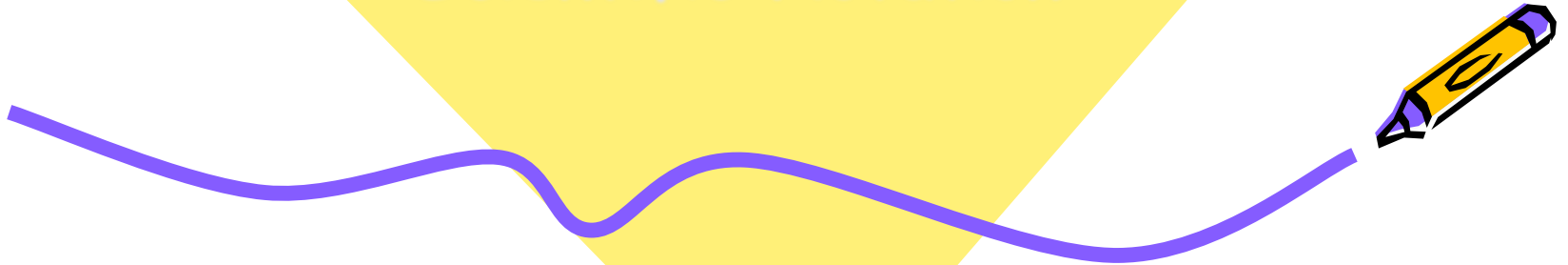




Ch 8.2

Scientific Notation



Scientific Notation

- A # is written in Sci. Note in the form $a \times 10^n$, where n is an integer and $1 \leq a < 10$.

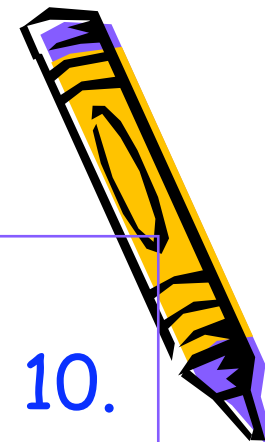
Examples:

$$2.6 \times 10^4$$

$$6.13 \times 10^{-7}$$

Are the following written in Sci. Note?

Ex. 34.5×10^2 7.2×10^{-3} 0.92×10^4



Writing a # in Sci. Note

- Move the decimal after the first number between 1 & 9
- Count the number of spaces you moved ~ this is your exponent

ASK MR AL!

- When you move right, minus (subtract) the exponent : MR Ex. $0.0063 \rightarrow 6.3 \times 10^{-3}$
- When you move left, add the exponents:
AL Ex. $234,000,000 \rightarrow 2.34 \times 10^8$



