# PERCENTAGE

PERCENTAGE (प्रतिशत %)

PER + CENT

↓ divide by 100 ↓

$X\% = \frac{X}{100}$

प्रतिशत वह भिन्न है जिसका हर 100 हो।

# PERCENT VS PERCENTAGE

⇓ ⇓

जब % किसी known/unknow value के साथ आता है तो उसे PERCENT बुलाया जाता है।

e.g $X\% = X$ PERCENT

$20\% = 20$ PERCENT

जब % अकेला आता है तो उसे % से बुलाया जाता है।

% = PERCENTage

# why we study % (आखिर क्यों)?

e.g Their are three student's A, B & C by looking at table I it looks like C is better but wait and see Table II

| | I MARKS |
|---|---|
| A | 45 |
| B | 80 |
| C | 90 |

TABLE II

| | MARKS | mm | % |
|---|---|---|---|
| A | 45 | 50 | 90% |
| B | 80 | 100 | 80% |
| C | 90 | 150 | 60% |

is better

Note:- Table I was incomplete. Now in Table II we calculate MARKS of A, B, C out of 100 (%)

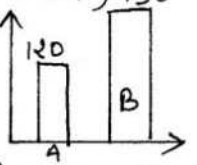
IInd Table देखने के बाद हमने सबके MARKS 100 में से निकाल लिए (%). अब हम Comapare कर सकते हैं और बता सकते हैं कि A is better.


divide by 100 OR Compare with 100

## PERCENTAGE CHANGE

$$\%\ \text{CHANGE} = \frac{\text{WHAT WE COMPARE (जिसको)}}{\text{TO WHOM WE COMPARE (जिसके साथ)}} \times 100$$

Let take Two No A = 120, B = 150




(i) A is what % of B

OR what % of B is A $= \frac{A}{B} \times 100 = \frac{120}{150} \times 100 = 80\%$

OR what % is A of B → [जिसके साथ of आता है वो नीचे आता है।]

(ii) B is what % of A

OR what % of A is B $= \frac{B}{A} \times 100 = \frac{150}{120} \times 100$

OR what % is B of A

$= 125\%$ Ans.

(iii) By how much % A is less than B $= \frac{B-A}{B} \times 100$

$= \frac{30}{150} \times 100 = 20\%$

(iv) By how much % B is more than A

$= \frac{30}{120} \times 100 = 25\%$

# Concept of BY and TO

1) A Number is decrease To 40%. [उतना हो जाएगा]

⇒ INITIAL 100 FINAL 40

2) A Number is decreased by (उतने से) घट जाएगा

⇒ INITIAL 100 FINAL 60

# PERCENTAGE CHANGE Vs PERCENTAGE POINT CHANGE

A = 10% B = 20%

% Change = $\frac{5\%}{10\%} \times 100 = 50\%$

15% − 10% = 5%

# % TO FRACTION [divide by 100]

$20\% = \frac{20}{100} = \frac{1}{5}$

$12.5\% = \frac{12.5}{100} = \frac{1}{8}$

$40\% = \frac{40}{100} = \frac{2}{5}$

# FRACTION TO % [multiply by 100]

$\frac{1}{5} \Rightarrow \frac{1}{5} \times 100 = 20\%$

$\frac{1}{6} \Rightarrow \frac{1}{6} \times 100 = 16\frac{2}{3}\%$

$\frac{3}{8} \Rightarrow \frac{3}{8} \times 100 = 37.5\%$

# How To calculate % QUICKly

520 → 100 %.
→ 10 % = 52
→ 1 % = 5.2
→ .1 % = .52

# 27 % of 520
= 25 % + 1 % + 1 %.
= $\frac{1}{4}$ × 520 + 5.2 + 5.2
= 130 + 10.4 = 140.4

21 % of 520
= 10 % + 10 % + 1 %
= 52 + 52 + 5.2
= 109.2 ANS.

57 % of 520
= 50 % + 5 % + 2 %
= 260 + 26 + 5.2 + 5.2
= 286 + 10.4
= 296.4 ANS.

# 144 is what % of 450
= $\frac{144}{450}$ × 100
= $\frac{(135+9)}{450}$ × 100
= $\frac{135}{450}$ × 100 + $\frac{9}{450}$ × 100
= 30 % + 2 % = 32 % ANS.

126 is what % of 450
= $\frac{126}{450}$ × 100
= $\frac{135-9}{450}$ × 100
= $\frac{135}{450}$ × 100 − $\frac{9}{450}$ × 100
= 30 % − 2 % = 28 %

# 138 is what % of 476
= $\frac{138}{476}$ × 100
= $\frac{(119+19)}{476}$ × 100
= $\frac{119}{476}$ × 100 + $\frac{19}{476}$ × 100
= 25 % + 4 % ≅ 29 %

63 % of 560
= (62.5 % + .5 %) of 560
= $\frac{5}{8}$ × 560 + 2.8
= 350 + 2.8
= 352.8 ANS.

