

Exponent Rules

Let a and b be a nonzero real number and m and n be any integer

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

$$\frac{a^m}{a^n} = a^{m-n}$$

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

$$(a^m)^n = a^{mn}$$

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

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

1. Write each expression without negative exponents, and evaluate if possible. Assume all variables represent nonzero real numbers.

a. $\left(\frac{9}{16}\right)^{\frac{3}{2}}$
 $= \frac{\sqrt{9}^3}{\sqrt{16}^3} = \frac{3^3}{4^3} = \boxed{\frac{27}{64}}$

c. $-\left(\frac{27}{8}\right)^{\frac{2}{3}}$
 $= -\left(\frac{\sqrt[3]{27}^2}{\sqrt[3]{8}^2}\right) = -\frac{3^2}{2^2} = \boxed{-\frac{9}{4}}$

e. $\left(\frac{4}{3}\right)^{-3}$
 $= \frac{3^3}{4^3} = \boxed{\frac{27}{64}}$

b. $\left(\frac{9}{16}\right)^{-\frac{3}{2}}$
 $= \frac{\sqrt{16}^3}{\sqrt{9}^3} = \frac{4^3}{3^3} = \boxed{\frac{64}{27}}$

d. $(-5)^{-2}$
 $= \left(-\frac{1}{5}\right)^2 = \frac{(-1)^2}{5^2} = \boxed{\frac{1}{25}}$

f. $(5t)^{-3}$
 $= \frac{1}{5^3 t^3} = \boxed{\frac{1}{125t^3}}$

2. Simplify each expression. Write answers without negative exponents. Assume all variables represent real numbers.

a. $\frac{5^9}{5^7} = 5^2 = \boxed{25}$

c. $\frac{15a^{-5}b^{-1}}{25a^{-2}b^4} = \frac{15a^2}{25a^3b^5} = \boxed{\frac{3}{5a^3b^5}}$

b. $\frac{15s^{-4}}{5s^{-8}} = \frac{15s^8}{5s^4} = \boxed{3s^4}$

d. $\frac{(-8xy)y^3}{4x^3y^4} = \frac{-8xy^4}{4x^3y^4} = \boxed{-\frac{2}{x^3}}$

$x^{1/2} = \sqrt{x}$

$$\begin{aligned}
 \text{e. } \frac{12k^{-2}(k^{-3})^{-4}}{6k^5} &= \frac{12k^{12}}{6k^5 k^2} \\
 &= \frac{2k^{12}}{k^7} = \boxed{2k^5}
 \end{aligned}$$

3. Evaluate each expression

$$\begin{aligned}
 \text{a. } 121^{\frac{1}{2}} &= \sqrt{121} \\
 &= \boxed{11}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } \left(-\frac{8}{27}\right)^{\frac{1}{3}} &= \frac{\sqrt[3]{-8}}{\sqrt[3]{27}} \\
 &= \boxed{\frac{-2}{3}}
 \end{aligned}$$

4. Simplify each expression. Write answers without negative exponents. Assume all variables represent positive real numbers.

$$\begin{aligned}
 \text{a. } 27^{\frac{4}{3}} &= \sqrt[3]{27}^4 \\
 &= 3^4 \\
 &= \boxed{81} \\
 \text{b. } (-32)^{\frac{4}{5}} &= \sqrt[5]{-32}^4 \\
 &= (-2)^4 \\
 &= \boxed{16}
 \end{aligned}$$

$$\begin{aligned}
 \text{c. } 6^{\frac{4}{3}} \cdot 6^{\frac{2}{3}} &= 6^{\frac{6}{3}} \\
 &= 6^2 \\
 &= \boxed{36} \\
 \text{d. } \frac{(r^{\frac{1}{5}} s^{\frac{2}{3}})^{15}}{r^2} &= \frac{r^3 s^{10}}{r^2} \\
 &= \boxed{r s^{10}}
 \end{aligned}$$

Homework:

Pg. 63
15, 19, 35, 41, 43, 49, 55, 65

Most Difficult First:

Pg. 63
46, 78