Lesson 4: Numbers Raised to the Zeroth Power

Classwork

We have shown that for any numbers x, y, and any positive integers m, n, the following holds

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

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

$$(xy)^n = x^n y^n. \qquad (3)$$

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.

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