

Name _____

Date _____

Numbers Raised to the Zeroth Power

1. Simplify the following expression as much as possible.

$$\frac{4^{10}}{4^{10}} \cdot 7^0 =$$

2. Let a and b be two numbers. Use the distributive law and then the definition of zeroth power to show that the numbers $a^0 + b^0 a^0$ and $a^0 + b^0 b^0$ are equal.

Let x, y be numbers ($x, y \neq 0$). Simplify each of the following expressions of numbers.

1. $\frac{y^{12}}{y^{12}} =$	2. $9^{15} \cdot \frac{1}{9^{15}} =$
3. $7 \cdot 123456.789 \cdot 4^0 =$	4. $2^2 \cdot \frac{1}{2^5} \cdot 2^5 \cdot \frac{1}{2^2} =$
5. $\frac{x^{41}}{y^{15}} \cdot \frac{y^{15}}{x^{41}} =$	

1. Simplify the following expression as much as possible.

$$\frac{4^{10}}{4^{10}} \cdot 7^0 = 4^{10-10} \cdot 1 = 4^0 \cdot 1 = 1 \cdot 1 = 1$$

2. Let a and b be two numbers. Use the distributive law and then the definition of zeroth power to show that the numbers $a^0 + b^0$ and $a^0 \cdot b^0$ are equal.

$$\begin{aligned} a^0 + b^0 &= a^0 \cdot a^0 + b^0 \cdot a^0 \\ &= a^{0+0} + a^0 b^0 \\ &= a^0 + a^0 b^0 \\ &= 1 + 1 \cdot 1 \\ &= 1 + 1 \\ &= 2 \end{aligned}$$

$$\begin{aligned} a^0 + b^0 &= a^0 \cdot b^0 + b^0 \cdot b^0 \\ &= a^0 b^0 + b^{0+0} \\ &= a^0 b^0 + b^0 \\ &= 1 \cdot 1 + 1 \\ &= 1 + 1 \\ &= 2 \end{aligned}$$

Since both numbers are equal to 2, they are equal.

Let x, y be numbers ($x, y \neq 0$). Simplify each of the following expressions of numbers.

1.

$$\begin{aligned} \frac{y^{12}}{y^{12}} &= y^{12-12} \\ &= y^0 \\ &= 1 \end{aligned}$$

2.

$$\begin{aligned} 9^{15} \cdot \frac{1}{9^{15}} &= \frac{9^{15}}{9^{15}} \\ &= 9^{15-15} \\ &= 9^0 \\ &= 1 \end{aligned}$$

3.

$$\begin{aligned} 7 \cdot 123456.789^4 \cdot 0 &= \\ &= 7^0 \cdot 123456.789^{4 \times 0} \\ &= 7^0 \cdot 123456.789^0 \\ &= 1 \end{aligned}$$

4.

$$\begin{aligned} 2^2 \cdot \frac{1}{2^5} \cdot 2^5 \cdot \frac{1}{2^2} &= \frac{2^2}{2^2} \cdot \frac{2^5}{2^5} \\ &= 2^{2-2} \cdot 2^{5-5} \\ &= 2^0 \cdot 2^0 \\ &= 1 \end{aligned}$$

5.

$$\begin{aligned} \frac{x^{41}}{y^{15}} \cdot \frac{y^{15}}{x^{41}} &= \frac{x^{41} \cdot y^{15}}{y^{15} \cdot x^{41}} \\ &= \frac{x^{41}}{x^{41}} \cdot \frac{y^{15}}{y^{15}} \\ &= x^{41-41} \cdot y^{15-15} \\ &= x^0 \cdot y^0 \\ &= 1 \end{aligned}$$