# FRACTION TO PERCENTAGE CONVERSION Table

| Fraction | Percentage | | Fraction | Percentage | |
|---|---|---|---|---|---|
| | I | II | | I | II |
| $1$ | 100% | 100% | $\frac{1}{14}$ | 7.14% | $7\frac{1}{7}\%$ |
| $\frac{1}{2}$ | 50% | 50% | $\frac{1}{15}$ | 6.67% | $6\frac{2}{3}\%$ |
| $\frac{1}{3}$ | 33.33% | $33\frac{1}{3}\%$ | $\frac{1}{16}$ | 6.25% | $6\frac{1}{4}\%$ |
| $\frac{1}{4}$ | 25% | 25% | $\frac{1}{17}$ | 5.88% | $5\frac{15}{17}\%$ |
| $\frac{1}{5}$ | 20% | 20% | $\frac{1}{18}$ | 5.56% | $5\frac{5}{9}\%$ |
| $\frac{1}{6}$ | 16.67% | $16\frac{2}{3}\%$ | $\frac{1}{19}$ | 5.26% | $5\frac{5}{19}\%$ |
| $\frac{1}{7}$ | 14.28% | $14\frac{2}{7}\%$ | $\frac{1}{20}$ | 5% | 5% |
| $\frac{1}{8}$ | 12.5% | $12\frac{1}{2}\%$ | $\frac{1}{24}$ | 4.16% | $4\frac{1}{6}\%$ |
| $\frac{1}{9}$ | 11.11% | $11\frac{1}{9}\%$ | $\frac{1}{25}$ | 4% | 4% |
| $\frac{1}{10}$ | 10% | 10% | $\frac{3}{4}$ | 75% | 75% |
| $\frac{1}{11}$ | 9.09% | $9\frac{1}{11}\%$ | $\frac{2}{5}$ | 40% | 40% |
| $\frac{1}{12}$ | 8.33% | $8\frac{1}{3}\%$ | | | |
| $\frac{1}{13}$ | 7.69% | $7\frac{9}{13}\%$ | | | |

# DERIVED FRACTION TO CONVERSION Table

| Fraction | Percentage | | Fraction | Percentage | |
|---|---|---|---|---|---|
| | I | II | | I | II |
| $\frac{1}{8}$ | 12.5% | $12\frac{1}{2}$% | $\frac{2}{3}$ | 66.67% | $66\frac{2}{3}$% |
| $\frac{3}{8}$ | 37.5% | $37\frac{1}{2}$% | $\frac{1}{12}$ | 8.33% | $8\frac{1}{3}$% |
| $\frac{5}{8}$ | 62.5% | $62\frac{1}{2}$% | $\frac{7}{12}$ | 58.33% | $58\frac{1}{3}$% |
| $\frac{7}{8}$ | 87.5% | $87\frac{1}{2}$% | $\frac{11}{12}$ | 91.67% | $91\frac{2}{3}$% |
| $\frac{1}{6}$ | 16.67% | $16\frac{2}{3}$% | $\frac{5}{6}$ | 83.33% | $83\frac{1}{3}$% |

# Larger FRACTION/PERCENTAGES

1) $108.33\%$ or $108\frac{1}{3}\% = 100\% + 8.33\% = 1 + \frac{1}{12} = \frac{13}{12}$

2) $362.5\%$ or $362\frac{1}{2}\% = 300\% + 62.5\% = 3 + \frac{5}{8} = \frac{29}{8}$

3) $191.67\%$ or $191\frac{2}{3}\% = 200\% - 8\frac{1}{3}\% = 2 - \frac{1}{12} = \frac{23}{12}$

4) $393.33\%$ or $393\frac{1}{3}\% = 400\% - 6\frac{2}{3}\% = 4 - \frac{1}{15} = \frac{59}{15}$

5) $283.33\%$ or $283\frac{1}{3}\% = 200\% + 83\frac{1}{3}\% = 2 + \frac{5}{6} = \frac{17}{6}$

OR $= 300 - 16\frac{2}{3}\% = 3 - \frac{1}{6} = \frac{17}{6}$

# PERCENTage Is INTERCHANGable

A% of B = B% of A = $A \times B / 100$

e.g. 64% of 62.5 = ?

= 62.5% of 64 [∵ % is interchangable]

= $\frac{5}{8} \times 64 = 40$ [∵ $62.5\% = \frac{5}{8}$]

e.g. 72% of $91\frac{2}{3}$ = ?

= $91\frac{2}{3}$% of 72

= $\frac{11}{12} \times 72 = 66$ ANS. [∵ $91\frac{2}{3}\% = \frac{11}{12}$]

# $17\frac{1}{2}$% of 84 = ?

= 35% of 42 [∵ a% of b = 2a% of $\frac{b}{2}$]

= 70% of 21

= 14.7 ANS.

# 32% of 250 + 12.5% of 640 = ?

12.5% of 640 = 25% of 320 [∵ a% of b = 2a% of $\frac{b}{2}$]

∴ 32% of 250 + 25% of 320

= 25% of 320 + 25% of 320

= (25% + 25%) of 320 = 50% of 320 = 160 ANS.

# $62.5\%$ of $512 + 83\frac{1}{3}\%$ of $216 = ?$

$= \frac{5}{8} \times 512 + \frac{5}{6} \times 216$ $\left[\because 62\frac{1}{2}\% = \frac{5}{8}, \; 83\frac{1}{3}\% = \frac{5}{6}\right]$

$= 5 \times 64 + 5 \times 36 = 5\,(100)$

$= 500$ ANS.

# $193\frac{1}{3}\%$ of $225 + 91\frac{2}{3}\%$ of $144 = ?$

$\left(200\% - 6\frac{2}{3}\%\right) 225 + \left(100\% - 8\frac{1}{3}\%\right)$ of $144$

$= 450 - \frac{1}{15} \times 225 + 144 - \frac{1}{12} \times 144$

$= 435 + 132 = 567$ $\left[\because 6\frac{2}{3}\% = \frac{1}{15}, \; 8\frac{1}{3}\% = \frac{1}{12}\right]$

# Population of city beautiful Chandigarh is 490000 in 2016. If growth Rate is $14\frac{2}{7}\%$. what will be Population in 2017?

Solution :— $P_{2016} = 490000$

$14\frac{2}{7}\%$ of $490000 = \frac{1}{7} \times 490000 = 70000$

$P_{2017} = 490000 + 70000 = 560000$

# TRICKY CONCEPTS

1. Convert % into fraction $\pm \frac{N}{D}$

   where + means increase

   & − means decrease.

