Simple Interest and Compound Interest

Examples

$$\text{time} \times \text{rate} = \frac{\text{S.I}}{\text{Principal}} \times 100$$

$$\text{Amount} = \text{S.I} + \text{Principal}$$

1

Find the simple interest, If

1. P = Rs.1000, R = 20% per annum, T = 4 years.
2. P = Rs.600, R = 5% per annum, T = 4 months.
3. P = Rs.200, R = 6% per six months, T = 3 years.
4. P = Rs.500, R = 2% per six months, T = $5/_2$ years.
5. P = Rs.400, R = 3% per three months, T = 2 months.
6. P = Rs.730, R = 10% per annum, T = 120 days.
7. P = Rs. 3000, R = 61/4 per annum, T = period from 4th Feb to 18th Apr.

Solution

1. **4×20×10 800**

$$20 \times 4 = \frac{\text{S.I}}{1000} \times 100$$

$$20 \times 4 \times 10 = \text{S.I}$$

2. **2×5 = 10**

$$\frac{4}{12} \times 5 = \frac{S.I}{600} \times 100$$

$$\frac{1}{3} \times 5 \times 6^{2} = S.I$$

$$S.I = 5 \times 2 = 10$$

3. **6×2×3×2 = 72**

$$(6 \times 2) \times 3 = \frac{S.I}{200} \times 100$$

$$6 \times 2 \times 3 \times 2 = S.I$$

4. **5×2×5=50**

$$\frac{5}{2} \times (2 \times 2) = \frac{S.I}{500} \times 100$$

$$5 \times 2 \times 5 = S.I$$

5. **4×2=8**

$$(\text{time} \times \text{rate}) = \frac{S.I}{\text{Principal}} \times 100$$

$$\frac{2}{12} \times (3 \times 4) = \frac{S.I}{400} \times 100$$

$$2 \times 4 = S.I$$

6. **73/3=24**

$$\frac{4}{12} \times 10 = \frac{S.I}{730} \times 100$$

$$\frac{73}{10} \times 10 \times \frac{1}{3} = S.I$$

7. **37.50**

$$T = (24+31+18)\text{days} = 73 \text{ days} = \frac{73}{365} = \frac{1}{5}\text{yr.}$$

$$\frac{1}{5} \times \frac{25}{4} = \frac{S.I}{3000} \times 100$$

$$\frac{5}{4} \times 30 = S.I$$

#2

Find the following:

1. P = Rs. 100, R = 3% per annum, T = 2 year, A= ?
2. P = Rs. 500, R = 6% per annum, T = 4 months, A= ?
3. P = Rs. 400, R = 3.65% per annum, T = 150 days, A= ?
4. A = Rs. 540, S.I = Rs. 108 , R = 5%, T = ?
5. A = Rs. 1,120, R = 5%, T = $2^2/_5$ yr, S.I = ?

Solution:

1. **S.I = 6 ; A = S.I + principal ; A = 6 + 100 106**

Method I

$$r \times t = \frac{S.I}{Principal}$$

$$3 \times 2 = \frac{S.I}{100} \times 100$$

$$6 = S.I$$

Amount = S.I + Principal

Amount = 6 + 100

A = 106

Method II

$$A = P\left[1 + \frac{RT}{100}\right]$$

$$A = 100\left[1 + \frac{3 \times 2}{100}\right]$$

$$A = 100 \times \frac{106}{100}$$

Amount = 106

2. **S.I = 10 ; A = S.I + P ; A = 10+500 510**
3. **S.I = 6 ; A = 400 + 6 406**

$$R \times T = \frac{S.I}{Principal} \times 100$$

$$\frac{365}{100} \times \frac{3}{365} = \frac{S.I}{400} \times 100$$

$$\frac{3}{2} \times 4^{2}$$

$$6 = S.I$$

Amount = S.I + Principal

A = 6 + 400

4. **T = 5 yr.**

$$R \times T = \frac{S.I}{Principal} \times 100$$

$$T = \frac{108}{5 \times 432} \times 100$$

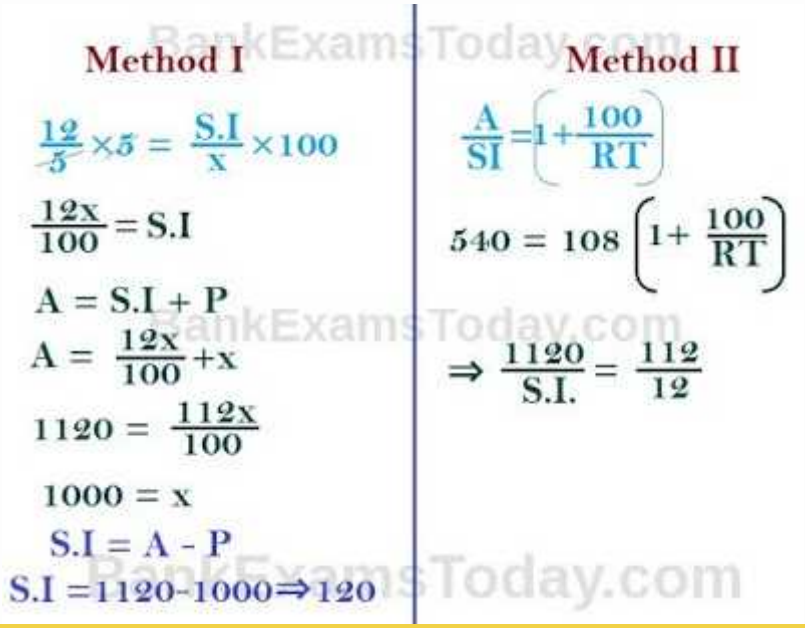
[27×4=108]

[27×16=432]

T= 5 yr.

