

# Percentage & Profit & Loss

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①  $\frac{25}{100} \times 200 = 50$

② let  $x$  be the number

$$0.4x = 80$$

$$x = \frac{80}{0.4} = 200$$

③  $\frac{75}{100} = 0.75$

$$0.75x = 150$$

$$x = \frac{150}{0.75} = 200$$

④  $\frac{15}{100} = 0.15$

$$0.15 \times 120 = 18$$

⑤  $\frac{90}{30} \times 100 = 300$

⑥  $\frac{250 - 200}{200} \times 100$

$$\frac{50}{200} \times 100$$

$$= 25\%$$

(7)  $\frac{50,000 - 40,000}{40,000} \times 100$

=  $\frac{10,000}{40,000} \times 100$

= 25%

(8)  $\frac{10,000 - 8000}{10000} \times 100$

=  $\frac{2000}{10000} \times 100$

= 20%

(9)  $\frac{500 - 400}{500} \times 100$

=  $\frac{100}{500} \times 100$

= 20%

(10)  $\frac{600 - 450}{600} \times 100$

=  $\frac{150}{600} \times 100$

= 25%

(11) 30% of 400 :  $\frac{30}{100} \times 400 = 120$

40% of 300 :  $\frac{40}{100} \times 300 = 120$

C = Both are equal.

(12) Let total income be  $x$ .

person spend 60%

$\therefore$  Saving = 40% of income

Saving = 8000.

40% of  $x = 8,000$

$$\frac{40}{100} \times x = 8,000$$

$$0.4x = 8,000$$

$$\frac{x}{0.4} = \frac{8,000}{0.4}$$

$$x = 20,000$$

let  $B = 100$

$\therefore A$  is 20% more than  $B$ .

$A = B + 20\% \text{ of } B$

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

$$A = 100 + 20 = 120$$

$$\left( \frac{A-B}{A} \right) \times 100$$

$$\frac{120 - 100}{120} \times 100$$

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

16.67%

(14) increase % = 25% initial con. = 100

Expense = Price × Quantity

$$= 100 \times 100$$

$$= 10000$$

Price Increase by 25%

∴ New Price = 100 + (25% of 100)

$$= 100 + 25$$

$$= 125$$

Expense is same 10,000

∴ New price × New Consumption -  
Initial Expense

$$125 \times x = 10000$$

$$x = 10000 / 125$$

$$x = 80$$

Initial Consumption = 100 kg

New Consumption = 80 kg

∴ Reduction = 100 - 80 = 20 kg

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Percentage reduction = Reduction / Initial  $\times 100$

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

$$= 20\%$$

(15) B income = 100 Rs.

$$A \text{ income} = 100 + \frac{40}{100} \times 100$$

$$\therefore \text{Total Income} = 140$$

$$\text{Difference} = 40$$

% of B income less than A

$$= \frac{40}{140} \times 100$$

$$= 28.57\%$$

(16) Let number is  $x$

$$\text{Resulting Number} = x + (20\% \text{ of } x)$$

$$= x + \frac{20}{100}x$$

$$\text{or } \text{Resulting Number} = x + \frac{x}{5}$$

$$\text{or } \text{Resulting Number} = \frac{6x}{5}$$

$$\text{Find Number} = \frac{6x}{5} - \left( 10 - 1. \text{ of } \frac{6x}{5} \right)$$

$$= \frac{6x}{5} - \left( \frac{10}{100} \times \frac{6x}{5} \right)$$

$$= \frac{6x}{5} - \frac{3x}{25}$$

$$= \frac{30x - 3x}{25} = \frac{27x}{25}$$

overall change = final no - initial no

$$= \frac{27x}{25} - x$$

$$= \frac{27x - 25x}{25}$$

$$= \frac{2x}{25}$$

$\therefore$  overall change =  $\frac{\text{Overall Change}}{\text{Initial Number}} \times 100\%$

$$= \frac{2x}{25} \times 100\%$$

$$= \frac{2x}{25} \times \frac{1}{x} \times 100\%$$

$$= 8\%$$

(17)

