Lesson 9: Scientific Notation

Classwork

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 $d \times 10^n$.

Are the following numbers written in scientific notation? If not, state why.

Exercise 1

1.908×10^{17}

Exercise 4

$4.0701 + 10^7$

Exercise 2

0.325×10^{-2}

Exercise 5

18.432×5^8

Exercise 3

7.99×10^{32}

Exercise 6

8×10^{-11}

Use the table below to complete Exercises 7 and 8.

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	69,000
Vermont	4,000,000,000	62,600
Wyoming	2,000,000,000	57,600

Exercise 7

    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 8

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 9

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. Write the number 68,127,000,000,000,000 in scientific notation. Which of the two representations of this number do you prefer? Explain.

2. 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.