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 $d×10^{n}$, 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 $d×10^{n}$.

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

* 1. What is the sum of the debts for the three most populous states? Express your answer in scientific notation.
	2. What is the sum of the debt for the three least populous states? Express your answer in scientific notation.
	3. 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

1. What is the sum of the population of the three most populous states? Express your answer in scientific notation.
2. What is the sum of the population of the three least populous states? Express your answer in scientific notation.
3. 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.