6.6 Exercise Set

FOR EXTRA HELP MyMathLab MathXL PRACTICE WATCH DOWNLOAD READ REVIEW

Concept Reinforcement *Use the words from the following list to label the numbered expressions from the division shown.*

dividend, divisor, quotient, remainder

$$\begin{array}{r} \text{(1)}\ x+2 \\ \text{(2)}\ x-3\overline{)\,x^2-x+9}\ \text{(3)} \\ -(x^2-3x) \\ \hline 2x+9 \\ -(2x-6) \\ \hline 15\ \text{(4)} \end{array}$$

1. Quotient
2. Divisor
3. Dividend
4. Remainder

Divide and check.

5. $\dfrac{32x^5-24x}{8}$ $4x^5-3x$
6. $\dfrac{12a^4-3a^2}{6}$ $2a^4-\frac{1}{2}a^2$
7. $\dfrac{u-2u^2+u^7}{u}$ $1-2u+u^6$
8. $\dfrac{50x^5-7x^4+x^2}{x}$ $50x^4-7x^3+x$
9. $(15t^3-24t^2+6t)\div(3t)$ $5t^2-8t+2$
10. $(20t^3-15t^2+30t)\div(5t)$ $4t^2-3t+6$
11. $(24t^5-40t^4+6t^3)\div(4t^3)$ $6t^2-10t+\frac{3}{2}$
12. $(18t^6-27t^5-3t^3)\div(9t^3)$ $2t^3-3t^2-\frac{1}{3}$
13. $(15x^7-21x^4-3x^2)\div(-3x^2)$ $-5x^5+7x^2+1$
14. $(16x^6+32x^5-8x^2)\div(-8x^2)$ $-2x^4-4x^3+1$
15. $\dfrac{8x^2-10x+1}{2x}$ $4x-5+\dfrac{1}{2x}$
16. $\dfrac{9x^2+3x-2}{3x}$ $3x+1-\dfrac{2}{3x}$
17. $\dfrac{9r^2s^2+3r^2s-6rs^2}{-3rs}$ $-3rs-r+2s$
18. $\dfrac{4x^4y-8x^6y^2+12x^8y^6}{4x^4y}$ $1-2x^2y+3x^4y^5$
19. $(10x^5y^2+15x^2y^2-5x^2y)\div(5x^2y)$ ⊡
20. $(12a^3b^2+4a^4b^5+16ab^2)\div(4ab^2)$ ⊡
21. $(x^2+10x+21)\div(x+7)$ $x+3$
22. $(y^2-8y+16)\div(y-4)$ $y-4$
23. $(a^2-8a-16)\div(a+4)$ $a-12+\dfrac{32}{a+4}$
24. $(y^2-10y-25)\div(y-5)$ $y-5+\dfrac{-50}{y-5}$
25. $(2x^2+11x-5)\div(x+6)$ ⊡
26. $(3x^2-2x-13)\div(x-2)$ ⊡

Aha!

27. $(y^2-25)\div(y+5)$ $y-5$
28. $(a^2-81)\div(a-9)$ $a+9$
29. $\dfrac{a^3+8}{a+2}$ a^2-2a+4
30. $\dfrac{t^3+27}{t+3}$ t^2-3t+9
31. $\dfrac{t^2-13}{t-4}$ $t+4+\dfrac{3}{t-4}$
32. $\dfrac{a^2-21}{a-5}$ $a+5+\dfrac{4}{a-5}$
33. $\dfrac{2t^3-9t^2+11t-3}{2t-3}$ t^2-3t+1
34. $\dfrac{8t^3-22t^2-5t+12}{4t+3}$ $2t^2-7t+4$
35. $(5x^2-14x)\div(5x+1)$ ⊡
36. $(3x^2-7x)\div(3x-1)$ ⊡
37. $(t^3+t-t^2-1)\div(t+1)$ $t^2-2t+3+\dfrac{-4}{t+1}$
38. $(x^3+x-x^2-1)\div(x-1)$ x^2+1
39. $(t^4+4t^2+3t-6)\div(5+t^2)$ $t^2-1+\dfrac{3t-1}{t^2+5}$
40. $(t^4-2t^2+4t-5)\div(t^2-3)$ $t^2+1+\dfrac{4t-2}{t^2-3}$
41. $(4x^4-3-x-4x^2)\div(2x^2-3)$ ⊡
42. $(x+6x^4-4-3x^2)\div(1+2x^2)$ $3x^2-3+\dfrac{x-}{2x^2+1}$

⊡ Answers to Exercises 19, 20, 25, 26, 35, 36, and 41 are on p. IA-14.

For Exercises 43–50, $f(x)$ and $g(x)$ are as given. Find a simplified expression for $F(x)$ if $F(x) = (f/g)(x)$. (See Example 6.) Be sure to list all restrictions on the domain of $F(x)$.

