

# Unit conversions in Nursing

We use a system of base words and prefixes. The base words are:

Base word	Symbol	Measures
litre	L	liquid volume
gram	g	mass (weight)
metre	m	length
mole	mol	amount of substance

This is a useful website that has an overview of metric units and calculations

<http://nursing.flinders.edu.au/students/studyaids/drugcalculations/>

Prefix	Symbol	Value compared to base unit
mega	M	1 000 000
kilo	k	1 000
base unit	L, g, m or mol	1
milli	m	$\frac{1}{1\,000}$
micro	$\mu$ or (mc)	$\frac{1}{1\,000\,000}$



You will need to know the following facts:

1 kilogram (kg) = 1000 grams (g)

1 gram (g) = 1000 milligrams (mg)

1 milligram (mg) = 1000 micrograms (mcg)

1 litre (L) = 1000 millilitre (mL)

1 mole (mol) = 1000 millimoles (mmol)

1 metre = 100 centimetres (cm)

1 day = 24 hours (hr)

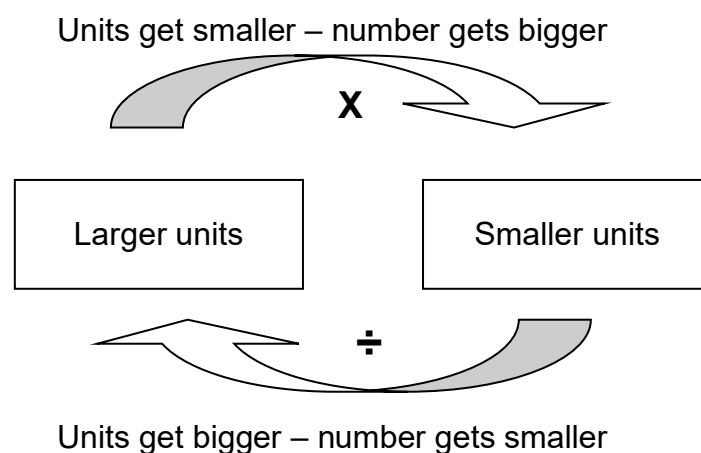
1 hour (hr) = 60 minutes (min)

1 minute (min) = 60 seconds (sec)

## Converting between different units

### Method 1

Notice that most of these facts involve the number 1000. So converting between units will often involve multiplying or dividing by 1000.





## Examples

1.  $3\text{kg} = \underline{\hspace{2cm}}\text{g}$   $1\text{kg} = 1000\text{g}$   
The units get smaller so  $\times 1000$

$$3\text{kg} = 3 \times 1000 = 3000\text{g}$$

2.  $750\text{mcg} = \underline{\hspace{2cm}}\text{mg}$   $1\text{mg} = 1000\text{mcg}$   
The units get bigger so  $\div 1000$

$$750\text{mcg} = 750 \div 1000 = 0.75\text{mg}$$

kg and mg are not directly related so you will have to use two steps

3.  $4\text{kg} = \underline{\hspace{2cm}}\text{mg}$   $1\text{kg} = 1000\text{g}$   
The units get smaller so  $\times 1000$

$$4\text{kg} = 4 \times 1000 = 4000\text{g}$$

$1\text{g} = 1000\text{mg}$   
 The units get smaller so  $\times 1000$

$$4000\text{g} = 4000 \times 1000 = 4\,000\,000\text{mg}$$

$$\text{So } 4\text{kg} = 4\,000\,000\text{mg}$$

## Method 2

If we know a fact/equation that relates the two units in the question we can multiply or divide both sides of that equation to get what we want.

## Examples

1.  $3\text{kg} = \underline{\hspace{2cm}}\text{g}$

Start with your known fact relating kilograms and grams.

Multiply by 3 to get what you want on this side.

$$\begin{aligned} 1\text{kg} &= 1000\text{g} \\ 3 \times 1\text{kg} &= 3 \times 1000\text{g} \\ 3\text{kg} &= 3000\text{g} \end{aligned}$$

Do the same to this side



2.  $500\text{mg} = \underline{\hspace{2cm}}\text{g}$

Start with your known fact relating milligrams and grams.

Divide by 2 to  
get 500 mg.

$$1000\text{mg} = 1\text{g}$$
$$500\text{mg} = \frac{1}{2}\text{g}$$

Do the same to this side

$$500\text{mg} = 0.5\text{g}$$

Change it to a decimal.

