7.1 : Percentages Introduction

What is Percent ?

Cent means 100 and per means divided by.

Discount is 25% means $\frac{25}{100}$

For every 100 you are getting discount 25.

Conversion of % to fraction (÷100)

$25\% = \frac{25}{100} = \frac{1}{4}$

$60\% = \frac{60}{100} = \frac{3}{5}$

$16\frac{2}{3}\% = 16.67\%$

$16\frac{2}{3}\%$

$= \frac{50}{3}\% = \frac{50}{3} \times \frac{1}{100} = \frac{1}{6}$

$83\frac{1}{3}\% = 83.33\%$

$= \frac{250}{3}\%$

$= \frac{250}{3} \times \frac{1}{100} = \frac{5}{6}$

Conversion of fraction to % (×100)

$\frac{3}{4} = \frac{3}{4} \times 100 = 75\%$

$\frac{2}{7} = \frac{2}{7} \times 100 = 28\frac{4}{7}\%$

1) $P\% \times x = \frac{P}{100} \times x$ ⓐ $20\% \times 800 = \frac{20}{100} \times 800 = 160$

2) $a\% \times b = b\% \times a$

$75 \times 32\%$

$75\% \times 32 = \frac{3}{4} \times 32 = 24$

Few '%'s

$10\% = \frac{10}{100} = \frac{1}{10}$

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

$30\% = \frac{3}{10}$

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

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

$75\% = \frac{3}{4}$

$100\% = 1$

$120\% = \frac{6}{5}$

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

$6\frac{1}{4}\% = \frac{1}{16}$

$37\frac{1}{2}\% = \frac{3}{8}$

$62\frac{1}{2}\% = \frac{5}{8}$

$8\frac{1}{3}\% = \frac{1}{12}$

$16.2/3\% = \frac{1}{6}$

$33\frac{1}{3}\% = \frac{1}{3}$

$66\frac{2}{3}\% = \frac{2}{3}$

$88\frac{1}{3}\% = \frac{5}{6}$

$11\frac{1}{9}\% = \frac{1}{9}$

$9\frac{1}{11}\% = \frac{1}{11}$

$14\frac{2}{7}\% = \frac{1}{7}$

$28\frac{4}{7}\% = \frac{2}{7}$

Ex: $2104 \times 12.5\%$

$= 2104 \times \frac{1}{8} = 263$

$133\frac{1}{3}\% = 100\% + 33\frac{1}{3}\%$

$= 1 + \frac{1}{3} = \frac{4}{3}$

Ex: $45\% \times 210$

$50\% - 5\%$

$105 - 10.5 = 94.5$

10% = unit digit can be eliminated

1% = last 2 digits can be diminated.

Ex

620 × 10% = 62

623.4 × 10% = 623.4

5162 × 1% = 51.62

Ex

42% × 210

/ \

40% 2%

84 + 4.2 = 88.2

⊛ Original value is always 100% (or) 100
Total ↓
Base Value

⊛ A number itself is always 100%.

Ex: Savings is 20% of my Income
↓
Base Value

Treat Income = 100% (or) 100 Base Value

① In terms of fraction

$25\% = \frac{1}{4}$ → Result
→ original value

&

Savings is 20% of my Income

$20\% = \frac{1}{5}$ → Savings
→ original value
↓
Income

To find

1) what % of x is y!
2) y is what % of x?
3) what % is y of x?

$\left.\begin{matrix}\\\\\end{matrix}\right\} \frac{y}{x} \times 100$

anything after of is denominator.

Q.1) 32 is what % of 80?

$32 = x\% \times 80$

$32 = \frac{x}{100} \times 80$

$\therefore x = 40\%$

(or) $\frac{y}{x} \times 100$

$\Rightarrow \frac{32}{80} \times 100$

$= 40\%$

Q.2) what % of 26 is 52?

$x\% \times 26 = 52$

$\frac{x}{100} \times 26 = 52$

$x = 200\%$

(or) $\frac{52}{26} \times 100$

$= 200\%$

Q.3) 18% of a number is 90, then find the number

$18\% \times N = 90$

$\frac{18}{100} \times N = 90$

$N = 500$

(or) $18\% \rightarrow 90$

$100\% \rightarrow \frac{90}{18} \times 100 = 500$

Concept

1) A number is increased by 20%.

Original number = 100%.

New Number = 120%.

(or) $20\% = 1/5$

original number = 5

New Number = $5+1 = 6$

2) A number is decreased by 25%.

