LF LearnFrenzy

QUANTITATIVE APTITUDE · FREE STUDY MATERIAL

Approximate Values

Formulas & Shortcut Tricks

Every important formula, shortcut and exam trick for Approximate Values in one place – with solved examples, common mistakes and a one-page revision sheet.

WHAT'S INSIDE

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USEFUL FOR

- Bank PO & Clerk prelims and mains (IBPS, SBI, RBI)
- SSC CGL / CHSL
- Railways (RRB NTPC, Group D)
- Campus placements (TCS, Infosys, Wipro, Accenture)
- UPSC CSAT & state PSC exams

Practise Approximate Values free on LearnFrenzy – questions with instant explanations →

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1 Topic introduction

What it is, why it matters and how it is asked

Approximation questions give awkward numbers such as 49.87 × 20.12 and ask for the nearest value among the options. The aim is not the exact answer but a quick, safe estimate: round each number to a friendly value, calculate mentally and pick the closest option.

Exams mix decimals, percentages, fractions, squares and roots, missing-number equations and growth problems. Knowing fraction equivalents of percentages, squares and cubes, and how much rounding the options allow, is what makes this section fast.

Why it matters in exams

- Bank prelims ask a set of 5 approximation questions.
- Each can be solved in 20–30 seconds with practice.
- Estimation also speeds up Data Interpretation.

Where it is used

- Checking bills and change.
- Estimating fuel, travel and budgets.
- Reading charts and reports quickly.

Common question patterns

Decimals
Round before multiplying or dividing.

Percentages
Turn them into easy fractions.

Fractions
Make the number divisible.

Squares and cubes
Near a round number.

Square and cube roots
Nearest perfect power.

Missing number (?)
Solve the rounded equation.

Growth and depreciation
Use round rates.

Everyday estimates
Bills, profit, speed, mileage.

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2 Important formulas

Cards marked MOST USED are the ones to revise first

Rounding rules

Round to friendly numbers

MOST USED

Decimals → nearest whole; 2,995 → 3,000; 0.98 → 1

Round first, calculate second.

EXAMPLE 49.87 × 20.12 ≈ 50 × 20 = **1,000** (exact 1,003.4).

Balance the rounding

MOST USED

In a product, round one number up and the other down

The errors cancel instead of adding up.

EXAMPLE 104.8 × 95.3 ≈ 105 × 95 = **9,975** (exact 9,987.4).

Make division exact

Round the dividend and divisor so that one divides the other

Choose numbers from the multiplication tables.

EXAMPLE 7,203 ÷ 48.1 ≈ 7,200 ÷ 48 = **150** (exact 149.75).

Percentages and fractions

Percent swap

MOST USED

x% of y = y% of x; round the percentage to a fraction

24.9% ≈ 25% = ¼.

EXAMPLE 24.9% of 801 ≈ ¼ × 800 = **200** (exact 199.45).

Fraction equivalents

MOST USED

33.33% = 1/3, 16.67% = 1/6, 14.28% = 1/7, 12.5% = 1/8, 11.11% = 1/9, 8.33% = 1/12

Divide instead of multiplying by a decimal.

EXAMPLE 14.28% of 6,302 ≈ 6,300⁄7 = **900** (exact 899.9).

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Powers, roots and equations

Squares near a round number

$(a \pm b)^2 \approx a^2 \pm 2ab$ (b small)

Drop the tiny b^2 term.

EXAMPLE $49.8^2 \approx 2{,}500 - 2 \times 50 \times 0.2 =$ **2,480** (exact 2,480.04).

Square roots

MOST USED

$\sqrt{(n^2 + d)} \approx n + d/(2n)$

Start from the nearest perfect square.

EXAMPLE $\sqrt{1{,}230} \approx 35 + 5/70 \approx$ **35.07** (exact 35.071).

Cube roots

Find the nearest perfect cube

Learn cubes up to 30^3.

EXAMPLE $\sqrt[3]{17{,}570} \approx$ **26** ($26^3 = 17{,}576$).

Missing number (?)

MOST USED

Round every known number, then solve for ?

Move ? to one side at the end.

EXAMPLE $39.9 \times 15.1 + ? = 1{,}000 \rightarrow 600 + ? = 1{,}000 \rightarrow ? \approx$ **400** (exact 397.5).

Growth and depreciation

$P(1 + r)^n \approx P(1 + nr + n(n - 1)r^2/2)$

Enough for 2–3 years at small rates.

EXAMPLE ₹10,000 at 10% for 3 years $\approx 10{,}000 \times 1.33 =$ **₹13,300** (exact 13,310).

