

Significant Figures

Gen Chem 1311

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In science we have a set of rules to follow when dealing with numbers.

An **exact number** is a number which has been **counted** or **defined**, thus any of the conversions and/or constant we use are exact numbers. Exact numbers have an infinite number of significant figures!!

An **inexact** number is a number with a point of uncertainty. In other words, an inexact number is a measurement, which often relies on instruments and human judgments for accuracy, as in weighing a sample in lab.

What to do when handling numbers in this course;

1. Determine if the number is exact or inexact. Recall that an exact number is a counted number, a constant, or a conversion factor. If the number is exact consider the number of significant figures to be infinite.
2. If the number is inexact, for example a measured number, we must consider significant figures.

All integers are significant figures!! The last integer is the position of uncertainty.

3. Zeroes are the tricky part....
 - a. Do you have a decimal point?
If yes, you are able to determine the number of significant figures.
If no, then you need more information in order to determine the number of significant figures.
 - b. If you have a decimal point, convert your number to scientific notation.
 - c. **Zeroes at the beginning are not significant.**
 - d. **Zeroes at the end with a decimal are always significant.**
 - e. **Zeroes in the middle are always significant.**
4. Determine the number of significant figures for each inexact number in all calculations.
5. You can only report your answer with the smallest number of significant numbers present in the problem.

For example;

Let's calculate the area of a square 6.221cm long and 5.2cm wide.

$$(6.221 \text{ cm})(5.2 \text{ cm}) = 32.3492 \text{ cm}^2$$

We are multiplying (6.221 cm, 4 sig fig) with (5.2cm, 2 sig fig)....2 sig figs is the smallest number of sig figs, so our answer must have only 2 sig figs.

$$(6.221 \text{ cm})(5.2 \text{ cm}) = 32 \text{ cm}^2$$

