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COMPOUND

- **Principal**: The amount of money borrowed from someone or lent out to someone for a certain period is called principal.
- **Interest** : Extra money paid for the amount of money borrowed is called Interest.
- **Compound interest:** Compound interest is the interest that applies not only to the initial principal of an investment or a loan, but also to the accumulated interest from previous periods.

❖ **Let's Principal = P, Rate = R%, Time = N years.**

- **When interest is compounded annually :**

$$\text{Amount} = P\left[1+\frac{R}{100}\right]^{N}$$

12 MONTHS

- **When interest is compounded Half-yearly :**

$$\text{Amount} = P\left[1+\frac{\left(\frac{R}{2}\right)}{100}\right]^{2N}$$

6 MONTHS

- **When interest is compounded Quarterly :**

$$\text{Amount} = P\left[1+\frac{\left(\frac{R}{4}\right)}{100}\right]^{4N}$$

3 MONTHS

- **When interest is compounded Annually but time is in fraction, say $3\frac{2}{5}$ years.**

$$\text{Amount} = P\left[1+\frac{R}{100}\right]^3 * \left[1+\frac{\left[\frac{2}{5}\right]R}{100}\right]$$

- **When rates are different for different years , say R1%, R2%, R3% for 1st , 2nd and 3rd year respectively.**

$$\text{Then Amount} = P\left[1+\frac{R_1}{100}\right] * \left[1+\frac{R_2}{100}\right] * \left[1+\frac{R_3}{100}\right]$$

- **If the difference between Compound Interest and Simple Interest given**

For 2 years:

$$\text{Difference} = P\left[\frac{R}{100}\right]^2$$

For 3 years:

$$\text{Difference} = P\left[\frac{R}{100}\right]^2 * \left[\frac{300+R}{100}\right]$$

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BASIC PROBLEMS:

1) Find the C.I on 10000 .
   (i) R% = 10%, for 2 years Ans: 2100
   (ii) R% = 10%, for 3 years Ans: 3310
   (iii) Find the $1/11^{th}$ of the C.I received on the sum of 10000 if the compound interest rate is 20% for 2 years. Ans: 400

2) Find the compound interest (CI) on Rs. 12,600 for 2 years at 10% per annum compounded annually. Ans: 2646

3) A sum becomes Rs. 1,352 in 2 years at 4% per annum compound interest. The sum is Ans: 1250

4) A certain sum of money yields Rs. 1261 as compound interest for 3 years at 5% per annum. The sum is Ans: 8000

MODEL : 1

1) Find compound interest on Rs.10,000 at 12% per annum for 2 years 5 months, compounded annually (**approx**).
   a) 2965 b) 3171 c) 3256 d) 3393

2) Find compound interest on Rs.8000 at 15% per annum for 2 years 4 months, compounded annually.
   a) 3109 b) 3239 c) 3456 d) 2968

3) Find the compound interest on Rs 48,000 for one year at 8% per annum when compounded half-yearly.

a) 3145.60 b) 3256.86 c) 3196.80 d) 3569.42

4) The compound interest on Rs.16,000 for 9 months at 20% per annum, interest being compounded quarterly, is

a) 2428 b) 2522 c) 2689 d) 2722

5) If the rate of interest be 4% per annum for first year, 5% per annum for second year and 10% per annum for third year, then the compound interest of Rs.10,000 for 3 years will be

a) 2156 b) 2024 c) 2018 d) 2012

MODEL : 2

1) A sum of Rs. 2000 amounts to Rs. 4000 in two years at compound interest. In how many years will the same amount become Rs.8000 ?

a) 6 years b) 4 years c) 8 years d) 5 years

2) A sum of money on compound interest amounts to Rs.10648 in 3 years and Rs. 9680 in 2 years. The rate of interest per annum is :

a) 10% b) 8% c) 6% d) 12%

3) The compound interest on a certain sum of money at 5% per annum for 2 years is Rs.246. The simple interest on the same sum for 3 years at 6% per annum is

a) 452 b) 432 c) 456 d) 521

4) A sum of money doubles itself at compound interest in 15 years. In how many years will it becomes eight times ?

a) 45 years b) 52 years c) 48 years d) 54 years

5) A sum of money triple itself in 3 years at C.I in how many years it becomes 9 times itself in C.I ?

a) 5 years b) 8 years c) 6 years d) 9 years

MODEL : 3

1) Find the difference between C.I and S.I for 2years on the sum of 2000 at the rate of 10% per annum.

