LESSON 2.7 Skills Practice

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You Can't Spell "Fundamental Theorem of Algebra" without F-U-N!

Quadratics and Complex Numbers

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Vocabulary

Write a definition for each term in your own words.

1. imaginary roots

2. discriminant

3. imaginary zeros

4. degree of a polynomial equation

5. Fundamental Theorem of Algebra

6. double root

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Problem Set

Use the Quadratic Formula to solve an equation of the form $f(x) = 0$ for each function.

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

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

$a = 1, b = -2, c = -3$

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

$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-3)}}{2(1)}$

$x = \frac{2 \pm \sqrt{16}}{2}$

$x = \frac{2 \pm 4}{2}$

$x = 3, x = -1$

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

3. $f(x) = 4x^2 - 9$

4. $f(x) = -x^2 - 5x - 6$

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5. $f(x) = x^2 + 2x + 10$

6. $f(x) = -3x^2 - 6x - 11$

Use the discriminant to determine whether each function has real or imaginary zeros.

7. $f(x) = x^2 + 12x + 35$

$b^2 - 4ac = 12^2 - 4(1)(35)$

$= 144 - 140$

$= 4$

The discriminant is positive, so the function has real zeros.

8. $f(x) = -3x + x - 9$

9. $f(x) = x^2 - 4x + 7$

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10. $f(x) = 9x^2 - 12x + 4$

11. $f(x) = -\frac{1}{4}x^2 + 3x - 8$

12. $f(x) = x^2 + 6x + 9$

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Use the vertex form of a quadratic equation to determine whether the zeros of each function are real or imaginary. Explain how you know.

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13. $f(x) = (x - 4)^2 - 2$

Because the vertex (4, −2) is below the x-axis and the parabola is concave up ($a > 0$), it intersects the x-axis. So, the zeros are real.

14. $f(x) = -2(x - 1)^2 - 5$

15. $f(x) = \frac{1}{3}(x - 2)^2 + 7$

16. $f(x) = -3(x - 1)^2 + 5$

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

18. $f(x) = \frac{3}{4}(x + 4)^2 - 6$

Factor each function over the set of real or imaginary numbers. Then, identify the type of zeros.

19. $k(x) = x^2 - 25$

$k(x) = (x + 5)(x - 5)$

$x = -5, x = 5$

The function $k(x)$ has two real zeros.

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20. $n(x) = x^2 - 5x - 14$

21. $p(x) = -x^2 - 8x - 17$

22. $g(x) = x^2 + 6x + 10$

23. $h(x) = -x^2 + 8x - 7$

24. $m(x) = \frac{1}{2}x^2 + 8$