Scientifically Speaking

Reporting Category	Expressions and Operations	
Topic	Working with scientific notation	
Primary SOL	A.2a	The student will perform operations on polynomials, including applying the laws of exponents to perform operations on expressions.
Related SOL	A.1	

Materials

- Scientifically Speaking activity sheet (attached)

Vocabulary

scientific notation, exponent, power, base

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Review scientific notation, and ask students how scientific notation and the laws of exponents are connected.
2. Distribute copies of the Scientifically Speaking activity sheet, and have students complete it.
3. Summarize the lesson by having students discuss how they used the laws of exponents to find solutions to the problems. Ask students what they would have done if they had not known the laws of exponents. Ask, "Did knowing the laws or rules of exponents make it easier? Why? Would scientific notation be as beneficial if you didn't know the laws of exponents? Why, or why not?

Assessment

- **Questions**
  - How are the laws of exponents and scientific notation connected?
  - How is knowing the laws of exponents helpful when operating with numbers in scientific notation?
- **Journal/Writing Prompts**
  - Describe a situation in which you would not only use scientific notation, but also perform operations on numbers in scientific notation.
- **Other**
  - Provide students with real-life situations that involve operating with numbers in scientific notation.

Extensions and Connections (for all students)

- Have students find real-life examples of numbers that can be written in scientific notation and create their own problems with these numbers.

Strategies for Differentiation

- If necessary, set up some selected word problems for students.
- Read through the problems with students, having them highlight important information and discuss which operations will be needed.
- Allow students to use calculators to compute answers, if they need support.

Scientifically Speaking

Name _____ **Date**_____

Set up the following word problems, and apply the laws of exponents to perform the indicated operations on the expressions. Show your work.

1. The mass of one molecule of water is 2.99×10^{-23} g. If a cylinder contains 2.93×10^{70} molecules of water, what is the mass of the water in the container?

2. A drop of water has an approximate mass of 5×10^{-2} g. Given the mass of one molecule of water is 2.99×10^{-23} g, how many molecules are in one drop of water?

3. There are 3 atoms in each molecule of water. How many atoms are in one drop of water?

4. The average distance from the sun to the Earth is 1.49×10^{8} km. The speed of light is 3×10^{5} km/s. How long does it take for light from the sun to reach the Earth?

5. The average distance from the sun to Neptune is 4.5043×10^{9} km. How long does it take for light from the sun to reach Neptune?

6. The populations of the United States, Canada, and Mexico are approximately 3.07×10^{8}, 3.33×10^{7}, and 1.06×10^{8} respectively. What is the combined population of these three countries?