Simple Interest

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INTRODUCTION

When a person A borrows some money from another person B, then A has to pay certain amount to B in exchange of using the money. This amount paid by A is called *Interest*. The total amount of money borrowed by A from B is called the *Principal*. The money paid back to B, which comprises the principal and the interest is called the *Amount*.

In other words,

$$\text{Amount} = \text{Principal} + \text{Interest}$$

The interest is usually charged according to a specified term, which is expressed as some per cent of the principal and is called the *rate of interest* for a fixed period of time. This fixed period may be a year, six months, three months or a month, and correspondingly the rate of interest is charged annually, semi-annually, quarterly or monthly basis. For Examinationple, the rate of interest is 5% per annum means, the interest payable on ₹100 for one year is ₹5.

Interest is of two types:

1. Simple Interest   2. Compound Interest

SIMPLE INTEREST

When interest is payable on the principal amount only, it is called *Simple interest*. For example, simple interest on ₹100 at 5% per annum will be ₹5 each year, that is, at the end of the first year, total amount will be ₹105. At the end of the second year, it will be ₹110, and so on.

Thus, simple interest is the interest computed on the principal amount for the entire period it is borrowed.

In this chapter, we shall limit ourselves to simple interest. Compound interest will be discussed in the next chapter.

SOME BASIC FORMULAE

If P stands for principal, R is the rate per cent per annum, T is the number of years, I is the simple interest and A is the amount, then

1. $\text{Simple Interest} = \dfrac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

   or, $\quad I = \dfrac{P \times R \times T}{100}$

2. $\text{Principal} = \dfrac{100 \times \text{Simple Interest}}{\text{Rate} \times \text{Time}}$

   or, $\quad P = \dfrac{100 \times I}{R \times T}$

Illustration 1: Find the simple interest on ₹5200 for 2 years at 6% per annum.

Solution: Here, P = ₹5200, T = 2 years and R = 6%

$\therefore$ Simple interest = $\dfrac{P \times R \times T}{100} = \dfrac{5200 \times 6 \times 2}{100}$

$\qquad\qquad = ₹624$.

Illustration 2: A man earns ₹450 as interest in 2 years on a certain sum of money invested in a company at the rate of 12 per cent per annum. Find the sum invested by the man in the company.

Solution: We have, I = ₹450, T = 2 years,

$\quad R$ = 12% per annum

$\therefore \quad P = \dfrac{I \times 100}{R \times T} = \dfrac{450 \times 100}{12 \times 2}$ = ₹1875.

Thus, the money invested by the man was ₹1875.

3. Rate = $\dfrac{100 \times \text{Simple Interest}}{\text{Principal} \times \text{Time}}$

or $R = \dfrac{100 \times I}{P \times T}$

Illustration 3: At what interest rate per annum, in 4 years, a sum of ₹5000 will become ₹6000?

Solution: Here, $P =$ ₹5000, $A =$ ₹6000, $T = 4$ years

So, $I = A - P =$ ₹(6000 − 5000) = ₹1000

∴ $R = \dfrac{100 \times I}{P \times T} = \dfrac{100 \times 1000}{5000 \times 4} = 5\%$

4. Time = $\dfrac{100 \times \text{Simple Interest}}{\text{Rate} \times \text{Principal}}$

or, $T = \dfrac{100 \times I}{R \times P}$

Illustration 4: In what time ₹1200 will earn an interest of ₹240 at 5% per annum?

Solution: Here, $P =$ ₹1200, $I =$ ₹240, $R = 5\%$

∴ $T = \dfrac{100 \times I}{R \times P} = \dfrac{100 \times 240}{1200 \times 5} = 4$ years.

5. Amount = Principal + Simple Interest

$= \text{Principal} + \dfrac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

$= \text{Principal} \left(1 + \dfrac{\text{Rate} \times \text{Time}}{100}\right)$

or, $A = P\left(1 + \dfrac{R \times T}{100}\right)$

Illustration 5: Mahesh borrowed ₹3000 from his friend Suresh at 15 per cent per annum for 3 years. Find the interest and money returned by Mahesh to Suresh.

Solution: Here, $P =$ ₹3000, $R = 15\%$ per annum, $T = 3$ years

∴ $I = \dfrac{P \times R \times T}{100} = \dfrac{3000 \times 15 \times 3}{100} = ₹1350.$

∴ $A = P + I = ₹3000 + ₹1350 = ₹4350.$

Thus, Mahesh paid ₹1350 as interest to Suresh, the total amount Mahesh returned to Suresh = ₹4350.

SOME USEFUL SHORT CUT METHODS

1. If a certain sum in T years at $R\%$ per annum amounts to ₹A, then the sum will be

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

Explanation

Let the principal be ₹x

∴ Simple interest = ₹$(A - x)$

∴ $A - x = \dfrac{x \times R \times T}{100}$

⇒ $100A - 100x = xRT$

⇒ $(100 + RT)x = 100A$

∴ $x = \dfrac{100 \times A}{100 + R \times T}.$

Illustration 6: What principal will amount to ₹570 at 4% per annum in $3\dfrac{1}{2}$ years?

Solution: We have, $A =$ ₹570, $R = 4\%$ per annum, $T = \dfrac{7}{2}$ years.

∴ $P = \dfrac{100 \times A}{100 + R \times T} = \dfrac{100 \times 570}{100 + 4 \times 7/2}$

$= \dfrac{100 \times 570}{114} = ₹500$

Thus, ₹500 will be ₹570 at 4% per annum in $3\dfrac{1}{2}$ years.

2. The annual payment that will discharge a debt of ₹A due in T years at $R\%$ per annum is

Annual payment = ₹$\left(\dfrac{100A}{100T + \dfrac{RT(T-1)}{2}}\right)$

Explanation

Let the annual payment be ₹x.

Since the first instalment is paid at the end of the first year,

∴ Amount of the first instalment at the end of t years

$= x + \dfrac{(T-1) \times R \times x}{100}$

Similarly, amount of the second instalment at the end of t years

$$= x + \frac{(T-2) \times R \times x}{100}, \text{ and so on.}$$

Thus, total amount of T instalments

$$A = \left[x + \frac{(T-1) \times R \times x}{100} \right] + \left[x + \frac{(T-2) \times R \times x}{100} \right] + \cdots + x$$

$$= Tx + \frac{Rx}{100}[(T-1) + (T-2) + \cdots + 1]$$

$$= Tx + \frac{Rx}{100}\left[\frac{(T-1) \times T}{2} \right]$$

or, $100\, Tx + Rx \left[\frac{T(T-1)}{2} \right] = 100A$

or, $x \left[100T + \frac{RT(T-1)}{2} \right] = 100A$

$$\therefore \quad x = \frac{100A}{100T + \frac{RT(T-1)}{2}}.$$

Illustration 7: Find out the annual instalment that will discharge a debt of ₹12,900 due in 4 years at 5% per annum simple interest.

Solution: Here, $A = $ ₹12900, $T = 4$ years, $R = 5\%$ per annum.

$$\therefore \quad \text{Annual instalment} = \frac{100 \times A}{100 \times T + \frac{RT(T-1)}{2}}$$

$$= \frac{100 \times 12900}{(100 \times 4) + \frac{5(4-1) \times 4}{2}}$$

$$= \frac{100 \times 12900}{400 + 30} = \frac{100 \times 12900}{430}$$

$$= ₹3000.$$

3. If a certain sum is invested in n types of investments in such a manner that equal amount is obtained on each investment where interest rates are $R_1, R_2, R_3, ..., R_n$ respectively, and time periods are $T_1, T_2, T_3, ...,T_n$ respectively, then the ratio in which the amounts are invested is:

$$\frac{1}{100 + R_1 T_1} : \frac{1}{100 + R_2 T_2} :$$
$$\frac{1}{100 + R_3 T_3} : \cdots \frac{1}{100 + R_n T_n}.$$

Explanation

Let $P_1, P_2, ..., P_n$ be invested in n types of investments whose interest rates are $R_1, R_2, ..., R_n$ and time periods are $T_1, T_2, ..., T_n$.

Then, $P_1 = \frac{100 \times A}{100 + R_1 T_1}$

$$P_2 = \frac{100 \times A}{100 + R_2 T_2}$$

$$\vdots \qquad \vdots$$

$$P_n = \left(\frac{100 \times A}{100 + R_n T_n} \right).$$

$\therefore \quad P_1 : P_2 : ... : P_n$

$$= \frac{100 \times A}{100 + R_1 T_1} : \frac{100 \times A}{100 + R_2 T_2} : \cdots \frac{100 \times A}{100 + R_n T_n}$$

$$= \frac{1}{100 + R_1 T_1} : \frac{1}{100 + R_2 T_2} : \cdots \frac{1}{100 + R_n T_n}$$

$[\because$ the amount A remains same for all$]$

Illustration 8: A sum of ₹1586 is divided among three such parts that amount obtained on these three parts of money after 2, 3 and 4 years, respectively, at the rate of 5% per annum remains equal. Find out such three parts of the sum.

Solution: Since the amount accured from each of the three parts of ₹1586 at the rate of 5% p.a. in 2, 3 and 4 years, respectively, remains equal, such three parts of ₹1586 will be in the ratio of

$$\frac{1}{100 + R_1 T_1} : \frac{1}{100 + R_2 T_2} : \frac{1}{100 + R_3 T_3}$$

Hence, the ratio is

$$= \frac{1}{100 + 5 \times 2} : \frac{1}{100 + 5 \times 3} : \frac{1}{100 + 5 \times 4}$$

$$= \frac{1}{110} : \frac{1}{115} : \frac{1}{120}$$

$$= \frac{1 \times 30360}{110} : \frac{1 \times 30360}{115} : \frac{1 \times 30360}{120}$$

$(\because$ L.C.M. of 110, 115 and 120 is 30360)

$\therefore \quad$ Ratio = 276:264:253

Sum of proportionals = 276 + 264 + 253 = 793

$\therefore \quad$ 1st part $= \frac{276}{793} \times 1586 = ₹552,$

2nd part $= \frac{264}{793} \times 1586 = ₹528$

and, 3rd part $= \frac{253}{793} \times 1586 = ₹506.$

4. If a certain sum of money becomes n times itself in T years at simple interest, then the rate of interest per annum is

$$R = \frac{100(n-1)}{T} \%$$

Explanation

Let, ₹P become ₹nP in t years.

∴ Simple interest I is given by

$$I = P - P = (n - 1)P$$

∴ Rate of interest R is given by

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

Illustration 9: A certain sum of money trebles itself in 5 years simple interest. Find the rate per cent per annum.

Solution: Here, $n = 3$, $T = 5$ years

∴ $R = \dfrac{100(n-1)}{T}\% = \dfrac{100(3-1)}{5}\% = 40\%$

5. If a certain sum of money becomes n times itself at $R\%$ per annum simple interest in T years, then

$$T = \left(\frac{n-1}{R}\right) \times 100 \text{ years.}$$

Illustration 10: In what time a sum of money will double itself at a rate of simple interest of 8% p.a.?

Solution: Required time $(T) = \dfrac{(n-1) \times 100}{R}$ years

$$= \frac{(2-1) \times 100}{8} \text{ years}$$

$$= 12\frac{1}{2} \text{ years.}$$

6. If a certain sum of money becomes n times itself in T years at a simple interest, then the time T in which it will become m times itself is given by

$$T' = \left(\frac{m-1}{n-1}\right) \times T \text{ years.}$$

Explanation

Let the principal be ₹P.

Let it become m times in T' years.

Then, the amount in T years = ₹nP

and the amount in T' years = ₹mP.

