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|-------------------------------------|-------------------------------------|---|---|
| 21. $(-2)^{-3}$ | 22. $(-5)^{-2}$ | 23. $\frac{1}{(-3)^{-2}}$ | 24. $\frac{1}{(-3)^{-3}}$ |
| 25. $\left(\frac{3}{5}\right)^{-1}$ | 26. $\left(\frac{1}{3}\right)^{-2}$ | 27. $\frac{5^{-1}}{3^{-2}}$ | 28. $\frac{3^{-3}}{6^{-2}}$ |
| 29. $3^{-2} + 3^2$ | 30. $5^{-1} + 25^0$ | 31. $4^{-1} - 4^{-2}$ | 32. $8^{-2} - 2^0$ |
| 33. $-2x^{-3}$ | 34. $-3x^{-2}$ | 35. $\frac{-5y^{-2}}{x^{-5}}$ | 36. $\frac{-6y^{-3}}{x^{-3}}$ |
| 37. $(x - y)^{-2}$ | 38. $(x + y)^{-3}$ | 39. $\frac{(b + c)^{-2}}{(b - c)^{-1}}$ | 40. $\frac{(a - 3)^{-2}}{(a + 3)^{-3}}$ |

■ Write each expression as a product or quotient of powers in which each factor occurs only once and all exponents are positive. See Examples 5 and 6.

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| 41. $x^{-7} \cdot x^3$ | 42. $x^{-5} \cdot x^2$ | 43. $\frac{x^3}{x^{-4}}$ | 44. $\frac{x^5}{x^{-5}}$ |
| 45. $(3x^{-2}y^3)^{-2}$ | 46. $(2x^3y^{-4})^{-3}$ | 47. $\frac{x^0y^{-3}}{4x^{-2}y^{-1}}$ | 48. $\frac{x^{-3}y^{-2}}{6x^{-5}y^0}$ |
| 49. $\left(\frac{a^{-3}}{b^2}\right)^{-2}$ | 50. $\left(\frac{a^4}{b^{-5}}\right)^{-3}$ | 51. $\frac{(a + b)^{-3}}{(a + b)^{-2}}$ | 52. $\frac{(a - b)^{-5}}{(a - b)^{-7}}$ |

■ Write each product as a sum of powers. See Example 7.

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|---------------------------------|-------------------------------|
| 53. $x^{-1}(x + y)$ | 54. $y^{-2}(x^2 + y)$ |
| 55. $x^{-1}y^{-2}(x^2y + xy^2)$ | 56. $x^{-2}y^{-3}(x^3 + y^3)$ |

■ Factor as indicated. See Example 8.

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| 57. $x^{-3}y^2 + 4xy^{-1} = x^{-3}y^{-1}(\ ? + \ ?)$ | 58. $xy^{-1} + x^{-1}y^{-2} = x^{-1}y^{-2}(\ ? + \ ?)$ |
| 59. $3x^{-3}y^{-4} + 4x^{-4}y^{-3} = x^{-4}y^{-4}(\ ? + \ ?)$ | 60. $4y^{-1} + x^2y^{-3} = y^{-3}(\ ? + \ ?)$ |

■ Write each expression as a single fraction involving positive exponents only. See Example 9.

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| 61. $x^{-2} + y^{-2}$ | 62. $x^{-1} - y^{-3}$ | 63. $\frac{x}{y^{-1}} + \frac{x^{-1}}{y}$ | 64. $\frac{x^{-1}}{y^{-1}} + \frac{y}{x}$ |
| 65. $x^{-1}y - xy^{-1}$ | 66. $xy^{-1} + x^{-1}y$ | 67. $\frac{x^{-1} - y}{x^{-1}}$ | 68. $\frac{x + y^{-1}}{y^{-1}}$ |
| 69. $\frac{x^{-1} + y^{-1}}{(xy)^{-1}}$ | 70. $\frac{x^{-2} - y^{-2}}{(xy)^{-1}}$ | 71. $(x^{-1} + y^{-1})^{-1}$ | 72. $\frac{(x + y)^{-1}}{x^{-1} + y^{-1}}$ |

■ Express each number using scientific notation. See Example 10.

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|-----------|------------|---------------|--------------|
| 73. 285 | 74. 68,742 | 75. 8,372,000 | 76. 481,000 |
| 77. 0.024 | 78. 0.421 | 79. 0.000523 | 80. 0.000004 |

■ Express each number using standard form. See Example 11.

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|--------------------------|--------------------------|---------------------------|---------------------------|
| 81. 2.4×10^2 | 82. 4.8×10^3 | 83. 6.87×10^5 | 84. 8.31×10^4 |
| 85. 5.0×10^{-3} | 86. 8.0×10^{-1} | 87. 2.02×10^{-4} | 88. 4.31×10^{-5} |