Original number = 100%. (or) $25\% = \frac{1}{4}$

New Number = 75%

original number = 4

New Number = $4-1 = 3$

Q.1) A number is increased by 25%, then it becomes 600. The original number is

Concept 1

Let original number be x.

$x + 25\% x = 600 \Rightarrow x + \frac{25}{100} x = 600 \Rightarrow \frac{125x}{100} = 600 \Rightarrow x = 480.$

Concept 2

Original number = 100%

New Number = 125%

$\therefore$ $125\% \rightarrow 600$

$100\% \rightarrow \frac{600}{125} \times 100 = 480.$

Concept 3

$25\% = 1/4$ (Original number = 4

New Number = $4+1 = 5$

$5 \rightarrow 600$

$4 \rightarrow \frac{600}{5} \times 4 = 480.$

Q2) A number is decreased by 20%, it becomes 120. find the original number.

Concept 1

Let original number be x

$x - 20\%$ of $x = 120$

$x - \frac{20x}{100} = 120$

$\frac{80x}{100} = 120$

$x = 150$

Concept 2 (in terms of %)

Let original number be 100%

New Number = 80%

80% $\longrightarrow$ 120

100% $\longrightarrow \frac{120}{80} \times 100 = 150$

Concept 3 (in terms of fractions)

20% = 1/5

Original number = 5

New Number = 5 - 1 = 4

4 $\longrightarrow$ 120

5 $\longrightarrow \frac{120}{4} \times 5 \Rightarrow 150$

Q 3) A number is decreased by $33\frac{1}{3}\%$, then it becomes 180. find the original number.

$33\frac{1}{3}\% = \frac{1}{3}$

Original number = 3

New Number = 3 - 1 = 2

$2 \longrightarrow 180$

$3 \longrightarrow \frac{180}{2} \times 3 = 270.$

Concept

A	B
You	Your friend
100	150

How much less you spent = ₹50/-

How much more your friend spent = ₹50/-

How much % less you spent = $\frac{50}{150} \times 100 = 33\frac{1}{3}\%$

How much % more your friend spent = $\frac{50}{100} \times 100 = 50\%$.

1) What % of A is B? $\Rightarrow \frac{B}{A} \times 100$

2) What % is A less than B?

3) What % of B is A? $\Rightarrow \frac{A}{B} \times 100$

4) What % is B more than A?

What % is A less than B? $\frac{B-A}{B} \times 100$

What % is B more than A? $\frac{B-A}{A} \times 100$.

Q.1) A is 25% less than B. By what % is B more than A?

let B = 100

A = 75% of B

= 75

$\frac{25}{75} \times 100 = 33\frac{1}{3}\%$

Q.2) A is $28\frac{4}{7}\%$ more than B. By what % is B less than A?

$28\frac{4}{7}\% = \frac{2}{7}$

B = 7 (assume)

$A = 7 + \frac{2}{7} \times 7$

= 9

$\frac{2}{9} \times 100 = 22\frac{2}{9}\%$

Concept

Price, consumption and expenditure.

When expenditure is constant

$$\text{Price ratio} \propto \frac{1}{\text{Quantity ratio}}$$

If price ratio = a : b

Quantity Ratio = $\frac{1}{a} : \frac{1}{b}$

= b : a

Ex

Apples cost for today is ₹20/-

Expenditure = ₹ 100/-

∴ Quantity = 5

Apples cost for tomorrow is ₹25/-

Expenditure = ₹100/-

∴ Quantity = 4

Price Ratio = 20 : 25

= 4 : 5

Quantity Ratio = 5 : 4

(*) Price Ratio = 4 : 3 : 2

Quantity Ratio = $\frac{1}{4} : \frac{1}{3} : \frac{1}{2}$ lcm(4,3,2)

= 3 : 4 : 6

8. The price of sugar increased by 10%, in order to keep the expenditure as constant by what % consumption must be reduced?

Let Price of Sugar = 100

Original Price = 100

New Price = 110

Price Ratio = 100 : 110

= 10 : 11

Quantity Ratio = 11 : 10

Required % = $\frac{1}{11} \times 100 = 9\frac{1}{11}\%$.

Alternative

100 —↑10%— 110

→ Price

↓ Quantity ← 10

100

$\frac{10}{110} \times 100 = 9\frac{1}{11}\%$

(OR)

$\frac{10}{100+10} \times 10 = \frac{10}{110} \times 100$

$= 9\frac{1}{11}\%$.