2. Initial value = Denominator = D

3. Final value = $D \pm N$ or $I \pm N$

   + for Increase
   − for Decrease

e.g. 20% Increase = $+\frac{1}{5}$ → Increase
5 → Initial

Final = 5+1 = 6

20% decrease = $-\frac{1}{5}$ → decrease
5 → Initial

Final = 5−1 = 4

# If $16\frac{2}{3}$% of a Number is added with itself, resultant Number becomes 3430. Find the original Number?

Solution :- $16\frac{2}{3}\%\uparrow = \frac{+1}{6 \to I}$

$\Rightarrow F = 6+1 = 7$

$7 \longrightarrow 3430$

$\Rightarrow 6 \longrightarrow \frac{3430}{7} \times 6 = 2940$ Ans.

# If $16\frac{2}{3}\%$ of a Number is substracted from itself then the resultant Number becomes 225. Find the original Number?

Sol. $16\frac{2}{3}\% = \frac{-1 \rightarrow \text{Dec.}}{6 \rightarrow \text{INITIAL}} \Rightarrow \text{Final} = 6-1 = 5$

$5 \rightarrow 225$

$1 \rightarrow 45 \Rightarrow 6 \longrightarrow 45 \times 6 = 270$ Ans.

# IF 210 is added in a no. then the no. becomes 137.5% of itself. Find the original Number?

Solution :- $137\frac{1}{2}\% = 100\% + 37\frac{1}{2}\% = 1 + \frac{3}{8} = \frac{11 \rightarrow F}{8 \rightarrow I}$

Final $\leftarrow 11$, Initial $\leftarrow 8$

$3 \rightarrow 210$

$1 \rightarrow 70$ $\longrightarrow$ original $= 8 \longrightarrow 8 \times 70$

560 Ans.

# Population of a city is 72900 in 2010. If population growth rate is $12\frac{1}{2}\%$. Find population in 2009.

Solution :- $12\frac{1}{2}\% = \frac{+1 \rightarrow \text{Increase}}{8 \rightarrow 2009} \Rightarrow P_{2010} = 8+1 = 9$

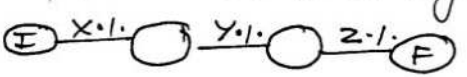
$9 \rightarrow 72900$

$1 \rightarrow 8100$

$P_{2009} = 8 \longrightarrow 8 \times 8100 = 64800$

# SUCCESSIVE (क्रमागत / लगातार) % Change


% change $= X + Y + \frac{XY}{100}$




$= X+Y+Z + \frac{XY+YZ+ZX}{100} + \frac{XYZ}{100^2}$

IF ↑ take x, Y +ve

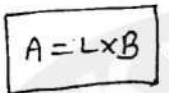
↓ take x, Y −ve

# L ↑ = 20%. B ↓ 10%. A = ?

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

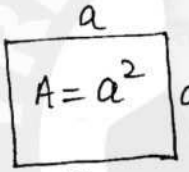
$= 8\%\uparrow$

A = L × B




# Square

a ↑ 20·/·




$A = 20 + 20 + \frac{400}{100}$

$= 44\%\uparrow$

# 50·/· + 40·/· = ?

$= -50 - 40 + \frac{2000}{100}$

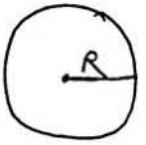
$= -70\%$

↓

Shows discount

# Circle (वृत)

$A = \pi R^2$



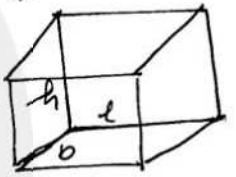

R ↓ 10·/·

$A = -10 - 10 + \frac{100}{100}$

$= -19\%\downarrow$

# Cuboid

$V = l b h$




l ↑ 10·/· b ↓ 10·/·

h ↑ 20·/·

$V = 10 - 10 + 20 + \frac{-100 - 200 + 200}{100} + \frac{-10 \times 10 \times 20}{100^2}$

$= 20 - 1 - \frac{1}{5} = \frac{94}{5} = 18.8\%\uparrow$

# 30·/· + 20·/· + 10·/· = ?

$= -30 - 20 - 10 + \frac{600 + 200 + 300}{100} - \frac{6000}{100^2}$

$= -60 + 11 - .6$

$= -49.6$

Ans 49.6%

# If the length of rectangle is increased by $12\frac{1}{2}\%$ and breadth decreased by 20%. Find the % change in Area?

Solution :-

| | L | × | B | = A |
|---|---|---|---|---|
| original | 8 | | 5 | = 40 |
| New | 9 | | 4 | = 36 |

$12\frac{1}{2}\% = +\frac{1}{8}$

$20\% \downarrow = -\frac{1}{5}$

% change $= \frac{-4}{40} \times 100 = -10\%$ Ans

– shows Area is ↓

# If radius of circle is decreased by 10%. Find the % change in Area of circle. ($A = \pi R^2$)

Solution :-

| | Radius | Area | |
|---|---|---|---|
| original | 10 | 100 | −19 |
| New | 9 | 81 | |

$10\% \downarrow = -\frac{1}{10}$

New $= 10 - 1 = 9$

% change $= \frac{-19}{100} \times 100 = 19\% \downarrow$

# If the Price of the sugar is increased by $16\frac{2}{3}\%$ and consumption is decreased by 25% find the % change in Expenditure?

Solution

| | Price | × | Consump. | = Exp. | |
|---|---|---|---|---|---|
| original | 6 | | 4 | = 24 | −3 |
| New | 7 | | 3 | = 21 | |

$16\frac{2}{3}\% \uparrow = +\frac{1}{6}$

$25\% \downarrow = -\frac{1}{4}$

% change $= \frac{-3}{24} \times 100 = 12.5\% \downarrow$ Ans.

# The value of a machine depreciates at the Rate of 10% per annum. If its present WORTH is 364500. find its WORTH after 3 years

Solution $10\% \downarrow = \frac{-1}{10}$

$$\begin{array}{l} 10 \text{ —— } 9 \\ 10 \text{ —— } 9 \\ 10 \text{ —— } 9 \\ \hline 1000 \text{ — } 729 \end{array}$$

$1000 \rightarrow 364500 \Rightarrow 729 \rightarrow 265\,7205$ AN8.

