1.4C Scientific Notation

A. Scientific Notation

Extremely large or extremely small numbers are sometimes written in **scientific notation**.

Scientific Notation looks like $\#\times 10^{power}$, where # is a number between 1 and 10.

B. Converting to Scientific Notation

Move the decimal point to get a number between 1 and 10.

If you move the decimal to the left, the power is **positive**.

If you move the decimal to the right, the power is **negative**

Examples:

1. Convert $14,730,000$ to scientific notation

   The decimal point sits to the right of the last zero, so you need to move it 7 times to the left to get 1.473.

   Thus we have $\boxed{1.473\times 10^{7}}$

2. Convert $891,500$ to scientific notation

   The decimal point is to the right of the last zero, so you need to move it 5 times to the left to get 8.915

   Thus we have $\boxed{8.915\times 10^{5}}$

3. Convert $.003436$ to scientific notation

   Move the decimal point 3 times to the right to get 3.436. Since we move it to the right, the power is negative.

   Thus we have $\boxed{3.436 \times 10^{-3}}$

C. Converting Back From Scientific Notation

Here we convert back, so we undo the steps above.

If the power is positive, you move the decimal to the **right**.

If the power is negative, you move the decimal to the **left**.

Examples:

1. Convert 6.15×10^{4} back to a regular number

   Positive power, so move to the right (need to add 2 zeros!)

   Thus we have $\boxed{61500}$

2. Convert 8.23×10^{-3} back to a regular number

   Negative power, so move to the left (need to add 2 zeros!)

   Thus we have $\boxed{.00823}$

To avoid getting the rules mixed up, just remember the following:

$10^{pos.power}$ $\Rightarrow$ big number

$10^{neg.power}$ $\Rightarrow$ small number

D. Multiplying and Dividing Scientific Notation

Here you multiply/divide the "base numbers" like normal. Do the powers of 10 separate using the properties of exponents.

Example:

Simplify $\frac{(5.2\times10^{-6})(6\times10^{3})}{1.3\times10^{-12}}$

$\frac{(5.2)(6)}{1.3} \times \frac{10^{-6}\cdot10^{3}}{10^{-12}}$

$24 \times \frac{10^{-3}}{10^{-12}}$

24×10^{9}

Move the decimal once to the left (+1 power) to write in scientific notation.

$\boxed{2.4 \times 10^{10}}$