Guidelines for Significant Digits

Significant Digits (measured values)

1. Regardless of decimal position, for all non-logarithmic values any of the digits 1 to 9 is a significant digit and 0 may or may not be significant.
   e.g. 123, 0.123, 0.00230, 2.30×10^3, 2.03 all have three significant digits.

2. Leading zeros are not significant.
   e.g. 0.027, and 0.00035 have two significant digits.

3. The Learner Assessment Branch considers all trailing zeros to be significant.
   e.g. 200 has three significant digits
   0.123 00 and 20.000 have five significant digits

You can combine the above three rules into one rule: **Find the leftmost nonzero digit. Count it and every digit to the right of it as significant.**

4. For logarithmic values, such as pH, any digit to the left of the decimal is **not** significant
   e.g. 1.23 has two significant digits
   7 has no significant digits

Manipulation of Data

1. When **adding or subtracting** measured quantities, the calculated answer should be rounded to the same degree of precision as that of the least precise of the numbers used in the computation. For example:

38.**5** (least precise - possessing the fewest number of **decimal places**)
0.123
19.54
58.163

The answer should be rounded to 58.**2** (same number of decimal places as 38.5)

2. When **multiplying or dividing** measured quantities, the answer should be rounded off to the same number of significant digits as are contained in the quantity with the fewest number of significant digits **if this is the only operation.**

28.06
×**2.10** (least precise - only three significant digits)
58.926

The answer should be rounded to three significant digits and is therefore **58.9.**

3. When a series of calculations is performed, each interim value should not be rounded before carrying out the next calculation. The final answer should then be rounded to the same number of significant digits as are contained in the quantity in the **original data** with the fewest number of significant digits. For example:

In determining the value of (1.23)(4.321)÷(3.45 - 3.21), three calculations are required

a. 3.45 - 3.21 = 0.2428.06
b. (1.23)(4.321) = 5.31483
c. 5.31483 ÷ 0.24 = 22.145125
[Not 5.31÷ 0.24 = 22.125**]**

The value should be rounded to 22.1.

Note: In the example given, steps *a* and *b* yield interim values. These values should not be used in determining the number of significant digits.

4. When calculations involve exact numbers (counted and defined values) the calculated answer should be rounded based upon the precision of the measured value(s). For example:

12 eggs x 52.3 g/egg = 627.6 g
or
5 mol x 32.06 g/mol = 160.30 g
or
(1 mol)(1 095.8 kJ/mol) + (2 mol)(40.8 kJ/mol) = 1 014.2 kJ

Rounding

1. When the first digit to be dropped is less than or equal to 4, the last digit retained should not be changed. For example:

1.2345 rounded to three digits is 1.23

2. When the first digit to be dropped is greater than or equal to 5, the last digit retained should be increased by one. For example:

12.25 rounded to three digits is 12.3