# The present population of a town is 108000. During the 1st yr. population increases by $66\frac{2}{3}\%$, while decreases by $16\frac{2}{3}\%$ during second year. During 3rd year increases by $33\frac{1}{3}\%$. Find the population of town 3 yrs hence?

Sol $66\frac{2}{3}\% \uparrow = +\frac{2}{3}$, $16\frac{2}{3}\% \downarrow = \frac{-1}{6}$, $33\frac{1}{3}\% = +\frac{1}{3}$

$$\begin{array}{ll} 3 & 5 \\ 6 & 5 \\ 3 & 4 \\ \hline 54 & 100 \end{array}$$

$54 \rightarrow 10800$

$\Rightarrow 100 \rightarrow \boxed{120000}$ AN8.

OR

$$\begin{array}{l} 3 \\ 6 \\ 3 \end{array}$$

# The single discount which is equivalent to successive discounts of 50% & 40% ?

Solution :-

| | 50% | 40% | |
|---|---|---|---|
| original | 2 | 5 | = 10 |
| New | 1 | 3 | = 3 |

) -7

equivalent d% = $-7/10 \times 100 = 70\%$ Ans.

discount is always decrease

50% ↓ = $-\frac{1}{2}$

40% ↓ = $-\frac{2}{5}$

# A single discount which is equivalent to successive discounts of 30%, 20% & 10% ?

Solution

| | 30% | 20% | 10% | |
|---|---|---|---|---|
| Original | 10 | 5 | 10 | = 500 |
| New | 7 | 4 | 9 | = 252 |

) -248

equivalent discount % = $\frac{248}{500} \times 100 = 49.6\%$

# If the Price of cinema ticket is increased by $16\frac{2}{3}$%, then the sale will be decreased by 20%. Find the % change in Revenue ?

Solution :-

| | Price | Sale | = Revenue |
|---|---|---|---|
| original | 6 | 5 | = 30 |
| New | 7 | 4 | = 28 |

) -2

%change = $\frac{-2}{30} \times 100 = 6\frac{2}{3}\%$ ↓

Ans.

$16\frac{2}{3}\%$ ↑ = $+\frac{1}{6}$

20% ↓ = $-\frac{1}{5}$

# Product Constancy Method

let $P = A \times B$

If one increases by some %, in order to keep P as constant, he should decrease B or vice-versa.

or in simple way If $P$ = constant

$\Rightarrow A \propto \frac{1}{B}$ [A & B are inversly Proportional]

e.g If $A = 2:3$, & If $P$ = constant

$\Rightarrow B = 3:2$

# Application

(i) Area of Reactangle $A = l \times b$

(ii) Expenditure = Price x Consumption

$E = P \times C$

(iii) Revenue = Price x Sales, $R = P \times S$

(iv) Distance = Speed x Time, $D = S \times T$

(v) WORK = Time x Efficiency etc.

# If the price of sugar is increased by 20%, then by how much % the consumption should be ↓ decreased so that expenditure will remain same?

Solution :- $20\% \uparrow = +\frac{1}{5} \longrightarrow$ Increase
$\frac{}{5} \rightarrow$ old Price

New Price $= 5+1 = 6$

Also $E = P \times C$ as $E =$ constant $\Rightarrow P \propto \frac{1}{C}$

| | original | | New |
|---|---|---|---|
| Price → | 5 | : | 6 |
| ⇒ Consumption → | 6 | $\underset{-1}{:}$ | 5 |

$[\because P \propto \frac{1}{C}]$

$\% \downarrow = -\frac{1}{6} = 16\frac{2}{3}\%$ Ans.

# If the lengths of rectangle is decreased by 12.5%. By how much Percentage breadth must be decreased in order to keep Area same?

Solution :- $12.5\% \downarrow = -\frac{1}{8} \rightarrow$ old length

New length $= 8-1 = 7$

$A = l \times b$ , as $A =$ constant $\Rightarrow l \propto \frac{1}{B}$

| | old | | New |
|---|---|---|---|
| length | 8 | : | 7 |
| Breadth | 7 | $\underset{+1}{:}$ | 8 |

$[\because l \propto \frac{1}{B}]$

$\% \uparrow = +\frac{1}{7} = 14\frac{2}{7}\%$ Ans.

# A reduction ~~in~~ of 25% in the price of sugar enables a housewife to purchase 4 kg more for ₹ 800. Find original and current price per kg?

**Solution :→** Here Expenditure = CONSTANT = 800

$\Rightarrow$ Price $\propto \frac{1}{\text{CONSUMPTION}}$

$25\%\downarrow = -\frac{1}{4} \rightarrow$ old $\Rightarrow$ New $= 4-1=3$

| | old | | New |
|---|---|---|---|
| Price | 4 | : | 3 |
| CONSUMP | 3 | : | 4 |
| | | | $+1 \rightarrow 4$ |

$\Rightarrow$ old CONSUMPTION $= 3\times4 = 12$kg

New CONSUMPTION $= 4\times4 = 16$kg

OR DIRECT
25% of 800 = 200
New/Reduced Price $= \frac{200}{4} = 50$
old $\Rightarrow$ 75% $\rightarrow$ 50
100% $\rightarrow 66\frac{2}{3}$

(i) old Price $= \frac{800}{12} = 66\frac{2}{3}$ ₹/kg (ii) New/current Price $= \frac{800}{16} = 50$

# Due to 30% increase in price of apples, 6 apples are less available for ₹ 520. Find the old and new price of a apple?

**Solution :–** $30\%\uparrow = \frac{+3}{10}$

| | old | | New |
|---|---|---|---|
| Price | 10 | : | 13 |
| CONS. | 13 | : | 10 |
| | | | $-3 \rightarrow 6$ |
| | | | $1 \rightarrow 2$ |

OR DIRECT
30% of 520 = 156
New Price $= \frac{156}{6} = 26$
old → 130% — 26
100% → 20

old CONS. $= 13\times2 = 26$

old Price $= \frac{520}{26} = 20$ ₹

New Consumpt. $= 10\times2 = 20$

New Price $= \frac{520}{20} =$ ₹ 26

## A reduction of 20% in the price of sugar enables a man to buy 10 kg more for ₹ 54. Find the original as well as reduced price per kg?