Q2) The price of the tea powder decreased by 25%, in order to keep the expenditure as constant by what % consumption must be increased!

Price Ratio = 100 : 75

4 : 3

Quantity Ratio = 3 : 4

$\frac{1}{3} \times 100 = 33\frac{1}{3}\%$

Alternative

Price

100 —— 75 ↘ 25

100 Quantity

$\frac{25}{75} \times 100 = 33\frac{1}{3}\%$

7.2 : Percentages Solved Problems

Q.1) If 40% of a = b, then b% of 40 is same as

(a) 4% of a (b) 8% of a (c) 16% of a (d) 8% of b

$40\% \times a = b$

$\frac{2}{5} \times a = b$

$b\%$ of $40 = b \times 40\%$

$b \times \frac{2}{5} = \frac{2}{5} \times a \times \frac{2}{5}$

$= \frac{4}{25} \times a \times 100$

$= 16\%$ of a.

Q.2) What % is 6 hours in a day?

1 day = 24 hours

What % is 6 of 24

$\frac{6}{24} \times 100 = 25\%$

(OR)

24 hrs —— 100%.

6 hrs —— ?

$\frac{6}{24} \times 100 = 25\%$.

Q.3) A student has to obtain 40% of the total marks to pass. He got 270 marks and failed by 50 marks. The maximum marks are:

40% of total Marks = pass marks

(270 + 50) Marks = pass marks

=> 320 marks

40% ⟶ 320

100% ⟶ $\frac{320}{40} \times 100$

= 800

Q.4) A student who secures 20% marks in examination fails by 30 marks. Another student who secures 32% marks gets 42 marks more than those required to pass. The percentage of marks required to pass is

Let total marks = x

1st Person pass marks = 20% of x + 30

2nd Person pass marks = 32% of x − 42

20% of x + 30 = 32% of x − 42

32% of x − 20% of x = 72

12% of x = 72

$\frac{12}{100} \times x = 72$

$x = 600$

Pass Mark = 20% of 600 + 30 = 120 + 30 = 150

Pass Marks (%) = $\frac{150}{600} \times 100 = 25\%$.

(Alternative)

Pass Marks

$$12\% \left[\begin{array}{ll} 20\% & 30 \\ 32\% & -42 \end{array}\right] \begin{array}{l} \rightarrow 5\% \\ 72 \\ \rightarrow -7\% \end{array}$$

$12\% \longrightarrow 72$

$1\% \longrightarrow \frac{72}{12} = 6$

$20\% + 5\% = 25\%$

(or)

$32\% - 7\% = 25\%$

Q.5) A man multiplying a number by $3/5$ instead of $5/3$. find the % change in the error.

$N \times 5/3 \rightarrow$ correct way

$N \times 3/5 \rightarrow$ Error

↙ denominators of $(5/3, 3/5)$

let N be LCM $(3,5) = 15$

$$\left.\begin{array}{l} 15 \times 5/3 = 25 \\ 15 \times 3/5 = 9 \end{array}\right] 16$$

$\frac{16}{25} \times 100 = 64\%$

Q.6) If 75% of a number is added to 125, then the result is the number itself. The number is

$$75\% \times N + 125 = N$$

$$\frac{3}{4} \times N + 125 = N$$

$$125 = N - \frac{3}{4}N$$

$$\frac{1}{4}N = 125$$

$$N = 500$$

(Alternative)

$$75\% + 125 = 100\%$$

$$25\% \rightarrow 125$$

$$100\% \rightarrow \frac{125}{25} \times 100 = 500.$$

Q.7) If the numerator of a fraction is increased by 20% and the denominator is decreased by 5%, the value of the fraction becomes $\frac{1}{2}$. The original fraction is

Let the original fraction $= \frac{x}{y}$

$$\text{New fraction} = \frac{120\% \text{ of } x}{95\% \text{ of } y} = \frac{120x}{95y}$$

$$\frac{120x}{95y} = \frac{5}{2}$$

$$\Rightarrow \frac{x}{y} = \frac{95}{48}.$$

Q.8) A reduction of 20% in the price of wheat enable to buy 5 kg more wheat for ₹ 320. The original rate of wheat is.

Expenditure is same, ie, ₹ 320

Price Ratio $\propto \frac{1}{\text{Quantity Ratio}}$

Let the original price be ₹100

∴ New Price = ₹80

Price Ratio = 100 : 80
= 5 : 4

Quantity Ratio = 4 : 5
(1)

1 ⟶ 5
4 ⟶ 5 × 4 = 20kgs
5 ⟶ 5 × 5 = 25kgs.

