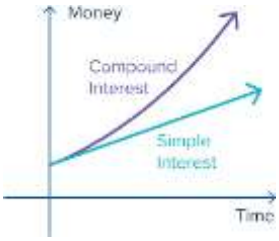
SIMPLE INTEREST



- **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.

- **Simple Interest** : If the interest on a sum borrowed for a certain period is reckoned uniformly , then it is called Simple interest.

- **Rate % (or) Rate of interest :**
  It is the interest rate at which amount is borrowed or lent to someone for a specific period of time is called **Rate of interest.** It is always indicated in percentage (%).

- **Time (T) :** Duration of time the principal is provided to an individual is called Time (T).
  Let's P = Principal , Rate = R% per annum & Time = T years,

$$S \cdot I = \frac{P \times T \times R}{100}$$

- **Amount (A) :** The sum of principal and the interest received on the principal for certain period of time is called Amount.

- $A = P + \frac{P \times T \times R}{100}$

$$A = \frac{P\,(100+TR)}{100}$$

Instalment: What annual instalment will discharge a debt of Rs . **A(amount)** in **T** (**time**) years at **R%(rate of interest)** per annum.

$$\frac{100A}{100T+\frac{RT(T-1)}{100}}$$

BASIC PROBLEMS:

1)

(i) Find the simple interest on 6000₹ for 3 years at 10% per annum. **Ans: 1800**

(ii) Find the simple interest on 810₹ for 2.5 years at **11 $\frac{1}{9}$%** per annum. **Ans: 225**

(iii) Calculate the simple interest on Rs. 8000 for 15 months at **6** paise per rupee per month. **Ans: 7200**

2)

(i) If certain principal amounts to Rs.1100 in 2 years at 5% simple interest rate. Then what is the principal ? **Ans:1000**

(ii) If Rs. 12000 amounts to 15000 in 4 years at simple interest then find the rate of interest (R%) per annum . **Ans: 6.25%**

(iii) In how many years Rs.1600 amounts to Rs.2200 at 12.5% simple interest rate. **Ans: 3 years**

MODEL:1

1) At what rate percent per annum will a sum of money double in 25 years.

a) 6% **b) 4%** **c) 15%** **d) 20%**

2) A sum doubles itself in 16 years, then in how many years will it triples itself; rate of interest being simple.

a) 24 years **b) 32 years** **c) 15 years** **d) 45 years**

3) A certain sum of money amounts to Rs. 2900 at rate of 4% per annum in 4 years. In how many years will it amount to Rs. 5000 at the same rate ?

a) 25 years **b) 12 years** **c) 28 years** **d) 30 years**

4) How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest ?

a) 3 years **b) 2 years** **c) 4 years** **d) 6 years**

MODEL:2

1) The simple interest on a sum of money will be Rs. 210 after 3 years. If in the next 3 years, principal become 4 times, then the total interest at the end of 6 years.

a)940 **b) 1050** **c) 1140** **d) 1320**

2) A sum of Rs. 800 amounts to Rs.920 in 3 years at simple interest. If the interest rate is increased by 3%,it would amount to how much ?

a) 1020 b) 960 c) 1054 d) 992

3) A person makes a fixed deposit of Rs. 20000 in Bank of India for 3 years. If the rate of interest be 13% Simple interest per annum charged half yearly. What amount will he get after 42 months as interest ?

a) 10200 b) 9100 c) 14200 d)13800

MODEL:3

1) Find the total percentage of interest gained on principal. if the rate of interest is 36% per annum at simple interest, calculated on the principal for 2 years 7 months.

a) 86 % b) 75% c) 82.54% d) 93%

2) A sum of Rs 1600 gives a simple interest of Rs 252 in the time period of 2 years and 3 months. What is the rate of interest per annum ?

a) 5% b) 6% c) 7% d) 8%

3) The simple interest on a certain sum of money for 3 ½ years at 14% per annum is Rs. 75 more than the simple interest on the same sum for 4 ½ years at 10% per annum. Find the sum.