**Solution :→** Here Expenditure = 54 = constant

$\Rightarrow$ Price $\propto \frac{1}{\text{Consumption}}$

$20\% \downarrow = -\frac{1}{5}$

| | old | New |
|---|---|---|
| price | 5 | 4 |
| Consumption | 4 | 5 |

$+1 \rightarrow 10$ kg

$\Rightarrow$ old consum $= 10 \times 4 = 40$

New " $= 10 \times 5 = 50$

Old Price $= \frac{54}{40} = 1.35$ ₹/kg

New or Reduced $= \frac{54}{50} = 1.08$ ₹/kg

OR DIRECT

20% of 54 $= 10.8$

New/Reduced Price $= \frac{10.8}{10} = 1.08$ **Ans.**

## Due to an increase ~~in~~ of 20% in the price of eggs, 2 eggs less available for ₹ 24. The present rate of egg per dozen?

**Solution :→** E = constant

$20\% \uparrow = +\frac{1}{5}$

| | old | New |
|---|---|---|
| Price | 5 | 6 |
| Consump. | 6 | 5 |

$-1 \rightarrow 2$

New Consumption

$\Rightarrow 5 \rightarrow 5 \times 2 = 10$ egg

Price per egg $= \frac{24}{10} = 2.4$

Price of dozen $= 2.4 \times 12 = 28.80$ ₹ **Ans.**

# If the Price of sugar is decreased by 40%. By how much % consumption should be increased so that expenditure will decrease by 10%?

Solution :→ METHOD→1 $E = P \times C$

Exp. = Price × Consumption

let old $\underset{-10\%}{100} = 10 \times 10$

New $\underset{-40\%}{90} = 6 \times$ New Consumption

$\Rightarrow$ New Consumption $= \frac{90}{6} = 15$

% ↑ in Consumption $= \frac{15-10}{10} \times 100 = 50\%$ Ans.

OR

$= x + y + \frac{xy}{100}$

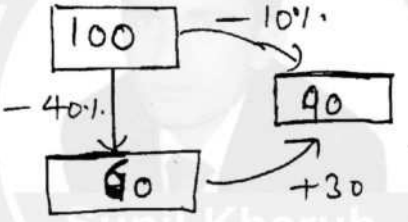
$-10 = -40 + x - \frac{40x}{100}$

$\Rightarrow 60x = 3000$

$\Rightarrow x = 50\%$

50% ↑

METHOD 2 :-




$\Rightarrow$ % change $= \frac{30}{60} \times 100$

$= 50\%$

# If the Price of Rice is decreased by 20%. By how much % consumption should be increased so that Expenditure also Increased by 20%?

Solution :- 1st Method

$E = P \times C$

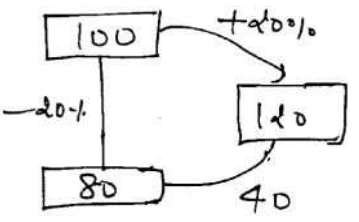
let old $100 = 10 \times 10$

New $120 = 8 \times N_C$

$\Rightarrow N_C = 15$

% ↑ $= \frac{5}{10} \times 100 = 50\%$

2nd Method




% increase

$= \frac{40}{80} \times 100 = 50\%$

# If the Price of sugar is decreased by 40%. By how much % consumption should be increased so that Expenditure will be decreased by ~~20%~~ 10% only?

# FOCUS ON FIX :→ The quantity that does not change in intial and final mixture make that equal.

e.g. If there is mixture of water and salt & water get evaporated. That means salt will not change in intial and final mixture. make salt equal. you will better understand by questions.

# A vessel has 60 litres of solution of acid & water having 80% acid. How much water must be added to make it a solution in which acid is 60%?

solution :- water is added ⇒ acid qty is same

1st METHOD

let final mixture (after add water) is = x ltr

equate Acid

$$\frac{80 \times 60}{100} = \frac{60 \times x}{100}$$

$$\Rightarrow x = 80 \text{ ltr}$$

water added = 80 − 60 = 20

2ND METHOD

By Ratio

| | Acid | | water |
|---|---|---|---|
| old | $4_{\times 3}$ | : | $1_{\times 3}$ |
| New | $3_{\times 4}$ | : | $2_{\times 4}$ |

make Acid equal

12 : 3
12 : 8 ) 5 water added

15 → 60 ⇒ 5 → 20 ltr

# 75 gm of a solution has 30% sugar in it. Then the qty of sugar that should be added to the solution to make 70% sugar solution. ANS. 100 gm

# FRESH grapes contains 90% water while dry grapes contains 20% water. what is the weight of dry grapes obtained from 20 kg FRESH GRAPES.?

Solution 1st method

the weight of non-water part called Pulp will Remain same equate

$$\frac{20*10}{100} = \frac{80*X}{100} \Rightarrow X = 2.5 \text{ kg}$$

$x \rightarrow$ dry grapes weight.

2ND METHOD Ratio

| | PULP | WATER |
|---|---|---|
| old | $1\times4$ : | $9\times4$ |
| New | 4 : | 1 |

Make PULP same

~~5 : 45~~ 4 : 36 → 40

~~5 :~~ 4 : 1 → 5

40 → 20 kg ⇒ 5 → 2.5 kg

# FRESH GRAPES Contains 80% water, while dry grapes contains 10% water. If the weight of dry grapes is 500 kg. what is total wt. when it is FRESH ?

Solution :- equate Non water Part (Pulp)

1st method

let total wt. of fresh grapes = $x$ kg.

