Lesson 11: Efficacy of Scientific Notation

Classwork

Exercise 1

The mass of a proton is

kg.

In scientific notation it is:

Exercise 2

The mass of an electron is

kg.

In scientific notation it is:

Exercise 3

Write the ratio that compares the mass of a proton to the mass of an electron.

Exercise 4

Compute how many times heavier a proton is than an electron (that is, find the value of the ratio). Round your final answer to the nearest one.

Example 2

The U.S. national debt as of March , , rounded to the nearest dollar, is . According to the U.S. census, there are about U.S. citizens. What is each citizen’s approximate share of the debt?

*Each U.S. citizen’s share of the national debt is about .*

Exercise 5

The geographic area of California is sq. mi., and the geographic area of the U.S. is sq. mi. Let’s round off these figures to and . In terms of area, roughly estimate how many Californias would make up one U.S. Then compute the answer to the nearest ones.

Exercise 6

The average distance from Earth to the moon is about km, and the distance from Earth to Mars is approximately km in year . On this simplistic level, how much further is traveling from Earth to Mars than from Earth to the moon?

Problem Set

1. There are approximately grains of sand on Earth. There are approximately atoms in an average human body. Are there more grains of sand on Earth or atoms in an average human body? How do you know?
2. About how many times more atoms are in a human body compared to grains of sand on Earth?
3. Suppose the geographic areas of California and the US are and sq. mi., respectively. California’s population (as of ) is approximately people. If population were proportional to area, what would be the U.S. population?
4. The actual population of the U.S. (as of ) is approximately . How does the population density of California (i.e., the number of people per sq. mi.) compare with the population density of the U.S.?