

Simple Interest

Exercise 12A

Simple Interest Formula

$$I = P \times R \times T$$

Where:

I = the Interest Money created in dollars

P = the "Principal" starting amount of money

R = the Interest Rate per year (in decimal form)

T = the Time the money is Invested,
or Borrowed, in Years

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

$$A = P + SI$$

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

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

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

where,

SI = Simple Interest

P = Principal

R = Rate

T = Time

A = Amount

Q1

Answer :

$$P = \text{Rs. } 6400, R = 6\%, T = 2 \text{ years}$$

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{6400 \times 6 \times 2}{100} \\ = \text{Rs. } 768$$

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

$$= 6400 + 768$$

$$= \text{Rs. } 7168$$

Q2

Answer :

$$P = \text{Rs. } 2650, R = 8\%, T = 2\frac{1}{2} \text{ years} = \frac{5}{2} \text{ years}$$

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{2650 \times 8 \times 5}{100 \times 2}$$

$$= \text{Rs. } 530$$

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

$$= 2650 + 530$$

$$= \text{Rs. } 3180$$

Q3

Answer :

$$P = \text{Rs. } 1500, R = 12\%, T = 3 + \frac{3}{12} = \frac{13}{4} \text{ years}$$

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{1500 \times 12 \times 13}{100 \times 4} \\ = \text{Rs. } 585$$

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

$$= 1500 + 585$$

$$= \text{Rs. } 2085$$

Q4

Answer :

$$P = \text{Rs. } 9600$$

$$R = 7\frac{1}{2}\%$$

$$T = 5 \text{ months} = \frac{5}{12} \text{ years}$$

$$\text{S.I.} = \frac{P \times R \times T}{100} \\ = \frac{9600 \times 15 \times 5}{100 \times 2 \times 12} \\ = \text{Rs. } 300$$

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

$$= 9600 + 300$$

$$= \text{Rs. } 9900$$

Q5

Answer :

$$P = \text{Rs. } 5000, R = 9\%, T = 146 \text{ days} = \frac{146}{365} \text{ years}$$

$$S.I. = \frac{P \times R \times T}{100} = \frac{5000 \times 9 \times 146}{100 \times 365} \\ = \text{Rs. } 180$$

$$\text{Amount} = P + S.I. \\ = 5000 + 180 \\ = \text{Rs. } 5180$$

Q6

Answer :

$$P = \text{Rs. } 6400, S.I. = \text{Rs. } 1152, R = 6\%$$

$$T = \frac{S.I. \times 100}{P \times R} = \frac{1152 \times 100}{6400 \times 6} \\ = \frac{1152}{384} \\ = 3 \text{ years}$$

Q7

Answer :

$$P = \text{Rs. } 9540, S.I. = \text{Rs. } 1908, R = 8\%$$

$$T = \frac{S.I. \times 100}{P \times R} = \frac{1908 \times 100}{9540 \times 8} \\ = \frac{10}{4} \\ = 2\frac{1}{2} \text{ years}$$

Q8

Answer :

$$P = \text{Rs. } 5000, A = \text{Rs. } 6450, R = 12\%$$

$$S.I. = A - P \\ = 6450 - 5000 \\ = \text{Rs. } 1450$$

$$T = \frac{S.I. \times 100}{P \times R} = \frac{1450 \times 100}{5000 \times 12} \\ = \frac{29}{12} \\ = 2\frac{5}{12} \\ = 2 \text{ years } 5 \text{ months}$$

Q9

Answer :

$$P = \text{Rs. } 8250, S.I. = \text{Rs. } 1100, T = 2 \text{ years}$$

$$R = \frac{S.I. \times 100}{P \times T} = \frac{1100 \times 100}{8250 \times 2} \\ = \frac{1100}{165} = 6.67\%$$

Q10

Answer :

$$P = \text{Rs. } 5200, S.I. = \text{Rs. } 975 \quad [T = 2\frac{1}{2} \text{ years} = \frac{5}{2} \text{ years}]$$

$$R = \frac{S.I. \times 100}{P \times T} = \frac{975 \times 100 \times 2}{5200 \times 5} \\ = \frac{195}{26} \\ = 7.5\%$$

