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

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

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

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 :

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

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

$T = \frac{S.I. \times 100}{P \times R} = \frac{1152 \times \cancel{100}}{\cancel{6400} \times 6}$

$= \frac{1152}{384}$

$= 3 \text{ years}$

Q7

Answer :

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

$T = \frac{S.I. \times 100}{P \times R} = \frac{1908 \times 100}{9540 \times 8}$

$= \frac{10}{4}$

$= 2\frac{1}{2}$ 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 :

$P = \text{Rs } 6000,\ R = 12\%,\ T = 3 \text{ years } 8 \text{ months} = 3\frac{8}{12} = \frac{44}{12} \text{ years}$
$S.I. = \frac{P \times R \times T}{100} = \frac{6000 \times 12 \times 44}{100 \times 12} = \text{Rs } 2640$
$A = P + S.I.$
$= 6000 + 2640$
$= \text{Rs } 8640$

Q13

Answer :

$P = \text{Rs. } 12600 \qquad R = 15\% \qquad T = 3 \text{ years}$
$S.I. = \frac{P \times R \times T}{100} = \frac{12600 \times 15 \times 3}{100}$
$= \text{Rs. } 5670$
$A = \text{Rs. } 12600 + \text{Rs. } 5670 = \text{Rs. } 18270$
Hari had to pay Rs. 18270 to the money lender, but he paid Rs. 7070 and a goat.
$\therefore$ Cost of the goat $= \text{Rs. } 18270 - \text{Rs. } 7070$
$= \text{Rs. } 11200$

Q14

Answer :

Let the sum be Rs. P.
$S.I. = \text{Rs. } 829.50,\ T = 3 \text{ years}, R = 10\%$

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,
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.

$$\text{S.I.} = \frac{\text{P}\times\text{R}\times\text{T}}{100} = \frac{x\times 11\times \cancel{27}^{9}}{\cancel{100}\times \cancel{12}_{4}} = \frac{99x}{400}$$

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

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

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.

$$\therefore \text{S.I.} = \frac{\text{P}\times\text{R}\times\text{T}}{100} = \frac{3600\times 11\times 3}{100} = \text{Rs. } 1188$$

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

$$= \text{Rs. } 4788$$

Q17

Answer :

Let the required sum be Rs. x.

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

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

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

But the amount is Rs. 12122.

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

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

Now, $\text{S.I.} = \frac{\text{P}\times\text{R}\times\text{T}}{100} = \frac{\cancel{1045}\cancel{0}\times\cancel{9}^{3}\times\cancel{3}\cancel{2}^{8}}{\cancel{10}\cancel{0}\times\cancel{1}\cancel{2}_{4_1}} = \text{Rs. } 2508$

$$\therefore \text{A} = \text{P} + \text{S.I.}$$

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

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

Q18

Answer :

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

$$\text{S.I.} = \text{A} - \text{P}$$

$$= 4734 - 3600$$

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

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

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

$$= 9\%$$

Q19

Answer :

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

$\mathrm{S.I.}=\mathrm{A}-\mathrm{P}$

$=768-640$

$=\mathrm{Rs.}\ 128$

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

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

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

$\therefore \mathrm{A}=\mathrm{P}+\mathrm{S.I.}$

$=850+204$

$=\mathrm{Rs.}\ 1054$

Q20

Answer :

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

$\mathrm{S.I.}=\mathrm{A}-\mathrm{P}$

$=6720-5600$

$=\mathrm{Rs.}\ 1120$

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

$=\frac{1120\times 100}{5600\times 8}$

$=\frac{1120}{448}$

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

Q21

Answer :

Let the sum be Rs. x.

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

$\therefore \mathrm{S.I.}=\mathrm{A}-\mathrm{P}=\frac{8x}{5}-x$

$=\frac{3x}{5}$

Let the rate be R%.

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

$=> \frac{3x}{5}=\frac{x\times \mathrm{R}\times \cancel{5}^{1}}{\cancel{100}_{20}}$

$=> 3x\times 20=\mathrm{R}\times x\times 5$

$=> \mathrm{R}=\frac{3\times \cancel{x}\times \cancel{20}^{4}}{\cancel{x}\times \cancel{5}}=12$

Hence, the rate of interest is 12%.

Q22

Answer :

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

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

On subtracting :

S.I. for 1 year $=(837-783)=$ Rs. 54

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

$\therefore$ Sum $=$ Amount for 2 years $-$ S.I. for 2 years

$=783-108$

$=\mathrm{Rs.}\ 675$

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

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

$=\frac{108\times \cancel{100}^{\cancel{4}^{2}}}{\cancel{675}_{27}\times \cancel{2}_{1}}$

$=8\%$

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
$\therefore$ 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 $= (3000 - x)$
$\therefore$ S.I. on x at 8% per annum for 4 years $= \frac{x \times 8 \times 4}{100} = \frac{8x}{25}$
S.I. on $(3000 - x)$ at 9% per annum $= \frac{(3000 - x) \times 9 \times 2}{100}$
$= \frac{27000 - 9x}{50}$
$\therefore \frac{8x}{25} = \frac{27000 - 9x}{50}$
$\Rightarrow 8x = \frac{(27000 - 9x) \times 25}{50}$
$\Rightarrow 16x = 27000 - 9x$
$\Rightarrow 16x + 9x = 27000$
$\Rightarrow x = \frac{27000}{25} = 1080$
$\therefore$ First part = Rs.1080
Second part $= (3000 - 1080) =$ Rs. 1920

