Percentage

$\frac{1}{2} \rightarrow 50\%$

$\frac{1}{3} \rightarrow 33\frac{1}{3} \rightarrow 33.33\%$

$\frac{1}{4} \rightarrow 25\%$

$\frac{1}{5} \rightarrow 20\%$

$\frac{1}{6} \rightarrow 16\frac{2}{3}\% \rightarrow 16.\overline{66}\%$

$\frac{1}{7} \rightarrow 14\frac{2}{7}\% \rightarrow 14.28\%$

$\frac{1}{8} \rightarrow 12\frac{1}{2}\% \rightarrow 12.5\%$

$\frac{1}{9} \rightarrow 11\frac{1}{9}\% \rightarrow 11.\overline{11}\%$

$\frac{1}{10} \rightarrow 10\%$

$\frac{1}{11} \rightarrow 9\frac{1}{11}\% \rightarrow 9.\overline{09}\%$

$133.33 \longrightarrow 1200$

$100 \longrightarrow \frac{1200}{133.33} \times 100 = 900$

$\rightarrow 25\% \rightarrow \frac{1}{4}$

25% of 4 → original

→ 25% of 4 is 1

$33\frac{1}{3}\% \longrightarrow \frac{1}{3}$ → original

33.33%

New $4 \rightarrow 1200$

$3 \rightarrow \frac{1200}{4} \times 3 = 900$

Q. Find 55% of 45

$= \frac{55}{100} \times 45^{9}$ Or $5 \times \frac{1}{9} \rightarrow 5 \times 11.\overline{11}\%$

$= \frac{99}{4} = 24.75$ $\frac{5}{9} \rightarrow 55.55$

$\frac{5}{9} \times 45 = 25$

$4\overline{)99}\ 24.7$ (8, 19, 16, 30, 28)

Q 45.45% of 44

$= \frac{4545}{10000} \times 44$ Or $5 \times \frac{1}{11} \rightarrow 9.09 \times 5$

$= 19.987$ $5 \times \frac{1}{11} \times 44 = 20$

45.45×44: 18180, 18170×, 1 99870

. 40 is what percent of 60?

Sol $\frac{40}{60} \times 100$

$6\overline{)400}\ 66.66$ (36, 40, 36)

66.66

. 60 is how much percentage greater than 40

Sol $\frac{40}{60} \times \frac{60.66}{100} = 44$ $\frac{20}{40} \times 100 = 50\%$

60 is 50% greater than 40

. 40 is how much percent lesser than 60?

Sol $\frac{20}{60} \times 100 = 33.33\%$

40 is 33.33% lesser than 60

Q. If A's Salary is 20% more than B, then by how much Percent B's Salary is less than A.

Sol

~~A → x + 20 / 100~~

Let B → 100) 20
A → 120

$= \frac{20}{120} \times 100$

$= 16.66\%$

Q If A's marks in a exam is 40% less than B then by how much % B's marks are more than A

B → 100
A → 60

$= \frac{40}{60} \times 100$

$= \frac{400}{6}$

$= 66.66\%$

Q. If 16(2/3)% of a number is added to itself the number becomes 700. find original number.

Sol

Original → 100
New → 116.66

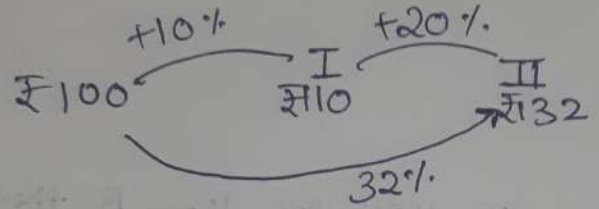
$= \frac{700}{116.66} \times 100$

=

Successive Increase and Decrease

$$\text{Net Change} = a + b + \frac{ab}{100}$$

Increase = Take positive Sign
Decrease = Take negative Sign



$$\text{N.C} = +10 + 20 + \frac{10 \times 20}{100}$$
$$= 32\%$$

Q. Price of petrol increased by 20% and then it is decreased by 10%. find the net change in the price.

$$= 20 - 10 - \frac{200}{100}$$
$$= 10 - \frac{200}{100}$$
$$= 8\%$$

Q. Demand of car went down by 25% in 2016 and 20% in 2017. What is net % decrease in demand?

$$= -25 - 20 + \frac{(-25 \times 20)}{100}$$
$$= -45 - \frac{500}{100}$$
$$= -50\ 40\%$$