∴ $nP - P = \dfrac{P \times R \times T}{100}$

or, $(n - 1)P = \dfrac{P \times R \times T}{100}$ ⋯(1)

and, $(m - 1)P = \dfrac{P \times R \times T}{100}$ ⋯(2)

∴ $\dfrac{(m-1)P}{(n-1)P} = \dfrac{P \times R \times T'}{100} \times \dfrac{100}{P \times R \times T}$

or, $\dfrac{m-1}{n-1} = \dfrac{T'}{T}$

∴ $T' = \left(\dfrac{m-1}{n-1}\right) T$ years.

Illustration 11: A sum of money put out on simple interest doubles itself in $12\dfrac{1}{2}$ years. In how many years would it treble itself?

Solution: Here, $n = 2$, $m = 3$, $T = \dfrac{25}{2}$ years.

∴ Required time $(T') = \left(\dfrac{m-1}{n-1}\right) \times T$ years

$$= \left(\frac{3-1}{2-1}\right) \times \frac{25}{2} \text{ years}$$

$$= 25 \text{ years.}$$

7. Effect of change of P, R and T on simple interest is given by the following formula:
Change in Simple Interest

$$= \frac{\text{Product of fixed parameter}}{100}$$

$\times$ [difference of product of variable parameters]

For example, if rate (R) changes from R_1 to R_2 and P, T are fixed, then

$$\text{Change in SI} = \frac{PT}{100} \times (R_1 - R_2)$$

Similarly, if principal (P) changes from P_1 to P_2 and R, T are fixed, then change in SI = $\dfrac{RT}{100} \times (P_1 - P_2)$

Also, if rate (R) changes from R_1 to R_2 and time (T) changes from T_1 to T_2, but principal (P) is fixed, then change in SI = $\dfrac{P}{100} \times (R_1T_1 - R_2T_2)$.

Illustration 12: If simple interest on ₹600 increases by ₹30, when the rate % increases by 4% per annum, find out the time.

Solution: Here, $P = 600$, change in SI = 30, $R_1 - R_2 = 4$, $T = ?$

Using, change in SI = $\dfrac{PT}{100} \times (R_1 - R_2)$

we have, $30 = \dfrac{600T}{100} \times 4$

$\Rightarrow \quad T = \dfrac{5}{4}$, i.e., $1\dfrac{1}{4}$ years.

Illustration 13: If the simple interest on ₹1400 be more than the interest on ₹1000 by ₹60 in 5 years, find the out the rate per cent per annum.

Solution: Here, change in SI = 60, $P_1 - P_2 = 400$, $T = 5$, $R = ?$

Using change in SI = $\dfrac{RT}{100} \times (P_1 - P_2)$

We have, $60 = \dfrac{5R}{100} \times 400 \quad \Rightarrow \quad R = 3\%$

Illustration 14: If the simple interest on a certain sum at 4% per annum for 4 years is ₹80 more than the interest on the same sum for 3 years at 5% per annum, find out the sum.

Solution: Here, change in SI = 80, $R_1 = 4$, $R_2 = 5$, $T_1 = 4$, $T_2 = 3$, $P = ?$

Using change in SI = $\dfrac{P}{100} \times (R_1 T_1 - R_2 T_2)$

We have, $80 = \dfrac{P}{100} \times (4 \times 4 - 5 \times 3)$

$\Rightarrow \quad P = ₹8000.$

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8. If a debt of ₹Z is paid in 'n' number of instalments and if the value of each instalment is ₹a, then the borrowed (debt) amount is given by

$$Z = na + \frac{Ra}{100 \times b} \times \frac{n(n-1)}{2}$$

where, R = rate of interest per annum

b = number of instalments/year

$b = 1$, when each instalment is paid yearly

$b = 2$, when each instalment is paid half-yearly

$b = 4$, when each instalment is paid quarterly

$b = 12$, when each instalment is paid monthly.

Illustration 15: A sum of ₹2 is lent to be paid back in 3 equal monthly instalments of ₹1 each. Find the rate per cent.

Solution: Here, $Z = ₹2$, $a = ₹1$, $n = 3$, $b = 12$, $R = ?$

Using the formula

$$Z = na + \frac{Ra}{100 \times b} \times \frac{n(n-1)}{2},$$

we have, $2 = 3 \times 1 + \dfrac{R \times 1}{100 \times 12} \times \dfrac{3 \times 2}{2} \quad \Rightarrow \quad R = 400\%$

∴ The rate % p.a. is 400%

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9. If a certain sum of money P lent out at SI amounts to A_1 in T_1 years and to A_2 in T_2 years, then

$$P = \frac{A_1 T_2 - A_2 T_1}{T_2 - T_1}$$

and, $\quad R = \dfrac{A_1 - A_2}{A_1 T_2 - A_2 T_1} \times 100\%$

Illustration 16: If a certain sum of money at simple interest amounts to ₹5184 in 2 years and to ₹5832 in 3 years, what is the sum and the rate of interest?

Solution: Principal = $\dfrac{A_1 T_2 - A_2 T_1}{T_2 - T_1}$

$$\begin{bmatrix} \text{Here, } A_1 = 5184, A_2 = 5832 \\ T_1 = 2, T_2 = 3 \end{bmatrix}$$

$= \dfrac{5184 \times 3 - 5832 \times 2}{3 - 2} = ₹3888$

and, Rate = $\dfrac{(A_2 - A_1) \times 100}{T_1 A_2 - T_2 A_1} = \dfrac{(5832 - 5184) \times 100}{2 \times 5832 - 3 \times 5184}$

$= \dfrac{64800}{3888} = 16\dfrac{2}{3}\%$

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10. If a certain sum of money P lent out for a certain time T amounts to A_1 at R_1% per annum and to A_2 at R_2% per annum, then

$$P = \frac{A_2 R_1 - A_1 R_2}{R_1 - R_2}$$

and, $T = \dfrac{A_1 - A_2}{A_2 R_1 - A_1 R_2} \times 100$ years.

Illustration 17: A certain sum is invested for certain time. It amounts to ₹450 at 7% per annum. But, when invested at 5% per annum, it amounts to ₹350. Find out the sum and time.

Solution: Here, $A_1 = 450$, $R_1 = 7$, $A_2 = 350$, $R_2 = 5$. Using the formula,

$$P = \frac{A_2 R_1 - A_1 R_2}{R_1 - R_2}$$

We get, $P = \dfrac{350 \times 7 - 450 \times 5}{7 - 5} = ₹100$

Also, using the formula,

$$T = \left(\frac{A_1 - A_2}{A_2 R_1 - A_1 R_2} \right) \times 100$$

we get, $T = \left(\dfrac{450 - 350}{350 \times 7 - 450 \times 5} \right) \times 100 = 5$ years.

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11. If an amount P_1 lent at simple interest rate of $R_1\%$ per annum, and another amount P_2 at simple interest rate of $R_2\%$ per annum, then the rate of interest for the whole sum is

$$R = \left(\frac{P_1 R_1 + P_2 R_2}{P_1 + P_2} \right).$$

Illustration 18: Mohan deposits ₹5000 in NSC at 2% per annum and ₹2000 in mutual funds at 4% per annum. Find out the rate of interest for the whole sum.

Solution: Here, $P_1 = 5000$, $R_1 = 2$, $P_2 = 2000$, $R_2 = 4$. Using the formula

$$R = \left(\frac{P_1 R_1 + P_2 R_2}{P_1 + P_2} \right)$$

We get, $R = \dfrac{5000 \times 2 + 2000 \times 4}{5000 + 2000} = 2\frac{4}{7}\%$

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12. If a certain sum of money is lent out in n parts in such a manner that equal sum of money is obtained as simple interest on each part where interest rates are $R_1, R_2, ..., R_n$ and time periods are $T_1, T_2, ..., T_n$, respectively, then the ratio in which the sum will be divided in n parts is given by

$$\frac{1}{R_1 T_1} : \frac{1}{R_2 T_2} : ... \frac{1}{R_n T_n}.$$

Explanation

Let the n equal parts be $P_1, P_2, ..., P_n$ and, let I be the equal interest earned on each part.

Then, $\quad P_1 = \dfrac{I \times 100}{R_1 T_1}$

$$P_2 = \frac{I \times 100}{R_2 T_2}$$

$$\vdots \qquad\qquad \vdots$$

$$P_n = \frac{I \times 100}{R_n T_n}.$$

$\therefore \quad P_1 : P_2 : ... : P_n = \dfrac{I \times 100}{R_1 T_1} : \dfrac{I \times 100}{R_2 T_2} : ... \dfrac{I \times 100}{R_n T_n}$

$$= \frac{1}{R_1 T_1} : \frac{1}{R_2 T_2} : ... \frac{1}{R_n T_n}.$$

Illustration 19: If a sum of ₹1600 is divided into two such parts that the simple interest on the first part for $2\frac{1}{2}$ years at the rate of 4% p.a. equals the simple interest on the second part for 5 years at the rate of 3% p.a., then find two such divisions of the sum.

Solution: Ratio of one part to other part of ₹1600

$$= \frac{1}{R_1 T_1} : \frac{1}{R_2 T_2}$$

$\therefore$ 1st part : 2nd part $= \dfrac{1}{4 \times \frac{5}{2}} : \dfrac{1}{3 \times 5}$

[Here, $R_1 = 4\%$ p.a., $T_1 = \dfrac{5}{2}$ years, $R_2 = 3\%$ p.a., $T_2 = 5$ years]

or, 1st part : 2nd part $= \dfrac{1}{10} : \dfrac{1}{15} = 3 : 2$

Sum of proportionals $= 3 + 2 = 5$

$\therefore$ 1st part $= \dfrac{3}{5} \times 1600 = ₹96$

and, 2nd part $= \dfrac{2}{5} \times 1600 = ₹640$.

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13. When there is a change in principal (P), Rate (R) and Time (T), then the value of simple interest I also changes and is given by

$$\frac{I_1}{I_2} = \frac{P \times R_1 \times T_1}{P_2 \times R_2 \times T_2}$$

$$\Rightarrow \quad \frac{A_1 - P_1}{A_2 - P_2} = \frac{P_1 \times R_1 \times T_1}{P_2 \times R_2 \times T_2}$$

as $I_1 = A_1 - P_1$ and $I_2 = A_2 - P_2$.

Illustration 20: If ₹85 amounts to ₹95 in 3 years, what ₹102 will amount to in 5 years at the same rate per cent?

Solution: Here, $P_1 = ₹85$, $A_1 = ₹95$, $T_1 = 3$ years, $P_2 = ₹102$, $T_2 = 5$ years, $R_1 = R_2 = R$ (say).

Then, using the formula

$$\frac{A_1 - P_1}{A_2 - P_2} = \frac{P_1 \times R_1 \times T_1}{P_2 \times R_2 \times T_2}$$

We have, $\dfrac{95 - 85}{A_2 - 102} = \dfrac{85 \times R \times 3}{102 \times R \times 5}$

$\Rightarrow \quad A_2 - 102 = 20$

$\Rightarrow \quad A_2 = 122$

$\therefore \quad$ The amount is ₹122.

