Simple Interest

Interest

When a person (borrower) takes money (loan) from another person or a bank (lender), then the borrower pays some extra money to lender.

The additional money paid by the borrower to the lender for having used his (her) money is called Interest.

Interest may be classified in two types as

1. Simple interest **2.** Compound interest

Simple Interest

If the interest on a certain sum borrowed for a certain period is calculated uniformly, then it is called simple interest.

Or

In SI, the interest is calculated only on the principal borrowed.

Or

In SI, the principal to calculate the interest remains constant throughout the time period.

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

Where, SI = Simple Interest

P = Principal,

R = Rate

T = Time Period

Example 1 Find the simple interest, if $P = ₹\,1000$, $R = 20\%$ per annum, $T = 4$ yr.

(a) ₹ 800 (b) ₹ 700 (c) ₹ 850 (d) ₹ 900

Sol. *(a)* $SI = \frac{P \times R \times T}{100}$

$\Rightarrow$ $SI = \frac{1000 \times 20 \times 4}{100} = ₹\,800$

Principal

The money borrowed by a borrower from the money lender is known as the principal.

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

Example 2 Find the principal, when SI = ₹ 36, rate = 3% per annum and time = 3 yr.

(a) ₹ 425 (b) ₹ 400 (c) ₹ 500 (d) ₹ 600

Sol. *(b)* Principal $= \frac{100 \times SI}{R \times T}$

$SI = ₹\,36$, $R = 3\%$ and $T = 3$ yr

$\therefore$ $P = \frac{100 \times 36}{3 \times 3} = ₹\,400$

Amount

The total money paid by the borrower to the lender at the end of the specified period is called the amount.

Thus, Amount = Principal + Interest

Example 3 Find the amount, if $P = ₹ 100$, $R = 3\%$ per annum and $T = 2$ yr.

(a) ₹ 250 (b) ₹ 200
(c) ₹ 106 (d) ₹ 105

Sol. *(c)* $\text{SI} = \frac{P \times R \times T}{100} = \frac{100 \times 3 \times 2}{100} = ₹ 6$

$\therefore$ Amount = Principal + Interest

$= 100 + 6 = ₹ 106$

Rate

It is the rate at which interest is charged on Principal.

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

Example 4 Find the rate per cent annum, when principal = ₹ 400, SI = ₹ 60 and time = 4 yr.

(a) $3\frac{3}{2}\%$ (b) $\frac{25}{3}\%$
(c) $\frac{15}{4}\%$ (d) $3\frac{1}{3}\%$

Sol. *(c)* $\text{Rate} = \frac{\text{SI} \times 100}{P \times T}$

$P = ₹ 400$, $\text{SI} = ₹ 60$ and $T = 4$ yr

$\therefore \quad \text{Rate} = \frac{60 \times 100}{400 \times 4} = \frac{15}{4}\%$

Time

The peried, for which the money is borrowed or deposited, is called time.

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

Example 5 Find the time, when $P = ₹ 10000$, rate = 18% per annum and SI = ₹ 12600.

(a) 7 yr (b) 5 yr (c) 8 yr (d) 12 yr

Sol. *(a)* $\text{Time} = \frac{\text{SI} \times 100}{P \times R}$,

$P = ₹ 10000$, $R = 18\%$ and $\text{SI} = ₹ 12600$

$\therefore \text{Time} = \frac{12600 \times 100}{10000 \times 18} = 7$ yr

Example 6 In how many years will a sum of money double itself at 18.75% per annum simple interest?

(a) 4 yr 3 months (b) 5 yr 4 months
(c) 3 yr 4 months (d) 4 yr 5 months

Sol. *(b)* Let the principal be ₹ P.

Then, amount = ₹ $2P$

$\therefore$ SI = Amount − Principal = $(2P - P) = ₹ P$

$R = 18.75\%$

Then, time $(T) = \frac{\text{SI} \times 100}{P \times R} = \frac{P \times 100}{P \times 18.75}$

$= \frac{16}{3}$ yr = 5 yr 4 months

Practice Exercise

1. Find SI, if P = ₹ 600, R = 5% per annum, T = 4 months.
   (a) ₹ 15 (b) ₹ 10 (c) ₹ 20 (d) ₹ 25
2. Find SI, if P = ₹ 800, R = 10% per annum, T = 146 days.
   (a) ₹ 100 (b) ₹ 50 (c) ₹ 40 (d) ₹ 32
3. Principal = ₹ 300, SI = ₹ 15 and Time = 2.5 yr, then find the rate.
   (a) 6% (b) 5% (c) 2% (d) 7%
4. Find the amount, when principal = ₹ 700, rate = 6% per annum and time = 6 months.
   (a) ₹ 900 (b) ₹ 850 (c) ₹ 800 (d) ₹ 721
5. Find the time, when principal = ₹ 1000, rate = 8% per annum and SI = ₹ 200.
   (a) $2\frac{1}{2}$ yr (b) 5 yr (c) $3\frac{1}{3}$ yr (d) 4 yr
6. Find the rate per cent per annum, when principal = ₹ 600, SI = ₹ 150 and time = 5 yr.
   (a) 4% (b) 6.5%
   (c) 5% (d) 3%
7. Find the time, when principal = ₹ 500, rate = 5% per annum and SI = ₹ 150.
   (a) 10 yr (b) 6 yr
   (c) 15 yr (d) 10 yr

