

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

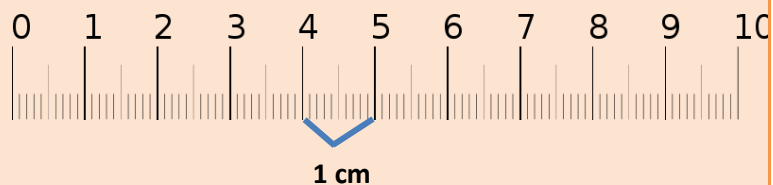
Mass	Volume	Length	Time
1 g = 1000 mg	1 tsp = 5 mL	1 inch = 2.5 cm	1 h = 60 min
1 mg = 1000 mcg	1 tbsp = 3 tsp (15 mL)	12 inches = 1 foot	1 minute = 60 seconds
1 oz = 30 g	2 tbsp = 1 fluid oz	100 cm = 1 meter	1 day = 24 hours
1 lb = 16 oz	1 cup = 8 oz	1000 m = 1 km	1 week = 7 days
1 lb = 454 g	1 cup = 250 mL	1 yard = 3 feet	1 year = 12 months
2.2 lb = 1 kg	1 L = 1000 mL	1 mile = 1.6 km	1 year = 365 days
1 kg = 1000 g	1 pint = 2 cups		
1 metric ton = 1000 kg	1 quart = 2 pints		
	1 gallon = 4 quarts		

Conversion Rules

- When moving from a **LARGER** unit to a **SMALLER** unit, **multiply** the starting measurement by the conversion factor.

Example: 1m → 100 cm

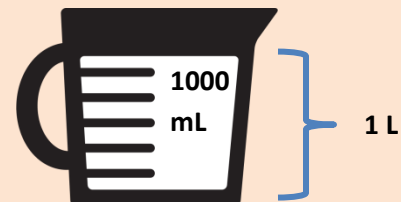
Since a meter is **LARGER** than a centimeter, multiply by the conversion factor (100).



- When moving from a **SMALLER** unit to a **LARGER** unit, **divide** the starting measurement by the conversion factor.

Example: 1000 mL → 1 L

Since a milliliter is **SMALLER** than a litre, divide by the conversion factor (1000).



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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 $1 \text{ cup} = 250 \text{ mL}$.

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 $2.2 \text{ lb} = 1 \text{ kg}$.

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 in to m, we are going to break the conversion into two steps.

a) inch \rightarrow cm b) cm \rightarrow m

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Step 2: In part a) our conversion factor is $1 \text{ in} = 2.5 \text{ cm}$.

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 $100 \text{ cm} = 1 \text{ m}$.

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 isn't a direct conversion from L to tsp, we are going to break the conversion into two steps.



Step 2: In part a) our conversion factor is $1 \text{ L} = 1000 \text{ mL}$.

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 $5 \text{ mL} = 1 \text{ tsp}$.

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.

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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.

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|------------------------------------|--------------------------------------|
| 1) 4 tsp (into mL) = | 2) 5 oz (into g) = |
| 3) $2\frac{3}{5}$ cups (into mL) = | 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) 60 mL (into tbsp) = | 20) $2\frac{2}{5}$ tbsp (into tsp) = |

Solutions:

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|--|--|
| 1) 20 mL (<u>1 tsp = 5 mL</u>) | 2) 150 g (<u>1 oz = 30 g</u>) |
| 3) 650 mL (<u>1 cup = 250 mL</u>) | 4) 0.4 L (<u>1000 mL = 1 L</u>) |
| 5) 120 mL (<u>1 tbsp = 15 mL</u>) | 6) 15 oz (<u>30 g = 1 oz</u>) |
| 7) 30 cm (<u>1 inch = 2.5 cm</u>) | 8) 90.9 kg (<u>2.2 lb = 1 kg</u>) |
| 9) 4.925 m (<u>1 inch = 2.5 cm; 100 cm = 1 m</u>) | 10) 2.6 cups (<u>250 mL = 1 cup</u>) |
| 11) 2 tbsp (<u>15 mL = 1 tbsp</u>) | 12) 11 lb (<u>1 kg = 2.2 lb</u>) |
| 13) 300 cm = 120 in (<u>2.5 cm = 1 inch</u>) | 14) 2.5 fluid oz (<u>2 tbsp = 1 fluid oz</u>) |
| 15) 63 inches = 157.5 cm = 1.575 m (<u>1 foot = 12 inches; 1 inch = 2.5 cm</u>) | 16) 500 cm = 200 inches = 16'8"
(<u>1 m = 100 cm; 2.5 cm = 1 inch; 12 inches = 1 foot</u>) |
| 17) 5200 mL = 1040 tsp (<u>1L = 1000 mL; 5 mL = 1 tsp</u>) | 18) 1.6 g = 0.053 oz (<u>1000 mg = 1 g; 30 g = 1 oz</u>) |
| 19) 4 tbsp (<u>15 mL = 1 tbsp</u>) | 20) $7\frac{1}{5}$ tsp (<u>1 tbsp = 3 tsp</u>) |