

Apothecary, Household and Metric Systems of Measurement

PART A – One Step Conversions

Given a direct conversion factor we can convert from one system of measurement to another.

Conversion Chart

Measure of	Conversion Factors
Mass	1 gram (g) = 1000 milligrams (mg) 1 milligram (mg) = 1000 micrograms (mcg) 1 ounce (oz) = 30 grams (g) 1 pound (lb.) = 16 ounces (oz) 1 pound (lb.) = 454 grams (g) 2.2 pounds (lb.) = 1 kilogram (kg) 1 kilogram (kg) = 1000 grams (g) 1 metric ton = 1000 kilograms (kg)
Volume	1 teaspoon (tsp) = 5 milliliters (mL) 1 tablespoon (tbsp) = 3 teaspoons (tsp) 2 tablespoons (tbsp) = 1 fluid ounce (oz) 1 cup = 8 ounces 1 cup = 250 milliliters (mL) 1 liter (L) = 1000 milliliters (mL) 1 pint = 2 cups 1 quart = 2 pints 1 gallon = 4 quarts
Length	1 inch (in) = 2.5 centimeters (cm) 12 inches (in) = 1 foot (ft) 100 centimeters (cm) = 1 meter (m) 1000 meters (m) = 1 kilometer (km) 1 yard = 3 feet (ft) 1 mile = 5280 feet (ft) 1 mile = 1.6 kilometers (km)

Measure of	Conversion Factors
Time	1 hour (h) = 60 minutes (min) 1 minute (min) = 60 seconds (s) 1 day = 24 hours (h) 1 week = 7 days 1 year = 12 months 1 year = 365 days

Conversion Rules

Rules	Examples
1. When moving from a LARGER unit to a SMALLER unit, multiply the starting measurement by the conversion factor.	Example: Going from meter to centimeter Since a meter is LARGER than a centimeter, multiply by the conversion factor (100).
2. When moving from a SMALLER unit to a LARGER unit, divide the starting measurement by the conversion factor.	Example 2: Going from millilitre to litre. Since a millilitre is SMALLER than a litre, divide by the conversion factor (1000).

Example 1:

Convert 5 cups into mL

Step 1:

Find the conversion factor between our starting measurement and our desired unit. Looking at our *conversion chart* we notice that **1 cup = 250 mL**.

Step 2:

Since we are moving from a **LARGER** unit to a **SMALLER** unit, multiply the starting measurement by the conversion factor and simplify.

$$5 \text{ cups} \times 250 \text{ mL} = 1250 \text{ mL}$$

Thus, there are 1250 mL in 5 cups.

Example 2:

Convert 154 lb. into kg.

Step 1:

Find the conversion factor between our starting measurement and our desired unit. Looking at our *conversion chart* we notice that **2.2 lb. = 1 kg.**

Step 2:

Since we are moving from a **SMALLER** unit to a **LARGER** unit, divide the starting measurement by the conversion factor and simplify.

$$154 \text{ lb} \div 2.2 \text{ lb} = 70 \text{ kg}$$

Thus, there are 70 kg in 154 lb.

PART B – Multi-Step Conversions

In some cases, we may not have a direct conversion factor. To convert from one unit of measure to another, we have to bridge together multiple conversions.

Example 3:

Convert 65 in into m.

Step 1:

Find the conversion factor between our starting measurement and our desired unit. Since there isn't a direct conversion from inches to meters, we are going to break the conversion into two steps. Firstly, is to convert inches to centimeters then secondly to convert centimeters to meters.

Step 2:

In part a) our conversion factor is **1 in = 2.5 cm.**

Since we are moving from a **LARGER** unit to a **SMALLER** unit, multiply the starting measurement by the conversion factor and simplify.

$$65 \text{ in} \times 2.5 \text{ cm} = 162.5 \text{ cm}$$

Step 3:

In part b) our conversion factor is **100 cm = 1 m**.