$$x - 65 = 15 - 20 + \frac{15 \times 20}{x}$$

$$x - 65 = -5 - \frac{300}{x}$$

$$-60 = -\frac{300}{x} - x$$

$$-60x = -300 - x^2$$

$$x^2 - 60x + 300 = 0$$

Q. If the price of petrol is raised by 20% then the percentage by which a car owner must reduce his consumption so that there is no change in expenditure.

Sol $\quad Exp = Price \times Cons.$

If Exp. is same $\quad Price \propto \frac{1}{Cons.}$

Initial.

Price	100	120
Cons.	120	100

$$\frac{20}{120} \times 100 = 16.66\%$$

Exp.	12000	12000

- When there is change in Expenditure by 10%.

Exp	100	110
Price	100	120
Cons.	100	$\frac{11}{12}$

$$Cons. = \frac{Price}{Exp.} \frac{Exp.}{Price}$$

12 $\quad$ 11 $\quad \rightarrow$ multiply by 12

$$\frac{1}{12} \times 100 = 8.33\%$$

Q. If the price of Commodity is decreased by 20% and its Consumption increased by 20%, what will be the Change in expenditure.

Price	100	80
Cons.	100	120
Exp	10000	9600

$$\frac{400}{10,000} \times 100 = -4\%$$

Q. If the price of Sugar is increased by 25% then by how much percent Consumption should be reduced so that the expenditure will increased by only 5%.

Expenditure	100	105
Price	100	125
Con.	1	$\frac{105}{125}$
	125	105

$$\frac{20}{125} \times 100 = 16\%$$

Q. If the price of Sugar is reduced by 20% due to which a person can buy 2kg more Sugar for Rs. 200 Find the original price of Sugar per kg.

Sol

2kg → ₹40

1kg → ₹20

80% → ₹20

100% → $\frac{20}{80} \times 100$

₹25

Q. The price of Sugar is increased by 30% due to this a housewife purchase 12kg less Sugar so that her Expen. will increase by 10% only. Find her original Consumption

Sol

Exp	100	110
price	100	130
Cons.	1	$\frac{11}{13}$
	13	11

$\frac{2}{13}$ → 12kg

→ $\frac{12}{2} \times 13 = 78$kg

Q. A Student scored 140 Marks and still failed by 35 marks. If the passing criteria of that exam is 35%. Then find the maximum marks of that exam.

Passing Marks 35% → 75 mark

$$100\% \longrightarrow \frac{175}{35} \times 100 = 500$$

Q. A Student Scored 25% in an examination and still failed by 30 marks while another Candidate Scored 50% marks and get 20 marks more than the passing marks. Then find the passing marks.

25%	— 30
50%	20
+25% →	+50 marks
×4	×4
100%	200 marks

$25 \times \frac{1}{50}$ — 1 mark

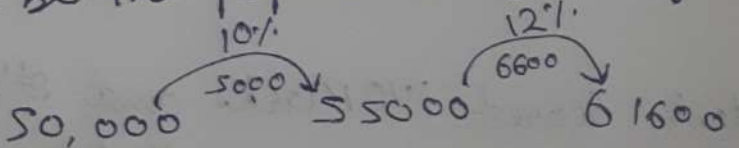
$\frac{1}{2}\%$ — 1 mark

$30 \times \frac{1}{2}\%$ — 30 marks

15% — 30 marks

Q. The population of a town is 50,000. It increased by 10% in the first year & 12% in the second year. What will be the population after 2 yrs.

Sol



Q. The current population of a town is 28,000. During the last 2 yrs the pop. increased at the rate of 16% and 20% p.a. per year. The population 2 yrs ago was (approx).

