

In Review Exercises 81–94, factor each polynomial completely, if possible.

81. $3t^3 - 3t$

82. $5r^3 - 5$

83. $6x^2 + 7x - 24$

84. $3a^2 + ax - 3a - x$

85. $8x^3 - 125$

86. $6x^2 - 20x - 16$

87. $x^2 + 6x + 9 - t^2$

88. $3x^2 - 1 + 5x$

89. $8z^3 + 343$

90. $1 + 14b + 49b^2$

91. $121z^2 + 4 - 44z$

92. $64y^3 - 1000$

93. $2xy - 4zx - wy + 2zw$

94. $x^8 + x^4 + 1$

In Review Exercises 95–106, perform the indicated operation and simplify.

95. $\frac{x^2 - 4x + 4}{x + 2} \cdot \frac{x^2 + 5x + 6}{x - 2}$

96. $\frac{2y^2 - 11y + 15}{y^2 - 6y + 8} \cdot \frac{y^2 - 2y - 8}{y^2 - y - 6}$

97. $\frac{2t^2 + t - 3}{3t^2 - 7t + 4} \div \frac{10t + 15}{3t^2 - t - 4}$

98. $\frac{p^2 + 7p + 12}{p^3 + 8p^2 + 4p} \div \frac{p^2 - 9}{p^2}$

99. $\frac{x^2 + x - 6}{x^2 - x - 6} \cdot \frac{x^2 - x - 6}{x^2 + x - 2} \div \frac{x^2 - 4}{x^2 - 5x + 6}$

100. $\left(\frac{2x + 6}{x + 5} \div \frac{2x^2 - 2x - 4}{x^2 - 25}\right) \cdot \frac{x^2 - x - 2}{x^2 - 2x - 15}$

101. $\frac{2}{x - 4} + \frac{3x}{x + 5}$

102. $\frac{5x}{x - 2} - \frac{3x + 7}{x + 2} + \frac{2x + 1}{x + 2}$

103. $\frac{x}{x - 1} + \frac{x}{x - 2} + \frac{x}{x - 3}$

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

105. $\frac{3(x + 1)}{x} - \frac{5(x^2 + 3)}{x^2} + \frac{x}{x + 1}$

106. $\frac{3x}{x + 1} + \frac{x^2 + 4x + 3}{x^2 + 3x + 2} - \frac{x^2 + x - 6}{x^2 - 4}$

In Review Exercises 107–110, simplify each complex fraction.

107. $\frac{\frac{5x}{2}}{\frac{3x^2}{8}}$

108. $\frac{\frac{3x}{y}}{\frac{6x}{y^2}}$

109. $\frac{\frac{1}{x} + \frac{1}{y}}{x - y}$

110. $\frac{\frac{1}{x} + \frac{1}{y}}{\frac{1}{y} - \frac{1}{x}}$

1

CHAPTER TEST

In Questions 1–2, answer either true or false.

1. $a \in \{a, b, c\}$

2. $a \subseteq \{a, b, c\}$

In Questions 3–4, $A = \{1, 2, 3\}$, $B = \{2, 3, 4\}$, and $C = \{4, 5, 6\}$. Find each set.

3. $(A \cap B) \cup C$

4. $(A \cup B) \cap C$

In Questions 5–6, graph each interval on a number line.

5. $\{x \mid -4 < x \leq 2\}$

6. $[-2, 3) \cup (0, 4]$

In Questions 7–8, tell which property justifies each statement.

7. $(a + b) + c = (b + a) + c$

8. $a(b + c) = ab + ac$

Questions 9–12, simplify each expression. Assume that all variables represent positive numbers and write all answers without using negative exponents.

9. $x^4x^5x^2$

10. $\frac{r^2r^3s}{r^4s^2}$

11. $\frac{(a^{-1}a^2)^{-2}}{a^{-3}}$

12. $\left(\frac{x^0x^2}{x^{-2}}\right)^6$

Questions 13–14, write each number in scientific notation.

13. 450,000

14. 0.000345

Questions 15–16, write each number in standard notation.

15. 3.7×10^3

16. 1.2×10^{-3}

Questions 17–22, simplify each expression. Assume that all variables represent positive numbers and write all answers without using negative exponents.

17. $(25a^4)^{1/2}$

18. $\left(\frac{36}{81}\right)^{3/2}$

19. $\left(\frac{8t^6}{27s^9}\right)^{-2/3}$

20. $\sqrt[3]{27a^6}$

21. $\sqrt{12} + \sqrt{27}$

22. $2\sqrt[3]{80} - 3\sqrt[3]{24}$

Questions 23–24, rationalize each denominator.

23. $\frac{x}{\sqrt{x} - 2}$

24. $\frac{\sqrt{x} + \sqrt{y}}{\sqrt{x} - \sqrt{y}}$

Questions 25–30, perform each operation.

25. $(a^2 + 3) - (2a^2 - 4)$

26. $(3a^3b^2)(-2a^3b^4)$

27. $(3x - 4)(2x + 7)$

28. $(a^n + 2)(a^n - 1)$

29. $(x^2 + 4)(x^2 - 4)$

30. $(x^2 - x + 2)(2x - 3)$

Questions 31–32, perform each division.

31. $x - 3 \overline{)6x^2 + x - 23}$

32. $2x - 1 \overline{)2x^3 + 3x^2 - 1}$

Questions 33–38, factor each polynomial.

33. $3x + 6y$

34. $x^2 - 100$

35. $10t^2 - 19tw + 6w^2$

36. $3a^3 - 648$

37. $x^4 - x^2 - 12$

38. $6x^4 + 11x^2 - 10$

In Questions 39–42, perform each operation and simplify, if possible.

39. $\frac{x}{x+2} + \frac{2}{x+2}$

40. $\frac{x}{x+1} - \frac{x}{x-1}$

41. $\frac{x^2 + x - 20}{x^2 - 16} \cdot \frac{x^2 - 25}{x - 5}$

42. $\frac{x+2}{x^2+2x+1} \div \frac{x^2-4}{x+1}$

In Questions 43–44, simplify each complex fraction.

43. $\frac{\frac{1}{a} + \frac{1}{b}}{\frac{1}{b}}$

44. $\frac{x^{-1}}{x^{-1} + y^{-1}}$