

Measurement

Formulas, conversions and quick reference - Primary to lower secondary

A practical reference covering length, mass, capacity, time, area, perimeter, volume, temperature and unit conversions for everyday mathematics.

1. Metric Length

Millimetre	1 centimetre = 10 millimetres.
Centimetre	1 metre = 100 centimetres.
Metre	1 kilometre = 1000 metres.
Conversion chain	km → m → cm → mm: multiply by 1000, 100, or 10 when moving to a smaller unit.
Reverse	Divide by the same factor when moving to a larger unit.

2. Common Length Conversions

1 inch	1 inch = 2.54 centimetres.
1 foot	1 foot = 12 inches = 30.48 centimetres.
1 yard	1 yard = 3 feet = 0.9144 metres.
1 mile	1 mile is approximately 1.61 kilometres.
1 kilometre	1 kilometre is approximately 0.62 miles.

3. Choosing a Length Unit

Small objects	Use mm or cm for very small or everyday objects.
Room/building	Use metres.
Long distances	Use kilometres or miles depending on the system used.
Estimate first	Choose a sensible unit before measuring.

Mass & Weight

Metric units, conversions and everyday applications

4. Metric Mass

Milligram	1 gram = 1000 milligrams.
Gram	1 kilogram = 1000 grams.
Kilogram	1 tonne = 1000 kilograms.
Conversion rule	Multiply when moving to a smaller unit; divide when moving to a larger unit.

5. Common Mass Conversions

1 pound	1 pound is approximately 0.45 kilograms.
1 kilogram	1 kilogram is approximately 2.2 pounds.
1 ounce	1 ounce is approximately 28.35 grams.
1 pound	1 pound = 16 ounces.

6. Choosing a Mass Unit

Tiny quantities	Use milligrams for very small masses.
Food/small objects	Use grams.
People/groceries	Use kilograms.
Very large loads	Use tonnes.

7. Important Language

Mass	Mass describes the amount of matter in an object.
Weight	In everyday language, weight is often used when people mean mass; scientific contexts distinguish the two.
Practical tip	Follow the terminology and units used in the question.

Capacity & Volume

Liquid measurement and cubic-unit relationships

8. Metric Capacity

Millilitre	1 litre = 1000 millilitres.
Litre	A common unit for liquid capacity.
Conversion	L → mL: multiply by 1000; mL → L: divide by 1000.
Estimate	Choose mL for small quantities and L for larger quantities.

9. Common US Customary Capacity

1 US gallon	1 US gallon = 4 US quarts.
1 US quart	1 US quart = 2 US pints.
1 US pint	1 US pint = 2 US cups.
1 US cup	1 US cup = 8 US fluid ounces.
Approximate conversion	1 US gallon is approximately 3.79 litres.

10. Volume

Cube	Volume of a cube = side × side × side.
Cuboid	Volume = length × width × height.
Units	Volume may be measured in cubic centimetres, cubic metres and other cubic units.
Capacity link	1 cubic centimetre = 1 millilitre; 1 cubic decimetre = 1 litre.

11. Everyday Applications

Cooking	Measure liquids and ingredients using mL, L, cups or other stated units.
Packaging	Compare container capacities using the same unit.
Travel	Convert capacity units when different measurement systems are used.

Perimeter & Area

Essential formulas for 2D shapes

12. Perimeter

General rule	Perimeter = total distance around a 2D shape.
Rectangle	Perimeter = $2 \times (\text{length} + \text{width})$.
Square	Perimeter = $4 \times \text{side length}$.
Regular polygon	Perimeter = number of sides $\times$ side length.

13. Area

Rectangle	Area = length $\times$ width.
Square	Area = side $\times$ side.
Triangle	Area = $\frac{1}{2} \times \text{base} \times \text{perpendicular height}$.
Parallelogram	Area = base $\times$ perpendicular height.
Trapezium / trapezoid	Area = $\frac{1}{2} \times (\text{sum of parallel sides}) \times \text{perpendicular height}$.