Note :
Divisibility Method: 9×3=27
1+0+8 = 9 , 4+3+2 = 9
9 which is divisible by 9 & 3 hence also divisible by 27

5. **120**



#3

1. A sum of money lent out at simple interest amounts to Rs. 720 after 2 years and to Rs. 1020 after a further period of 5 years. Find the sum and the rate %.
2. Adam borrowed some money at the rate of 6% p.a. for the first two years, at the rate of 9% p.a. for the next three years, and at the rate of 14% p.a. for the period beyond five years. If he pays a total interest of Rs. 11,400 at the end of nine years , how much money did he borrow ?**(Bank P.O 1999)**

3. A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at $6^1/_4$% p.a. for 2 years. Find his gain in the transaction per year.**(S.S.C.2000)**
4. A certain sum of money amounts to Rs. 1008 in 2 years and to Rs. 1164 in $3^1/2$ years.Find the sum and the rate of interest?
5. The simple interest on a certain sum of money for $2^1/2$ years at 12% per annum is Rs. 40 less than the simple interest on the same sum for $3^1/2$ years at 10% per annum. Find the sum.

Solution

1. **Principal = 600, R = 10%**

$$r \times t = \frac{SI}{P} \times 100$$

$$SI = 1020 - 720 = 300$$

$$\text{In 2 Years} = SI = \frac{300}{5} \times 2$$

$$\Rightarrow \text{Rs. } 120$$

$$P = 720 - 120 \Rightarrow 600$$

$$R = \frac{120}{2 \times 600} \times 100$$

$$R = 10\%$$

2. **12000**

$$\left(\frac{x\times6\times2}{100}\right)+\left(\frac{x\times9\times3}{100}\right)+\left(\frac{x\times14\times4}{100}\right)=11400$$

$$\left(\frac{3x}{25}+\frac{27}{100}+\frac{14}{25}\right)=11400$$

$$\frac{95x}{100}=11400$$

$$x=\frac{11400\times100}{95}$$

3. **112.50**

Same Year & Same Amount

$$\left[6\frac{1}{4} - 4\right] \Rightarrow 6-4 = 2$$

Now, We have $2\frac{1}{4}$

$$\frac{9}{4} \times 2 = \frac{S.I}{5000} \times 100$$

$$9 \times 25 = SI$$

Gain in 1 yr.

$$\frac{225}{2} = 112.50$$

4. [1164-1008 = 156] $^{156}/_{3\times4} = 208$; R = $^{208}/_{2\times800}\times100$ 13
5. $^{7x}/_{20} - {}^{3x}/_{10} = 40$ x = (40 × 20) x = 800 [Hint : Given Below]

