5.7 Polynomial Equations

Quadratic Equations Higher Degree Equations Equations in Quadratic Form Applications

Quadratic Equations

Exercises 1-5: Solve, if possible.

1. $x^2 - 9 = 0$ **1.** _____

2. $8x^2 - 8 = 0$ **2.** _____

3. $x^2 + 16 = 0$ **3.** _____

4. $25y^2 - 1 = 0$ **4.** _____

5. $4a^2 = 100$ **5.** _____

Exercises 6-10: Solve each equation.

6. $16x^2 - 24x + 9 = 0$ **6.** _____

7. $2x^2 + x - 10 = 0$ **7.** _____

8. $3x^2 = 12x$ **8.** _____

9. $6x^2 = 11x + 2$ **9.** _____

10. $2x^2 + 12x = -18$ **10.** _____

11. The elevation E in feet of a highway x feet along a hill is modeled by $E(x) = -0.0002x^2 + 150$, where $-800 \le x \le 800$, and where $x = 0$ corresponds to the peak or crest of the hill. Determine the x-values where the elevation is 118 feet.

11. _____

12. Quadratic polynomials can also be used to model valleys. Suppose that the elevation E in feet of the sag curve x (horizontal) feet along a proposed route is modeled by $E(x) = 0.0004x^2 - 0.55x + 350$, where $0 \le x \le 1375$. Determine where the elevation is 200 feet.

12. _____

Higher Degree Equations

Exercises 13-18: Solve each equation.

13. $x^3 = 25x$ **13.** _____

14. $3x^3 - 9x^2 - 12x = 0$ **14.** _____

15. $6x^2 = 2x + 20$ **15.** _____

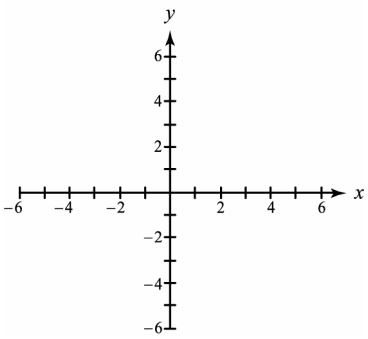
16. $x^3 + 3x^2 - 4x - 12 = 0$ **16.** _____

17. $x^3 - 27 = 0$ **17.** _____

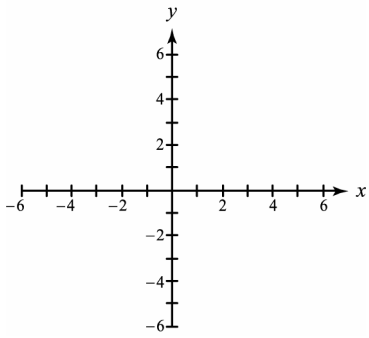
18. $2x^4 = 11x^3 + 6x^2$ **18.** _____

Exercises 19-22: Solve each equation graphically.

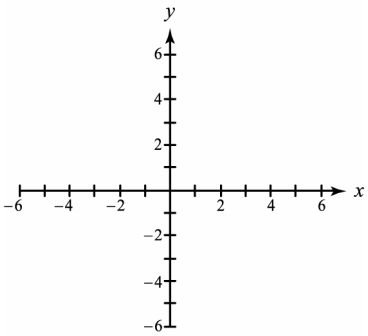
19. $x^2 + 4x = 0$ **19.** _____



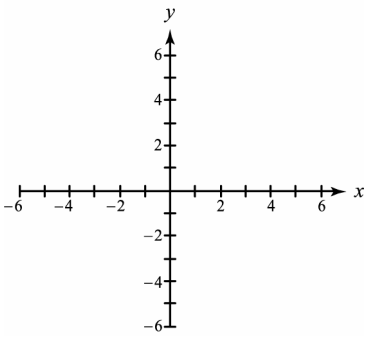
20. $x^2 = 2x + 15$ **20.** _____



21. $5x^4 - 30x^3 + 45x^2 = 0$ **21.** _____



22. $-3x^3 + 48x = 0$ **22.** _____



Equations in Quadratic Form

Exercises 23-26: Solve each equation.

23. $x^4 - 16 = 0$ **23.** _____

24. $b^4 - 625 = 0$ **24.** _____

25. $x^4 - 17x^2 + 16 = 0$ **25.** _____

26. $x^4 - 13x^2 + 36 = 0$ **26.** _____

Applications

27. A frame surrounding a picture is 2 inches wide. The picture inside the frame is 4 inches wider than it is high. If the overall area of the picture and frame is 320 square inches, find the dimensions of the picture inside the frame.

27. _____

28. The outside measurements of a rectangular frame are 32 inches by 44 inches. The area of the rectangular picture inside the frame is 864 square inches. Find the width of the frame that surrounds the picture.

28. _____

29. On wet, level pavement, the stopping distance d in feet for a car traveling at x miles per hour can be estimated by $d(x) = \frac{1}{9}x^2 + \frac{10}{3}x$. Use this formula to approximate the speed of a car that takes 375 feet to stop.

29. _____

30. The width of a rectangular box is 6 inches more than its height, and its length is 9 inches more than its height. If the volume of the box is 324 cubic inches, find its dimensions graphically.

30. _____