

Lesson 5: Significant Digits

Significant digits – The digits in a measurement that are certain plus one that is estimated. These are the digits that carry meaning relative to the precision of the instrument used to take the measurement.

Rules for Sig. Dig's

1. Count all non – zero digits **e.g., 43.26 g (4 Sig. Dig's)**
2. All zeros between 2 nonzero digits are significant **e.g., 40.1 mL (3 Sig. Dig's)**
3. Zeros appearing to the right of non – zero digits, and to the left of an assumed decimal are not significant. **e.g., 55 000 kg (2 Sig. Dig's)**

Orally: *The instrument used allowed the reader to estimate the 5 in the thousands place and the zeros are required for place value. Therefore the zeros are important but they are not significant digits b/c we may not include more than one estimated digit.*

Question: *What if we estimated the zero in the hundreds place and were certain of the 5's?*

Answer: *We would use scientific notation to indicate the digits that are significant.*

e.g., 5.50×10^4 kg (3 Sig. Dig's)

4. Zeros appearing after the decimal, but before non – zero digits are not significant.

e.g., 0.000 56 g (2 Sig. Dig's)

Orally: *Why are the zeros not counted when we are certain of them? The convention is that digits are only considered significant if they are included in scientific notation (i.e., 5.6×10^{-3} g), therefore the zeros are present for the purpose of place value only.*

5. Zeros to the right of a decimal and to the right of non – zero digits are significant.

e.g., 0.0690 °C (3 Sig Dig's)

Orally: *Why is the last zero significant? Does the last zero change the place value of the other digits if it is removed? If No, why does the zero need to be there?*

Answer: *The last zero shows the degree of precision that the instrument is able to read to. For example, the digital balances in our class read to the hundredths place, so an item weighing two grams will read “2.00 g”. If the mass was a little higher it would read 2.01 g.*

Counting numbers –a number of things that we count; do not use the system of significant digits because we are not measuring anything (the degree of precision is considered infinite).

Defined numbers – These are assigned values. e.g., the original mass that is used as the standard kilogram was not measured.

Note: The number of significant digits in a measure does NOT change when we convert from one metric prefix to another. e.g., converting 43.26 g to 0.04326 kg still retains the original 4 sig dig's.

Page 28 (Hebden workbook) #42, 46 and 47.