

## Percentage..

Concepts

Normal Method

Rs. 2800 of

60%

$$\frac{50}{100} \times 2800 = 1400$$

Mind Calculation

Rs. :- 2800 of

50%

2800 - half - 1400.

50% = 1400 ) - 25%.

25% = 700 )

10% = 280 ) - 10%.

1% = 2.8 ) - 1%.

1 x 3 = 8.4

20% = 280 x 2 = 560.

$$10 = 850$$

$$1 = 85$$

$$35\% \rightarrow 30\% + 5\%.$$

$$\begin{array}{rcl} & \downarrow & \downarrow \\ 30\% + 10\% & = 140 \\ & = 280 \times 3 & \end{array}$$

$$\Rightarrow 840$$

$$\Rightarrow 840$$

$$\begin{array}{r} 140 \\ \hline 980 \end{array}$$

$$23\% \rightarrow 20 + 3$$

$$20\% = 540, 3 = 84$$

Problem:-  $\oplus$

vice versa.

$$\boxed{x\% \text{ of } y = y\% \text{ of } x} \quad \text{APPLY here}$$

36% of 50.

$$\begin{array}{r} 540 \\ 84 \\ \hline 624 \end{array}$$

$$x\% \text{ of } y = y\% \text{ of } x$$

Question:-

① If 50% of P = 25% of Q then, P = x% of Q. Find x?

$\Rightarrow$

$$50\% \text{ of } P = 25\% \text{ of } Q$$

$$\begin{array}{r} 50 = 25 \\ \hline 2 \end{array}$$

### Problems:-

Sol:-

If  $50\% \text{ of } P = 25\% \text{ of } Q$  then,  $P = x\% \text{ of } Q$  find  $x$

$$2P = Q$$

$$\boxed{P = \frac{Q}{2}}$$

$$P = x\% \text{ of } Q$$

$$\frac{Q}{2} = \frac{x}{100} \times Q$$

$$250$$

$$\boxed{100x = 50}$$

Q<sub>2</sub> :- If  $20\% \text{ of } (P+Q) = 50\% \text{ of } (P-Q)$  then,

find  $P:Q$

Sol:-

$$20\% \text{ of } (P+Q) = 50\% \text{ of } (P-Q)$$

$$20 \times (P+Q) = 50 \times (P-Q)$$

$$20P + 20Q = 50P - 50Q$$

$$7Q = 3P$$

$$\frac{7}{3} = \frac{P}{Q} = 7:3$$

?

Q<sub>3</sub> :- If  $90\% \text{ of } A = 30\% \text{ of } B$  and  $B = 2x\%$

of  $A$ , Then the value of  $x$  is

$90\% \text{ of } A = 30\% \text{ of } B$

$$\frac{90}{3} \times A = \frac{30}{1} \times B$$

$$\boxed{A = \frac{B}{3}}$$

$$B = 2 \times \% \text{ of } A$$

$$B = \frac{2 \times}{+100} \times \frac{B}{3}$$

$$\boxed{x = 150}$$

?

$40\% \text{ of } (A+B) = 60\% \text{ of } (A-B)$  then,

QH:

$$\frac{2A - 3B}{A+B} \text{ is ?}$$

Solution:

$$\cancel{40\%} \times (A+B) = \frac{30}{60\%} \times (A-B)$$

$$20A + 20B = 30A - 30B$$

$$2A + 2B = 3A - 3B$$

$$5B = A$$

$$\boxed{\frac{A}{5} = B}$$

$$\frac{2A - 3}{5}$$

$$A + \frac{A}{5}$$

$$\Rightarrow \frac{10A - 3A}{5} \Rightarrow \frac{7A}{5}$$

$$\frac{6A}{5} \Rightarrow \frac{7}{6}$$

$$\frac{2A - 3A}{A + \frac{A}{5}}$$

$$A + \frac{A}{5}$$

$$= 2A - \frac{3A}{5}$$

$$\frac{6A}{5}$$

27

Q5:- If 20% of a is equal to 80% b, then  
 $(b+a)/(b-a)$  is equal to:

Solution:-

$$20 \times a = 80 \times b$$

$$\boxed{a = 4b}$$

Solve:-

$$\frac{(b+4b)}{(b-4b)} \Rightarrow \frac{5b}{3b}$$

$$\Rightarrow \boxed{\frac{5}{3}}$$

Practice:-

If 20% of  $(A+B)$  = 50% of B, then

the value  $(2A-B)/(2A+B)$  is.

