2-3 Multiplying and Dividing Numbers in Scientific Notation Date _____

Multiply and Divide Scientific Notation

Objective: I can find the product and quotient of numbers written in scientific notation.

Warm Up: Answer the following questions (without a calculator)

(a) 2.7×3.4

$$\begin{array}{r} 2.7 \\ \times\ 3.4 \\ \hline 108 \\ 810 \\ \hline 9.18 \end{array}$$

9.18

(b) $8.04 \div 6.7$

1.2

$$\begin{array}{r|l} & 1.2 \\ 6.7 & 8.04 \\ & -67\downarrow \\ & 134 \\ & -134 \\ & 0 \end{array}$$

(c) $10^3 \times 10^5$

Keep Base, Add exponents → 10^8

← M^A D^S →

(d) $\frac{10^{12}}{10^4}$

Keep Base, subtract exponents → 10^8

*To find the **product** of numbers that are in scientific notation:*

1. Multiply the first factors (the numbers before the multiplication sign)
2. Keep the Base of ten
3. ADD the exponents

* product Rule: M^A

Exercise 1- Evaluate the following $(7 \times 10^3)(2 \times 10^4)$

Add Exponents.

14×10^7

LA

convert to correct Sci. Not.

1.4×10^8

Exercise 2- Evaluate the following $(8.4 \times 10^2)(2.5 \times 10^6)$

21×10^8

LA

Not correct Sci. Not.

2.1×10^9

*To find the **quotient** of numbers that are in scientific notation:*

1. Divide the first factors (the numbers before the multiplication sign)
2. Keep the Base of ten
3. Subtract the exponents

Exercise 3- Evaluate the following $\frac{9 \times 10^{10}}{3 \times 10^6}$

3×10^4

Exercise 4- Evaluate the following $\frac{1.14 \times 10^{6}}{4.8 \times 10^{3}}$

0.2375×10^{3} (RS) Not correct Sci. Not. 2.375×10^{2}

PROBLEM SET:

1. Evaluate the following

a. $(2.63 \times 10^{4})\,(1.2 \times 10^{-3})$

3.156×10^{1}

b. $\frac{9 \times 10^{-11}}{2.4 \times 10^{8}}$

3.75×10^{-19}

c. $(9 \times 10^{-4})\,(4.34 \times 10^{-3})$

39.06×10^{-7} (LA) 3.906×10^{-6}

d. $\frac{1.24 \times 10^{1}}{4 \times 10^{-2}}$

0.31×10^{3} (RS) 3.1×10^{2}

2. Neurons are cells in the nervous system that process and transit information. An average neuron is about 5×10^{-6} meter in diameter. A standard table tennis ball is 0.04 meter in diameter. About *how many times* as great is the diameter of a ball than a neuron? 4×10^{-2}

$\frac{\text{Ball}}{\text{Neuron}} = \frac{4 \times 10^{-2}}{5 \times 10^{-6}} = 0.8 \times 10^{4} = 8 \times 10^{3}$

(RS) NOT Scientific NOTATION

The diameter of the ball is approx. 8,000 times larger.

3. Central Park in New York City is rectangular in shape and measures approximately 1.37×10^{4} feet by 2.64×10^{2} feet. If one acre is equal to 4.356×10^{4} square feet, how many acres does Central Park cover? *Round to the nearest hundredth.* [HINT: space covered is area]

AREA is L*W (multiply!)

$(1.37 \times 10^{4})(2.64 \times 10^{2})$

3.62×10^{6} ft. AREA in feet.

acres: $\frac{3.62 \times 10^{6}}{4.356 \times 10^{4}}$

$0.83 \times 10^{2} = 8.3 \times 10^{1}$ acres!

(RS) or 83 acres!

4. In 2005, 8.1×10^{10} text messages were sent in the United States. In 2010, the number of annual text messages had risen to 1,810,000,000,000. About *how many times* as great was the number of text messages in 2010 than 2005?

1.8×10^{12} (Top) (Bottom) 8.1×10^{10}

$\frac{1.8 \times 10^{12}}{8.1 \times 10^{10}} = 0.22 \times 10^{2} = 2.2 \times 10^{1}$

(RS)

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About 22 times as many text messages