

Oral Exercises

State the number that must be added to both sides of the equation in order to complete the square.

1. $x^2 - 10x = 2$

3. $y^2 - 5y = -7$

5. $r^2 - \frac{2}{3}r = \frac{1}{3}$

2. $x^2 + 12x = -4$

4. $t^2 - \frac{4}{3}t = -1$

6. $n^2 - \frac{5}{2}n = -\frac{5}{4}$

Tell which method—factoring, completing the square, or using the quadratic formula—you would use to solve each equation.

7. $x^2 - 6x = 1$

9. $5x^2 + 3x - 7 = 0$

8. $x^2 - 8x + 15 = 0$

10. $15x^2 + 8x = 0$

State values of a , b , and c that would be used in the quadratic formula.

11. $k^2 - 6k = -4$

14. $8v^2 = 3 - 12v$

12. $3y^2 = 4y + 1$

15. $7z^2 = 6z$

13. $11 = 8x - 2x^2$

16. $9x^2 + 4 = 8x$

Written Exercises

Solve over \mathbb{C} by the indicated method; give irrational answers in simple radical form. In Exercises 1–10 solve by completing the square.

A 1–6. Solve the equations in Oral Exercises 1–6.

7. $2u^2 - 8u + 9 = 0$

9. $3y^2 + 16y + 8 = 0$

8. $8v^2 + 4v - 3 = 0$

10. $2x^2 - 6x + 5 = 0$

Solve by using the quadratic formula.

11–16. Solve the equations in Oral Exercises 11–16.

17. $5 + 2k^2 = 10k$

19. $\frac{1}{5}n^2 = \frac{2}{3}n - 5$

18. $6v^2 + 16v = 3$

20. $\frac{5}{3}(t^2 - 4t) = -7$

Solve by any method.

21. $2(x + 3)^2 + 7 = 0$

23. $7x^2 - 12x + 4 = 0$

25. $3x^2 - 2x + 1 = 0$

27. $4x^2 - 12x + 7 = 0$

22. $\frac{2}{3}x^2 - 3x = 0$

24. $\frac{(3x - 1)^2}{2} = 10$

26. $-2x^2 + 2x - 5 = 0$

28. $2x^2 + 15x + 29 = 0$

B 29. $x^2\sqrt{3} + 6x + 7\sqrt{3} = 0$

30. $8x^2 - 12\sqrt{5}x + 9 = 0$

31. $\frac{29}{x + 3} + 2x = 10$

32. $\frac{x + 4}{x - 2} = \frac{3x - 4}{x + 8}$

Solve by any method.

33. $\frac{5}{x-3} + \frac{4}{x} + 3 = 0$

35. $x^4 - 5x^2 - 36 = 0$

37. $x^6 - 7x^3 - 8 = 0$

39. $\left(\frac{1}{x}\right)^2 - 2\left(\frac{1}{x}\right) - 1 = 0$

41. $x^2 + ix + 6 = 0$

43. $x^2 - (2 + 3i)x + (3 + 3i) = 0$

34. $\frac{7}{x-1} - 3 = \frac{2}{x+1}$

36. $x^4 - 6x^2 + 5 = 0$

38. $x^6 + 65x^3 + 64 = 0$

40. $\left(\frac{1}{x+1}\right)^2 - \left(\frac{1}{x+1}\right) = 5$

42. $x^2 - 2ix + 3 = 0$

44. $ix^2 + (1 - 2i)x - (1 - 3i) = 0$

- C 45. a. Factor $x^4 + 4$ over the real numbers.
(Hint: You can rewrite $x^4 + 4$ as $x^4 + 4x^2 + 4 - 4x^2$)
b. Use the same method to factor $x^4 + 1$.
46. Solve the equation $\sqrt{2x - x^2} = (x - 1)^2$.
(Hint: $2x - x^2 = 1 - (1 - 2x + x^2)$)

Problems

Express each irrational answer (a) in simple radical form and (b) using a calculator or Table 3, as a decimal approximation to the nearest tenth. Give *only* answers that are physically possible (e.g., distances cannot be negative).

- A 1. At time t (in seconds) the height y above the ground (in meters) of an object thrown straight up with an initial velocity v_0 is given by

$$y = -4.9t^2 + v_0t.$$

How many seconds will it take an object thrown upward at a velocity of 14 m/s to reach a height of 7 m?

2. When two resistors of resistances R_1 and R_2 are connected in series, their combined resistance is $R_1 + R_2$. When they are connected in parallel, their combined resistance is $\frac{R_1R_2}{R_1 + R_2}$. Two resistors are found to have a combined resistance of 10Ω (ohms) when connected in series and 2Ω when connected in parallel. What is the resistance of each?
3. A U.S. Postal Service regulation requires that a rectangular package have a "length-plus-girth" measurement of at most 108 in., where the girth is the perimeter of a cross-section perpendicular to the length. If a package with the maximum length-plus-girth allowable has a length of 40 in. and a volume of $11,000 \text{ in.}^3$, what are its height and width?

