

Investment.

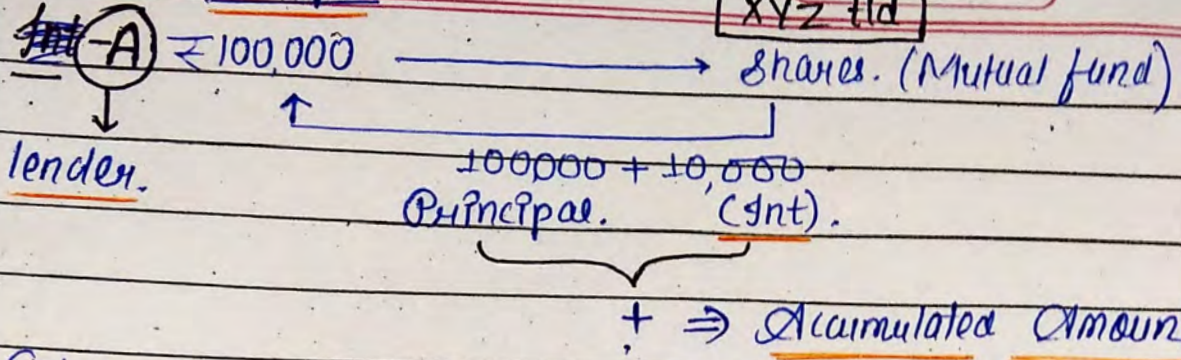
Borrower.



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XYZ Ltd



- Extra money on principal = Interest.
- Accumulated amt = Principal + Interest.

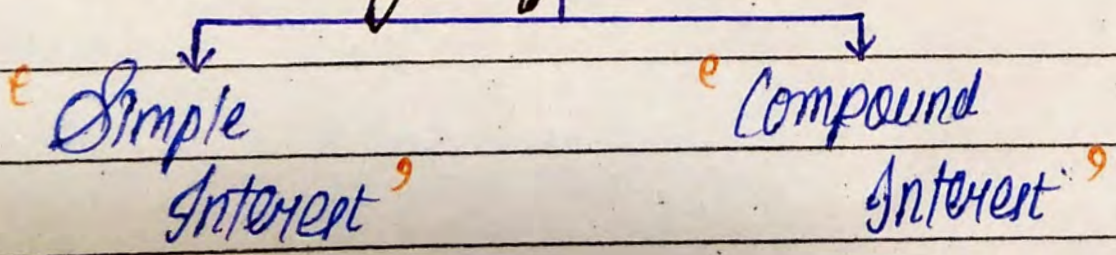
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given by Borrower.

• Principal amount = given by lender at first.

• Rate of Int in % age = $\frac{\text{Interest}}{\text{Principal}} \times 100$
(H).

• Time period = Time for which principal amount is invested
(generally per annum. when not specified)

Type of Interest





(a) Simple Interest $\Rightarrow \frac{P \times R \times T}{100}$ [When R is in %]

$P \times R \times T$ [When R is in decimal]

here: $\left[R = \frac{R}{100} \right]$

(B) Accumulated Amount (A) in case of (SI) \Rightarrow

$$A = P + (I) \rightarrow SI.$$

$$A = P + (SI) \rightarrow \frac{P \times R \times T}{100}$$

$$A = P + \left(\frac{P \times R \times T}{100} \right)$$

$$A = P \left[1 + \left(\frac{R \times T}{100} \right) \right]$$

• Simple Interest on Calculator \rightarrow

$\rightarrow SI = P \times T \times R \%$ Trick.



• Accumulated Amount on Calculator -

→ $A = (P \times T \times R\%) + P.$ trick

(P) Accumulated Amount for n^{th} year -

n^{th} year = $A_n = P + n(SI_1)$

and, $SI_1 = \frac{P \times T}{100}$

$SI_1 =$ simple interest for 1 year.

Example. $\Rightarrow A_3 = P + 3(SI_1)$
 $A_2 = P + 2(SI_1)$

Lecture 02

(b) Compound Interest - (CI)

• $CI =$ For next year Principal = Accumulated amt of previous year.

Ex- for 1st year.