Q11

Answer :

$$P = \text{Rs. } 3560, A = \text{Rs. } 4521.20, T = 3 \text{ years}$$

$$S.I. = A - P = 4521.20 - 3560$$

$$= \text{Rs. } 961.20$$

$$R = \frac{S.I. \times 100}{P \times T} = \frac{961.20 \times 100}{3560 \times 3}$$

$$= \frac{96120 \times 100}{100 \times 3560 \times 3}$$

$$= 9\%$$

Q12

Answer :

$$P = \text{Rs } 6000, R = 12\%, T = 3 \text{ years } 8 \text{ months} = 3 \frac{8}{12} = \frac{44}{12} \text{ years}$$

$$S.I. = \frac{P \times R \times T}{100} = \frac{6000 \times 12 \times \frac{44}{12}}{100 \times 12} = \text{Rs } 2640$$

$$A = P + S.I.$$

$$= 6000 + 2640$$

$$= \text{Rs } 8640$$

Q13

Answer :

$$P = \text{Rs. } 12600 \quad R = 15\% \quad T = 3 \text{ years}$$

$$S.I. = \frac{P \times R \times T}{100} = \frac{12600 \times 15 \times 3}{100}$$

$$= \text{Rs. } 5670$$

$$A = \text{Rs. } 12600 + \text{Rs. } 5670 = \text{Rs. } 18270$$

Hari had to pay Rs. 18270 to the money lender, but he paid Rs. 7070 and a goat.

$$\therefore \text{Cost of the goat} = \text{Rs. } 18270 - \text{Rs. } 7070$$

$$= \text{Rs. } 11200$$

Q14

Answer :

Let the sum be Rs. P.

$$S.I. = \text{Rs. } 829.50, T = 3 \text{ years}, R = 10\%$$

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

$$= \frac{829.50 \times 100}{10 \times 3}$$

$$= \frac{8295}{3}$$

$$= 2765$$

Hence, the sum is Rs. 2765.

Q15

Answer :

Let the required sum be Rs. x .

$$A = \text{Rs. } 3920, R = 7 \frac{1}{2} \%, T = 3 \text{ years}$$

Now,

$$\text{Now, } S.I. = \frac{P \times R \times T}{100} = \frac{x \times 15 \times 3}{2 \times 100} = \frac{9x}{40}$$

$$A = P + S.I.$$

$$= x + \frac{9x}{40} = \frac{40x + 9x}{40} = \frac{49x}{40}$$

But the amount is Rs. 3920.

$$\Rightarrow \frac{49x}{40} = 3920$$

$$\Rightarrow x = \frac{3920 \times 40}{49} = \frac{156800}{49} = 3200$$

Hence, the required sum is Rs. 3200.

Q16

Answer :

Given: $R=11\%$, $T=2$ years 3 months $= 2 + \frac{3}{12} = \frac{27}{12}$ years

Let the required sum be Rs. x .

$$S.I. = \frac{P \times R \times T}{100} = \frac{x \times 11 \times \frac{27}{12}}{100} = \frac{99x}{400}$$

$$A = P + S.I.$$

$$= x + \frac{99x}{400} = \frac{400x + 99x}{400} = \frac{499x}{400}$$

But the amount is Rs. 4491.

$$\Rightarrow \frac{499x}{400} = 4491$$

$$\Rightarrow x = \frac{4491 \times 400}{499} = \frac{1796400}{499} = 3600$$

Hence, the required sum is Rs. 3600.

$$\therefore S.I. = \frac{P \times R \times T}{100} = \frac{3600 \times 11 \times \frac{27}{12}}{100} = \text{Rs. } 1188$$

$$\therefore \text{Amount} = P + S.I. = 3600 + 1188 = \text{Rs. } 4788$$

Q17

Answer :

Let the required sum be Rs. x .

$$S.I. = \frac{P \times R \times T}{100} = \frac{x \times 8 \times 2}{100} = \frac{16x}{100}$$

$$A = P + S.I.$$

$$= x + \frac{16x}{100} = \frac{100x + 16x}{100} = \frac{116x}{100}$$

But the amount is Rs. 12122.

$$\Rightarrow \frac{116x}{100} = 12122$$

$$\Rightarrow x = \frac{12122 \times 100}{116} = 10450$$

$$\text{Now, } S.I. = \frac{P \times R \times T}{100} = \frac{10450 \times 8 \times \frac{3}{4}}{100} = \text{Rs. } 2508$$

$$\therefore A = P + S.I.$$

$$= \text{Rs. } 10450 + \text{Rs. } 2508$$

$$= \text{Rs. } 12958$$

Q18

Answer :

$$P = \text{Rs. } 3600 \quad A = \text{Rs. } 4734 \quad T = 3\frac{1}{2} = \frac{7}{2} \text{ years}$$

