NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

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

Any order Commutative $a \times b \times c = a \times c \times b$

Any group Associative $a \times (b \times c) = (a \times b) \times c$

CONCEPT DEVELOPMENT:

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?

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

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

Group "d" together

Group powers of 10 together

$(3.1 \times 10^6)(6.9 \times 10^{11})$

$(3.1 \times 6.9)(10^6 \times 10^{11})$

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.

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

NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

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?

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

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

23.94×10^9

2.394×10^{10} lbs of dairy

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?

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

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

10.0534×10^{-1}

1.00534 ~~$\times 10^{1} \times 10^{-1}$~~ grams.

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?

$R = \frac{D}{T}$ $T = \frac{D}{R}$

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

$.5 \times 10^3$

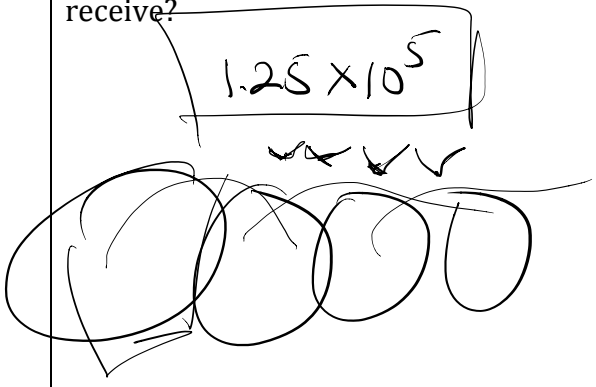
5×10^2

500 seconds

8 min. 20 sec.

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?

1.25×10^5



NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

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?	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.
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?	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 citizens share of the national debt?

NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

Activating Prior Knowledge:

We can compare numbers that are large or small.

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

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