Lesson 4: Numbers Raised to the Zeroth Power

Classwork

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

 $x^{m}∙x^{n}=x^{m+n}$ (1)

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

 $\left(xy\right)^{n}=x^{n}y^{n}$. (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 $(x, y\ne 0)$. Simplify each of the following expressions of numbers.

|  |  |
| --- | --- |
| $$\frac{y^{12}}{y^{12}}=$$ | $$9^{15}∙\frac{1}{9^{15}}=$$ |
| $$\left(7\left(123456.789\right)^{4}\right)^{0}=$$ | $$2^{2}∙\frac{1}{2^{5}}∙2^{5}∙\frac{1}{2^{2}}=$$ |
| $$\frac{x^{41}}{y^{15}}∙\frac{y^{15}}{x^{41}}=$$ |