LF LearnFrenzy

QUANTITATIVE APTITUDE · FREE STUDY MATERIAL

Time and Work

Formulas & Shortcut Tricks

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

WHAT'S INSIDE

1. Topic introduction
2. Important formulas
3. Shortcut tricks & smart techniques
4. Solved examples
5. Important exam tips
6. Quick revision sheet
7. A message from LearnFrenzy

USEFUL FOR

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

Practise **Time and Work** free on LearnFrenzy – questions with instant explanations →

© 2026 LearnFrenzy · Free for personal study

1 Topic introduction

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

Time and Work asks how long people (or machines) take to finish a job alone, together, or in turns. The key idea is the rate: if A finishes a job in 12 days, A does 1/12 of it each day. Rates add when people work together, and time is simply work ÷ rate.

The fastest exam method is the LCM (total-units) method: take the whole job as the LCM of the given days, so every worker's daily work becomes a whole number. Questions about joining late, leaving early, alternate days and wages then become simple arithmetic.

Why it matters in exams

- Bank, SSC and railway papers ask 2–3 time-and-work questions, plus data-interpretation sets built on them.
- Placement tests favour efficiency comparisons, alternate days and "leaves before completion".
- The same rate logic solves pipes and cisterns and speed problems.

Where it is used

- Planning projects and deadlines with several people.
- Sharing payment fairly by the work each person did.
- Comparing the output of machines or teams.

Common question patterns

Together
Two or three workers finish a job together.

Efficiency
A is twice as fast / 50% more efficient than B.

Pairs
A + B, B + C, C + A given – find one or all.

Join late / leave early
Someone leaves after t days or n days before the end.

Alternate days
Workers take turns, one day each.

Wages
Payment shared in proportion to work done.

x more days
A takes x days more, B y days more than both together.

Hours per day
Working hours change, so days change.

© 2026 LearnFrenzy · Free for personal study

2 Important formulas

Cards marked MOST USED are the ones to revise first

Rates and working together

Work rate

MOST USED

A finishes in a days → A's rate = 1/a of the job per day; time = work ÷ rate

Think "how much of the job per day".

EXAMPLE In 4 days a worker who needs 12 days finishes 4/12 = **1/3** of the job.

Two workers together

MOST USED

Time together = a × b/(a + b)

Add the daily rates: 1/a + 1/b, then flip.

EXAMPLE A 12 days, B 18 days → 12 × 18/30 = **7.2 days**.

Three workers together

Time = 1/(1/a + 1/b + 1/c) = abc/(ab + bc + ca)

The same idea: add all the rates.

EXAMPLE 10, 15 and 30 days → 1/(3/30 + 2/30 + 1/30) = **5 days**.

LCM (total units) method

MOST USED

Total work = LCM of the days; efficiency = total ÷ days; time = total ÷ combined efficiency

Whole numbers instead of fractions – the fastest method in exams.

EXAMPLE A 12, B 18 → total 36 units; A 3/day, B 2/day → 36 ÷ 5 = **7.2 days**.

Efficiency

Efficiency and time are inverse

MOST USED

Efficiency ratio a : b ⇔ time ratio b : a

Twice as efficient means half the time.

EXAMPLE A is 50% more efficient than B (3 : 2); B takes 30 days → A takes 30 × 2/3 = **20 days**.

© 2026 LearnFrenzy · Free for personal study

Pairs A + B, B + C, C + A

MOST USED

> **2(A + B + C) = (A + B) + (B + C) + (C + A); one person = all three − the other pair**

Adding the three pairs counts everyone twice.

EXAMPLE A + B 12, B + C 15, C + A 20 days → total 60 units: 5, 4, 3 → all 6 per day → **10 days**.

Hours per day

> **Days × hours per day = constant for the same job**

Working longer each day shortens the number of days.

EXAMPLE 12 days at 6 h/day → at 8 h/day: 12 × 6 ÷ 8 = **9 days**.