2 yrs Ago

16% → 100 → 116 (16)

20% → 116 → 139.2 (23.2) ≈ 140

$$= \frac{28000}{140} \times 100$$

$$= 20000$$

Q. Raju invest 65% of his investment in a machine and 20% of his investment on raw material. If he had Rs. 6000 balance. Find the total money he had.

100

85 | 15 → 6000

$100 \rightarrow \frac{6000}{15} \times 100$

40000 Ans

Another: if we add Remaining investment

100

65 | 35 → 5600

$\frac{5600}{35} \times 100$

100

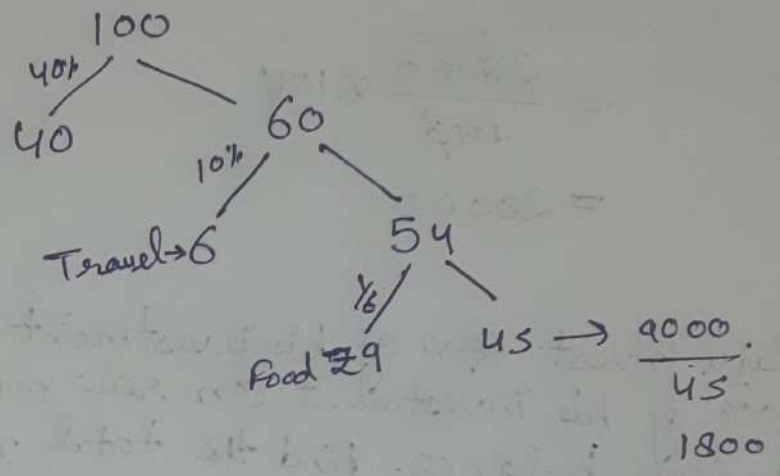
65 | 35

20% → 7 | 28 → 5600

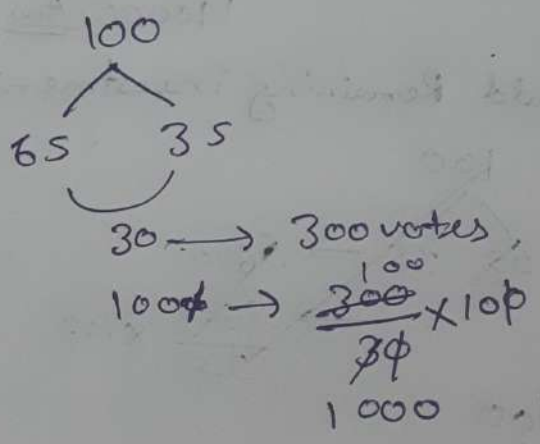
$\rightarrow \frac{5600}{28} \times 100$

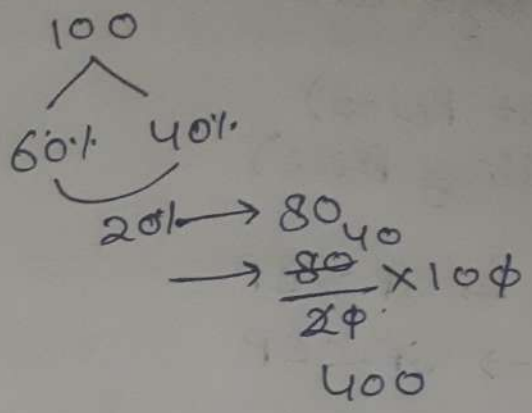
$= 20000$

Q. Raju Spend 40% of his Salary on house rent. On the remaining 10% Spend on travel. On remaining 16(2/3)% Spend on food and remaining is 9000 saved Find the money he spend on food.

