

Properties of Exponents

Positive Exponents

$$a^n = a \times a \times a \times \dots \times a \text{ (n times)}$$

$$a^1 = a$$

$$a^2 = a \times a$$

$$a^3 = a \times a \times a$$

Exponent of Zero

$$a^0 = 1$$

$$7^0 = 1$$

Negative Exponents

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

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

$$a^{-2} = \frac{1}{a^2}$$

Fractional Exponents

$$a^{1/n} = \sqrt[n]{a}$$

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

$$a^{1/3} = \sqrt[3]{a}$$

$$a^{m/n} = \sqrt[n]{a^m}$$

$$a^{4/3} = \sqrt[3]{a^4}$$

Multiplication

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

$$a^2 \times a^4 = a^6$$

Division

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

$$\frac{a^6}{a^2} = a^4$$

Powers

$$(a^m)^n = a^{m \times n}$$

$$(a^2)^4 = a^8$$

The “One Step Down” Rule

When you multiply, you add.

When you divide, you subtract.

When you raise a power to a power, you multiply.

Power Rules

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

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