Joining, leaving and taking turns

One leaves after t days

MOST USED

> **Work done together in t days, then the rest by the one who stays**

Split the job into two phases.

EXAMPLE A 20, B 30 (60 units: 3, 2) work 6 days → 30 units; B does the other 30 in 15 → total **21 days**.

Leaves n days before completion

> **If the job takes T days: (one who stays) × T + (one who leaves) × (T − n) = total work**

The one who stays works for the whole time.

EXAMPLE A 10, B 15 (30 units: 3, 2); A leaves 5 days before the end → 3(T − 5) + 2T = 30 → T = **9 days**.

Alternate days

MOST USED

> **Work in one full cycle = sum of the daily works; complete cycles first, then finish day by day**

Check who works on the last (possibly partial) day.

EXAMPLE A 8, B 12 (24 units: 3, 2), A first → 4 cycles = 20 units in 8 days; A does 3 on day 9; B finishes in half a day → **9.5 days**.

© 2026 LearnFrenzy · Free for personal study

Wages and special cases

Work and wages

MOST USED

> **Share of wages ∝ work done (= efficiency × days worked)**

Pay follows work, not time.

EXAMPLE A 10 days, B 15 days work together for ₹5,000 → work 3 : 2 → A gets **₹3,000**.

“x more days” rule

> **If A alone takes x days more and B alone y days more than both together, then together = √(xy)**

A neat result that saves a quadratic equation.

EXAMPLE A takes 6 more, B 24 more → together √144 = **12 days**.

© 2026 LearnFrenzy · Free for personal study

3 Shortcut tricks & smart techniques

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

Ready answers for two workers

MOST USED

USE WHEN Two people with common day values.

A (days)	B (days)	Together (days)
6	12	4
10	15	6
12	24	8
15	30	10
20	30	12
12	18	7.2

EXAMPLE A 20 days, B 30 days → 600 ÷ 50 = **12 days**.

LCM method step by step

MOST USED

USE WHEN Any question with several workers or phases.

1. Total work = LCM of all the days.
2. Daily work of each = total ÷ their days.
3. Add, subtract and divide with whole numbers.

EXAMPLE A 15, B 20, C 30 → total 60: 4 + 3 + 2 = 9 per day → 60/9 = **6 2/3 days**.

Efficiency to days in one step

USE WHEN "A is k times / p% more efficient than B."

1. p% more efficient → ratio (100 + p) : 100.
2. Time ratio is the reverse.

EXAMPLE A is 25% more efficient → 5 : 4 → if B takes 25 days, A takes 25 × 4/5 = **20 days**.

Pair-sum shortcut

USE WHEN Times for A + B, B + C and C + A are given.

1. Use LCM units for the three pairs.
2. All three = half the sum of pair efficiencies.
3. One person = all three – the opposite pair.

EXAMPLE In the pairs example (5, 4, 3 units) all three do 6 → A alone = 6 – 4 = 2 per day → **30 days**.

© 2026 LearnFrenzy · Free for personal study

4 Solved examples

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

1 TOGETHER

A can finish a job in 15 days and B in 10 days. How long will they take together?

STEP BY STEP

1. Rates: 1/15 + 1/10 = 2/30 + 3/30 = 5/30 = 1/6.
2. Time = 6 days.

SHORTCUT

15 × 10 ÷ 25 = 6.

Why it works: Working together, their daily rates add.

Answer: 6 days

2 THREE WORKERS

A, B and C can do a piece of work in 12, 15 and 20 days. How long will they take together?

STEP BY STEP

1. Total = LCM 60 units; rates 5, 4, 3 per day.
2. Together = 12 units per day.
3. Time = 60 ÷ 12 = 5 days.

SHORTCUT

abc ÷ (ab + bc + ca) = 3,600 ÷ 720 = 5.

Why it works: The LCM keeps every rate a whole number.

Answer: 5 days

3 EFFICIENCY

A is twice as efficient as B. Together they finish a job in 14 days. How long would A take alone?