a)1750 b)1875 c)1926 d)2100

4) The simple interest on a certain sum of money for 3 ½ years at 10% per annum is ₹55 less than the simple interest on the same sum for 4 ½ years at 9% per annum. Find the sum.

a) 2000 b)1000 c)1250 d) 800

MISCELLANEOUS:

1) The difference between the Simple Interest received from two different sources on Rs.1500 for 5 years is Rs, 22.50 the difference between their rates of interest is :

a) 3% b) 5% c)7 % d) 9%

2) What is the amount received on the sum 11₹ at the rate of 11% per annum in simple interest after 11 years ?

a) 28.96% b) 33.25 % c) 22.11% d) 24.31 %

3) Simple interest on a certain sum at a certain annual rate of interest is $\frac{16}{25}$ of the sum. If the number representing rate percent and time in years be equal, then the rate of interest is

a) 8% b)12% c) 6% d) 14%

4) Rakesh invests Rs. 12000 at 10% per annum simple interest. After 3 years, he withdraws the money at a lower interest rate, receiving Rs. 3320 less than if he had kept it for 5 years. What is the new interest rate offered by the bank ?

a) 72 / 5 % b) 67 / 9 % c) 33 1/3 % d) 25 /9 %

5) The simple interest on Rs.7,300 from 11 May, 1987 to 10 September, 1987 (both days included) at 5% per annum is .

a) 146 b) 134 c) 123 d) 105

6) What equal instalment of annual payment will discharge a debt which is due as Rs. 848 at the end of 4 years at 4% per annum simple interest ?

a) 150 b) 200 c) 250 d) 320

7) What quarterly payment will discharge a debt of Rs. 2280 in 2 years at 16% per annum simple interest ?

a) 250 b) 350 c) 375 d) 280

8) A part of certain sum of money is invested at 8% per annum and the rest at 12% per annum. If the interest received in each case for the same period be equal, the ratio of the sum invested is :

a) 7 / 5 b) 1 /4 c) 3 / 2 d) 4 / 7

SIMPLE INTEREST

(1)(i) $S.I = \frac{P \times T \times R}{100}$

$S.I = \frac{6000 \times 3 \times 10}{100}$

Ans: $\boxed{S.I = 1800}$

(or)

- In simple interest, interest is same for every year.

10% (1) 600
10% (2) 600
10% (3) 600
} 1800 (S.I)

Ans:

2. (i) $A = P\left(\frac{100+TR}{100}\right)$

$1100 = P\left(\frac{100+2\times5}{100}\right)$

Ans: $\boxed{P = 1000}$

(or)

110% → 1100

11% → 110

1% → 10

$\boxed{100\% \rightarrow 1000}$

1.

(ii)

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

$\frac{1}{9} \times 810 \rightarrow 90$ (1st)

$\rightarrow 90$ (2nd)

$\rightarrow 45$ ($\frac{1}{2}$ year)

Ans: 225 ₹ interest

2. (ii)

$A = P\left(\frac{100+TR}{100}\right)$

$1500 = 1200\left(\frac{100+4R}{100}\right)$

Ans: $\boxed{R\% = 6.25\%}$

1.(iii) Principal (P) = 8000 ₹

- 6 paisa per month for "15" months

∴ $15 \times 6 = 90$ paisa.

- So, for (1) rupee the interest is 90 paisa. for 100% P ⇒ 90% In

∴ Interest = 90% (8000)

Ans: $\boxed{I = 7200}$

2. (iii) P = 1600 ; A = 2200, R% = 12.5

R% = 12.5%

$A = P\left(\frac{100+TR}{100}\right)$

$2200 = 1600\left(\frac{100+12.5\times T}{100}\right)$

Ans: $\boxed{T = 3y}$ (or)

1600 becomes 2200,

So, increment is 600

(1st y) $1600 \times \frac{1}{8} = 200$

(2nd y) $1600 \times \frac{1}{8} = 200$

(3rd y) $1600 \times \frac{1}{8} = 200$

So, "1600 becomes 2200 in "3" years.