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

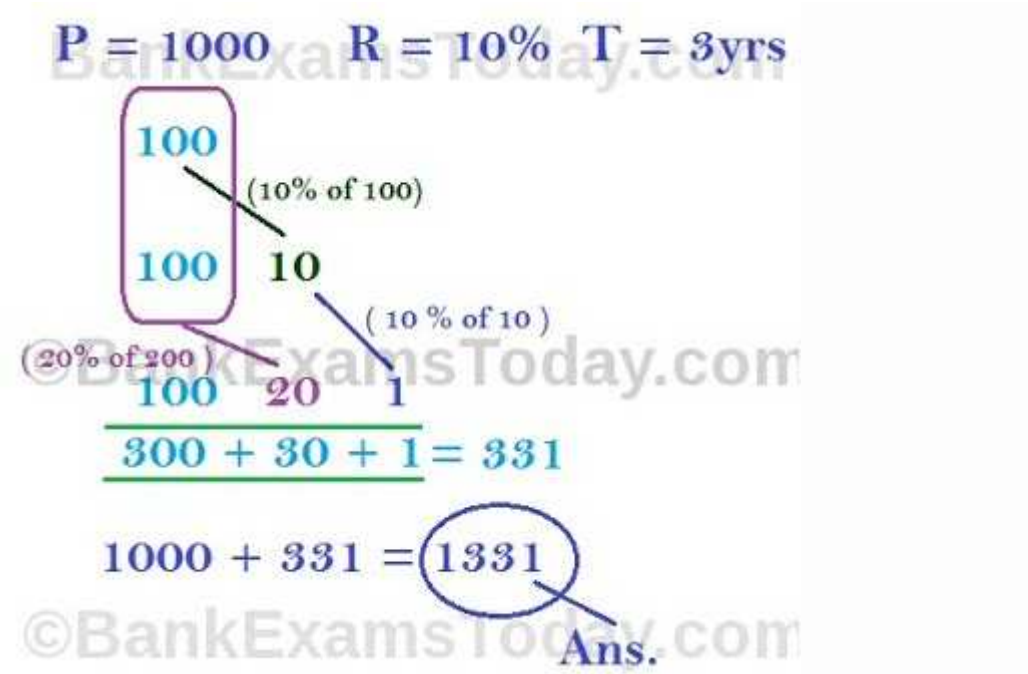
Let P = x

$$\frac{5}{2} \times 12 = \frac{SI}{x} \times 100$$

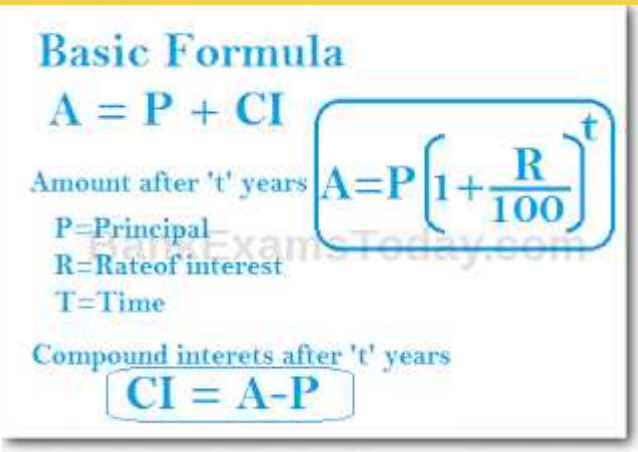
$$\frac{30x}{100} = SI$$

$$SI = \frac{3x}{10}$$

COMPOUND INTEREST



Formulas



Case 1. When interest is not Compound yearly,

Amount after 't' years $A = P\,[1+ {}^{r}/_{n\times 100}]^{nt}$

n= no of compounding per year

When interest is compounded half yearly, n = 2

compounded quarterly, n = 4

compounded monthly, n = 12

Case 2. When rate % is no equal every year and interest is compounded yearly

Basic formula :

$P\,[1+ {}^{r}/_{100}]\,[1+ {}^{r}/_{100}]$ ...upto 't' times

But as rate % is not same every year, so

$A = P\left[1+ {}^{r1}/_{100}\right]^{t1}\left[1+ {}^{r2}/_{100}\right]^{t2}$ .... and so on

Where R1 = Rate% p.a. for t1 years. and R2 = Rate % p.a. for t2 years.

Case 3 When interest is compounded yearly but time is in fraction

$T = 5{}^{3}/_{4}$ years

A= (whole part) × (fraction part of time)

$A = P\left[1+ {}^{r}/_{100}\right]^{5} \times \left[1+ {}^{3r}/_{4/100}\right]$

Difference between Compound Interest and Simple Interest

CI - SI = P [R/100]2

When time t = 3 years

$CI - SI = P\left[({}^{R}/_{100^{3}} + 3 ({}^{R}/_{100})^{2}\right]$

Examples

#1

- If the compound interest on a certain sum for two years at 10% p.a. is Rs 2,100 the simple interest on it at the same rate for two years will be. **(RRB, 2009)**
- The compound interest on a sum for 2 years is Rs. 832 and the simple interest on the same sum for the same period is Rs. 800. The difference between the compound and simple interest for 3 years will be.
- The difference between simple interest and compound interest on a sum for 2 years at 8% when the interest is compounded annually is Rs. 16, if the interest were compounded half yearly, the difference in one interest would be nearly.
- The difference in C.I and S.I for 2 years on a sum of money is Rs. 160.If the S.I for 2 years be Rs. 2880, the rate of percent is .

Solution

1. 2000

$$P\left(1+\frac{10}{100}\right)^2 - P = 2100$$

$$P\,(1.21 - 1) = 2100$$

$$P \times 0.21 = 2100$$

$$P = \frac{2100}{21} \times 100$$

$$P = 10{,}000$$

SI = 2000

2. 98.56

	SI	CI
Year	800	832
	S.I	C.I
I.	400	400
II.	400	432

Rs. 32

r% = 8%

8%

III.	400	400+66.56

SI 66.56+32= 98.56

3. 04

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$$P\left[\frac{r}{100}\right] = 16$$

$$P \times \frac{16}{\cancel{100}\,25} \times 100 = 16$$

$$P = 2500$$

S.I

$$r \times t = \frac{SI}{2500} \times 100$$

$$8 \times 2 = \frac{SI}{2500} \times 100$$

$16 \times 8 \times 2 = SI$

C.I

$$P\left[1 + \frac{R}{100 \times 2}\right] - P$$

$$= 2500\left[1 + \frac{8}{100 \times 2}\right] - 2500$$

$$= 2500 \times \frac{26}{25} \times \frac{26}{25} - 2500$$

$676 \times 4 - 2500 \Rightarrow 204$ CI

4.

2880

Year	S.I	C.I
I.	1440	1440
II.	1440	1600
		160

$$r\% = \frac{160}{1440} \times 100$$

$$= \frac{100}{9}$$

$$= 11\frac{1}{9}\%$$