9.4 Factoring to Solve Quadratic Equations

* Property: Zero Product Property

For any real numbers a & b, if $ab=0$, then $a=0$ or $b=0$.

Therefore if $(x+3)(x+2)=0$ then $x+3=0$ or $x+2=0$

* Review Problem 1 on pg. 568

* Got it #1

A) $(x+1)(x-5)=0$

$(x+1)=0$ $\quad$ $(x-5)=0$

$-1\ -1$ $\quad$ $+5\ +5$

$x=-1$ $\quad$ $x=5$

$\{-1, 5\}$

*write your answer as a set

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

$2x+3=0$ $\quad$ $x-4=0$

$-3\ -3$ $\quad$ $+4\ +4$

$\frac{2x=-3}{2}$ $\quad$ $x=4$

$x=-\frac{3}{2}$ $\quad$ $x=4$

$\{-\frac{3}{2}, 4\}$

C) $\{-\frac{1}{2}, -14\}$

D) $\{\frac{2}{7}, \frac{4}{5}\}$

* Review Problem 2 on pg. 569

* Got it? 2 (* Factor 1st)

A) $m^2 - 5m - 14 = 0$

$m^2 - 7m + 2m - 14 = 0$

$(m^2 - 7m) + (2m - 14) = 0$

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

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

$m = \{-2, 7\}$

Factors of ac (-14)	Sum of b (-5)
$-7, +2$	✓

B) $p^2 + p - 20 = 0$

$(p^2 + 5p) + (-4p - 20) = 0$

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

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

$p = \{-5, 4\}$

Factors of ac (-20)	Sum of b (1)
$+5, -4$	✓

c) $2a^2-15a+18=0$

Factors of ac (36)	Sum of b (-15)
-9, -4	NO
-3, -12	✓

$2a^2-12a-3a+18=0$

$(2a^2-12a)+(-3a+18)=0$

$2a(a-6)-3(a-6)=0$

$(2a-3)(a-6)=0$

$2a-3=0$ $\quad$ $a-6=0$

$+3\ +3$ $\quad$ $+6\ +6$

$\frac{2a=3}{2}$ $\quad$ $a=6$

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

$a=\left\{\frac{3}{2}, 6\right\}$

* Review Problem 3 on pg. 569

* Got it #3)

A) $x^2+14x=-49$

$+49\ +49$

$x^2+14x+49=0$

$(x+7)^2=0$

$x=-7$

B) The quadratic polynomials are perfect trinomial squares that yields the same binomial multiplied by itself (binomial squared)

* Review Problem 4 on pg. 570

* Got it #4)

$(2x+11)(2x+17) = 391$

$4x^2+56x+187 = 391$

$-391 \quad -391$

$4x^2+56x-204 = 0$

$4(x^2+14x-51) = 0$

$4(x^2+17x-3x-51) = 0$

$4((x^2+17x)+(-3x-51)) = 0$

$4(x(x+17)-3(x+17)) = 0$

$4(x-3)(x+17) = 0$

Factors of ac (-51)	Sum of b (14)
+17, -3	✓

$x-3=0$ $\qquad$ $x+17=0$

$x=3$ $\qquad$ $x=-17$

* Not a reasonable x value

$(2x+11)$

$2(3)+11$

$6+11$

17 in

$(2x+17)$

$2(3)+17$

$6+17$

23 in

by

Name _____ Class _____ Date _____

9-4 Practice

Form K

Factoring to Solve Quadratic Equations

Use the Zero-Product Property to solve each equation.

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

2. $(4a + 2)(a - 6) = 0$

3. $(5y - 3)(2y + 1) = 0$

4. $(3k - 2)(6k + 8) = 0$

5. $x(x - 3) = 0$

6. $2v(3v + 4) = 0$

Solve by factoring.

7. $t^2 + 3t - 18 = 0$

8. $j^2 - 17j + 72 = 0$

9. $2c^2 + 9c + 4 = 0$

10. $8k^2 - 2k - 3 = 0$

11. $m^2 + 6m = -5$

12. $y^2 + 3y = 28$

13. $2z^2 + z = 6$

14. $15a^2 - a = 6$

~~**Use the Zero-Product Property to solve each equation. Write your solution in roster form.**~~

15. $x^2 - 10x + 24 = 0$

16. $d^2 + 3d - 10 = 0$

17. The volume of a storage tub shaped like a rectangular prism is 24 ft^3. The height of the tub is 3 feet. The width is w feet and the length is $w + 2$ feet. Use the formula $V = lwh$ to find the value of w.

18. The area of a parking lot is 2475 ft^2. The rectangular parking lot has dimensions such that the length is 10 feet longer than the width. What are the dimensions of the parking lot?

