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# Simple Interest

## Formulas & Shortcut Tricks

Every important formula, shortcut and exam trick for Simple Interest 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
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### 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 Simple Interest 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

Interest is the price paid for using money. Under simple interest it is charged only on the original sum (the principal) – the interest itself never earns interest – so the same amount is added every year.

One formula, SI = P × R × T/100, connects the principal, the rate per year, the time in years and the interest. Exam questions turn it around to find any one of the four, compare two situations, split a sum between rates, or work out equal instalments.

**Why it matters in exams**

- Bank and SSC papers ask 1–3 simple-interest questions and often pair SI with CI.
- Placement tests use doubling, rate-change and split-sum questions.
- Loans, deposits and EMIs all start from this idea.

**Where it is used**

- Short-term loans, fixed deposits and bonds that pay simple interest.
- Borrowing from one person and lending to another.
- Comparing offers with different rates and periods.

## Common question patterns

**Basic SI**
Find the interest, principal, rate or time.

**Two amounts**
Amounts after two different times – find the sum.

**Days and months**
Interest for part of a year.

**Doubling**
A sum doubles (or becomes n times) – find rate or time.

**Rate change**
Interest at a higher rate is more by ₹x.

**Different periods**
One rate for some years, another for the rest.

**Split sums**
Parts lent at different rates with known total interest.

**Instalments**
Equal yearly payments that clear a debt.

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# 2 Important formulas

Cards marked MOST USED are the ones to revise first

## The basic formula

### Simple interest and amount

MOST USED

$$SI = P \times R \times T/100;\ \text{Amount } A = P + SI = P(1 + RT/100)$$

R is the rate per year and T the time in years.

**P** – principal **R** – rate % per year **T** – time in years

**EXAMPLE** ₹8,000 at 6% for 3 years → SI = **₹1,440**, amount ₹9,440.

### Finding P, R or T

MOST USED

$$P = 100 \times SI/(R \times T);\ R = 100 \times SI/(P \times T);\ T = 100 \times SI/(P \times R)$$

Rearrange the same formula.

**EXAMPLE** ₹12,000 earns ₹2,880 in 3 years → R = 100 × 2,880/36,000 = **8%**.

### Interest for days or months

$$T = \text{days}/365 \text{ or } \text{months}/12$$

Count the days carefully: leave out the day of deposit, include the day of withdrawal.

**EXAMPLE** ₹7,300 at 10% for 73 days → 7,300 × 10 × 73/36,500 = **₹146**.

## Comparing amounts and rates

### Two amounts after two different times

MOST USED

$$\text{Interest per year} = (A_2 - A_1)/(T_2 - T_1);\ P = A_1 - T_1 \times (\text{interest per year})$$

Simple interest grows by the same amount every year.

**EXAMPLE** ₹9,440 after 3 years and ₹10,400 after 5 years → ₹480 a year → P = 9,440 – 1,440 = **₹8,000**.

### Doubling and “n times”

MOST USED

$$\text{A sum becomes n times in T years} \rightarrow R = 100(n - 1)/T$$

Interest of (n – 1) × P is earned in T years.

**EXAMPLE** Doubles in 8 years → R = 100/8 = **12.5%**.

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### Change in rate (or time)

MOST USED

> **Extra interest = P × (change in rate) × T/100**

Only the change matters, not the actual rates.

**EXAMPLE** 2% higher for 3 years gives ₹720 more → P = 100 × 720/6 = **₹12,000**.

## Special situations

### Different rates for different periods

> **$SI = P \times (R_1T_1 + R_2T_2 + \ldots)/100$**

Add up the "rate × years" for each slab.

**EXAMPLE** ₹10,000 at 5% for 2 years, then 7% for 3 years → 10,000 × 31/100 = **₹3,100**.

### A sum split between two rates

MOST USED

> **Average rate = total yearly interest/total sum; parts in the ratio $(R_2 - \text{avg}) : (\text{avg} - R_1)$**

It is an alligation on the rates.

**EXAMPLE** ₹20,000 partly at 8% and partly at 12%, yearly interest ₹2,000 → average 10% → equal parts → **₹10,000** at 8%.

### Equal annual instalments

MOST USED

> **Instalment $x = 100A/(100T + RT(T - 1)/2)$**

Each instalment earns simple interest from its payment date until the debt is due.

**EXAMPLE** ₹3,150 due in 3 years at 5% → x = 3,15,000/315 = **₹1,000**.

### Borrowing and lending

> **Gain = P × (lending rate − borrowing rate) × T/100**

Profit comes from the gap between the two rates.

