

Beyond a Million

STRAND: Number and Number Sense

STRAND CONCEPT: Rational Numbers - Compare and Order

SOL 7.1b

Remediation Plan Summary

The students will practice writing numbers in scientific notation from standard notation. The students will not be comparing or ordering numbers in scientific notation.

Common Errors and Misconceptions

- Students may not write the decimal part of the number correctly by writing a decimal smaller than one or greater than 10.
- Students may count the number of zeros at the end of the number to use for the exponent.
- Students may have difficulty converting to scientific notation if the number they are converting from has a zero not at the end of the number, for example 89,060,000. Students may incorrectly drop the extra digits when converting, for example 8.9×10^7 when it should be 8.906×10^7 .

Materials

- Book On Beyond A Million: An Amazing Math Journey by David M. Schwartz
- Guinness Book of World Records
- Earth Facts
- Access to the internet
- Exit Ticket

Introductory Activity

- Have students extract some very large numbers from a book such as On Beyond a Million: An Amazing Math Journey by David M. Schwartz, or pull number facts from *The Guinness Book of World Records* or *Earth Facts*. Tell the students to write the number “googol” 1 followed by 100 zeros, or 10^{100} , and time how long it takes them to do this. Ask students to explain the value of using exponents for writing large numbers. Discuss why it is a faster way of recording numbers. Review using a base and exponent for writing other large numbers (e.g., million, billion, and trillion) as powers of 10.

Plan for Instruction

1. Using examples of large numbers from the selected book, explain that many people work with huge numbers. One example are scientists who measure distances among stars. Very large numbers are so big that they are hard to read and are cumbersome to write. Therefore, when scientists write very big numbers, they take a shortcut and use *scientific notation*, which is different from the usual way of writing numbers using the standard notation.

AR Remediation Plan – Rational Numbers – Compare and Order

2. Explain the process of changing a huge number into scientific notation. Begin with simple numbers such as 8,000,000,000 as 8×10^9 . Practice these numbers for a few minutes then move on to more complicated numbers.
3. For example, to write in scientific notation the number of Tootsie Rolls® manufactured daily, 37,000,000, do the following:
 - Determine the new number greater than or equal to 1 and less than 10: Move the decimal point in the original number so that the new number is greater than or equal to 1 and but less than 10. (3.7000000, or 3.7)
 - Determine the power of 10: Count the number of places you moved the decimal point. This number equals the exponent. Write the power of 10 that you would need to multiply the new number by in order to get the original number.
 - Write the two parts as a multiplication expression. 3.7×10^7
1. Have students practice writing other numbers from the selected book in scientific notation, for example: use the population of countries; the number of stars in the Milky Way; the weight of the earth in pounds.
2. Have students practice changing numbers in scientific notation into standard notation.
3. Ask students to find a very large number that interests them, such as the number of M&M's manufactured in one day, and write it in scientific notation. Students will need access to the internet to find a number.

Pulling It All Together (Reflection)

Have students complete the questions on the exit ticket.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Name: _____

Exit Ticket

1. Write the number 243,000,000,000 in scientific notation.
2. Write the number 3.6×10^{12} in standard notation.
3. Explain the advantage of writing numbers in scientific notation.
4. Explain the process for writing numbers in scientific notation.