Name ______________________ Date __________ Class __________

LESSON 5-6

Practice A

The Quadratic Formula

Find the zeros of each function by using the Quadratic Formula, $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

1. $f(x) = x^2 + 4$

   $x^2 + 0x + 4 = 0$

   $x = \dfrac{-0 \pm \sqrt{0^2 - 4 \cdot 1 \cdot 4}}{2 \cdot 1}$

   $x = \dfrac{\pm\sqrt{\_\_\_\_}}{\_\_\_\_}$

   ____

2. $f(x) = 2x^2 - 5x + 3$

   $2x^2 - 5x + 3 = 0$

   $x = \dfrac{-(\_\_\_) \pm \sqrt{(\_\_\_)^2 - 4 \cdot (\_\_\_) \cdot (\_\_\_)}}{2 \cdot \_\_\_\_}$

   $x = \dfrac{\_\_\_\_ \pm \sqrt{\_\_\_\_ - \_\_\_\_}}{\_\_\_\_}$

   ____

3. $f(x) = x^2 + 2x + 4$

   ____

4. $f(x) = x^2 + 2x$

   ____

Find the value of the discriminant for each function.

5. $f(x) = x^2 + x + 4$

   ____

6. $f(x) = -2x^2 + 3x - 1$

   ____

7. $f(x) = 3x^2 + 6x + 3$

   ____

Find the type and number of solutions for each equation.

8. $x^2 + 2x + 1 = 0$

   ____

9. $2x^2 + x - 4 = 0$

   ____

10. $2x^2 + 4x + 3 = 0$

    ____

11. $2x^2 - 5x + 3 = 0$

    ____

Solve.

12. The length of a rectangle is 3 feet longer than its width. The area of the rectangle is 270 square feet.

    a. What is the width of the rectangle? ____________________

    b. What is the width of the rectangle if the area is only 160 square feet?

    ____

LESSON **5-6**

Practice A
The Quadratic Formula

Find the zeros of each function by using the Quadratic Formula,

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

1. $f(x) = x^2 + 4$

$x^2 + 0x + 4 = 0$

$x = \dfrac{-0 \pm \sqrt{0^2 - 4 \cdot 1 \cdot 4}}{2 \cdot 1}$

$x = \dfrac{\pm\sqrt{-16}}{2}$

$x = \pm 2i$

2. $f(x) = 2x^2 - 5x + 3$

$2x^2 - 5x + 3 = 0$

$x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4 \cdot (2) \cdot (3)}}{2 \cdot 2}$

$x = \dfrac{5 \pm \sqrt{25 - 24}}{4}$

$x = 1, 1.5$

3. $f(x) = x^2 + 2x + 4$ $x = -1 \pm i\sqrt{3}$

4. $f(x) = x^2 + 2x$ $x = 0, -2$

Find the value of the discriminant for each function.

5. $f(x) = x^2 + x + 4$ -15

6. $f(x) = -2x^2 + 3x - 1$ 1

7. $f(x) = 3x^2 + 6x + 3$ 0

Find the type and number of solutions for each equation.

8. $x^2 + 2x + 1 = 0$ One real solution

9. $2x^2 + x - 4 = 0$ Two real solutions

10. $2x^2 + 4x + 3 = 0$ Two nonreal complex solutions

11. $2x^2 - 5x + 3 = 0$ Two real solutions

Solve.

12. The length of a rectangle is 3 feet longer than its width. The area of the rectangle is 270 square feet.

a. What is the width of the rectangle? 15 ft

b. What is the width of the rectangle if the area is only 160 square feet? 11 ft

LESSON **5-6**

Practice B
The Quadratic Formula

Find the zeros of each function by using the Quadratic Formula.

1. $f(x) = x^2 + 10x + 9$ $x = -9, -1$

2. $g(x) = 2x^2 + 4x - 12$ $x = -1 \pm \sqrt{7}$

3. $h(x) = 3x^2 - 3x + \frac{3}{4}$ $x = 0.5$

4. $f(x) = x^2 + 2x - 3$ $x = -3, 1$

5. $g(x) = 2x^2 + 3x + 1$ $x = -1, -0.5$

6. $g(x) = x^2 + 5x + -3$ $x = \dfrac{-5 \pm \sqrt{37}}{2}$

Find the type and number of solutions for each equation.

7. $x^2 - 3x = -8$ Two nonreal solutions

8. $x^2 + 4x = -3$ Two real solutions

9. $2x^2 - 12x = -18$ One real solution

Solve.

