

Name: _____ Date: _____ Period: _____

Rules of Exponents Practice

Simplify each of the following using the properties of exponents.

I.

$$a^b \cdot a^c = a^{b+c}$$

1. $y^7 \cdot y^5$

2. $n^4 \cdot n^3 \cdot n^2$

3. $2^3 \cdot 2^4$

4. $t^{13} \cdot t^{15} \cdot t^{18}$

II.

$$(a^b)^c = a^{bc}$$

5. $(m^3)^2$

6. $(y^5)^2$

7. $(a^2)^5$

8. $(y^3)^5$

III.

$$\frac{a^b}{a^c} = a^{b-c}$$

9. $\frac{x^6}{x^5}$

10. $\frac{x^5 y^3}{x^2 y^2}$

11. $\frac{32x^5 y^5}{16x^2 y^3}$

12. $\frac{xy^4 z^2}{y^4 z}$

IV.

$$a^{-b} = \frac{1}{a^b}$$

13. x^{-5}

14. $x^2 y^{-3}$

15. $x^{-2} y^5 z^{-3}$

16. $xy^{-2} z^3$

V.

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

17. $\left(\frac{x}{z}\right)^3$

18. $\left(\frac{x^2}{y}\right)^3$

19. $\left(\frac{3}{x^3}\right)^4$

20. $\left(\frac{x^2z^5}{2y^3}\right)^2$

VI.

$$(ab)^n = a^n b^n$$

21. $(2x)^3$

22. $(x^2y^3)^5$

23. $(3x^2yz^7)^3$

24. $(3ab^3c^5)^2$

VII.

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n = \frac{b^n}{a^n}$$

25. $\left(\frac{1}{x}\right)^{-2}$

26. $\left(\frac{x^2}{y}\right)^{-5}$

27. $\left(\frac{y^3}{1}\right)^{-4}$

28. $\left(\frac{x^4y^3}{z^8}\right)^{-5}$

VIII.

$$a^{\frac{1}{2}} = \sqrt{a}$$

29. $x^{\frac{1}{2}}$

30. $5^{\frac{1}{2}}$

31. $(xy)^{\frac{1}{2}}$

32. $(x^3)^{\frac{1}{2}}$

IX.

$$a^{\frac{1}{3}} = \sqrt[3]{a}$$

33. $x^{\frac{1}{3}}$

34. $5^{\frac{1}{3}}$

35. $(xy)^{\frac{1}{3}}$

36. $(x^2)^{\frac{1}{3}}$

X.

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

37. $x^{\frac{2}{3}}$

38. $5^{\frac{2}{5}}$

39. $(xy)^{\frac{1}{4}}$

40. $(2x^2)^{\frac{3}{5}}$

XI. Mixed Practice

41. $\frac{r^4}{r}$

42. $\frac{n^5}{n^5}$

43. $\frac{x^6}{x^8}$

44. $\frac{5y^{10}}{y^{13}}$

45. $\frac{1}{m^{-2}}$

46. $\frac{6^{-2}}{6^{-4}}$

47. $\frac{3^{-3}}{3^{-2}}$

48. $\left(\frac{1}{2}\right)^{-2}$

49. $\left(\frac{1}{10}\right)^{-4}$

50. $\left(\frac{2}{3}\right)^0$

51. $\left(\frac{3}{b}\right)^6$

52. $\left(\frac{7}{b}\right)^{-5}$

53. $m^{-8}m^3$

54. $r^{-2}r^4$

55. $\frac{12n^8}{4n^3}$

56. $\frac{-24s^8}{2s^5}$

57. $\frac{6mn^2}{3m}$

58. $\frac{an^6}{n^5}$

59. $\frac{xy^7}{x^4}$

60. $\frac{48a^8}{12a^{11}}$

61. $\frac{15b^9}{3b^{12}}$ 62. $\frac{4x^3}{28x^5}$ 63. $\frac{12b^4}{60b^6}$ 64. $\frac{-20y^5}{40y^2}$
65. $\frac{2x^{-3}}{6(x^2)^2}$ 66. $\frac{8(m^{-2})^2}{4m^{-2}}$ 67. $\frac{16b^6c^5}{4b^4c^2}$ 68. $\frac{1}{m^0+n^0}$
69. $\frac{4}{x^0+y^0}$ 70. $\frac{-15r^5s^2}{5r^5s^{-4}}$ 71. $\frac{-27w^3t^7}{-3w^3t^{12}}$ 72. $\frac{-2a^3b^6}{24a^2b^2}$
73. $\frac{(3c^2)^2(-d^5)}{-45c^7d^3}$ 74. $\frac{-66p^3(mp)^{10}}{33(mp)^2}$ 75. $\frac{20n^5m^9}{20nm^7}$
76. $\frac{16b^6c^5}{(2b^2c)^2}$ 77. $\frac{3^{xy+5}}{3^{xy}}$ 78. $\frac{r^{2a}}{r^{2a-3}}$ 79. $\frac{x^{3a}}{x^{3a-2}}$
80. $\frac{5^{2x}}{5^{2x+2}}$ 81. $(x^3y^2)^{-1}$ 82. $(m^4n^5)^{-2}$ 83. $5^{-3}b^3x^4y^{-1}$

84. $8a^2b^4(-2b)^{-1}$

85. $3^3r^3s^3(3r)^{-2}$

86. $36x^3y^5(12x^2y^2)^{-1}$

87. $(6z)^{-4}x^3y^0$

88. $(2)^{-7}b^{-6}c^0$

89. $\left(\frac{x}{k^{-1}}\right)^{-1}$

90. $\left(\frac{2}{d^3f}\right)^5$

91. $\left(\frac{1}{x^2y^3}\right)^3$

92. $\left(\frac{3}{2x^{-2}}\right)^{-1}$

93. $\left(\frac{x}{y^{-1}z^2}\right)^{-1}$

94. $\left(\frac{-3y^4}{2y^2}\right)^{-2}$

95. $\left(\frac{1}{5}\right)^{-2} + \left(\frac{1}{4}\right)^{-1}$

96. $\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^2$

97. $\frac{-15r^5s^8(r^3s^2)}{45r^4s}$

98. $\frac{-3w^6t^7}{(-27w^3t^2)(wt)^2}$

99. $\frac{(-2r^3)^2(r^{-2})^{-1}}{(r^2)^{-3}}$

100. $\frac{(4x^3y)(4^2x^{-1}y)}{4^3xy^2}$

