

Name: \_\_\_\_\_  
Adding and Subtracting Numbers in Scientific Notation

Date: \_\_\_\_\_

The population of the United States of America is  $3.189 \times 10^8$  people. The population of Canada is  $3.516 \times 10^7$ .

- a. Which country has a larger population? How do you know?

United States b/c exponent is bigger!

- b. How many more people (in scientific notation) does the larger population have?

$$3.189 \times 10^8 - 3.516 \times 10^7 =$$

### Steps for Adding/Subtracting Numbers in Scientific Notation

1. We need to have both of the powers of 10 to be the same. To do this, take the larger of the **exponents** in the problem and rewrite it as follows:

2.

$$10^{\text{larger power}} = 10^{\text{smaller power}} \cdot 10^{\text{larger power} - \text{smaller power}}$$
$$10^8 = 10^7 \cdot 10^{8-7}$$

So, in our problem:  $3.189 \times 10^8 - 3.516 \times 10^7 = 3.189 \times 10^7 \times 10^1 - 3.516 \times 10^7$

3. Now use the commutative property to move the terms around and multiply so that both populations have the same exponents.

This means:  $3.189 \times 10^8 - 3.516 \times 10^7 = 3.189 \times 10^1 \times 10^7 - 3.516 \times 10^7$

And we multiply the first two coefficients:  $= 31.89 \times 10^7 - 3.516 \times 10^7$

4. Now you are subtracting two terms with the same exponents. These are now like terms.

$$3.189 \times 10^8 - 3.516 \times 10^7 = 31.89 \times 10^7 - 3.516 \times 10^7$$
$$= 28.374 \times 10^7$$

5. Is the coefficient of between 1 and 9.9? If "yes", then you are done! If "no", adjust the coefficient and then your exponent appropriately.

$$= 2.8374 \times 10^8$$

The same procedure applies for adding numbers in scientific notation!

Example 1: Find the sum:  $5.64 \times 10^8 + 1.08 \times 10^6$

$$\begin{aligned} & 5.64 \times 10^6 \times 10^2 + 1.08 \times 10^6 \\ & = 564 \times 10^6 + 1.08 \times 10^6 \\ & = 565.08 \times 10^{6+2} \\ & = 5.6508 \times 10^8 \end{aligned}$$

Example 2: Find the difference:  $3.179 \times 10^{11} - 3.41 \times 10^9$

$$\begin{aligned} & = 3.179 \times 10^7 \times 10^4 - 3.41 \times 10^7 \\ & = 31,790 \times 10^7 - 3.41 \times 10^7 \\ & = 31,786.59 \times 10^{7+4} \\ & = 3.178659 \times 10^{11} \end{aligned}$$

31,790.00  
  3.41  
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31,786.59

Example 5: The table shown below gives the approximate enrollment at the University of Michigan every fifty years.

Year	Approximate Enrollment at the University of Michigan
1850	$7.2 \times 10^1$
1900	$3.7 \times 10^3$
1950	$2.7 \times 10^4$
2000	$3.8 \times 10^4$

How many more students were enrolled at the University of Michigan in 1950 than in 1900? Express your answer in scientific notation.

$$\begin{aligned}
 & 2.7 \times 10^4 - 3.7 \times 10^3 \\
 & \begin{array}{r} 27.0 \\ - 3.7 \\ \hline 23.3 \end{array} \\
 & = 2.7 \times 10^3 \times 10^1 - 3.7 \times 10^3 \\
 & = 27 \times 10^3 - 3.7 \times 10^3 \\
 & = 23.3 \times 10^3 = 2.33 \times 10^4 \text{ more students}
 \end{aligned}$$