14. Out of a certain sum P, $\dfrac{1}{a}$ part is invested at $R_1\%$, $\dfrac{1}{b}$ part at $R_2\%$ and the remainder $\left(1 - \dfrac{1}{a} - \dfrac{1}{b}\right)$ say $\dfrac{1}{c}$ part at $R_3\%$. If the annual income from all these investments is ₹A, then the original sum is given by

$$P = \left(\frac{A \times 100}{\dfrac{R_1}{a} + \dfrac{R_2}{b} + \dfrac{R_3}{c}}\right).$$

Illustration 21: Out of a certain sum, $\dfrac{1}{3}$ is invested at 3%, $\dfrac{1}{6}$ at 6% and the rest at 8%. If the annual income is ₹300, then the original sum is

Solution: Here,

$$\frac{1}{a} = \frac{1}{3}, \frac{1}{b} = \frac{1}{6},$$

$$\frac{1}{c} = 1 - \left(\frac{1}{3} + \frac{1}{6}\right) = \frac{1}{2},$$

$R_1 = 3\%, R_2 = 6\%, R_3 = 8\%,$

$A = $ ₹300.

$\therefore \quad$ The original sum $= \dfrac{A \times 100}{\dfrac{R_1}{a} + \dfrac{R_2}{b} + \dfrac{R_3}{c}}$

$$= \frac{300 \times 100}{\dfrac{3}{3} + \dfrac{6}{6} + \dfrac{8}{2}} = \frac{30000}{6}$$

$$= ₹5000.$$

EXERCISE-1

1. The simple interest on ₹500 at 6% per annum from May 3rd to July 15th in the same year is:
   (a) ₹9 (b) ₹6
   (c) ₹4 (d) None of these

2. Mr Irani borrowed a sum of ₹10000 from a finance company for 6 years at 8% per annum. The amount returned by Mr Irani to the finance company is:
   (a) ₹14800 (b) ₹12600
   (c) ₹13300 (d) None of these

3. The principal that will yield ₹60 as simple interest at 6% per annum in 5 years is:
   (a) ₹175 (b) ₹350
   (c) ₹200 (d) None of these

4. The sum of money that will produce ₹1770 interest in $7\dfrac{1}{2}$ years at 8% simple interest per annum is:
   (a) ₹2950 (b) ₹3120
   (c) ₹2800 (d) None of these

5. If the simple interest on a certain sum of money after $6\dfrac{1}{4}$ years is 3/8 of the principal, then the rate of interest per annum is:
   (a) 5% (b) 6%
   (c) 4% (d) None of these

6. Rakesh borrowed ₹5000 from Ganesh at simple interest. If Ganesh received ₹500 more than his capital after 5 years, then the rate of interest per annum is:
   (a) 2% (b) 3%
   (c) 4% (d) None of these

7. The rate per cent per annum at which ₹1200 amount to ₹1440 in 4 years, is:
   (a) 5% (b) 4%
   (c) 6% (d) None of these

8. If simple interest on a certain sum of money is ₹256 and the rate of interest per annum equals the number of years, then the rate of interest is:
   (a) 13% (b) 14%
   (c) 16% (d) None of these

9. If the simple interest on a certain sum of money for 2 years is one-fifth of the sum, then the rate of interest per annum is:
   (a) 9% (b) 10%
   (c) 8% (d) None of these

10. If the simple interest on a certain sum of money is $\frac{4}{25}$ of the sum and the rate per cent equals the number of years, then the rate of interest per annum is:

(a) 2%   (b) 3%
(c) 4%   (d) None of these

11. If a certain sum of money borrowed at 5% per annum simple interest amounts to ₹1020 in 4 years, then the sum of money borrowed is:

(a) ₹850   (b) ₹925
(c) ₹750   (d) None of these

12. In what time ₹1200 will become ₹1344 at 6% per annum?

(a) $2\frac{1}{2}$ years   (b) 3 years
(c) 2 years   (d) None of these

13. In what time ₹8100 will produce the same income at 3% as ₹225 in 4 years at 3%.

(a) $\frac{1}{7}$ years   (b) $\frac{1}{9}$ years
(c) $\frac{1}{6}$ years   (d) None of these

14. If ₹1000 be invested at interest rate of 5% and the interest be added to the principal every 10 years, then the number of years in which it will amount to ₹2000 is:

(a) $16\frac{2}{3}$ years   (b) $16\frac{1}{4}$ years
(c) 16 years   (d) None of these

15. If ₹500 amounts to ₹725 at 9% simple interest in some time, what will ₹600 amount to at 11% in the same time?

(a) ₹870   (b) ₹930
(c) ₹910   (d) None of these

16. Sumit lends ₹10000 for 2 years at 20% per annum simple interest. After 1 year, he receives ₹6000. How much will he receive next year?

(a) ₹5900   (b) ₹6400
(c) ₹7200   (d) None of these

17. What principal will amount to ₹15000 at 10% per annum in 5 years?

(a) ₹10000   (b) ₹8700
(c) ₹10500   (d) None of these

18. The annual payment that will discharge a debt of ₹47250 due 3 years, hence at the rate of 5% simple interest is:

(a) ₹8000   (b) ₹10000
(c) ₹15000   (d) None of these

19. The annual instalment that will discharge a debt of ₹4200 due in 5 years at 10% simple interest is:

(a) ₹700   (b) ₹750
(c) ₹800   (d) None of these

20. If the amount obtained by Mahesh by investing ₹1500 for $2\frac{1}{2}$ years at the rate of 8% p.a. is equal to the amount obtained by Suresh by investing a certain sum for 2 years at 5% p.a. simple interest, then the sum invested by Suresh is:

(a) ₹$1636\frac{4}{11}$ (b) ₹1636

(c) ₹$1636\frac{1}{2}$ (d) None of these

21. A man invests ₹3965 in the names of his three daughters, Neeta, Sita and Gita in such a way that they would receive the same amount after 2, 3 and 4 years. If the rate of interest is 5% p.a., then the amount invested for Neeta, Sita and Gita is:

(a) ₹1380, ₹1320, ₹1265
(b) ₹1330, ₹1360, ₹1380
(c) ₹1265, ₹1320, ₹1340
(d) None of these

22. A sum of money at simple interest becomes four times in 24 years. The rate per cent of interest per annum is:

(a) $13\frac{3}{4}$%   (b) $12\frac{1}{2}$%
(c) $11\frac{3}{4}$%   (d) None of these

23. In how many years will a sum of money treble itself at 10% per annum simple interest?

(a) 15 years   (b) 19 years
(c) 20 years   (d) None of these

24. A sum of money doubles itself in 8 years. In how many years will it treble?

(a) 16 years   (b) 15 years
(c) 14 years   (d) None of these

25. A sum was put at simple interest at a certain rate for 4 years. Had it been put at 2% higher rate, it would have fetched ₹56 more. Find the sum.

(a) ₹680   (b) ₹700
(c) ₹720   (d) None of these

26. If the interest on ₹800 be more than the interest on ₹400 by ₹40 in 2 years, then the rate of interest per annum is:

(a) 5%　　　　　　(b) $5\frac{1}{2}$%

(c) 6%　　　　　　(d) None of these

27. If the difference between the simple interest on a certain sum for 4 years at $2\frac{1}{2}$% per annum and the simple interest on the same sum for the same period at 3% per annum is ₹60, then the sum is:

(a) ₹3000　　　　　(b) ₹2900

(c) ₹3100　　　　　(d) None of these

28. If a certain sum of money at simple interest amounts to ₹2800 in 2 years and ₹3250 in 5 years, then the rate of interest per annum is:

(a) 4%　　　　　　(b) 6%

(c) 5%　　　　　　(d) None of these

29. If a certain sum of money amounts to ₹1760 in two years and ₹2000 in 5 years at simple interest, then the sum is:

(a) ₹1960　　　　　(b) ₹1590

(c) ₹1600　　　　　(d) None of these

30. A certain sum is invested for certain time. It amounts to ₹450 at 7% per annum. But when invested at 5% per annum, it amounts to ₹350. Find the sum.

(a) ₹60　　　　　　(b) ₹100

(c) ₹120　　　　　(d) None of these

31. A certain sum is invested for T years. It amounts to ₹400 at 10% per annum. But, when invested at 4% per annum, it amounts to ₹200. Find the time (T).

(a) 41 years　　　　(b) 39 years

(c) 50 years　　　　(d) None of these

32. If a sum of ₹9 is lent to be paid back in 10 equal monthly instalments of ₹1 each, then the rate of interest is:

(a) $266\frac{2}{3}$%　　　(b) $265\frac{3}{4}$%

(c) 266%　　　　　(d) None of these

33. A sum of ₹7700 is to be divided among three brothers Vikas, Vijay and Viraj in such a way that simple interest on each part at 5% per annum after 1, 2 and 3 years, remains equal. The share of Vikas is more than that of Viraj by:

(a) ₹2800　　　　　(b) ₹2500

(c) ₹3000　　　　　(d) None of these

34. If simple interest on a certain sum of money for 4 years at 5% p.a. is same as the simple interest on ₹560 for 10 years at the rate of 4% p.a., then the sum of money is:

(a) ₹1190　　　　　(b) ₹1120

(c) ₹1210　　　　　(d) None of these

35. Mr Mani invested an amount of ₹12000 at a simple interest rate of 10% per annum and another amount at a simple interest rate of 20% per annum. The total interest earned at the end of one year on the total amount invested became 14% per annum. Find the total amount invested.

(a) ₹20000　　　　(b) ₹20800

(c) ₹21000　　　　(d) None of these

36. Mr Gupta deposits ₹3000 in a bank at 10% per annum and ₹5000 in another bank at 8% per annum. The rate of interest for the whole sum is:

(a) $8\frac{1}{2}$%　　　　(b) $8\frac{3}{4}$%

(c) 8%　　　　　　(d) None of these

37. A person invested $\frac{2}{3}$ of his capital at 3%, $\frac{1}{6}$ at 6% and the remainder at 12%. If his annual income is ₹25, then the capital is:

(a) ₹490　　　　　(b) ₹510

(c) ₹500　　　　　(d) None of these

38. The simple interest on a sum of money will be ₹600 after 10 years. If the principal is trebled after 5 years, then what will be the total interest at the end of the tenth year?

(a) ₹1200　　　　　(b) ₹1190

(c) ₹1210　　　　　(d) None of these

39. ₹1500 is invested at a rate of 10% simple interest and interest is added to the principal after every 5 years. In how many years will it amount to ₹2500.

(a) $6\frac{1}{9}$ years　　　(b) $6\frac{1}{4}$ years

(c) 7 years　　　　(d) None of these

40. Sumit lent some money to Mohit at 5% per annum simple interest. Mohit lent the entire amount to Birju on the same day at $8\frac{1}{2}$% per annum. In this transaction, after a year Mohit earned a profit of ₹350. Find out the sum of money lent by Sumit to Mohit.

(a) ₹9000　　　　　(b) ₹10000

(c) ₹10200　　　　(d) None of these

41. Brinda borrowed ₹1000 to build a hut. She pays 5% simple interest. She lets the hut to Ramu and receives a rent of ₹$12\frac{1}{2}$ per month from Ramu. In how many years Brinda would clear off the debt?

