

METRIC SYSTEM

Metric prefix chart

All 24 SI prefixes, quetta to quecto. Highlighted rows are the ones used most in class; multiply the base unit by the multiplier.



LENGTH

**meter (m)**

km, cm, mm all start here.

MASS

**gram (g)**

Prefixes go on the gram: kg, mg.

VOLUME

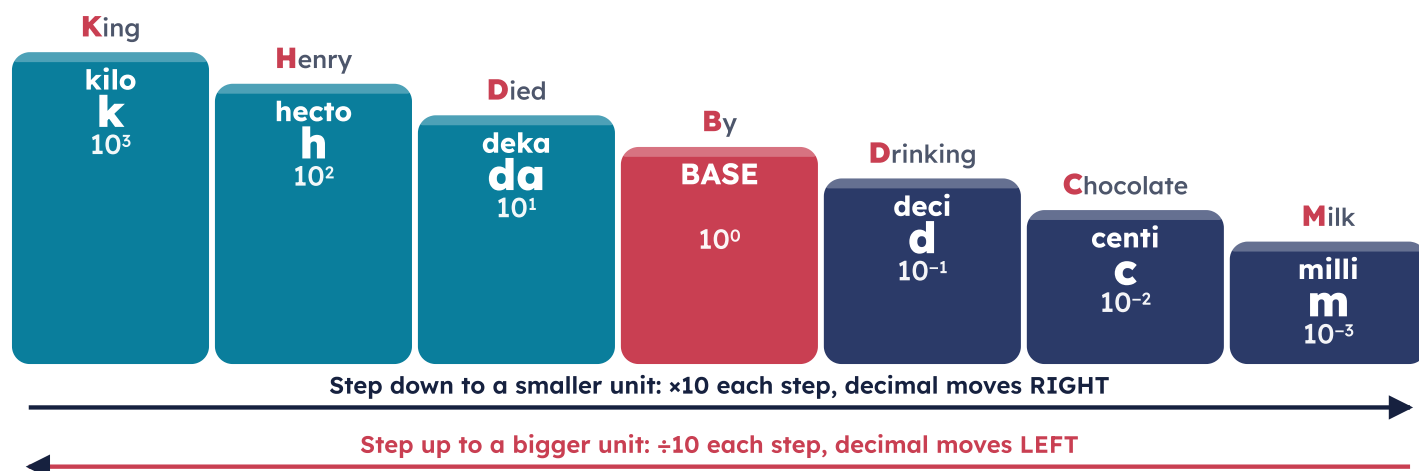
**liter (L)**

1 L = 1 dm³, 1 mL = 1 cm³.

ALSO IN THE SI

The SI base unit of mass is the kilogram; prefixes attach to the gram. Others: second (s), kelvin (K), ampere (A), mole (mol), candela (cd).

PREFIX	SYMBOL	POWER OF 10	MULTIPLIER	EVERYDAY EXAMPLE
quetta NEW IN 2022	Q	10³⁰	1 followed by 30 zeros	Jupiter's mass is about 1.9 Qg
ronna NEW IN 2022	R	10²⁷	1 followed by 27 zeros	Earth's mass is about 6 Rg
yotta	Y	10²⁴	1 followed by 24 zeros	Earth's oceans weigh about 1.4 Yg
zetta	Z	10²¹	1 followed by 21 zeros	Earth's atmosphere weighs about 5 Zg
exa	E	10¹⁸	1 followed by 18 zeros	The Milky Way is about 950 Em across
peta	P	10¹⁵	1 followed by 15 zeros	One light-year is about 9.5 Pm
tera	T	10¹²	1,000,000,000,000	Sun to Neptune is about 4.5 Tm
giga	G	10⁹	1,000,000,000	Earth to Sun is about 150 Gm
mega	M	10⁶	1,000,000	Earth's diameter is about 12.7 Mm
kilo	k	10³	1,000	A 12-minute walk is about 1 km
hecto	h	10²	100	A football field is about 1 hm
deka	da	10¹	10	A school bus is about 1 dam long
BASE UNIT	-	10⁰	1	meter (m) · gram (g) · liter (L)
deci	d	10⁻¹	0.1	A small glass of juice is about 2 dL
centi	c	10⁻²	0.01	A fingernail is about 1 cm wide
milli	m	10⁻³	0.001	A credit card is about 0.8 mm thick
micro	μ	10⁻⁶	0.000001	A red blood cell is about 7 μm across
nano	n	10⁻⁹	0.000000001	DNA's double helix is about 2 nm wide
pico	p	10⁻¹²	0.000000000001	A hydrogen atom is about 100 pm wide
femto	f	10⁻¹⁵	0.000...1 (15 decimal places)	A proton is about 1.7 fm across
atto	a	10⁻¹⁸	0.000...1 (18 decimal places)	Electrons and quarks measure under 1 am
zepto	z	10⁻²¹	0.000...1 (21 decimal places)	Fastest event timed: 247 zs
yocto	y	10⁻²⁴	0.000...1 (24 decimal places)	A proton has a mass of about 1.7 yg
ronto NEW IN 2022	r	10⁻²⁷	0.000...1 (27 decimal places)	An electron has a mass of about 0.9 rg
quecto NEW IN 2022	q	10⁻³⁰	0.000...1 (30 decimal places)	A neutrino's mass is under about 0.0014 qg