Name _____ Class _____ Date _____

9-4 Practice (continued) *Form K*

Factoring to Solve Quadratic Equations

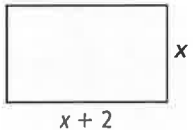
Write each equation in standard form. Then solve.

19. $3x^2 - x - 7 = 2x^2 + 5$

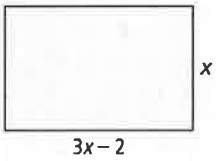
20. $x^2 - 4x - 2 = -9x + 4$

Find the value of x as it relates to each rectangle or triangle.

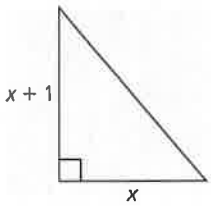
21. Area = 15 m^2



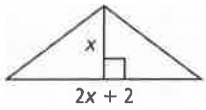
22. Area = 408 in^2



23. Area = 36 ft^2



24. Area = 600 cm^2



25. Reasoning For each equation, find k and the value of any missing solutions.

a. $x^2 - kx - 15 = 0$ where -3 is one solution of the equation.

b. $x^2 - 10x = k$ where 12 is one solution of the equation.

26. Writing Explain how you solve an equation by using the Zero-Product Property.

Name Key Class _____ Date _____

9-4 Practice

Form K

Factoring to Solve Quadratic Equations

Use the Zero-Product Property to solve each equation.

1. $(n + 3)(n - 2) = 0$ $-3, 2$

2. $(4a + 2)(a - 6) = 0$ $6, -\frac{1}{2}$

3. $(5y - 3)(2y + 1) = 0$ $\frac{3}{5}, -\frac{1}{2}$

4. $(3k - 2)(6k + 8) = 0$ $\frac{2}{3}, -\frac{4}{3}$

5. $x(x - 3) = 0$ $0, 3$

6. $2v(3v + 4) = 0$ $0, -\frac{4}{3}$

Solve by factoring.

7. $t^2 + 3t - 18 = 0$ $-6, 3$

8. $j^2 - 17j + 72 = 0$ $8, 9$

9. $2c^2 + 9c + 4 = 0$ $-\frac{1}{2}, -4$

10. $8k^2 - 2k - 3 = 0$ $-\frac{1}{2}, \frac{3}{4}$

11. $m^2 + 6m = -5$ $-5, -1$

12. $y^2 + 3y = 28$ $-7, 4$

13. $2z^2 + z = 6$ $-2, \frac{3}{2}$

14. $15a^2 - a = 6$ $-\frac{3}{5}, \frac{2}{3}$

~~**Use the Zero-Product Property to solve each equation. Write your solution in roster form.**~~

15. $x^2 - 10x + 24 = 0$ ~~$\{6, 4\}$~~ 6, 4

16. $d^2 + 3d - 10 = 0$ ~~$\{-5, 2\}$~~ $-5, 2$

17. The volume of a storage tub shaped like a rectangular prism is 24 ft^3. The height of the tub is 3 feet. The width is w feet and the length is $w + 2$ feet. Use the formula $V = lwh$ to find the value of w. 2 ft

18. The area of a parking lot is 2475 ft^2. The rectangular parking lot has dimensions such that the length is 10 feet longer than the width. What are the dimensions of the parking lot? 45 ft by 55 ft

Name _____ Class _____ Date _____

9-4 Practice (continued) *Form K*

Factoring to Solve Quadratic Equations

Write each equation in standard form. Then solve.

19. $3x^2 - x - 7 = 2x^2 + 5$

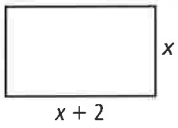
$x^2 - x - 12 = 0; -3, 4$

20. $x^2 - 4x - 2 = -9x + 4$

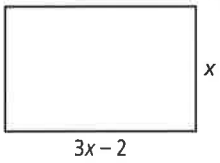
$x^2 + 5x - 6 = 0; -6, 1$

Find the value of x as it relates to each rectangle or triangle.

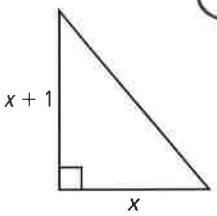
21. Area = 15 m^2 3



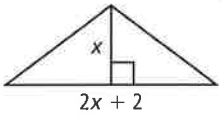
22. Area = 408 in^2 12



23. Area = 36 ft^2 8



24. Area = 600 cm^2 24



25. Reasoning For each equation, find k and the value of any missing solutions.

a. $x^2 - kx - 15 = 0$ where -3 is one solution of the equation. $k = 2; 5$

b. $x^2 - 10x = k$ where 12 is one solution of the equation. $k = 24; -2$

26. Writing Explain how you solve an equation by using the Zero-Product Property.

When the product of two factors is zero, then one or both of the factors equal zero. Set each factor equal to zero and find each solution.