$$S.I. = A - P$$

$$= 4734 - 3600$$

$$= \text{Rs. } 1134$$

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

$$= \frac{1134 \times 100 \times 2}{3600 \times 7}$$

$$= 9\%$$

Q19

Answer :

$$P = \text{Rs. } 640, A = \text{Rs. } 768, T = 2 \text{ years } 6 \text{ months} = \frac{5}{2} \text{ years}$$

$$\begin{aligned} \text{S.I.} &= A - P \\ &= 768 - 640 \\ &= \text{Rs. } 128 \end{aligned}$$

$$R = \frac{\text{S.I.} \times 100}{P \times T} = \frac{128 \times 100 \times 2}{640 \times 5} = 8\%$$

$$P = \text{Rs. } 850, R = 8\%, T = 3 \text{ years}$$

$$\therefore \text{S.I.} = \frac{P \times R \times T}{100} = \frac{850 \times 8 \times 3}{100} = \frac{2040}{10} = \text{Rs. } 204$$

$$\begin{aligned} \therefore A &= P + \text{S.I.} \\ &= 850 + 204 \\ &= \text{Rs. } 1054 \end{aligned}$$

Q20

Answer :

$$P = \text{Rs. } 5600, A = \text{Rs. } 6720, R = 8\%$$

$$\begin{aligned} \text{S.I.} &= A - P \\ &= 6720 - 5600 \\ &= \text{Rs. } 1120 \end{aligned}$$

$$\begin{aligned} T &= \frac{\text{S.I.} \times 100}{P \times R} \\ &= \frac{1120 \times 100}{5600 \times 8} \\ &= \frac{1120}{448} \\ &= 2\frac{1}{2} \text{ years} \end{aligned}$$

Q21

Answer :

Let the sum be Rs. x .

$$\text{Amount} = \frac{8x}{5}$$

$$\begin{aligned} \therefore \text{S.I.} &= A - P = \frac{8x}{5} - x \\ &= \frac{3x}{5} \end{aligned}$$

Let the rate be $R\%$.

$$\begin{aligned} \text{S.I.} &= \frac{P \times R \times T}{100} \\ \Rightarrow \frac{3x}{5} &= \frac{x \times R \times 5}{100} \\ \Rightarrow 3x \times 20 &= R \times x \times 5 \\ \Rightarrow R &= \frac{3 \times x \times 20}{x \times 5} = 12 \end{aligned}$$

Hence, the rate of interest is 12%.

Q22

Answer :

$$\text{Amount in 3 years} = (\text{Principal} + \text{S.I. for 3 years}) = \text{Rs. } 837$$

$$\text{Amount in 2 years} = (\text{Principal} + \text{S.I. for 2 years}) = \text{Rs. } 783$$

On subtracting :

$$\text{S.I. for 1 year} = (837 - 783) = \text{Rs. } 54$$

$$\text{S.I. for 2 years} = \left(\frac{54}{1} \times 2\right) = \text{Rs. } 108$$

$$\begin{aligned} \therefore \text{Sum} &= \text{Amount for 2 years} - \text{S.I. for 2 years} \\ &= 783 - 108 \\ &= \text{Rs. } 675 \end{aligned}$$

$$P = \text{Rs. } 675, \text{S.I.} = \text{Rs. } 108 \text{ and } T = 2 \text{ years}$$

$$\begin{aligned} R &= \frac{\text{S.I.} \times 100}{P \times T} \\ &= \frac{108 \times 100}{675 \times 2} \\ &= 8\% \end{aligned}$$

Q23

Answer :

Amount in 5 years = (Principal + S.I. for 5 years) = Rs. 5475

Amount in 3 years = (Principal + S.I. for 3 years) = Rs. 4745

On subtracting :

S.I. for 2 years = (5475 - 4745) = Rs. 730

S.I. for 3 years = $\left(\frac{730}{2} \times 3\right)$ = Rs. 1095

∴ Sum = Amount for 3 years - S.I. for 3 years

= 4745 - 1095

= Rs. 3650

P = Rs. 3650, S.I. = Rs. 1095, T = 3 years

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

$$= \frac{1095 \times 100}{3650 \times 3}$$

$$= 10\%$$

Q24

Answer :

Let the first part be Rs. x .