Model : 1

(1.) A sum of money double in 25 years. which means "100%" becomes 200% in "25" years.

- So, interest is (200-100) = 100%.
- R% per Annum = $\frac{100\%}{25} = \underline{4\%}$

Ans: 4%

(2.) 'x' $\xrightarrow{16y}$ 2x

$\therefore x \xrightarrow{?} 3x$

In 16 years S.I = 2x - x = x

$\therefore$ x becomes 3x in 32 years

Ans: 32 years

(3.) x $\xrightarrow{4y\ @\ 4\%}$ 2900

Interest is 4 × 4 = 16% in 4 years.

Principal "4 years" Amount

$\therefore$ 100% $\xrightarrow{\text{4 years}}$ 116%

116% → 2900

100% → ?

$100\% = \frac{100 \times 2900}{116} = 2500$

- if 2500 becomes "5000", then interest is "2500". which is 100%

$\therefore$ 4% becomes 100% in "25" years.

Ans: 25 years

(4.) 4.5% → $\left(4 + \frac{1}{2}\right)\%$

→ $\frac{9}{200}$ (in ratio)

$450 \times \frac{9}{200} \times x = 81$

$\frac{450}{200} \times x = 9$

$x = 4$ years

(or)

you can use:

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

$81 = \frac{P \times T \times R}{100}$

$81 = \frac{450 \times T \times 4.5}{100}$

Ans: T = 4 years

Model : 2

(1.) $\frac{P \times T \times R}{100} = S.I$

$\frac{P \times 3 \times R}{100} = 210$

Now: for later 3 years

(P) principal becomes 4P.

$\therefore SI = \frac{4P \times 3 \times R}{100}$

$S.I = 4(210) = 840$

$\therefore$ Total interest $= 840 + 210$

Ansr Total interest = **1050**

(2.) 800 $\xrightarrow{\text{in 3y}}$ 920

$\therefore \frac{120}{800} \times 100 = 15\%$

Rate of interest 15% for 3 years

$\therefore$ for one year $\frac{15\%}{3} = 5\%$

Now new interest is $\rightarrow 5\% + 3\%$ (8%).

$3 \times 8\% = 24\%$

$S.I = \frac{24}{100} \times 800 \Rightarrow 192.$

then amount $= P + S.I$

$A = 800 + 192$

$\boxed{A = 992}$ (Ans)

(3.) 42 months = 3Y 6 Months

$\therefore$ Total interest $= 13 \times 3 + \frac{13}{12} \times 6$

$= (39 + 6.5)\%$

$= 45.5\%$

$\rightarrow 45.5\%$ of (20000)

$\rightarrow (45 + \frac{1}{2})\%$ of (20,000)

$\rightarrow \frac{91}{2} \times \frac{20,000}{100} = 9100$

$\boxed{\text{Ans: } 9100}$

Interest = 9100, Amount = 29,100

MODEL:3

(1) 36% per Annum.

per month $= \frac{36}{12} = 3\%$

• Total percentage of interest gained $= 2 \times 36 + 7 \times 3$

$= 93\%$

(2) $P = 1600, S.I = 252$

2 y, 3 Month = 27 months

$27 \times \frac{x}{100} \times 1600 = 252$

$x = \frac{252}{16 \times 27}$

$12x = \frac{\cancel{3}\ \cancel{12} \times \cancel{252}\ 28}{\cancel{16} \times \cancel{27}\ \cancel{3}}$

4

$\boxed{12x = 7\%}$

∴ Rate of interest per annum $= 7\%$

(3)

• 14% per annum for $3\frac{1}{2}$ years $= 14 \times 3 + \frac{1}{2}(14)$

$= 49\%$

• 10% per annum for $4\frac{1}{2}$ years $= 4 \times (10) + \frac{1}{2}(10)$

$= 45\%$

diff = (49-45)% = 4%

4% → 75

100% → ?

