Interest.

1) **Simple interest** : Interest calculated only on the principal or original amount of loan.

$$\therefore \boxed{I = \frac{P \times r \times n}{100}}$$

r = Rate of interest
n = No. of years
P = Principal

∴ Amount = Principal + Interest

$$\boxed{A = P + I}$$

Q. (Ex: 9.3) (Q.1.) (Page 130)

→

$P = 9600$, $r = 6\%$, $n = 3$

$$I = \frac{P \times r \times n}{100}$$

$$= \frac{9600 \times 6 \times 3}{100}$$

$$= 96 \times 18$$

$$\boxed{I = 1728}$$

Q. (Ex: 9.3) (Q2) (Page 130)

→

$P = 6000$, $r = 9.5\%$, $n = 2.5$

$$I = \frac{P \times r \times n}{100}$$

$$= \frac{6000 \times 9.5 \times 2.5}{100}$$

$$= \frac{60 \times 95 \times 25}{100}$$

$$= \frac{95 \times 150}{10}$$

$$= 95 \times 15$$

$$\therefore \boxed{I = 1425}$$

Q. (Ex: 9.3) (Q3) (Page 130)

→

$P = 8400$, $r = 8.25\%$, $n = \frac{9}{12} = \frac{3}{4}$

$$I = \frac{P \times r \times n}{100}$$

$$= \frac{8400 \times 8.25 \times 3/4}{100}$$

$$= \frac{21 \times 8.25 \times 3}{100}$$

$$= 519.75$$

Q. (Ex: 9.3) (Q8) (Page 130)

→ Gain (%) = 6.5% − 4%
= 2.5%

∴ Total Gain = $\frac{1000 \times 2.5 \times 2}{100}$

= 250 × 2

∴ **Total Gain = 500**

Q. (Ex: 9.3) (Q7) (Page 130)

→ Let, Sum = principal = x

∴ Amount = $3x$

$A = P + I$

$3x = x + I$

$3x - x = I$

$2x = I$

∴ $I = \frac{P \times r \times n}{100}$

$2x = \frac{x \times r \times 20}{100}$

$\frac{20x}{2x} = r$

∴ **r = 10%**

∴ Now, in how many year the sum will be double of it self?

$\therefore A = 2x$

$A = P + I$

$2x = x + I$

$\boxed{I = x}$

$\therefore I = \frac{P \times r \times n}{100}$

$x = \frac{x \times 10 \times n}{10\cancel{0}}$

$\frac{10\cancel{x}}{\cancel{x}} = n$

$\therefore \boxed{n = 10 \text{ years.}}$

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2) Compound interest: Interest calculated on the principal amount and also on the accumulated interest of previous years.

Ex: $P = 10000$, $r = 10\%$, $n = 3y$

year	opening balance	interes @ 10%	Closing
0	10,000 ~~Nil~~	Nil	10,000
1	10,000	1000	11,000
2	11,000	1,100	12100
3	12,100	1210	13310

$$C.I = A - P$$
$$= 13,310 - 10,000$$
$$= 3310.$$

$$S.I = \frac{1000 \times 10 \times 3}{100}$$
$$= 3000$$

- **Formulas**

$$A = P\left[1 + \frac{R}{100}\right]^n$$

$$C.I = A - P$$

Ex: $A = 10,000\left[1 + \frac{10}{100}\right]^3$

$$= 10,000\left[\frac{110}{100}\right]^3$$

$$= 10000\left[\frac{11}{10}\right]^3$$

$$= 10,000 \times \frac{1331}{1000}$$

$$= 13,310$$

$$C.I = A - P$$
$$= 13310 - 10,000$$
$$= 3,310.$$

Q. S.E ✱ 1 (Page 129)

→

$P = 8000, \quad r = 5\%, \quad n = 3.$

$$\therefore A = P\left[1 + \frac{r}{100}\right]^n$$

$$= 8000\left[1 + \frac{5}{100}\right]^3$$

$$= 8000\left[\frac{105}{100}\right]^3$$

$$= 21 \times 21 \times 21$$

$$= 9261.$$

$$I = A - P$$

$$= 9261 - 8000$$

$$= 1261$$

· formula

· Compounded		No. of Compounding P.a
yearly	12 m	1 time r
Half yearly	6 m	2 time r/2
Quarterly	3 m	4 time r/4

1) yearly : $A = P\left[1 + \frac{r}{100}\right]^n$

2) Half yearly = $A = P\left[1 + \frac{r/2}{100}\right]^{2n}$

3) Quarterly = $A = P\left[1 + \frac{r/4}{100}\right]^{4n}$

- difference between Compound interest and simple interest over 2 years is given by

$$CI - SI = \frac{Pr^2}{100^2}$$

Q. Ex: 9.3 (Q4) - (page 130)

Ex: If $P = 10,000$, $r = 12\%$, $n = 1$ year Find C.I, for half yearly Compounding.