(a) 10 years   (b) $10\frac{1}{4}$ years

(c) $10\frac{1}{2}$ years   (d) None of these

42. The rate of interest on a sum of money is 4% per annum for the first 2 years, 6% per annum for the next 4 years, and 8% per annum for the period beyond 6 years. If the simple interest accrued by the sum for a total period of 9 years is ₹1120, then the sum is:

(a) ₹2400   (b) ₹2200

(c) ₹2000   (d) None of these

EXERCISE-2
(BASED ON MEMORY)

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1. The effective annual rate of interest, corresponding to a nominal rate of 6% per annum, payable half yearly, is:

(a) 6.06%   (b) 6.07%

(c) 6.08%   (d) 6.09%

[SSC (GL) Prel. Examination, 2005]

2. What annual instalment will discharge a debt of ₹6450 due in 4 years at 5% simple interest?

(a) ₹1650   (b) ₹1835

(c) ₹1935   (d) ₹1950

[SSC (GL) Prel. Examination, 2005]

3. In what time will ₹72 become ₹81 at $6\frac{1}{4}$% per annum simple interst?

(a) 2 years   (b) 3 years

(c) 2 years 6 months   (d) None of these

[SSC (GL) Prel. Examination, 2005]

4. A sum of ₹1500 is lent out in two parts in such a way that the simple interest on one part at 10% per annum for 5 years is equal to that on the second part at 12.5% per annum for 4 years. The sum lent out at 12.5% is

(a) ₹500   (b) ₹1000

(c) ₹750   (d) ₹1250

[SSC (GL) Prel. Examination, 2005]

5. Veena obtained an amount of ₹8376 as simple interest on a certain amount at 8 per cent p.a. after 6 years. What is the amount invested by Veena?

(a) ₹17180   (b) ₹18110

(c) ₹16660   (d) ₹17450

(e) None of these

[SBI PO, 2008]

6. Manish borrowed a sum of ₹1150 from Anil at the simple rate of 6 per cent p.a. for 3 years. He then added some more money to the borrowed sum and lent it to Sunil for the same time at 9 per cent p.a. at simple interest. If Manish gains ₹274.95 by way of interest on the borrowed sum as well as his own amount from the whole transaction, then what is the sum lent by him to Sunil?

(a) ₹1290   (b) ₹1785

(c) ₹1285   (d) ₹1200

(e) None of these

[OBC PO, 2007]

7. What will be the simple interest earned on an amount of ₹988 @ 18 per cent p.a. at the end of 5 years?

(a) ₹711.36   (b) ₹898.23

(c) ₹799.25   (d) ₹805.40

(e) None of these

[Allahabad Bank PO, 2007]

8. The simple interest in 14 months on a certain sum at the rate of 6% per annum is ₹250 more than the interest on the same sum at the rate of 8% in 8 months. How much amount was borrowed?

(a) ₹15000   (b) ₹25000

(c) ₹7500   (d) ₹14500

(e) None of these

[BSRB Bangalore PO, 1999]

9. At a simple interest ₹800 becomes ₹956 in three years. If the interest rate is increased by 3%, how much would ₹800 become in three years.

(a) ₹1020.80   (b) ₹1004

(c) ₹1028   (d) Data inadequate

(e) None of these

[BSRB Delhi PO, 1999]

10. Ankit deposited two parts of a sum of ₹25000 in different banks at the rates of 15% per annum and 18% per annum respectively. In one year he got ₹4050 as the total interest. What was the amount deposited at the rate of 18% per annum?

(a) ₹9000   (b) ₹18000

(c) ₹15000   (d) Data inadequate

(e) None of these

[BSRB Patna PO, 2001]

11. Mr Kalia invested a total amount of ₹16500 for two years in two schemes A and B with rate of simple interest 10% per annum and 12% per annum, respectively. If the total amount of interest earned was ₹3620, what was amount invested in scheme A?

(a) ₹8000   (b) ₹8600

(c) ₹8150   (d) Data inadequate

(e) None of these

[Andhra Bank PO, 2002]

12. A sum fetched total simple interest of ₹4016.25 at the rate of 9% per annum in 5 years. What is the sum?

(a) ₹8925   (b) ₹8032.50

(c) ₹4462.50   (d) ₹8900

(e) None of these

[NABARD Asst. Manager, 2002]

13. A shopkeeper allows two successive discounts of 10% and 20%. If he sells an article for ₹540, then the marked price of the article is:

(a) ₹750   (b) ₹740

(c) ₹725   (d) ₹700

[SI of Police Rec. Examination, 1997]

14. In how many years will a sum of money double itself at 10% simple interest?

(a) 5 years   (b) 6 years

(c) 10 years   (d) 20 years

[SI of Police Rec. Examination, 1997]

15. What is the present worth of ₹132 due in 2 years at 5% simple interest per annum?

(a) ₹120   (b) ₹122

(c) ₹112   (d) ₹118.80

[SI of Police Rec. Examination, 1997]

16. A sum of ₹5000 was lent partly at 6% and partly at 9% simple interest. If the total interest received after one year was ₹390, the ratio in which the money was lent at 6% and 9% is:

(a) 1:1   (b) 3:2

(c) 2:3   (d) 1:2

[SI of Police Rec. Examination, 1997]

17. Divide ₹2379 into 3 parts so that their amount after 2, 3 and 4 years, respectively may be equal, the rate of interest being 5% per annum at simple interest. The first part is given by:

(a) ₹828   (b) ₹792

(c) ₹759   (d) ₹818

[SI Rec. Examination Delhi Police, 1997]

18. The simple interest on a certain sum of money for $2\frac{1}{2}$ years at 12% per annum is ₹40 less than the simple interest on the same sum for $3\frac{1}{2}$ years at 10% per annum. The sum is:

(a) ₹600   (b) ₹800

(c) ₹700   (d) ₹900

[SI Rec. Examination Delhi Police, 1997]

19. In how much time would the simple interest on a certain sum be 0.125 times the principal at 10% per annum?

(a) $1\frac{1}{4}$ years   (b) $1\frac{3}{4}$ years

(c) $2\frac{1}{4}$ years   (d) $2\frac{3}{4}$ years

[Asstt. Grade Examination, 1997]

20. The simple interest on a sum of money is $\frac{1}{4}$ of the principal. If number of years is equal to rate per cent per annum, the interest rate is:

(a) 5.0%   (b) 5.1%

(c) 5.2%   (d) 4.8%

[SI of Police Rec. Examination PO, 1998]

21. In how many years a certain sum doubles itself at 4% per annum simple interest?

(a) 5 years   (b) 10 years

(c) 20 years   (d) 25 years

[SSC (GL) Prel. Examination, 1999]

22. The difference between the simple interest on a certain sum of money at 6% per annum for 10 years and at 5% per annum for 2 years is ₹100. Find the sum:

(a) ₹100   (b) ₹200

(c) ₹400   (d) ₹500

[SSC (GL) Prel. Examination, 1999]

23. Two equal sums of money were invested, one at 4% and the other at $4\frac{1}{2}$%. At the end of 7 years, the simple interest received from the latter exceeds to that received from the former by ₹31.50. Each sum was:

(a) ₹1000   (b) ₹500

(c) ₹750   (d) ₹900

[SSC (GL) Prel. Examination, 1999]

24. The simple interest on a certain sum at 5% per annum for 3 years and 4 years differ by ₹42. The sum is:

(a) ₹210   (b) ₹280

(c) ₹750   (d) ₹840

[SSC (GL) Prel. Examination, 1999]

25. A sum of ₹1600 gives a simple interest of ₹252 in 2 years and 3 months. The rate of interest per annum is:

(a) $5\dfrac{1}{2}\%$ (b) 8%

(c) 7%   (d) 6%

[SSC (GL) Prel. Examination, 2000]

26. A sum of ₹400 amounts to ₹480 in 4 years. What will it amount to if the rate of interest is increased by 2%?

(a) ₹484   (b) ₹560

(c) ₹512   (d) None of these

[SSC (GL) Prel. Examination, 2000]

27. The simple interest on a sum of money is $\dfrac{4}{9}$ of the principal and the number of years is equal to the rate per cent per annum. The rate per annum is:

(a) 5%   (b) $6\dfrac{2}{3}\%$

(c) 6%   (d) $7\dfrac{1}{5}\%$

[SSC (GL) Prel. Examination, 2000]

28. ₹1500 were divided into two parts. One part was put at 6% and the other at 5% interest. If the whole annual interest from both investments was ₹85, then the investment at 6% was:

(a) ₹1200   (b) ₹1000

(c) ₹1300   (d) ₹1150

[Railway Rec. Board Examination, 2000]

29. A person borrows ₹5000 for two years at 4% per annum simple interest. He immediately lends to another person at $6\dfrac{1}{4}\%$ per annum for 2 years. Find his gain in the transaction per year:

(a) ₹112.50   (b) ₹450.00

(c) ₹244.53   (d) ₹150.00

[SSC (GL) Prel. Examination, 2000]

30. A sum of ₹1550 was lent partly at 5% and partly at 8% simple interest. The total interest received after 3 year is ₹300. The ratio of money lent at 5% to that at 8%:

(a) 5:8   (b) 8:5

(c) 31:6   (d) 16:5

[SSC (GL) Prel. Examination, 2002]

31. In what time will the simple interest be $\dfrac{2}{5}$ of the principal at 8% per annum?

(a) 8 years   (b) 7 years

(c) 5 years   (d) 6 years

[SSC (GL) Prel. Examination, 2002]

32. A person lent ₹5,000 partly at the rate of 4% and partly at the rate of 5% per annum simple interest. The total interest after 2 years is ₹440. To find the sum of money lent at each of the above rates, ₹5,000 is to be divided in the ratio:

(a) 4:5   (b) 3:2

(c) 5:4   (d) 2:3

[SSC (GL) Prel. Examination, 2002]

33. At what rate per cent per annum will the simple interest on a sum of money be $\dfrac{2}{5}$ of the amount in 10 years?

(a) 4%   (b) 6%

(c) $5\dfrac{2}{3}\%$ (d) $6\dfrac{2}{3}\%$

[SSC (GL) Prel. Examination, 2002]

34. If the simple interest on a certain sum for 15 months at $7\dfrac{1}{2}\%$ per annum exceeds the simple interest on the same sum for 8 months at $12\dfrac{1}{2}\%$ per annum by ₹32.50, then the sum (in ₹) is:

(a) 312   (b) 312.50

(c) 3120   (d) 3120.50

[SSC Prel. (L) Examination, 2002]

35. In 4 years, the simple interest on a certain sum of money is $\dfrac{9}{25}$ of the principal. The annual rate of interest is:

(a) 4%   (b) $4\dfrac{1}{2}\%$

(c) 9%   (d) 10%

[SSC (GL) Prel. Examination, 2002]

36. What sum of money will amount to ₹520 in 5 years and to ₹568 in 7 years at simple interest?

(a) ₹400   (b) ₹120

(c) ₹510   (d) ₹220

[SSC (GL) Prel. Examination, 2003]

37. A lends ₹2500 to B and a certain sum to C at the same time at 7% annual simple interest. If after 4 years, A altogether receives ₹1120 as interest from B and C, the sum lent to C is:

(a) ₹700   (b) ₹6500

(c) ₹4000   (d) ₹1500

[SSC (GL) Prel. Examination, 2003]

38. A sum of money becomes $\dfrac{41}{40}$ of itself in $\dfrac{1}{4}$ years at a certain rate of simple interest. The rate of interest per annum is:

(a) 10%   (b) 1%
(c) 2.5%   (d) 5%

39. A man loses ₹55.50 yearly when the annual rate of interest falls from 11.5 to 10%. His capital (in rupees) is:

(a) 3700   (b) 7400
(c) 8325   (d) 11100

40. A certain amount earns simple interest of ₹1750 after 7 years. Had the interest been 2% more, how much more interest would it have earned?

(a) ₹35   (b) ₹350
(c) ₹245   (d) Cannot be determined
(e) None of these

41. Nikhil invested certain amount in three different schemes A, B and C with the rate of interest 10% per annum, 12% per annum and 15% per annum, respectively. If the total interest accrued in one year was ₹3200 and the amount invested in scheme C was 150% of the amount invested in scheme A and 240% of the amount invested in scheme B, what was the amount invested in scheme B?