Original Price = $\frac{320}{20}$ = ₹16/- per kg.

(Alternative)

Let original price = x

New Price = $x - 20\%\, x = \frac{4}{5}x$

Total Exp = ₹ 320

$\frac{320}{x} = y$ ... (i)

$\frac{320}{\frac{4}{5}x} = y + 5$ ... (ii)

(ii) − (i)

$\frac{320}{\frac{4}{5}x} - \frac{320}{x} = 5$

$\Rightarrow \frac{400}{x} - \frac{320}{x} = 5 \Rightarrow \frac{80}{x} = 5 \Rightarrow x = ₹16/-$

(Alternative)

20% ——— 5kg

100% ——— $\frac{5}{20} \times 100 = 25$kg

original qty = 25 - 5 = 20kg

$\frac{320}{20}$ = ₹16 per kg.

7.3: Problems on Successive Percentage

8s

Let Ravi's Salary be ₹10,000

It increased by 10% in next month and again decreased by 10% next to next month. What is the net effect value in %.

10% ↑ 10,000 + 1,000 = 11,000

10% ↓ 1,100

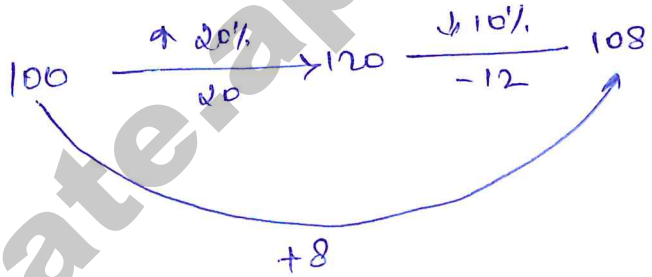
9,900

10,000 − 9,900 = 100

$\frac{100}{10,000} \times 100 = 1\%$ decrease.

$\boxed{x + y + \frac{xy}{100}}$ increased '+' sign
decreased '−' sign.

Q.1) A number is increased by 20% and then it is decreased by 10%. Find the net increase or decrease %.



Net effect (%) $= \frac{8}{100} \times 100 = 8\%$ increase

(Alternative)

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

$= 20\% - 10\% + \frac{(20)(-10)}{100}$

$= 10 - 2 = 8\%$ increase.

Q.24 The price of TV increased by 20%. and its sales was decreased by 20%. find the % change in the turnover to the shop keeper?

Price ↑ = 20% = 1/5

Original Price = 5

New Price = 5+1 = 6

Sales ↓ 20% = 1/5

Original Sales = 5

New Sales = 5-1 = 4

Total Sales = 5 x 5 = 25

New Sales = 6 x 4 = 24

New change (%) = $-1/25 \times 100 = -4\%$

∴ 4% decrease

(Alternative)

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

$$20\% - 20\% + \frac{20 \times (-20)}{100}$$

-4%

∴ decrease of 4%.

Q.3) The length and breadth of the rectangle are increased by 10% and 20% respectively. Find the % change in the area of rectangle?

Area of a rectangle = $l \times b$

$L \uparrow 10\%$, $b \uparrow 20\%$

$= 1/10$ $= 1/5$

Original length = 10

New length = 10+1 = 11

Original Breadth = 5

New Breadth = 5+1 = 6

Original Area = $10 \times 5 = 50$

New Area = $11 \times 6 = 66$

Change of Area = 66 - 50 = 16

Change of Area (in %) = $\frac{16}{50} \times 100$

= 32% increase

Alternative

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

$10\% + 20\% + \frac{10 \times 20}{100}$

= 32% increase

Q4) Radius of circle is decreased by 50%, then find out % change in area of circle?

Area of circle $= \pi r^2$

Radius ↓ 50%

$= 1/2$

Original Radius = 2

New Radius = 2 − 1 = 1

Area (original) $= \pi 2^2$

$= 4\pi$

New Area $= \pi 1^2$

$= \pi$

Change in Area $= \pi - 4\pi$

$= -3\pi$

Change in Area (%) $= \frac{-3\pi}{4\pi} \times 100$

$= -75\%$

∴ 75% decrease

(Alternative)

$x = 50\%$ ↓

$y = 50\%$

$x + y + \frac{xy}{100} = (-50) + (-50) + \frac{(-50)\times(-50)}{100}$

$= -100 + 25$

$= -75\%$

∴ 75% decrease

Q5) Price of sugar is increased by 25% and consumption is decreased by 16%, then find out % change in expenditure?

