Name: _____

Date: _____ Period: _____

Focus Standard:	8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 x 10^8 and the population of the world as 7 x 10^9, and determine that the world population is more than 20 times larger.*
	8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Student Outcomes

- Students write, add, and subtract numbers in scientific notation and understand what is meant by the term leading digit.

A positive, finite decimal s is said to be written in **scientific notation** if it is expressed as a product $d \times 10^n$, where d is a finite decimal so that $1 \leq d < 10$, and n is an integer.

The integer n is called the **order of magnitude** of the decimal $d \times 10^n$.

Simplify the following expressions:

1. $1.234 \times 10^5 + 2.345 \times 10^5$

2. $1.234 \times 10^7 + 2.345 \times 10^5$

3. $9.876 \times 10^4 - 6.543 \times 10^4$

4. $9.876 \times 10^6 - 6.543 \times 10^4$

Use the table below to complete Exercises 1 and 2.

The table below shows the debt of the three most populous states and the three least populous states.

State	Debt (in dollars)	Population (2012)
California	407,000,000,000	38,000,000
New York	337,000,000,000	19,000,000
Texas	276,000,000,000	26,000,000
North Dakota	4,000,000,000	690,000
Vermont	4,000,000,000	626,000
Wyoming	2,000,000,000	576,000

Exercise 1

a. What is the sum of the debts for the three most populous states? Express your answer in scientific notation.

b. What is the sum of the debt for the three least populous states? Express your answer in scientific notation.

c. How much larger is the combined debt of the three most populous states than that of the three least populous states? Express your answer in scientific notation.

Exercise 2

a. What is the sum of the population of the three most populous states? Express your answer in scientific notation.

b. What is the sum of the population of the three least populous states? Express your answer in scientific notation.

c. Approximately how many times greater is the total population of California, New York, and Texas compared to the total population of North Dakota, Vermont, and Wyoming?

Exercise 3

All planets revolve around the sun in elliptical orbits. Uranus's furthest distance from the sun is approximately 3.004×10^9 km, and its closest distance is approximately 2.749×10^9 km. Using this information, what is the average distance of Uranus from the sun?

Problem Set

1. $9.876 \times 10^6 + 6.543 \times 10^6$

2. $9.876 \times 10^8 + 6.543 \times 10^6$

3. $9.876 \times 10^4 - 9.543 \times 10^4$

4. $9.876 \times 10^6 - 9.543 \times 10^4$

5. Here are the masses of the so-called inner planets of the solar system.

Mercury: 3.3022×10^{23} kg   Earth: 5.9722×10^{24} kg

Venus: 4.8685×10^{24} kg   Mars: 6.4185×10^{23} kg

What is the average mass of all four inner planets? Write your answer in scientific notation.