Try some

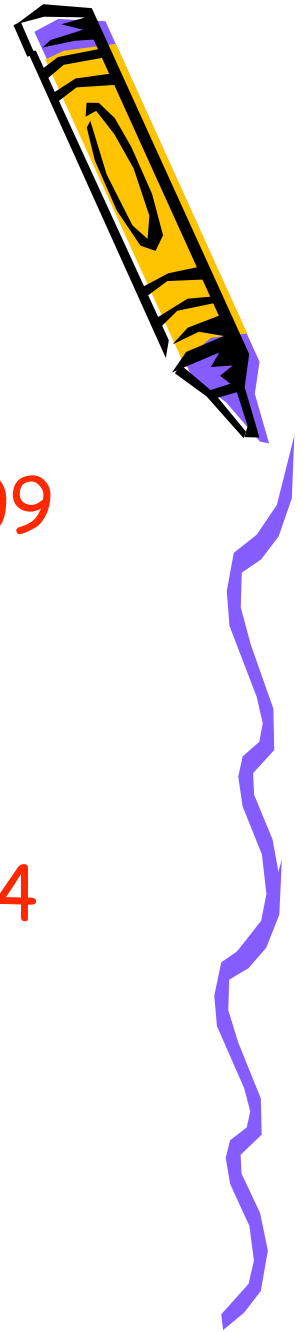
Write each number in Sci. Note

1. 46,205,000

2. 0.00000009

3. 3400

4. 0.0000054



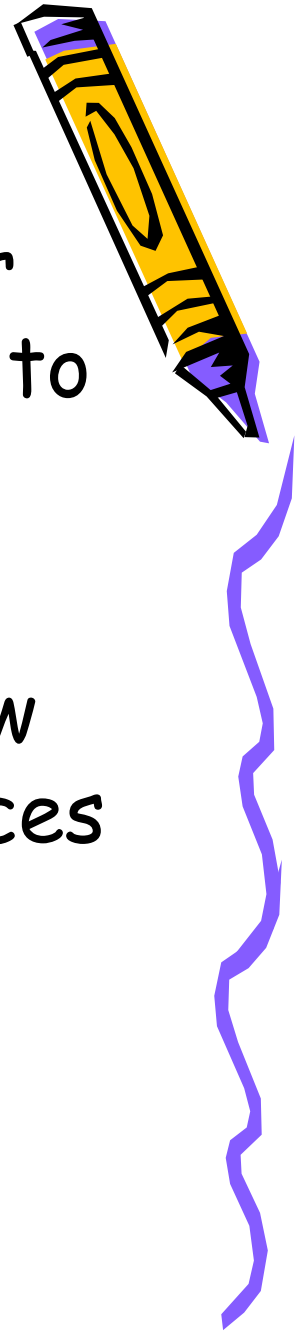
Writing a # in Standard Notation

- A **positive exponent** makes a bigger #, move decimal that # of spaces to the **right**. Fill in zeros if nec.

Ex. $8.8 \times 10^4 \rightarrow 88,000$

- A **negative** exponent makes a # b/w 0 & 1, move decimal that # of spaces **left**. Fill in zeros if nec.

Ex $7.36 \times 10^{-5} \rightarrow 0.0000736$



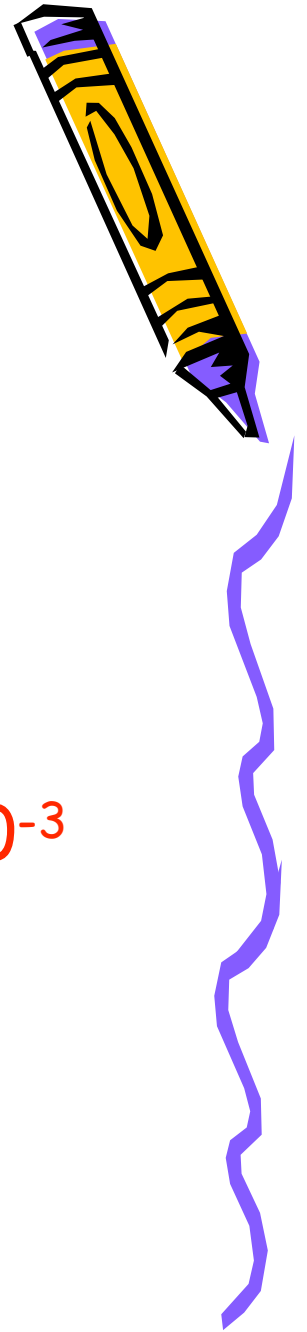
Try some
Write each number in Stand. Note

1. 3.04×10^7

2. 1.7×10^{-8}

3. 6.23×10^6

4. 5.782×10^{-3}



Ordering #s in Sci. Note

- 1- Make sure #s are in Sci. Note
- 2- Order the powers of 10
- 3- If #s have same power of 10 then order by the decimal
- 4- Write in order as original values

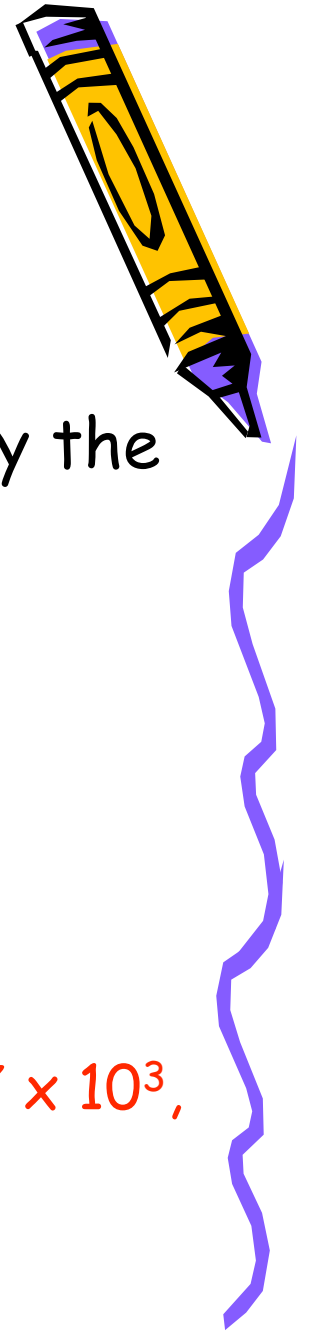
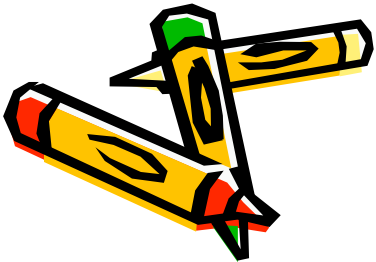
Example: Place in order from least to greatest

