

Introduction to Significant Figures

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In science, we measure. We attempt to measure with precision and accuracy. When we measure with precision, we find an answer to “How big?” that others will also find or that we will find again if we measure the same quantity again. Precision is determined by our skill using the measuring tools and the care we use when measuring.

When we measure with accuracy, we record our measurements to a certain number of decimal places. Accuracy is determined by the measuring device we use and the smallest gradations on the device. For example, if our stopwatch records tenths of seconds, then we cannot measure with an accuracy of hundredths of second.

Just as we cannot measure more accurately than our tools allow, we cannot calculate more accurately than our tools allow. Also, the least accurate measurement in a collection limits the accuracy that the results can be reported. These limits are the basis of the rules of “significant figures” that scientists follow, and these are commonly called “sig figs.”

Science students are urged to follow accepted practices of sig figs; with practice the rules are easy to follow and good habits become the norm.

Here are some rules that we follow when working with sig figs:

- 1) All non-zero digits are significant.
- 2) Zeros between sig figs are significant.
- 3) Zeros to the left are not sig figs.
- 4) Zeros to the right usually are significant.
- 5) Perform all calculations, then round as necessary for sig figs.

There are a number of good tutorials on sig figs on the World Wide Web. Many of these are created by professional scientists for use by their students.