Unit Conversions and Examples

Common basic units used in health are listed below with examples showing how to do the conversions.

**Measuring weight:**

The units used to measure weight are:

- micrograms (mcg or µg)
- milligrams (mg)
- grams (g)
- kilograms (kg)

The metric conversions are:

\[
\begin{align*}
1 \text{ mg} &= 1000 \mu\text{g} \\
1 \text{ g} &= 1000000 \mu\text{g} \\
1 \text{ g} &= 1000 \text{ mg} \\
1 \text{ kg} &= 1000 \text{ g}
\end{align*}
\]

**Converting from one unit to another:**

**Example 1:** Convert 4.25 grams to milligrams.

**Steps to follow**

1. Find out the appropriate unit conversion definition, that is: \(1 \text{ g} = 1000 \text{ mg}\).
2. As we want to convert grams (bigger unit) to milligrams (smaller unit), we need to **multiply** the given unit by the equivalent, that is:

\[
4.25 \text{ g} = 4.25 \times 1000 \text{ mg} = 4250 \text{ mg}.
\]

**Note:** When you are multiplying by 1000, you can move the decimal point 3 places to the **right** to get the answer.
**Example 2:** Convert 250 milligrams to grams.

*Steps to follow*

1. Find out the appropriate unit conversion definition, that is: $1 \text{ mg} = 1000 \text{ µg}$.
2. When converting from a **smaller** unit (milligrams) to a **bigger** unit (grams), we need to **divide**, that is:

$$250 \text{ mg} = \left( \frac{250}{1000} \right) \text{ g} = 0.25 \text{ g}.$$ 

*Note:* when dividing by 1000 you can move the decimal point 3 places towards your **left** to get the answer.

**Volume**

Units used to measure volume are:

- litre (L)
- millilitre (mL)
- microlitres (µL)
- cubic centimeter: cc (cm$^3$)

The metric equivalents are:

$$
\begin{align*}
1 \text{ L} &= 1000 \text{ mL} \\
1 \text{ L} &= 1000000 \text{ µL} \\
1 \text{ mL} &= 1000 \text{ µL} \\
1 \text{ cc} &= 1 \text{ mL}
\end{align*}
$$

**Example 3:** Convert 1500 millilitres to litres.

*Steps to follow*

1. Find out the appropriate unit conversion definition, that is: $1 \text{ L} = 1000 \text{ mL}$.
2. As we are to convert from a smaller unit to a bigger unit we need to **divide** the given unit by the equivalent. That is

$$1500 \text{ mL} = \left( \frac{1500}{1000} \right) \text{ L} = 1.5 \text{ L}.$$ 

**Time:**

The symbols used for time units are:

- day (d)
- hour (h)
- minute (min)
• second (s)

The unit conversions for time are:

\[
\begin{align*}
1 \text{ d} &= 24 \text{ h} \\
1 \text{ h} &= 60 \text{ min} \\
1 \text{ h} &= 3600 \text{ s} \\
1 \text{ min} &= 60 \text{ s} \\
1 \text{ s} &= \frac{1}{60} \text{ min}
\end{align*}
\]

**Example 3:** Convert 45 minutes to hours.

1. Find out the appropriate unit conversion definition, that is: \(1 \text{ h} = 60 \text{ min}\).

2. **Divide** the given unit by the equivalent, that is:

\[
45 \text{ min} = (45 \div 60) \text{ h} = 0.75 \text{ h}.
\]

**Example 4:** Convert 3 hours to minutes.

1. Find out the equivalent, that is: \(1 \text{ h} = 60 \text{ min}\).

2. **Multiply** the given unit by the equivalent, that is:

\[
3 \text{ h} = 3 \times 60 \text{ min} = 180 \text{ min}.
\]

**Example 5:** Convert 30 seconds to minutes.

1. Identify the unit conversion required: \(1 \text{ s} = \frac{1}{60} \text{ min}\).

2. Now we need to multiply the given unit by the equivalent, that is

\[
30 \text{ s} = 30 \times \frac{1}{60} \text{ min} = \frac{1}{2} \text{ min}.
\]

**Other resources**

- Brotto and Rafferty (2016)
- Reid-Searl, Dwyer, Moxham, and Reid-Speirs (2007)

**References**
