Honors Algebra 2
NOTES: Rules of Exponents (Power Rules)

Name: _____
Date: _____

a^b

The exponent tells you how many times to multiply the base to itself.

For example: 2^4 means _____

We will use concept as we learn the rules of exponents.

Rule	Example	Example	Example
1. $a^b \cdot a^c = a^{b+c}$	a. $y^5 \cdot y^7$	b. $2^3 \cdot 2^4$	c. $x^3y^6 \cdot x^2y^3 \cdot x^1$
2. $(a^b)^c = a^{bc}$	a. $(m^3)^2$	b. $(10^3)^5$	c. $(p^2)^4$
3. $\frac{a^b}{a^c} = a^{b-c}$	a. $\frac{2^5}{2^3}$	b. $\frac{6m^{10}}{3m^4}$	c. $\frac{x^5y^8}{x^4y^3}$
4. $a^{-b} = \frac{1}{a^b}$	a. x^{-6}	b. $x^{-2}y^5$	c. $xy^{-2}z^3$

4b: $a^b = \frac{1}{a^{-b}}$	a. $\frac{x^3}{z^{-4}}$	b. $\frac{7}{14x^{-3}}$	c. $\frac{5^{-7}}{5^{-3}}$
5. $\left(\frac{a}{b}\right)^c = \frac{a^c}{b^c}$	a. $\left(\frac{x}{z}\right)^3$	b. $\left(\frac{3}{x^3}\right)^4$	c. $\left(\frac{x^2z^5}{2y^3}\right)^2$
6. $(ab)^c = a^c b^c$	a. $(2x)^3$	b. $(x^2y^3)^5$	c. $(3ab^3c^5)^2$
7. $\left(\frac{a}{b}\right)^{-c} = \left(\frac{b}{a}\right)^c = \frac{b^c}{a^c}$	a. $\left(\frac{1}{x}\right)^{-2}$	b. $\left(\frac{x^2}{y}\right)^{-5}$	c. $\left(\frac{x^4y^3}{z^8}\right)^{-5}$
8. $a^{\frac{1}{2}} = \sqrt{a}$	a. $x^{\frac{1}{2}}$	b. $5^{\frac{1}{2}}$	c. $(xy)^{\frac{1}{2}}$
9. $a^{\frac{1}{3}} = \sqrt[3]{a}$	a. $5^{\frac{1}{3}}$	b. $(xy)^{\frac{1}{3}}$	c. $(x^2)^{\frac{1}{3}}$
10. $a^{\frac{b}{c}} = \sqrt[c]{a^b}$	a. $x^{\frac{2}{3}}$	b. $(xy)^{\frac{1}{4}}$	c. $(2x^2)^{\frac{3}{5}}$

11. $a^0 = 1$	a. 142^0	b. $(xy)^0$	c. $\frac{7^3}{7^3}$

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. $\dfrac{15b^9}{3b^{12}}$ 62. $\dfrac{4x^3}{28x^5}$ 63. $\dfrac{12b^4}{60b^6}$ 64. $\dfrac{-20y^5}{40y^2}$

65. $\dfrac{2x^{-3}}{6\left(x^2\right)^2}$ 66. $\dfrac{8\left(m^{-2}\right)^2}{4m^{-2}}$ 67. $\dfrac{16b^6c^5}{4b^4c^2}$ 68. $\dfrac{1}{m^0+n^0}$

69. $\dfrac{4}{x^0+y^0}$ 70. $\dfrac{-15r^5s^2}{5r^5s^{-4}}$ 71. $\dfrac{-27w^3t^7}{-3w^3t^{12}}$ 72. $\dfrac{-2a^3b^6}{24a^2b^2}$

73. $\dfrac{\left(3c^2\right)^2\left(-d^5\right)}{-45c^7d^3}$ 74. $\dfrac{-66p^3(mp)^{10}}{33(mp)^2}$ 75. $\dfrac{20n^5m^9}{20nm^7}$

76. $\dfrac{16b^6c^5}{\left(2b^2c\right)^2}$ 77. $\dfrac{3^{xy+5}}{3^{xy}}$ 78. $\dfrac{r^{2a}}{r^{2a-3}}$ 79. $\dfrac{x^{3a}}{x^{3a-2}}$

80. $\dfrac{5^{2x}}{5^{2x+2}}$ 81. $\left(x^3y^2\right)^{-1}$ 82. $\left(m^4n^5\right)^{-2}$ 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. $\frac{(4x^3y)(4^2x^{-1}y)}{4^3xy^2}$