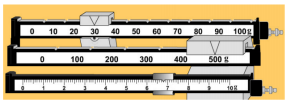
Triple beam balance



Apr 28-9:35 AM

Digital equipment

Note: On digital equipment, record exactly what you see.

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Concludes Video 1:

Make sure you have taken good notes.

Come to class with any questions.

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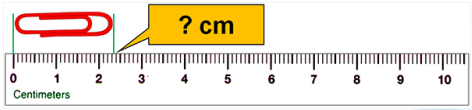
SIG FIGS

Scientific measurements are limited by the degree of "exactness" or precision that the measuring instrument gives us.

EX: If we wish to measure the length of a paperclip with a centimeter ruler, we can estimate the length to the hundredths place, estimating one digit beyond what we can see marked on the ruler. **The digits we obtain in our measurements are called significant figures.**



Sig Figs

SIG FIGS

Certain **instruments** can give us more significant figures than others.

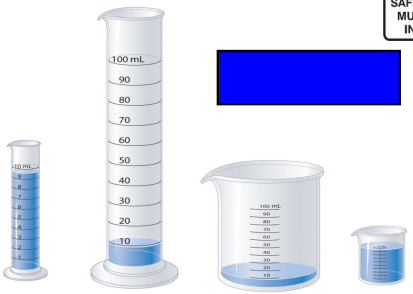
Example: If we were to find the mass of a pet turtle using a simple toy scale, we could estimate a reading to the nearest gram (ex: 35 g). But with a digital balance, we could measure it to the nearest thousandth of a gram (ex: 35.532 g).

***The digital balance gives more significant figures and therefore more precision.

Sig Figs

SIG FIGS IN THE LAB

Which measuring apparatus would you use to deliver 9.7 mL of water as accurately as possible? To how many significant figures can you measure that volume of water with the apparatus you selected?



sig figs in lab

SIG FIGS ARE VERY IMPORTANT

The number of significant figures in a measurement is important, because when we use measured numbers in a calculation, we have to round our answers to reflect the precision of the original measurements.

***The least precise measurement, meaning the one with the **fewest significant figures,** will limit the precision of the final answer.

Before we can learn to round answers to our calculations, we need to know how to count significant figures in a measurement.

Sig Figs

SIG FIGS

Rules for counting significant figures in a measurement:

1. **Any number that isn't a zero is always a sig fig.**
   Examples: 6.15 has 3 sig figs
   34231.5678 has 9 sig figs

2. **Zeros that are between two non-zeros are always sig figs.**
   Example: 100.02 has 5 sig figs

3. **Leading zeros are not sig figs. They only act as placeholders.**
   Examples: 0.0000203 has 3 sig figs
   0.02 has 1 sig fig

4. **Zeros that come at the end of a number are significant only if the number contains a decimal point.**
   Examples: 5200 has 2 sig figs
   5200.00 has 6 sig figs
   100. has 3 sig figs
   100 has 1 sig fig

5. **For values written in scientific notation, all digits in the coefficient (big # in front of power of 10) are the significant digits.**
   Examples: 4.50×10^{7} has 3 sig figs
   9.0×10^{-6} has 2 sig figs

Sig Figs

SIG FIGS

Practice:

a. 325 ____
b. 96400 ____
c. 2.538 ____
d. 0.361 ____
e. 0.00573 ____
f. 0.0000054 ____
g. 3.60×10^{3} ____
h. 6.21×10^{-4} ____
i. 1000 ____
j. 1000. ____

Sig Figs

SIG FIGS

Some #s have Infinite Sig Figs

- **Exact Numbers:** Numbers that are obtained by counting rather than measuring are assumed to have infinite significant figures.

  Example: You count the number of eggs left in the carton and find it to be 8. This number has infinite significant figures because it is exact (no uncertainty).

- **Definitions:** Numbers that arise from definitions are also exact.

  Example: 1 meter = 100 centimeters. The 1 and the 100 have infinite significant figures.

Sig Figs

USING SIG FIGS IN CALCULATIONS:

Addition and Subtraction: Round the answer so that it has the same number of **DECIMAL PLACES** as the measurement with the **least** number of **places pass the decimal** (the least precise measurement). If a measurement does not have a decimal place, use the measurement with the least number of place value.

Examples:

#1 7.0 cm + 445.9 cm + 84.22 cm +78.990 cm =

7.0
445.9
84.22
+ 78.990
616.11 so, answer is

#2: 58.5mm – 45 mm =

58.5
- 45
13.5 so, answer is

Sig Figs

USING SIG FIGS IN CALCULATIONS:

Multiplication and Division: Round the answer so that it has the same number of **TOTAL significant figures** as the measurement with the **least** number of **TOTAL significant figures** (the least precise measurement).

Examples:

#1: 52.3 cm x 8.8 cm =

#2: $5\ m^2 / 2.2\ m =$

Sig Figs

Concludes Video 2:

Make sure you have taken good notes.

Come to class with any questions.

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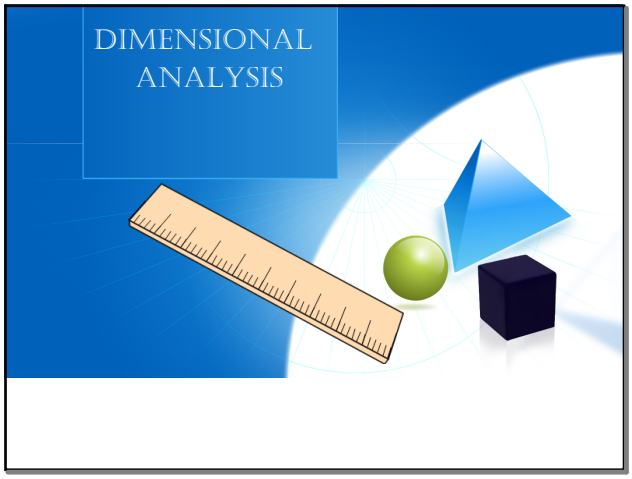

Measurement and Calculation

DIMENSIONAL ANALYSIS

In chemistry this year we will use conversion factors to solve problems through **dimensional analysis!**

Dimensional Analysis is an important method of solving mathematical problems requiring unit conversions. DO NOT attempt to do these problems using your own method. We are in **training**, and you will have to be able to solve problems using this technique, so start learning now!

DA

DIMENSIONAL ANALYSIS

Every Dimensional Analysis problem contains three major parts:

1. The unknown and its UNIT
2. The given amount and its UNIT
3. A conversion factor which relate or connect the given UNIT to the UNIT of the unknown. a conversion factor may be given in the problem OR you may need to have it memorized.

DA