$Pulp_1 = Pulp_2$

$$\frac{20*X}{100} = \frac{90*500}{100}$$

$\Rightarrow x = 2250$ kg.

2ND METHOD (Ratio)

| | PULP | WATER |
|---|---|---|
| old | $1\times9$ : | $4\times9$ |
| New | 9 : | 1 |

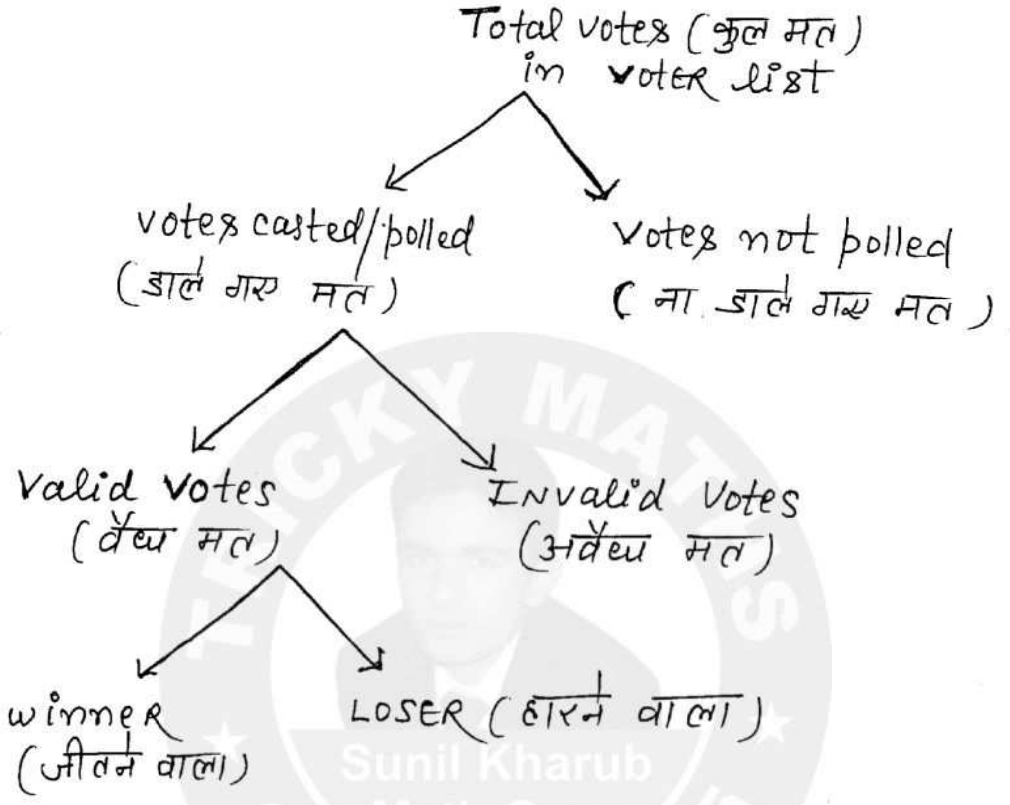
By $10(9+1) = 500$

$1 \rightarrow 50$ kg

FRESH = $9+36 = 45$

wt = $45\times50 = 2250$ kg

# ELECTIONS RELATED QUESTIONS




Note :- जो counting होगी वो सिर्फ valid votes की होगी OR we can say that difference of winners and losers votes is of valid votes only (winner + LOSER votes = valid votes)

Note : अगर 1 के वोट Total votes की % में given है तो Total votes को 100 मान लो और अगर valid votes की % में given है तो valid votes को 100 मानने में फायदा होगा।

# In an election between two candidates, the candidate getting 60% of votes polled is elected by a majority of 14000 votes. The No. of votes get by winner 1) 28000 2) 32000 3) 42000 4) 46,000

Solution :- winner LOSER

60% 100 − 60 = 40%

60% − 40% = 14000 ⇒ 20% → 14000

∴ 60% → $\frac{14000}{20} \times 60$

= 42000 Ans

# एक चुनाव में दो उम्मीदवार चुनाव लड़ रहे थे। जीतने वाले उम्मीदवार को कुल मतों का 55% प्राप्त हुआ और वह 500 मतों से चुनाव जीत गया। तो इस चुनाव में कुल कितने वोट डाले गए।

Solution :- W L

55% 45%

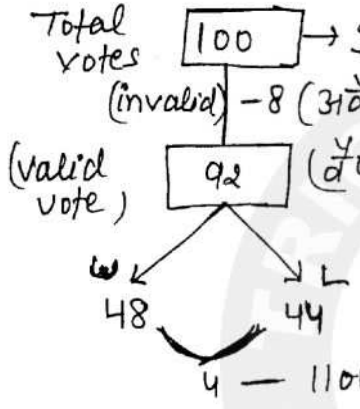
(margin) 10% → 500

⇒ 100% → 5000 Ans.

# In an election b/w BJP & CONGRESS, BJP SCORED 22% of total votes more than Cong. if congress get 11700 votes and there is no invalid vote then find the total No. of votes. [30000 Ans.]

# 8% of the voters in an election did not cast their votes. In this election their were only two candidates. The winner by obtaining 48% of total votes defeated his opponent by 1100 votes. The total no. of voters in voter list is a). 21000 b). 23500 c). 24000 d). 27500

Solution :- let Total votes = 100



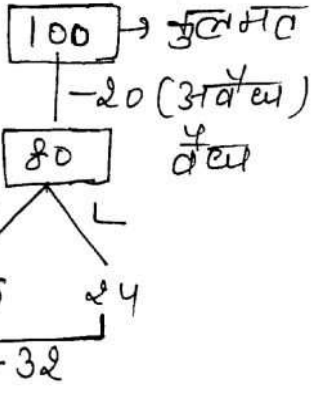

[ LOSER + WINNER = Valid vote
LOSER + 48 = 92
⇒ L = 92 − 48 = 44 ]

4 — 1100 ⇒ 100 → $\frac{1100}{4} \times 100 = 27500$ Ans.

