

Properties of Exponents

HW: p. 246 #7, 11, 14, 18, 31, 32, 51, 56, 58,
63, 71, 79, 80, 86, 88

Product Rule

$$x^n \cdot x^m = x^{n+m}$$

Ex: $2x^3 \cdot 3x^2$ $2 \cdot 3 \cdot x^3 \cdot x^2$
 $x+x+x \quad x \cdot x$
 $6 x^{3+2} = 6x^5$

Quotient Rule

$$\frac{x^n}{x^m} = x^{n-m} = \frac{1}{x^{m-n}}$$

Ex: $\frac{x^3}{x^4} = x^{3-4} = x^{-1}$ $\frac{a^{12}}{a^4} = a^{12-4} = a^8$

$\frac{\cancel{x} \cancel{x} \cancel{x}}{\cancel{x} \cancel{x} \cancel{x} \cancel{x}} = \frac{1}{x}$

$\frac{a a a a a a a a a a a a a a a a}{a a a a}$

Power to Power Property

$$(xy)^m = x^m y^m \quad (x^m)^n = x^{m \cdot n}$$

Ex: $(3x^2y)^3 = 3x^2y \cdot 3x^2y \cdot 3x^2y$

$3^3 (x^2)^3 y^3 = 3 \cdot 3 \cdot 3 x^2 x^2 x^2 y y y$

$27 x^6 y^3$

Negative Exponents

$$a^{-n} = \frac{1}{a^n} \qquad \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$$

Ex: $\left(\frac{x^2}{y^4}\right)^{-2} = \left(\frac{y^4}{x^2}\right)^2 = \frac{y^4 \cdot 2}{x^2 \cdot 2} = \frac{y^8}{x^4}$

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|-----------------------|---------------------------------------|-------------------------|
| 1) No | 15) $\frac{1}{a^{10}}$ | 25) $\frac{1}{m^5}$ |
| 2) Yes | 16) $\frac{49}{9}$ | 26) $27x^{14}y^{18}$ |
| 3) Yes | 17) -2401 | 27) $\frac{42}{x^{14}}$ |
| 4) No | 18) $\frac{9}{16}$ | |
| 5) x^{13} | 19) $\frac{16}{49}$ | |
| 6) y^{13} | 20) x^5 | |
| 7) $-18x^{13}y^6$ | 21) $\frac{1}{x^{15}}$ | |
| 8) 1 | 22) The quotient rule does not apply. | |
| 9) -1 | 23) $\frac{343}{27}$ | |
| 10) 2 | 24) $\frac{16w^{28}}{x^4}$ | |
| 11) $\frac{1}{r^5}$ | | |
| 12) $\frac{1}{25p^2}$ | | |
| 13) $\frac{3}{x^2}$ | | |
| 14) $-\frac{1}{12}$ | | |

$$27) (4x-3)^2(x^2)^{-4}$$

$$4^2 (x^{-3})^2 (x^2)^{-4}$$

$$16 x^{-6} x^{-8}$$

$$16 x^{-6 + -8}$$

$$16 x^{-14} = 16 \cdot \frac{1}{x^{14}} = \frac{16}{x^{14}}$$

$$(4x^{-3})^{-2} (x^2)^{-4}$$

$$4^{-2} x^{-3 \cdot -2} x^{2 \cdot -4}$$

$$\frac{1}{16} x^6 x^{-8}$$

$$\frac{1}{16} x^{6 + -8} = \frac{1}{16} x^{-2} = \frac{1}{16x^2}$$

