LF LearnFrenzy

QUANTITATIVE APTITUDE · FREE STUDY MATERIAL

True Discount

Formulas & Shortcut Tricks

Every important formula, shortcut and exam trick for True Discount 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 (IBPS, SBI, RBI)
- SSC CGL / CHSL
- Railways (RRB NTPC)
- Campus placements (TCS, Infosys, Wipro, Accenture)
- UPSC CSAT & state PSC exams

Practise True Discount 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

A sum of money due at a future date is worth less today. Its present worth (PW) is the amount which, put out at interest now, would grow to the sum due (A) by that date. The true discount (TD) is the difference: TD = A − PW.

So the true discount is simply the interest on the present worth. Exams ask you to find PW, TD, the sum, the rate or the time, compare cash and credit offers, and link TD with simple interest and banker's gain.

Why it matters in exams

- Bank and SSC papers include it alongside Simple Interest.
- It is formula-based – quick marks once PW is understood.
- It leads straight into Banker's Discount.

Where it is used

- Paying a bill early in return for a discount.
- Comparing a cash price with a credit price.
- Valuing payments due in the future.

Common question patterns

Present worth
What a future sum is worth today.

True discount
A − PW, or interest on PW.

Sum, rate, time
Find the missing value from TD.

SI and TD
Sum = SI × TD ÷ (SI − TD).

Banker's gain
SI − TD = SI on TD; TD^2 = PW × BG.

Changed time or rate
New TD on the same sum.

Cash vs credit
Which offer is cheaper today?

Compound PW
$A \div (1 + r/100)^n$.

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2 Important formulas

Cards marked MOST USED are the ones to revise first

Present worth and true discount

Present worth

MOST USED

$$PW = 100 \times A/(100 + rt);\ A = PW \times (100 + rt)/100$$

PW grows into A at simple interest.

A – sum due **r** – rate % per annum **t** – time in years

EXAMPLE ₹1,320 due in 2 years at 10% → PW = 1,32,000/120 = **₹1,100**.

True discount

MOST USED

$$TD = A - PW = A \times rt/(100 + rt) = SI \text{ on } PW$$

TD is interest on the present worth, not on the sum due.

EXAMPLE ₹2,240 due in 1 year at 12% → TD = 2,240 × 12/112 = **₹240**.

Finding the sum, rate or time

Sum from TD

MOST USED

$$A = TD \times (100 + rt)/(rt)$$

Turn the TD formula round.

EXAMPLE TD ₹60 at 8% for 9 months (rt = 6) → A = 60 × 106/6 = **₹1,060**.

Rate or time

$$TD = PW \times r \times t/100 \rightarrow r = 100 \cdot TD/(PW \cdot t),\ t = 100 \cdot TD/(PW \cdot r)$$

Use the simple-interest formula on PW.

EXAMPLE PW ₹1,500, TD ₹180, 2 years → r = 18,000/3,000 = **6%**.

Sum from SI and TD

MOST USED

$$A = SI \times TD/(SI - TD) \text{ (same sum, time and rate)}$$

SI is on the sum due; TD on its present worth.

EXAMPLE SI ₹85, TD ₹80 → A = 85 × 80/5 = **₹1,360**.

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Banker’s gain and compound interest

Link with banker’s gain

MOST USED

$$BG = SI - TD = SI \text{ on } TD;\ TD^2 = PW \times BG$$

Banker’s gain is the interest on the true discount.

EXAMPLE PW ₹1,600, TD ₹160 → BG = $160^2/1{,}600$ = **₹16**.

Compound-interest present worth

$$PW = A/(1 + r/100)^n$$

Use only when the question says compound interest.

EXAMPLE ₹1,331 due in 3 years at 10% CI → 1,331/1.331 = **₹1,000**.

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3 Shortcut tricks & smart techniques

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

TD as a fraction of the sum

MOST USED

USE WHEN rt is a friendly number.

rt	TD = A ×	PW = A ×
5	1/21	20/21
10	1/11	10/11
12.5	1/9	8/9
20	1/6	5/6
25	1/5	4/5

EXAMPLE A ₹1,650, rt = 10 → TD = 1,650/11 = **₹150**.

