

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Learning Goal 2.2**

I can apply exponent laws to expressions.

Recall from yesterday:

$a = 3$	$b = 4$	$c = 2$
Base	Bigger Exponent	Smaller Exponent

**Multiplying powers of the same base.**

$$\begin{aligned}
 3^4 \times 3^2 &= (3 \times 3 \times 3 \times 3) \times (3 \times 3) \\
 &= 3^{4+2} \\
 &= 3^6
 \end{aligned}$$

When multiplying powers of the same base, you add the exponents.

**Dividing powers of the same base.**

$$\begin{aligned}
 \frac{3^4}{3^2} &= \frac{3 \times 3 \times 3 \times 3}{3 \times 3} \\
 &= 3^{4-2} \\
 &= 3^2
 \end{aligned}$$

When dividing powers of the same base you subtract the exponents.

**When the power of a base is another power.**

$$\begin{aligned}
 (3^4)^2 &= (3 \times 3 \times 3 \times 3) \times (3 \times 3 \times 3 \times 3) \\
 &= 3^{4 \times 2} \\
 &= 3^8
 \end{aligned}$$

When raising a power to another exponent, you multiply the exponents.

**Dividing when the exponent in the numerator is smaller than the exponent in the denominator.**

$$\begin{aligned}\frac{3^2}{3^4} &= \frac{\cancel{3} \times \cancel{3}}{\cancel{3} \times \cancel{3} \times 3 \times 3} \\ &= 3^{2-4} \\ &= 3^{-2} \\ &= \frac{1}{3^2}\end{aligned}$$

The result is a negative exponent, which indicates to take the reciprocal.

**Dividing two powers of the same base and exponent.**

$$\begin{aligned}\frac{3^4}{3^4} &= \frac{\cancel{3} \times \cancel{3} \times \cancel{3} \times \cancel{3}}{\cancel{3} \times \cancel{3} \times \cancel{3} \times \cancel{3}} \\ &= 3^0 \\ &= 1\end{aligned}$$

Any base raised to the power of zero is one.