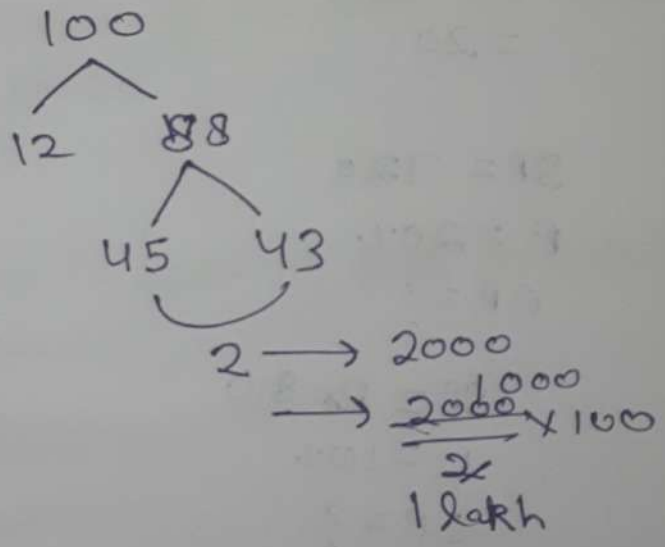


Q. In an Election b/w 2 Candidates one got 65% of the votes and won by 300 votes. Find total no. of votes.

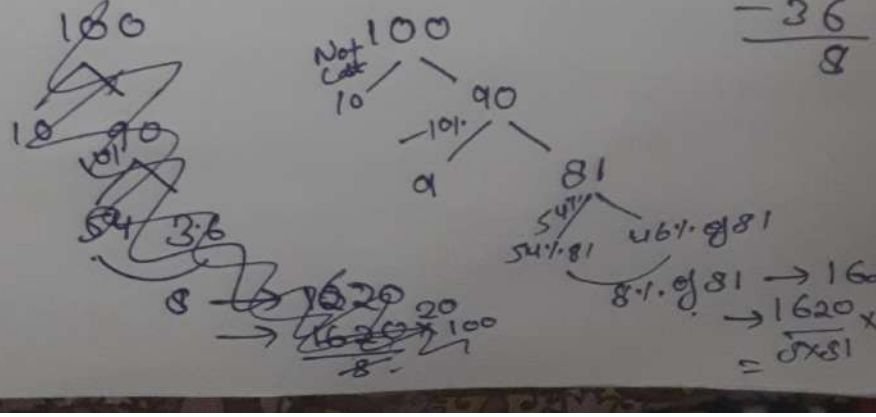




Q. In a election of 2 candidate 12% of the voters did not cast their votes. The winner by getting 45% of the total votes, defeated his rival by 2000 votes. Find the total no. of voters.



$$\begin{array}{r} 4 \\ 14 \\ -\ 6 \\ \hline 8 \end{array}$$



Profit and Loss

CP (Cost Price)
SP (Selling Price)

Profit → SP > CP
Loss → SP < CP

$$P\% = \frac{P}{SP} \times 100$$

$$L\% = \frac{L}{CP} \times 100$$

$$L\% = \frac{20}{\cancel{100}} \times \cancel{100}$$

$$= 20$$

SP = 720
P = 20%
CP = ?

SP = Rs. 810
L = 10%
CP = ?

Q. When a plot is sold for Rs. 18,700 the owner loses 15%. At what price must that plot be sold in order to gain 15%?

Sol

$\text{Loss} = \frac{15}{100} \rightarrow CP$

$L \rightarrow 15$

$SP \rightarrow 85 \longrightarrow 18,7500$

$115 \longrightarrow \frac{18,700}{85} \times 115$

$\longrightarrow$ Rs 25,300

Q Alfred buys an old scooter for Rs. 4700 and spends Rs 800 on its repairs. If he sells the scooter for Rs. 5800, his gain percent is?

Q. If CP of 25 articles is equal to SP of 20 articles. find the profit or loss percent.

Sol

$25\,CP = 20\,SP$

$\frac{CP}{SP} = \frac{\cancel{20}\,4}{\cancel{25}\,5}$

$SP - CP = 5 - 4 = 1 \rightarrow$ Profit

$= \frac{1}{4} \times 100$

$= 25\%$.

Q.