Months into years

USE WHEN The time is given in months or days.

1. t = months/12 (days/365).
2. Find rt first – it is usually a round number.

EXAMPLE 8 months at 9% → rt = 9 × 8/12 = **6**.

Cash or credit?

MOST USED

USE WHEN An item can be paid for now or later.

1. Find the PW of the credit price.
2. Compare it with the cash price – the smaller is cheaper.

EXAMPLE ₹9,800 cash or ₹11,000 after 1 year at 10% → PW ₹10,000 → cash saves **₹200**.

Rate × time from SI and TD

USE WHEN SI and TD on the same sum are given.

1. BG = SI – TD.
2. rt/100 = BG/TD.

EXAMPLE SI ₹66, TD ₹60 → BG 6 → rt = 100 × 6/60 = **10**.

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4 Solved examples

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

1 PRESENT WORTH

Find the present worth of ₹2,688 due in 3 years at 4% per annum simple interest.

STEP BY STEP

1. rt = 4 × 3 = 12.
2. PW = 100 × 2,688/112.
3. = ₹2,400.

SHORTCUT

2,688 × 100/112 = 24 × 100.

Why it works: Check: SI on 2,400 for 3 years at 4% = 288; 2,400 + 288 = 2,688.

Answer: ₹2,400

2 TRUE DISCOUNT

Find the true discount on ₹1,590 due in 9 months at 8% per annum.

STEP BY STEP

1. t = 9/12 = ¾ year → rt = 6.
2. TD = 1,590 × 6/106.
3. = ₹90.

SHORTCUT

1,590/106 = 15 → × 6 = 90.

Why it works: Trap: ₹95.40 – taking 6% of the sum due (that is banker's discount).

Answer: ₹90

3 FIND THE SUM

The true discount on a sum due in 2 years at 6% per annum is ₹120. Find the sum.

STEP BY STEP

1. rt = 12.
2. A = 120 × 112/12.
3. = ₹1,120.

SHORTCUT

TD = A × 12/112 → A = 120 × 112/12.

Why it works: PW = 1,000 and SI on it for 2 years at 6% = 120.

Answer: ₹1,120

4 FIND THE RATE

The present worth of ₹4,500 due in 2½ years is ₹4,000. Find the rate of interest.

STEP BY STEP

1. TD = 4,500 – 4,000 = ₹500.
2. TD = SI on PW: 500 = 4,000 × r × 2.5/100.
3. r = 5%.

SHORTCUT

r = 100 × 500/(4,000 × 2.5).

Why it works: Interest is earned on the present worth.

Answer: 5%

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5 FIND THE TIME

The true discount on ₹1,456 at 8% per annum is ₹56. Find the time.

STEP BY STEP

1. PW = 1,456 − 56 = ₹1,400.
2. 56 = 1,400 × 8 × t/100 → t = 0.5 year.
3. = 6 months.

SHORTCUT

t = 5,600/11,200.

Why it works: Trap: using ₹1,456 instead of the PW ₹1,400.

Answer: 6 months

6 SI AND TD

The simple interest and the true discount on a certain sum for the same time and rate are ₹110 and ₹100. Find the sum.

STEP BY STEP

1. Sum = SI × TD/(SI − TD).
2. = 110 × 100/10.
3. = ₹1,100.

SHORTCUT

11,000/10.

Why it works: The extra ₹10 is the interest on the TD.

Answer: ₹1,100

7 BANKER'S GAIN

The true discount on a bill is ₹150 and its present worth is ₹1,500. Find the banker's gain.

STEP BY STEP

1. TD^2 = PW × BG.
2. BG = 150^2/1,500 = 22,500/1,500.
3. = ₹15.

SHORTCUT

BG = TD × (TD/PW) = 150 × 1/10.

Why it works: BG is SI on TD at the same rt (here rt = 10).

Answer: ₹15

8 DOUBLE THE TIME

The true discount on ₹1,500 due after a certain time is ₹300. What is the true discount on the same sum due after twice that time at the same rate?