43. $f(x) = 6x^2 - 11x - 10$, $g(x) = 3x + 2$ $2x - 5, x \neq -\frac{2}{3}$

44. $f(x) = 8x^2 - 22x - 21$, $g(x) = 2x - 7$ $4x + 3, x \neq \frac{7}{2}$

45. $f(x) = 8x^3 - 27$, $g(x) = 2x - 3$ $4x^2 + 6x + 9, x \neq \frac{3}{2}$

46. $f(x) = 64x^3 + 8$, $g(x) = 4x + 2$ $16x^2 - 8x + 4, x \neq -\frac{1}{2}$

47. $f(x) = x^4 - 24x^2 - 25$, $g(x) = x^2 - 25$ $x^2 + 1, x \neq -5, x \neq 5$

48. $f(x) = x^4 - 3x^2 - 54$, $g(x) = x^2 - 9$ $x^2 + 6, x \neq -3, x \neq 3$

49. $f(x) = 8x^2 - 3x^4 - 2x^3 + 2x^5 - 5$, $g(x) = x^2 - 1$ $2x^3 - 3x^2 + 5, x \neq -1, x \neq 1$

50. $f(x) = 4x - x^3 - 10x^2 + 3x^4 - 8$, $g(x) = x^2 - 4$ $3x^2 - x + 2, x \neq -2, x \neq 2$

TW **51.** Explain how factoring could be used to solve Example 6.

TW **52.** Explain how to construct a polynomial of degree 4 that has a remainder of 3 when divided by $x + 1$.

SKILL REVIEW

Review graphing equations and inequalities (Sections 2.2, 2.3, and 4.5).

Graph on a plane.

53. $3x - y = 9$ [2.3]

54. $5y = -15$ [2.3]

55. $y < \frac{5}{2}x$ [4.5]

56. $x + y \geq 3$ [4.5]

57. $y = -\frac{3}{4}x + 1$ [2.2]

58. $x \geq -1$ [4.5]

SYNTHESIS

TW **59.** Explain how to construct a polynomial of degree 4 that has a remainder of 2 when divided by $x + c$.

TW **60.** Do addition, subtraction, and multiplication of polynomials always result in a polynomial? Does division? Why or why not?

Divide.

61. $(4a^3b + 5a^2b^2 + a^4 + 2ab^3) \div (a^2 + 2b^2 + 3ab)$ $a^2 + ab$

62. $(x^4 - x^3y + x^2y^2 + 2x^2y - 2xy^2 + 2y^3) \div (x^2 - xy + y^2)$ $x^2 + 2y$

63. $(a^7 + b^7) \div (a + b)$ $a^6 - a^5b + a^4b^2 - a^3b^3 + a^2b^4 - ab^5 + b^6$

64. Find k such that when $x^3 - kx^2 + 3x + 7k$ is divided by $x + 2$, the remainder is 0. $\frac{14}{3}$

65. When $x^2 - 3x + 2k$ is divided by $x + 2$, the remainder is 7. Find k. $-\frac{3}{2}$

66. Let

$$f(x) = \frac{3x + 7}{x + 2}. \quad 3 + \frac{1}{x + 2}$$

a) Use division to find an expression equivalent to $f(x)$. Then graph f.

b) On the same set of axes, sketch both $g(x) = 1/(x + 2)$ and $h(x) = 1/x$.

c) How do the graphs of f, g, and h compare?

TW **67.** D'Andre incorrectly states that

$$(x^3 + 9x^2 - 6) \div (x^2 - 1) = x + 9 + \frac{x + 4}{x^2 - 1}.$$

Without performing any long division, how could you show D'Andre that his division cannot possibly be correct?

68. Use a graphing calculator to check Example 5. Perform the check using

$$y_1 = (9x^2 + x^3 - 5)/(x^2 - 1),$$
$$y_2 = x + 9 + (x + 4)/(x^2 - 1), \text{ and}$$
$$y_3 = y_2 - y_1.$$

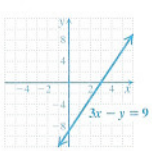
Try Exercise Answers: Section 6.6

9. $5t^2 - 8t + 2$ **17.** $-3rs - r + 2s$ **21.** $x + 3$

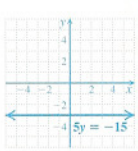
23. $a - 12 + \frac{32}{a + 4}$ **39.** $t^2 - 1 + \frac{3t - 1}{t^2 + 5}$

43. $2x - 5, x \neq -\frac{2}{3}$

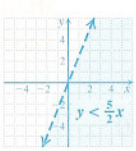
53.



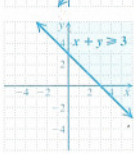
54.



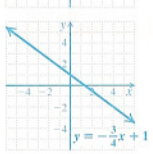
55.



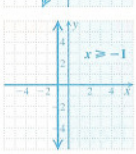
56.



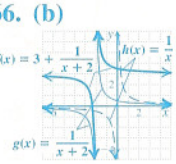
57.



58.



66. (b)



(c) The graph of g is the graph of h shifted left 2 units. The graph of f is the graph of g shifted up 3 units.