# एक चुनाव में दो उम्मीदवार हैं। जिसमें 20% मतों को अवैध घोषित कर दिया और विजेता को कुल मतों का 56% वोट प्राप्त होते हैं तथा वह 6400 मतों से चुनाव जीत जाता है। तो चुनाव में कुल कितने मत/वोट डाले गए?

Solution W = 56% of 100 = 56

L + W = 80 ⇒ L = 24



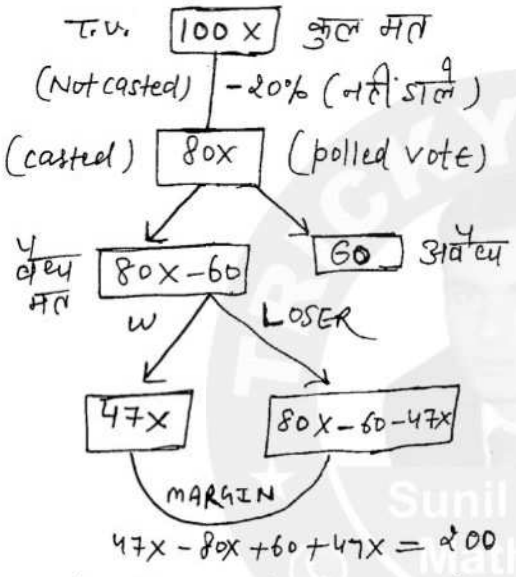

100% → $\frac{6400}{32} \times 100 = 20,000$

6400 ← 32

# In an election their are two candidates 20% of voters didn't cast their votes. And 60 votes were declared invalid. If winners gets 47% of total votes and win by 200 votes then find the total no. of votes?

Solution :-

I



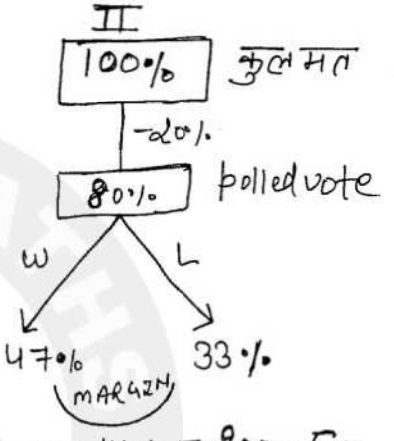

$47x - 80x + 60 + 47x = 200$

$\Rightarrow 14x = 200 - 60 = 140$

$\Rightarrow x = 10$ $\quad T.V = 100x$

$= 1000$ Ans.

II




$14\% = 200 - 60$

$100\% = 1000$ Ans

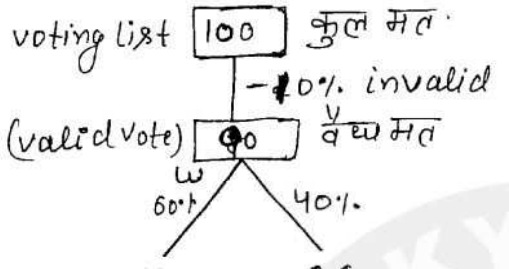
Note :- आपको invalid मतों को यहाँ - करना है ना कि ऊपर।

# एक चुनाव में दो उम्मीदवार हैं। 20% मतदाताओं ने अपने मत का प्रयोग नहीं किया। और 200 मत अवैध पाये गए। जीतने वाले प्रत्याशी को कुल मतों का 48% प्राप्त हुआ और वह 6600 मतों से चुनाव जीत गया तो मतदाता सूची में कितने मतदाता थे?

[40000 Ans]

# In an election two candidate Participated. 10% votes declared invalid and the winner gets 60% of the valid votes and win by 5400 votes find the total No. of votes in voting list?

Solution :- I




$18 \longrightarrow 5400$

$100 \longrightarrow \frac{5400}{18} \times 100$

$= 30,000$ Ans.

II

let Total votes $X$

$\therefore X * \frac{9}{10}$ = valid votes

$W = 60\%$ of valid votes

$\Rightarrow L = 40\%$ of valid votes

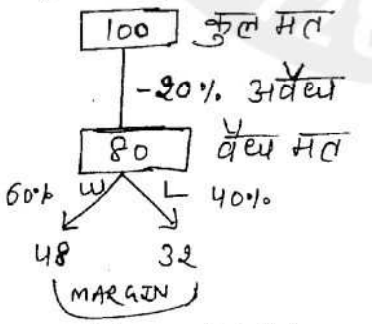
MARgin $= 20\% = \frac{1}{5}$ of valid votes

$\therefore \boxed{X * \frac{9}{10} * \frac{1}{5} = 5400}$

$\Rightarrow X = 30,000$ Ans.

# एक चुनाव में दो प्रत्याशी चुनाव लड़ रहे हैं। उसमें 20% मतों को अवैध घोषित किया गया। विजेता को कुल वैध मतों का 60% मत प्राप्त हुए और वह 4096 मतों से चुनाव जीत गया तो उस चुनाव में कुल कितने मत डाले गए।

Solution :- I




$16 \longrightarrow 4096$

$\Rightarrow 100 \longrightarrow \frac{4096}{16} \times 100$

$= 6400$ Ans.

$= 25600$

II

let total votes $= (X)$

$\therefore X * \frac{80}{100} = X * \frac{4}{5} =$ वैध मत

विजेता 60% of वैध मत

$\Rightarrow$ LOSER $= 40\%$ of वैध मत

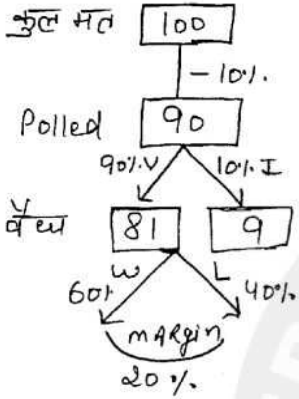
MARgin $= 20\%$ of वैध मत

$\therefore X * \frac{4}{5} * \frac{1}{5} = 4096$

$X = 25600$ Ans.

