

Multiplying & Dividing Scientific Numbers

I. Steps:

- a) Group the coefficients
- b) Group the powers of ten (the exponents)
- c) Multiply or Divide the coefficients.
- d) Multiply the powers of ten by: adding the exponents or Divide the powers of ten by: subtracting the exponents.
- e) Make Sure your final answer is in scientific notation (Coefficient has to be ≥ 1 and < 10)

**** Exponents don't have to be the same****

**** If you move the decimal point one place to the right, you subtract one number from the exponent (If you make the coefficient bigger, make the exponent smaller)**

*** If you move the decimal point one place to the left, you add one number to the exponent (If you make the coefficient smaller, make the exponent bigger)**

II. Examples: Perform the indicated operation. Write your answer in scientific notation.

1) $(4.84 \times 10^{11}) \div (8.8 \times 10^4)$

$(4.84 \div 8.8) \times (10^{11} \div 10^4)$ *sub. exponent*
 $10^{11-4} = 10^7$

$0.55 \times 10^{7-1}$
 5.5×10^6

gets bigger (pointing to 5.5)
must get smaller (pointing to 10^6)

2) $(8.9 \times 10^7) \cdot (9.8 \times 10^{10})$

$(8.9 \cdot 9.8) \times (10^7 \cdot 10^{10})$ *Add exponents*
 $10^{7+10} = 10^{17}$

$87.22 \times 10^{17+1}$
 8.722×10^{18}

gets smaller (pointing to 8.722)
must get bigger (pointing to 10^{18})

* ~~Must~~ put the parentheses in the calculator around each scientific number * Don't have to show work if putting into the calculator
 * ~~Answers~~ should be in scientific notation *

3) $\frac{(2.21 \times 10^9)}{(2.6 \times 10^3)}$ → Fraction means to divide

$$\left(\frac{2.21}{2.6}\right) \times \left(\frac{10^9}{10^3}\right) \text{ sub. exponent}$$

$$.85 \times 10^{6-1}$$

$$\boxed{8.5 \times 10^5}$$

4) $(6.3 \times 10^{31})(3.5 \times 10^{13})$

→ means to multiply

Add exp

$$(6.3 \cdot 3.5) \times (10^{31} \cdot 10^{13})$$

$$22.05 \times 10^{44+1}$$

$$\boxed{2.205 \times 10^{45}}$$

5) $(1.44 \times 10^{13}) \cdot (2.5 \times 10^2)$

Add exp

$$(1.44 \cdot 2.5) \times (10^{13} \cdot 10^2)$$

$$\boxed{3.6 \times 10^{15}}$$

6) $(2.66 \times 10^{10}) \div (9.5 \times 10^5)$

sub exp

$$(2.66 \div 9.5) \times (10^{10} \div 10^5)$$

$$.28 \times 10^{5-1}$$

$$\boxed{2.8 \times 10^4}$$

7) $(2.2 \times 10^2)(4.55 \times 10^{12})$

Add

$$(2.2 \cdot 4.55) \times (10^2 \cdot 10^{12})$$

$$10.01 \times 10^{14+1}$$

$$\boxed{1.001 \times 10^{15}}$$

8) $\frac{(2.42 \times 10^{10})}{(5.5 \times 10^4)}$

sub exp

$$\left(\frac{2.42}{5.5}\right) \times \left(\frac{10^{10}}{10^4}\right)$$

$$.44 \times 10^{6-1}$$

$$\boxed{4.4 \times 10^5}$$