

Metric Units of Mass

Mass and weight are closely related. Weight is a measure of how strongly the earth is pulling on an object. Therefore, an object's weight is less in space than on earth's surface. However, the amount of material in the object, its **mass**, remains the same. On the surface of the earth, mass and weight can be used interchangeably.

The basic unit of mass in the metric system is the **gram**. If a box that is 1 cm long on all sides is filled with water; then the mass of water is 1 gram.

1gram = the mass of water in the box.

The units of mass in the metric system have the same prefixes as the units of length:

- 1 Kilogram (kg) = 1000 grams (g)
- 1 hectogram (hg) = 100 g
- 1 decagram (dag) = 10g
- 1 gram (g) = 1 g
- 1 decigram (dg) = 0.1 g
- 1 centigram (cg) = 0.01 g
- 1 milligram (mg) = 0.001 g

Conversion between units of mass in the metric system involves moving the decimal point to the right or to the left. Listing the units in order from largest to smallest will indicate how many places to move the decimal point and in which direction.

To convert 350 g to kilograms, first write the units in order from the largest to the smallest.

Kg	hg	dag	g	dg	cg	mg	3 positions
←	←	←					

Converting g to kg requires moving 3 positions to the left. 3 places

$$324\text{g} = 0.324 \text{ kg}$$

Move the decimal point the same number of places and in the same direction.

Example1

Convert 4.23 g to milligrams.

Solution

$$4.23 \text{ g} = 4230 \text{ mg}$$

Example2

Convert 42.3 mg to grams.

Solution

$$42.3 \text{ mg} = 0.0423 \text{ g}$$