Lesson 4: Numbers Raised to the Zeroth Power

Classwork

For any numbers x, y, and any positive integers m, n, the following holds

$$x^m \cdot x^n = x^{m+n} \quad (1)$$

$$x^m{}^n = x^{mn} \quad (2)$$

$$xy{}^n = x^n y^n. \quad (3)$$

Definition: _____

Exercise 1

List all possible cases of whole numbers m and n for identity (1). More precisely, when $m > 0$ and $n > 0$, we already know that (1) is correct. What are the other possible cases of m and n for which (1) is yet to be verified?

Exercise 2

Check that equation (1) is correct for each of the cases listed in Exercise 1.

Exercise 3

Do the same with equation (2) by checking it case-by-case.

Exercise 4

Do the same with equation (3) by checking it case-by-case.

Exercise 5

Write the expanded form of $8{,}374$ using exponential notation.

Exercise 6

Write the expanded form of $6{,}985{,}062$ using exponential notation.

Problem Set

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