(a) ₹8000   (b) ₹5000
(c) ₹6500   (d) Cannot be determined
(e) None of these

42. The simple interest accrued on a sum of certain principal is ₹1200 in 4 years at the rate of 8% per annum.. What would be the simple interest accrued on thrice of that principal at the rate of 6% per annum in 3 years?

(a) ₹2025   (b) ₹3025
(c) ₹2250   (d) ₹2150

43. Arun invested a sum of money at a certain rate of simple interest for a period of four years. Had he invested the same sum for a period of six years, the total interest earned by him would have been fifty per cent more than the earlier interest amount? What was the rate of interest per cent per annum?

(a) 4   (b) 8
(c) 5   (d) Cannot be determined

44. In what time will a sum of money double itself @ 20% per annum simple interest

(a) 10 years   (b) 5 years
(c) 2 years   (d) 14 years

45. 800 becomes ₹956 in 3 years at a certain rate of simple interest. If the rate of interest is increased by 4%, what amount will ₹800 become in 3 years?

(a) ₹1020.80   (b) ₹1025
(c) ₹1052   (d) ₹1050

46. Simple interest on a certain sum is $\frac{16}{25}$ of the sum. The rate per cent if the rate per cent and time (in years) are equal, is:

(a) 6%   (b) 8%
(c) 10%   (d) 12%

47. Prakash lends a part of ₹20,000 at 8% simple interest and remaining at $\frac{4}{3}$% simple interest. His total income after a year was ₹800. Find the sum lent at 8%.

(a) ₹8,000   (b) ₹12,000
(c) ₹6,000   (d) ₹10,000

48. Nitin borrowed some money at the rate of 6% p.a. for the first three years, 9% p.a. for the next five years and 13% p.a. for the period beyond eight years. If the total interest paid by him at the end of eleven years is ₹8,160, the money borrowed by him was:

(a) 12,000   (b) 6,000
(c) 8,000   (d) 10,000

49. The simple interest on a sum of money is $\frac{1}{9}$th of the principal and the number of years is equal to the rate per cent per annum. The rate per cent per annum is equal to:

(a) 3%   (b) $\frac{1}{3}$%

(c) $\frac{1}{10}$%   (d) $3\frac{1}{3}$%

50. Arun lends ₹20,000 to two of his friends. He gives ₹12,000 to the first at 8% p.a. simple interest. Arun wants to makes a profit of 10% on the whole. The simple interest rate at which he should lend the remaining sum of money to the second friend is:

(a) 8%   (b) 16%
(c) 12%   (d) 13%

51. If the simple interest on ₹x at a rate of a% for m years is same as that on ₹y at a rate of a^2% for m^2 years, then $x{:}y$ is equal to:

(a) $m{:}a$ (b) $am{:}1$

(c) $\dfrac{1}{m}{:}\dfrac{1}{a}$ (d) $\dfrac{1}{am}{:}1$

52. A took two loans altogether of ₹1200 from B and C. B claimed 14% simple interest per annum, while C claimed 15% per annum. The total interest paid by A in one year was ₹172. Then a borrowed:

(a) ₹800 from C   (b) ₹625 from C
(c) ₹400 from B   (d) ₹800 from B

53. A person has left an amount of ₹1,20,000 to be divided between his two sons aged 14 years and 12 years such that they get equal amounts when each attains 18 years of age. If the amount gets a simple interest of 5% per annum, the younger son's share at present is:

(a) ₹48,800   (b) ₹57,600
(c) ₹62,400   (d) ₹84,400

54. A man invested $\dfrac{1}{3}$ of his capital at 7%, $\dfrac{1}{4}$ at 8% and the remaining at 10% rate of simple interest. If his annual income from interests is ₹561, then the capital invested was:

(a)₹6000   (b) ₹5600
(c)₹6600   (d) ₹7200

55. A sum of ₹16800 is divided into two parts. One part is lent at a simple rate of interest 6% per annum and the other at 8% per annum. After 2 years the total sum received is ₹19000. The sum lent at the rate of 6% simple interest is:

(a) ₹12200   (b) ₹12000
(c) ₹11000   (d) ₹10000
(e) None of these

56. The simple interest accrued on an amount of ₹22,500 at the end of four years is ₹10,800. What would be the compound interest accrued on the same amount at the same rate of interest at the end of two years?

(a) ₹16,908   (b) ₹5,724
(c) ₹28,224   (d) ₹8,586
(e) None of these

57. A person rece a simple interest of ₹1,000 on a certain principal at the rate of 5% p.a. in 4 years. What compound interest will would that person receive on twice the principal in two years at the same rate?

(a) ₹1,000   (b) ₹1,005
(c) ₹11,025   (d) ₹10,125
(e) None of these

58. What amount would a man receive on a principal of ₹4,000 after two years on simple interest rate of 5% p.a?

(a) ₹4,161   (b) ₹ 5,200
(c) ₹4,410   (d) ₹4,100
(e) None of these

ANSWER KEYS												

EXERCISE-1

1. (b)	**2.** (a)	**3.** (c)	**4.** (a)	**5.** (b)	**6.** (a)	**7.** (a)	**8.** (c)	**9.** (b)	**10.** (c)	**11.** (a)	**12.** (c)	**13.** (b)
14. (a)	**15.** (b)	**16.** (c)	**17.** (a)	**18.** (c)	**19.** (a)	**20.** (a)	**21.** (a)	**22.** (b)	**23.** (c)	**24.** (a)	**25.** (b)	**26.** (a)
27. (a)	**28.** (b)	**29.** (c)	**30.** (b)	**31.** (c)	**32.** (a)	**33.** (a)	**34.** (b)	**35.** (a)	**36.** (b)	**37.** (c)	**38.** (a)	**39.** (a)
40. (b)	**41.** (a)	**42.** (c)										

EXERCISE-2

1. (d)	**2.** (c)	**3.** (a)	**4.** (c)	**5.** (d)	**6.** (b)	**7.** (e)	**8.** (a)	**9.** (c)	**10.** (e)	**11.** (e)	**12.** (a)	**13.** (a)
14. (c)	**15.** (a)	**16.** (c)	**17.** (a)	**18.** (b)	**19.** (a)	**20.** (a)	**21.** (d)	**22.** (b)	**23.** (d)	**24.** (d)	**25.** (c)	**26.** (c)
27. (b)	**28.** (b)	**29.** (a)	**30.** (d)	**31.** (c)	**32.** (b)	**33.** (d)	**34.** (c)	**35.** (c)	**36.** (a)	**37.** (d)	**38.** (a)	**39.** (a)
40. (d)	**41.** (b)	**42.** (a)	**43.** (d)	**44.** (b)	**45.** (c)	**46.** (b)	**47.** (a)	**48.** (c)	**49.** (d)	**50.** (d)	**51.** (b)	**52.** (d)
53. (b)	**54.** (c)	**55.** (a)	**56.** (b)	**57.** (e)	**58.** (e)							

EXPLANATORY ANSWERS

EXERCISE-1

1. (b) Time from May 3rd to July 15th

= 28 days of May + 30 days of June and 15 days of July

= 73 days = $\frac{73}{365}$ years, i.e., $\frac{1}{5}$ years.

$\therefore \quad I = \frac{P \times R \times T}{100} = \frac{500 \times 6 \times \frac{1}{5}}{100} = ₹6.$

2. (a) We have, $P = ₹10000$, $R = 8\%$ per annum, $T = 6$ years.

$\therefore \quad I = \frac{P \times R \times T}{100} = \frac{10000 \times 8 \times 6}{100} = ₹4800$

$\therefore \quad A = P + I = 10000 + 4800 = ₹14800$

Thus, Mr Irani returned ₹14800 to the finance company.

3. (c) Here, $I = ₹60$, $R = 6\%$ per annum, $T = 5$ years.

$\therefore \quad$ Principal $(P) = \frac{100 \times I}{R \times T} = \frac{100 \times 60}{6 \times 5} = ₹200.$

4. (a) Here, $I = ₹1770$, $R = 8\%$ per annum, $T = \frac{15}{2}$ years.

$\therefore \quad$ Principal $(P) = \frac{100 \times I}{R \times T} = \frac{100 \times 1770}{8 \times \frac{15}{2}}$

$= ₹2950.$

5. (b) Let the sum of money be ₹x.

Then, simple interest = $\frac{3}{8}x$

Also, time = $6\frac{1}{4}$ years, i.e., $\frac{25}{4}$ years

$\therefore \quad$ Rate $(R) = \frac{100 \times I}{P \times T} = \frac{100 \times \frac{3x}{8}}{x \times \frac{25}{4}}$

$= \frac{100 \times 3}{2 \times 25} = 6\%.$

6. (a) Here, $P = ₹5000$, $I = ₹500$, $T = 5$ years.

Therefore, using the formula

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

We have, rate of interest $(R) = \frac{100 \times 500}{5000 \times 5} = 2\%$ p.a.

7. (a) We have, $P = ₹1200$, $T = 4$ years,

$I = 1440 - 1200 = ₹240.$

$\therefore \quad$ Rate $(R) = \frac{100 \times I}{P \times T} = \frac{100 \times 240}{1200 \times 4} = 5\%$ per annum.

8. (c) Here, $I = ₹256$.

Let the principal be $₹100$.

Let the rate of interest per annum be $x\%$.

Then, time $(T) = x$ years.

Therefore, using the formula

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

We have, $x = \dfrac{100 \times 256}{100 \times x} \quad \Rightarrow \quad x^2 = 256 \quad \text{or} \quad x = 16\%$

∴ Rate of interest per annum is 16%

9. (b) We have, $T = 2$ years.

Let the principal be $₹x$.

Then, simple interest $(I) = ₹\dfrac{x}{5}$.

Rate of interest $(R) = \dfrac{100 \times I}{P \times T} = \dfrac{100 \times \frac{x}{5}}{x \times 2}$

$$= \frac{100}{5 \times 2} = 10\% \text{ p.a.}$$

10. (c) Let the principal be $₹x$, then the simple interest $(I) = \dfrac{4}{25}x$.

Let the rate of interest p.a. be $r\%$, then time $(T) = r$ years.

∴ $R = \dfrac{100 \times I}{P \times T} \quad \Rightarrow \quad r = \dfrac{100 \times \frac{4}{25}x}{x \times r}$

$\Rightarrow \quad r^2 = \dfrac{400}{25} \quad \text{or } r = \dfrac{20}{5} = 4\%$.

11. (a) We have, $A = ₹1020$, $T = 4$ years, $R = 5\%$ p.a.

Let, the principal be $₹x$.

Then, Interest $(I) = A - P = 1020 - x$.

Therefore, by using formula,

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

We have, $x = \dfrac{100 \times (1020 - x)}{5 \times 4}$

$\Rightarrow \quad x = 5100 - 5x$ or, $6x = 5100$

or, $x = \dfrac{5100}{6} = ₹850$.

∴ The sum of money borrowed $= ₹850$.

12. (c) Here, $P = ₹1200$, $A = ₹1344$, $R = 6\%$ p.a.

∴ Interest (I) $= 1344 - 1200 = 144$

∴ Time $(T) = \dfrac{100 \times I}{P \times R} = \dfrac{100 \times 144}{1200 \times 6} = 2$ years.

13. (b) Income on $₹225$ in 4 years at 3%

$$= \frac{P_1 \times R \times T_1}{100} = \frac{225 \times 3 \times 4}{100} ₹27.$$

Now, interest of $₹27$ is earned on $₹8100$ at 3% simple interest.

