Fractions, Decimals, Percentages, Ratio and Proportion

Year 6 Maths Cheat Sheet

Quick reference for common word-problem methods.

Scholarly Training

1 Fractions foundations

How to use this

Use the steps and templates to set up **word problems** quickly. Highlight keywords like **of, remaining, at least, each** and **per** before you calculate.

Fractions are shown in stacked form, like a textbook.

A fraction tells you how many equal parts you have.

$\frac{3}{4}$ = 3 parts out of 4 equal parts

- **Numerator** = top number: how many parts.
- **Denominator** = bottom number: how many equal parts make 1 whole.

Equivalent fractions and simplifying

- Equivalent fractions: multiply or divide the top and bottom by the **same non-zero number**.
- To simplify, divide both by the **GCF**, the greatest common factor.

Example: simplify

$\frac{12}{18} = \frac{12 \div 6}{18 \div 6} = \frac{2}{3}$

Compare and order fractions

Use a common denominator, often the LCM, or cross-multiply. With positive denominators, compare the two cross-products:

$\frac{a}{b}$ and $\frac{c}{d}$ $\longrightarrow$ ad and bc

Quick tip: if one denominator is a multiple of the other, like 12 and 6, use that denominator.

Fraction of a quantity

$\frac{3}{5}$ of 40 $\longrightarrow$ $40 \div 5 \times 3$

Word clue: **of** usually means **multiply**.

Rounding rule

If a question asks for the **least whole number** and says **at least**, round up when needed. If the result is already a whole number, keep it.

2 Fraction operations

Simplify whenever you can, especially before multiplying.

Add or subtract

Find a common denominator, then add or subtract the numerators.

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

Example

Use a common denominator of 8.

$$\frac{1}{4} + \frac{1}{8} = \frac{2}{8} + \frac{1}{8} = \frac{3}{8}$$

Multiply or divide

Multiply: tops together, bottoms together.

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

Divide: multiply by the reciprocal of the second fraction.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Speed trick

Cross-cancel common factors before multiplying to keep the numbers small.

Mixed numbers

To change a mixed number into an improper fraction, multiply the whole number by the denominator, then add the numerator. **Keep the same denominator.**

Example

$$2\frac{1}{3} = \frac{2 \times 3 + 1}{3} = \frac{7}{3}$$

3 Decimals and conversions

Handy conversions

Common fraction, decimal and percentage matches:

Fraction	Decimal	Percent	Fraction	Decimal	Percent
$\frac{1}{2}$	0.5	50%	$\frac{1}{4}$	0.25	25%
$\frac{3}{4}$	0.75	75%	$\frac{1}{5}$	0.2	20%
$\frac{2}{5}$	0.4	40%	$\frac{3}{5}$	0.6	60%
$\frac{4}{5}$	0.8	80%	$\frac{1}{8}$	0.125	12.5%

Decimals: quick foundations

To turn a decimal into a fraction, write it over 10, 100, 1000 and so on, then simplify.

Decimal	As a fraction	Simplified
0.5	$\frac{5}{10}$	$\frac{1}{2}$
0.25	$\frac{25}{100}$	$\frac{1}{4}$
0.375	$\frac{375}{1000}$	$\frac{3}{8}$
0.82	$\frac{82}{100}$	$\frac{41}{50}$

Multi-step tip

When you see “percent of a fraction of a number”, convert the percent to a fraction and multiply in any order. Cancel early.

Setup: 45% of seven-twelfths of 240.

$$\frac{45}{100} \times \frac{7}{12} \times 240$$

4 Percentages

Percent means “per 100”. Treat p% as the fraction p/100.

Convert between forms

From	To	Rule
Percent	Decimal	Divide by 100: move the decimal point 2 places left.
Decimal	Percent	Multiply by 100: move the decimal point 2 places right.
Percent	Fraction	Write p/100, then simplify.

Find a percent of a number

$$p\% \text{ of } N = \frac{p}{100} \times N$$

Example: 20% of 150 = 0.20 × 150.

Reverse percentage: find the whole

$$\text{whole} = \frac{\text{part}}{p/100}$$

Word clue: “represents ... percent of” usually means reverse percentage.

Percent increase or decrease

$$\text{new} = \text{original} \times \left(1 \pm \frac{r}{100}\right)$$

Use + for an increase and − for a decrease. Here, r is the percentage rate.

Successive changes

Do the changes one after another by multiplying their factors.

Example: +25%, then −20%, then +50%, then −40%.

$$\times 1.25 \times 0.80 \times 1.50 \times 0.60$$

Percent error

$$\text{percent error} = \frac{|\text{measured} - \text{true}|}{\text{true}} \times 100\%$$

Example: a scale reads 1 kg but the true mass is 0.95 kg. The error fraction is 0.05 ÷ 0.95.

Cents per $100: sales tax style

82 cents per $100 = $0.82 per $100 = 0.82%.

5 Ratios, proportions and mixtures

A ratio a:b compares quantities. It can also be read as a/b: the first quantity compared with the second.

Split a total in a ratio

Add the parts to find the total number of parts. Then divide the total amount by the total number of parts.

$$\text{one part} = \frac{\text{total}}{a+b}$$

Example: a difference question

There are 510 balls. The ratio of iron balls to copper balls is 16:1.

Total parts: 16 + 1 = 17. **One part:** 510 ÷ 17 = 30.

Iron = 16 × 30 = 480. Copper = 30. **Difference = 450.**

Proportions

$$\frac{a}{b} = \frac{c}{d} \implies ad = bc$$

Use proportions for scaling, unit rates and “for every” problems.

Mixtures: parts language

Sentence	Maths meaning
1 part bleach for every 4 parts water	Bleach:water = 1:4. There are 5 total parts. $\text{Bleach} = \frac{1}{5}$ of the mixture
Half as much bleach as needed	Halve the bleach amount. The water stays the same, so the ratio changes.

Worked setup

Correct ratio: 1:4. Half the bleach gives 0.5:4.

Multiply both parts by 2 to get 1:8. Bleach is now 1 part out of 9 total parts.

If the total mixture is 27 L:

$$\text{bleach} = \frac{1}{9} \times 27 = 3 \text{ L}$$

6 Word-problem patterns

Quick templates for multi-step questions: remaining amounts, containers, nested percentages and discounts.

Pattern A: "remaining … is …"

- Find the missing fraction or percentage first: 100% − known%.
- Whole = remainder amount ÷ remainder decimal or fraction.

Example: marbles

50% + 25% + 20% = 95% accounted for, so 5% remains.

If 20 marbles remain, the total is 20 ÷ 0.05 = **400**.

Pattern B: containers and capacity

Match the change in the fraction of the capacity to the added amount.

Example

A container goes from half full to 70% full after adding 4 L. The change is 20 percentage points, or 20% of its capacity.

Capacity = 4 ÷ 0.20 = 20 L.

Pattern C: "of" means multiply

30% of 52% of the total = total × 0.52 × 0.30.

Pattern D: discounts and buying more

With the same budget, 25% off makes the new price 75% of the old price.

$$\text{new price} = \frac{3}{4} \times \text{old price} \qquad \text{buying multiplier} = \frac{4}{3}$$

The buying multiplier is the old price divided by the new price.

Quick result

If you could buy 15 items before the discount:

$$15 \times \frac{4}{3} = 20 \text{ items} \quad \longrightarrow \quad 5 \text{ more}$$

Final checklist

Look for	Usually means
of	Multiply.
per / for every	Ratio, unit rate or proportion.
remaining	Find the missing fraction or percentage first.
at least	Round up to a whole number when needed.
each additional ... (or fraction)	Round up the extra amount before pricing.