

Journal Entry:

1. Describe how to graph the equation of a linear function. Give an example and graph it.
2. What is an exponent? What does it mean?
3. If the number of dentists in the United States is experiencing exponential decay, what do you think this means?

Chapter 7
Exponents and
Exponential Functions

Section 7 - 1
Zero and Negative
Exponents

Students will be able to simplify expressions involving negative and zero exponents

Complete the table.
Make a conjecture about how the value of an exponential expression changes as the exponent decreases by 1.

2^x	10^x
$2^4 = 16$	$10^4 = 10,000$
$2^3 = 8$	$10^3 = 1,000$
$2^2 = 4$	$10^2 = 100$
$2^1 = 2$	$10^1 = 10$
$2^0 = 1$	$10^0 = 1$
$2^{-1} = \frac{1}{2}$	$10^{-1} = \frac{1}{10}$
$2^{-2} = \frac{1}{4}$	$10^{-2} = \frac{1}{100}$

What do you think is the value of 5^{-2} is? Explain.

$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$
 $2^{-4} = \frac{1}{16}$ $10^{-4} = \frac{1}{10,000}$

$3^3 = 27$ $3^2 = 9$ $3^1 = 3$

By looking at the pattern, what can we say is a general rule for decreasing the exponent by 1?

Continue the pattern:

$3^0 = \frac{1}{3}$ $3^{-2} = \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{9}$
 $3^{-1} = \frac{1}{3}$ $3^{-3} = \frac{1}{9} \cdot \frac{1}{3} = \frac{1}{27}$

$4^0 = 1$

~~$2^0 = -1$~~
 -1

$z^0 = 1$

~~$(-2)^0 = 1$~~
 ~~$(-2 \times 3)^0 = 1$~~

What is the general rule for anything raised to the zero power?

becomes a 1

$$\frac{4^{-1}}{12} = \frac{1}{4}$$

$$10^{-1} = \frac{1}{10}$$

$$\frac{a^{-1}}{2} = \frac{1}{a}$$

What is a general rule for a negative exponent?

move that base to the opp. side of the fraction
↓ make exp. pos.

Simplify:

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

$$(-2.5)^0 = 1$$

Algebraic expressions are simplified when powers with a variable base are written with only positive exponents.

Simplify:

$$\frac{4c^3b}{2}$$

$$\frac{1}{n^4}$$

$$\frac{n^{-5}}{m^2} = \frac{1}{n^5 m^2}$$

$$\frac{4b}{c^3}$$

Evaluate for $n = -2$ and $w = 5$

$$1. -3w^2n^{-3} = \frac{-3w^2}{n^3} = \frac{-3(5)^2}{(-2)^3} =$$

$$2. \frac{1}{2n^2w^3} = \frac{1}{2(-2)^2(5)^3} = \frac{1}{2(4)(125)} = \frac{1}{1000}$$

$$\frac{n}{2} = \frac{-2}{2} = -1$$

The population of insects triple every week. The number of insects is modeled by the expression $5400 \cdot 3^w$, where w is the number of weeks. How many insects were there initially, after 2 weeks, and after 4 weeks?

Hwk: pg. 421 - 423

#10 - 44 (evens)

54, 55, 58, 62, 68