

Lesson 8: Estimating Quantities

Classwork

Exercise 1

The Federal Reserve states that the average household in January of 2013 had \$7,122 in credit card debt. About how many times greater is the U.S. national debt, which is \$16,755,133,009,522? Rewrite each number to the nearest power of 10 that exceeds it, and then compare.

Exercise 2

There are about 3,000,000 students attending school, kindergarten through 12th grade, in New York. Express the number of students as a single-digit integer times a power of 10.

$$3,000,000 = 3 \times 1,000,000 = 3 \times 10^6$$

The average number of students attending a middle school in New York is 8×10^2 . How many times greater is the overall number of K-12 students compared to the number of middle school students?

$$\frac{3 \times 10^6}{8 \times 10^2} = \frac{3}{8} \times \frac{10^6}{10^2}$$

$$\frac{3}{8} \times 10^4$$

$$0.375 \times 10^4 = 3,750$$

There are about 3,750 times more students in K-12 than in middle school.

Exercise 3

A conservative estimate of the number of stars in the universe is 6×10^{22} . The average human can see about 3,000 stars at night with his naked eye. About how many times more stars are there in the universe, compared to the stars a human can actually see?

$$3,000 = 3 \times 10^3$$

division.

$$\frac{6 \times 10^{22}}{3 \times 10^3} = \frac{6}{3} \times \frac{10^{22}}{10^3} = 2 \times 10^{19}$$

There are 2×10^{19} times more stars in the universe than human eye can see.

Exercise 4

The estimated world population in 2011 was 7×10^9 . Of the total population, 682 million of those people were left-handed. Approximately what percentage of the world population is left-handed according to the 2011 estimation?

Exercise 5

The average person takes about 30,000 breaths per day. Express this number as a single-digit integer times a power of 10.

If the average American lives about 80 years (or about 30,000 days), how many total breaths will a person take in her lifetime?