

Mr. Tallman

**Do Now****Simplify the following using rules of exponents. Leave your answer in EXPONENTIAL FORM:**

1)  $8^2 \cdot 8^4 = 8^6$

2)  $\frac{5^3}{5^2} = 5^1$

3)  $2^{-2} \cdot 2^6 = 2^4$

4)  $(9^5)^2 = 9^{10}$

5)  $6^{-3} = \frac{1}{6^3}$

6)  $(2^2)^{-2} = \frac{1}{2^4}$

**Lesson #46: Converting Numbers From Standard Form to Scientific Notation**

- **Scientific Notation** is a way to shorten very large or very small numbers.
- Numbers in scientific notation have two parts:
  1. A factor **greater than or equal to 1, but less than 10 (the coefficient)**.

Examples:

6, 8, 1.3, 2.7

2. A factor which is a power of 10.

Examples:

 $10^3, 10^{-2}, 10^{45}$ 

Example 1) Write the number 340,000 in scientific notation.

**Steps for writing a whole number in scientific notation:**

<b><u>Steps</u></b>	<b><u>Example</u></b>
1) Put the decimal point after the first <b>non-zero digit</b> starting from the left side of the number.	3.40000
2) Drop all of the zeros after the last non-zero digit. This is your first factor.	3.4
3) Count how many places the decimal point moved. This number is your power of 10.	$10^5$
4) Write your number in scientific notation.	$3.4 \times 10^5$

Example 2) Express 0.000035 in scientific notation.

$$3.5 \times 10^{-5}$$

**Now You Try:** Express the following numbers in scientific notation. Show work.

3)  $\rightarrow$   
4,100,000  
4.1  $\times 10^6$

4)  $\rightarrow$   
500,000  
5.0  $\times 10^5$

5)  $\leftarrow$   
0.00092  
9.2  $\times 10^{-4}$

6)  $\leftarrow$   
0.0000004  
4.0  $\times 10^{-7}$

7)  $\leftarrow$   
0.00558  
5.58  $\times 10^{-3}$

8)  $\rightarrow$   
32,500,000  
3.25  $\times 10^7$

Example 9) There are about 3,000,000 students attending school, kindergarten through 12th grade, in New York. Express the number of students in scientific notation.

$$3 \times 10^6$$

Example 10) There are about 100 million smartphones in the US. In Scientific Notation, how many smartphones are in the US?

100,000,000 =  $1.0 \times 10^8$

**Now, You Try!**

11) What is 0.000058 written in scientific notation?

A)  $5.8 \times 10^{-6}$

B)  $5.8 \times 10^{-5}$

C)  $5.8 \times 10^5$

D)  $5.8 \times 10^6$

$5.8 \times 10^{-5}$

12) The length of the Amazon River in South America is 6,400 kilometers. What is this length written in scientific notation?

A)  $6.4 \times 10^2$  km

B)  $6.4 \times 10^3$  km

C)  $6.4 \times 10^4$  km

D)  $6.4 \times 10^5$  km

~~$6.4 \times 10^2$~~

$6.4 \times 10^3$

13) Which number is equivalent to .0000001:  $10^7$  or  $10^{-7}$ ? Explain your choice.

$10^{-7}$ . Bases with negative exponents are less than 1.

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14) A virus is viewed under a microscope. Its diameter is 0.0000002 meters. How would this length be expressed in scientific notation?

$2.0 \times 10^{-7}$

15) Sarah said that .00001 is bigger than .001 because the first number has more digits to the right of the decimal point. Is Sarah correct? Explain using scientific notation in your explanation.

No.  $.001 = 1.0 \times 10^{-3}$  and  $.00001 = 1.0 \times 10^{-5}$ .

$10^{-3} > 10^{-5}$ .

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