30 CP = 45 SP

$\frac{CP}{SP} = \frac{45}{30} \quad 3 : 2$

3 - 2 = 1

$= \frac{1}{3} \times 100 \quad 33.33$

$= 33.33\%$

Q. By selling 12 articles a man earn a loss of which is equal to Selling price of 4 articles. Find his loss percent.

Sol

SP → ₹1 / 1 Article

OR

SP → ₹12

L → ₹4

CP → 16

$L\% = \frac{L}{CP} \times 100$

$= \frac{4}{16} \times 100 \quad 25$

$= 25\%$

Q. By selling 66m cloths a man earn a profit of equal to selling price of 6m cloths find his profit percent.

SP → ₹66 , SP → ₹1 / 1m

P → ₹6

CP → ₹60

$= \frac{6}{60} \times 100 = 10\%$

Q. By selling 40 articles a man earn a profit of equal to Cost price of 5 articles. Find his profit percent.

Q. A shopkeeper buy some number of article at the rate of 11 articles for Rs 10. and sold all of them at the rate of 10 articles for Rs 11. find his profit or loss percent.

Sol

CP → ₹10 / 11 ×10 → Price of 1 article

₹100 / 110 Art.

SP → 11 / 10 Articles ×11

₹121 / 110 Art.

121 − 100 = 21

$P\% = \frac{21}{100} \times 100 = 21\%$

2 14 ×15 70 14× 210

12 ×14 48 12× 168

CP → 12 ×14 / 15 ×14 → 168 / 210

SP → 10 ×15 / 14 ×15 → 150 / 210

168 − 150 = 8

= 8

Q. A Shopkeeper buy some lemons at rate of 2 for Rs1. Again he bought the same no. of lemons at rate of 1 for Rs.2. He mixed both the types and sold at 3 for Rs. 3. Find profit/loss%.

Sol

$CP_1 \rightarrow \frac{₹1}{2 \rightarrow \text{lemons}}$

$CP_2 \rightarrow \frac{₹2}{1 \rightarrow \text{lemon}} \times 2 = \frac{₹4}{2}$

Overall $CP \rightarrow \frac{₹5}{4 \rightarrow \text{lemons}}$

$SP \rightarrow \frac{3}{3} \rightarrow \frac{₹1 \times 4}{1 \text{ lemons}} \rightarrow \frac{4}{4}$

$\text{loss} \rightarrow 5 - 4 = 1$

$\text{loss}\% = \frac{1}{5} \times 100 = 25\%$

$= 25\%$

Q. A Shopkeeper purchase some no. of article for Rs. 8400. He sold 3/5th of them at 15% profit each. At what percent profit should he sell the remaining to gain overall 20% profit?

$\frac{3}{5}$ - lemmons

No.	×	Avg
3	×	(15%)
+ 2	(	x%)
= 5	×	(+20%)

$45 + 2x = 100$

$2x = 55$

$x = 27.5\%$

Q. A Shopkeeper purchase some no. of article for Rs. 4500. He sold 1/3rd of them at 10% loss each. At what percent profit should he sell the remaining to gain overall 20%.

$$1(-10) + 2(x) = 3 \times (20)$$
$$-10 + 2x = 60$$
$$2x = 70$$
$$x = 35\%$$

Q.