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3 Shortcut tricks & smart techniques

Each trick says when to use it – that matters as much as the trick

Percent ↔ fraction table

MOST USED

USE WHEN Any percentage close to a friendly value.

%	50	33.3	25	20	16.7	14.3	12.5	11.1	10	9.09
Fraction	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11

EXAMPLE 37.5% of 1,601 ≈ ⅜ × 1,600 = **600**.

Read the options first

MOST USED

USE WHEN Before rounding.

1. Options far apart → round boldly.
2. Options close together → round carefully and balance.

EXAMPLE 19.97% of 4,999 + 11.03^2 ≈ 1,000 + 121 = **1,121**.

Last digit for perfect cubes

USE WHEN Cube root of a number that is (nearly) a perfect cube.

1. Last digit of the cube → last digit of the root (2↔8, 3↔7, others same).
2. The thousands part gives the first digit.

EXAMPLE $\sqrt[3]{50{,}653}$ → ends in 3 → 7; 50 lies between 3^3 and 4^3 → **37**.

Add and subtract with whole numbers

USE WHEN A chain of additions and subtractions.

1. Round each term to the nearest whole number or ten.
2. Keep a rough note of how much you rounded up or down.

EXAMPLE 498.7 + 301.2 − 199.6 ≈ 499 + 301 − 200 = **600**.

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4 Solved examples

The full method on the left, the exam shortcut on the right

1 DECIMALS

What is the approximate value of 299.8 × 12.02 ÷ 5.98?

STEP BY STEP

1. Round: 300 × 12 ÷ 6.
2. = 3,600 ÷ 6 = 600.
3. Exact ≈ 602.6.

SHORTCUT

300 ÷ 6 = 50 → × 12.

Why it works: Divide first to keep the numbers small.

Answer: 600

2 PERCENTAGES

Find the approximate value of 35.02% of 1,599 + 24.98% of 2,401.

STEP BY STEP

1. 35% of 1,600 = 560.
2. 25% of 2,400 = 600.
3. Total ≈ 1,160 (exact 1,159.7).

SHORTCUT

35% = 7/20 → 1,600 × 7/20.

Why it works: Each part rounds cleanly on its own.

Answer: 1,160

3 FRACTIONS

What is approximately 3/7 of 2,099.6?

STEP BY STEP

1. Round 2,099.6 to 2,100 (divisible by 7).
2. 2,100 ÷ 7 = 300.
3. × 3 = 900 (exact 899.8).

SHORTCUT

Make the number a multiple of the denominator.

Why it works: Trap: rounding to 2,000 – it does not divide by 7.

Answer: 900

4 SQUARE ROOT

Find the approximate value of $\sqrt{4,902}$.

STEP BY STEP

1. Nearest perfect square: $4,900 = 70^2$.
2. $\sqrt{4,902} \approx 70$ (exact 70.01).

SHORTCUT

$n + d/(2n) = 70 + 2/140$.

Why it works: A tiny remainder hardly changes the root.

Answer: 70

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5 SQUARES

Find the approximate value of $19.9^2 + 30.1^2$.

STEP BY STEP

1. $19.9^2 \approx 400$; $30.1^2 \approx 900$.
2. Sum ≈ 1,300 (exact 1,302).

SHORTCUT

Errors −4 and +6 nearly cancel.

Why it works: One rounded down, one up – balanced.

Answer: 1,300

6 CUBE ROOT

What is the approximate value of $\sqrt[3]{13{,}820}$?

STEP BY STEP

1. $24^3 = 13{,}824$.
2. $\sqrt[3]{13{,}820} \approx 24$.

SHORTCUT

Ends near 4 → root ends in 4; 13 lies between 2^3 and 3^3 → 24.

Why it works: Learn cubes to 30.

Answer: 24

7 MISSING NUMBER

Find the approximate value of ? in 24.97 × ? = 1,249.6.

STEP BY STEP

1. Round: 25 × ? = 1,250.
2. ? = 50 (exact 50.04).

SHORTCUT

1,250 ÷ 25 = 50.

Why it works: Round both sides the same way.

Answer: 50

8 CHAIN

Find the approximate value of 4,998 ÷ 24.9 × 7.98.

STEP BY STEP

1. Round: 5,000 ÷ 25 × 8.
2. = 200 × 8 = 1,600.
3. Exact ≈ 1,601.8.

SHORTCUT

Work left to right.

Why it works: Trap: 25 – doing 24.9 × 7.98 first.

Answer: 1,600

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9 DEPRECIATION

A machine worth ₹80,000 loses 9.8% of its value every year. What is its approximate value after 3 years?