Expenditure = Price x Quantity

Price ↑ 25% = 1/4

Consumption ↓ 16% = 4/25

Original Price = 4

New Price = 4+1 = 5

Original Consumption = 25

New Consumption = 25 - 4 = 21

Expenditure = 4 x 25 = 100

New Expenditure = 21 x 5 = 105

Change in Expenditure = 105 - 100
= 5

Change (%) = $\frac{5}{100} \times 100$ = 5% increase

(Alternative)

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

= 25% - 16% + $\frac{(25) \times (-16)}{100}$

= 9 - 4

= 5% increase

Q.6) The present population of a city is 1,80,000. If it increases at the rate of 10% p.a., its population after 2 years will be

$$\text{Population after } n \text{ years} = \text{Original population} \times \left(1 + \frac{r}{100}\right)^n$$

$$= 1,80,000 \times \left(1 + \frac{10}{100}\right)^2$$

$$= 1,80,000 \times \left(\frac{11}{10}\right)^2$$

$$= 1,80,000 \times \frac{11}{10} \times \frac{11}{10}$$

$$= 2,17,800$$

Alternative)

1,80,000
(+) 10% 18,000
1,98,000
+(10%) 19,800
2,17,800

(Alternative)

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

$= 10 + 10 + \frac{10 \times 10}{100}$

$= 21\%$.

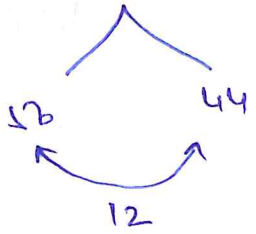
$1,80,000 \times 21\% = 37,800$

∴ New Population $= 1,80,000 + 37,800$
$= 2,17,800$.

Problem on votes

Q.7) There were only two candidates in an election, one get 56% votes and was won by margin of 144 votes. The total number of votes are :

Let the total votes be 100



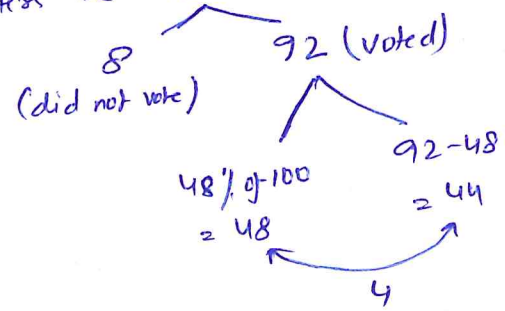
12 → 144

100 → $\frac{144}{12} \times 100$

= 1200 votes in total.

Q.8) 8% of the voters in an election did not cast their votes. In this election, there were only two candidates. The winner by obtaining 48% of the total voter defeated his contestant by 1200 votes. The total number of voters are

