3 Develop the Concept: Visual

ELL STRATEGY Visual Learning

Visual Learning

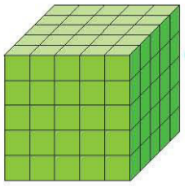
Exponents

How can you use exponents to write large numbers?

A box of cubes has 5 layers. Each layer has 5 rows, with 5 cubes in each row.

There are $5 \times 5 \times 5$ cubes in the box.

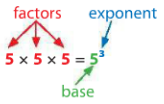
You can use exponential notation to represent repeated multiplication of the *same* number such as $5 \times 5 \times 5$.



Can you use exponential notation to write $5 \times 4 \times 2$? Explain. [No. Each number in the expression is different. Exponential notation is used to represent repeated multiplication of the same number.]

The base is the number to be multiplied.

The exponent is the number that tells how many times the base is used as a factor.



1 Visual Learning

Set the Purpose Call students' attention to the **Visual Learning Bridge** at the top of the page. *In this lesson, you will learn how to use exponents to write large numbers.*

Animated Glossary Students can see highlighted words defined in the Online Student Edition.

exponential notation, exponent, base, standard form, expanded form, squared, cubed

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Lesson 3-7

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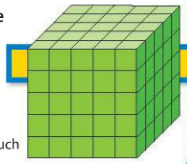

Understand It! Exponents are used to show the number of times a factor is repeated.

Other Examples

Remind students that numbers involving exponents can be written in three different forms. *What is the standard form of 2^5?* [32] *What is the expanded form of 2^5?* [$2 \times 2 \times 2 \times 2 \times 2$] *How do you write $4 \times 4 \times 4$ in exponential notation?* [4^3]

Other Examples

Exponential notation	Expanded form	Standard form
Write $4 \times 4 \times 4$ in exponential notation.	Write 10^4 in expanded form.	Write 2^5 in standard form.
$4 \times 4 \times 4 = 4^3$	$10^4 = 10 \times 10 \times 10 \times 10$	$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$

An exponent is also called a power. You can read 4^6 as "4 to the sixth power". The second and third powers have special names. Read 3^2 as "3 to the second power," or 3 squared. Read 6^3 as "6 to the third power," or 6 cubed.

2 Guided Practice

Formative Assessment

Remind students that an exponent tells how many times a number is used as a factor.

Exercise 4

Error Intervention

If students are having difficulty determining what is the base and what is the exponent,

then remind them that the base is on the bottom, and the exponent is elevated. *You can use the letter b in base and bottom to remind you that the base is on the bottom, and the letter e in exponent and elevated to remind you that the exponent is elevated.*

Reteaching For another example and more practice, assign **Reteaching** Set E on p. 81.

Guided Practice*

Do you know HOW?

1. Write 3^5 in expanded form. $3 \times 3 \times 3 \times 3 \times 3$
2. Write 2^4 in standard form. 16
3. Write $7 \times 7 \times 7 \times 7 \times 7$ using exponential notation. 7^5
4. Write 5^4 in expanded form and standard form. $5 \times 5 \times 5 \times 5$; 625

Do you UNDERSTAND?

5. In 3^5, what is the base? The exponent? 3, 5
6. In the example at the top, how is 125 written in expanded form? $5 \times 5 \times 5$
7. What is the standard form of 3 squared? For 6 cubed? 9; 216

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72 *For another example, see Set E on page 81.