→ term

Q6:- If  $x$  is 20% less than  $y$ , then find the value of  $(y-x)/y$  and  $x/(x-y)$ ?

$$x - 20\% = y$$

$$x - \frac{20}{100} = y \quad (\text{or})$$

$$\boxed{x = 50y}$$

$$x : y$$

$$100 - 20 : 100$$

$$80\% : 100$$

$$\Rightarrow \frac{100-80}{100} \frac{(y-x)}{y}$$

$$\Rightarrow \frac{20}{100} \Rightarrow \frac{1}{5}$$

$$\Rightarrow \frac{-4}{-20} \Rightarrow -4$$

$$\Rightarrow \boxed{\frac{1}{5}}, \boxed{-4}$$

Q7: If 8% of  $x = 4\%$  of  $y$ , then 20% of  $x$  is.

$$\frac{8x}{2} = \frac{4y}{1}$$

20% of  $x$

$$2x = y$$

$$\frac{20}{100} \times y$$

$$\frac{1}{5} \times y$$

$$\frac{1}{5} \times y \Rightarrow y \text{ of } 10\%$$

Q8: If 60% of  $A = 30\%$  of  $B$ ,  $B = 40\%$  of  $C$ ,

$C = ?\%$  of  $A$  Then the value of  $x$  is  
Find the value of  $x$ ?

$$60^2 \times A = 30 B$$

$$2A = B$$

$$B = 40\% C$$

~~$$B = 40\% C$$~~

$$C = \frac{B}{40} \quad A = \frac{B}{2}$$

~~$$C = x\% A$$~~

~~$$\frac{B}{40} = x \times \frac{B}{2}$$~~

$$B \Rightarrow 2A$$

$$2A = \frac{40}{100} \times C$$

$$A = \frac{C}{5}$$

$$C = \frac{x}{100} \times \frac{C}{5}$$

$$C = 500$$

### 3) what Percentage:-

Formula 1:-

$$x \text{ is what } \boxed{y \text{ or } \%} = \frac{x}{y} \times 100$$

$$\text{What } \boxed{\% \text{ of } x} \text{ is } y = \frac{y}{x} \times 100$$

Formula 2:-

$x$  is what  $y$ .  $\boxed{\text{more or less than } y}$

$$y = \frac{x-y}{y} \times 100$$

$\rightarrow$  Ans = value  
More

Questions:-

Ans = - value  
Less

If  $x$  is 10% more than  $y$  then; by what percentage is  $y$  less than  $x$ ?  $\rightarrow ?$

$\rightarrow$  already mention.

$$y = \frac{x-y}{y} \times 100$$

$$x \quad | \quad y$$

$$100 = 110 - 100 \quad | \quad 10\%$$

$$110 \quad | \quad 100 \rightarrow 10\%$$

$$x = \frac{y-x}{y} \times 100 = \frac{100-110}{110} \times 100$$

$$= \frac{-100}{110} \times 100 \rightarrow -\frac{10}{11} \times 100$$

$$= -\frac{100}{11} \text{ or } -9\frac{1}{11}$$

Q2:- If A's percent height is 10% more than B height, how much percent less is B's height than of A?  $\rightarrow$  than (or) of by formula 2

$$\begin{array}{c} B \quad A \\ 100 \quad 110 \cdot x \Rightarrow \frac{Y - x}{x} \times 100 \\ 10\%. \end{array}$$

$$= \frac{10}{110} \times 100 \Rightarrow \frac{100}{11}$$

$$= -100/11 \Rightarrow 9(\frac{1}{11})$$

$\rightarrow$  Mixed fraction conversion.

Q3:- B got 20% marks less than A.

