

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

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

By grouping  
Factor each polynomial.

$$3A. \left( \frac{c}{2} - \frac{2d}{2} \right) \left( \frac{8d}{-4} - \frac{4}{-4} \right)$$

$$\begin{aligned} &= (1 - 2d) \cdot (-4) \cdot (-2d + 1) \\ &= (1 - 2d)(c - 4) \end{aligned}$$

$$\underline{\underline{2x^3 + 8x^2 + 12x}}$$

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

$$2x^3 + 8x^2 + 12x$$

$$3B. \overset{*}{-} 3p - 2p^2 - 18p + 27 \quad ,$$

$$p(3 - 2p) + 9(-2p + 3)$$

$$\overset{*}{\rightarrow} (3 - 2p)(p + 9)$$

$$\frac{14ab^2}{7ab^2} + \frac{7ab^2}{7ab^2} \text{ matching activity}$$
$$7ab^2(2a + 1)$$

 **Key Concept** Zero Product Property

**Words** If the product of two factors is 0, then at least one of the factors must be 0.

**Symbols** For any real numbers  $a$  and  $b$ , if  $ab = 0$ , then  $a = 0$ ,  $b = 0$ , or both  $a$  and  $b$  equal zero.

### Example 4 Solve Equations

$2 \cdot -3 + 6$     $3 \cdot 5 - 15$   
Solve each equation. Check your solutions.

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

$$\begin{array}{r} \downarrow \qquad \searrow \\ 2d + 6 = 0 \qquad 3d - 15 = 0 \\ \begin{array}{r} -6 \quad -6 \\ \hline 2d = -6 \\ \frac{2}{2} \qquad \frac{-6}{2} \\ d = -3 \end{array} \qquad \begin{array}{r} +15 \quad +15 \\ \hline 3d = 15 \\ \frac{3}{3} \qquad \frac{15}{3} \\ d = 5 \end{array} \end{array}$$

### Guided Practice

4A.  $3n(n+2) = 0$

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

$$n = 0$$

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

must=0 to factor

$$4B. \frac{8b^2}{8b} - \frac{40b}{8b} = 0$$

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

$$\begin{array}{l} \downarrow \\ 8b = 0 \\ \frac{8}{8} \quad \frac{b}{8} \end{array} \quad \begin{array}{l} b - 5 = 0 \\ + 5 \quad + 5 \\ \hline b = 5 \end{array}$$

$$b = 0$$

$$\text{b. } c^2 = 3c$$

$$\frac{-3c \quad -3c}{-3c \quad -3c}$$

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

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

$$\downarrow$$
$$c = 0$$

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

Must = 0 to factor

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

$$\downarrow$$
$$\begin{array}{r} y - 3 = 0 \\ +3 \quad +3 \\ \hline y = 3 \end{array}$$

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



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

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~~$x+3=1$        $x-2=1$~~

**4C.**  $x^2 = -10x$

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$$x^2 + 6x$$

$$x(x+6)$$

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