STEP BY STEP

1. Let B do 1 unit a day, A 2 units → together 3 units.
2. Total = 3 × 14 = 42 units.
3. A alone = 42 ÷ 2 = 21 days.

SHORTCUT

A's share of the effort is 2/3 → A alone = 14 × 3/2 = 21.

Why it works: Efficiency ratio fixes how the combined work splits.

Answer: 21 days

4 PAIRS

A and B can finish a job in 10 days, B and C in 12 days, and C and A in 15 days. How long would C take alone?

STEP BY STEP

1. Total = 60 units; pair rates 6, 5, 4 per day.
2. All three = (6 + 5 + 4) ÷ 2 = 7.5 per day.
3. C = 7.5 − (A + B) = 7.5 − 6 = 1.5 → 60 ÷ 1.5 = 40 days.

SHORTCUT

C = half-sum − opposite pair → 1.5 units → 40 days.

Why it works: Adding the three pairs counts each person twice.

Answer: 40 days

© 2026 LearnFrenzy · Free for personal study

5 ONE LEAVES

A can do a job in 20 days and B in 30 days. They work together for 4 days, then A leaves. How many days does the whole job take?

STEP BY STEP

1. Total = 60 units; A 3, B 2 per day.
2. 4 days together → 20 units; 40 left.
3. B alone: 40 ÷ 2 = 20 days → total 24 days.

SHORTCUT

4 + (60 − 4 × 5) ÷ 2 = 24.

Why it works: The question asks for the total time, including the 4 days together.

Answer: 24 days

6 LEAVES BEFORE THE END

A can finish a job in 10 days and B in 15 days. They start together, but A leaves 5 days before the job is finished. How long does the job take?

STEP BY STEP

1. Total = 30 units; A 3, B 2 per day.
2. If the job takes T days: 3(T − 5) + 2T = 30.
3. 5T = 45 → T = 9 days.

SHORTCUT

(30 + 3 × 5) ÷ (3 + 2) = 9.

Why it works: Add back the work A would have done in the missing days.

Answer: 9 days

7 ALTERNATE DAYS

A can do a job in 8 days and B in 12 days. They work on alternate days, A starting. In how many days is the job finished?

STEP BY STEP

1. Total = 24 units; A 3, B 2 → 5 units per 2-day cycle.
2. 4 cycles = 20 units in 8 days; 4 left.
3. Day 9: A does 3 → 1 left; day 10: B needs 1/2 day → 9.5 days.

SHORTCUT

Full cycles first, then finish day by day: 8 + 1 + 0.5.

Why it works: The last day may be only partly used.

Answer: 9.5 days

© 2026 LearnFrenzy · Free for personal study

8 WAGES

A and B can do a job in 12 and 15 days. They work together for 4 days, and C finishes the rest at the same time so that the job is done in 4 days. The payment is ₹2,700. What is C's share?

STEP BY STEP

1. Total 60 units; A 5/day, B 4/day.
2. In 4 days: A 20, B 16 → C did 60 − 36 = 24.
3. Shares 20 : 16 : 24 = 5 : 4 : 6 → C = 2,700 × 6/15 = 1,080.

SHORTCUT

Wages follow work done: C did 24 of 60 units → 2/5 of ₹2,700.

Why it works: Payment is in proportion to work, not to days.

Answer: ₹1,080

9 X MORE DAYS

A alone takes 9 days more than A and B together, and B alone takes 16 days more than A and B together. How long do they take together?

STEP BY STEP

1. Let together = T: 1/(T + 9) + 1/(T + 16) = 1/T.
2. This simplifies to $T^2 = 9 \times 16$.
3. T = 12 days.

SHORTCUT

$\sqrt{(9 \times 16)} = 12$.

Why it works: The equation always reduces to $T^2 = xy$.

Answer: 12 days

10 PERCENTAGE EFFICIENCY

A is 25% more efficient than B. B alone can do a job in 25 days. How long will A and B take together?