~~then~~ What %

$$\begin{array}{c} A \quad B \\ 100 \quad 80 \\ -20\%. \end{array}$$

marks did A got more than B?

$$B = \frac{A - B}{B} \Rightarrow \frac{100 - 80}{80} \times 100$$

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

$$\frac{1}{4} \times 100 \Rightarrow 25\%$$

Qn:6

If  $x$  earns 25% more than  $y$ . What per less does  $y$  earn than  $x$ ?

$$\begin{array}{rcl} & x & y \\ & 128 & 100 \\ & \underbrace{\quad}_{25\%} & \\ & 100+25 & \end{array} \left| \begin{array}{l} x = \frac{y+x}{x} \times 100 \\ x = \frac{100+125}{125} \times 100 \end{array} \right.$$

$$\Rightarrow \frac{25}{125} \times 100 = \frac{20}{5}$$

$$\boxed{x \Rightarrow 20\%}$$

Qn 6:- ~~1. Maximum~~

Two numbers are resp  $12(1/2)\%$  and 25% more than a third num. The first num is what percentage of second?

$$\begin{array}{ccc} A & B & C \\ 12(1/2)\% & 25\% & x \\ & \swarrow & \searrow \\ & 25\% & \\ & 12(1/2)\% & \end{array}$$

~~↳ First formula.~~

$$C = Y 100$$

$$B = 125$$

$$A = 12(50) \Rightarrow 600$$

$$\frac{A}{B} \Rightarrow \frac{600}{125}$$

A      B      C  
12(1/2)%    28%    X

$$12 \times \frac{1}{2} = 12\% \quad 100$$

$$\frac{25}{2} \times \frac{1}{100}$$

$$\frac{25}{200} \times \frac{1}{100}$$

$$A = \frac{25}{200}$$

$$A \times C$$

$$\Rightarrow \frac{25}{200} \times 2 = \frac{225}{125 \times 2} \times 100$$

$$A = \frac{25}{2} = \frac{225}{2} \Rightarrow 90\%$$

Practice:- If speed of car is halved

Two num are less than a third num by 30%

and 35%. resp. The perc by which second num is less than the first is

$$0.30 < 0.35$$

$$0.30 \times 0.35 < 0.35 - 0.30$$

$$0.105 < 0.05$$

$$0.05 < 0.01$$

## (4) Percentage Based on Salary.

Base value - If not given.

100% - If not given value  
 $\Rightarrow$  Salary Always 100 percentage!

Ques:-

Radha Spends 40% of her salary on food,  
 20% on house rent,  
 10% on entertainment,  
 10% on conveyance.

her salary saving after spending is 15000

then her salary per month is ?

100%  $\rightarrow$  Salary  
 (Base)

Salary not given

So need to  
 take percentage.

40% of 100%

$$20\% \Rightarrow 1500 \times 5$$

20% of 100

$$\frac{20}{100} \Rightarrow 1500 \times 2$$

10% of 100

$$\frac{10}{100} \Rightarrow 1500 \times 1$$

10% of 100

$$\frac{20}{100} \Rightarrow 1500 \times 2$$

100%  $\Rightarrow$  80%

$$20\% = 1500 \Rightarrow \frac{20}{100} \times 1500 = 1500 \times 100$$

$$\begin{array}{l} 20\% = 1500 \\ \times 2 \quad \text{Find} \\ \hline 100\% = 80\% \end{array}$$

$$\begin{array}{l} 20 \times x = 1500 \times 100 \\ \hline x = 7500 \end{array}$$

Ques 2:-

Kishan Spends 30% of his Salary on Food

and donates 3% in a Charitable Trust.

He Spends Rs. 2810 on these two items.

then Total Salary for that Month is?

30% - Food

3% - donates

> 33%

$$33\% \Rightarrow 2810$$

$$\cancel{100\%} = x$$

base  $\Rightarrow 100\%$

$$33 \times 100 \Rightarrow 2810 \times 100$$

$$x = 7000$$

Ques 3:-

Expense  
Savings

Mr. X Spends 35% of his Salary on food

5% on children education.

In Jan he Spend Rs. 17600 on these

two item. His Salary for this Month

$$\Rightarrow 35\% + 5\% = 40\% \Rightarrow 17600$$

$$100\% \Rightarrow x$$

$$100 \times x = 17600 \times 100$$

$$x = 114000$$

Question 4:-

Keshav spent Rs. 554.75 on his birthday on buying home Appl. & and remaining 25% of total amount cash, what is total amount?