14. Circle Area

Formula	Area = $\pi \times \text{radius} \times \text{radius}$.
Using diameter	Area = $\pi \times (\text{diameter}/2) \times (\text{diameter}/2)$.
Units	Area is measured in square units, such as cm squared or m squared.

15. Area vs Perimeter

Area	Measures the space inside a 2D shape.
Perimeter	Measures the distance around a 2D shape.
Units	Perimeter uses linear units; area uses square units.

Surface Area & Volume

3D measurement formulas

16. Cubes & Cuboids

Cube volume	Volume = side x side x side.
Cuboid volume	Volume = length x width x height.
Cube surface area	Surface area = 6 x side x side.
Cuboid surface area	Surface area = 2 x (lw + lh + wh).

17. Prisms

Volume	Volume of a prism = area of cross-section x length.
Units	Volume uses cubic units.
Check	Make sure the cross-sectional area and length use compatible units.

18. Cylinders

Volume	Volume = $\pi \times \text{radius} \times \text{radius} \times \text{height}$.
Curved surface area	Curved surface area = $2 \times \pi \times \text{radius} \times \text{height}$.
Total surface area	Total surface area = $2 \times \pi \times \text{radius} \times \text{radius} + 2 \times \pi \times \text{radius} \times \text{height}$.

19. Capacity & Volume

Key relationship	1 litre = 1000 millilitres.
Cubic link	1 cubic centimetre = 1 millilitre.
Larger cubic link	1 cubic metre = 1000 litres.
Practical check	Convert all measurements to the same unit before calculating.

Time, Temperature & Speed

Measurement formulas used in everyday problems

20. Time Conversions

Seconds	1 minute = 60 seconds.
Minutes	1 hour = 60 minutes.
Hours	1 day = 24 hours.
Days	1 week = 7 days.
Calendar	Months have different numbers of days; check the stated year for February.

21. Elapsed Time

Formula	Elapsed time = finishing time - starting time.
Crossing midnight	Break the time into parts before and after midnight, then add.
Timetables	Check whether times use a 12-hour or 24-hour clock.

22. Temperature

Celsius to Fahrenheit	$\text{Fahrenheit} = (\text{Celsius} \times 9/5) + 32.$
Fahrenheit to Celsius	$\text{Celsius} = (\text{Fahrenheit} - 32) \times 5/9.$
Reference	0 degrees Celsius = 32 degrees Fahrenheit.
Reference	20 degrees Celsius = 68 degrees Fahrenheit.
Reference	30 degrees Celsius = 86 degrees Fahrenheit.

23. Speed, Distance & Time

Speed	$\text{Speed} = \text{distance} / \text{time}.$
Distance	$\text{Distance} = \text{speed} \times \text{time}.$
Time	$\text{Time} = \text{distance} / \text{speed}.$
Unit check	Keep distance and time units compatible, such as km and hours.

Unit Conversion & Quick Reference

Fast reminders, common mistakes and checking rules

24. Metric Conversion Ladder

Length	km -> m -> cm -> mm.
Mass	tonne -> kg -> g -> mg.
Capacity	L -> mL.
Rule	Moving to a smaller unit usually means multiplying; moving to a larger unit means dividing.

25. Common Area & Volume Units

Length	mm, cm, m, km.
Area	cm squared, m squared, km squared.
Volume	cm cubed, m cubed.
Capacity	mL, L.

26. Common Mistakes to Watch

Mixed units	Convert measurements to the same unit before adding, subtracting or comparing.
Area	Remember that area uses square units.
Volume	Remember that volume uses cubic units.
Perimeter	Do not use an area formula for a perimeter question.
Time	Do not treat minutes as decimal fractions of an hour without converting correctly.
Temperature	Use the correct conversion formula and keep the scale clear.

27. Calculation Checks

Estimate	Predict the size of the answer before calculating.
Units	Write units in the final answer.
Reasonableness	Ask whether the measurement is realistic for the object or situation.
Reverse check	Use the inverse conversion or formula where possible.

Maths Connects Us All

Measurement gives us a common mathematical language for comparing distance, mass, capacity, time, temperature and space around the world.