IF a sum of money becomes N_1 Times in T_1 yrs and N_2 times in T_2 years then

$$(N_1)^{T_2} = (N_2)^{T_1} \quad \text{OR} \quad N_2 = (N_1)^{T_2/T_1}$$

A sum of money get doubled in 4 years. IN how much time it will become 8 times?

Solution:— I (FORMULA)

$N_1 = 2$, $T_1 \to 4$

$N_2 \to 8$, $T_2 = ?$

$N_2 = (N_1)^{T_2/T_1} \Rightarrow 8 = (2)^{T_2/4}$

OR $2^3 = (2)^{T_2/4} \Rightarrow T_2/4 = 3$

$\Rightarrow T_2 = 12$ yrs.

II (TRICKY)

2^1 गुणी $\longrightarrow$ 4]+4

2^2 times $\longrightarrow$ 8]+4

2^3 times $\longrightarrow$ 12]+4

8 times — 12 yrs

कोई राशी चक्रवृद्धि ब्याज की दर से 3 साल में 3 गुणी हो जाती है। कितने समय में यह राशी 81 गुणी हो जाएगी?

Solution:— I (FORMULA)

$N_1 \to 3$ $T_1 - 3$

$N_2 - 81$ $T_2 \to ?$

$N_2 = (N_1)^{T_2/T_1}$

$\Rightarrow 81 = (3)^{T_2/3} \Rightarrow 3^4 = 3^{T_2/3}$

$\Rightarrow T_2/3 = 4 \Rightarrow 12$ yrs

II (TRICKY)

3^1 times — 3]+3

3^2 times — 6]+3

3^3 times — 9]+3

$3^4 = 81$ times $\longrightarrow$ 12]+3

12 years ANS.

A Sum of money becomes 81 times in 4 years. in how much time it will become 27 times?

Solution:— I (FORMULA)

$N_1 - 81$, $T_1 - 4$

$N_2 - 27$, $T_2 - ?$

$27 = (81)^{T_2/4}$

OR $\Rightarrow 27 = (3^4)^{T_2/4}$

$3^3 = 3^{T_2} \Rightarrow T_2 = 3$ yrs.

II (TRICKY)

	A	:	P
$T=4 \to$	81	:	1
$T=1 \to$	$\sqrt[4]{81}$	:	$\sqrt[4]{1}$
	3	:	1

$\therefore 3^1$ — 1 साल

3^2 — 2 साल

$27 = 3^3$ — 3 साल → ANS 3

P = 625 ₹ R = 4% T = 2 yrs , CI = ?

$4\% = \frac{1}{25} \frac{I}{P} \Rightarrow A = 26$

25 : 26 : 26
25 : 25 : 26

625 : 650 : 676

मूलधन ← 625 | 650 → 1 साल के बाद मिश्रधन | → 2 साल के बाद मिश्रधन

मिश्रधन: 25 ₹ | 26 ₹

25 ₹ ← पहले साल का ब्याज

26 ₹ → दूसरे साल का ब्याज

1 ₹ ← दो साल के ब्याज का अन्तर

$I = A - P$
$= 676 - 625 = 51$

1000 = P, R = 10%, T = 3 yrs

CI

$10\% = \frac{1}{10}$

10 : 11 : 11 : 11
10 : 10 : 11 : 11
10 10 : 10 : 11

1000 — 1331

331 ↓ ANS.

# P = 3000, R = 20%
T = 2 yrs, A = ?

$20\% = \frac{1}{5}$

5 : 6 : 6
5 : 5 : 6

(P) 25 : 30 : 36 (A)

×120 ↓ 3000

×120 ↓ 4320 ANS.

A sum of money becomes ₹ 4800 after 4 years and ₹ 6000 after 8 years. Find the Principal?

Solution:— I (TRICKY)

$A_8 \longrightarrow 6000$

$A_4 \longrightarrow 4800$

4 yr change $\frac{A_8}{A_4} = \frac{6000}{4800} = \frac{5}{4}$

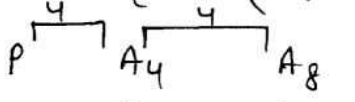
[Every 4 yrs CI will change by 5/4]

$\therefore \frac{A_4}{P} = \frac{5}{4} \Rightarrow \frac{4800}{P} = \frac{5}{4} \Rightarrow P = 3840$

OR $P \times \frac{5}{4} = 4800$ OR $P \times \frac{5}{4} \times \frac{5}{4} = 6000$

$P = 3840$ ANS.

II (SUPER TRICKY)



4800 : 6000

4 : 4 : 5

4 : 5 : 5

16 : 20 : 25

×240 ↓ ×240

4800

3840

कोई धनराशि 8 साल के बाद 1600 ₹ हो जाती है और 12 साल के बाद 2000 ₹ हो जाती है तो 16 साल बाद कितनी हो जाएगी?

Solution:— I

$A_{12} \longrightarrow 2000$

4 yrs $A_8 \longrightarrow 1600$

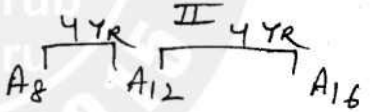
4 साल में $= \frac{2000}{1600} = \frac{5}{4}$ गुणी

[हर 4 साल बाद $\frac{5}{4}$ गुणी हो जाएगी]

$A_{12} \times \frac{5}{4} = A_{16}$

$2000 \times \frac{5}{4} = 2500$ ₹ ANS.

II



1600 : 2000

4 : 5 : 5

4 : 4 : 5

16 : 20 : 25

×100 ×100

2000 2500 ANS.