Birthday  $\rightarrow$  554.75 Rs.

Home App  $\rightarrow$  285.25 Rs.

$\boxed{25\%}$  Remaining.

$\boxed{75\%}$

Saving.

$$75\% = 84000$$

$$100\% = x$$

$$75 \times x = 84000 \times 100$$

$$x = 112000$$

31000  
310

Question 5:-

Ms Sujata Invests 7% Rs. 2170.

of her monthly salary invested 18%.  $\frac{31000 \times 3}{100\%}$

$$7\% \Rightarrow 2170 \times 100 \quad 31\% \quad x = 31000$$

$$100\% \Rightarrow x$$

$$x = 31000$$

MF

$$100\% - (7\% + 18\% + 6\%)$$

$$100\% (31\%)$$

31%

Q The monthly salaries of A and B together amount to Rs. 40000. A spends 85% of his salary and B, 95% of salary. If now their savings [are the same], then the salary (in Rs.) of A is.

$$\begin{array}{cc} A & B \\ 20000 & 20000 = 40000 \rightarrow \text{Same} \end{array}$$

$$(M.C) \quad (40000 - x) \quad [S_1 = S_2]$$

$$x \times \frac{15}{100} \quad [40000 - x] \times \frac{5}{100}$$

$$3x = 40000 - x$$

$$2x = 40000$$

$$x = 10,000 \rightarrow A \text{ [Value]}$$

Now apply in B

$$A = 10,000$$

$$B = 30000$$

## Lesson - 5 Election Percentage

→ Question - Two parties - Who wins, invalid, individual votes.

Points

- ① DMK got 5000 votes and won election
- ② ADMK won the ele by Majority / 5000 votes

~~Note's~~ Total votes  
 Majority 100%  $\frac{\text{Total votes}}{100\%}$  difference  
 By } Winner ~ Loser  
 difference

Question 1:- (always need to find with value)

Two person contested an ele of

Parliament. The winning candidate Secured

57% of total and won by an Majority

of 42000. The total num of votes polled

$$\begin{array}{cccc} T & W & L & \\ \hline 100\% & 57\% & 43\% & \\ & 100-57 & & \end{array}$$

$57 - 43 = 14\%$   
 Majority = 14%.

$$14\% = 42000$$

$$100\% = x$$

14 \*

Question 2:-

In a election, a candidate secured 40%  
but is defeated by only candidate  
by majority of 298 votes. Find the total  
no. of votes.

T W L Majority Majority percentage  
100% 60% 40% 298 20%

$$20\% = 298$$

$$100\% = x$$

5

$$x = 1490$$

Question 3:-

In a election b/w two candi, one get

72% of total. If total votes are 8200

By how many votes did the winner win the election?  $\rightarrow$  Total vote given  
 $\rightarrow$  difference find

W L T  
72% 28% 100%

$$\text{Percentage} = 44\%$$

$$100\% = 8200$$

$$44\% = x$$

$$x = 3608$$

Question 9:- 700m

n

7200

In an election b/w two candidates

the can get 60% of votes L%

elected by majority of 14000. The

no. of votes polled by winning candidate

is ?

$$\frac{T}{100\%}, \frac{W}{60\%}, \frac{L}{40\%}, \frac{M}{20\%}$$

$$20x = 14000$$
$$100x = n$$
$$n =$$

$$20x = 14000$$
$$4x = 2800$$
$$x = 700$$
$$\text{winning} \Rightarrow 4200$$

it is wrong  
not asking total

votes.

asking total winning  
votes

Question 6:-

In an election, three candidates contested.

1st got 40% and Second got 36%.

Total no. of votes polled were 3600.

Find no. of votes got by the third?