Second part = (3000 - x)

$$\therefore \text{S.I. on } x \text{ at } 8\% \text{ per annum for 4 years} = \frac{x \times 8 \times 4}{100} = \frac{8x}{25}$$

$$\begin{aligned} \text{S.I. on } (3000 - x) \text{ at } 9\% \text{ per annum} &= \frac{(3000 - x) \times 9 \times 2}{100} \\ &= \frac{27000 - 9x}{50} \end{aligned}$$

$$\therefore \frac{8x}{25} = \frac{27000 - 9x}{50}$$

$$\Rightarrow 8x = \frac{(27000 - 9x) \times 2 \times 5}{50}$$

$$\Rightarrow 16x = 27000 - 9x$$

$$\Rightarrow 16x + 9x = 27000$$

$$\Rightarrow x = \frac{27000}{25} = 1080$$

∴ First part = Rs. 1080

Second part = (3000 - 1080) = Rs. 1920

Q25

Answer :

Let the first part be Rs. x .

Second part = (3600 - x)

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

$$\text{And, S.I. on } (3600 - x) \text{ at } 10\% \text{ per annum} = \frac{(3600 - x) \times 10 \times 1}{100} = \frac{3600 - x}{10}$$

$$\therefore \frac{9x}{100} + \frac{3600 - x}{10} = 333$$

$$\Rightarrow \frac{9x + 36000 - 10x}{100} = 333$$

$$\Rightarrow -x + 36000 = 33300$$

$$\Rightarrow -x = 33300 - 36000$$

$$\Rightarrow -x = -2700$$

$$\Rightarrow x = 2700$$

First part = Rs. 2700

Second part = (3600 - 2700) = Rs. 900

Simple Interest Exercise 12B

Q1

Answer :

(a) Rs. 125

Principal = Rs. 6250

Simple Interest = 4% per annum

Time = 6 months = $\frac{1}{2}$ years

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

$$\text{Simple Interest} = \frac{6250 \times 4 \times 1}{100 \times 2}$$

$$\text{Simple Interest} = \frac{250}{2} = \text{Rs. 125}$$

Q2

Answer :

(b) Rs. 3500

Amount = Rs. 3605

Time = $\frac{219}{365}$ days = $\frac{219}{365}$ days

Rate = 5% per annum

$$\text{Amount} = \text{Sum} + \frac{\text{Sum} \times \text{Rate} \times \text{Time}}{100}$$

$$\text{Amount} = \text{Sum} \left(1 + \frac{\text{Rate} \times \text{Time}}{100} \right)$$

$$\text{Sum} = \frac{3605}{1 + \frac{5}{100} \times \frac{219}{365}} = \frac{3605 \times 36500}{37595}$$

Sum = Rs. 3500

Q3

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Answer :

(c) 8%

Let the sum be Rs. x .

Rate of interest = $r\%$

Time = $2\frac{1}{2}$ years = $\frac{5}{2}$ years

Amount = $\frac{6}{5} \times \text{Sum}$

Rate = ?

Amount = $\frac{6}{5} \times \text{Sum}$

Principal + S.I. = Amount

Principal + $\frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100} = \frac{6}{5} \times \text{Principal}$

$$\Rightarrow x + \frac{x \times r \times 5}{100 \times 2} = \frac{6}{5} x$$

$$\Rightarrow x \left(1 + \frac{5r}{100 \times 2} \right) = \frac{6}{5} x$$

$$\Rightarrow 1 + \frac{r}{40} = \frac{6}{5}$$

$$\Rightarrow r = 40 \times \frac{1}{5}$$

$$\Rightarrow r = 8$$

So, the rate of interest is 8%.

Q4

Answer :

(b) 9 months

4. (b)

Let the time be t years.

Principal = Rs. 8000

Amount = Rs. 8360

Rate = 6% per annum

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

$$\frac{8360}{8000} = 1 + \frac{6 \times t}{100}$$

$$\Rightarrow \frac{8360}{8000} - 1 = \frac{6t}{100}$$

$$\Rightarrow t = \left(\frac{8360 - 8000}{8000} \right) \times \frac{100}{6}$$

$$= \frac{360}{8000} \times \frac{100}{6}$$

$$= \frac{6}{8} \times 12 \text{ months}$$

$$= 9 \text{ months}$$

Q5

Answer :

(b) 10%

Let the sum be Rs. x and the rate be $r\%$.

