Rules for working with Significant Figures

The rules for working with significant figures, or as they are more commonly known "sig figs", can be confusing. We have broken down the rules, with some examples, to help clarify them.

All digits 1-9 are ALWAYS significant. These numbers are called non-zero digits because they do not contain the number zero.

597 has three sig figs and 21 has two sig figs.

A zero between two non-zero digits are ALWAYS significant. These zeros are called trapped zeros because the zero is trapped between two non-zero digits.

201 has three sig figs and 1001 has four sig figs.

A zero that comes before a non-zero digit is NEVER significant. These zeros are known as leading zeros because they lead into a non-zero digit.

0.12 has two sig figs and 000000.12 has two sig figs.

A zero that comes after a non-zero digit can be a bit trickier, but don't worry, we've got you covered! These zeros are called trailing zeros because they are trailing behind non-zero digits. The thing to remember about trailing zeros is that they are only significant after a decimal point.

120 has two sig figs because the zero isn't after the decimal point, but 12.0 has three sig figs because the zero is after the decimal point.

A special note: a decimal makes a trailing zero before a decimal point significant.

For example, 120.0 has four significant figures. Sometimes you might see 120. (without anything after the zero). The decimal after the zero is letting you know that that trailing zero is significant.

Using Sig Figs in Mathematical Operations

When adding or subtracting numbers, the answer will have the same number of decimal places as the number with the fewest number of decimal places in your problem.

$$2.45 + 3.987 = 6.437 \rightarrow 6.44$$

2.45 has two decimal places, and 3.987 has three decimal places. Our answer will need to be rounded to two decimal places, or to the same number of decimal places and the number with the fewest number of decimal places in our problem. Our answer when rounded becomes 6.44

When multiplying or dividing numbers, the answer will have the same number of sig figs as the number with the fewest number of sig figs in your problem.

$$64.3 * 0.01 = 0.643 \rightarrow 0.64$$

64.3 has three sig figs (all the digits are non-zero digits). 0.01 has two sig figs (the leading zero before the decimal point is not significant, the zero after the decimal point is significant along with the non-zero digit). Our answer will need to be rounded to two sig figs, or to the same number of sig figs as the number with the fewest number of sig figs in our problem. Our answer when rounded becomes 0.64 (remember the zero before the zero is not significant).