Q25

Answer :

Let the first part be Rs. x.
Second part $= (3600 - x)$
$\therefore$ S.I. on x at 9% per annum for 1 years $= \frac{x \times 9 \times 1}{100} = \frac{9x}{100}$
And, S.I. on $(3600 - x)$ at 10% per annum $= \frac{(3600 - x) \times 1 \times 10}{100} = \frac{3600 - x}{10}$
$\therefore \frac{9x}{100} + \frac{3600 - x}{10} = 333$
$\Rightarrow \frac{9x + 36000 - 10x}{100} = 333$
$\Rightarrow -x + 36000 = 33300$
$\Rightarrow -x = 33300 - 36000$
$\Rightarrow -x = -2700$
$\Rightarrow x = 2700$
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

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

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

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

Q2

Answer :

(b) Rs.3500

Amount $=$Rs. 3605

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

Rate$=5\%$ per annum

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

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

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

Sum$=$ Rs. 3500

Q3

Answer :

(c) 8%

Let the sum be Rs. x.
Rate of interest $= r\%$
Time$=2\frac{1}{2}$ years$=\frac{5}{2}$ years
Amount$=\frac{6}{5}\times$ Sum
Rate$=?$
Amount $=\frac{6}{5}\times$Sum
Principal + S.I. = Amount
Principal$+\frac{\text{Principal}\times\text{Rate}\times\text{Time}}{100}=\frac{6}{5}\times$Principal
$\Rightarrow x+\frac{xr\times5}{100\times2}=\frac{6}{5}x$
$\Rightarrow x\left(1+\frac{5r}{100\times2}\right)=\frac{6}{5}x$
$\Rightarrow 1+\frac{r}{40}=\frac{6}{5}$
$\Rightarrow r=40\times\frac{1}{5}$
$\Rightarrow r=8$
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
$\text{Amount}=\text{Principal}\left(1+\frac{\text{Rate}\times\text{Time}}{100}\right)$
$\frac{8360}{8000}=1+\frac{6\times t}{100}$
$\Rightarrow \frac{8360}{8000}-1=\frac{6t}{100}$
$\Rightarrow t=\left(\frac{8360-8000}{8000}\right)\times\frac{100}{6}$
$=\frac{360}{8000}\times\frac{100}{6}$
$=\frac{6}{8}\times 12$ months
$=9$ months

Q5

Answer :

(b) 10%

Let the sum be Rs. x and the rate be $r\%$.
A/Q:
Amount $=2x$
$\Rightarrow P+S.I.=2x$
$\Rightarrow P+\frac{P\times R\times T}{100}=2x$
$\Rightarrow x(1+\frac{r\times10}{100})=2x$
$\Rightarrow \frac{100+10r}{100}=2$
$\Rightarrow 10r=200-100$
$\Rightarrow 10r=100$
$\Rightarrow r=\frac{100}{10}$
$\Rightarrow r=10$

Q6

Answer :

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

Simple Interest=Rs. x
Rate= $x\%$ per annum
Time = x years
Simple Interest= $\frac{\text{Principal}\times\text{Rate}\times\text{Time}}{100}$
$\Rightarrow \cancel{x} = \frac{\text{Principal}\times\cancel{x}\times x}{100}$
$\Rightarrow$ Principal = Rs. $\frac{100}{x}$

Q7

Answer :

(b) 8%

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

$\Rightarrow Rate = \frac{2\times 100}{5\times 5}$
$\Rightarrow$Rate=8%

Q8

Answer :

(c) 22 years

$R1 = 12\%$
$R_2 = 10\%$
$P_1 = Rs.8000$
$P_2 = Rs.9100$
Let their amounts be equal in T years.
$\text{Amount}_1 = S.I._1 + P_1$
$= \frac{P_1\times R_1\times T}{100} + P_1$
$= \frac{8000\times 12\times T}{100} + 8000$
$= 960T + 8000$
$\text{Amount}_2 = S.I._2 + P_2$
$= \frac{P_2\times R_2\times T}{100} + P_2$
$= \frac{9100\times 10\times T}{100} + 9100$
$= 910T + 9100$
$\text{Amount}_1 = \text{Amount}_2$
$\Rightarrow 960T + 8000 = 910T + 9100$
$\Rightarrow 960T - 910T = 9100 - 8000$
$\Rightarrow 50T = 1100$
$\Rightarrow T = 22$
Hence, after 22 years their amounts will be equal.

Q9

Answer :

(c) Rs. 768

Let the rate be R %.

$\text{S.I.} = \text{A} - \text{P}$

$= 720 - 600$

$= \text{Rs. } 120$

$\text{Time} = 4 \text{ years}$

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

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

$= 5$

$\text{Rate of interest} = 5\%$

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

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

$= \frac{600 \times 7 \times 4}{100}$

$= \text{Rs. } 168$

$\text{Amount} = \text{SI} + \text{P}$

$= 600 + 168$

$= \text{Rs. } 768$

Q10

Answer :

(d) $y^2 = zx$

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

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

$\text{Dividing equation } \left(\text{i}\right) \text{ by } \left(\text{ii}\right) :$

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

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

$\Rightarrow \text{y}^2 = \text{xz}$

Q11

Answer :

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

Rate=10% per annum

Simple Interest=0.125 × 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

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

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

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

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

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

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

$\Rightarrow \text{P} = 600 \times 4$

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