10. A newspaper delivery person in a car is tossing folded newspapers from the car window to driveways. The speed of the car is 30 feet per second, and the driver does not slow down. The newspapers are tossed horizontally from a height of 4 feet above the ground. The height of the papers as they are thrown can be modeled by $y = -16t^2 + 4$, and the distance they travel to the driveway is $d = 30t$.

a. How long does it take for a newspaper to land? 0.5 s

b. From how many feet before the driveway must the papers be thrown? 15 ft

c. The delivery person starts to throw the newspapers at an angle and the height of the papers as they travel can now be modeled by $y = -16t^2 + 12t + 4$. How long does it take the papers to reach the ground now? 1 s

LESSON **5-6**

Practice C
The Quadratic Formula

Find the zeros of each function by using the Quadratic Formula.

1. $f(x) = x^2 + 8x - 3$ $x = -4 \pm \sqrt{19}$

2. $g(x) = 2x^2 - 6x - 1$ $x = \dfrac{3 \pm \sqrt{11}}{2}$

3. $h(x) = x^2 - x + 12$ $x = \dfrac{1 \pm i\sqrt{47}}{2}$

4. $f(x) = -2x^2 - 5x + 20$ $x = -\dfrac{5 \pm \sqrt{185}}{4}$

5. $f(x) = -2x^2 + 6x - 2$ $x = \dfrac{3 \pm \sqrt{5}}{2}$

6. $f(x) = 3x^2 - 10x + 4$ $x = \dfrac{5 \pm \sqrt{13}}{3}$

Find the type and number of solutions for each equation.

7. $2x^2 + 7 = -4x$ Two nonreal solutions

8. $x^2 - 3 = -6x$ Two real solutions

9. $4x^2 + 4 = -8x$ One real solution

Solve.

10. The height $h(t)$ measured in feet of an object dropped by an astronaut on the moon can be approximated by $h(t) = h_0 - 2.7t^2$, where h_0 is the height from which the object was dropped. About how long would it take an object to fall to the surface of the moon $(h = 0)$ if it were dropped by an astronaut from a height of 6 feet? About 1.49 s

11. The height in feet, h, of a base jumper jumping off a cliff is given by the equation $h = 3t^2 - 700t + 2000$, where t is the time in seconds. The horizontal distance that he travels from the cliff is given by $d = 13t$.

a. How long does it take the base jumper from the time he jumps $(t = 0)$ until he hits ground $(h = 0)$? 2.9 s

b. When he reaches the ground, how far away is he from the base of the cliff? 37.7 ft

12. A path of uniform width surrounds a rectangular garden that is 5m wide and 12m long. The area of the path is 168m². Find the width of the path. 3.5 m

LESSON **5-6**

Reteach
The Quadratic Formula

The Quadratic Formula is another way to find the roots of a quadratic equation or the zeros of a quadratic function.

Find the zeros of $f(x) = x^2 - 6x - 11$.

Step 1 Set $f(x) = 0$. $x^2 - 6x - 11 = 0$

Step 2 Write the Quadratic Formula. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Step 3 Substitute values for a, b, and c into the Quadratic Formula.
$a = 1$, $b = -6$, $c = -11$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \dfrac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-11)}}{2(1)}$

Step 4 Simplify.

$x = \dfrac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-11)}}{2(1)} = \dfrac{6 \pm \sqrt{36 + 44}}{2} = \dfrac{6 \pm \sqrt{80}}{2}$

Step 5 Write in simplest form.

$x = \dfrac{6 \pm \sqrt{80}}{2} = 3 \pm \dfrac{\sqrt{80}}{2} = 3 \pm \dfrac{\sqrt{(16)(5)}}{2} = 3 \pm \dfrac{4\sqrt{5}}{2} = 3 \pm 2\sqrt{5}$

Remember to divide both terms of the numerator by 2 to simplify.

Find the zeros of each function using the Quadratic Formula.

1. $f(x) = x^2 + x - 1$

$x^2 + x - 1 = 0$

$a = 1$, $b = 1$, $c = -1$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{-(1) \pm \sqrt{(1)^2 - 4(1)(-1)}}{2(1)}$

$x = \dfrac{-1 \pm \sqrt{1 + 4}}{2}$

$x = \dfrac{-1 \pm \sqrt{5}}{2}$

2. $f(x) = x^2 - 6x + 6$

$x^2 - 6x + 6 = 0$

$a = 1$, $b = -6$, $c = 6$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(6)}}{2(1)}$

$x = \dfrac{6 \pm \sqrt{36 - 24}}{2}$

$x = 3 \pm \sqrt{3}$