Measurements and Dimensional Analysis – Study Guide

*sections 1.4 and 1.6 in OpenStax*

**Units of Measurement (section 1.4)**

A **unit** is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The two most common unit systems are the \_\_\_\_\_\_\_\_\_\_\_\_\_system and the \_\_\_\_\_\_\_\_\_\_\_\_system.

The unit system used by scientists, which is based on the metric system, is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Complete the following table of **SI Base Units**:

**Quantity Unit Symbol**

Length

Mass

Time

Temperature

Amount of substance

Complete the following table of **Prefix** values:

|  |  |  |
| --- | --- | --- |
| Prefix | Symbol | Factor of 10 |
| giga |  |  |
|  | M | 106 |
| kilo |  |  |
|  | d |  |
|  | c | 10-2 |
| milli |  |  |
|  | μ |  |
|  |  | 10-9 |

Using the table of prefix multipliers, complete the following:

1 km = \_\_\_\_\_ m 1 cg = \_\_\_\_\_ g 1 mL = \_\_\_\_\_ L

1 dm = \_\_\_\_\_ m 1 μg = \_\_\_\_\_ g 1 GL = \_\_\_\_\_ L

1 nm = \_\_\_\_\_ m

**Volume** is a measure of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1 mL = \_\_\_\_ cm3

Using your math textbook (or other sources), find the geometric formula used to calculate the volume of a:

Cylinder \_\_\_\_\_\_\_\_ Cube \_\_\_\_\_\_\_\_\_ Sphere \_\_\_\_\_\_\_\_\_\_ Rectangular Box \_\_\_\_\_\_\_\_\_

**Density**

What is **density**? How would you calculate the density of a substance (what formula would you use)?

Some common units of density are \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.

How can density be used as a conversion factor?

***Watch the video tutorial on*** [Density](https://www.youtube.com/watch?v=v5Cc4w7rsf8)

**Math with Measurements (section 1.6)**

**Dimensional Analysis** is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Chemistry uses dimensional analysis to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

A **conversion factor** is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

An example of a conversion factor is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

For metric conversions involving a metric base unit (e.g. grams, meters, etc.) and that same unit with a prefix, remember to **always put the 1 next to the unit with the prefix** (that will be the unit consisting of two letters, e.g. cm, mg, etc.). The other number in the conversion factor will simply be the numerical equivalent of that prefix.

There are other ways to correctly write such conversion factors, and if you wish to do so you may, but if you find yourself getting confused about them, always put the 1 with the prefix.

***Watch video tutorial on*** [Dimensional Analysis](https://www.youtube.com/watch?v=IezBwWosNzU)

What conversion factor(s) would you use to convert 75 meters to kilometers?

What conversion factor(s) would you use to convert 16 cm to yards?

The three common temperature scales are \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

How does the size of a degree differ among them?

**Absolute zero** is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**End of Chapter 1 Practice Problems**

#41, 59, 67, 69, 77, 81, 89, 91

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”