

Name: _____ Date: _____ Per. _____

U8 CWK #2 Multiplying and Dividing 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.

1. Begin by writing these two numbers in standard form and then changing them to scientific notation.

	Standard Form	Scientific Notation
One Million	1,000,000	1×10^6
One Trillion	1,000,000,000,000	1×10^{12}

2. What operation should you use if you want to compare these numbers? (Hint: Remember it is asking how many millions are in a trillion.)
3. Write this problem out with the correct operation using scientific notation.

division

$$\frac{(1 \times 10^{12})}{(1 \times 10^6)} = 1,000,000 = 1 \times 10^6$$

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.

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

Review of Unit 6

a. $10^4 \times 10^3 = 10^7$	b. $10^{-3} \times 10^5 = 10^2$	c. $\frac{10^6}{10^3} = 10^3$	d. $10^4 \div 10^6 = 10^{-2}$
------------------------------	---------------------------------	-------------------------------	-------------------------------

Multiplying same base: Add exponents

Dividing same base: Subtract exponents

5. Discuss the multiplication problem $(5 \times 3)(2 \times 8)$ with your class. Write your thoughts below.

Commutative Prop.: Move #s in any order

$$(5 \times 2)(3 \times 8)$$

↓ ↓

$$10 \times 24 = 240$$

$$(5 \times 8)(2 \times 3)$$

↓ ↓

$$40 \times 6 = 240$$

Associative Prop.: Group #s how we want

6. Rewrite this problem $(5.1 \times 10^5)(6.8 \times 10^3)$ like the problem above (group the powers of 10 together).

Then solve the problem (use exponent properties) and write the solution.

Significant figures

$$(5.1 \times 6.8) \times (10^5 \times 10^3)$$

order of magnitude

sig. fig. smaller exponent larger

needs to be between 1-10

$$\rightarrow 34.68 \times 10^8$$

$$\Rightarrow 3.468 \times 10^9$$

1. Use the same method to evaluate the problems below.

<p>a. $(6.9 \times 10^2)(3.5 \times 10^5)$</p> <p>Rewrite the problem:</p> $(6.9 \times 3.5) \times (10^2 \times 10^5)$ <p>Problem solution:</p> 24.15×10^7 2.415×10^8	<p>b. Solve the problem:</p> $(1.9 \times 10^3)(2.4 \times 10^6) =$ 4.56×10^9	<p>c. Solve the problem:</p> $\frac{(7.2 \times 10^5)}{(3.6 \times 10^2)} =$ 2×10^3
---	--	--

When multiplying/Dividing scientific notation:

* Group significant figures, then (x or ÷)

* Group orders of magnitude, then (x or ÷)

Day 2 (cont)

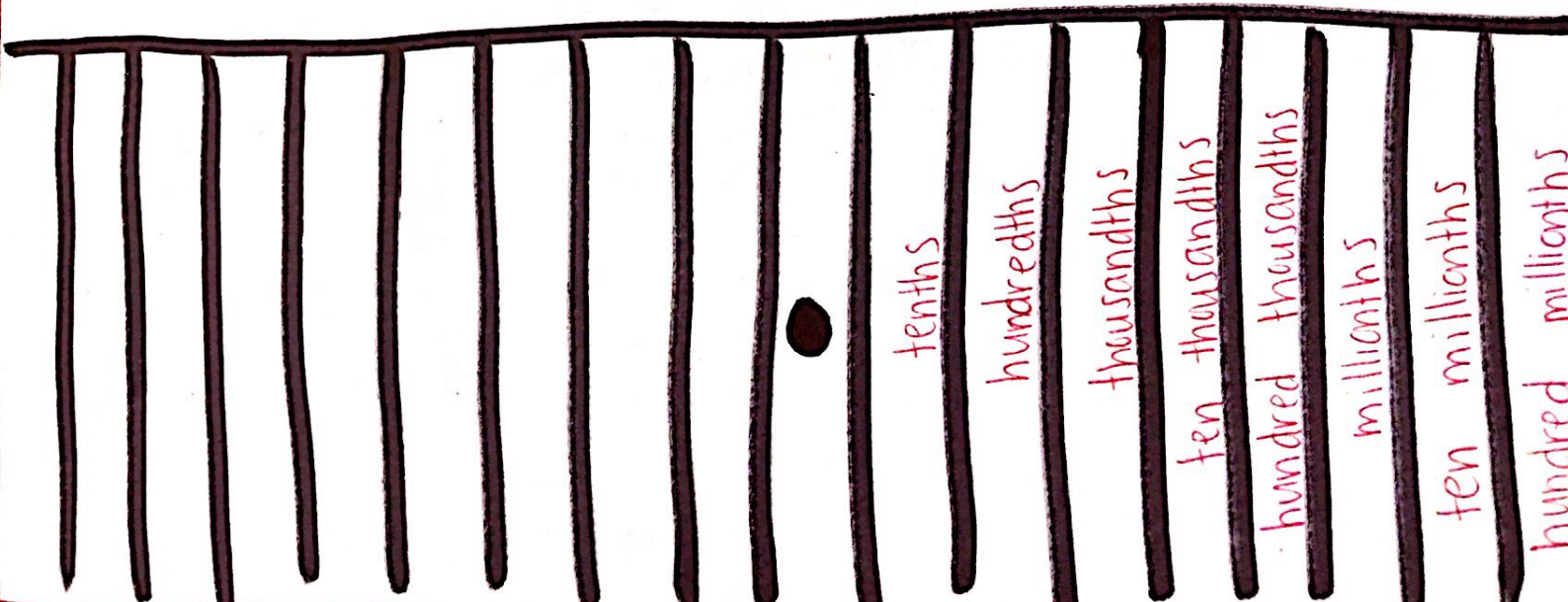
2. Find each product or quotient. Write your answer in scientific notation.

