GUIDED PRACTICE

Vocabulary Check ✓

1. State the remainder theorem.

Concept Check ✓

2. Write a polynomial division problem that you would use long division to solve. Then write a polynomial division problem that you would use synthetic division to solve.

3. Write the polynomial divisor, dividend, and quotient represented by the synthetic division shown at the right.

$$\begin{array}{r|cccc} -3 & 1 & -2 & -9 & 18 \\ & & -3 & 15 & -18 \\ \hline & 1 & -5 & 6 & 0 \end{array}$$

Skill Check ✓

Divide using polynomial long division.

4. $(2x^3 - 7x^2 - 17x - 3) \div (2x + 3)$
5. $(x^3 + 5x^2 - 2) \div (x + 4)$
6. $(-3x^3 + 4x - 1) \div (x - 1)$
7. $(-x^3 + 2x^2 - 2x + 3) \div (x^2 - 1)$

Divide using synthetic division.

8. $(x^3 - 8x + 3) \div (x + 3)$
9. $(x^4 - 16x^2 + x + 4) \div (x + 4)$
10. $(x^2 + 2x + 15) \div (x - 3)$
11. $(x^2 + 7x - 2) \div (x - 2)$

Given one zero of the polynomial function, find the other zeros.

12. $f(x) = x^3 - 8x^2 + 4x + 48; 4$
13. $f(x) = 2x^3 - 14x^2 - 56x - 40; 10$

14. **BUSINESS** Look back at Example 5. If the company produces 1 million radios, it will make a profit of \$21,000,000. Find another number of radios that the company could produce to make the same profit.

PRACTICE AND APPLICATIONS

STUDENT HELP

Extra Practice to help you master skills is on p. 948.

USING LONG DIVISION **Divide using polynomial long division.**

15. $(x^2 + 7x - 5) \div (x - 2)$
16. $(3x^2 + 11x + 1) \div (x - 3)$
17. $(2x^2 + 3x - 1) \div (x + 4)$
18. $(x^2 - 6x + 4) \div (x + 1)$
19. $(x^2 + 5x - 3) \div (x - 10)$
20. $(x^3 - 3x^2 + x - 8) \div (x - 1)$
21. $(2x^4 + 7) \div (x^2 - 1)$
22. $(x^3 + 8x^2 - 3x + 16) \div (x^2 + 5)$
23. $(6x^2 + x - 7) \div (2x + 3)$
24. $(10x^3 + 27x^2 + 14x + 5) \div (x^2 + 2x)$
25. $(5x^4 + 14x^3 + 9x) \div (x^2 + 3x)$
26. $(2x^4 + 2x^3 - 10x - 9) \div (x^3 + x^2 - 5)$

USING SYNTHETIC DIVISION **Divide using synthetic division.**

27. $(x^3 - 7x - 6) \div (x - 2)$
28. $(x^3 - 14x + 8) \div (x + 4)$
29. $(4x^2 + 5x - 4) \div (x + 1)$
30. $(x^2 - 4x + 3) \div (x - 2)$
31. $(2x^2 + 7x + 8) \div (x - 2)$
32. $(3x^2 - 10x) \div (x - 6)$
33. $(x^2 + 10) \div (x + 4)$
34. $(x^2 + 3) \div (x + 3)$
35. $(10x^4 + 5x^3 + 4x^2 - 9) \div (x + 1)$
36. $(x^4 - 6x^3 - 40x + 33) \div (x - 7)$
37. $(2x^4 - 6x^3 + x^2 - 3x - 3) \div (x - 3)$
38. $(4x^4 + 5x^3 + 2x^2 - 1) \div (x + 1)$

STUDENT HELP

HOMEWORK HELP

Example 1: Exs. 15–26
Example 2: Exs. 27–38
Example 3: Exs. 39–46
Example 4: Exs. 47–54
Example 5: Exs. 60–62

FACTORING **Factor the polynomial given that $f(k) = 0$.**

39. $f(x) = x^3 - 5x^2 - 2x + 24; k = -2$

40. $f(x) = x^3 - 3x^2 - 16x - 12; k = 6$

41. $f(x) = x^3 - 12x^2 + 12x + 80; k = 10$

42. $f(x) = x^3 - 18x^2 + 95x - 126; k = 9$

43. $f(x) = x^3 - x^2 - 21x + 45; k = -5$

44. $f(x) = x^3 - 11x^2 + 14x + 80; k = 8$

45. $f(x) = 4x^3 - 4x^2 - 9x + 9; k = 1$

46. $f(x) = 2x^3 + 7x^2 - 33x - 18; k = -6$

FINDING ZEROS **Given one zero of the polynomial function, find the other zeros.**

