

Algebra 1 8.5

Use the distributive property to factor polynomials
Solve quadratic equations by factoring

quadratic
factor
distributive property
greatest common factor (GCF)
zero product property
whiteboards

activ: cubes

$$\frac{x^2}{x} + \frac{5x}{x}$$
$$x(x+5)$$
$$x^2 + 3x = 0$$
$$x(x+3) = 0$$

$x=0$

$x+3=0$
 $x = -3$

Use the Distributive Property to factor each polynomial.

$$21xy - 18x^2$$

$$\cancel{3} \cdot \cancel{7} \cdot y - 2 \cdot \cancel{3} \cdot \cancel{3} \cdot x$$

$$3x(7y - 6x)$$

$$3x \cdot 7y + 3x \cdot -6x$$

$\begin{matrix} 4 & 2 \\ \swarrow & \searrow \\ 2 & 2 \end{matrix}$
 $\begin{matrix} 6 & 4 \\ \swarrow & \searrow \\ 2 & 2 \end{matrix}$
 $\begin{matrix} 3 & 2 \\ \swarrow & \searrow \\ 2 & 2 \end{matrix}$

$$222r^2s - 27222r^2s^3 + 2722r^2s^2$$

$$64r^3s - 32r^2s^3 + 8r^2s^2$$

$$8r^2s(8r - 4s^2 + s)$$

GCF
all (left over)

Use the Distributive Property to factor each polynomial.

15. $16t - 40y$
 $2222t \quad 2225y$

17. $2k^2 + 4k$
 $2kk \quad 22k$
 $2k(k+2)$

19. $4a^2b^2 + 2a^2b - 10ab^2$
 $\frac{1 \cdot 2 \cdot a \cdot b \cdot b}{2 \cdot 2 \cdot b} \quad \frac{2 \cdot a \cdot a \cdot b}{2 \cdot 2 \cdot b} \quad \frac{2 \cdot 5 \cdot a \cdot b \cdot b}{2 \cdot 2 \cdot b}$

$2ab(2ab + a - 5b)$

16. $30v + 50x$
 $2 \cdot 3 \cdot 5v \quad 2 \cdot 5 \cdot 5x$

18. $\frac{5z^2}{5z} + \frac{10z}{5z}$
 20. $5c^2v - 15c^2v^2 + 5c^2v^3$

$5z(z + 2)$

Example 4
p. 478

Solve each equation. Check your solutions.

39. $3b(9b - 27) = 0$

41. $(8z + 4)(5z + 10) = 0$

$$\begin{array}{r} 8z + 4 = 0 \\ -4 \quad -4 \\ \hline 8z = -4 \\ \frac{8z}{8} = \frac{-4}{8} \\ z = -\frac{1}{2} \end{array} \qquad \begin{array}{r} 5z + 10 = 0 \\ -10 \quad -10 \\ \hline 5z = -10 \\ \frac{5z}{5} = \frac{-10}{5} \\ z = -2 \end{array}$$

$$2 \cdot (-1)(3 \cdot (-1) + 3) = 0$$
$$-2 \cdot 0 = 0$$

40. $2n(3n + 3) = 0$

42. $(7x + 3)(2x - 6) = 0$

$$\begin{array}{r} 7x + 3 = 0 \\ -3 \quad -3 \\ \hline 7x = -3 \\ \frac{7x}{7} = \frac{-3}{7} \end{array} \qquad \begin{array}{r} 2x - 6 = 0 \\ +6 \quad +6 \\ \hline 2x = 6 \\ \frac{2x}{2} = \frac{6}{2} \\ x = 3 \end{array}$$

$$2x^2 = 4x$$

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

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

↓

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

↓

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

$$8b^2 - 40b = 0$$

$$2b : 2$$

$$4b(b - 5) = 0$$

$$3A \quad C-2cd + 8d - 4$$

NP

$$\frac{2x^3}{2x} + \frac{8x^2}{2x} + \frac{12x}{2x} \quad \begin{matrix} 1 \cdot 2 \cdot 3 \\ \cancel{x} \end{matrix}$$

$$2x (x^2 + 4x + 6)$$

$$3p - 2p^2 - 18p + 27$$

NP

$$(\quad) \cdot (\quad) = 0$$

$$(2d + 6)(3d - 15) = 0$$

↓

$$2d + 6 = 0$$

$$\begin{array}{r} -6 \\ -6 \end{array}$$

$$\frac{2d}{2} = \frac{-6}{2}$$

$$d = -3$$

↓

$$3d - 15 = 0$$

$$\begin{array}{r} +15 \\ +15 \end{array}$$

$$\frac{3d}{3} = \frac{15}{3}$$

$$d = 5$$

$$4A \quad (3n)(n+2) = 0$$

↓

↓

$$\frac{3n=0}{3 \quad 3}$$

$$n=0$$

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

$$2 \cdot 2 \cdot 2 \cdot 4 \cdot b \quad 2 \cdot 2 \cdot 2 \cdot 5 \cdot b$$

$$8b^2 - 40b = 0$$

$$8b(b-5) = 0$$

$$\frac{8b}{8} = \frac{0}{8}$$

$$b = 0$$

$$\begin{array}{r} b-5=0 \\ +5 \quad +5 \\ \hline b=5 \end{array}$$

$$\begin{array}{r} c^2 = 3c \\ -3c \quad -3c \\ \hline \end{array}$$

$$\frac{c^2}{c} - \frac{3c}{c} = 0$$

$$c(c-3) = 0$$

$$\begin{array}{l} \downarrow \\ c=0 \end{array}$$

$$\begin{array}{l} \downarrow \\ c-3=0 \\ +3 \quad +3 \\ \hline c=3 \end{array}$$

$$X^2 = -10X$$

$$+10X + 10X$$

$$X^2 + 10X = 0$$

$$X(X+10) = 0$$

$$\downarrow$$
$$X=0$$

$$\downarrow$$
$$X+10=0$$
$$\begin{array}{r} -10 \quad -10 \\ \hline X = -10 \end{array}$$

$$X(X+3)(X+2)(X-1) = 0$$
$$\begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow \\ X=0 & X+3=0 & X+2=0 & X-1=0 \\ & \begin{array}{r} -3 \quad -3 \\ \hline X = -3 \end{array} & \begin{array}{r} -2 \quad -2 \\ \hline X = -2 \end{array} & \begin{array}{r} +1 \quad +1 \\ \hline X = \end{array} \end{array}$$