

Simple Interest

1. Find the simple interest on:

(a) \$ 900 for 3 years 4 months at 5% per annum. Find the amount also.

(b) \$ 1000 for 6 months at 4% per annum. Find the amount also.

(c) \$ 5000 for 146 days at $15\frac{1}{2}\%$ per annum.

(d) \$ 1200 from 9th April to 21st June at 10% per annum.

Ans. (a) \$ 900 for 3 years 4 months at 5% per annum. Find the amount also.

Solution:

$$P = \$ 900,$$

$$R = 5\% \text{ p.a.}$$

$$T = 3 \text{ years } 4 \text{ months} = \frac{40}{12} \text{ years} = \frac{10}{3} \text{ years}$$

Therefore,

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{900 \times 5 \times 10}{100 \times 3} = \$150$$

$$\text{Amount} = P + \text{S.I.} = \$ 900 + \$ 150 = \$ 1050$$

(b) \$ 1000 for 6 months at 4% per annum. Find the amount also.

Solution:

$$P = \$ 1000,$$

$$R = 4\% \text{ p.a.}$$

$$T = 6 \text{ months} = \frac{6}{12} \text{ years}$$

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{1000 \times 4 \times 1}{100 \times 2} = \$20$$

$$\text{Therefore, } A = P + I = \$ (1000 + 20) = \$ 1020$$

(c) \$ 5000 for 146 days at $15\frac{1}{2}\%$ per annum.

Solution:

$$P = \$ 5000, R = 15\frac{1}{2}\% \text{ p.a. } T = 146 \text{ days}$$

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{5000 \times 31 \times 146}{100 \times 2 \times 365} = \$10 \times 31 = \$310$$

(d) \$ 1200 from 9th April to 21st June at 10% per annum.

Solution:

$$P = \$ 1200, R = 10\% \text{ p.a. } T = 9\text{th April to 21st June}$$

$$= 73 \text{ days [April} = 21, \text{ May} = 31, \text{ Jun} = 21, 73 \text{ days]}$$

$$= \frac{73}{365} \text{ years}$$

$$S.I. = \frac{P \times R \times T}{100} = \frac{1200 \times 10 \times 73}{100 \times 365} = \$24$$

2. In how much time dose \$ 500 invested at the rate of 8% p.a. simple interest amounts to \$ 580.

Ans. Here P = \$ 500, R = 8% p.a A = \$ 580

Therefore S.I = A - P = \$ (580 - 500) = \$ 80

Therefore,

$$T = \frac{100 \times S.I}{(P \times R)} = \frac{(100 \times 80)}{(500 \times 8)} = 2 \text{ years}$$

3. In how many years will a sum of \$ 400 yield an interest of \$ 132 at 11% per annum?

Ans. P = \$ 400, R = 11% S.I = \$ 132

$$T = \frac{100 \times S.I}{(P \times R)} = \frac{(132 \times 100)}{(400 \times 11)} = 3 \text{ years}$$

4. In how many years will a sum double itself at 8 % per annum?

Ans. Let Principal = P, then, Amount = 2P

So, S.I. = A - P = 2P - P = P

$$T = \frac{100 \times S.I}{(P \times R)} = \frac{(P \times 100)}{(P \times 8)} = \frac{25}{2} = \frac{121}{2} = 3 \text{ years}$$

5. In how many years will simple interest on certain sum of money at $6\frac{1}{4}\%$ Per annum be $\frac{5}{8}$ of itself

Ans. Let P = \$ x, then S.I = \$ $\frac{5}{8}x$

Rate = $6\frac{1}{4}\% = \frac{25}{4}\%$

$$\text{Therefore } T = \frac{100 \times S.I}{(P \times R)} = \frac{\left(\frac{5}{8} \times 100\right)}{\left(x \times \frac{25}{4}\right)} = \frac{(100 \times 5 \times x \times 4)}{(x \times 8 \times 25)}$$

T = 10 years

6. Find at what rate of interest per annum \$ 600 amount to \$ 708 will in 3 years

Ans. P = \$ 600 , A = \$ 708 Time = 3 years

Therefore S.I. = \$ 708 - \$ 600 = \$ Rs. 108

$$\text{Now, } R = \frac{100 \times S.I}{(P \times R)} = \frac{100 \times 108}{(600 \times 3)} = 6\% \text{ p. a.}$$

7. Simple interest on a certain sum is $\frac{36}{25}$ of the sum. Find the Rate per cent and time if they are both numerically equal.

Ans. Let the Principal be \$ X Then S.I. = $\frac{36}{25}x$

$$R = ? T = ?$$

Let Rate = R % per annum, then Time = R years.

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

$$\Rightarrow \frac{36}{25}x = \frac{(x \times R \times T)}{100} = \frac{36 \times 10 \times x}{(25 \times x)} = R^2$$

$$R^2 = 36 \times 4$$

$$R = \sqrt{(36 \times 4)} = 6 \times 2$$

Therefore Rate = 12 % p.a. and T = 12 years

8. At what rate per cent per annum will \$ 6000 produce \$ 300 as S.I. in 1 years?

Ans. P = \$ 600, T = 1 year S.I. = \$ 300

$$\text{Therefore } R = \frac{(S.I \times 100)}{(P \times R)} = \frac{300 \times 100}{(6000 \times 1)} = 5\% \text{ p.a}$$