**EXAMPLE** Borrow ₹25,000 at 6%, lend at 9% for 2 years → gain = 25,000 × 3 × 2/100 = **₹1,500**.

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# 3 Shortcut tricks & smart techniques

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

### Interest as a percentage of P

MOST USED

**USE WHEN** Any SI calculation.

1. Interest over T years = (R × T)% of P.
2. Use percentage shortcuts instead of the full formula.

**EXAMPLE** 6% for 3 years = 18% of ₹8,000 = **₹1,440**.

### Doubling table

MOST USED

**USE WHEN** Questions about a sum becoming 2, 3, 4 … times.

| Becomes | Interest earned | Time if it doubles in T years |
|---|---|---|
| **2 times** | 1 × P | T |
| **3 times** | 2 × P | 2T |
| **4 times** | 3 × P | 3T |
| **n times** | (n – 1) × P | (n – 1)T |

**EXAMPLE** Doubles in 6 years → becomes 4 times in 3 × 6 = **18 years**.

### Rate equals time

**USE WHEN** "The rate and the time are numerically equal."

1. $R \times T = R^2 = 100 \times SI/P$.
2. Take the square root.

**EXAMPLE** SI is 16% of P with R = T → $R^2 = 16$ → R = T = **4**.

### Alligation for split sums

**USE WHEN** A sum is lent partly at one rate and partly at another.

1. Find the average rate earned.
2. Cross-subtract to get the ratio of the parts.

**EXAMPLE** ₹24,000 at 10% and 15% earning ₹2,800 a year → average 11 2/3% → parts 2 : 1 → **₹16,000** at 10%.

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# 4 Solved examples

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

**1** BASIC

**Find the simple interest on ₹12,500 at 8% per annum for 2½ years.**

| STEP BY STEP | SHORTCUT |
|---|---|
| 1. SI = 12,500 × 8 × 2.5/100.<br>2. = 2,500. | 8 × 2.5 = 20% of 12,500 = 2,500. |

**Why it works:** Rate × time gives the total percentage of P earned.

**Answer: ₹2,500**

**2** RATE

**₹16,000 earns ₹4,320 simple interest in 3 years. Find the rate.**

| STEP BY STEP | SHORTCUT |
|---|---|
| 1. R = 100 × 4,320/(16,000 × 3).<br>2. = 4,32,000/48,000 = 9%. | Per year 1,440 = 9% of 16,000. |

**Why it works:** Interest per year divided by the principal is the rate.

**Answer: 9%**

**3** TWO AMOUNTS

**A sum amounts to ₹7,560 in 2 years and to ₹8,640 in 4 years at simple interest. Find the sum.**

| STEP BY STEP | SHORTCUT |
|---|---|
| 1. Interest for 2 years = 8,640 − 7,560 = 1,080 → ₹540 a year.<br>2. P = 7,560 − 2 × 540 = 6,480. | $A_1 - T_1 \times (A_2 - A_1)/(T_2 - T_1)$ = 7,560 − 1,080. |

**Why it works:** Simple interest adds the same amount every year.

**Answer: ₹6,480**

**4** DOUBLING

**A sum doubles itself in 6 years at simple interest. In how many years will it become four times?**

| STEP BY STEP | SHORTCUT |
|---|---|
| 1. Doubling: interest = P in 6 years → R = 100/6 %.<br>2. Four times needs interest 3P → time = 3 × 6 = 18 years. | n times → (n − 1) × 6 = 18. |

**Why it works:** Interest grows in a straight line, so 3P takes three times as long as P.

**Answer: 18 years**

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**5** DAYS

**Find the simple interest on ₹5,840 at 12.5% per annum from 1 March to 12 May of a non-leap year.**

STEP BY STEP

1. Days: March 30 (after the 1st), April 30, May 12 → 72 days.
2. SI = 5,840 × 12.5 × 72/36,500 = 144.

SHORTCUT

5,840 ÷ 365 = 16 per day at 100% → 16 × 12.5% × 72 = 144.

**Why it works:** The day of deposit is not counted; the day of withdrawal is.

**Answer: ₹144**

**6** RATE CHANGE

**Had a sum been lent at 3% higher rate for 4 years, it would have earned ₹1,080 more. Find the sum.**

STEP BY STEP

1. Extra interest = P × 3 × 4/100 = 1,080.
2. P = 1,08,000/12 = 9,000.

SHORTCUT

12% of P = 1,080 → P = 9,000.

**Why it works:** The actual rate does not matter – only the extra 3%.

**Answer: ₹9,000**

**7** DIFFERENT PERIODS

**₹15,000 is lent at 6% for the first 2 years, 8% for the next 3 years and 10% after that. What is the interest after 7 years?**

STEP BY STEP

1. Rate-years: 6 × 2 + 8 × 3 + 10 × 2 = 12 + 24 + 20 = 56.
2. SI = 15,000 × 56/100 = 8,400.

SHORTCUT

56% of 15,000 = 8,400.

