Unit 1 Lesson 8 – Using Powers of Ten to Estimate Quantities

1.) What is the smallest power of 10 that would exceed $987,654,321,098,765,432$?

2.) What is the smallest power of 10 that would exceed $999,999,999,991$?

3.) Which number is equivalent to $0.0000001$: $10^{7}$or $10^{-7}$?

4.) The chance of winning a big lottery prize is about $10^{-8}$, and the chance of being struck by lightning in the US in any given year is about 0.000001. Which do you have a greater chance of experiencing? Explain.

5.) Place the following numbers in order from least to greatest.

 $10^{5} 10^{-99} 10^{-17} 10^{14} 10^{-5} 10^{30}$

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

7.) The estimated world population in 2011 was 7,000,000,000. What is this number as a single-digit integer times a power of ten?

8.) A conservative estimate of the number of stars in the universe is 60,000,000,000,000,000,000,000. How many stars are there in the universe written as a single-digit integer times a power of ten?

9.) The U.S. national debt was $16,755,133,009,522 in 2013. Rewrite the number as single-digit times a power of ten.

10.) Express 0.000000298 as a single digit times a power of ten.

11.) Mt. Everest is 29,035 feet tall. Use a single digit times a power of 10 to estimate the height of Mt. Everest to the nearest ten thousand feet.

12.) A scientist records the mass of a proton as 0.0000000000000000000000016726231 gram. Use a single digit times a power of 10 to estimate the mass.

13.) The dimeter of one species of bacteria is 0.00000025691. Bonnie approximates the measure as 3 x 10-11. Is she correct? Explain.

14.) Keegan and Jeff did some research and found that here are approximately 7,492,000,000,000,000,000 grains of sand on Earth. Jeff says that it is about 7 x 1015 grains of sand. Keegan says that this is about 7 x 1018 grains of sand. Whose estimate, Jeff’s or Keegan’s, is more logical? Explain.

15.) How does the Gross Domestic Product (GDP) of Canada compare to that of the United States?

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| Canada | $1,785,387,000,000,000 |
| USA | $17,348,075,000,000,000 |

16.) Mathaias used a laser to measure the average thickness of a human hair, which is 0.00017763 meters. A sheet of paper is about 0.001 meters thick. How do the two thicknesses compare?