Increase - 30%

Decrease - 20%

Suppose initial no is 100

$$30\% : 100 + 100 \times \frac{30}{100}$$

$$= 100 + 30$$

$$= 130$$

$$20\% = 130 - 130 \times \frac{20}{100}$$

$$= 130 - 26$$

$$= 104$$

$$\text{Net charge} = 104 - 100 \\ = 4$$

$$\text{Percentage change} = \frac{4}{100} \times 100 = 4\%$$

$$(18) \quad \text{Net \% change} = x - y - \left( \frac{x-y}{100} \right)$$

$$= 25 - 20 - \left( \frac{25-20}{100} \right)$$

$$= 25 - 20 - \left( \frac{500}{100} \right)$$

$$= 25 - 20 - 5$$

$$(19) \quad \text{Net \% change} = x - y - \left( \frac{x-y}{100} \right)$$

$$\left( 40 - 30 = \frac{40}{100} \right) - 30 = \left( \frac{40 \times 30}{100} \right)$$

$$\left( 40 - 30 = \frac{10}{100} \right) - 30 = \frac{1200}{100}$$

$$= 40 - 30 - 12 =$$

$\therefore 10\% \text{ increase}$

$$(20) \quad \text{Net \% change} = x - y - \left( \frac{x-y}{100} \right)$$

$$\div 20 - 10 - \left( \frac{20 \times 10}{100} \right)$$

$$= 20 - 10 - \left( \frac{200}{100} \right)$$

$$= 20 - 10 - 2$$

= 8% increase

(21) Selling Price = Cost Price + Profit

$$SP = CP + 25\% \text{ of } CP$$

$$SP = CP + \frac{25}{100} \times CP$$

$$SP = CP \times \left(1 + \frac{25}{100}\right)$$

$$SP = CP \times 1.25$$

$$SP = 125\% \text{ of } CP$$

(22)

Marked Price = 500 Rs

Discount = 10%

Profit = 8%

$$SP = MP \left(1 - \frac{10}{100} \times MP\right)$$

$$= 500 \left(1 - \frac{10}{100} \times 500\right)$$

$$= 500 - 500 =$$

$$= 450$$

~~CP = SP~~ ~~SP = CP + 8% of CP~~

$$450 = CP \times \left(1 + \frac{8}{100}\right)$$

$$450 = CP \times 1.08$$

$$CP = \frac{450}{1.08}$$

$$= 416.67$$

$$\therefore \underline{\underline{420}}$$

$$\textcircled{23} \quad \text{Profit} = 20\% = \frac{20}{100} \times CP = 0,2 \times CP$$

$$SP = CP + \text{Profit} = CP + 0,2 \times CP$$

$$= 1,2 \times CP$$

$$= \frac{\text{Profit}}{SP} \times 100$$

$$= \frac{0,2 \times CP}{1,2 \times CP} \times 100$$

$$= \frac{0,2}{1,2} \times 100$$

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

$$= 16,67\%$$

(24) Marked price = 1,200  
Selling price = 960

$$\text{Discount \%} = \frac{\text{MP} - \text{SP}}{\text{MP}} \times 100$$
$$= \frac{1200 - 960}{1200} \times 100$$
$$= \frac{240}{1200} \times 100$$
$$= 20\%$$

(25) Cost price = 500  
Selling price = 650

$$\text{Profit \%} = \frac{\text{SP} - \text{CP}}{\text{CP}} \times 100$$
$$= \frac{650 - 500}{500} \times 100$$
$$= \frac{150}{500} \times 100$$
$$= 30\%$$

(26) A's income is 200%  
 $\therefore$  B's income = 100  
A's income =  $100 + 20\% \text{ of } 100$   
= 120

$$\text{% Decrease} = \frac{\text{Difference}}{\text{Original Value}} \times 100$$

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

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

$$= 16.67\%$$

(27) Ratio of boys of girls = 3 : 2  
 $3x + 2x = 5x$

$$= \frac{\text{Boys}}{\text{Total Student}} \times 100$$

$$= \frac{3x}{5x} \times 100$$

$$= 60\%$$

(28) Percentage Increase =  $\frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100$

$$= \frac{2,50,000 - 2,00,000}{2,00,000} \times 100$$

$$= \frac{50,000}{2,00,000} \times 100$$

$$= 25\%$$

(29) Candidate Uatis - 65%

Losing Uati - 35%

Winning Margin = 3000.