Since we are moving from a **SMALLER** unit to a **LARGER** unit, divide the starting measurement by the conversion factor and simplify.

$$162.5 \text{ cm} \div 100 \text{ cm} = 1.625 \text{ m}$$

Thus, there is 1.625 m in 65 in.

Example 4:

Convert 5.2 L into tsp.

Step 1:

Find the conversion factor between our starting measurement and our desired unit. Since there is no direct conversion from liters to teaspoons, we are going to break the conversion into two steps. Firstly, is to convert liters to milliliters then secondly to convert milliliters to teaspoons.

Step 2:

In part a) our conversion factor is **1 L = 1000 mL**.

Since we are moving from a **LARGER** unit to a **SMALLER** unit, multiply the starting measurement by the conversion factor and simplify.

$$5.2 \text{ L} \times 1000 \text{ mL} = 5200 \text{ mL}$$

Step 3:

In part b) our conversion factor is **5 mL = 1 tsp**.

Since we are moving from a **SMALLER** unit to a **LARGER** unit, divide the starting measurement by the conversion factor and simplify.

$$5200 \text{ mL} \div 5 \text{ mL} = 1040 \text{ tsp}$$

Thus, there is 1040 tsp in 5.2 L.

NOTE: There are other methods of converting between different systems of measurement. For alternative methods, see “Dimensional Analysis” or “Conversions in the Metric System” TLC hand-outs.

Exercises:

Convert between the apothecary, household and metric systems of measurement.

- 1) 4 tsp (into mL) =
- 2) 5 oz (into g) =
- 3) 60 mL (into tbsp) =
- 4) 400 mL (into L) =
- 5) 8 tbsp (into ml) =
- 6) 450 g (into oz) =
- 7) 12 in (into cm) =
- 8) 200 lb (into kg) =
- 9) 197 in (into m) =
- 10) 650 mL (into cups) =
- 11) 30 ml (into tbsp.) =
- 12) 5 kg (into lb) =
- 13) 3 m (into in) =
- 14) 5 tbsp (into fluid oz) =
- 15) 5 feet 3 in (into m) =
- 16) 5 m (into feet and inches) =
- 17) 5.2 L (into tsp) =
- 18) 1600 mg (into oz) =
- 19) $2\frac{3}{5}$ cups (into mL) =
- 20) $2\frac{2}{5}$ tbsp (into tsp) =

Solutions:

- 1) 20 mL (1 tsp = 5 mL)
- 2) 150 g (1 oz = 30 g)

- 3) 120 mL (1 tbsp = 15 mL)
- 4) 0.4 L (1000 mL = 1 L)
- 5) 120 mL (1 tbsp = 15 mL)
- 6) 15 oz (30 g = 1 oz)
- 7) 30 cm (1 inch = 2.5 cm)
- 8) 90.9 kg (2.2 lb = 1 kg)
- 9) 4.925 m (1 inch = 2.5 cm; 100 cm = 1 m)
- 10) 2.6 cups (250 mL = 1 cup)
- 11) 2 tbsp (15 mL = 1 tbsp)
- 12) 11 lb (1 kg = 2.2 lb)
- 13) 300 cm = 120 in (2.5 cm = 1 inch)
- 14) 2.5 fluid oz (2 tbsp = 1 fluid oz)
- 15) 63 inches = 157.5 cm = 1.575 m (1 foot = 12 inches; 1 inch = 2.5 cm)
- 16) 500 cm = 200 inches = 16'8" (1 m = 100 cm; 2.5 cm = 1 inch; 12 inches = 1 foot)
- 17) 5200 mL = 1040 tsp (1L = 1000 mL; 5 mL = 1 tsp)
- 18) 1.6 g = 0.053 oz (1000 mg = 1 g; 30 g = 1 oz)
- 19) 650 mL (1 cup = 250 mL)
- 20) $7\frac{1}{5}$ tsp (1 tbsp = 3 tsp)