∴ Time $(T_2) = \dfrac{100 \times I}{P_2 \times R} = \dfrac{100 \times 27}{8100 \times 3} = \dfrac{1}{9}$ year.

14. (a) The interest earned in 10 years on $₹1000$ at 5% per annum

$$= \frac{1000 \times 5 \times 10}{100} = ₹500.$$

The principal now becomes $= ₹1000 + ₹500 = ₹1500$. We now find the time in which $₹1500$ becomes $₹2000$ at 5% p.a.

$P = ₹1500$, $A = ₹2000$,

$I = A - P = 2000 - 1500 = ₹500$, $R = 5\%$ p.a.

∴ Time $(T) = \dfrac{100 \times I}{R \times P} = \dfrac{100 \times 500}{5 \times 1500} = 6\dfrac{2}{3}$ years.

∴ Total time $= \left(10 + 6\dfrac{2}{3}\right)$ years $= 16\dfrac{2}{3}$ years.

15. (b) Interest on $₹500$ is $= 725 - 500$
$$= ₹225.$$

Time $= \dfrac{225 \times 100}{500 \times 9} = 5$ years.

∴ Required amount $(A) = P\left(1 + \dfrac{R \times T}{100}\right)$

$$= 600\left(1 + \frac{11 \times 5}{100}\right)$$

$$= ₹930.$$

16. (c) Amount after 1 year $= P\left(1 + \dfrac{R \times T}{100}\right)$

$$= 10000\left(1 + \frac{20 \times 1}{100}\right)$$

$$= ₹12000$$

After paying $₹6000$, the remaining sum
$$= ₹6000$$

∴ Amount obtained in the next year

$$= P\left(1 + \frac{R \times T}{100}\right)$$

$$= 6000\left(1 + \frac{20 \times 1}{100}\right) = ₹7200.$$

17. (a) We have, $A = ₹15000$, $R = 10\%$ p.a., $T = 5$ years.

∴ $P = \dfrac{100 \times A}{100 + R \times T} = \dfrac{100 \times 15000}{100 + 10 \times 5}$

$$= ₹10000.$$

18. (c) We have, $A = ₹47250$, $T = 3$ years, $R = 5\%$ p.a.

∴ Annual payment $= \dfrac{100 \times A}{100 \times T + \dfrac{RT(T-1)}{2}}$

$$= \frac{100 \times 47250}{100 \times 3 + \dfrac{5 \times 3 \times 2}{2}}$$

$$= ₹15000.$$

19. (a) Here, $A = ₹4200$, $T = 5$ years.
$R = 10\%$ p.a.

$\therefore$ Annual instalment $= \dfrac{100 \times A}{100 \times T + \dfrac{RT(T-1)}{2}}$

$$= \dfrac{100 \times 4200}{100 \times 5 + \dfrac{10 \times 5 \times 4}{2}}$$

$$= ₹700.$$

20. (a) Let the sum of money invested by Suresh be $₹x$.
Since the amount obtained in both the cases is equal, the ratio in which the sums are invested is:

$$\frac{1}{100 + R_1 T_1} : \frac{1}{100 + R_2 T_2}$$

where $R_1 = 8\%$, $T_1 = \dfrac{5}{2}$ years, $R_2 = 5\%$, $T_2 = 2$ years.

That is, $\dfrac{1}{100 + 8 \times \dfrac{5}{2}} : \dfrac{1}{100 + 5 \times 2}$ or, $\dfrac{1}{120} : \dfrac{1}{110}$

Given: $1500:x :: \dfrac{1}{120} : \dfrac{1}{110}$

$\Rightarrow \dfrac{1500 \times 1}{110} = \dfrac{1}{120} \times x$

or, $x = \dfrac{1500 \times 1 \times 120}{110} = 1636\dfrac{4}{11}$

$\therefore$ The sum invested by Suresh is $₹1636\dfrac{4}{11}$.

21. (a) We have, $T_1 = 2$ years, $T_2 = 3$ years, $T_3 = 4$ years.
$R_1 = R_2 = R_3 = 5\%$ p.a.

$\therefore$ The ratio in which the amount is invested

$$= \frac{1}{100 + R_1 T_1} : \frac{1}{100 + R_2 T_2} : \frac{1}{100 + R_3 T_3}$$

i.e., $\dfrac{1}{100 + 2 \times 5} : \dfrac{1}{100 + 3 \times 5} : \dfrac{1}{100 + 4 \times 5}$

i.e., $\dfrac{1}{110} : \dfrac{1}{115} : \dfrac{1}{120}$ or, $276:264:253$.

Their sum $= 276 + 264 + 253 = 793$

$\therefore$ The amount invested for

Neeta $= \dfrac{3965}{793} \times 276 = ₹1380$

Sita $= \dfrac{3965}{793} \times 264 = ₹1320$

Gita $= \dfrac{3965}{793} \times 253 = ₹1265.$

22. (b) We have, $n = 4$ and $T = 24$ years.

$\therefore$ Rate of interest $= \dfrac{100(n-1)}{T} = \dfrac{100(4-1)}{24}$

$$= 12\dfrac{1}{2}\%$$

23. (c) Here, $n = 3$, $R = 10\%$ p.a.

$\therefore$ Required time $= \left(\dfrac{n-1}{R}\right) \times 100 = \left(\dfrac{3-1}{10}\right) \times 100$

$$= 20 \text{ years.}$$

24. (a) We have, $n = 2$, $T = 8$ years, $m = 3$.

$\therefore$ Required Time $(T) = \left(\dfrac{m-1}{n-1}\right) \times T$

$$= \left(\dfrac{3-1}{2-1}\right) \times 8 = 16 \text{ years.}$$

25. (b) Here, change in $SI = ₹56$, $R_1 - R_2 = 2$, $T = 4$ years, $P = ?$

Therefore, using the formula

Change in $SI = \dfrac{PT}{100} \times (R_1 - R_2)$

We get, $56 = \dfrac{P \times 4}{100} \times 2 \Rightarrow P = ₹700$

$\therefore$ The sum is $₹700.$

26. (a) Here, change in $SI = ₹40$,
$P_1 - P_2 = 800 - 400 = ₹400$, $T = 2$ years.

Using, change in $SI = \dfrac{RT}{100} \times (P_1 - P_2)$

We have, $40 = \dfrac{R \times 2}{100} \times 400 \Rightarrow R = 5\%$

27. (a) Here, change in $SI = ₹60$,

$R_1 - R_2 = 3 - \dfrac{5}{2} = \dfrac{1}{2}$, $T = 4$ years, $P = ?$

Using, change in $SI = \dfrac{PT}{100} \times (R_1 - R_2)$

We have, $60 = \dfrac{P \times 4}{100} \times \dfrac{1}{2} \Rightarrow P = ₹3000.$

28. (b) We have, $A_1 = ₹2800$, $A_2 = ₹3250$, $T_1 = 2$ years, $T_2 = 5$ years

$\therefore$ Rate of interest per annum (R)

$= \dfrac{A_1 - A_2}{A_1 T_2 - A_2 T_1} \times 100\% = \dfrac{2800 - 3250}{2800 \times 5 - 3250 \times 2} \times 100\%$

$= \dfrac{450 \times 100}{14000 - 6500}\% = \dfrac{45000}{7500}\% = 6\%$

29. **(c)** We have, $A_1 = ₹1760$, $A_2 = 2000$, $T_1 = 2$ years, $T_2 = 5$ years.

$$\therefore \text{ Principal } (P) = \frac{A_1 T_2 - A_2 T_1}{T_2 - T_1}$$

$$= \frac{1760 \times 5 - 2000 \times 2}{5 - 2} = \frac{4800}{3}$$

$$= ₹1600.$$

30. **(b)** We have, $A_1 = ₹450$, $A_2 = ₹350$, $R_1 = 7\%$, $R_2 = 5\%$.

$$\therefore \text{ Principal } (P) = \frac{A_2 R_1 - A_1 R_2}{R_1 - R_2}$$

$$= \frac{350 \times 7 - 450 \times 5}{7 - 5} = \frac{200}{2} = ₹100.$$

31. **(c)** We have, $A_1 = ₹400$, $A_2 = ₹200$, $R_1 = 10\%$, $R_2 = 4\%$.

$$\therefore \text{ Time } (T) = \frac{A_1 - A_2}{A_2 R_1 - A_1 R_2} \times 100$$

$$= \frac{400 - 200}{200 \times 10 - 400 \times 4} \times 100 = \frac{20000}{400}$$

$$= 50 \text{ years.}$$

32. **(a)** Here, $z = ₹9$, $a = ₹1$, $b = 12$, $n = 10$, $R = ?$
Using the formula

$$z = na + \frac{Ra}{100 \times b} \times \frac{n(n-1)}{2},$$

We get, $9 = 10 \times 1 + \dfrac{R \times 1}{100 \times 12} \times \dfrac{10 \times 9}{2}$

$$\Rightarrow \frac{90R}{2400} = 1 \Rightarrow R = \frac{2400}{9} = 266\frac{2}{3}\%$$

33. **(a)** Here, $T_1 = 1$, $T_2 = 2$, $T_3 = 3$,

$$R_1 = R_2 = R_3 = 5\%$$

The shares of Vikas, Vijay and Viraj will be in the ratio

$$\frac{1}{R_1 T_1} : \frac{1}{R_2 T_2} : \frac{1}{R_3 T_3} = \frac{1}{1 \times 5} : \frac{1}{2 \times 5} : \frac{1}{3 \times 5}$$

$$= \frac{1}{1} : \frac{1}{2} : \frac{1}{3} = 6:3:2.$$

Sum of proportionals = $6 + 3 + 2 = 11$

$$\therefore \text{ Share of Vikas} = \frac{6}{11} \times 7700 = ₹4200$$

$$\text{Share of Vijay} = \frac{3}{11} \times 7700 = ₹2100$$

$$\text{Share of Viraj} = \frac{2}{11} \times 7700 = ₹1400$$

Therefore, Vikas's share is $4200 - 1400 = ₹2800$ more than that of Viraj.

34. **(b)** Let the required sum of money be $₹x$. Here $R_1 = 5\%$, $T_1 = 4$ years, $R_2 = 4\%$, $T_2 = 10$ years.

Given: $x{:}560 = \dfrac{1}{R_1 T_1} : \dfrac{1}{R_2 T_2} = \dfrac{1}{5 \times 4} : \dfrac{1}{4 \times 10}$

$$\Rightarrow \frac{x}{560} = \frac{2}{1} \quad \text{or,} \quad x = ₹1120.$$

35. **(a)** Here, $P_1 = ₹12000$, $R_1 = 10\%$, $P_2 = ?$, $R_2 = 20\%$, $R = 14\%$.
Therefore, using the formula

$$R = \frac{P_1 R_1 + P_2 R_2}{P_1 + P_2}$$

We get, $14 = \dfrac{12000 \times 10 + P_2 \times 20}{12000 + P_2}$

or, $P_2 = ₹8000$

$$\therefore \text{ Total amount invested} = ₹(12000 + 8000)$$

$$= ₹20000.$$

36. **(b)** We have, $P_1 = ₹3000$, $R_1 = 10\%$, $P_2 = ₹5000$, $R_2 = 8\%$.
$\therefore$ Required rate of interest

$$= \frac{P_1 R_1 + P_2 R_2}{P_1 + P_2}$$

$$= \frac{3000 \times 10 + 5000 \times 8}{3000 + 5000} = \frac{70}{8} = 8\frac{3}{4}\%$$

37. **(c)** We have, $\dfrac{1}{a} = \dfrac{2}{3}$, $\dfrac{1}{b} = \dfrac{1}{6}$,

$$\frac{1}{c} = 1 - \left(\frac{2}{3} + \frac{1}{6}\right) = \frac{1}{6},$$

$R_1 = 3\%$, $R_2 = 6\%$, $R_3 = 12\%$, $A = ₹25$.

$$\therefore \text{ The capital} = \frac{A \times 100}{\dfrac{R_1}{a} + \dfrac{R_2}{b} + \dfrac{R_3}{c}}$$

$$= \frac{25 \times 100}{3 \times \dfrac{2}{3} + \dfrac{6}{6} + \dfrac{12}{6}} = \frac{2500}{5}$$

$$= ₹500.$$

38. **(a)** Interest for 5 years on the sum = ₹300.
When the principal is trebled, the interest is also trebled.
$\therefore$ Interest for another 5 years on this increased sum = $₹(300 \times 3) = ₹900$
$\therefore$ Total interest = $₹300 + ₹900 = ₹1200$.