$P = 1000$

$R = 10\%$

, $t = 1 \text{ yrs}$

$SI_1 = \frac{P \times R \times T}{100}$

$= \frac{1000 \times 10 \times 1}{100} = 100 \text{ ₹}$



$$A = P + CI$$
$$= 1000 + 100$$
$$= 1100$$

for next year (2nd year)

$P =$ Accumulated amount of 1st year.

$$P_1 = 1100$$

$$R = 10\%$$

$$t = 1 \text{ yr.}$$

$$I_2 = \frac{P \times R \times t}{100} = \frac{1100 \times 10 \times 1}{100} = 110 \text{ ₹}$$

and so on.

$$CI = I_1 + I_2 \dots$$

(P) Accumulated Amount (A) in case of (CI) -

$$A_n = P \left(\frac{1+R}{100} \right)^n \quad n^{\text{th}} \text{ year.}$$

also, $A = P + CI$

then $CI = A - P$



$$CI = A - P \rightarrow P \left(1 + \frac{r}{100}\right)^n$$

$$CI = P \left(1 + \frac{r}{100}\right)^n - P$$

- Derivation of Accumulated amount formula.

for 1st year $\Rightarrow SI = CI$.

$A_1 \Rightarrow$ Accumulated amt of SI = Accumulated amt of CI.

$$A_1 = P \left(1 + \frac{r}{100}\right) \Rightarrow \text{as } t=1$$

2nd year onwards
 $P_2 = A_1$

3rd year
 $P_3 = A_2$

for any year.

$$A^n = P_n = A_{n-1}$$

$$A_n = P_n \left(1 + \frac{r}{100}\right)^n$$



- Accumulated Amount in case of CI on calculator -

$$A = P + \text{Holo} + \text{Holo} + \text{Holo} \dots$$

These Holo for t times.

⇒ trick

- Compound Interest on calculator from Accumulated amount -

$$CI = A - P$$

$$CI = (P + \text{Holo} + \text{Holo} + \text{Holo} \dots) + \text{Principal}$$

These Holo for
 t times.

trick ⇒

Conversion Period.

In previous situations time of annually so the P of next year was the accumulated amt of previous year.

But if we want to take the Principal of next year is according to annually, semi annually, quarterly, monthly or

daily then,

Period	conversion (c)	(no of conversion year) c.
1 yr	Annually (Jan → Jan)	1
6 Month	Semi Annually (Jan → July → Jan)	2
3 Month	Quarterly (Jan → April → July → Oct → Jan)	4
Monthly	Every Month.	12
daily	Every day	365



• Accumulated Amount in case of conversion period.

$$A = P \left(1 + \frac{r}{100}\right)^{t \times c} \quad / \quad A = P (1+i)^n$$

$n = t \times c, \quad i = \frac{r}{100c}$

• Compound Interest in case of conversion period

$$CI = P \left[\left(1 + \frac{r}{100}\right)^{t \times c} - 1 \right]$$

or

$$CI = P \left[(1+i)^n - 1 \right]$$

$$i = \frac{r}{100c}, \quad n = t \times c$$

• Accumulated Amount in case of conversion period on calculator →

if conversion ~~is~~ semiannually, quarterly etc. and ~~the~~ r will be given according to p.a interest rate. in que. then



We can convert the rate in semi-annually rate of interest as-

$$\frac{r}{c} \rightarrow \text{(annual rate of interest)}$$

$$c \rightarrow \text{(conversion period)}$$

then let us assume $\frac{r}{c}$ as R_{ob} .

$$R_{ob} = \frac{r}{c}$$

on calculator -

$$A = P + R_{ob} + R_{ob} + R_{ob}$$

$\underbrace{\hspace{10em}}$
 n times
 \downarrow
 $(n = t \times c)$

- Compound Interest in case of conversion period on calculator \rightarrow

considering R_{ob} the same as above



$$CI = A - P.$$

$$CI = P + \underbrace{R\% + R\% + R\%}_{\substack{\text{n times} \\ (n = t \times c)}} - P.$$

Note :- If conversion period is not given assume that it is 1.

- formula for difference between CI & SI in general

$$CI - SI = P \left[\left(\frac{1 + r}{100} \right)^t - 1 \right] - P \cdot r \cdot t$$

$$CI - SI = P \left[\left(\frac{1 + r}{100} \right)^t - 1 - rt \right]$$

Or,

you can separately calculate CI with the calculator trick as -

$$CI = P + \underbrace{R\% + R\% + R\%}_{\text{n times}} - P.$$



and $SI = P \times \cancel{t} \times 40\%$

and

than simply subtract.

CI with SI.