**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

**U13 CWK #2** *Operations with Scientific Notation*

You are beginning to get a sense that Scientific notation can help you work with big numbers like how many millions are in a trillion.

Write these two following numbers in standard form and then scientific notation.

|  |  |  |
| --- | --- | --- |
|  | Standard Form | Scientific Notation |
| One Million  One Trillion |  |  |

1. What operation should you use if you want to compare these numbers?

(Hint: Remember it is asking how many millions are in a trillion.)

1. Write this problem out with the correct operation using scientific notation.

Multiplying and Dividing with Numbers in Scientific Notation

When numbers are written in scientific notation the problem above can be solved rather quickly. The problems below will help you practice the skills you will need to do this. You will return to the problem above on the next page.

Discuss with a partner what properties of exponents you will use to help simplify the problems below. Use these properties to simplify each expression.

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1. Discuss the multiplication problemwith your class. Write your thoughts below.
2. Rewrite this problem like the problem above (group the powers of 10 together). Then solve the problem (use exponent properties) and write the solution.

Use the same method to evaluate the problems below.

|  |  |  |
| --- | --- | --- |
| Rewrite the problem:  Problem solution: | 1. Solve the problem: | 1. Solve the problem: |

**Practice:** Find each product or quotient. Write your answer in scientific notation.

|  |  |  |
| --- | --- | --- |
|  |  |  |
| 1. What is 3 millionths multiplied by 7 ten-thousandths? |  | 1. How much is 40% of 140 million? |
|  |  | 1. What percent of  is ? |

Return back to the problem at the beginning of the section. If we want to figure out how many millions are in a trillion what operation will help us achieve this?

1. Use the method discovered above to perform this operation.
2. Now try it to find out how many thousands are in a trillion.

*Adding and Subtracing with Numbers in Scientific Notation*

Do you think the method for multiplying and dividing numbers in scientific notation work for adding and subtracting numbers in scientific notation?

Rewrite 5,000,000 and 2,000,000 in scientific notation.



Test the method you learned above to see if it works for subtraction.

* 1. Subtract 2,000,000 from 5,000,000.
  2. Write your answer in scientific notation.
  3. Subtract the numbers written in scientific notation with the method we used for multiplying and dividing to see if you get the same answer.

(2-5) x (106-106) =

In your own words, write what you think you do to add or subtract numbers in scientific notation that have the same exponent or order of magnitude.

**Practice:** Find each sum or difference. Write your answer in scientific notation.

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You might be wondering what to do if the numbers do not have the same order of magnitude. Write down your ideas of how you might be able to add or subtract these numbers. Be ready to share your ideas with the class.

To add or subtract numbers in scientific notation:

1. Make sure they have the same exponent or order of magnitude. If they don’t, move the decimal so they do.
2. Add or subtract the significant figures and keep the order of magnitude the same.
3. Write your final answer in scientific notation.



**Practice:** Try it out with the problems given below. Find each sum or difference. Write your final answer in scientific notation.

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|  |  |  |
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**Problem Solving** (HINT: Problems 1-3 are multiplication or division. Problems 4-6 are addition or subtraction.)

Use scientific notation to answer each question. First, write out the problem in scientific notation, then solve using the method above. Check your answer with a calculator.

1. In the world, approximately 1,146,000,000 people speak Chinese as their first language, while, 341,000,000 people speak English as their first language. Approximately how many times more people speak Chinese than English as their first language?
2. The thickness of a dollar bill is .010922 cm. The thickness of a dime is .135 cm. How many times thicker is a dime compare to a dollar bill?
3. A millipede’s leg is cm long.
   1. How long is the millipede’s leg in standard form?
   2. Despite its name a millipede does not really have 1000 legs. If it did, what would the length be if you could line up all the legs of a 1,000 leg millipede end to end?
4. The earth is miles from the sun. Pluto is  miles from the sun. How far is it to Pluto from Earth? (Hint: Draw and label a picture.)

1. Pretend a new planet has been found in the far reaches of the universe.
   1. You know the earth is miles from the sun and the planet you are interested in is miles beyond the sun in the opposite direction of the earth. What is the distance to the planet from Earth? (Hint: Draw and label a picture)
   2. Using the distance you found above and the fact that light travels at  miles in one light year. Determine how many light years it will take for light to travel to this planet from Earth.