Power Laws Worksheet

1. Simplify each expression using the power laws. All final answers should have positive exponents.

   a. $(x^2)(x^9)(x^{-7})$ b. $\frac{x^5}{x^8}$ c. $x^{-1} \bullet x^{-3}$

   d. $(x^{-3})(x^4)$ e. $(x^{-6})^{-3}$ f. $(x^{-5})^5$

   g. $(x^3)(x^0)$ h. $\frac{(x^{12})(x^{-6})}{x^7}$ i. $x^8 \bullet x \div x^{-7}$

2. Simplify each expression using the power laws and then evaluate. All final answers should have positive exponents.

   a. $(2^{-3})(2^{-4})$ b. $(3^{-4})(3^5)$ c. $5^0 \times 5^{-2}$

   d. $4^{-5} \div 4^{-3}$ e. $\left(\frac{2}{3}\right)^{-1}\left(\frac{2}{3}\right)^3$ f. $\left(\frac{3}{4}\right)^{-2} \div \left(\frac{3}{4}\right)^2$

3. Write each of the following with positive exponents.

   a. 5^{-3} b. $\frac{1}{4^{-3}}$ c. $\frac{x^3}{y^{-2}}$

   d. $\left(\frac{3}{5}\right)^{-4}$ e. $\frac{2x^{-2}y^3}{3w^{-4}}$ f. $\frac{1}{a^3b^{-2}}$

4. Evaluate each of the following.

   a. 2^{-3} b. $(-5)^{-2}$ c. $\left(\frac{5}{3}\right)^{-3}$

   d. $(-7)^0$ e. $\frac{2}{3^{-2}}$ f. $\frac{5^{-1}}{2^3}$

   g. $\left(\frac{3^3}{5}\right)^{-2}$ h. $\left(\frac{2^{-2}}{3^{-1}}\right)^{-2}$ i. $\left(-12\frac{3}{4}\right)^0$

5. Simplify each of the following expressions. Write the answer with positive exponents.

a. $m^6 \bullet m^{-3}$ b. $a^{-3} \div a^{-5}$ c. $(x^2y^{-1})^{-1}$

d. $\left(\frac{b^{-2}}{b^{-1}}\right)^{-3}$ e. $(x^{-1}y^0)^{-3}$ f. $(15r^{-4})(2r^{-3})$

6. Evaluate each of the following.

a. $\frac{2^{-1}+2^{-3}}{2^{-2}}$ b. $\frac{3^{-2}+3^{-3}}{3^{-2}-3^{-3}}$ c. $\frac{3^{-6}\times 3^{-5}}{3^{-9}}$

d. $\frac{(10^2)(10^3)(10)}{10^5 \div 10^2}$ e. $\frac{10^2 \div 10^{-2}}{10^6}$ f. $\frac{10^{-6}\times 10^{-5}}{10^{-3}}$

Answers

1a) x^4 b) $\frac{1}{x^3}$ c) x^3 d) $\frac{1}{x^{12}}$ e) x^{18} f) $\frac{1}{x^{25}}$

g) x^3 h) $\frac{1}{x}$ i) x^{16}

2a) 4096 b) 3 c) $\frac{1}{25}$ d) $\frac{1}{16}$ e) $\frac{4}{9}$ f) $\frac{256}{81}$

3a) $\frac{1}{5^3}$ b) 4^3 c) x^3y^2 d) $\left(\frac{5}{3}\right)^4$ e) $\frac{2y^3w^4}{3x^2}$ f) $\frac{b^2}{a^3}$

4a) $\frac{1}{8}$ b) $\frac{1}{25}$ c) $\frac{27}{125}$ d) 1 e) 18 f) $\frac{1}{40}$

g) $\frac{25}{729}$ h) $\frac{16}{9}$ i) 1

5a) m^3 b) a^2 c) $\frac{y}{x^2}$ d) b^3 e) x^3 f) $\frac{30}{r^7}$

6a) $\frac{5}{2}$ b) 2 c) $\frac{1}{9}$ d) 1000 e) $\frac{1}{100}$ f) 0.00000001