

PRINCIPLES OF SIGNIFICANT FIGURES REFERENCE GUIDE

1. Significant figures do not apply to exact numbers or exact counts.

Examples: 1 dozen; \$9.95; 13 people

2. Significant figures apply to numbers that are measured, such as a physical quantity, which are not exact.

Examples: 4.33 cm; 9.7 cm³; 15.76 g

3. Significant figures indicate the limitations on the precision of the instrument used to make the measurement. In other words, they communicate the degree of uncertainty of the measurement.

4. The significant figures in a measured number include all of the figures (or digits) of which are certain and one figure that is estimated:

Example: In the measurement 15.76, the "6" is uncertain, or estimated, and is significant. The "15.7" is certain, or definite, and also is significant. The measurement therefore has four significant figures.

IDENTIFYING SIGNIFICANT FIGURES REFERENCE GUIDE

1. All digits known with certainty plus the first digit that is uncertain are significant figures.

2. All non-zero digits are significant, no matter what their position

137.34 contains five (5) significant figures

3. Captive zeros (between two non-zero digits) are significant.

120.007 contains six (6) significant figures

4. Leading zeros (preceding all non-zero digits) are **never** significant.

0.00476 contains three (3) significant figures

5. Trailing zeros are significant if the decimal point is printed on the page.

100.0 contains four (4) significant figures

2000. contains four (4) significant figures

0.00300 contains (3) significant figures

0.04060 contains (4) significant figures

6. If the decimal point is understood rather than printed, trailing zeros are not significant unless specified otherwise.

109,000 contains three (3) significant figures.

109,000 contains six (6) significant figures, if specified

7. When using scientific notation, all of the significant figures and only the significant figures appear in the coefficient. 1.00×10^5 has three (3) significant figures.

USING SIGNIFICANT FIGURES REFERENCE GUIDE

Addition and Subtraction

To add or subtract significant figures, align the decimal points. The rightmost decimal place is the key feature. The final answer cannot have a decimal place farther to the right than any of the measurements being used:

$$\begin{array}{r} 52.357 \\ + 45.23 \\ \hline = 97.587 \end{array} = 97.59$$

$$\begin{array}{r} 152.36 \\ - 5.037 \\ \hline = 147.323 \end{array} = 147.32$$

In addition and subtraction, the actual number of significant figures is irrelevant. Their position relative to the decimal point is the key.

Multiplication and Division

To multiply or divide significant figures, count the number of significant figures in each measurement being used. The answer will be limited to the same number of significant figures as the measurement with the fewest number of significant figures:

$$\begin{array}{r} 23.56 \\ \times 5.2 \\ \hline = 122.512 \end{array} = 120$$

$$\begin{array}{r} 2.36 \\ \div 5.037 \\ \hline = 0.46853286 \end{array} = 0.469$$

In multiplication and division, the position of the significant figures relative to the decimal point is irrelevant. The total number is the central issue.

Multiple Operations

When doing a series of multiplications or divisions, only the final answer need be rounded to the correct number of sig. figs.

When doing a series of additions or subtractions, only the final answer need be rounded to the correct number of sig. figs.