# In an election two candidate participated. 10% voters did not vote, out of which 10% votes declared invalid and the winner got 60% of valid votes and win by 8100 votes. Then find the total no of votes in voter list?

Solution :- I




$\therefore 81 \times \frac{20}{100} = 8100$

$\Rightarrow 100 \rightarrow 50000$ Ans.

II

let valid vote = 100


$20 \rightarrow 8100$

$\Rightarrow 100 \rightarrow \frac{8100}{20} \times 100$

वैध मत = 40500

T.V. $= 40500 \times \frac{10}{9} \times \frac{10}{9}$

$= 50,000$ Ans.

III

let T.V. = X

vote polled $= X * \frac{9}{10}$

valid votes $= X * \frac{9}{10} * \frac{9}{10}$

MARgin = 20% $= \frac{1}{5}$

$\therefore X * \frac{9}{10} * \frac{9}{10} * \frac{1}{5}$

$= 8100$

$X = 50,000$ Ans.

# एक चुनाव में दो प्रत्याशी थे। जिसमें 20% मतदाताओं ने अपने मत का प्रयोग नहीं किया। और 10% मत अवैध पाए गए। अगर विजेता को वैध मतों का 70% मिले तो वह 2160 मतों से चुनाव जीत जाता है। तो मतदाता सूची में कुल कितने मतदाता थे?

Solution : Let कुल मत = X

poll हुए वोट $= X * \frac{80}{100} = X * \frac{4}{5}$

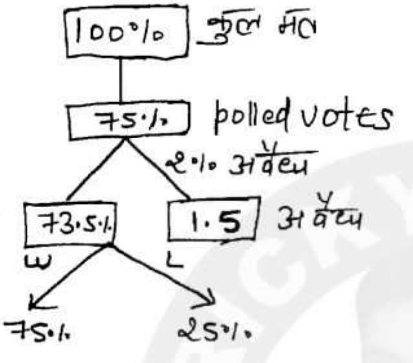
वैध मत $= X * \frac{4}{5} * \frac{9}{10}$

MARgin = 70% - 30% = 40% of वैध मत

$\therefore X * \frac{4}{5} \times \frac{9}{10} \times \frac{2}{5} = 2160 \Rightarrow X = 7500$ Ans.

# In an election between two candidates 75% of the voters casts their vote, out of which 2% votes declared invalid. A candidate get 9261 votes which were 75% of valid votes. The total No. of voters in voting list was 1) 16000 2) 16400 3) 16800 4) 18000

Solution :- I




∴ 75·1· of 73·5·1· = 9261

⇒ 100·1· = 16800 Ans.

II

माना कुल मत = X

Polled votes = $X * \frac{75}{100} = X * \frac{3}{4}$

वैध मत (valid) = $X * \frac{3}{4} * \frac{98}{100}$

winner get 75·1· of valid vote

$\therefore \left[X * \frac{3}{4} * \frac{98}{100}\right] * \frac{75}{100} = 9261$

⇒ X = 16800 Ans.

# एक चुनाव में बंसीलाल और देवीलाल ने भाग लिया। 37.5·1· मतदाताओं ने बंसीलाल को वोट करने का वादा किया और शेष ने देवीलाल को वादा किया। वोट वाले दिन 20·1· बंसीलाल के वोटरों ने और 25·1· देवीलाल के वोटरों ने अपना वादा तोड़ दिया (मुकर गया)। कुल कितने वोट थे अगर देवीलाल 8400 वोट से चुनाव जीत गया?

Solution :-

37.5·1· = $\frac{3}{8}$

माना Total वोट 800

⇒ देवीलाल → 500

बंसीलाल → 300

| बंसीलाल | देवीलाल |
|---|---|
| 300 | 500 |
| -60 (20·1·) | -125 |
| 240 | 375 |
| +125 | +60 |
| 365 | 435 |

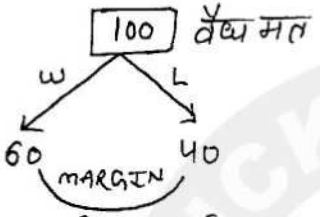
70 — 8400

→ 800 → 96000 Ans

# किसी चुनाव में दो उम्मीदवार हैं। 10% मतदाताओं ने वोट नहीं डाले और 500 वोट अवैध घोषित कर दिए जाते हैं। जीतने वाला उम्मीदवार वैध मतों का 60% प्राप्त करता है और 800 वोटों से चुनाव जीत जाता है। पंजीकृत मतदाताओं की संख्या ज्ञात करें।

Solution :- I

Let valid vote = 100




वैध मत = 4000

votes Polled = वैध + अवैध
= 4000 + 500 = 4500

let x = T.V. = कुल मत

$\therefore x * \frac{90}{100} = 4500 \Rightarrow x = 5000$ Ans.

II

Let कुल मत = x

वोट पड़े = $x * \frac{90}{100} = x * \frac{9}{10}$

वैध मत = $x * \frac{9}{100} - 500$

margin = 60% - 40% = 20%
= $\frac{1}{5}$ of वैध मत

$\therefore \left[x * \frac{9}{100} - 500\right] * \frac{1}{5} = 800$

$\Rightarrow x = 5000$ Ans.

# In an election two candidate participated. 20% voters did not cast their votes out of which 1600 votes declared invalid and the winner get 62.5% of valid votes and wins by 2000 votes. Find the number of votes in voting list?

Solution :- let Total votes = x

$\therefore \left[x * \frac{4}{5} - 1600\right] \times \frac{1}{4} = 2000$

$\Rightarrow x = 12000$ Ans.

| (W) | (L) |
|---|---|
| 62.5% | 37.5% |
| 25% = 1/4 MARGIN | |