9. At what rate per cent per annum will a sum triple itself in 12 years ?

Ans. Let the sum be \$ P, then Amount = \$ 3P

$$\text{S.I.} = \$ 3P - P = \$ 2P, \text{ Time} = 12 \text{ years}$$

$$\text{Now, } R = \frac{(S.I \times 100)}{(P \times R)} = \frac{100 \times 2P}{(P \times 12)} = \frac{50}{3} = 16.6\%$$

10. What sum will yield \$ 144 as S.I. in $\frac{21}{2}$ years at 16% per annum?

Ans. Let P = \$ x, S.I. = \$ 144

$$\text{Time} = \frac{21}{2} \text{ years or } \frac{5}{2} \text{ years, Rate} = 16\%$$

$$\text{So, } P = \frac{(100 \times S.I)}{(P \times R)} = \frac{(100 \times 144)}{(16 \times \frac{5}{2})} = \frac{(100 \times 144 \times 2)}{(16 \times 5)} = \$ 360$$

11. A some amount to \$ 2040 in $21\frac{1}{2}$ years at , P = ?

Ans. Let the principal = \$ x

$$\text{S.I.} = \$ \left(x \times 11 \times \frac{5}{2} \times \frac{1}{100} \right) = \$ \frac{11x}{40}$$

$$\text{Amount} = P + \text{S.I.} = \frac{x}{1} + \frac{11x}{40} = \frac{(40x + 11x)}{40} = \frac{51x}{40}$$

$$\text{But } \frac{51x}{40} = 2040$$

$$51x = 2040 \times 40 \text{ ---- } x = \frac{(2040 \times 40)}{51} = \$ 1600$$

12. A certain sum amounts to \$ 6500 in 2 years and to \$ 8750 in 5 years at S.I. Find the sum and rate per cent per annum.

Ans. S.I. for 3 years = Amount after 5 years - Amount after 2 years

$$= \$ 8750 - \$ 6500 = 2250$$

$$\text{S.I. for 1 years} = \text{Rs. } \frac{2250}{3} = \$ 750$$

$$\text{Therefore S.I. for 2 years} = \$ 750 \times 2 = \$ 1500$$

So, sum = Amount after 2 years - S.I. for 2 years

$$= \$ 6500 - 1500 = \$ 5000$$

Now, P = Rs. 5000, S.I. = \$ 1500, Time = 3 years

$$R = \frac{(100 \times \text{S.I.})}{(P \times T)} = \frac{(100 \times 1500)}{(5000 \times 3)} = 15\%$$

Therefore The sum is \$ 5000 and the rate of interest is 15%

13. Divide \$ 6500 in to two parts, such that if one part is lent out at 9% per annum and other at 10% per annum, the total yearly income is \$ 605

Ans. Let the first part be \$ x. Second part = \$ (6500 - x)

$$\text{Now S.I. on } \$ X \text{ at } 9\% \text{ per annum for 1 year} = \$ \frac{(x \times 9 \times 1)}{100} = \frac{9x}{100}$$

S.I. on \$ (6500 - x) at 10% per annum

$$1 \text{ year} = \$ \frac{((6500-x) \times 10 \times 1)}{100} = \$ \frac{(6500-x)}{10}$$

$$\text{Total S.I.} = \$ \left(\frac{9x}{100} + \frac{(6500-x)}{10} \right) = \left(\frac{9x+6500-10x}{100} \right) = \$ \frac{(65000-x)}{100}$$

But given that total S.I. = \$ 605

$$\text{So, } \frac{(65000-x)}{100} = 605$$

$$\Rightarrow 65000 - x = 60500$$

$$\Rightarrow 65000 - 60500 = x$$

$$\Rightarrow x = \$ 4500$$

$$\text{Now, second part} = 6500 - x = 6500 - 4500 = \$ 2000$$

Hence, first part = \$ 2000 and second part = \$ 4500

14. When the rate of interest in a bank is increased from 9% to 10% per annum; A person deposits \$ 500 more into his account. If the annual interest now Received by him is \$ 150 more than before, find his original deposit.

Ans. Let the original deposits be \$ x

Then, S.I. on \$ x for 1 year at (10 - 9)% = 1% per annum + S.I. on \$ 500

For 1 year at 10% per annum = \$ 15

$$\Rightarrow \frac{(x \times 1 \times 1)}{100} + \frac{(500 \times 10 \times 1)}{100} = 150$$

$$\Rightarrow \frac{x}{100} + 50 = 150$$

$$\Rightarrow \frac{x}{100} + 150 - 50$$

$$\Rightarrow \frac{x}{100} + 100$$

$$\Rightarrow x = 100 \times 100 = \$ 10,000$$

Therefore, the original deposit is \$ 10,000.

15. The marked price of a water cooler is \$ 4650. The shopkeeper offers an off-season discount of 18% on it. Find its selling price.

Ans. \$ 3813

16. The price of a sweater was slashed from \$ 960 to \$ 816 by a shopkeeper in the winter season. Find the rate of discount given by him.

Ans. 15%

17. Find the rate of discount being given on a shirt whose selling price is \$ 546 after deducting a discount of \$ 104 on its marked price. Hint. MP = (SP) + (discount).

Ans. 16%

18. After allowing a discount of 8% on a toy, it is sold for \$ 216.20. Find the marked price of the toy.

Ans. \$235

19. A tea set was bought for \$ 528 after getting a discount of 12% on its marked price. Find the marked price of the tea set.

Ans \$600

20. A dealer marks his goods at 35% above the cost price and allows a discount of 20% on the marked price. Find his gain or loss per cent.

Ans. Gain = 8%