STEP BY STEP

1. PW = 1,200; SI on 1,200 = 300 → rt = 25.
2. Twice the time: rt = 50.
3. TD = 1,500 × 50/150 = ₹500.

SHORTCUT

rt doubles; TD does not.

Why it works: Trap: ₹600 – TD does not double when time doubles.

Answer: ₹500

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9 CASH VS CREDIT

A TV costs ₹24,000 cash or ₹26,500 payable after 6 months. If money is worth 12% per annum, which is cheaper and by how much?

STEP BY STEP

1. rt = 12 × ½ = 6.
2. PW of ₹26,500 = 26,50,000/106 = ₹25,000.
3. Cash is cheaper by ₹1,000.

SHORTCUT

Compare 24,000 with 26,500 × 100/106.

Why it works: Always compare amounts at the same date.

Answer: Cash, by ₹1,000

10 CREDIT SALE

A trader buys a watch for ₹1,000 cash and sells it for ₹1,166 payable after one year. If money is worth 6% per annum, find his gain.

STEP BY STEP

1. PW of ₹1,166 = 1,16,600/106 = ₹1,100.
2. Gain = 1,100 − 1,000 = ₹100.

SHORTCUT

1,166/1.06 − 1,000.

Why it works: Trap: ₹166 – the credit price is not worth ₹1,166 today.

Answer: ₹100

11 COMPOUND PW

Find the present worth of ₹2,205 due in 2 years at 5% per annum compound interest.

STEP BY STEP

1. PW = 2,205/$(1.05)^2$.
2. = 2,205/1.1025.
3. = ₹2,000.

SHORTCUT

2,205 × $(20/21)^2$ = 2,205 × 400/441.

Why it works: 5% = 1/20 → growth factor 21/20 each year.

Answer: ₹2,000

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5 Important exam tips

Patterns, traps and habits that save marks

Frequently asked question patterns

- Present worth of a sum due later.
- True discount from A, r and t.
- Finding the sum, rate or time.
- Sum from SI and TD.
- Banker's gain and $TD^2 = PW \times BG$.
- Cash versus credit offers.
- Compound-interest present worth.

Common mistakes to avoid

- Taking interest on the sum due instead of PW.
- Using months as years.
- Doubling TD when the time doubles.
- Comparing a cash price with the credit price directly.
- Using compound interest when the question means simple.
- Mixing up TD and banker's discount.

Points to remember

- $PW = 100A/(100 + rt)$.
- $TD = A \cdot rt/(100 + rt)$.
- TD = SI on PW.
- $A = SI \cdot TD/(SI - TD)$.
- $TD^2 = PW \times BG$.

Speed and accuracy

- Find rt first.
- Use the fraction table for TD.
- Check: PW + SI on PW = A.
- Convert months with $t = m/12$.

Preparation strategy

- Revise Simple Interest first – TD is SI on PW.
- Practise on LearnFrenzy in order: Easy → Medium → Hard → Exam Pattern Mix → Data Sufficiency.
- Aim for 40–50 seconds per question.
- Then move to Banker's Discount.
- 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

Present worth	**100A/(100 + rt)**	True discount	**A – PW = A·rt/(100 + rt)**
TD	**SI on PW**	Sum due	**PW(100 + rt)/100**
Sum from TD	**TD(100 + rt)/rt**	Rate	**100·TD/(PW·t)**
Time	**100·TD/(PW·r)**	Sum from SI, TD	**SI·TD/(SI – TD)**
Banker's gain	**SI – TD = SI on TD**	TD^2	**PW × BG**
Compound PW	**$A/(1 + r/100)^n$**		

Shortcut tricks

- rt = 10 → TD = A/11.
- rt = 20 → TD = A/6.
- Cash vs credit → compare PW.
- rt/100 = BG/TD.
- Double time ≠ double TD.
- Find rt before anything else.

Must-know numbers

Months	3 m = ¼ · 4 m = ⅓ · 6 m = ½ · 8 m = ⅔ · 9 m = ¾ year
TD fractions	rt 5: 1/21 · rt 10: 1/11 · rt 12.5: 1/9 · rt 20: 1/6 · rt 25: 1/5

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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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