8. Find the principal when simple interest = ₹ 80, rate = 4% per annum and time = 6 months.
(a) ₹ 4000 (b) ₹ 6000 (c) ₹ 3000 (d) ₹ 4500

9. If the rate of simple interest is 12% per annum, then what is the amount that would fetch interest of ₹ 6000 per annum?
(a) ₹ 50000 (b) ₹ 40000
(c) ₹ 60000 (d) ₹ 65000

10. On what sum of money lent out at 9% per annum simple interest for 6 yr does the simple interest amount to ₹ 810?
(a) ₹ 1600 (b) ₹ 1500 (c) ₹ 1700 (d) ₹ 2000

11. If ₹ 1 becomes ₹ 9 in 60 yr at simple interest. Find the rate per cent per annum.
(a) $3\frac{1}{3}\%$ (b) $33\frac{1}{3}\%$ (c) $3\frac{3}{4}\%$ (d) $13\frac{1}{3}\%$

12. In what time will a sum of money put at $13\frac{1}{3}\%$ simple interest triple itself?
(a) 15 yr (b) 20 yr (c) 16 yr (d) 10 yr

13. Find the simple interest on ₹ 800 at 6% per annum for 9 months.
(a) ₹ 50 (b) ₹ 36 (c) ₹ 40 (d) ₹ 45

14. A certain sum of money amounts to $\frac{5}{4}$ of itself in 5 yr. Find the rate per cent per annum.
(a) 2.3% (b) 4% (c) 5% (d) 3%

15. If ₹ 5000 amounts to ₹ 6100 at $5\frac{1}{2}\%$ per annum. Find the time.
(a) 7 yr (b) 6 yr (c) 4 yr (d) 5 yr

Answers

1	(b)	2	(d)	3	(c)	4	(d)	5	(a)	6	(c)	7	(b)	8	(a)	9	(a)	10	(b)
11	(d)	12	(a)	13	(b)	14	(c)	15	(c)										

Hints & Solutions

1. Time = 4 months $= \frac{4}{12}$ yr $= \frac{1}{3}$ yr

$\therefore \quad SI = \frac{P \times R \times T}{100} = \frac{600 \times 5 \times 1}{100 \times 3} = ₹\ 10$

2. Time = 146 days $= \frac{146}{365}$ yr $= \frac{2}{5}$ yr

$\therefore \quad SI = \frac{P \times R \times T}{100} = \frac{800 \times 10 \times 2}{100 \times 5} = ₹\ 32$

3. P = ₹ 300, SI = ₹ 15 and T = 2.5 yr

$\therefore \quad Rate = \left(\frac{SI \times 100}{P \times T}\right)$

$= \left(\frac{15 \times 100}{300 \times 2.5}\right) = \frac{5}{2.5} = 2\%$

4. Principal = ₹ 700, $R = 6\%$

$T = 6$ months $= \frac{6}{12}$ yr $= \frac{1}{2}$ yr

$\therefore \quad SI = \frac{P \times R \times T}{100} = \left(\frac{700 \times 6 \times \frac{1}{2}}{100}\right) = ₹\ 21$

$\therefore$ Amount = Principal + Interest

$= ₹\ (700 + 21) = ₹\ 721$

5. P = ₹ 1000, R = 8%, SI = ₹ 200

$T = \frac{SI \times 100}{P \times R} = \left(\frac{200 \times 100}{1000 \times 8}\right) = \frac{5}{2} = 2\frac{1}{2}$ yr

6. P = ₹ 600, SI = ₹ 150 and T = 5 yr

$\therefore$ Rate $= \frac{SI \times 100}{P \times T} = \frac{150 \times 100}{600 \times 5} = 5\%$

7. P = ₹ 500, $R = 5\%$ and SI = ₹ 150

$\therefore \quad T = \left(\frac{SI \times 100}{P \times R}\right) = \left(\frac{150 \times 100}{500 \times 5}\right) = 6$ yr

8. SI = ₹ 80, R = 4%, T = 6 months $= \frac{6}{12}$ yr $= \frac{1}{2}$ yr

$P = \frac{SI \times 100}{R \times T} = \frac{80 \times 100 \times 2}{4 \times 1} = ₹\ 4000$

9. Let principal = ₹ P, $R = 12\%$, T = 1 yr
and SI = ₹ 6000

$\therefore \quad P = \frac{SI \times 100}{R \times T} = \frac{6000 \times 100}{12 \times 1} = ₹\ 50000$