STEP BY STEP

1. A : B efficiency = 5 : 4 → A alone = 25 × 4/5 = 20 days.
2. Together = 20 × 25 ÷ 45 = 100/9 days.
3. = 11 1/9 days.

SHORTCUT

Total 100 units (B 4/day, A 5/day) → 100 ÷ 9.

Why it works: 25% more efficient means 4/5 of the time.

Answer: 11 1/9 days

11 HOURS PER DAY

A finishes a job in 18 days working 8 hours a day. How many days will A take working 6 hours a day?

STEP BY STEP

1. Total = 18 × 8 = 144 hours.
2. At 6 hours a day: 144 ÷ 6 = 24 days.

SHORTCUT

18 × 8/6 = 24.

Why it works: Fewer hours each day → more days (inverse).

Answer: 24 days

© 2026 LearnFrenzy · Free for personal study

5 Important exam tips

Patterns, traps and habits that save marks

Frequently asked question patterns

- Two or three workers together.
- Efficiency comparisons (twice as fast, 25% more efficient).
- Pairs A + B, B + C, C + A.
- Joining late, leaving after t days, leaving n days before the end.
- Alternate days with a partial last day.
- Wages shared by work done.
- The “x more days” rule and hours per day.

Common mistakes to avoid

- Adding days instead of adding rates (10 + 15 ≠ together time).
- Mixing up efficiency and time – they are inverse.
- Forgetting the partial last day in alternate-day questions.
- Sharing wages by days worked instead of work done.
- Answering only the second phase when the question asks for total time.
- Treating “leaves 5 days before completion” as “leaves after 5 days”.

Points to remember

- Rate = 1/days; time = work ÷ rate.
- Two together = ab/(a + b).
- Efficiency ratio is the reverse of the time ratio.
- 2(A + B + C) = sum of the three pairs.
- x more and y more days → together $\sqrt{(xy)}$.

Speed and accuracy

- Always use the LCM method for three or more numbers.
- Learn the two-worker answers in the table.
- Write each phase on its own line.
- Check by recomputing the total units done.

Preparation strategy

- Master rates and the LCM method; every other type builds on them.
- Practise on LearnFrenzy in order: Easy → Medium → Hard → Exam Pattern Mix → Data Sufficiency.
- Aim for 45–60 seconds per time-and-work question.
- Keep an error log of rate-vs-time mix-ups.
- Read the Quick Revision Sheet (next page) the night before the exam.

© 2026 LearnFrenzy · Free for personal study

6 Quick revision sheet

Everything on one page for the night before the exam

Formulas

Rate	**1/days**	Time	**work ÷ rate**
Two together	**ab/(a + b)**	Three together	**abc/(ab + bc + ca)**
Total units	**LCM of days**	Efficiency	**total ÷ days**
Efficiency : time	**inverse**	Pairs	**all = ½ Σ pairs**
One alone	**all − opposite pair**	Leaves after t	**t together + rest alone**
Leaves n before	**stayer × T + leaver × (T − n)**	Alternate days	**cycles, then day by day**
Wages	**∝ work done**	x, y more days	**together √(xy)**
Hours per day	**days × hours constant**	p% more efficient	**time × 100/(100 + p)**

Shortcut tricks

- LCM units – no fractions.
- Add rates, never days.
- Twice as fast → half the time.
- Partial last day in turns.
- Pay by work, not by days.
- Total time includes phase 1.

Must-know numbers

Pairs → together	(6,12) 4 · (10,15) 6 · (12,24) 8 · (15,30) 10 · (20,30) 12 · (12,18) 7.2
Efficiency ↔ time	50% more → 2/3 time · 25% more → 4/5 · 100% more → 1/2 · 20% more → 5/6

© 2026 LearnFrenzy · Free for personal study

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

Practise **Time and Work** free on LearnFrenzy – questions with instant explanations →

© 2026 LearnFrenzy · Free for personal study