15x \quad -6 \end{array}$$

$(5x-2)(x+3)=0$

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

10) $3n^2 + 8n + 2 = -2$

$$\begin{array}{r} 12 \\ \times \\ 6 \\ \hline 2 \end{array} \quad \begin{array}{r} 3n \quad 2 \\ n \quad 3n^2 \quad 2n \\ 2 \quad 6n \quad 4 \end{array}$$

$(3n+2)(n+2)=0$

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

2) $(m+2)(m-7)=0$

$$\begin{array}{r} m+2=0 \\ -2 \quad -2 \\ \hline m=-2 \end{array} \quad \begin{array}{r} m-7=0 \\ +7 \quad +7 \\ \hline m=7 \end{array}$$

4) $(3r+1)(r+6)=0$

$$\begin{array}{r} 3r+1=0 \\ -1 \quad -1 \\ \hline 3r=\frac{-1}{3} \\ r=\frac{-1}{3} \end{array} \quad \begin{array}{r} r+6=0 \\ -6 \quad -6 \\ \hline r=-6 \end{array}$$

6) $k^2 - 2k - 35 = 0$

$$\begin{array}{r} -35 \\ \times \\ -7 \\ \hline +5 \\ \hline -2 \end{array} \quad (k-7)(k+5)=0$$

$$\begin{array}{r} k-7=0 \\ k=7 \end{array} \quad \begin{array}{r} k+5=0 \\ k=-5 \end{array}$$

Solve by Factoring - HW

Solve each equation by factoring.

1) $(b + 2)(b - 3) = 0$

2) $(k - 5)(7k + 2) = 0$

3) $(b - 1)(b - 8) = 0$

4) $(2m - 5)(m - 6) = 0$

5) $x^2 + 13x + 42 = 0$

6) $k^2 + 3k - 40 = 0$

7) $7m^2 + 15m + 2 = 0$

8) $2b^2 - 3b - 9 = 0$

9) $6m^2 - 7m - 3 = 7$

10) $5x^2 + 21x + 6 = 2$