$$60.2 \times 10^{-5}, 63 \times 10^{-2}, 0.067 \times 10^3, 61 \times 10^{-2} =$$

$$6.02 \times 10^{-4}, 6.3 \times 10^{-1}, 6.7 \times 10, 6.1 \times 10^{-1} =$$

Order: 1, 3, 4, 2

Original Values: $60.2 \times 10^{-5}, 61 \times 10^{-2}, 63 \times 10^{-2}, 0.067 \times 10^3,$



Try Some
Put in Order from Least to
Greatest

0.0063×10^5 , 6.03×10^4 , 6103, 63.1×10^3



Multiplying # in Sci. Note

- Multiply the #s together
 - **Add the exponents** together of base 10
- *Make sure the number is still written in Scientific Notation. If not rewrite it.

Examples:

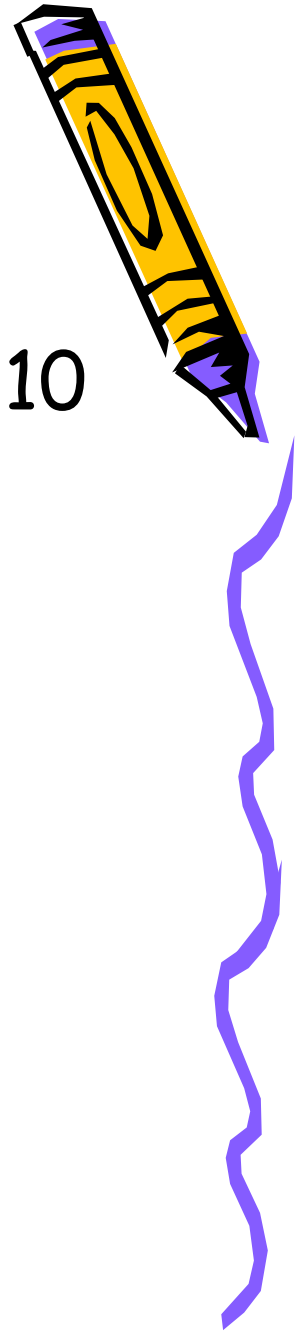
$$2.5 (6 \times 10^3) = (2.5 \cdot 6) \times 10^3 = 15 \times 10^3$$

New value is not Sci. Note so **ASK MR. AL**

Add left so **1.5×10^4**

$$(3 \times 10^{-3})(7 \times 10^{-5}) = (3 \cdot 7)(10^{-3+(-5)}) = 21 \times 10^{-8}$$