<p>a. $\frac{2.3958 \times 10^3}{1.98 \times 10^7}$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> 1.21×10^{-4} </div>	<p>b. $(7 \times 10^5)(3.5 \times 10^{-3})$</p> <div style="text-align: center; margin: 10px auto;"> 24.5×10^2 <div style="border: 1px solid black; padding: 2px;"> 2.45×10^3 </div> </div>	<p>c. $\frac{3.006 \times 10^8}{7.3 \times 10^3}$</p> <div style="text-align: center; margin: 10px auto;"> 412×10^5 <div style="border: 1px solid black; padding: 2px;"> 4.12×10^4 </div> </div>
<p>d. What is 3 millionths multiplied by 7 ten-thousandths?</p> <p>$(3 \times 10^{-6}) \times (7 \times 10^{-4})$</p> <div style="text-align: center; margin: 10px auto;"> 21×10^{-10} <div style="border: 1px solid black; padding: 2px;"> 2.1×10^{-9} </div> </div>	<p>e. $(3.1 \times 10^{-3}) \times 562.1$</p> <div style="text-align: center; margin: 10px auto;"> 1742.51×10^{-3} <div style="border: 1px solid black; padding: 2px;"> 1.74×10^0 </div> </div>	<p>f. How much is 40% of 140 million?</p> <p>$(.4) (1.4 \times 10^8)$</p> <div style="text-align: center; margin: 10px auto;"> $.56 \times 10^8$ <div style="border: 1px solid black; padding: 2px;"> 5.6×10^7 </div> </div>
<p>g. $\frac{30 \times 10^0}{1.2 \times 10^5}$</p> <div style="text-align: center; margin: 10px auto;"> 25×10^{-5} <div style="border: 1px solid black; padding: 2px;"> 2.5×10^{-4} </div> </div>	<p>h. $(5 \times 10^5)(0.4)$</p> <div style="text-align: center; margin: 10px auto;"> <div style="border: 1px solid black; padding: 2px;"> 2×10^5 </div> </div>	<p>i. What percent of (1.3×10^6) is (6.5×10^5)?</p> <div style="text-align: center; margin: 10px auto;"> $\left(\frac{6.5 \times 10^5}{1.3 \times 10^6}\right) 100$ $(5 \times 10^{-1}) 100$ <div style="border: 1px solid black; padding: 2px; display: inline-block;"> 500×10^{-1} 50% </div> </div>

9. 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?

a. Use the method discovered above to perform this operation.

b. Now try it to find out how many thousands are in a trillion.



Use scientific notation to answer each question

10. 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?

↓ this ÷ ↓ that

$$\frac{1.146 \times 10^9}{3.41 \times 10^8} = 0.336 \times 10^1 = 3.36 \times 10^0 \text{ OR}$$

3.36 times more

→ division

11. 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?

→ division

↓ this ÷ ↓ that

$$\frac{1.35 \times 10^{-1}}{1.0922 \times 10^{-2}} = 1.24 \times 10^1$$

12.4 times thicker

12. A millipede's leg is 4.23×10^{-3} cm long.
a. How long is the millipede's leg in standard form?

.00423 cm

- b. 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?

$$\frac{(4.23 \times 10^{-3}) \times 1000}{4230 \times 10^{-3}}$$

4.23×10^0 OR 4.23 cm

13. A cricket weighs 3.88×10^{-2} ounces. How many crickets are in a pound (a pound has 16 ounces)?

$$\frac{16 \text{ oz}}{3.88 \times 10^{-2}} = 4.12 \times 10^2 = 412 \text{ crickets}$$



14. Determine the thickness of one sheet of paper in this book. Show your work and solution using scientific notation. Express your answer in units of appropriate size.