CP → ₹1/1gm

SP → ₹1/1gm

CP → ~~₹950~~

SP → ₹1000

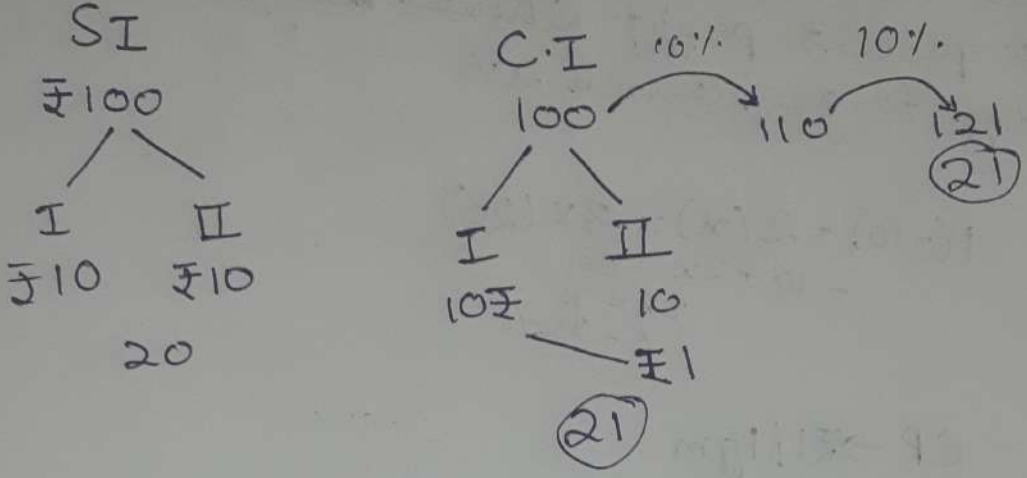
~~50~~ 10 × 10%

~~45~~%

19

= 5.26%

Simple Intrest and Compound Intrest



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

$$SI = \frac{1000 \times 10 \times 3}{100}$$
$$= 300$$

- Amount = P + SI

Q. A Sum amount to Rs. 1008 in 2yrs and amount to Rs. 1112 in 3yrs at SI. find the Sum & rate of interest per annum.

Sol

SI → 104 1yr

SI → 208 2yrs

P = 1008 − 208 = 800

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

$$R = \frac{104 \times 100}{800 \times 1}$$

$$= 13\%$$

Q.Sol

20000

Let borrow money from 1 person is x

I	II
$P \to x$	$P \to 2000-x$
$R \to 12\%$	$R \to 14\%$
$T \to 1$ yr	$T \to 1$ yr

$$\text{Total SI} = \frac{x \times 12 \times 1}{100} + \frac{(20000-x) \times 14 \times 1}{100}$$

$$2560 = \frac{12x}{100} + \frac{280000-14x}{100}$$

$$256000 = 12x - 14x + 280000$$

$$2x = 280000 - 256000$$

$$x = \frac{24000}{2}$$

$$x = 12000$$

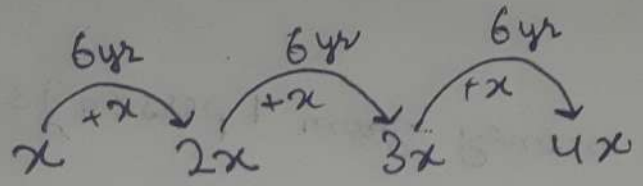
Q.Sol

950

I	II
$P \to x$	$950-x$
$R \to 6\%$	$R \to 4\%$
$T \to 5$ yrs	$T \to 5$ yrs

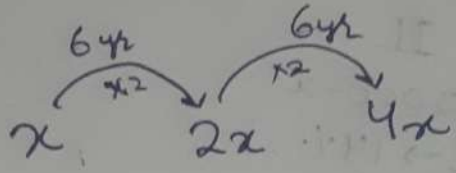
$$\frac{x \times 6 \times 5}{100} + \frac{(950-x) \times 4 \times 5}{100} = 200$$

SI



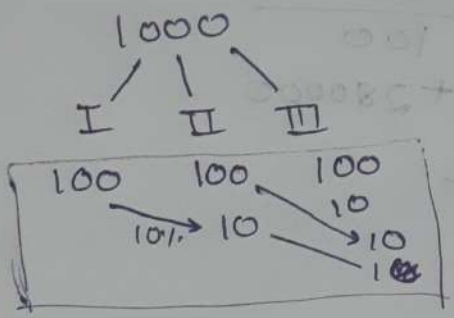
→ 18 yrs

CI



→ 12 yrs

- P = 1000 , T = 3yrs
  R = 10% , CI = ?



331 = CI

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

  ↓ P+CI

i) When interest is Compounded Annually:

$$\text{Amount} = P(1+R/100)^n$$

ii) Half-yearly

$$A = P[1+(R/2)/100]^{2n}$$

iii) Quarterly

$$A = P[1+(R/4)/100]^{4n}$$

Q. What will be the difference b/w the S.I and C.I on Rs 600 for one year at 10% PA, if Compounded half yearly.

Rate per half year → 5%.

