Name _____ Class _____ Date _____

9-4 Reteaching

Factoring to Solve Quadratic Equations

If the product of two or more numbers is 0, then one of the factors must be 0. You can use this fact to solve quadratic equations.

Problem

What are the solutions of the equation $(4a + 12)(5a - 20) = 0$?

Since the product is 0, either $(4a + 12)$ or $(5a - 20)$ must equal 0.

$4a + 12 = 0$	or	$5a - 20 = 0$
$4a + 12 - 12 = 0 - 12$	or	$5a - 20 + 20 = 0 + 20$
$4a = -12$	or	$5a = 20$
$\frac{4a}{4} = \frac{-12}{4}$	or	$\frac{5a}{5} = \frac{20}{5}$
$a = -3$	or	$a = 4$

The solutions are -3 and 4.

Exercises

Solve each equation.

1. $b(b + 7) = 0$
0; −7

2. $8y(2y - 12) = 0$
0; 6

3. $(d - 8)(d - 2) = 0$
8; 2

4. $(m + 1)(m - 4) = 0$
−1; 4

5. $(2a + 14)(3a + 12) = 0$
−7; −4

6. $(5p - 10)(2p + 20) = 0$
2; −10

7. $(8t + 4)(3t + 6) = 0$
$-\frac{1}{2}$; −2

8. $(4h - 1)(2h + 1) = 0$
$-\frac{1}{2}$; $\frac{1}{4}$

9. $(8n - 16)(5n - 12) = 0$
2; $\frac{12}{5}$

10. $(s + 6)(4s - 6) = 0$
−6; $\frac{3}{2}$

11. $(5w - 30)(2w - 1) = 0$
6; $\frac{1}{2}$

12. $(3g + 1)(2g - 5) = 0$
$-\frac{1}{3}$; $\frac{5}{2}$

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9-4 Reteaching (continued)

Factoring to Solve Quadratic Equations

If you can rewrite a quadratic equation as a product of factors that equals zero, you can solve the equation. To solve equations in this manner, you must use all your factoring skills.

Problem

What are the solutions of the equation $x^2 - x = 20$?

First rewrite the equation so that one side equals zero.

$$x^2 - x = 20$$

$x^2 - x - 20 = 20 - 20$ Subtract 20 from each side.

$x^2 - x - 20 = 0$ Simplify.

Now, factor to rewrite the equation as a product of factors equal to zero. Find two integers whose product is -20 and whose sum is -1. The product of 4 and -5 is -20, and the sum of 4 and -5 is -1.

$$x^2 - x - 20 = 0$$

$$(x + 4)(x - 5) = 0$$

$x + 4 = 0$ or $x - 5 = 0$

$x + 4 - 4 = 0 - 4$ or $x - 5 + 5 = 0 + 5$

$x = -4$ or $x = 5$

The solutions are -4 and 5.

Exercises

Solve each equation by factoring.

13. $y^2 + 3y + 2 = 0$
−1; −2

14. $a^2 - a - 20 = 0$
−4; 5

15. $m^2 - 7m + 6 = 0$
1; 6

16. $2d^2 + 7d - 4 = 0$
$\frac{1}{2}$; **−4**

17. $6t^2 + 13t + 6 = 0$
$-\frac{2}{3}$; $-\frac{3}{2}$

18. $5p^2 + 29p - 6 = 0$
$\frac{1}{5}$; **−6**

19. $s^2 + 9s = -20$
−4; −5

20. $x^2 - 5x = 14$
−2; 7

21. $b^2 + 7b = 8$
1; −8

22. $2h^2 - 9h = 5$
$-\frac{1}{2}$; **5**

23. $3s^2 - 13s = -12$
$\frac{4}{3}$; **3**

24. $6v^2 + 13v = 5$
$\frac{1}{3}$; $-\frac{5}{2}$