47. $f(x) = 9x^3 + 10x^2 - 17x - 2; -2$

48. $f(x) = x^3 + 11x^2 - 150x - 1512; -14$

49. $f(x) = 2x^3 + 3x^2 - 39x - 20; 4$

50. $f(x) = 15x^3 - 119x^2 - 10x + 16; 8$

51. $f(x) = x^3 - 14x^2 + 47x - 18; 9$

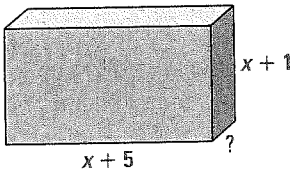
52. $f(x) = 4x^3 + 9x^2 - 52x + 15; -5$

53. $f(x) = x^3 + x^2 + 2x + 24; -3$

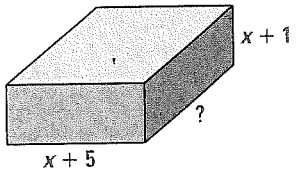
54. $f(x) = 5x^3 - 27x^2 - 17x - 6; 6$

GEOMETRY CONNECTION **You are given an expression for the volume of the rectangular prism. Find an expression for the missing dimension.**

55. $V = 3x^3 + 8x^2 - 45x - 50$

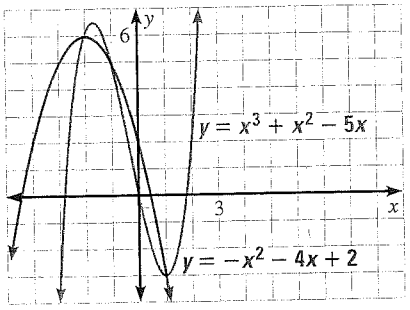


56. $V = 2x^3 + 17x^2 + 40x + 25$

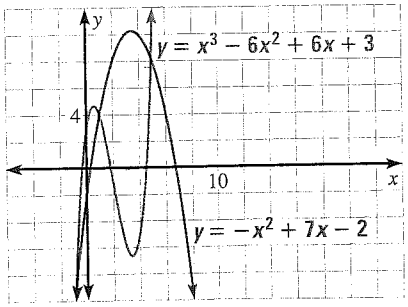


POINTS OF INTERSECTION **Find all points of intersection of the two graphs given that one intersection occurs at $x = 1$.**

57.



58.



59. **LOGICAL REASONING** You divide two polynomials and obtain the result $5x^2 - 13x + 47 - \frac{102}{x+2}$. What is the dividend? How did you find it?

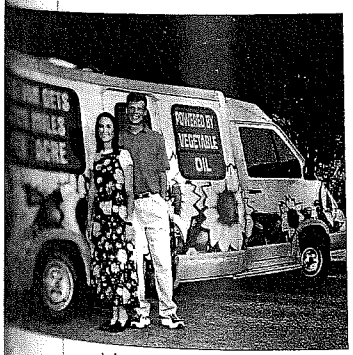
60. **COMPANY PROFIT** The demand function for a type of camera is given by the model $p = 100 - 8x^2$ where p is measured in dollars per camera and x is measured in millions of cameras. The production cost is \$25 per camera. The production of 2.5 million cameras yielded a profit of \$62.5 million. What other number of cameras could the company sell to make the same profit?

61. **FUEL CONSUMPTION** From 1980 to 1991, the total fuel consumption T (in billions of gallons) by cars in the United States and the average fuel consumption A (in gallons per car) can be modeled by

$$T = -0.026x^3 + 0.47x^2 - 2.2x + 72 \quad \text{and} \quad A = -8.4x + 580$$

where x is the number of years since 1980. Find a function for the number of cars from 1980 to 1991. About how many cars were there in 1990?

FOCUS ON APPLICATIONS



REAL LIFE ALTERNATIVE FUEL

Joshua and Kaia Tickell built the Green Grease Machine, which converts used restaurant vegetable oil into biodiesel fuel. The Tickells use the fuel in their motor home, the Veggie Van, as an alternative to the fuel referred to in **Ex. 61.**

APPLICATION LINK
www.mcdougallittell.com