

mm, cm, m and km against inches, feet, yards and miles: the length units chart

mm is the millimetre, a thousandth of a metre: 10 mm in a cm, 1,000 mm in a metre, 1,000,000 mm in a km, and exactly 25.4 mm in an inch (NIST SP 811 Appendix B, exact since 1959). Symbols: lowercase, no full stop, no plural s, a space after the number (5 mm).

Metric: move the decimal point

Unit	mm	cm	m	km
1 mm	1	0.1	0.001	0.000001
1 cm	10	1	0.01	0.00001
1 m	1,000	100	1	0.001
1 km	1,000,000	100,000	1,000	1

[] mm to cm: / 10 (45 mm = 4.5 cm). cm to mm: x 10 (7.2 cm = 72 mm)

[] cm to m: / 100 (350 cm = 3.5 m). m to cm: x 100 (1.62 m = 162 cm)

[] mm to m: / 1,000 (2,500 mm = 2.5 m). m to km: / 1,000 (1,500 m = 1.5 km). km to m: x 1,000 (3.2 km = 3,200 m)

[] Check: a bigger unit gives a smaller number (45 mm = 4.5 cm, never 450 cm)

Imperial, with the exact metric values

Unit	Equals	In millimetres	In metres	Going back
1 inch (in)		25.4 mm	0.0254 m	1 cm = 0.3937 in; 1 mm = 0.0394 in
1 foot (ft)	12 in	304.8 mm	0.3048 m	1 m = 3.281 ft = 39.37 in
1 yard (yd)	3 ft = 36 in	914.4 mm	0.9144 m	1 m = 1.094 yd
1 mile (mi)	1,760 yd = 5,280 ft	1,609,344 mm	1,609.344 m	1 km = 0.6214 mi

[] Inches to mm: x 25.4 (6 in = 152 mm; a 1/4-inch bolt = 6.35 mm). mm to inches: / 25.4 (100 mm = 3.94 in)

[] Feet to cm: x 30.48 (6 ft = 183 cm). cm to ft and in: / 2.54 then / 12 (170 cm = 66.9 in = 5 ft 7 in)

[] Miles to km: x 1.609, or x 8 / 5 (26.2 mi = 42.2 km). km to miles: x 0.6214, or x 5 / 8 (10 km = 6.2 mi)

The short answers

mm in a cm	10	cm in a metre	100	mm in an inch	25.4
mm in a metre	1,000	metres in a km	1,000	cm in an inch	2.54
mm in a km	1,000,000	inches in a metre	39.37	cm in a foot	30.48
mm in a foot	304.8	feet in a metre	3.28	km in a mile	1.609

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Reading a ruler, choosing the unit, and a practice set

How to read the millimetres on a ruler

- [] The long numbered lines are centimetres; the medium line halfway between two numbers is 5 mm; the short lines are single millimetres (nine lines, ten gaps, between each pair of centimetre lines)
- [] Line the object up with the 0 mark, not the end of the ruler
- [] Read the last whole centimetre the object passes (say 7), then count the small lines past it (say 4): 7.4 cm = 74 mm
- [] The three mistakes: starting at the ruler's edge; counting lines instead of gaps; writing 7 cm 4 mm as 7.04 cm

Which unit for what

Measuring	Use	Examples
Very small things, precision work	mm	a 4 mm screw, 12 mm of rain, A4 paper 210 x 297 mm, drill bits, 3D printing, sewing patterns
Everyday objects, people	cm	a book 21 cm tall, height 158 cm, a 30 cm ruler
Rooms, buildings, sport	m	a room 4.5 m long, a 100 m race, a 25 m pool
Distances between places	km (miles in the UK and US)	12 km to school, a 42.195 km marathon, 150 miles = 241 km

Worked example

A shelf is 1.2 m long; three boxes 35 cm wide go on it. $1.2 \text{ m} = 120 \text{ cm}$; $3 \times 35 = 105 \text{ cm}$; $120 - 105 = 15 \text{ cm} = 150 \text{ mm}$ of shelf left.

Practice

- Write 68 mm in centimetres, and 3.5 cm in millimetres.
- A door is 2.04 m tall. How many centimetres? How many millimetres?
- A pencil is 17.5 cm long. A pencil case is 180 mm long. Does it fit?
- Convert 8 inches to millimetres, and 50.8 mm to inches.
- A running track is 400 m. How many laps make 5 km?
- A car journey is 150 miles. Roughly how many kilometres?
- Which is longer, 2,350 mm or 2.4 m? By how much?
- A child is 4 ft 2 in tall. What is that in centimetres?

Answers

- 6.8 cm; 35 mm.
- 204 cm; 2,040 mm.
- Yes: $17.5 \text{ cm} = 175 \text{ mm}$, less than 180 mm.
- 203.2 mm; 2 inches.
- 12.5 laps ($5,000 / 400$).
- About 240 km ($150 \times 1.609 = 241$).
- $2.4 \text{ m} = 2,400 \text{ mm}$, longer by 50 mm (5 cm).
- $50 \text{ in} \times 2.54 = 127 \text{ cm}$.