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Unit Conversion Formulas Chart

The formula for every common conversion, with the reverse formula and a worked example

For: Students, teachers, engineers, nurses and anyone checking a calculation by hand

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EXACT DEFINITION	FORMULA	REVERSE	WORKED EXAMPLE
Most conversions multiply by a fixed factor; temperature also adds an offset	To = From × factor; °F = °C × 1.8 + 32	From = To ÷ factor; °C = (°F − 32) ÷ 1.8	12 in × 2.54 = 30.48 cm; 25 °C × 1.8 + 32 = 77 °F

All factors here are exact definitions; those marked Rounded are shown to 7 significant figures. Examples use the exact factor.

Length formulas

Conversion	Formula	Reverse	Example	Factor
Inches to centimetres	cm = in × 2.54	in = cm ÷ 2.54	12 in = 30.48 cm	Exact as shown
Inches to millimetres	mm = in × 25.4	in = mm ÷ 25.4	0.5 in = 12.7 mm	Exact as shown
Feet to metres	m = ft × 0.3048	ft = m ÷ 0.3048	10 ft = 3.048 m	Exact as shown
Yards to metres	m = yd × 0.9144	yd = m ÷ 0.9144	100 yd = 91.44 m	Exact as shown
Miles to kilometres	km = mi × 1.609344	mi = km ÷ 1.609344	26.2 mi = 42.165 km	Exact as shown
Nautical miles to kilometres	km = nmi × 1.852	nmi = km ÷ 1.852	100 nmi = 185.2 km	Exact as shown

Area and volume formulas

Conversion	Formula	Reverse	Example	Factor
Square feet to square metres	$m^2 = ft^2 \times 0.09290304$	$ft^2 = m^2 \div 0.09290304$	500 ft^2 = 46.452 m^2	Exact as shown
Acres to hectares	ha = ac × 0.4046856	ac = ha ÷ 0.4046856	40 ac = 16.187 ha	Rounded
Acres to square feet	ft^2 = ac × 43,560	ac = ft^2 ÷ 43,560	0.25 ac = 10,890 ft^2	Exact as shown
US gallons to litres	L = US gal × 3.785412	US gal = L ÷ 3.785412	5 US gal = 18.927 L	Rounded
UK gallons to litres	L = UK gal × 4.54609	UK gal = L ÷ 4.54609	5 UK gal = 22.73 L	Rounded
US fluid ounces to millilitres	mL = US fl oz × 29.57353	US fl oz = mL ÷ 29.57353	8 US fl oz = 236.588 mL	Rounded
US cups to millilitres	mL = cup × 236.5882	cup = mL ÷ 236.5882	2 cup = 473.176 mL	Rounded
Cubic feet to litres	L = ft^3 × 28.31685	ft^3 = L ÷ 28.31685	10 ft^3 = 283.168 L	Rounded

Weight and mass formulas

Conversion	Formula	Reverse	Example	Factor
Ounces to grams	g = oz × 28.34952	oz = g ÷ 28.34952	8 oz = 226.796 g	Rounded
Pounds to kilograms	kg = lb × 0.4535924	lb = kg ÷ 0.4535924	150 lb = 68.039 kg	Rounded
Stones to kilograms	kg = st × 6.350293	st = kg ÷ 6.350293	11 st = 69.853 kg	Rounded
Pounds to ounces	oz = lb × 16	lb = oz ÷ 16	2.5 lb = 40 oz	Exact as shown

Speed, pressure, energy and power formulas

Conversion	Formula	Reverse	Example	Factor
Miles per hour to km/h	km/h = mph × 1.609344	mph = km/h ÷ 1.609344	70 mph = 112.654 km/h	Rounded
Knots to km/h	km/h = kn × 1.852	kn = km/h ÷ 1.852	120 kn = 222.24 km/h	Exact as shown
Metres per second to km/h	km/h = m/s × 3.6	m/s = km/h ÷ 3.6	10 m/s = 36 km/h	Rounded
psi to kilopascals	kPa = psi × 6.894757	psi = kPa ÷ 6.894757	32 psi = 220.632 kPa	Rounded
Bar to psi	psi = bar × 14.50377	bar = psi ÷ 14.50377	2.2 bar = 31.908 psi	Rounded
Kilowatt-hours to megajoules	MJ = kWh × 3.6	kWh = MJ ÷ 3.6	10 kWh = 36 MJ	Exact as shown
Kilocalories to kilojoules	kJ = kcal × 4.184	kcal = kJ ÷ 4.184	250 kcal = 1,046 kJ	Exact as shown
BTU to kilojoules	kJ = BTU × 1.055056	BTU = kJ ÷ 1.055056	1000 BTU = 1,055.056 kJ	Rounded

Conversion	Formula	Reverse	Example	Factor
Horsepower to kilowatts	kW = hp × 0.7456999	hp = kW ÷ 0.7456999	150 hp = 111.855 kW	Rounded

Temperature formulas

Conversion	Formula	Reverse	Example
Celsius to Fahrenheit	°F = °C × 9/5 + 32	°C = (°F − 32) × 5/9	25 °C = 77 °F
Celsius to kelvin	K = °C + 273.15	°C = K − 273.15	25 °C = 298.15 K
Fahrenheit to kelvin	K = (°F − 32) × 5/9 + 273.15	°F = (K − 273.15) × 9/5 + 32	98.6 °F = 310.15 K
Fahrenheit to Rankine	°R = °F + 459.67	°F = °R − 459.67	70 °F = 529.67 °R
Temperature difference	Δ°F = Δ°C × 1.8 (no offset)	Δ°C = Δ°F ÷ 1.8	A 10 °C rise = an 18 °F rise

Useful relationships

Quantity	Formula	Units
Speed	speed = distance ÷ time	km/h = km ÷ h; m/s = km/h ÷ 3.6
Density	density = mass ÷ volume	1 g/cm^3 = 1000 kg/m^3 = 62.43 lb/ft^3
Pressure	pressure = force ÷ area	1 Pa = 1 N/m^2; 1 psi = 1 lbf/in^2
Power	power = energy ÷ time	1 W = 1 J/s; 1 kWh = 3.6 MJ
Area of a circle	$A = \pi \times r^2$	Use the same unit for r and A (m → m^2)
Volume of a cylinder	$V = \pi \times r^2 \times h$	1 m^3 = 1000 L; 1 ft^3 = 28.32 L

Sources and method

- **International Yard and Pound Agreement (1959)** — 1 in = 25.4 mm, 1 ft = 0.3048 m, 1 lb = 0.453 592 37 kg exactly
- **NIST Special Publication 811** — Guide for the Use of the International System of Units (www.nist.gov/pml/special-publication-811)
- **BIPM SI Brochure, 9th edition** — Definitions of the SI units, including the kelvin (www.bipm.org/en/publications/si-brochure)

Every factor is taken from the exact definitions used across this site (1959 yard and pound agreement, NIST SP 811, SI Brochure); examples are calculated from them. Interactive version, corrections and more charts: **allunitconversions.com/conversion-formulas-chart**