₹600
5% / \ 5%

I half year — II half year

₹30 — ₹30

₹30 —5%→ ₹1.5

SI → 60
CI → 61.5
₹1.5

Q. If the S.I of certain money for 3yrs is Rs. 225 & CI on same money, same rate for 2yrs is Rs. 153, then what was the principal amount?

SI → 225/3 = 75₹ → 1yr

2 yrs SI → 150
" CI → 153
₹3

x

I ₹75 — II ₹75 → ₹3

Rate of Intrest → 3/75 × 100

4%.

$$\frac{4}{100} \text{ of } x = 75$$

$$x = \frac{75 \times 100}{4} = 1875$$

- C.I − S.I for 2 yrs $= P\left(\frac{R}{100}\right)^2$
- C.I − S.I for 3 yrs $= P\left(\frac{R}{100}\right)^2\left(\frac{R}{100} + 3\right)$

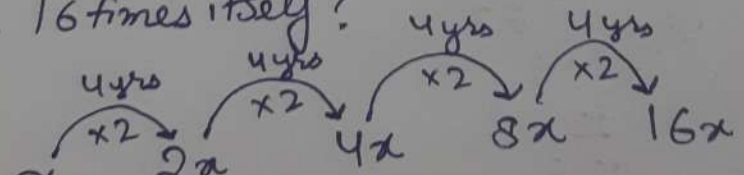
Q. If the difference b/w S.I & C.I at 4% P.A for 2 yrs is 20 Rs. What will be the value of principle amount.

Sol $D = P\left(\frac{R}{100}\right)^2 \Rightarrow 20 = P\left(\frac{4}{100}\right)^2$

$P = 12500$

Q. A Sum of money under Compound interest doubles itself in 4 yrs. In how many years will it become 16 times itself?

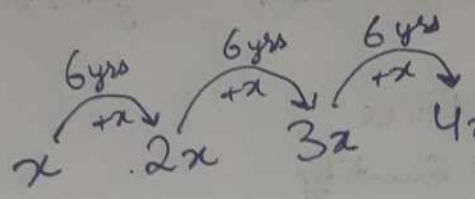
Sol



$= 16$ yrs

Q. If a sum of money at simple interest doubles in 6yrs, it will become 4 times in:

Sol



→ 18yrs

Q. A Shopkeeper selling his goods at 7% loss. Had he sold it for Rs. 800 more he would get 9% profit. Find the CP of that article.

Sol

$$\begin{array}{r} +\ 9\% \\ -\ 7\% \\ \hline 16\% \end{array}$$

$$\frac{\cancel{100}\ 50}{\cancel{800} \times \cancel{100}\ 2} \rightarrow 5000$$

Q. A Shopkeeper selling his goods at 20% profit. Had he purchase it 10% less and sold it for Rs. 18 less than he would get 30% profit. Find the initial CP of that article.

Sol

Initial CP → 100 SP → 120
final SP → 90 SP → 117

27 → 30%

3 → 18 × 100 / 3 = 600
100 → ?

Q. A man purchase some number of articles at the rate of 11 articles for Rs. 1. How many articles should he sell for Rs. 1 to gain 10% profit.

Sol.

$$CP \rightarrow \frac{1}{11} \rightarrow \text{Price}$$
$$\rightarrow \text{Quantity}$$

$$SP \rightarrow \frac{1.1}{11} \leftarrow 10\% \text{ of } 11$$

₹1.1 → 11

$$1 \rightarrow \frac{11}{1.1} \times 1 = 10$$

Q. A man purchase 25 articles for Rs 1. How many articles should he sell for Rs. 1 to gain 25% profit.

Sol.

$$CP \rightarrow \frac{1}{25}$$

$$SP \rightarrow \frac{1.25}{25}$$

₹1.25 → 25

$$1 \rightarrow \frac{25}{1.25} \times 1 = 20$$

Q. By selling 32 articles for Rs.1 a man earn loss of 40%. How many articles should he sell for Rs.1 to gain 20% profit.

Sol.

CP → 100

SP → 60

→ We want SP → 120

$SP \rightarrow \frac{1}{32} \times 120 \rightarrow 60 \times \frac{2}{120}$

$1\frac{2}{32} \rightarrow 120$

(16)

→ 16 articles

Q.