3.  $4\text{kg} = \underline{\hspace{2cm}}\text{mg}$

Start with your known fact relating micrograms and grams.

kg and mg are not  
directly related so  
you will have to use  
two steps

$$1\text{kg} = 1000\text{g}$$

Do the same this side  
 $\times 4$

$\times 4$

$$4\text{kg} = 4\,000\text{g}$$

$$4\text{kg} = 4\,000\,000\text{mg}$$

$\times 1000$  this side to  
change g to mg



## Exercises

### 1. Convert the following amounts

- (a) 3000g = \_\_\_\_\_ kg  
 (b) 1500mcg = \_\_\_\_\_ mg  
 (c) 4000mL = \_\_\_\_\_ L  
 (d) 45000g = \_\_\_\_\_ kg  
 (e) 750mcg = \_\_\_\_\_ mg  
 (f) 250mg = \_\_\_\_\_ g  
 (g) 5600mcg = \_\_\_\_\_ mg  
 (h) 600ml = \_\_\_\_\_ L

### 2. Convert the following amounts:

- (a) 3 mg = \_\_\_\_\_ mcg  
 (b) 0.5mg = \_\_\_\_\_ mcg  
 (c) 2kg = \_\_\_\_\_ g  
 (d) 2.5g = \_\_\_\_\_ mg  
 (e) 4.5mg = \_\_\_\_\_ mcg  
 (f) 1.5L = \_\_\_\_\_ mL  
 (g) 45g = \_\_\_\_\_ mg  
 (h) 27.5L = \_\_\_\_\_ mL

### 3. Convert the following:

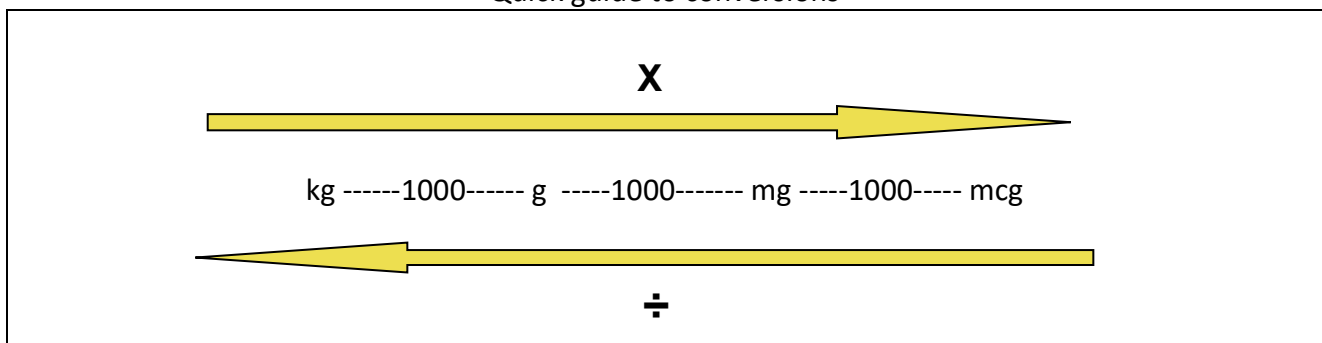
- (a) 5000g = \_\_\_\_\_ kg  
 (b) 6kg = \_\_\_\_\_ g  
 (c) 6000mL = \_\_\_\_\_ L  
 (d) 2300g = \_\_\_\_\_ kg  
 (e) 27g = \_\_\_\_\_ mg  
 (f) 850mg = \_\_\_\_\_ g  
 (g) 500mcg = \_\_\_\_\_ mg  
 (h) 6.4mg = \_\_\_\_\_ mcg

### 4. Convert the following:

- (a) 2 days = \_\_\_\_\_ hrs  
 (b)  $\frac{1}{2}$  day = \_\_\_\_\_ hrs  
 (c) 480 mins = \_\_\_\_\_ hrs  
 (d) 3 hrs = \_\_\_\_\_ mins  
 (e) 2 mins = \_\_\_\_\_ seconds  
 (f) 150 mins = \_\_\_\_\_ hrs  
 (g) 600secs = \_\_\_\_\_ mins  
 (h) 6 hours = \_\_\_\_\_ days

Bonus question      1 day = \_\_\_\_\_ seconds

### Quick guide to conversions





## Answers

1.

- (a) 3 kg
- (b) 1.5 mg
- (c) 4 L
- (d) 45 kg
- (e) 0.75 mg
- (f) 0.25 g
- (g) 5.6 mg
- (h) 0.6 L

2.

- (a) 3000 mcg
- (b) 500 mcg
- (c) 2000 g
- (d) 2500 mg
- (e) 4500 mcg
- (f) 1500 mL
- (g) 45000 mg
- (h) 27500 mL

3.

- (a) 5 kg
- (b) 6000 g
- (c) 6 L
- (d) 2.3 kg
- (e) 27000 mg
- (f) 0.85 g
- (g) 0.5 mg
- (h) 6400 mcg

4.

- (a) 48 hrs
- (b) 12 hrs
- (c) 8 hrs
- (d) 180 mins
- (e) 120 seconds
- (f) 2.5 hrs (2 ½ hours)
- (g) 10 mins
- (h) ¼ day

### Bonus question

1 day =  $24 \times 60 \times 60 = 86400$  seconds