Let total no. of voters be 100



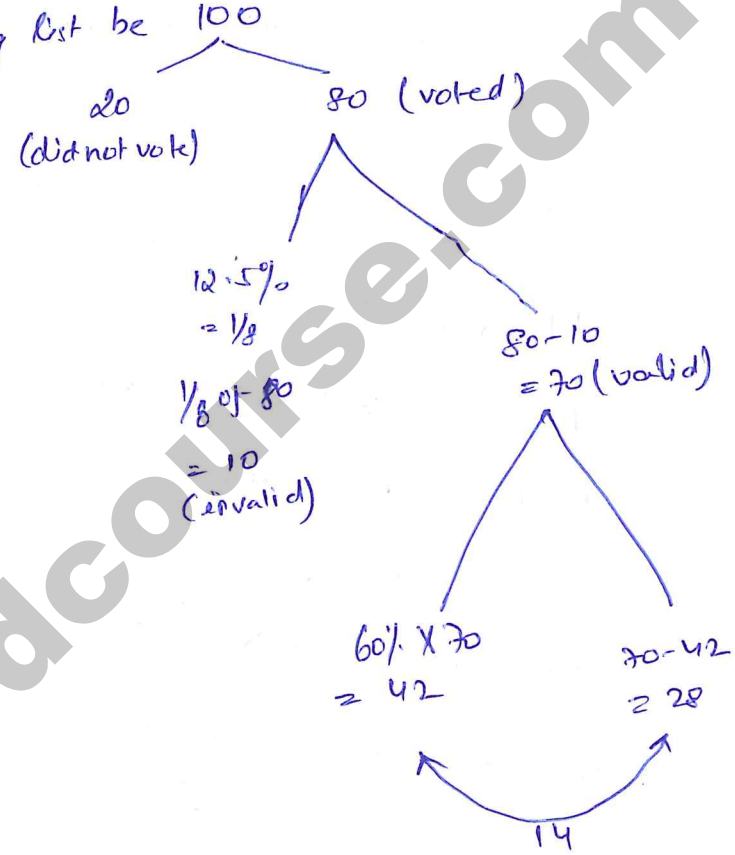
4 → 1200

100 → $\frac{1200}{4} \times 100$

= 30,000 voters.

Q.9) In an election two candidates participated. 20% voters did not vote. 12.5% votes declared invalid and winner get 60% of the valid votes and won by 7000 voter. Find the total no. of valid votes.

Let the total voters in voting list be 100



14 → 7000

70 → $\frac{7000}{14} \times 70$

= 35,000 valid votes.

Q.10) Radha spends 20% of her salary on food, 10% on house rent, 15% on entertainment and 15% on transport. If her savings at the end of the month are ₹1,800, then her salary per month (in ₹).

Income − Expenditure = Savings

Let income be ₹ 100.

Food = 20% × 100 = 20

Rent = 10% × 100 = 10

Entertainment = 15% × 100 = 15

Transport = 15% × 100 = 15

Total Expenditure = 20 + 10 + 15 + 15

= ₹ 60

Savings = 100 − 60

= ₹ 40

40 ⟶ 1800

100 → $\frac{1800}{40} \times 100$

= ₹ 4,500/- (Salary)

Alternative

Expenditure (%) = 20% + 10% + 15% + 15% = 60%

Savings (%) = 100% − 60% = 40%

40% → 1800

100% → $\frac{1800}{40} \times 100$ = ₹ 4500/-

Q.11) Chiru spends 30% of his monthly income on food articles, 40% of the remaining on transport and saves 50% of the remaining. If he saves ₹1,680, what will be his monthly income in (₹)?

Let monthly income be ₹100

Food 30% — 30

₹70

Transport 40% (70×40%) — 28

₹42

Savings 50% (42×50%) — ₹21

21 → 1680

100 → $\frac{1680}{21} \times 100$

= ₹8,000/- (Monthly Income)

(Alternative) Let monthly income be x.

$x \times (100-30) \times (100-40) \times (100-50) = 1680$

$\Rightarrow x \times 70\% \times 60\% \times 50\% = 1680$

$\Rightarrow x \times \frac{7}{10} \times \frac{3}{5} \times \frac{1}{2} = 1680$

$\Rightarrow x = ₹8,000/-$

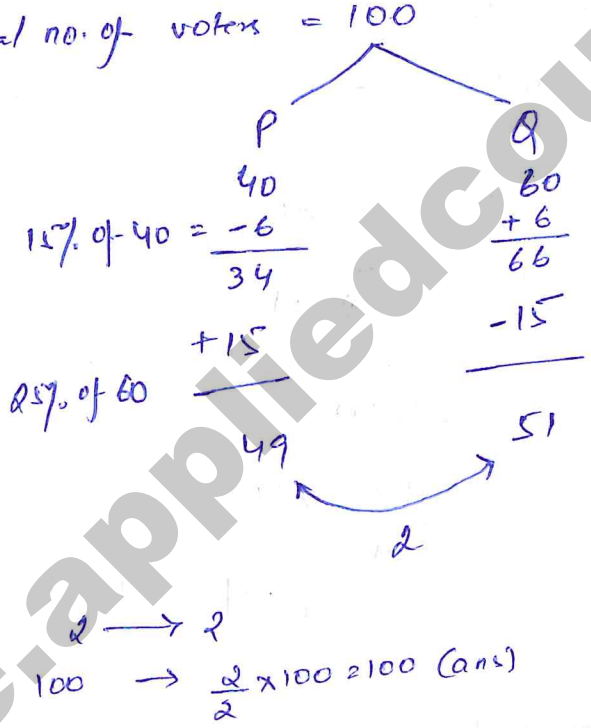
7.4 : Previous Year Gate Questions

Q.1) There are two candidates P and Q in an election. During the campaign 40% of the voters promised to vote for P, and rest for Q. However, on the day of election 15% of the voters went back on their promise to vote for P and instead voted for Q. 25% of the voters went back on their promise to vote for Q and instead voted for P. Suppose, P lost by 2 votes, then what was the total number of voters? (GATE 2011)