39. **(a)** The simple interest on ₹1500 invested at a rate of 10% p.a. for 5 years is

$$= \frac{1500 \times 10 \times 5}{100} = ₹750$$

Now, principal after 5 years = ₹1500 + 750

$$= ₹2250$$

Also, final amount = ₹2500

∴   Simple interest = ₹2500 − 2250 = ₹250

∴   Time (T) = $\dfrac{250 \times 100}{2250 \times 10} = \dfrac{10}{9}$ years

Hence, total time = 5 + $\dfrac{10}{9} = \dfrac{55}{9}$ or $6\dfrac{1}{9}$ years.

40. (b) Let the sum of money lent by Sumit to Mohit be ₹x.

Then, simple interest paid by Mohit after 1 year

$$= \dfrac{x \times 5 \times 1}{100} = ₹\,\dfrac{5x}{100}$$

Also, the simple interest received by Mohit from Birju after 1 year

$$= \dfrac{x \times \dfrac{17}{2} \times 1}{100} = ₹\,\dfrac{17x}{200}$$

Given: $\dfrac{5x}{100} + 350 = \dfrac{17x}{200}$

⇒ $\dfrac{5x + 35000}{100} = \dfrac{17x}{200}$

⇒   1700x − 1000x = 7000000

or, 700x = 7000000

or, x = $\dfrac{7000000}{700}$ = ₹10000.

Thus, the sum of money lent by Sumit to Mohit is ₹10000.

41. (a) Simple interest paid by Brinda on ₹1000 for 1 year

$$= \dfrac{1000 \times 5 \times 1}{100} = ₹50$$

Rent received by Brinda from Ramu in 1 year

$$= 12\dfrac{1}{2} \times 12 = ₹150$$

∴   Net savings = ₹100

Thus, Brinda will clear the debt of ₹1000 in 10 years.

42. (c) Let the sum be ₹x

Given: $\dfrac{x \times 4 \times 2}{100} + \dfrac{x \times 6 \times 4}{100} + \dfrac{x \times 8 \times 3}{100}$ = 1120

⇒   56x = 112000

or, x = $\dfrac{112000}{56}$ = ₹2000.

Exercise-2
(Based on Memory)

1. (d) 10 + 3% = 103

[Amount after 1st half year @ 3%]

103 + 3% = 106.09

[Amount after 2nd half year @ 3%]

∴   Effective rate of interest = 6.09% per annum

3. (a) Sum = ₹72, SI = ₹9

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

∴   Time = $\dfrac{9 \times 100}{72 \times \dfrac{25}{4}} = \dfrac{9 \times 100}{18 \times 25} = 2$

4. (c) Let one part be ₹x

∴   The other part = ₹(1500 − x)

Given: $\dfrac{x \times 5 \times 10}{100} = \dfrac{(1500 - x) \times 4}{100} \times \dfrac{25}{2}$

⇒   50x = (1500 − x)50

⇒   100x = 1500 × 50

⇒ x = 750

∴   The sum lent out at 12.5% p.a.

= 1500 − x = 750

5. (d) Principal amount = $\dfrac{S.I. \times 100}{T \times R}$

$$= \dfrac{8376 \times 100}{8 \times 6} = ₹17450$$

6. (b) Suppose Manish added ₹x to the borrowed money.

Then

3 × (9 − 6)% of 1150 + (9 × 3)% of x = 274.95

⇒   9% of 1150 + 27% of x = 274.95

⇒ $x = \dfrac{274.95 - 103.5}{27} \times 100 = ₹635$

∴   Required value = 635 + 1150

= ₹1785

7. (e) (18 × 5)% of 988 = 90% of 988

100% of 988 − 10% of 988

= 988 − 98.8 = ₹889.2

8. (a) Let the amount be ₹x

According to question,

$\dfrac{x \times 14 \times 6}{1200} - \dfrac{x \times 8 \times 8}{1200} = 250$

$\therefore$ $x = ₹15000$.

9. (c) Rate of interest $= \dfrac{956 - 800}{3 \times 800} \times 100$

$= 6.50\%$

$\therefore$ Amount $= 800 + \dfrac{800 \times 9.5 \times 3}{100}$

$= 800 + 228 = ₹1028$.

10. (e) Let the amount deposited at the rate of 15% per annum be ₹x

15% of x + 18% of $(25000 - x) = 4050$

or, 15% of x + 18% of 25000 − 18% of $x = 4050$

or, 3% of $x = 4500 - 4050$

or, $\dfrac{3}{100} \times x = 450$

or, $x = ₹15000$

$\therefore$ Amount deposited at 18%

$= ₹(25000 - 15000) = ₹10000$.

11. (e) % interest on total amount per annum

$= \dfrac{3620 \times 100}{16500 \times 2} = \dfrac{362}{33}$

Now, by Alligation method
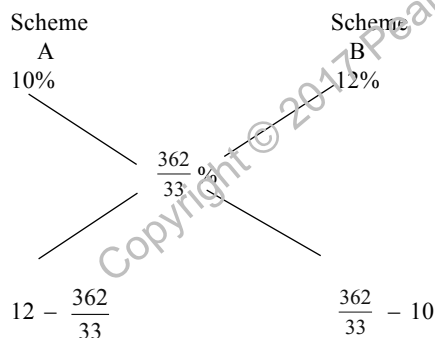
Hence, ratio of amount invested in schemes

A and B $= \left(12 - \dfrac{362}{33}\right) : \left(\dfrac{362}{33} - 10\right) = 17:16$

Hence, amount invested in A $= \dfrac{17 \times 16500}{17 + 16}$

$= ₹8500$.

12. (a) Let the sum be ₹P

Now, 45% of $P = 4016.25$ or, $P = ₹8925$.

13. (a) Suppose, marked price $= ₹100$

Price after 1st discount $= ₹90$

Price after 2nd discount $= ₹72$

$\therefore$ If S.P. is ₹72, then marked price $= ₹100$

$\therefore$ If S.P. is ₹540, then marked price

$= ₹\dfrac{100}{72} \times 540 = ₹750$.

14. (c) Let sum $= ₹P$

Simple interest $= ₹P$

Rate $R = 10\%$

$\therefore$ Time $= \dfrac{P \times 100}{P \times 10} = 10$ years.

15. (a) Suppose present worth $= ₹x$

$\therefore$ $\dfrac{x \times 5 \times 2}{100} = 132 - x$

$\therefore$ $x = 10(132 - x)$

$\Rightarrow$ $11x = 1320$ or, $x = 120$.

16. (c) Suppose ₹x are invested at 6% and ₹$(5000 - x)$ at 9%.

$\therefore$ $\dfrac{x \times 6 \times 1}{100} + \dfrac{(5000 - x) \times 9 \times 1}{100} = 390 \Rightarrow x = 2000$

$\therefore$ ₹2000 are lent at 6% and ₹3000 at 9%

17. (a) Let first part be x

Second part be y

$\therefore$ Third part $= 2379 - (x + y)$

$\therefore$ $x + \dfrac{x \times 5 \times 2}{100} = y + \dfrac{y \times 5 \times 3}{100}$

$= [2379 - (x + y)] + \dfrac{[2379 - (x + y)] \times 5 \times 4}{100}$ $\cdots$(1)

$\therefore$ $x + \dfrac{x}{10} = y + \dfrac{3y}{20}$ (from 1)

$\Rightarrow$ $x + \dfrac{x}{10} = y + \dfrac{3y}{20}$

$\Rightarrow$ $22x = 23y$ $\cdots$(2)

Also $y + \dfrac{3y}{20} = \dfrac{6}{5}[2379 - (x + y)]$ (from 1)

$\Rightarrow$ $\dfrac{23y}{20} = \dfrac{6}{5}\left[2379 - x - \dfrac{22x}{23}\right]$ (from 2)

$\Rightarrow$ $\dfrac{22x}{4} = 6\left[2379 - \dfrac{45x}{23}\right]$

$\Rightarrow$ $\dfrac{11x}{12} = 2379 - \dfrac{45x}{23}$

$\Rightarrow$ $\dfrac{11x}{12} + \dfrac{45x}{23} = 2379 \Rightarrow x = 828$.

18. (b) Let P be the sum

$\therefore$ $\dfrac{P \times \frac{5}{2} \times 12}{100} = \dfrac{P \times \frac{7}{2} \times 10}{100} - 40$

$\Rightarrow$ $\dfrac{30P}{100} - \dfrac{35P}{100} = -40 \Rightarrow -\dfrac{5P}{100} = -40$

$\Rightarrow$ $P = \dfrac{100 \times 40}{5} = 800$.

19. (a) Suppose, sum = K

$I = 0.125K$

Rate = 10%

∴ Time = $\dfrac{100 \times 0.125K}{K \times 10} = 1.25 = 1\dfrac{1}{4}$ years.

20. (a) Let sum = ₹K

Time = T

∴ $I = \dfrac{K}{4}$

∴ Rate % (R) = $\dfrac{\dfrac{K}{4} \times 100}{K \times T} = \dfrac{25}{T}$

⇒ $RT = 25 \Rightarrow R^2 = 25$ (∵ $R = T$)

⇒ $R = 5$.

21. (d) Let Principal = ₹P

$I = ₹P$

∴ $T = \dfrac{SI \times 100}{\text{Principal} \times \text{Rate}\%} = \dfrac{P \times 100}{P \times 4} = 25$ years.

22. (b) Let sum = ₹P

∴ $\dfrac{P \times 6 \times 10}{100} - \dfrac{P \times 5 \times 2}{100} = 100$

⇒ $60P - 10P = 10000$

⇒ $P = 200$.

23. (d) Let the sum be ₹P

∴ $\dfrac{P \times 7 \times \dfrac{9}{2}}{100} - \dfrac{P \times 7 \times 4}{100} = 31.50$

⇒ $\dfrac{63P}{2} - 28P = 3150$

⇒ $7P = 6300 \Rightarrow P = 900$.

24. (d) Sum = $\dfrac{\text{Difference} \times 100}{|R_1 T_1 - R_2 T_2|}$

$= \dfrac{42 \times 100}{5} = ₹840$.

25. (c) $252 = 1600 \times R \times \dfrac{9}{4} \times \dfrac{1}{100}$ $\left[I = \dfrac{P \times R \times T}{100} \right]$

∴ $R = \dfrac{252}{36} = 7\%$

26. (c) $I = \dfrac{P \times R \times T}{100}$

$80 = \dfrac{400 \times 4 \times R}{100} \Rightarrow R = 5$

If $R = 7$, then

$I = \dfrac{400 \times 4 \times 7}{100} = 112$

∴ Amount = ₹512.