a) 35 b) 20 c) 40 d) 60

2) If the difference between the compound interest, compounded every six months, and the simple interest on a certain sum of money at the rate of 12% per annum for one year is Rs. 36. The sum is :

a)12000 b) 36000 c) 10000 d) 15000

3) The difference between S.I & C.I (compounded annually) on Rs.40,000 for 3 years at 5% per annum is:

a) 450 b) 360 c) 310 d) 390

4) Find the difference between the compound interest and the simple interest on Rs.32,000 at 10% p.a. for 4 years.

a)1956 b) 1984 c) 1972 d) 1964

5) A builder borrows Rs. 2550 to be paid back with compound interest at the rate of 4% per annum by the end of 2 years in two equal yearly instalments. How much will each instalment be ?

a) 1352 b) 1456 c) 1396 d) 1242

6) A man saves Rs. 2000 at the end of each year and invests the money at 5% compound interest. At the end of 3 years he will have ?

a) 6305 b) 6250 c) 6456 d) 6600

Basic problems:-

(1.) $P = 10,000$.

(i) R% = 10%, for "2" years.

C.I = ? * N(or)T same

$A = P\left(1+\frac{R}{100}\right)^N$

$A = 10,000\left(1+\frac{10}{100}\right)^2$

$A = 10,000 \times \left(\frac{11}{10}\right)^2$

$A = 10,000 \times \frac{11}{10} \times \frac{11}{10}$

$A = 12,100$

$C.I = A - P = 12,100 - 10,000$

Ans:- C.I = 2,100

(or)

* $P = 10,000$

1.) 1000 } C.I
2.) 1000 100 } 2100

(ii) 1.) 1000

2.) 1000 100

3.) 1000 100 100 10

3000 300 10

(Ans) C.I = 3310 ₹

(iii) Principal(P) = 10,000

(1) 2000

(2) 2000 400

4000 400

CI = 4400

$\frac{1}{11}$ of (C.I) $= \frac{1}{11}(4400)$

Ans:- = 400

(2.) Principal (P) = 12,600

10% (1) 1260

10% (2) 1260 126

2520 126

Ans:- C.I = 2646

(3.) P = ? A = 1352, T = 2

R% = 4%

$A = P\left(1+\frac{R}{100}\right)^N$

$1352 = P\left(1+\frac{4}{100}\right)^2$

$1352 = P\left(\frac{26}{25}\right)\left(\frac{26}{25}\right)$

$P = 625 \times 2$

Ans:- $\boxed{P = 1250}$

(or)

$\rightarrow 4\% = \frac{4}{100} \Rightarrow \frac{1}{25} \Rightarrow \frac{26}{25} \Rightarrow \left(\frac{26}{25}\right)^N$

$\left(\frac{26}{25}\right)^2 = \frac{676\,(A)}{625\,(P)}$ > diff = C.I

$676P = 1352$

$1P = 2$ ∴ 625 pools = 625 × 2 = 1250

(4.) $5\% \Rightarrow \frac{5}{100} \Rightarrow \frac{1}{20} \Rightarrow \frac{21}{20}$

$\left(\frac{21}{20}\right)^N \Rightarrow \left(\frac{21}{20}\right)^{N=3}$

(A) 9261 > diff = C.I
(P) 8000

Here diff 1261 parts

1261 parts = 1261

1 part = 1

∴ 1261 parts = 1261 × 1
= 1261

So, principal = 8000

Ans:- (P) = 8000

MODEL: 1

(1.) Principal (P) = 10,000

R% = 12%

Time (T) = 2Y 3M

- for 5 months interest is

$\frac{12}{12} \times 5 = 5\%$

12% 1.) 1200
12% 2.) 1200 144
5% 3.) 500 60 60 7.2
2900 264 7.2

* C.I = 3171.2 (Ans:)

(2.) P = 8000, R% per annum = 15%

- for 4 Months R% is

$\frac{15}{12} \times 4 \Rightarrow 5\%$

15% 1.) 1200
15% 2.) 1200 180
5% 3.) 400 60 60 9
2800 300 9

(Ans:) C.I = 3109

(3.) 48,000 = P, R% = 8

Compounded half-yearly.