(a) 100 (b) 110 (c) 90 (d) 95

Solution

Let total no. of voters = 100



$2 \rightarrow 2$

$100 \rightarrow \frac{2}{2} \times 100 = 100$ (ans)

Q.27 An average household spent his monthly budget on various items, viz., on food - ₹ 4,000, clothing - ₹ 1,200, Rent - ₹ 2,000, Savings - ₹ 1,500 and others - ₹ 1,800. The approximate % of the Monthly budget not spent on savings is (GATE 2012)

(a) 10% (b) 14% (c) 81% (d) 86%

Solution

food → 4000
cloth → 1200
Rent → 2000
Savings → 1500
Others → 1800
10,500

% Spent on savings $= \frac{1500}{10500} \times 100$

$= 1/7 \times 100$

$= 14\ 2/7\ \% \cong 14\%$.

∴ % not spent on savings = 100 − 14

= 86% (Ans)

Q.3) Round trip tickets to a tourist destination are eligible for a discount of 10% on the total fare. In addition, groups of 4 or more get a discount of 5% on the total fare, if the one way single person fare is ₹100, a group of 5 tourist purchasing round-trip tickets will be charged ₹ ——— (GATE 2014)

Solution

one way trip cost is ₹100/- per person

Then two way trip = ₹200/- per person

Cost of 5 person = 5 X 200 = 1000

Discount @ 10% 100

900

Discount @ 5% 50

850 (ans)

Q.4) One percentage of the people of country X are taller than 6 feet. Two percentage of the people of country Y are taller than 6 feet. There are thrice as many people in country X as in country Y. Taking both countries together, what is the percentage of people taller than 6 feet ——— ? (GATE 2014)

	X	Y
No. of people	300	100 (let) = 400
taller than 6 feet	3	2 = 5

$\frac{5}{400} \times 100 = 1.25\%$ (ans)

Q.5) The given question is followed by two statements; select the most appropriate option that solves the question. Capacity of a solution tank A is 70% of the capacity of tank B. How many gallons of solution are in tank A and tank B?

Statements

I. Tank A is 80% full and Tank B is 40% full.

II. Tank A is full contains 14,000 gallons of solution.

(a) Statement - I alone is sufficient

(b) Statement - II alone is sufficient

(c) Either statement I or II alone is sufficient

(d) Both the statements I and II together are sufficient

Solution

Let the capacity of tank B be 100 gallons
Then the capacity of tank A = 70 gallons

From Statement I

% of Gallon in Tank A = 80%
Tank B = 40%

Answer is not possible from Statement I alone.

Statement II

Tank A = 14,000 gallons.

A	B
70	100
14,000	20,000.

Statement II alone is not possible.

Both Statement I and II together (and).

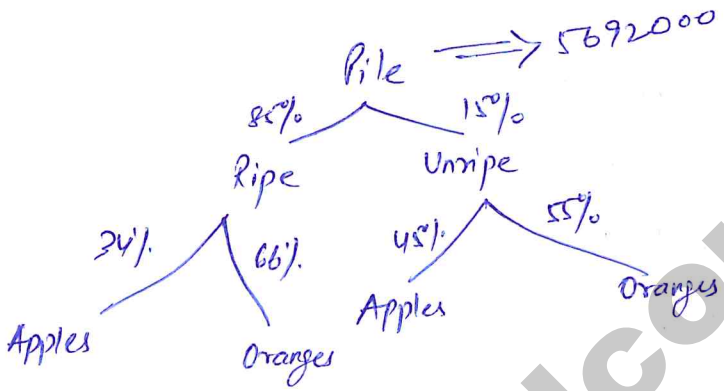
S-I
S-II

Yes, we can get the solution.