**Why it works:** Each slab adds rate × years to the total percentage.

**Answer: ₹8,400**

**8** SPLIT SUM

**₹24,000 is lent partly at 10% and the rest at 15% simple interest. The total interest after 2 years is ₹5,600. How much is lent at 10%?**

STEP BY STEP

1. Yearly interest = 2,800 → average rate = 2,800/24,000 = 11 2/3 %.
2. Ratio (15 – 11 2/3) : (11 2/3 – 10) = 10/3 : 5/3 = 2 : 1.
3. At 10%: 24,000 × 2/3 = 16,000.

SHORTCUT

Let x at 10%: 0.10x + 0.15(24,000 – x) = 2,800 → x = 16,000.

**Why it works:** The average rate sits closer to the rate with the bigger part.

**Answer: ₹16,000**

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9 INSTALMENTS

**What equal annual instalment will clear a debt of ₹3,150 due in 3 years at 5% simple interest?**

STEP BY STEP

1. Instalments paid at the end of years 1, 2 and 3 earn interest for 2, 1 and 0 years.
2. x(1.10) + x(1.05) + x = 3.15x = 3,150.
3. x = 1,000.

SHORTCUT

100A/(100T + RT(T − 1)/2) = 3,15,000/315.

**Why it works:** Each payment grows with interest until the debt's due date.

**Answer: ₹1,000**

10 R = T

**The simple interest on a sum is 9/16 of the sum, and the rate (in %) equals the time (in years). Find the rate.**

STEP BY STEP

1. P × R × R/100 = 9P/16.
2. $R^2$ = 900/16 = 56.25 → R = 7.5%.

SHORTCUT

R = √(100 × 9/16) = 30/4 = 7.5.

**Why it works:** With R = T, the formula becomes $R^2$ = 100 × SI/P.

**Answer: 7.5%**

11 BORROW AND LEND

**A man borrows ₹25,000 at 6% simple interest and lends it at 9% for 2 years. What is his gain?**

STEP BY STEP

1. Interest earned = 25,000 × 9 × 2/100 = 4,500.
2. Interest paid = 25,000 × 6 × 2/100 = 3,000.
3. Gain = 1,500.

SHORTCUT

3% gap × 2 years = 6% of 25,000 = 1,500.

**Why it works:** Only the difference between the two rates is profit.

**Answer: ₹1,500**

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# 5 Important exam tips

Patterns, traps and habits that save marks

### Frequently asked question patterns

- Find SI, P, R or T from the other three.
- Amounts after two different times.
- Doubling, tripling and “n times”.
- Interest for days between two dates.
- Extra interest from a higher rate.
- Slabs with different rates; split sums.
- Equal instalments and borrowing-lending gains.

### Common mistakes to avoid

- Using months or days directly as T without converting to years.
- Counting both the deposit day and the withdrawal day.
- Treating “becomes three times” as interest = 3P (it is 2P).
- Confusing the amount with the interest.
- Applying CI ideas (interest on interest) to SI.
- Forgetting that instalments also earn interest until the due date.

### Points to remember

- SI = PRT/100; A = P + SI.
- Interest over T years = RT% of P.
- n times in T years → R = 100(n − 1)/T.
- Interest per year = $(A_2 - A_1)/(T_2 - T_1)$.
- R = T → R = $\sqrt{(100\ SI/P)}$.

### Speed and accuracy

- Think of RT as a single percentage.
- Use the yearly-interest difference for two-amount questions.
- Use alligation for split sums.
- Check by recomputing the interest from your answer.

### Preparation strategy

- Learn the formula in all four forms before the special types.
- Practise on LearnFrenzy in order: Easy → Medium → Hard → Exam Pattern Mix → Data Sufficiency.
- Aim for 30–40 seconds per SI question.
- Keep an error log of time-unit and day-count slips.
- 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

| | | | |
|---|---|---|---|
| SI | **PRT/100** | Amount | **P(1 + RT/100)** |
| P | **100 SI/RT** | R | **100 SI/PT** |
| T | **100 SI/PR** | Days | **T = days/365** |
| Interest per year | **$(A_2 - A_1)/(T_2 - T_1)$** | n times in T years | **R = 100(n − 1)/T** |
| Extra for ΔR | **P × ΔR × T/100** | Slabs | **P × Σ RT/100** |
| Split sum | **alligation on rates** | Instalment | **100A/(100T + RT(T − 1)/2)** |
| Borrow / lend gain | **$P(R_2 - R_1)T/100$** | R = T | **√(100 SI/P)** |

## Shortcut tricks

- RT% of P = interest.
- Double in T → n times in (n − 1)T.
- Two amounts → yearly interest.
- Only Δrate matters.
- Exclude deposit day.
- Split sums by alligation.

## Must-know numbers

| | |
|---|---|
| **Doubling times** | 5% → 20 y · 8% → 12.5 y · 10% → 10 y · 12.5% → 8 y · 20% → 5 y · 25% → 4 y |
| **Days in months** | Jan 31 · Feb 28/29 · Mar 31 · Apr 30 · May 31 · Jun 30 · Jul 31 · Aug 31 · Sep 30 · Oct 31 · Nov 30 · Dec 31 |

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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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