10. Let principal = ₹ P, SI = ₹ 810, $T = 6$ yr, $R = 9\%$

$\therefore \quad P = \frac{100 \times SI}{R \times T} \Rightarrow P = \frac{100 \times 810}{6 \times 9} = ₹\ 1500$

11. $P = ₹\ 1$, Amount $= ₹\ 9$, $T = 60$ yr

$SI = \text{Amount} - \text{Principal}$

$SI = (9-1) = ₹\ 8$

$\because\ SI = \dfrac{P \times R \times T}{100} \quad \Rightarrow R = \left(\dfrac{SI \times 100}{P \times T}\right)$

$\therefore\ R = \left(\dfrac{8 \times 100}{1 \times 60}\right) = \dfrac{80}{6} \text{ or } \dfrac{40}{3}$

$\Rightarrow R = 13\dfrac{1}{3}\%$

12. Let principal $= ₹\ P$, then amount $= ₹\ 3P$

$\therefore\ SI = \text{Amount} - \text{Principal} = ₹\ (3P - P) = ₹\ 2P$

$R = 13\dfrac{1}{3}\% = \dfrac{40}{3}\%$, Time $= ?$

$\therefore \quad \text{Time} = \dfrac{SI \times 100}{P \times R} = \dfrac{2P \times 100}{P \times \frac{40}{3}} = 15 \text{ yr}$

13. $P = ₹\ 800$, $R = 6\%$, $T = 9 \text{ months} = \dfrac{9}{12} \text{ yr} = \dfrac{3}{4} \text{ yr}$

$\therefore\ SI = \dfrac{P \times R \times T}{100} = \dfrac{800 \times 6 \times 3}{4 \times 100} = ₹\ 36$

14. Let the principal be $₹\ P$, then amount $= ₹\ \dfrac{5}{4}P$

$\therefore\ SI = \text{Amount} - \text{Principal} = \left(\dfrac{5}{4}P - P\right) = ₹\ \dfrac{P}{4}$

$T = 5$ yr

$\therefore \text{Rate} = \left(\dfrac{P \times 100}{4 \times P \times 5}\right) = 5\%$

15. $SI = (6100 - 5000) = ₹\ 1100$, $R = \dfrac{11}{2}\%$,

$P = ₹\ 5000$

$\therefore\ T = \dfrac{SI \times 100}{P \times R} = \dfrac{1100 \times 100 \times 2}{5000 \times 11} = 4 \text{ yr}$

Try Yourself

1) Find the amount if principal $= ₹\ 8000$, rate $= 10\%$ per annum and time $= 5$ yr.
(a) ₹ 12000 (b) ₹ 11000 (c) ₹ 10000 (d) ₹ 11500

2) Find the principal, if SI $= ₹\ 60$, rate $= 6\%$ and time $= 5$ yr.
(a) ₹ 200 (b) ₹ 225
(c) ₹ 250 (d) ₹ 205

3) In how much time ₹ 2600 fetch ₹ 288 at the rate 8%?
(a) 18/13 yr (b) 17/13 yr (c) 15/ 13 yr (d) 19/ 13 yr

4) In how much time ₹ 50 amounts to ₹ 55 at the rate of 4%?
(a) 9/2 yr (b) 3/2 yr (c) 7/2 yr (d) 5/2 yr

5) If ₹ 900 becomes ₹ 1080 in 3 yr, then find the rate per cent per annum.
(a) $6\frac{2}{3}\%$ (b) $7\frac{2}{3}\%$ (c) $5\frac{2}{3}\%$ (d) $8\frac{1}{3}\%$

6) A man borrows ₹ 500 and pays back after 18 months at 14% per annum. Find the simple interest.
(a) ₹ 100 (b) ₹ 105
(c) ₹ 101 (d) ₹ 120

7) At how much rate a sum becomes doubles in 16 yr?
(a) 27/4% (b) 17/4%
(c) 19/4% (d) 25/4%

8) In how much time ₹ 650 becomes ₹ 812.50 at $6\frac{1}{4}\%$?
(a) 3 yr (b) 5 yr (c) 4 yr (d) 8 yr

9) A man borrowed ₹ 300 at 6% per annum. At the end of 6 yr he paid back an amount of
(a) ₹ 444 (b) ₹ 440
(c) ₹ 408 (d) ₹ 445

10) A sum of ₹ 200 is deposited in a post office at the rate of $5\frac{1}{2}\%$ simple interest per annum.
What will be the total amount after 2 yr ?
(a) ₹ 220 (b) ₹ 225
(c) ₹ 222 (d) ₹ 229

Answers

1	(a)	2	(a)	3	(a)	4	(d)	5	(a)
6	(b)	7	(d)	8	(c)	9	(c)	10	(c)