→

$$A = P\left[1 + \frac{r/2}{100}\right]^{2n}$$

$$= 10000\left[1 + \frac{6}{100}\right]^2$$

$$= 10,000\left[\frac{106}{100}\right]^2$$

$$= 10,000 \times \frac{106}{100} \times \frac{106}{100}$$

$$= 106 \times 106$$

$$= 11236$$

$$C.I = A - P = 11236 - 10000$$

$$= 1236$$

Q. (Ex: 9.3) (Q 4) (page 130)

→

$P = 4200$, $r = 10\%$, $n = \frac{18}{12} = 1.5$

$$A = P\left[1 + \frac{r/2}{100}\right]^{2n}$$

$$= 4200\left[1 + \frac{5}{100}\right]^{2\times 1.5}$$

$$= 4200\left[\frac{21}{20}\right]^{3}$$

$$= 4200 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$$= \frac{21 \times 21 \times 21 \times 21}{40}$$

$$= \frac{441 \times 441}{40}$$

$$= \frac{1,94,481}{40}$$

$$A = 4862.025$$

$\therefore I = A - P$

$= 4862.025 - 4200$

$= 662.025$

- Recurring deposit means deposit same (equal) amount repeatedly over a period of time.

→

Q (Ex: 9.3) (Q6) (Page 130)

$$A = P\left[1 + \frac{r}{100}\right]^n$$

$$1,33,100 = 1,00,000\left[1 + \frac{10}{100}\right]^n$$

$$\frac{133100}{100000} = \left[\frac{11}{10}\right]^n$$

$$\left[\frac{11}{10}\right]^3 = \left[\frac{11}{10}\right]^n$$

$$\therefore \boxed{n = 3}$$

Q. (Ex: 9.3) (Q9) (Page 130)

→

year	op. bal	Interest	Fresh depos.	Cl. bal.
1	Nil	Nil	200	200
2	200	10	200	410
3	410	20.5	200	630.5

∴ Amount at the end of 3rd year
= 630.5.

Q. Ex: 9.3 (Q10) (Page 130)

→

$$S.I = \frac{P \times r \times n}{100}$$

$$2000 = \frac{P \times 5 \times 4}{100}$$

$$\frac{2000 \times 100}{20} = P$$

$$\therefore P = 10,000$$

∴ Twice of ₹0,000 = 20,000, C.I = ?

$$A = P\left[1 + \frac{r}{100}\right]^n$$

$$= 20000\left[1 + \frac{5}{100}\right]^2$$

$$= 22,050$$

$$\therefore C.I = A - P$$

$$= 22050 - 20,000$$

$$= 2050.$$

Q. Ex: 9.3 (Q11) (Page 130)

→

~~C.I - S.I~~

diff. betⁿ C.I & S.I

$= C.I - S.I$

$32 = \frac{Pr^2}{100^2}$

$32 = \frac{P(8)^2}{10,000}$

$\therefore 32 \times 10,000 = P(64)$

$\frac{32 \times 10000}{64} = P$

$\therefore \boxed{P = 5000}$

Q. Ex: 9.3 (Q5) (Page 130)

→

$P = 10,000, \quad n = 4, \quad R = \frac{1}{2} \times 8 = 4.$

$\therefore A = P\left[1 + \frac{4}{100}\right]^n$

$= 1000\left[1 + \frac{4}{100}\right]^4$

$= 10000 \times \frac{104}{100} \times \frac{104}{100} \times \frac{104}{100} \times \frac{104}{100}$

$$= \frac{10816 \times 10816}{10000}$$

$$= 10816 \times 1.0816$$

$$= 11698.58$$

$$\therefore I = A - P$$

$$= 11698.58 - 10,000$$

$$= 1698.58$$