Significant Figures with Scientific Notation Addition and Subtraction

Speaking realistically, the problems discussed below can all be done on a calculator. However, you need to know how to enter values into the calculator, read your calculator screen, and round off to the proper number of significant figures. Your calculator will not do these things for you.

All exponents MUST BE THE SAME before you can add and subtract numbers in scientific notation. The actual addition or subtraction will take place with the numerical portion, NOT the exponent.

The student might wish to re-read the above two sentences with emphasis on the emphasized portions.

It might be advisable to point out again - DO NOT, under any circumstances, add the exponents.

Example #1: $1.00 \times 10^3 + 1.00 \times 10^2$

A good rule to follow is to express all numbers in the problem in the highest power of ten.

Convert 1.00×10^2 to 0.10×10^3, then add:

$$
\begin{aligned}
&1.00 \times 10^3 \\
+\ &0.10 \times 10^3 \\
=\ &1.10 \times 10^3
\end{aligned}
$$

Example #2: The significant figure issue is sometimes obscured when numbers are in scientific notation. For example, add the following four numbers:

$$(4.56 \times 10^6) + (2.98 \times 10^5) + (3.65 \times 10^4) + (7.21 \times 10^3)$$

When the four numbers are written in the highest power, we get:

$$
\begin{aligned}
&4.56 \ \times 10^6 \\
&0.298 \ \times 10^6 \\
&0.0365 \ \times 10^6 \\
+\ &0.00721 \times 10^6 \\
=\ &4.90171 \times 10^6
\end{aligned}
$$

The answer upon adding must be rounded to 2 significant figures to the right of the decimal point, thus giving 4.90×10^6 as the correct answer.

Generally speaking, you can simply enter the numbers into the calculator and let the calculator keep track of where the decimal portion is. However, you must then round off the answer to the correct number of significant figures.

Lastly, be warned about using the calculator. Students often push buttons without understanding the math behind what they are doing. Then, when the teacher questions their work, they say "Well, that's what the calculator said!" As if the calculator is to blame for the wrong answer. Remember, it is your brain that must be in charge and it is you that will get the points deducted for poor work, not the calculator.

Practice Problems

1) $(4.52 \times 10^{-5}) + (1.24 \times 10^{-2}) + (3.70 \times 10^{-4}) + (1.74 \times 10^{-3})$

2) $(2.71 \times 10^6) - (5.00 \times 10^4)$

Reminder: you must have the same exponent on each number of the problem.