US CUSTOMARY ≈ METRIC

Conversion tables

Middle column: exact definitions. Right column: rounded reverse factors. Multiply to go US to metric.

Length international foot		
US UNIT	EQUALS (EXACT)	METRIC TO US (ROUNDED)
1 in	2.54 cm	÷ 2.54 or × 0.393701
1 ft	0.3048 m	÷ 0.3048 or × 3.28084
1 yd	0.9144 m	÷ 0.9144 or × 1.09361
1 mi	1.609344 km	÷ 1.609344 or × 0.621371
Quick checks: 1 in = 2.5 cm · 1 m = 3.3 ft · 1 mi = 1.6 km · 5 km = 3.1 mi		

Mass avoirdupois		
US UNIT	EQUALS (EXACT)	METRIC TO US (ROUNDED)
1 oz	28.349523125 g	÷ 28.349523125 or × 0.0352740
1 lb	0.45359237 kg	÷ 0.45359237 or × 2.20462
1 short ton	907.18474 kg	÷ 907.18474 or × 0.00110231
Quick checks: 1 kg = 2.2 lb · 1 oz = 28 g · 100 g = 3.5 oz		

Volume US liquid measure		
US UNIT	EQUALS (EXACT)	METRIC TO US (ROUNDED)
1 fl oz	29.5735295625 mL	÷ 29.5735295625 or × 0.0338140
1 cup	236.5882365 mL	÷ 236.5882365 or × 0.00422675
1 pt	0.473176473 L	÷ 0.473176473 or × 2.11338
1 qt	0.946352946 L	÷ 0.946352946 or × 1.05669
1 gal	3.785411784 L	÷ 3.785411784 or × 0.264172
Quick checks: 1 L = 1.06 qt · 1 cup = 237 mL · 500 mL = 16.9 fl oz		

Area		
US UNIT	EQUALS (EXACT)	METRIC TO US (ROUNDED)
1 in ²	6.4516 cm ²	÷ 6.4516 or × 0.155000
1 ft ²	0.09290304 m ²	÷ 0.09290304 or × 10.7639
1 yd ²	0.83612736 m ²	÷ 0.83612736 or × 1.19599
1 acre	0.40468564224 ha	÷ 0.40468564224 or × 2.47105
1 mi ²	2.589988110336 km ²	÷ 2.589988110336 or × 0.386102
Quick checks: 1 m ² = 10.8 ft ² · 1 ha = 2.47 acre		

Temperature formulas and landmarks	
$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times \frac{5}{9}$	-40°F = -40°C same on both 0°F = -17.8°C 32°F = 0°C water freezes 50°F = 10°C
$^{\circ}\text{F} = ^{\circ}\text{C} \times \frac{9}{5} + 32$	68°F = 20°C room 98.6°F = 37°C body 104°F = 40°C fever 212°F = 100°C water boils
$\text{K} = ^{\circ}\text{C} + 273.15$	
Check: 20°C is a nice day (68°F), 37°C is body temperature. A quick estimate: double the °C and add 30.	

BEFORE YOU PRESS EQUALS

Sense-check the size of the answer: inches become **more** centimeters (about 2.5 times as many), pounds become **fewer** kilograms (about 0.45 as many). Use the exact factor in your working and round only the final answer. The US gallon is not the UK gallon: 1 UK gallon = 4.54609 L.