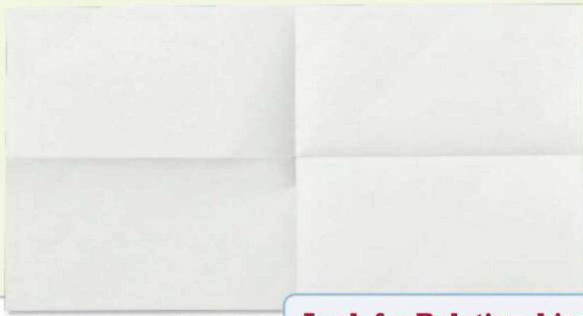


Lesson 3-1: Understand and Represent Exponents

I can... write and evaluate numbers with exponents.

Solve & Discuss It!

Fold a sheet of paper in half. Record the number of sections you see when it is unfolded. Continue folding the paper in half 4 more times. Record the number of sections each time. Describe any patterns you see.



Look for Relationships How are the number of sections related to the number of folds?

Handwritten notes showing the relationship between the number of folds and the number of sections:

- 1 fold - 2 $\rightarrow \times 2$
- 2 fold - 4 $\rightarrow \times 2$
- 3 fold - 8 $\rightarrow \times 2$
- 4 fold - 16 $\rightarrow \times 2$
- 5 fold - 32

How many sections will there be after 6 folds? 7 folds?

Handwritten answers: 64 and 128

Vocabulary:

Exponent: The number of times the base is used as a factor.

Base: The number that is repeatedly multiplied.

Power: A number that can be written using exponents.



Power: A number that can be written using exponents.

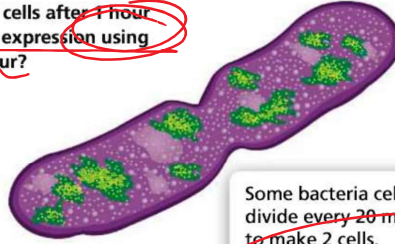
Evaluate: To find the value of a power.

Handwritten calculation: $4 \cdot 4 \cdot 4$
 \downarrow
 $16 \cdot 4$
 $\rightarrow 64$

Example 1: Understand and Represent Exponents

The expression $2 \times 2 \times 2$ represents the number of cells after 1 hour if there is 1 cell at the start. How can you write this expression using exponents? How many cells will there be after 1 hour?

Reasoning Repeated multiplication can be represented in more than one way.



Some bacteria cells divide every 20 minutes to make 2 cells.

Power 2^3

evaluate



Try it! 2^3

There are $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ bacteria cells after 3 hours. Write the repeated multiplication as a power and then evaluate.

Handwritten equation: $2^9 = 512$

Handwritten equation: $3 = 8$

Convince me!

Why can you represent the number of cells after two hours as the power 2^6 ?

Handwritten equations: $1 \text{ hr} = 2^3$
 $2 \text{ hr} = 2^6$

Example 2: Evaluate Exponents

A.) How can you evaluate 2^0 ?

Always going to be 1.

B.) How can you evaluate 1.2^4 ?

2.0736

Try it!

Evaluate $(\frac{1}{3})^3$

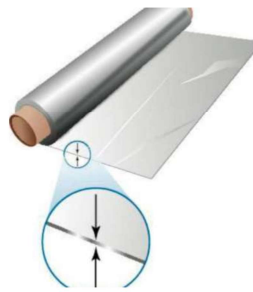
$\frac{1^3}{3^3} = \frac{1}{27}$

$(\frac{1}{3})^3 = \frac{1}{27}$

$\frac{1}{27}$

Example 3: Evaluate Expressions with Exponents

Julia calculated the foil as 1.9×10^5 units thick. Thom calculated the foil as 183,000 units thick. Which calculation represents the greater thickness for the foil?



1.9×10^5

J - 1.90000

T - 183000

Try it!

Rafael calculated the foil as 1.8×10^4 units thick. Evaluate Rafael's expressions.

18,000

Exp.

Base

KEY CONCEPT



You can represent a repeated multiplication expression using an exponent.

$5 \times 5 \times 5 \times 5 = 5^4$

base: 5, exponent: 4, power: 5⁴

You can evaluate a power using repeated multiplication.

$5^4 = 5 \times 5 \times 5 \times 5 = 625$

Do you understand?

1.) How can you write and evaluate numbers with exponents?

1.

Do you understand?

1.) How can you write and evaluate numbers with exponents?

Need a base
and exponent

→ solve the power.
Find the value.

2.) How many times is 4 used as a factor in the expression 4^5 ? Write the numerical expression as repeated multiplication.

5 times

$4^5 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

Rate your understanding. 1-Do not understand...4-can teach someone else

Learning Target: write and evaluate expression with exponents				
I can write expressions with exponents.	1	2	3	4
I can evaluate expressions with exponents.	1	2	3	4