Lesson 5: Negative Exponents and the Laws of Exponents

Classwork

**Definition:** For any positive number and for any positive integer , we define .

Note that this definition of negative exponents says is just the reciprocal, , of .

As a consequence of the definition, for a positive and all *integers* *,* we get

.

Exercise 1

Verify the general statement for and .

Exercise 2

What is the value of ?

Exercise 3

What is the value of ?

Exercise 4

Write the complete expanded form of the decimal in exponential notation.

For Exercises 5–10, write an equivalent expression, in exponential notation, to the one given and simplify as much as possible.

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| Exercise 5 | Exercise 6 |
| Exercise 7 | Exercise 8  Let be a nonzero number. |
| Exercise 9  Let be a nonzero number. | Exercise 10  Let be two nonzero numbers. |

We accept that for positive numbers , and all integers and ,

.

We claim

for all *integers* , .

for any *integer .*

|  |  |
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| Exercise 11 | Exercise 12 |

Exercise 13

If we let in (11), be any integer, and be any positive number, what do we get?

Exercise 14

Show directly that .

Problem Set

1. Compute:

Compute:

Compute for a nonzero number, :

1. Without using (10), show directly that .

1. Without using (10), show (prove) that for any whole number and any positive number , .
2. Show directly without using (13) that .