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CI FOR 2 years and 3 years for a certain sum is 156 and 254 respectively. Find the Rate of compound interest? a] $14\frac{2}{7}$ %. b) $16\frac{2}{3}$ %. c) 10 %. d) 9 %.

Solution:- $$\frac{CI_3}{CI_2} = \frac{P\left[\left(1+\frac{R}{100}\right)^3-1\right]}{P\left[\left(1+\frac{R}{100}\right)^2-1\right]} = \frac{254}{156} = \frac{127}{78} \quad -(1)$$

Let $1+\frac{R}{100} = x \Rightarrow \frac{x^3-1}{x^2-1} = \frac{127}{78} \Rightarrow \frac{(x-1)(x^2+1+x)}{(x-1)(x+1)} = \frac{127}{78}$

$\Rightarrow 78x^2+78+78x = 127x+127$

$\Rightarrow 78x^2-127x+78x+78-127=0 \Rightarrow 78x^2-49x-49=0$

$78x^2-91x+42x-49=0$

OR $13x[6x-7]+7[6x-7]=0 \Rightarrow x=\frac{7}{6}$ $\therefore 1+\frac{R}{100}=\frac{7}{6}$

$\Rightarrow R = 16\frac{2}{3}\%$ Ans.

OR Check by option in (1)
option b will satisfy.

Find the compound interest on Rs 15625 for 9 months at 16% p.a. compounded quarterly?

Solution:- $R = \frac{16}{4} = 4\%$ and $T = 9\times4 = 36$ months $= 3$ yrs

$4\% = \frac{1}{25}$

P	A
25	26
25	26
25	26
15625	17576

CI = A - P = 1951

OR PASCAL 3 3 1

$3A+3B+C$

$3\times\frac{15625\times4}{100}+3\times\frac{625\times4}{100}+1$

$= 625\times3+25\times3+1$

$= 1951$ Ans.

TRICKY MATHS
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INSTALLMENT (किश्त) IN COMPOUND INTEREST

$$P = \frac{X}{\left[1+\frac{R}{100}\right]^1} + \frac{X}{\left[1+\frac{R}{100}\right]^2} + \cdots + \frac{X}{\left[1+\frac{R}{100}\right]^T}$$

where P = मूलधन / Principal, X = किश्त (INSTALLMENT)
T → समय (Time) OR No. of Installments

A man borrows Rs 21000 at 10% compound interest. How much he has to pay equally at the end of year to settle his loan in two years.

Solution :- I (FORMULA)

$$21000 = \frac{X}{\left[1+\frac{10}{100}\right]} + \frac{X}{\left[1+\frac{10}{100}\right]^2}$$

OR $21000 = \frac{10X}{11} + \frac{100X}{121}$

OR $21000 = \frac{110X+100X}{121}$

OR $X = 12100$ Ans.

II (TRICKY)

$R = 10\% = \frac{1}{10} \rightarrow \frac{I}{P} \Rightarrow$ Installment = 11

[make each installment equal]

	P	Installment
1st year	10×11	11×11
2nd year	$(10)^2$	$(11)^2$

OR

110	121
100	121

$21000 = 100 \times (210)$ $\quad 121 \times 100 = 12100$

A man buys a scooter on making a cash down payment of ₹ 16224 and promise to pay two more yearly installment of equivalent amount in next two years. If the Rate of Interest is 4% p.a.CI. Find the cash value of scooter?

Solution :- I (BASIC)

$$P = \frac{16224}{\left(1+\frac{4}{100}\right)^1} + \frac{16224}{\left[1+\frac{4}{100}\right]^2}$$

$$= 16224\left[\frac{25}{26} + \frac{625}{676}\right]$$

$= 30600$

cash value $= 30600 + 16224$

$= 46824$ Ans.

II (TRICKY) $R = 4\% = \frac{1}{25}$

	Principal	Installment
I	25×26	26×26
II	$+\ 625$	676
	1275	676
	1×24	1×24
	30600	16224

CASH VALUE = 30600 + 16224 = 46824

A man borrows Rs 4200 and undertakes to pay back with CI @ 10% p.a in two equal yearly installments at the end of 1st and 2nd year. what is the amount of each installment?

Solution :- $R = 10\% = \frac{1}{10}$ [but installment must be equal]

	P	Inst.
1st Yr	10×11	11×11
2nd Yr +	100	121
	210	121
	$\times 20$	$\times 20$
	4200	2420 Ans.

OR by FORMULA

$$4200 = \frac{x}{\left[1+\frac{10}{100}\right]} + \frac{x}{\left[1+\frac{10}{100}\right]^2}$$

$$\Rightarrow 4200 = x\left[\frac{10}{11} + \frac{100}{121}\right]$$

$$\Rightarrow 4200 = \frac{210x}{121} \Rightarrow x = 2420 \text{ Ans.}$$

A man borrows Rs 1820 and undertakes to pay back with compound interest @ 20% p.a in 3 equal yearly installment at the end of 1st, 2nd and 3rd year. what is the amount of each installment?

Solution :- $R = 20\% = \frac{1}{5-P} \Rightarrow$ Installment $= 5+1 = 6$

1st	5×36	$6 \times 36 = 216$	} Installment must be equal
2nd	25×6	$36 \times 6 = 216$	
3rd	125	$216 = 216$	
	455	216	
	$\times 4$	$\times 4$	
	1820	864 Ans.	

A man borrows a certain sum of money and pays it back in two equal installments, IF CI is reckoned at 5% per annum and he pays back annually Rs 882. what sum did he borrow?

Solution :- $R = 5\% = \frac{1}{20}$

	P	I	
1st	20×21	21×21	} [Installment must be equal]
2nd +	400	441	
	820	441	
	$\times 2$	$\times 2$	
Ans	1640	882	

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