

Exponent Laws

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## Exponent Laws

1.

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

2.

$$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$$

3.

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

4.

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

5.

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$$

6.

$$x^0 = 1$$

7.

$$x^{-n} = \frac{1}{x^n}, x \neq 0$$

8.

$$\frac{1}{x^{-n}} = x^n, x \neq 0$$

9.

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n, a, b \neq 0$$

10.

$$a^{p/q} = (\sqrt[q]{a})^p \text{ or } \sqrt[q]{a^p}$$

11.

$$a^{p/q} = (a^p)^{1/q} = (a^{1/q})^p$$

**Exercises**

Use the exponent laws above to simplify.

a)

$$(3x^{-2}y^3)^{-1}$$

e)

$$\sqrt[4]{16^3}$$

b)

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

f)

$$\sqrt[3]{27p^6}$$

c)

$$\frac{(4x^2y^{1/3})^{1/2}}{(8xy^{1/4})^{1/3}}$$

g)

$$\sqrt{2}a^{1/2} \times \sqrt{32}a^{3/4}$$

d)

$$\frac{(5x^{-2}y)^3}{(25x^2y)^{1/2}}$$

h)

$$(\sqrt[3]{t})^2 \times \sqrt{t^5}$$