STEP BY STEP

1. Round the rate to 10%.
2. 80,000 × 0.9^3 = 80,000 × 0.729.
3. ≈ ₹58,320 (exact ≈ ₹58,710).

SHORTCUT

0.9^3 = 0.729.

Why it works: Round rates make the powers easy.

Answer: ₹58,320

10 PROFIT

An article costing ₹1,198 is sold at a profit of 24.9%. What is its approximate selling price?

STEP BY STEP

1. Round: cost ₹1,200, profit 25%.
2. SP = 1,200 × 1.25 = ₹1,500.
3. Exact ≈ ₹1,496.3.

SHORTCUT

25% of 1,200 = 300 → 1,500.

Why it works: 25% = ¼ is a friendly rate.

Answer: ₹1,500

11 MILEAGE

A car runs 14.8 km per litre. Petrol costs ₹101.9 per litre. What is the approximate fuel cost for 592 km?

STEP BY STEP

1. Litres = 592 ÷ 14.8 = 40.
2. Cost ≈ 40 × 102 = ₹4,080.
3. Exact = ₹4,076.

SHORTCUT

592 = 40 × 14.8 exactly.

Why it works: Check if a number divides exactly before rounding.

Answer: ₹4,080

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5 Important exam tips

Patterns, traps and habits that save marks

Frequently asked question patterns

- Decimals multiplied and divided.
- Percentages of near-round numbers.
- Fractions with awkward numbers.
- Squares, square roots and cube roots.
- Missing number equations.
- Growth and depreciation.
- Everyday cost and profit estimates.

Common mistakes to avoid

- Rounding everything in the same direction.
- Rounding to numbers that do not divide.
- Ignoring the order of operations.
- Over-rounding when options are close.
- Calculating exactly – wasting time.
- Forgetting to round the percentage to a fraction.

Points to remember

- Round first, calculate second.
- Balance: one up, one down.
- x% of y = y% of x.
- $\sqrt{(n^2 + d)} \approx n + d/2n$.
- Pick the nearest option.

Speed and accuracy

- Learn squares to 30 and cubes to 20.
- Learn the percent–fraction table.
- Look at the options before rounding.
- Divide early to keep numbers small.

Preparation strategy

- Practise mental maths daily for 10 minutes.
- Practise on LearnFrenzy in order: Easy → Medium → Hard → Exam Pattern Mix → Data Sufficiency.
- Aim for 20–30 seconds per question.
- Revise Simplification and Square Roots alongside this topic.
- Read the Quick Revision Sheet (next page) the night before the exam.

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6 Quick revision sheet

Everything on one page for the night before the exam

Formulas

Rounding	**friendly numbers first**	Products	**one up, one down**
Division	**make it divide exactly**	Percent swap	**x% of y = y% of x**
Square	**$(a \pm b)^2 \approx a^2 \pm 2ab$**	Square root	**$n + d/(2n)$**
Cube root	**nearest perfect cube**	Missing ?	**round, then solve**
Growth	**$1 + nr + n(n-1)r^2/2$**		

Shortcut tricks

- 12.5% = 1/8.
- 14.28% = 1/7.
- 16.67% = 1/6.
- Cube ends 2 ↔ 8, 3 ↔ 7.
- Options far apart → round boldly.
- Divide before multiplying.

Must-know numbers

Squares	21^2 441 · 22^2 484 · 23^2 529 · 24^2 576 · 25^2 625 · 26^2 676 · 27^2 729 · 28^2 784 · 29^2 841
Cubes	13^3 2,197 · 14^3 2,744 · 15^3 3,375 · 16^3 4,096 · 17^3 4,913 · 18^3 5,832 · 19^3 6,859 · 24^3 13,824
Powers	$1.1^2 = 1.21$ · $1.1^3 = 1.331$ · $0.9^2 = 0.81$ · $0.9^3 = 0.729$

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7 A message from LearnFrenzy

For everyone preparing for placements, competitive and government exams

Keep going – you are closer than you think

Success in examinations is not just about how many hours you study. It is about how effectively you understand concepts, practise questions, and improve yourself every day.

Every formula you learn, every problem you solve, and every mistake you correct brings you one step closer to your goal.

Whether you are preparing for campus placements, competitive examinations, or government jobs, remember that consistency, confidence, and smart preparation make a real difference.

Don’t just memorize formulas. Understand the concepts, practise smart techniques, and develop the confidence to solve problems independently.

Your hard work today can create the opportunities you dream of tomorrow.

— Team LearnFrenzy

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