A/Q:

Amount = $2x$

$$\Rightarrow P + S.I. = 2x$$

$$\Rightarrow P + \frac{P \times R \times T}{100} = 2x$$

$$\Rightarrow x \left(1 + \frac{r \times 10}{100} \right) = 2x$$

$$\Rightarrow \frac{100 + 10r}{100} = 2$$

$$\Rightarrow 10r = 200 - 100$$

$$\Rightarrow 10r = 100$$

$$\Rightarrow r = \frac{100}{10}$$

$$\Rightarrow r = 10$$

Q6

Answer :

(c) Rs. $\left(\frac{100}{x}\right)$

Simple Interest = Rs. x

Rate = $x\%$ per annum

Time = x years

$$\text{Simple Interest} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

$$\Rightarrow x = \frac{\text{Principal} \times x \times x}{100}$$

$$\Rightarrow \text{Principal} = \text{Rs. } \frac{100}{x}$$

Q7

Answer :

(b) 8%

Time = 5 years

$$\text{Simple interest} = \frac{2}{5} P$$

$$\Rightarrow \frac{P \times \text{Rate} \times \text{Time}}{100} = \frac{2}{5} P$$

$$\Rightarrow \frac{\text{Rate} \times 5}{100} = \frac{2}{5}$$

$$\Rightarrow \text{Rate} = \frac{2 \times 100}{5 \times 5}$$

$$\Rightarrow \text{Rate} = 8\%$$

Q8

Answer :

(c) 22 years

$$R_1 = 12\%$$

$$R_2 = 10\%$$

$$P_1 = \text{Rs. } 8000$$

$$P_2 = \text{Rs. } 9100$$

Let their amounts be equal in T years.

$$\begin{aligned} \text{Amount}_1 &= S.I._1 + P_1 \\ &= \frac{P_1 \times R_1 \times T}{100} + P_1 \\ &= \frac{8000 \times 12 \times T}{100} + 8000 \\ &= 960T + 8000 \end{aligned}$$

$$\begin{aligned} \text{Amount}_2 &= S.I._2 + P_2 \\ &= \frac{P_2 \times R_2 \times T}{100} + P_2 \\ &= \frac{9100 \times 10 \times T}{100} + 9100 \\ &= 910T + 9100 \end{aligned}$$

$$\text{Amount}_1 = \text{Amount}_2$$

$$\Rightarrow 960T + 8000 = 910T + 9100$$

$$\Rightarrow 960T - 910T = 9100 - 8000$$

$$\Rightarrow 50T = 1100$$

$$\Rightarrow T = 22$$

Hence, after 22 years their amounts will be equal.

Q9

Answer :

(c) Rs. 768

Let the rate be $R\%$.

$$\begin{aligned} \text{S.I.} &= A - P \\ &= 720 - 600 \\ &= \text{Rs. } 120 \end{aligned}$$

Time = 4 years

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

$$R = \frac{100 \times 120}{600 \times 4}$$

$$= 5$$

Rate of interest = 5%

$$\text{Now, } R = (5 + 2)\% = 7\%$$

$$\begin{aligned} \text{S.I.} &= \frac{P \times R \times T}{100} \\ &= \frac{600 \times 7 \times 4}{100} \end{aligned}$$

$$= \text{Rs. } 168$$

$$\begin{aligned} \text{Amount} &= \text{SI} + P \\ &= 600 + 168 \\ &= \text{Rs. } 768 \end{aligned}$$

Q10

Answer :

$$(d) y^2 = zx$$

$$y = \text{S.I. on } x = \frac{x \times R \times T}{100} \quad \dots (i)$$

$$z = \text{S.I. on } y = \frac{y \times R \times T}{100} \quad \dots (ii)$$

Dividing equation (i) by (ii) :

$$\Rightarrow \frac{y}{z} = \left(\frac{x \times R \times T}{100} \times \frac{100}{y \times R \times T} \right)$$

$$\Rightarrow \frac{y}{z} = \frac{x}{y}$$

$$\Rightarrow y^2 = xz$$

Q11

Answer :

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

Rate = 10% per annum

Simple Interest = $0.125 \times \text{Principal}$

$$\Rightarrow \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100} = 0.125 \times \text{Principal}$$

$$\Rightarrow \frac{\text{Time}}{10} = 0.125$$

$$\Rightarrow \text{Time} = 1.25 = 1\frac{1}{4} \text{ years}$$

Q12

Answer :

(b) Rs 2400

Rate = $3\frac{3}{4}\%$ per annum

$$= \frac{15}{4}\% \text{ per annum}$$

Time = $2\frac{1}{3}$ years

$$= \frac{7}{3} \text{ years}$$

$$\text{S.I.} = \frac{P \times \frac{15}{4} \times \frac{7}{3}}{100}$$

$$\Rightarrow P = \frac{210 \times 100}{\left(\frac{15}{4} \times \frac{7}{3}\right)}$$

$$\Rightarrow P = 600 \times 4$$

$$\Rightarrow P = \text{Rs } 2400$$