Add right so **2.1×10^{-7}**



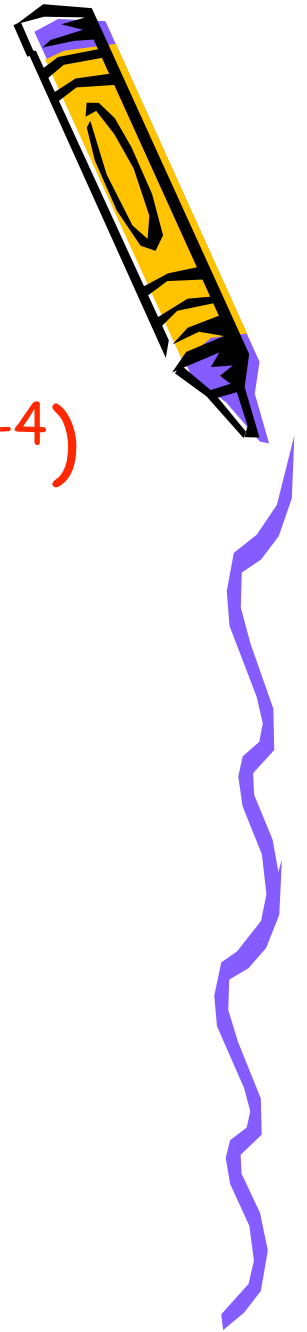
Try Some

Simplify & write in Sci. Note

1. $0.4(2 \times 10^{-9})$

2. $6(8 \times 10^{-4})$

3. $(3 \times 10^{-3})(8 \times 10^{-5})$

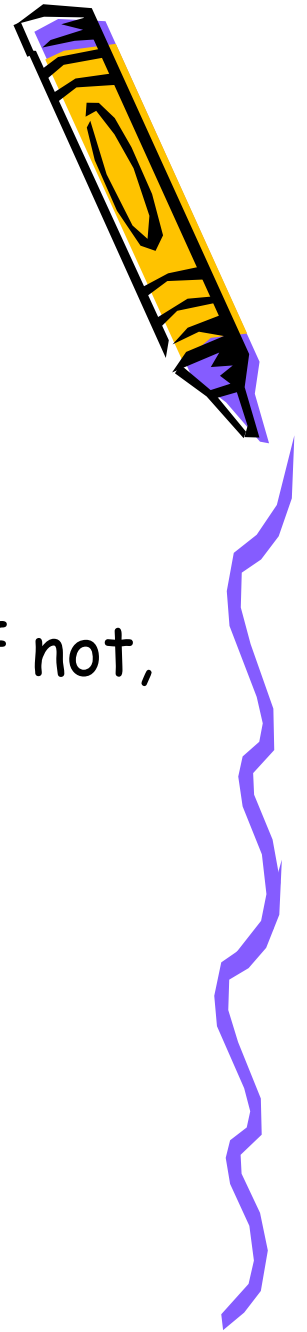


Raising Powers with Sci. Note

- Raise both the # & the base 10 to the power, simplify the #
- If the base 10 has an exponent already, multiply the 2 exponents
- Make sure # still in Sci. Note (rewrite if not, rmb: Ask MR. AL)

Example:

$$\begin{aligned}10^{-3} \cdot (4 \times 10^4)^2 &= 10^{-3} \cdot 4^2 \times 10^{4 \cdot 2} = \\16 \times 10^8 \cdot 10^{-3} &= 16 \times 10^5 \\ &= 1.6 \times 10^6\end{aligned}$$

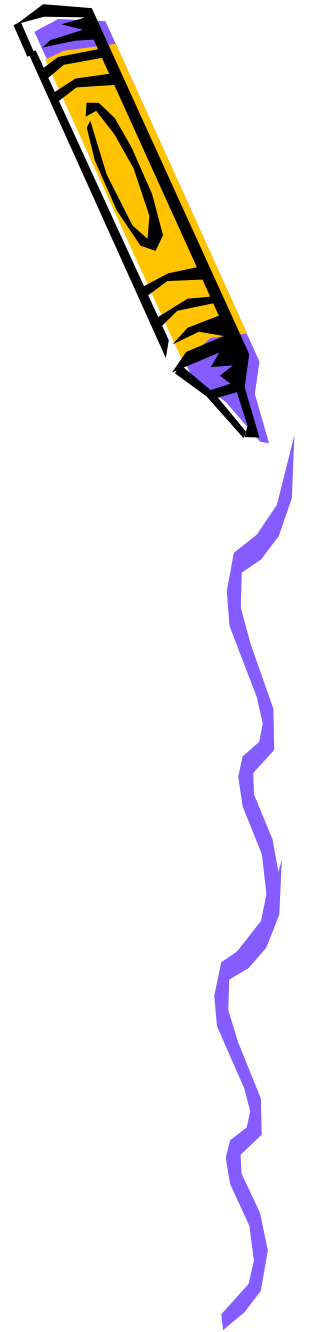


Dividing Powers with Sci. Note

- Divide the #s, subtract exponents
- Make sure # still in Sci. Note

Example:

$$\frac{2 \times 10^3}{10 \times 10^8} = .2 \times 10^{-5} = 2 \times 10^{-6}$$



Try some
Simplify each expression.

1. $(5 \times 10^6)^{-2}$

2. $(2 \times 10^2)(3 \times 10^8)^2$

3. $\frac{7.5 \times 10^{16}}{2.5 \times 10^{-4}}$