Let Total Votes =  $x$

$$(65\% - 35\%) \times x = 3000$$

$$30\% \times x = 3000$$

$$\frac{30}{1000} \times x = 3000$$

$$x = \frac{3000 \times 100}{30}$$

$$x = 10,000$$

(30)

Article Reduce by 30%

let Original price = 100

$\therefore$  After 30% reduction

$$\text{New Price} = 100 - 30 = 70$$

$$\text{Required increase} = \frac{\text{Original Price} - \text{N. Price}}{\text{New Price}} \times 100$$

$$= \frac{100 - 70}{70} \times 100$$

$$= 0.30 \times 100$$

$$= 42.85\%$$

(31)

Let A's initial price 100

Decrease by 50%

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New Salary =  $100 - (50\% \text{ of } 100)$   
 $= 100 - 50$   
 $= 50$

Increases by 50

New Salary =  $100 + (50\% \text{ of } 50)$   
 $= 50 + 25$   
 $= 75$

$\therefore \text{Loss} = 100 - 75$   
 $= 25$

Percentage Loss =  $\left( \frac{\text{Loss}}{\text{Initial salary}} \right) \times 100$   
 $= \frac{25}{100} \times 100$   
 $= 25\%$

(iii) A is 20% taller than B

$\therefore \text{Let B Height} = 100$

A is 20% taller

A's height =  $100 + 20\% \text{ of } 100$   
 $= 100 + 20$   
 $= \frac{120 - 100}{120} \times 100$   
 $= \frac{20}{120} \times 100$   
 $= \frac{1}{6} \times 100 = \frac{100}{6} = 16.67\%$

(33) 30% of number 90  
let  $x$  be the number.  
 $\Rightarrow$  30% of  $x$  is 90

$$\therefore \frac{30}{100}x = 90$$

$$\therefore x = 90 \times \frac{100}{30}$$

$$x = 3 \times 100$$

$$x = 300$$

$\Rightarrow$  60% of 300 is  $\frac{60}{100} \times 300$

$$\frac{60}{100} \times 300 = \frac{60 \times 300}{100}$$

$$\frac{60 \times 300}{100} = 60 \times 3$$

$$60 \times 3 = 180$$

(34) Spends 75% income  
Saves 5000

$\therefore$  let Income =  $x$

$$25\% x = \text{Savings}$$

$$25\% \times x = 5000$$

$$\frac{25}{100} \times x = 5000$$

$$x = \frac{5000 \times 100}{25}$$

$$= 20,000$$

(55) Required % loss =  $\frac{9}{100+a} \times 100\%$

$a$  = increase or  
Decrease.

$$a = 20\%$$

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

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

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

$$\therefore = 16.67\%$$

(56) 1<sup>st</sup> increase by 20%  
Decrease by 10%

let,

$$\therefore \text{Price} = 100$$

$$\text{After } 20\% \text{ increase} = 100 + (20\% \text{ of } 100)$$

$$\begin{aligned} & (100 + 20) \\ & (100 + 20) \times 100 \\ & = 120 \end{aligned}$$

$$\text{After } 10\% \text{ Decrease} = 120 - (10\% \text{ of } 120)$$

$$\begin{aligned} & 120 - 12 \\ & = 108 \end{aligned}$$

$$\text{Percent change} = \frac{\text{Final value} - \text{Initial value}}{\text{Initial value}} \times 100$$

$$\frac{108 - 100}{100} \times 100$$

$$\Rightarrow \frac{8}{100} \times 100$$

= 8% increase

(37)  $MP = CP + 25\%$

$$CP = 100 + 0.25 \times 100$$

$$= 125$$

$$SP = MP - 20\% \text{ off}$$

$$MP = 125 - 0.20 \times 125$$

$$= 125 - 25$$

$$= 100$$

$$\therefore SP - CP = 100 - 100$$

$$= 0\%$$

(38)  $CP = 500$

$$L = 20\%$$

$$\therefore SP = 500 \times \left(1 + \frac{20}{100}\right)$$

$$SP = 500 \times (1 - 0.2)$$

$$SP = 500 \times 0.8$$

$$= 400$$

(39) Salary increase by 10%.

Decrease by 10%.