4 × 25 → 75 × 25

100% → 1875

Ans: 1875

(4).

- 10% for $3\frac{1}{2}$ years to be 35%
- 9% for $4\frac{1}{2}$ years to be 40.5%

diff = 5.5% → 55

55% → 550

5% → 50

1% → 10

Ans: 100% → 1000

MISCELLANEOUS:-

(1). $S.I = \frac{P \times T \times R}{100}$

on 1st source

$$S.I = \frac{1500 \times 5 \times R_1}{100}$$

on 2nd source

$$S.I = \frac{1500 \times 5 \times R_2}{100}$$

diff = 22.50

$$\rightarrow \frac{1500 \times 5 \times R_1}{100} - \frac{1500 \times 5 \times R_2}{100} = 22.50$$

$$15 \times 5 (R_1 - R_2) = 22.50$$

$$(R_1 - R_2) = \frac{2250}{10 \times 15 \times 5}$$

$$= \frac{75}{5 \times 5}$$

$$\boxed{(R_1 - R_2) = 3}$$

(2) $$\frac{11 \times 11}{100} \times 11 = S.I$$

$$\frac{1331}{100} = S.I$$

$$13.31 = S.I$$

Amount = 11 + 13.31 = 24.31

Ans: 24.31

(3.)

Here, $R = T$

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

$$\frac{16}{25}x = \frac{x \times R \times R}{100}$$

$$16 \times 4 = R^2$$

$$\sqrt{64} = R$$

Ans: $\boxed{R = 8\%}$

(4.) $P = 12,000$

$10\% @ 5y = 50\%$

50% of $(12,000) = 6,000$.

Now received interest =>

$6000 - 3320$

- Received interest: $\boxed{2680}$

$$\frac{2680}{12,000} \times 100 = 22\frac{67}{3}\%$$

- $\frac{67}{3}\%$ is for '3' years. for one year $\frac{\frac{67}{3}}{3} \Rightarrow \frac{67}{9}\%$ per annum

Ans: $\boxed{\frac{67}{9}\%}$

(5.)

11th May 1987 to 10th Sep 1987.

Principal $(P) = 7,300$

$R\% = 5\%$ per annum

May + June + July + Aug + Sep

$31 + 30 + 31 + 31 + 30$

$\Rightarrow 153 - 30 = 123$ days.

$$\therefore S.I = 7,300 \times \frac{123}{365} \times \frac{5}{100}$$

$$= \frac{7300 \times 123 \times 5}{365 \times 100}$$

$$\boxed{\therefore S.I = 123} \quad \text{Ans:}$$

(6.)

Annual instalment =

$$\frac{100A}{100t + \frac{rt(t-1)}{2}}$$

$$= \frac{100 \times 848}{100 \times 4 + \frac{4 \times 4(3)}{2}}$$

$$= \frac{848 \times 100 \times 2}{848}$$

$$= 200 \text{ (Ans)}$$

(7.) instalment $= \dfrac{100A}{100t + \frac{8t(t-1)}{2}}$

* Two years but Quaterly
$\therefore$ no. of times $= (t) = 8$

$= \dfrac{100 \times 2280}{100 \times 8 + \frac{4 \times 8 \times 7}{2}}$

*16% per annum but quarterly $\therefore R\% = \frac{16}{4} = 4\%$

$= \dfrac{100 \times 2280}{800 + 112} \Rightarrow \dfrac{2280 \times 100}{912} \Rightarrow 250$

$\therefore$ Ans:- instalment = 250₹

(8.) $8\%(x) = 12\%(y)$

$8x = 12y$

$4x = 6y$

$2x = 3y \Rightarrow \dfrac{x}{y} = \dfrac{3}{2}$