1st      2nd      3rd  
40%    36%    28%

$$40 - 36 = 4\%$$

$$\begin{array}{r} 40 \\ 36 \end{array}$$

$$100\% = 3600 \times \frac{4}{16} = 900$$

$$\begin{array}{r} 3600 \\ 24 \\ \hline 144 \\ 144 \\ \hline 0 \end{array} \quad \begin{array}{r} 3600 \\ 24 \\ \hline 144 \\ 144 \\ \hline 0 \end{array}$$

$$100\% = 3600$$

$$\cancel{24} = x$$

$$\boxed{x = 8640}$$

V. v.  
~~✓~~

Value

1110

1000

008 = 0.8

[Estimate]

500

007 x 008 = 0.56

0.56

Question 3: (Votes Invalid).

In collage there b/t 2 candidate

Total of votes cast are invalid.

The winner gets 70% of the valid

Votes and defeats the Loser by  
1800 votes. How many votes

T

100% - 10% (invalid)  $\rightarrow$  final  
100% find

90% - valid votes

winner

70% of 90

$$\frac{70}{100} \times 90 = 63\%$$

Converting  
all to 90%.

~~W L~~  
~~70% 20%~~

To find Loser

$$63 - 90 \Rightarrow 27\%$$

$$W = 63\%, L = 27\%, T = 90\%$$

diff

$$M = 36\%$$

50%

$$36\% = 1800$$

$$100 \times ? = ?$$

2

$$n = 6000$$

[cast]

$$\frac{100 \times 100}{36} = 27$$

Ques:- In collage election b/w two cand, 10% of  
votes not cast So, consider 100%.

87. of the votes in an election did  $\textcircled{D}$   $\textcircled{D}$   
not cast their votes in this election, there were  
only two candidates. The winner by obtaining  
48% of total votes defeated his contestant  
by 1100 votes. The total no. of voters in  
the election was.

Sol:-

87. - not cast	100% - Total votes
48% - W	$100\% - 87\% \Rightarrow 92\%$
44% - L	Take 100 as it is

$$\begin{aligned} 44\% &= 1100 \\ 100\% &= x \\ \hline 44 &= 25 \\ 100 &= 25 \\ x &= 1100 \times 25 \\ x &= 27500 \end{aligned}$$

Ques:- In an assembly election, a candidate got 55% of total valid votes. 2% of the total votes were declared invalid. If the total num of votes is 104000, then the num of valid votes polled in favour of the candidate.

## Lesson-6 Percentage on Marks

Exe

Ques:

In an exam, there were 1000 boys and 800 girls. 60% of the boys and 50% of the girls passed. Find the per. of the candidates failed.

Soln:-

Boys	Girls
1000	<u>800</u>

B      G

<u>60%</u>	<u>50%</u>
<u>40%</u>	<u>50%</u>
Failed	Failed

$$\Rightarrow 1800 \Rightarrow 100\%$$

$$\frac{50}{100} \times 1000$$

40% of 1000

50% of 800

$$\frac{40}{100} \times 1000$$

$$2 \times 400$$

$$B \Rightarrow 400$$

$$G \Rightarrow 400$$

$$50\% \quad 4 \frac{800}{100} \times 100 \Rightarrow \text{Total} \Rightarrow 800$$

$$+ 800$$

$$900$$

$$\frac{400}{900} \Rightarrow 44.4\%$$

Q2:- In an examination, a candidate must score  $\frac{4}{5}$  marks to pass. A candidate, who gets 20 Marks, fails by 20 marks. What are maximum marks for the examination?

must gets  
 $40\% \rightarrow 20$  Marks

Failed

$240 \rightarrow$

$$40\% \Rightarrow 240$$

$$100\% \Rightarrow x$$

$$x = \frac{6}{40} \times 240 \Rightarrow 600$$

Q3:- for an exam, it required to get 367. A student got 113. The maximum marks and failed by 85 Marks.

Marks?

Pass Mark	Student	
367.	113	$\rightarrow$ failed by 85

$$367\% \Rightarrow 198$$

$$100\% \Rightarrow x$$

$$x = \frac{198 \times 100}{367} \Rightarrow 550$$

Q4:- A student has to obtain 33% of total marks to pass. He got 25% of total marks. Failed by 10 marks. The no. of total marks.

Pass Got margin  
33% → 40 failed  
8% → margin.

