The FRAME Routine

Key Topic: Scientific Notation

Name: Period 5

is about...

a short way to write very BIG or very small numbers

How to write:
- expressed as two factors
- Factor 1 - a number greater or equal to 1 but less than 10
- Factor 2 - a power of 10 ($\times 10^{\square}$)

Main idea

BIG Numbers

Standard → Scientific

① Move decimal left to make a number greater or equal to 1 & less than 10

72,000,000. = 7.2 (factor 1)

② Number of spots you moved decimal becomes your power of 10

moved 7 places = 10^7 (factor 2) ③ 7.2×10^7

Scientific → Standard

Positive Exponent = move decimal to right

$6.2 \times 10^6 = 6.2000000 = 6200000$

Main idea

small Numbers

Standard → Scientific

① Move decimal right to make a number greater or equal to 1 & less than 10

.0000072 = 7.2 (factor 1)

② Number of spots you moved decimal becomes your power of 10, must be Negative

moved 6 places = 10^{-6}

③ 7.2×10^{-6}

Scientific → Standard

Negative Exponent = move decimal left

$6.2 \times 10^{-7} =$ .0000006,2 = .00000062

write decimal point

Operations in Scientific Notation

Main idea
Multiplying

① Group the numbers
② Add the exponents (law of exponents)
③ Multiply the numbers
④ Ask.... Is it in scientific notation?
- yes → all done
- no → move decimal and change exponent

Main idea
Dividing

① Divide the numbers
② Subtract the exponents (law of exponents)
③ Ask.... Is it in scientific notation?
- yes → all done (11)
- no → move decimal and change exponent

Main idea
Adding/Subtracting

① Make sure exponent is the same
* To increase exponent move decimal to the left & increase exponent number of spots moved
② Add or subtract the numbers (factor 1)
③ Ask.... is answer in scientific notation? no → move decimal and change exponent
yes = done

Ex

$(7.3 \times 10^8)(2.4 \times 10^3)$

$7.3 \times 2.4 \times 10^8 \times 10^3$ ①

$17.52 \times 10^{11+1}$ ②

1.752×10^{12} ④

③
$\begin{array}{r} 1 \\ 7.3 \\ \times 2.4 \\ \hline 292 \\ +1460 \\ \hline 17.52 \end{array}$

Ex

$\frac{8.37 \times 10^8}{2.7 \times 10^3}$

3.1×10^5 ②

③ In S.N.? yes ✓

① $2.7 \overline{)8.37}$ → 3.1, -81, 27, -27, 0

Ex

$(6.9 \times 10^7) + (2.12 \times 10^5)$

$(6.9 \times 10^7) + (.0212 \times 10^7)$

$\begin{array}{r} 6.9000 \\ +\ .0212 \\ \hline 6.9212 \end{array}$ 6.9212×10^7

So What? (What's important to understand about this?)

to be able to convert #'s between Scientific notation & standard form