Q.67 In a huge pile of apples and oranges, both ripe and unripe mixed together, 15% are unripe fruits. Of the unripe fruits, 45% are apples. Of the ripe ones, 66% are oranges. If the pile contains a total of 5692000 fruits, how many of them are apples? (GATE 2016)

(a) 2029198 (b) 2467482 (c) 2789080 (d) 3577422

Solution



No. of apples =

$$\underbrace{34\% \times 85\%}_{\text{Ripe}} + \underbrace{15\% \times 45\%}_{\text{Unripe}}$$

$$\left(\frac{34}{100} \times \frac{85}{100} + \frac{15}{100} \times \frac{45}{100}\right) \times 5692000$$

$$\left(\frac{2890}{10000} + \frac{675}{10000}\right) \times 5692000$$

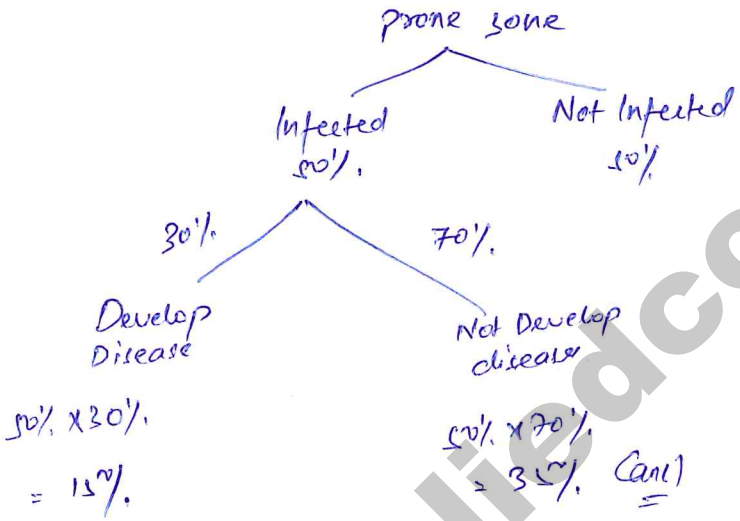
$$\frac{3565}{10000} \times 5692000$$

$$= 2029198 \quad \text{(ans)}$$

Q7) A person moving through a tb prone zone has a 50%. probability of becoming infected. However, only 30%. of infected people develop the diseases. What percentage of people moving through a tb prone zone remains infected but does not show symptoms of disease? (GATE 2014)

(a) 15 (b) 33 (c) 35 (d) 37

Solution



Q8) (x% of y) + (y% of x) is equivalent to (GATE 2016)

(a) 2% of xy (b) 2% of (xy/100) (c) xy% of 100 (d) 100% of xy

$$\frac{x}{100} \times y + \frac{y}{100} \times x$$

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

$$= \frac{2xy}{100}$$

= 2% of xy (ans)

Q.9) Rajiv spends 40% of his salary on food, 20% on house rent, 10% on entertainment and 10% on conveyance. If his savings at the month end are ₹ 2,000, then his monthly salary is - (GATE 2017)

(a) ₹ 6,000 (b) ₹ 8,000 (c) ₹ 10,000 (d) ₹ 12,000

Solution

Let the monthly salary be ₹ 100

Expenses

40% x 100	40
20% x 100	20
10% x 100	10
10% x 100	10
	₹ 80

Savings = 100 - 80 = ₹ 20.

20 → 2000

100 → $\frac{2000 \times 100}{20}$

= ₹ 10,000.

Q.10) If the radius of a right circular cone is increased by 50%, its volume increase by (GATE 2017)

(a) 75% (b) 100% (c) 125% (d) 237.5%

Solution

Volume of cone = $\frac{1}{3}\pi r^2 h$ 50% ↑ = 1/2.

Original Radius = 2, New Radius = 2+1 = 3

Original Volume = $\frac{1}{3}\pi 4h$, New Volume = $\frac{1}{3}\pi 9h$

Original Volume : New Volume = 4 : 9

5

∴ 5/4 x 100 = 125%. (ans)

Q.114 A designer uses marbles of four different colours for his designs. The cost of each marble is the same, irrespective of the color. The cost of each marble increased by 25%. Therefore, the designer decided to reduce equal number of marbles of each color to keep the total cost unchanged. What is the percentage of blue marbles in the new design? (GATE 2018)

Blue	Black	Red	Yellow
40%	25%	20%	15%

(a) 35.75% (b) 40.25% (c) 43.75% (d) 46.25%

Let the no. of marbles = ₹100

Let price of each marble be ₹10.

100

Blue	Black	Red	Yellow	
40	25	20	15	×10
400	250	200	150	= 1,000/-

Price increased to ₹12.5/-

Let No. of marbles reduced is x.

$(40-x + 25-x + 20-x+15-x) \times 12.5 = 1000$

$(100-4x)\,12.5 = 1000$

$1250 - 50x = 1000$

$x = 5$

Blue	Total
40	100
-5	-20 (5×4)
35	80

$\frac{35}{80} \times 100 = \frac{175}{4} = 43.75\%$ Ans