Sol.

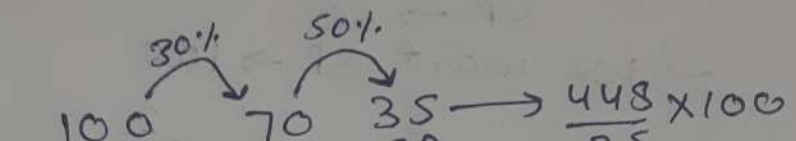
MP → 100

SP → 90

D → 10

$D\% = \frac{D}{MP} \times 100$

Q. An item was sold at a price after giving two successive discount of 30% and 50%. If the selling price of the item was Rs 448, then what was the marked price of the item?



$= 1280$

- Successive Change formula

$$\boxed{a + b + \frac{ab}{100}}$$

$$(-3) + (-5) + \frac{15}{100}$$

65%.

Q. Buy 5 articles get 3 articles free. Find discount percent.

Sol

MP → ₹1 / 1 Article

MP → ₹8

SP → ₹5

D → ₹3

$D\% \rightarrow \frac{3}{8} \times \frac{50^{25}}{100} \rightarrow 37.5\%$

Q. If after giving a discount of 12%, a profit of 10% was made on an article, then by what % was the price marked up?

$$\text{Markup} = MP - CP$$

$$\text{Markup\%} = \frac{MP - CP}{CP} \times 100$$

$MP \rightarrow 100$

$SP \rightarrow 88$

$CP \rightarrow 80$

$$= \frac{20}{80} \times 100$$

$$= 25\%$$

$$P\% = \frac{P}{CP} \times 100$$

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

$\rightarrow CP$

$SP \rightarrow 110$

$$\frac{88}{110} \times 100$$

Q. The CP of a table is Rs. 330. It is sold for a profit of Rs 30 after giving 10% discount find its marked price.

Sol

$MP \rightarrow 100$

$SP \rightarrow 90$

$$SP \rightarrow \frac{360}{90} \times 10 = 400$$

Q. A retailer purchase 70 pens at the mark price of 56 pens and sell them to a customer at their MP. Find the profit percent of Shopkeeper.

$$CP \rightarrow 56$$
$$SP \rightarrow 70$$

$$P\% = \frac{14}{56} \times 100$$
$$= \frac{1}{4} \times 100 = 25\%.$$

Q. By how much percent a Shopkeeper should mark his goods above its CP so that he will gain 10% profit after giving 30% discount.

Sol

$$MP \rightarrow 100$$
$$SP \rightarrow 70$$
$$CP \rightarrow \frac{700}{11} \quad \left\{ CP = \frac{70}{110} \times 100 \right.$$

$$MP - CP = \frac{1100}{11} - \frac{700}{11} = \frac{400}{11}$$

$$\text{Markup}\% = \frac{\frac{400}{11}}{\frac{700}{11}} \times 100$$

$$= \frac{400}{7}$$

Q. By how much percent a Shopkeeper Should mark his goods above its CP so that he will gain 10% profit after giving 10% discount.

$MP \rightarrow 100$

$SP \rightarrow 90$

$CP \rightarrow \frac{90}{11\%} \times 10\% = \frac{900}{11}$

$$\text{Markup \%} = \frac{1100}{11} - \frac{900}{11}$$

$$= \frac{\frac{200}{11}}{\frac{900}{11}} \times 100$$

$$= \frac{2}{9} \times 100 = \frac{200}{9}$$

Q. A Shopkeeper gives 10% discount on an article and earn 20% profit then find his profit his profit percent if he will give 20% discount on the same article.

Sol

$MP \rightarrow 100$

$D/ \rightarrow 10\%$

$SP \rightarrow 90$

$P\% \rightarrow 20\%$

$CP \rightarrow \frac{90}{120} \times 100 = 75$

After 20% dis.

$SP = 80$

$D = 80 - 75 = 5$

$$d\% = \frac{5}{75} \times 100 = \frac{100}{15}$$