- you can use formula

$A = P\left(1 + \frac{R}{100}\right)^{2N}$

$A = 48{,}000\left(1 + \frac{8}{100}\right)^2$

(or)

4% 1.) 1920 } C.I
4% 2.) 1920 76.8 }

- Half-yearly. So, R% is 4%

C.I = 3196.80

(4.) P = 16,000

R% per Quarterly is $\frac{20}{12} \times 3$

R% = 5%

5% (1) 800
5% (2) 800 40
5% (3) 800 40 40 2

C.I = 2522 (Ans):-

(5.) P = 10,000

4%. 1) 400

5%. 2) 500 20

10%. 3) 1000 40 50 2

1900 110 2

C.I = 2012 (Ans)

MODEL : 2.

1.)

$2000 \xrightarrow{\times 2} 4000 \xrightarrow{\times 2} 8000$

2000 double in '2' years.

then 4000 double in '2' years.

T = 4 years

(2.) 10,648 in 3y

9680 in 2y

• So, 9680 is the principal for the amount of 10,648.

$\left(\frac{10648 - 9680}{9680}\right) \times 100$

$\frac{968}{9680} \times 100 = 10\%$

(3.) For '2' years we have formula to find C.I in terms of percentage.

$x + y + \frac{xy}{100}$

$5 + 5 + \frac{5 \times 5}{100} \Rightarrow 10.25\%$.

$\therefore 10.25\% \rightarrow 246$

$\frac{205}{1025} \times x = 246$

$\frac{100 \times 100}{20}$ 4

$\frac{41}{4} \times \frac{x}{100} = \frac{6}{246}$

$x = 2400$

$\therefore$ principal 'x' = 2400

S.I 3y @ 6% is 18%.

$S.I = \frac{18}{100} \times 2400 = 432$

Ans: S.I = 432

(4.) $x \xrightarrow{\times 2} 2x \xrightarrow{\times 2} 4x \xrightarrow{\times 2} 8x$

(15) (15) (15)

Ans: 45 years

(5.) $x \xrightarrow{\times 3} 3x \xrightarrow{\times 3} 9x$

$\therefore$ x "becomes" 9x in '6' years.

Model: 3

(1.) you can use formula.

difference formula for '2' years

$$diff = P\left(\frac{R}{100}\right)^2$$

$$diff = 2000\left(\frac{10}{100}\right)^2$$

$$= 2000\left(\frac{1}{10}\right)\left(\frac{1}{10}\right)$$

$$diff = 20$$

(or)

$P = 2000$, $R\% = 10\%$

1.) 2000

2.) 200 20

Ans: difference = 20

(2.)

For C.I $\Rightarrow x + y + \frac{xy}{100}$

$6 + 6 + \frac{6 \times 6}{100}$

C.I = 12.36%

For S.I $\Rightarrow$ Interest is 12%

$\therefore$ C.I − S.I = 36

12.36% − 12% $\Rightarrow$ 36

0.36% $\Rightarrow$ 36

$\frac{36}{100 \times 100} \Rightarrow 36'$

1% $\rightarrow$ 100

100% $\rightarrow$ 10,000

(3.) $P = 40{,}000$, $T = 3y$, $R\% = 5\%$

Either formula (or) concept.

Formula:

$$diff = P\left[\frac{R}{100}\right]^2\left[\frac{300 + R}{100}\right]$$

(or)

5%.(1) 5% → 2000

5%.(2) 5% → 2000 100

5%.(3) 5% → 2000 100 100 10

diff = 310

(4.) $P = 32{,}000$

10%. 1.) 3200

10%. 2.) 3200 320

10%. 3.) 3200 320 320 32

10%. 4.) 3200 320 320 320+32

(Ans.) diff = 1984

(5.) Amount $A = Rs.\ 2550$

$R\% = 4\%$, $n = 2$

$$\text{Present worth} = \frac{\text{instalment}}{(1 + r/100)^n}$$

$$\Rightarrow P_1 = \frac{x}{\left(1 + \frac{4}{100}\right)^1} = \frac{25}{26}x$$

$$\Rightarrow P_2 = \left(\frac{25}{26}\right)^2 x = \frac{625}{676}x$$

$\Rightarrow P_1 + P_2 = A$

$\Rightarrow 25/26x + 625/67x = 2550$

$\Rightarrow (650 + 625)x/676 = 2550$

$$x = \frac{2550 \times 676}{1275}$$

Ans: $\boxed{x = 1352}$

(6) . 2000 Every year

(1) 100

(2) 100 100 5

305

6000 + 305 → 6305 (Ans).