

5-6

Practice

Form G

The Fundamental Theorem of Algebra

Without using a calculator, find all the complex roots of each equation.

1. $x^5 - 3x^4 - 8x^3 - 8x^2 - 9x - 5 = 0$

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

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

4. $x^4 - 2x^3 - x^2 - 4x - 6 = 0$

5. $x^4 + 3x^3 - 21x^2 - 48x + 80 = 0$

6. $x^5 - 3x^4 + x^3 + x^2 + 4 = 0$

Find all the zeros of each function.

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

8. $f(x) = x^3 - 16x$

9. $g(x) = 12x^3 - 2x^2 - 2x$

10. $y = 6x^3 + x^2 - x$

11. $f(x) = 5x^3 + 6x^2 + x$

12. $y = -4x^3 + 100x$

For each equation, state the number of complex roots, the possible number of real roots, and the possible rational roots.

13. $2x^2 + 5x + 3 = 0$

14. $3x^2 + 11x - 10 = 0$

15. $2x^4 - 18x^2 + 5 = 0$

16. $4x^3 - 12x + 9 = 0$

17. $6x^5 - 28x + 15 = 0$

18. $x^3 - x^2 - 2x + 7 = 0$

19. $x^3 - 6x^2 - 7x - 12 = 0$

20. $2x^4 + x^2 - x + 6 = 0$

21. $4x^5 - 5x^4 + x^3 - 2x^2 + 2x - 6 = 0$

22. $7x^6 + 3x^4 - 9x^2 + 18 = 0$

23. $5 + x + x^2 + x^3 + x^4 + x^5 = 0$

24. $6 - x + 2x^3 - x^3 + x^4 - 8x^5 = 0$

Find the number of complex roots for each equation.

25. $x^8 - 5x^6 + x^4 + 2x - 16 = 0$

26. $x^{10} - 100 = 0$

27. $2x^4 + x^3 - 3x^2 + 4x - 2 = 0$

28. $-4x^3 + x^2 - 3x + 10 = 0$

29. $x^6 + 2x^5 + 3x^4 + 4x^3 + 5x^2 + 6x + 10 = 0$

30. $-3x^5 + 4x^4 + 5x^2 - 15 = 0$

5-6

Practice (continued)

Form G

The Fundamental Theorem of Algebra**Find all the zeros of each function.**

31. $f(x) = x^3 - 9x^2 + 27x - 27$

32. $y = 2x^3 - 8x^2 + 18x - 72$

33. $y = x^3 - 10x - 12$

34. $y = x^3 - 4x^2 + 8$

35. $f(x) = 2x^3 + x - 3$

36. $y = x^3 - 2x^2 - 11x + 12$

37. $g(x) = x^3 + 4x^2 + 7x + 28$

38. $f(x) = x^3 + 3x^2 + 6x + 4$

39. $g(x) = x^4 - 5x^2 - 36$

40. $y = x^4 - 7x^2 + 12$

41. $y = 9x^4 + 5x^2 - 4$

42. $y = 4x^4 - 11x^2 - 3$

43. Error Analysis Your friend says that the equation $4x^7 - 3x^3 + 4x^2 - x + 2 = 0$ has 5 complex roots. You say that the equation has 7 complex roots. Who is correct? What mistake was made?

44. A section of roller coaster can be modeled by the function $f(x) = x^5 - 5x^4 - 31x^3 + 113x^2 + 282x - 360$. A walkway bridge will be placed at one of the zeros. What are the possible locations for the walkway bridge?

45. Writing Using the Fundamental Theorem of Algebra, explain how $x^3 = 0$ has 3 roots and 3 linear factors.

46. How many complex roots does the equation $x^4 = 256$ have? What are they?

47. Reasoning Can a fifth-degree polynomial with rational coefficients have 4 real roots and 1 irrational root? Explain why or why not?