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Module 13 Solving Quadratic Equations of One Variable
Lesson 2 Solving Quadratic Equations by Evaluating Square Roots

Solve by evaluating square roots.

1. $x^2 = 81$

2. $x^2 = 169$

3. $x^2 = 441$

4. $x^2 = 49$

5. $3x^2 = 75$

6. $-4x^2 = 400$

7. $-2x^2 = -72$

8. $4x^2 = 60$

9. $2x^2 - 4 = 28$

10. $3x^2 + 2 = 149$

11. $(x + 4)^2 = 81$

12. $(x - 2)^2 = 100$

13. $(x + 1)^2 = 49$

14. $(x - 3)^2 = 196$

15. $(x + 4)^2 = 11$

16. $(x + 7)^2 = 26$

17. $2(x - 3)^2 + 7 = 135$

18. $3(x + 4)^2 + 12 = 12$

19. $3(x - 6)^2 - 5 = 22$

20. $5(x + 3)^2 - 8 = 172$

21. $2(x + 3)^2 - 2 = 60$

22. $3(x + 1)^2 - 5 = 502$

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Journal

1. Give one example each of quadratic equations which have zero, one, and two roots.
2. Sonya says that the solutions to $(x - 2)^2 = 16$ are 6 and –6. Maggie says the solutions are 6 and –2. Which girl is correct? Explain.
3. Describe how to solve $4(x - 2)^2 + 2 = 102$.
4. Lewis solved the equation $x^2 + 9 = 0$ and found the solutions 3 and –3. Where did he make a mistake?
5. Describe the general process used to solve a quadratic equation by evaluating square roots.

Cumulative Review

Simplify.

1. $2x^4(y^2z)^3 + (3x^2)^2y^6z^3$

2. $(3m - 2n + 5z) + (8m + 3n - 7z)$

3. $3p^2(4p^2 - 8p + 6)$

4. $(6a + 2b)(2a - 3b)$

Factor, if possible.

5. $4m^2 + 9n^2$

6. $a^2 - 2a - 99$

7. $12c^2 + 13c - 35$

8. $2m^2 - 10mn + 12n^2$

Identify each polynomial equation as quadratic, linear, or neither.

9. $3^2x + 4x + 7 = 0$

10. $3a + 2 = 5a^2$

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Graphing Calculator Problem

Solve $3x^2 - 10 = 65$ by graphing its associated quadratic function on a graphing calculator.

1. Change the equation such that it is in the form $y = ax^2 + bx + c$, where $y = 0$. In this case, subtract 65 from both sides of the equation. The equation becomes $3x^2 - 75 = 0$. The associated quadratic function is $y = 3x^2 - 75$. To enter this into the calculator, press [Y=] and enter function $3x^2 - 75$ into $\mathbf{Y_1}$**=**. To enter x^2, press [X,T,θ,n] and [x^2]. To enter "–75," press [(–)], [7], and [5].
2. Press [GRAPH].
3. To solve the equation, find the *x*-intercepts of the graph. This is where the graph crosses the *x*-axis, and $y = 0$. When $y = 0$, we get the original equation with which we started. Use the CALC menu to find the *x*-intercept. Press [2nd] and then [CALC]. Use the down arrow to select **2:zero** and then, press [ENTER]. **Left Bound?** will appear in the lower left-hand corner of the screen. Use the arrow keys to move the cursor to the left of what appears to be the first *x*-intercept, just above the *x*-axis. Press [ENTER]. **Right Bound?** will appear in the lower left-hand corner of the screen. Use the arrow keys to move the cursor to the right of what appears to be the first x-intercept, just below the *x*-axis. Press [ENTER]. **Guess?** will appear in the lower left-hand corner of the screen. Press [ENTER]. The *x* and *y* values for the first root, or *x*-intercept, appear in the lower left-hand corner of the screen. The value of *x* in this case will be –5. Write this value on a piece of paper.
4. Repeat Step 3 to identify the value of the other root. Use the arrow keys to move the cursor just to the left and just to the right of the second *x*-intercept. The value of *x* in this case will be five.

The roots are {5, –5}.

Solve by graphing on a graphing calculator. If needed, round answers to the nearest hundredth.

1. $x^2 = 16$

2. $-2x^2 = 14$

3. $2(x + 2)^2 + 25 = 25$

4. $3(x - 1)^2 - 1 = 38$

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