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

$$\begin{aligned}
 a &= 10\% \text{ & } b = -10\% \text{ (i.e. } 10 + -10) \\
 &= 10 + (-10) \\
 &= 10 - 10 \\
 &= -1\%
 \end{aligned}$$

(40) Passing % = 40 %

Mark = 200

Fail by = 20 mark

$$\begin{aligned}
 \text{Passing Mark} &= \text{Mark obtain} + \text{Mark Needed} \\
 &= 200 + 20 \\
 &= 220
 \end{aligned}$$

$$\begin{aligned}
 \text{Total Mark} &= \frac{\text{Passing Mark} \times 100}{\text{Passing Percentage}} \\
 &= \frac{220 \times 100}{40} \\
 &= \frac{22000}{40} \\
 &= 550
 \end{aligned}$$

(41)

Total Expense = 20% + 30% + 10%

Saving 40% of Salary = 18,000

$$\begin{aligned}
 \text{Salary} &= \frac{18,000 \times 100}{40} \\
 &= 45,000
 \end{aligned}$$

(62)

Let Original No -  $x$ 

- No after 30% Increase of  $x$   
 $= x + 0.30x$   
 $= 1.30x$ .

- No after 30% Decrease of  $x$ ,

$$\begin{aligned} &= 1.30x - 0.30 \times 1.30x \\ &= 1.30x - 0.39x \\ &= 0.91x \end{aligned}$$

∴ Original No -  $x$ Final No =  $0.91x$ 

$$\therefore x - 0.91x = 0.09x$$

$$\text{Percentage Decrease} = \frac{\text{Decrease}}{\text{Original}} \times 100$$

$$\begin{aligned} \% \text{ Decrease} &= \frac{0.09x}{x} \times 100 \\ &= 9\% \end{aligned}$$

(63)

New Population = 10,000

Annual Increase = 10%

Time = 3 years

$$\text{New Population} = P \times (1.10)^3$$

$$= 10,000 \times 1.331$$

$$= 13,310$$

(44)  $15\% \text{ of } A = 20\% \text{ of } B$

$$\frac{15}{100} \times A = \frac{20}{100} \times B$$

$$\frac{A}{B} = \frac{4}{3}$$

$$A : B = 4 : 3$$

(45)  $CP = 800$

$$\text{Profit \%} = 25\%$$

$\text{Profit} = \text{Profit \%} \times \text{Cost Price}$

$$= \frac{25}{100} \times 800$$

$$\text{Profit} = 200$$

$$SP = \text{Cost Price} + \text{Profit}$$

$$= 800 + 200$$

$$SP = 1000$$

(46)  $CP = 200$

$$SP = 250$$

$$\text{Profit \%} = \frac{\text{Profit}}{\text{CP}} \times 100$$

$$\text{Profit} = SP - CP = 250 - 200 = 50$$

$$\text{Profit \%} = \frac{50}{200} \times 100$$

$$= 25\%$$

(47)

$$SP = 720$$

Profit = 20%

$$\begin{aligned} CP &= \frac{100}{100 + \text{Profit \%}} \times SP \\ &= \frac{100}{100 + 20\%} \times 720 \\ &= \frac{100}{120} \times 720 \\ &= \frac{100 \times 720}{120} = \frac{100 \times 36}{6} \\ &= 600 \end{aligned}$$

(48)

$$CP = 500$$

Loss \% = 15%

$$\text{Loss} = \frac{15}{100} \times 500$$

$$= 15 \times 5 = 75$$

SP = CP - Loss Amount

$$= 500 - 75$$

$$= 425$$

$$SP = CP \times \left( 1 - \frac{\text{Loss \%}}{100} \right)$$

$$= 500 \times \left( 1 - \frac{15}{100} \right)$$

$$= 500 \times (1 - 0.15)$$

$$= 500 \times 0.85$$

$$= 425$$

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(49)  $CP = 1500$

$LOSS \% = 10\%$

$$LOSS = LOSS \% \times CP$$

$$= \frac{10}{100} \times 1500$$

$$= 0.1 \times 1500$$

$$= 150$$

$$SP = CP - LOSS$$

$$= 1500 - 150$$

$$= 1350$$

(50) Let  $CP = x$ .

$$\therefore SP = x + x \times \frac{30}{100}$$

$$= \frac{10x + 3x}{10}$$

$$SP = \frac{13x}{10}$$

$$discount = \frac{13x}{10} \times \frac{10}{100}$$

$$= \frac{13x}{100}$$

$$After discount CP = \frac{13x}{10} - \frac{13x}{100}$$

$$= \frac{130x - 13x}{100}$$

$$= \frac{117x}{100}$$

$$SP - x = gain = \frac{117x}{100} - x = \frac{17x}{100}$$