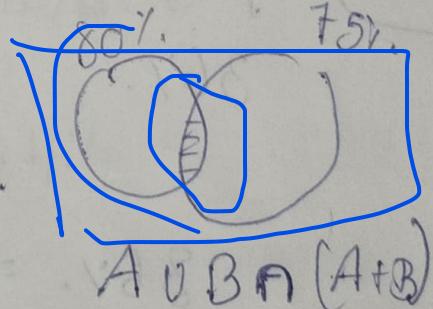
$$8\% = 40$$

$$100x = ?$$

$$x = \frac{40 \times 100}{8} = 500$$

Q5:- In an exam, 80% of the boys passed in English and 85% passed in Maths while 75% passed in both. The no. of boys who sat for the exam: - if 45 boys failed in both

En	Math	both
80%	85%	75%



$$25\% = 45$$

$$80 + 85 - 75$$

$$\Rightarrow 90\% \rightarrow \text{Boys Passed}$$

10% Failed

$$10\% = 45$$

$$100x = ?$$

Q6:-

In an exam 68% of students passed in Maths.

78% passed in Physics and 30% passed in both.

How much percentage of students failed in both?

$$68 + 78 - 30 = 83\% \text{ passed}$$

$$83 \Rightarrow 17\% \text{ failed}$$

Practice:-

In an exam 70% of students passed in English.

80% passed in Maths 10% failed in both the subjects.

If 144 candidates passed in both, what is the total no. of candidates?

70%  $\rightarrow$  Passed in Eng

80%  $\rightarrow$  Maths

10%  $\rightarrow$  Failed in both

90%  $\Rightarrow$  144

100%  $\Rightarrow$  70% + 80%  $\neq$  144  $\Rightarrow$  Both Passed

$$100\% \Rightarrow 160\% - x$$

$$n = 60\%$$

$$60\% \Rightarrow 144$$

$$100\% \Rightarrow n$$

$$x = 240$$

Q10 In an exam, a student who gets 20% of the maximum marks fails by 5 marks.

Another student who scores 30% of the max marks get 20 marks more than his

Pass Marks. [The necessary per cent for pass?]

$$\begin{array}{c} \text{Stu 1} \\ \hline 20\% \\ \leftarrow 5 \text{ failed} \end{array} \quad \begin{array}{c} \text{Stu 2} \\ \hline 30\% \\ \rightarrow 20 \text{ more passed} \end{array} \quad \begin{array}{l} \Rightarrow 10\% = 20 \\ 100\% = x \\ x = 200 \end{array}$$

not diff opposite

$$\text{Pass Mark} \geq 85$$

$$20\% = 50 + 5$$

Pass  
Mark

$$\text{Per cent} \Rightarrow \frac{55}{200} \times 100$$

$$\frac{50}{75} = 72.2\%$$

In an exam, there are 3 sub of 100 marks each.

A student scores 60% in the first

80% in second. [both or aggregate]

Scored 70%.

What is in third?

$$100\% \Rightarrow 60\% + 80\% \Rightarrow 70\% + x\%$$

$$= 70\% + 70\% + x\%$$

$$100\% = 70\% + x\%$$

$$\boxed{x = 30\%}$$

$$100\% \quad 100\% \quad 100\% = 300\%$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$60\% \quad 80\% \quad 70\% = 70\% \quad \text{aggregation}$$

$$60 + 80 + x\% = 210$$

$$x\% = 210 - 140$$

$$\boxed{x = 70\%}$$

Average:-

$$\boxed{\text{Avg} = \frac{\text{Sum of obs}}{\text{tot. n.o.f. obs}}}$$

Consecutive No.:-

$$n, n+1, n+2, n+3$$

Consecutive odd no.:-

$$n, n+2, n+4, n+6$$

Consecutive Even no.:-

$$n, n+2, n+4, n+6$$

- 1) 1, 3, 5, 7, 9  $\Rightarrow 5$
- 2) 26, 28, 30, 32, 34  $\Rightarrow 30$
- 3) 96, 97, 98, 99, 100  $\Rightarrow 98$
- 4) 101, 102, 103, 104  $\Rightarrow 102.5$
- 5) 52, 54, 56, 58  $\Rightarrow 55$