

MathLinks

GRADE 8 TASKS Number Sense, Exponents

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THE PROBLEM OF 4s

number sense

Using exactly four 4s, express as many of the numbers as you can from 0 to 50. You may use any mathematical symbols you know. Write out steps that show your solution is correct.

$$\begin{aligned}0 &= 4 + 4 - 4 - 4 \\ &= 0\end{aligned}$$

$$\begin{aligned}1 &= \frac{4}{4} + 4 - 4 \\ &= 1 + 4 - 4\end{aligned}$$

HOW MUCH IS A MILLION? A BILLION? A TRILLION?

number sense – exponents / scientific notation

1. Have you been alive for a million seconds? A billion seconds? A trillion seconds? Predict answers to these three questions before going on.
2. Approximate the number of seconds in one year to three significant digits.
3. Write an approximation of the number of seconds in one year in words.
4. Write this approximation in scientific notation.
5. Write one million in scientific notation.
6. Write one billion in scientific notation.
7. Write one trillion in scientific notation.
8. Calculate the number of years in one million seconds.
9. Calculate the number of years in one billion seconds.
10. Calculate the number of years in one trillion seconds.
11. Did you predict correctly in the beginning?
12. What historical events were taking place one million seconds ago? One billion seconds ago? One trillion seconds ago? This may require research on the internet.

THE NATIONAL DEBT

number sense – exponents / scientific notation

The national debt refers to the amount of money that our nation's government owes. Find websites that give the national debt as of today and the current population of the United States. Some websites may also give the amount of the debt per person. Make a note of that number.

1. As of _____, the national debt was
(Date)

\$

2. Approximate the national debt by rounding it to two significant digits.
3. Write an approximation of the national debt in words.
4. Write an approximation of the national debt in scientific notation.
5. There are currently about _____ citizens in the United States.
6. Approximate the number of citizens by rounding to two significant digits.
7. Write an approximation of the number of citizens in words.
8. Write an approximation of the number of citizens in scientific notation.
9. Approximate each citizen's portion of the national debt.
10. If you found an internet website stating each citizen's portion of the national debt, does that website agree with your answer? Explain.

DIGITAL MEMORY

number sense – exponents / scientific notation

In the world of computers, digital cameras and MP3s, memory is measured in “bytes.”

- 1 kilobyte (KB) \approx 1000 bytes.
- 1 megabyte (MB) \approx 1000 kilobytes
- 1 gigabyte (GB) \approx 1000 megabytes
- 1 terabyte (TB) \approx 1000 gigabytes

For problems 1-4, write each number in scientific notation and in words.

1. How many bytes are in a kilobyte?
2. How many gigabytes are in a byte?
3. How many bytes are in a megabyte?
4. How many terabytes are in a byte?
5. A song stored in an MP3 music file typically requires about 4 megabytes. How many music files can be stored on an MP3 player that has 8 gigabytes of digital memory?

Think: How many megabytes are in a gigabyte?

6. Ellie’s workstation computer had a 500 gigabyte hard drive. Her new workstation has a 1 terabyte hard drive. Which workstation holds more data? By how much? Explain.
7. Rudy has a 4 gigabyte memory stick for his camera. According to the manufacturer, the memory stick will hold 1,595 pictures. How many megabytes are required for each picture, on average? Explain.

HIT THE JACKPOT WITH A CATCH

number sense / estimation

A friend won a lottery worth \$1,000,000, but in order to collect she had to answer some questions. She comes to you because she thinks you have the math know-how to help her.

1. What is the approximate height of this sum of money in stacks of...
 - a. \$100 bills
 - b. \$10 bills
 - c. \$1 bills

2. Perform the same estimations for \$1 billion dollars.

3. Will your friend's money fit in a suitcase on an airplane in the overhead compartment if it is in \$100 bills? \$10 bills? \$1 bills? Explain your reasoning.

SEA FLOOR SPREADING

number sense / estimation

The European and the North American tectonic plates meet along an ocean ridge running down the middle of the North Atlantic Ocean. These plates are moving away from each other at a rate of about 25 mm per year. As the plates move apart, molten material from the Earth's core rises and fills the gap.

1. At this rate of seafloor spreading, how many years will it take for the plates to move one meter apart?
2. About how many inches will the plates move apart in a year?
3. Could you draw a line that would fit on this piece of paper to approximate how far the plates have moved apart since you were born? Explain.
4. About how many feet will the plates move apart in a century?
5. New York is about 4,500 miles west of Paris. If the plates continue moving apart at the same rate, how long will it be before Paris is twice as far from New York? (A mile is approximately 1,600 meters.)