

NAME: _____

Math _____, Period _____

Mr. Rogove

Date: _____

LEARNING OBJECTIVE: We will multiply and divide numbers expressed in scientific notation. (G8M1L10)

CONCEPT DEVELOPMENT: *ANY ORDER, ANY GROUPING.*
Using the Commutative and Associative Properties
to Rewrite Multiplication Problems

Example: The world population is about 7 billion. If there are 4.6×10^7 ants for every human, how many ants are there?

$(7 \times 10^9)(4.6 \times 10^7)$

$$\begin{array}{r} 4.6 \\ \times 7 \\ \hline 32.2 \end{array}$$

$$\begin{aligned} &7 \times 10^9 \times 4.6 \times 10^7 \\ &(7 \times 4.6) \times (10^9 \times 10^7) \\ &32.2 \times 10^{16} \end{aligned}$$

$$32.2 \times 10^{16} \leftarrow$$

$$3.22 \times 10^{17} \leftarrow$$

CONVERT TO SCI. NOTATION.

GUIDED PRACTICE:

Steps for Multiplying (or Dividing) Numbers Expressed in Scientific Notation ($d \times 10^n$)

1. Multiply (or divide) the d values.
2. Multiply (or divide) the powers of 10.
3. If necessary, rewrite expressing number in correct scientific notation.

<p>Multiply $(7 \times 10^2)(4 \times 10^5)$</p> $(7 \times 4) \times (10^2 \times 10^5)$ 28×10^7 2.8×10^8	<p>Multiply $(1.5 \times 10^{-4})(7 \times 10^{15})$</p> $(1.5 \times 7) (10^{-4} \times 10^{15})$ 10.5×10^{11} 1.05×10^{12}
<p>Divide:</p> $\frac{2 \times 10^3}{8 \times 10^8}$ $.25 \times 10^{-5}$ $(25 \times 10) \times 10^{-5} \times \frac{1}{10}$ 2.5×10^{-6} $.25 \times 10^{-5}$ 2.5×10^{-6}	<p>Divide:</p> $\frac{4.2 \times 10^2}{8.4 \times 10^5}$ $.5 \times 10^{-3}$ 5×10^{-4}

The population of California is 3.8×10^7 people. Each person on average eats 6.3×10^2 pounds of dairy products in a year. How many pounds of dairy products are consumed in California each year?

Multiply?

$$(3.8 \times 10^7) (6.3 \times 10^2)$$

$$(3.8 \times 6.3) (10^7 \times 10^2)$$

$$23.94 \times 10^9$$

$$2.394 \times 10^{10} \text{ lbs.}$$

$$\begin{array}{r} \checkmark \\ 6.3 \\ \times 3.8 \\ \hline 5.04 \\ 18.90 \\ \hline 23.94 \end{array}$$

The term mole can be used in chemistry to refer to 6.02×10^{23} atoms of a substance. The mass of a single hydrogen ~~molecule~~^{atom} is approximately 1.67×10^{-24} gram. What is the mass (in grams) of 1 mole of hydrogen atoms?

$$(6.02 \times 10^{23}) (1.67 \times 10^{-24})$$

$$(6.02 \times 1.67) (10^{23} \times 10^{-24})$$

$$10.0534 \times 10^{-1}$$

$$1.00534 \times 10^0$$

$$= 1.00534 \text{ gra}$$

$$\begin{array}{r} 1.67 \\ 6.02 \\ \hline 10.0534 \end{array}$$

The speed of light is 300,000,000 meters per second. The sun is approximately 1.5×10^{11} meters from earth. How many seconds does it take for sunlight to reach earth?



$$1.5 \times 10^{11} \text{ m}$$

$$300,000,000$$

$$3 \times 10^8$$

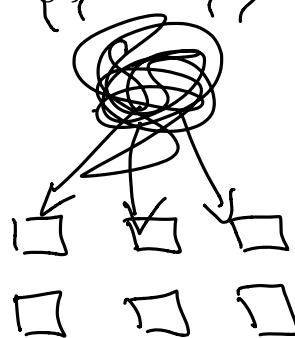
$$\frac{1.5 \times 10^{11}}{3 \times 10^8}$$

$$.5 \times 10^3$$

$$5 \times 10^2$$

$$500 \text{ seconds}$$

In 2010, Americans generated 2.5×10^8 tons of garbage. If there are 2000 landfills in the U. S., how much garbage (on average) did each landfill receive?



$$\frac{2.5 \times 10^8}{2 \times 10^3}$$

$$1.25 \times 10^5$$

$$1.25 \times 10^5 \text{ tons}$$

$$125,000$$

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INDEPENDENT PRACTICE:**Steps for Multiplying (or Dividing) Numbers Expressed in Scientific Notation**
($d \times 10^n$)

1. Multiply (or divide) the d values.
2. Multiply (or divide) the powers of 10.
3. If necessary, rewrite expressing number in correct scientific notation.

A certain social media company processes about 990 billion "likes" per year. If the company has approximately (8.9×10^8) users of the social media, how many "likes" is each user responsible for?

$$\frac{9.9 \times 10^{11}}{8.9 \times 10^8}$$

A cup of decaf coffee has about 0.009 grams of caffeine. A cup of regular coffee has about 12 times the caffeine. How much caffeine does a regular cup have? Please write your answer in scientific notation.

$$(9 \times 10^{-3}) (12)$$

About 8.4×10^{11} drops of water flow over Niagara Falls each minute. Each drop of water contains about 1.7×10^{22} molecules of water. About how many molecules fall each minute?

$$(8.4 \times 10^{11}) (1.7 \times 10^{22})$$

As of January 1, 2014, the US debt was roughly \$17,300,000,000,000. The population was about 3.14×10^8 . About how much is each citizen's share of the national debt?

$$\frac{1.73 \times 10^{13}}{3.14 \times 10^8}$$

$$0.55 \times 10^5$$

\$5,000 / person

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ACTIVATING PRIOR KNOWLEDGE:

We can compare numbers that are large or small.

<p>Order the following numbers from largest to smallest:</p> <p>A. 3.4×10^8</p> <p>B. 9.996×10^7</p> <p>C. 10^9</p> <p>D. 500,000,000</p>	<p>Order the following numbers from largest to smallest:</p> <p>A. 0.00012</p> <p>B. 1.2×10^{-3}</p> <p>C. 9.9×10^{-4}</p> <p>D. 10^{-4}</p>
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CLOSURE:

The speed of light is 3×10^8 meters per second. The sun is approximately 230,000,000,000 meters from Mars. How many seconds does it take for sunlight to reach Mars?

If the sun is approximately 1.5×10^{11} meters from Earth, what is the approximate distance from Earth to Mars?

TEACHER NOTES:

Homework for this: Multiplying and Dividing Scientific Notation on Khan