

4 EXAMPLE Choosing an Appropriate Method

Which method(s) would you choose to solve each equation? Justify your reasoning.

- | | |
|---------------------------|--|
| a. $2x^2 - 6 = 0$ | Square roots; there is no x term. |
| b. $6x^2 + 13x - 17 = 0$ | Quadratic formula; the equation cannot be factored easily. |
| c. $x^2 + 2x - 15 = 0$ | Factoring; the equation is easily factorable. |
| d. $16x^2 - 96x + 45 = 0$ | Quadratic formula; the equation cannot be factored easily, and the numbers are large. |
| e. $x^2 - 7x + 4 = 0$ | Quadratic formula, completing the square, or graphing; the coefficient of the x^2 term is 1, but the equation is not factorable. |



4 Which method(s) would you choose to solve each equation? Justify your reasoning.

- a. $13x^2 - 5x + 21 = 0$ b. $x^2 - x - 30 = 0$ c. $144x^2 = 25$

EXERCISES

For more exercises, see *Extra Skill and Word Problem Practice*.

Practice and Problem Solving

A Practice by Example

Example 1
(page 586)



Example 2
(page 586)

Example 3
(page 587)

Example 4
(page 588)

Use the quadratic formula to solve each equation. If necessary, round answers to the nearest hundredth.

- | | | |
|---------------------------|---------------------------|---------------------------|
| 1. $2x^2 + 5x + 3 = 0$ | 2. $5x^2 + 16x - 84 = 0$ | 3. $4x^2 - 12x + 9 = 0$ |
| 4. $3x^2 + 47x = -30$ | 5. $12x^2 - 77x - 20 = 0$ | 6. $3x^2 + 39x + 108 = 0$ |
| 7. $3x^2 + 40x - 128 = 0$ | 8. $2x^2 - 9x - 221 = 0$ | 9. $5x^2 - 68x = 192$ |
| 10. $5x^2 + 13x - 1 = 0$ | 11. $2x^2 - 24x + 33 = 0$ | 12. $7x^2 + 100x - 4 = 0$ |
| 13. $8x^2 - 3x - 7 = 0$ | 14. $6x^2 + 5x - 40 = 0$ | 15. $3x^2 - 11x - 2 = 0$ |

For Exercises 16 and 17, use the vertical motion formula $h = -16t^2 + vt + c$.

16. A child tosses a ball upward with a starting velocity of 10 ft/s from a height of 3 ft.
- Substitute the values into the vertical motion formula. Let $h = 0$.
 - Solve. If it is not caught, how long will the ball be in the air? Round to the nearest tenth of a second.
17. A soccer ball is kicked with a starting upward velocity of 50 ft/s from a starting height of 3.5 ft.
- Substitute the values into the vertical motion formula. Let $h = 0$.
 - Solve. If no one touches the ball, how long will the ball be in the air? Round to the nearest tenth of a second.

Which method(s) would you choose to solve each equation? Justify your reasoning.

- | | | |
|-------------------------|-------------------------|--------------------------|
| 18. $x^2 + 2x - 13 = 0$ | 19. $4x^2 - 81 = 0$ | 20. $9x^2 - 31x = 51$ |
| 21. $3x^2 - 5x + 9 = 0$ | 22. $x^2 + 4x - 60 = 0$ | 23. $-4x^2 + 3x + 2 = 0$ |




B Apply Your Skills

Use any method you choose to solve each equation. If necessary, round to the nearest hundredth.

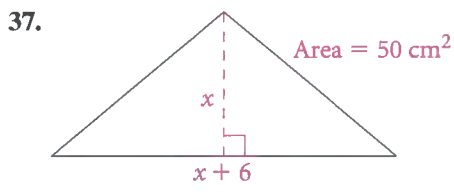
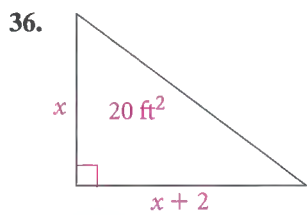
24. $2t^2 = 72$ 25. $3x^2 + 2x - 4 = 0$ 26. $5b^2 - 10 = 0$
 27. $3x^2 + 4x = 10$ 28. $m^2 - 4m = -4$ 29. $13n^2 - 117 = 0$
 30. $3s^2 - 4s = 2$ 31. $5b^2 - 2b - 7 = 0$ 32. $15x^2 - 12x - 48 = 0$


GO for Help

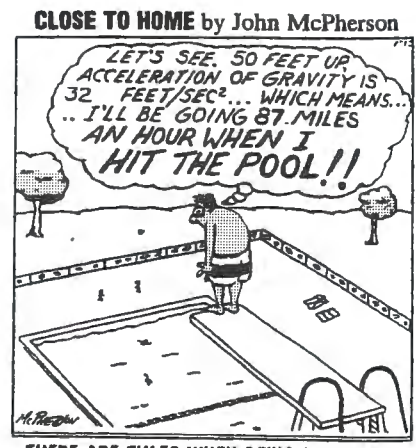
For a guide to solving Exercise 33, see p. 591.

-  **33. Vertical Motion** Suppose you throw a ball upward with a starting velocity of 30 ft/s. The ball is 6 ft high when it leaves your hand. After how many seconds will it hit the ground? Use the vertical motion formula $h = -16t^2 + vt + c$.
-  **34. Geometry** Suppose a rectangle has an area of 60 ft^2 and dimensions x and $(x + 1)$.
 a. Estimate each dimension of the rectangle to the nearest integer.
 b. Write a quadratic equation and use the quadratic formula to find each dimension to the nearest hundredth.
-  **35. Writing** Compare the way you solve the linear equation $mx + b = 0$ with the way you solve the quadratic equation $ax^2 + bx + c = 0$.

 **Geometry** Find the base and height of each triangle below. If necessary, round to the nearest hundredth.



- 38. Open-Ended** Write a problem in which you find the area of a rectangle that you can solve using a quadratic equation. Draw a diagram and solve.
- 39. Critical Thinking** How can you tell from the quadratic formula that a quadratic equation has one solution? Explain.
-  **40. Multiple Choice** Refer to the cartoon. Suppose the man's starting upward velocity v is 5 ft/s. Use $0 = -16t^2 + vt + c$, where c is the starting height. Find the number of seconds t before he hits the water.
 (A) about 1.6 s (B) about 1.9 s
 (C) about 3.0 s (D) about 3.2 s



THERE ARE TIMES WHEN BEING A WHIZ AT PHYSICS CAN BE A DEFINITE DRAWBACK.

 **Challenge**  **41. Population** The function below models the United States population P in millions since 1900, where t is the number of years after 1900.

$$P = 0.0089t^2 + 1.1149t + 78.4491$$

- a. Use the function to estimate the United States population the year you graduate from high school.
 b. Estimate the United States population in 2025.
 c. Use the function to predict when the population will reach 300 million.

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