

# Sec. 9.8 Solve Equations by Factoring

Find the zeros of the polynomial

a.  $y = (x-6)(x+5)$

$$0 = (x-6)(x+5)$$

Use the  
Zero Product  
Property

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

$$\boxed{x=6}$$

$$\text{or } \begin{array}{r} x+5=0 \\ -5 \quad -5 \\ \hline \end{array}$$

$$\boxed{x=-5}$$

If  $A \cdot B = 0$ , then  
 $A = 0$  or  $B = 0$

b.  $y = (x-1)(x-2)$

$$0 = (\overset{2}{x-1})(\overset{2}{x-2})$$

$$\begin{array}{r} 0 \cdot -1 = 0 \\ 1 \cdot 0 = 0 \end{array}$$

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

$$\boxed{x=1}$$

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

$$\boxed{x=2}$$

c.  $y = (2x-3)(x+4)$

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

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

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

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

d.  $y = x^2 + 3x - 10$

$$0 = x^2 + 3x - 10$$

Factor  $\begin{array}{r} -10 \\ 1 \cdot 10 \\ 2 \cdot 5 \\ -2 + 5 \end{array}$

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

$$\begin{array}{rcl} x - 2 = 0 & & x + 5 = 0 \\ + 2 = 2 & & - 5 - 5 \\ \hline x = 2 & & x = -5 \end{array}$$

e.  $x^2 + 12x + 27 = 0$   $\begin{array}{r} 27 \\ 1 \cdot 27 \\ 3 \cdot 9 \\ 3 + 9 \end{array}$

$$(x + 3)(x + 9) = 0$$

$$\begin{array}{rcl} x + 3 = 0 & & x + 9 = 0 \\ - 3 - 3 & & - 9 - 9 \\ \hline \boxed{x = -3} & & \boxed{x = -9} \end{array}$$

f.  $-8x^2 - 40x = 0$

$$-8x(x + 5) = 0$$

$$\begin{array}{rcl} \frac{-8x}{-8} = \frac{0}{-8} & & x + 5 = 0 \\ \boxed{x = 0} & & \begin{array}{r} - 5 - 5 \\ \hline \boxed{x = -5} \end{array} \end{array}$$

g.  $-10x^2 + 100x = 0$

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

$$\begin{array}{rcl} \frac{-10x}{-10} = \frac{0}{-10} & & x - 10 = 0 \\ \boxed{x = 0} & & \begin{array}{r} + 10 + 10 \\ \hline \boxed{x = 10} \end{array} \end{array}$$

h.  $\boxed{2}x^2 + 5x\boxed{-12} = 0$   $\frac{-24}{1 \cdot 24}$   
 $2 \cdot 12$   
 $\boxed{3 \cdot 8}$   
 $4 \cdot 6$

$\underbrace{2x^2}_{\cancel{x}} - \underbrace{3x}_{\cancel{x}} + \underbrace{8x}_{\cancel{x}} - \underbrace{12}_{\cancel{x}} = 0$   $\boxed{3+8}$

$x(2x-3) + 4(2x-3) = 0$   $-3+8$

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

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

$$\boxed{x = \frac{3}{2}}$$

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

$$\boxed{x = -4}$$

i.  $\boxed{2}x^2 + 5x\boxed{-3} = 0$   $\frac{-6}{1 \cdot 6}$   
 $2 \cdot 3$

$\underbrace{2x^2}_{\cancel{x}} - \underbrace{1x}_{\cancel{x}} + \underbrace{6x}_{\cancel{x}} - \underbrace{3}_{\cancel{x}} = 0$   $\boxed{2+3}$   
 $\boxed{-1+6}$