27. (b) Let the sum of money be P

$I = \dfrac{P \times R \times T}{100} \Rightarrow \dfrac{4}{9}P = \dfrac{P \times R \times T}{100}$

∴ $R = \sqrt{\dfrac{400}{9}} = \dfrac{20}{3} = 6\dfrac{2}{3}\%$ %

28. (b) Suppose, one part of sum = ₹x

∴ Other part of the sum = ₹$(1500 - x)$

According to question,

$\dfrac{x \times 6 \times 1}{100} + \dfrac{(1500 - x) \times 5 \times 1}{100} = 85$
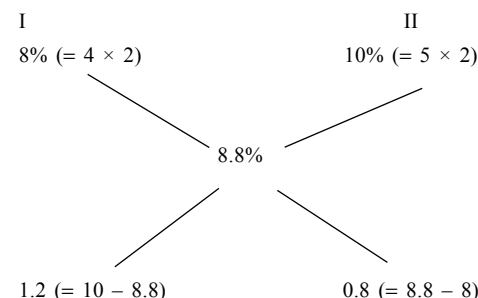
$6x + 7500 - 5x = 8500$ or, $x = 1000$.

29. (a) $\dfrac{5000 \times 2\dfrac{1}{4} \times 2}{100} = 50 \times \dfrac{9}{4} \times 2 = 225$

∴ Gain per year = ₹112.50.

31. (c) Required time = $\dfrac{2 \times 100}{5 \times 8}$

$= 5$ years.

32. (b) By the method of Alligation

₹440 is 8.8% of 5000

I	II
8% (= 4 × 2)	10% (= 5 × 2)

8.8%

1.2 (= 10 − 8.8)   0.8 (= 8.8 − 8)

Hence, required ratio = $\dfrac{1.2}{0.8} = \dfrac{3}{2} = 3{:}2$.

33. (d) Here, $P = 3K$, $I = 2K$, $T = 10$ years

Hence, rate = $\dfrac{2K \times 100}{3K \times 10} = \dfrac{20}{3} = 6\dfrac{2}{3}\%$

34. (c) Let the sum be ₹x

∴ $\dfrac{x \times 7\dfrac{1}{2} \times 1\dfrac{1}{4}}{100} - \dfrac{x \times 12\dfrac{1}{2} \times \dfrac{2}{3}}{100} = 32.50$

⇒ $\dfrac{75}{8}x - \dfrac{25}{3}x = 3250$

⇒ $25x = 3250 \times 24$

⇒ $x = 3120$.

35. (c) Let the sum be ₹x

Let the rate be $R\%$

∴ $\dfrac{x \times 4 \times R}{100} = \dfrac{9}{25}x$

⇒ $R = 9$.

36. (a) Rate % per annum = $\dfrac{100[568-520]}{520\times 7 - 568\times 5}$

$= \dfrac{100\times 48}{3640 - 2840}$

$= \dfrac{100\times 48}{800} = 6\%$

Sum = $\dfrac{(568-520)\times 100}{(7-5)\times 6} = \dfrac{48\times 100}{2\times 6} = ₹400.$

38. (a) Rate % = $\dfrac{\left(\dfrac{41}{40}-1\right)\times 100}{\dfrac{1}{4}} = 10\%$

39. (a) His capital = $\dfrac{55.50}{1.5} \times 100 = ₹3700.$

40. (d) Let Principal = P and Rate of interest = $R\%$ per annum.

Then $\dfrac{P\times R\times 7}{100} = 1750$

or $PR = 25000$

Now $I = \dfrac{P\times (R+2)\times 7}{100} = \dfrac{25000\text{x } 7 + P\text{ x } 14}{100}$

When we solve this equation, we find that we have two variables and one equation.

Therefore, cannot be determined is the correct answer.

41. (b) Ratio of Nikhil's investment in difference schemes

$= 100:\dfrac{150\times 100}{240}:150 = 8:5:12$

Now, according to the question

$\dfrac{8K\times 10}{100}+\dfrac{5K\times 12}{100}+\dfrac{12K\times 15}{100} = 3200$

or, $80K + 60K + 180K = 3200\times 100$

or, $320K = 3200\times 100$ or $K = 1000$

∴ Amount invested in scheme B = 1000×5
= ₹5000.

42. (a) $1200 = \dfrac{P\times 4\times 8}{100}$

$P = \dfrac{1200\times 1000}{4\times 8} = 3750$

Now, S.I. = $\dfrac{3750\times 3\times 6\times 3}{100} = 2025.$

43. (d) Let the rate of interest be $x\%$ per annum.

∴ $\dfrac{P\times x\times 4}{100}\times\dfrac{3}{2} = \dfrac{P\times x\times 6}{100}$

$6x = 6x$

∴ The value of x cannot be determined.

44. (b) SI = $2P - P = P$

∴ $P = \dfrac{P\times 20\times t}{100}$

⇒ $t = 5$ years.

45. (c) SI = $956 - 800 = ₹156$

Therefore, rate of interest

$= \dfrac{\text{SI}\times 100}{\text{Principal}\times\text{Time}}$

$= \dfrac{156\times 100}{800\times 3} = 6.5\%$

per annum.

Thus, new rate = 10.5%

so,

S.I. = $\dfrac{\text{Principal}\times\text{Time}\times\text{Rate}}{100}$

$= \dfrac{800\times 3\times 105}{100} = ₹252$

Hence, Amount = $800 + 252$
= ₹1052.

46. (b) $\dfrac{\text{Interest}}{\text{Principal}} = \dfrac{16}{25}$

Therefore, rate of interest

$= \dfrac{\text{SI}\times 100}{\text{Principal}\times\text{Time}}$

⇒ $x = \dfrac{16}{25}\times\dfrac{100}{x}$

⇒ $x^2 = 16\times 4 = 64$

⇒ $x = \sqrt{64} = 8$ % per annum.

47. (a) Let the amount lent at 8% rate of interest be ₹x.

∴ Amount lent at $\dfrac{4}{3}\%$ rate of interest = ₹$(20,000 - x)$

∴ SI = $\dfrac{\text{Principal}\times\text{Rate}\times\text{Time}}{100}$

∴ $\dfrac{x\times 8\times 1}{100}+\dfrac{(20000 - x)\times\dfrac{4}{3}\times 1}{100} = 800$

⇒ $\dfrac{2x}{25}+\dfrac{20000 - x}{75} = 800$

⇒ $\dfrac{6x + 20000 - x}{75} = 800$

⇒ $5x + 20000 = 75\times 800 = 60000$

⇒ $5x = 60000 - 20,000 = 40000$

⇒ $x = \dfrac{40000}{5} = ₹8000.$

48. (c) Let the sum of money be ₹x.

Now, according to the question,

$$\frac{x \times 6 \times 3}{100} + \frac{x \times 5 \times 9}{100} + \frac{x \times 3 \times 13}{100} = 8160$$

$$\Rightarrow \quad 18x + 45x + 39x = 816000$$

$$\Rightarrow \quad 120x = 816000 \quad \Rightarrow \quad x = \frac{816000}{102} = ₹8000.$$

49. (d) If the principal be ₹P, then $SI = \dfrac{P}{9}$

If rate = $r\%$, then

$$Rate = \frac{SI \times 100}{Principal \times Time}$$

$$\Rightarrow \quad r = \frac{1 \times 100}{9 \times r} = 9r^2 = 100$$

$$\Rightarrow \quad r^2 = \frac{100}{9}$$

$$\Rightarrow \quad r = \frac{10}{3} = 3\frac{1}{3}\%$$

50. (d) S1 on ₹12000

$$= \frac{12000 \times 8 \times 1}{100} = ₹960$$

Desired gain on ₹20000

$$= 20000 \times \frac{10}{100} = ₹2000$$

$$\therefore \quad SI \text{ on } ₹8000 = (2000 - 960) = ₹1040$$

$$\therefore \quad Rate = \frac{SI \times 100}{Principal \times Time} = \frac{1040 \times 100}{8000}$$

= 13% per annum.

51. (b) $SI = \dfrac{Principal \times Time \times Rate}{100}$

Now, according to the question,

$$\frac{x \times m \times a}{100} = \frac{y \times m^2 \times a^2}{100}$$

$$\Rightarrow \quad \frac{x}{y} = \frac{m^2 a^2}{ma} = \frac{ma}{1}.$$

52. (d) Let A borrowed ₹x from B.

$\therefore$ Amount borrowed from C = ₹$(1200 - x)$

Now, according to the question

$$\frac{x \times 14 \times 1}{100} + \frac{(1200 - x) \times 15 \times 1}{100} = 172$$

$$\Rightarrow \quad 14x + 18000 - 15x = 17200$$

$$\Rightarrow \quad 18000 - x = 17200$$

$$\Rightarrow \quad x = 18000 - 17200 = ₹800.$$

53. (b) Let the younger son's share be ₹x.

$\therefore$ Elder son's share = ₹$(120000 - x)$

Now, according to the question,

$$x + \frac{x \times 5 \times 6}{100} = (120000 - x) + \frac{(120000 - x) \times 4 \times 5}{100}$$

$$\Rightarrow \quad 20x + 6x = 20 \times 120000 - 20x + 480000 - 4x$$

$$\Rightarrow \quad 50x = 2400000 + 480000$$

$$\Rightarrow \quad 50x = 2880000$$

$$\Rightarrow \quad x = \frac{2880000}{50} = ₹57600.$$

54. (c) Let the total capital invested be ₹x

$\therefore$ Total interest

$$= \frac{\frac{1}{3}x \times 7 \times 1}{100} + \frac{\frac{1}{4}x \times 8 \times 1}{100} + \frac{\left(1 - \frac{1}{3} - \frac{1}{4}\right)x \times 10 \times 1}{100}$$

$$= \frac{7x}{300} + \frac{8x}{400} + \frac{5x}{120}$$

$$= \frac{28x + 24x + 50x}{1200} = \frac{102x}{1200}$$

Now, according to the question,

$$561 = \frac{102x}{1200}$$

$$\therefore \quad x = \frac{561 \times 1200}{102} = ₹6600.$$

55. (a)

Let the sum lent at 6% rate of interest be ₹x.

Then, ₹$(1680 - x)$ is lent at 8% rate of interest.

Then, SI = 19000 − 16800 = ₹2200

$$\frac{x \times 6 \times 2}{100} + \frac{(16800 - x) \times 2 \times 8}{100} = 2200$$

or, $12x + 268800 - 16x = 2200 \times 100$

or, $268800 - 220000 = 4x$

or, $x = \dfrac{48800}{4} = ₹12200.$

56. (b) $r = \dfrac{10800 \times 100}{22500 \times 4} = 12\%$

$$CI = 22500\left(1 + \frac{12}{100}\right)^2 - 22500$$

$$= 22500 \times \frac{112}{100} \times \frac{112}{100} - 22500 = 28224 - 22500 = 5724$$

57. (e) Principal (P) $= \dfrac{1000 \times 100}{5 \times 4} = ·5000$

$$\therefore CI = 5000 \times 2\left[\left(1 + \frac{5}{100}\right)^2 - 1\right]$$

$$= 10000 \times (1.1025 - 1) = ₹1025.$$

Notes:

Combined rate of interest for 2 years in case of calculating compound interest

$$\left(5 + 5 + \frac{5 \times 5}{100}\right)\% = (10 + 0.25)\% = 10.25\%$$

Required $CI = 10000 \times \dfrac{10.25}{100} = ₹1025$

58. (e) Required amount $= 4000\left(\dfrac{100+10}{100}\right) = ₹4400.$