

## Exponents and Scientific Notation

## Family Letter

Dear Family,

In this module, *Exponents and Scientific Notation*, students will use their prior knowledge of exponents to develop understanding of the properties of exponents and scientific notation. By having a solid understanding of exponents and scientific notation, students will be better prepared to study more advanced mathematical concepts in later courses as well as within more advanced science concepts.

### What Did Students Learn Previously?

In earlier grades, students learned how to apply properties of operations to generate equivalent expressions in order to make greater sense of the problem in context.

For example,  $x + 0.25x = 1.25x$  means that an increase of 25% is the same as multiplying by 1.25.

### What Will Students Learn in This Module?

#### Powers and Exponents

- Students will understand how to write and evaluate expressions involving **powers** and **exponents**. A **power** is a product of repeated factors and is expressed using a **base** and an **exponent**. For example,  $4^3$  is a **power**, having a **base** of 4 and an **exponent** of 3.

#### Monomials

- A **monomial** is a number, a variable, or a product of a number and one or more variables. Some examples of **monomials** are  $x$ , 80, and  $8x$ .
- Students will understand how to use the **Product of Powers** and **Quotient of Powers** properties to multiply and divide **monomials**.
- The **Power of a Power** and the **Power of a Product** properties are used to simplify expressions with integer exponents.
- The **Zero Exponent Rule** and the **Quotient of Powers Property** are used to simplify expressions with zero and negative integer exponents.

#### Scientific Notation

- Students will understand how to write numbers in **scientific notation** and compute with numbers in **scientific notation**.
- Scientific notation** is a way of expressing a very large or very small number as the product of a factor and an integer power of 10. The numbers 1,620,000 and 0.0005 are written in scientific notation as  $1.62 \times 10^6$  and  $5 \times 10^{-4}$ , respectively.

- When computing with numbers written in **scientific notation**, use the **Product of Powers Property** for multiplication, the **Quotient of Powers Property** for division, and the Distributive Property for addition or subtraction.

## What Vocabulary Terms Will Students Use?

| Term                               | Definition                                                                                         |
|------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>base</b>                        | In a power, the number that is the common factor.                                                  |
| <b>exponent</b>                    | In a power, the number of times the base is used as a factor.                                      |
| <b>monomial</b>                    | A number, a variable, or a product of a number and one or more variables.                          |
| <b>negative exponent</b>           | The result of repeated division used to represent very small numbers.                              |
| <b>Product of Powers Property</b>  | A property that states to multiply powers with the same base, add their exponents.                 |
| <b>power</b>                       | A product of repeated factors using an exponent and a base.                                        |
| <b>Power of a Power Property</b>   | A property that states to find the power of a power, multiply the exponents.                       |
| <b>Power of a Product Property</b> | A property that states to find the power of a product, find the power of each factor and multiply. |
| <b>Quotient of Powers Property</b> | A property that states to divide powers with the same base, subtract their exponents.              |
| <b>scientific notation</b>         | A compact way of writing numbers with absolute values that are very large or very small.           |
| <b>standard form</b>               | Numbers written without exponents.                                                                 |
| <b>Zero Exponent Rule</b>          | A rule that states that any nonzero number to the zero power is equivalent to 1.                   |

## How You Can Provide Support

- Support your child's understanding of exponents and scientific notation by asking them to explain how they are used in everyday life.
  - News Articles or Media:* Find a news article or other form of media that includes a number represented in billions or trillions, such as 1.2 billion. Have your child write the number in standard form and in scientific notation. Encourage your child to think about the advantages of each representation.
- Encourage your child to have a positive, growth-oriented attitude towards mathematics and their learning.
  - Encourage them to ask questions – both at home and in class. Sometimes, an answer to a question will generate more questions. That's how you know they are learning!
  - Encourage your child to embrace challenges and remind them that every challenge is an opportunity to learn something new.
  - Celebrate successes – both small and large.
- Contact me to arrange a time to discuss the specifics of your child's performance and how we can work together to help them succeed in this module.

Sincerely,

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(Teacher's Name)

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(Email/Phone)