

[1-7] Use Properties of Integer Exponents

Name: _____

Negative Exponents

Complete the following tables. Leave all answers as integers or fractions.

Powers of 10

2^5	32
2^4	16
2^3	8
2^2	4
2^1	2
2^0	1
2^{-1}	$\frac{1}{2}$
2^{-2}	$\frac{1}{4}$
2^{-3}	$\frac{1}{8}$

3^5	243
3^4	81
3^3	27
3^2	9
3^1	3
3^0	1
3^{-1}	$\frac{1}{3}$
3^{-2}	$\frac{1}{9}$
3^{-3}	$\frac{1}{27}$

10^5	100,000
10^4	10,000
10^3	1,000
10^2	100
10^1	10
10^0	1
10^{-1}	$\frac{1}{10}$
10^{-2}	$\frac{1}{100}$
10^{-3}	$\frac{1}{1,000}$

$2^{-4} = \frac{1}{16}$
Solving Negative Exponents $3^{-5} = \frac{1}{243}$

You already know that an exponent represents the number of times you have to multiply a number by itself. For example, 2^4 means $2 \cdot 2 \cdot 2 \cdot 2$. But what if your variable is being raised to a negative exponent? If you were given 2^{-4} , how would you multiply two by itself negative four times?

A negative exponent is equivalent to the inverse of the same number with a positive exponent. In other words:

$$x^{-7} = \frac{1}{x^7}$$

There is nothing special about solving a problem that includes negative exponentials. It's just an intermediate step that you may or may not want to complete to make things simpler. The best way to get comfortable with negative exponents is to work a few example problems that use them. Here are some samples:

$$-3^2 = -9$$

Examples:

$$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$$

$$-4^{-2} = -\frac{1}{4^2} = -\frac{1}{16}$$

$$6^0 = 1$$

$$4^{-3} = \frac{1}{4^3} = \frac{1}{64}$$

$$(-5)^{-2} = \frac{1}{(-5)^2} = \frac{1}{25}$$

$$-4^0 = -1$$

$$(-3)^2 = 9$$

$$(-4)^0 = 1$$

$$-3^2 = -$$

$$2 \cdot 2 \cdot 2 \cdot 2 \\ 4 \cdot 4$$

TRY IT

Practice:

$$7^{-2}$$

$$\frac{1}{7^2} = \frac{1}{49}$$

$$(-1)^2$$

$$1$$

$$-2^{-4}$$

$$-\frac{1}{2^4} = -\frac{1}{16} \quad -36$$

$$-6^2$$

$$8^0$$

$$1$$

$$10^{-3}$$

$$\frac{1}{10^3} = \frac{1}{1000}$$

Homework: Leave all answers as fractions if applicable.

Simplify

1. 9^2

2. -3^{-2}

3. 4^3

4. $(-2)^{-2}$

5. $(-6)^0$

6. -8^2

7. -1^4

8. -9^0

9. $(-3)^{-2}$

10. -5^{-2}

11. $(-4)^{-2}$

12. 7^{-2}

13. -10^5

14. $(-2)^3$

15. 6^{-2}

16. $(-3)^{-4}$