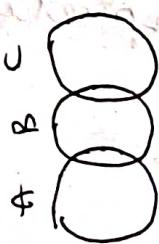


30/11/22

- 1) Syllogism
- 2) Direction
- 3) Seating Arrangement
- 4) Percentage
- 5) Ratio
- 6) Average
- 7) Ages
- 8) Profits & loss
- 9) Mixture's & Alligation
- 10) Blood Relation
- 11) Number System
- 12) Number Series & Picture series
- 13) Coding & Decoding
- 14) Time, Speed & Distance
- 15) Time & work
- 16) SI & CI (^{compound} interest)
- 17) Logarithm
- 18) Partnership
- 19) Permutations & Combination
- 20) Probability
- 21) Geometry
- 22) Data Interpretation

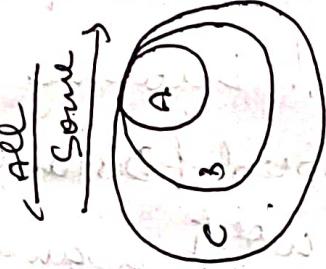
Some

- ① Some A is B
- ② Some B is C
- ③ Some B is not A
- ④ Some B is A
- ⑤ Some A is not B



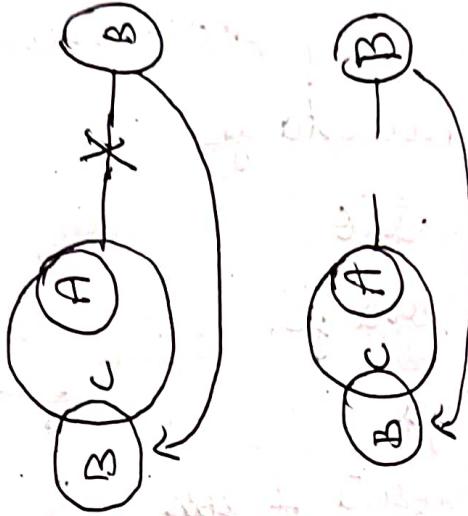
All

- ① All A is B
- ② All B is C
- ③ All A is C
- ④ All A is C
- ⑤ Some B is A
- ⑥ Some C is A
- ⑦ Some C is B



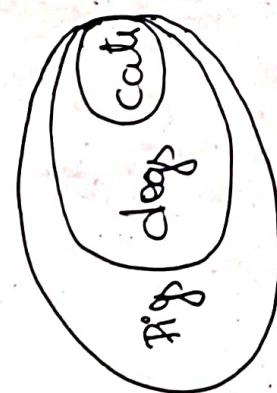
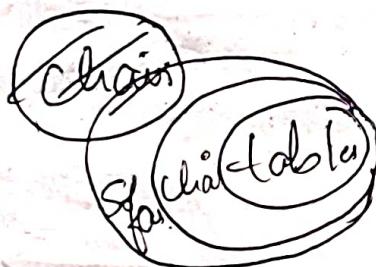
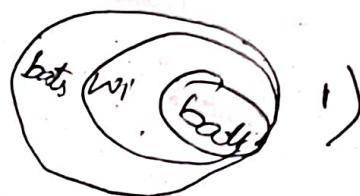
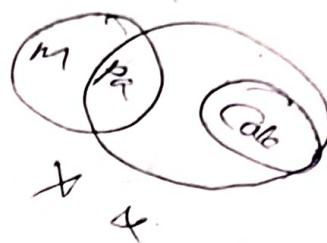
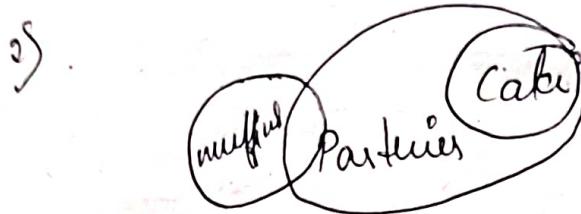
No

- ① No A is B
- ② No B is A
- ③ All A is C
- ④ Some B is C



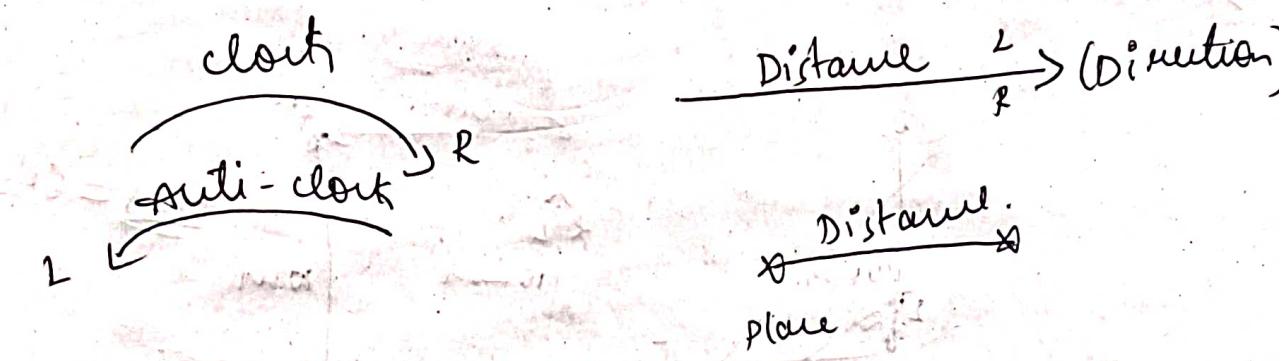
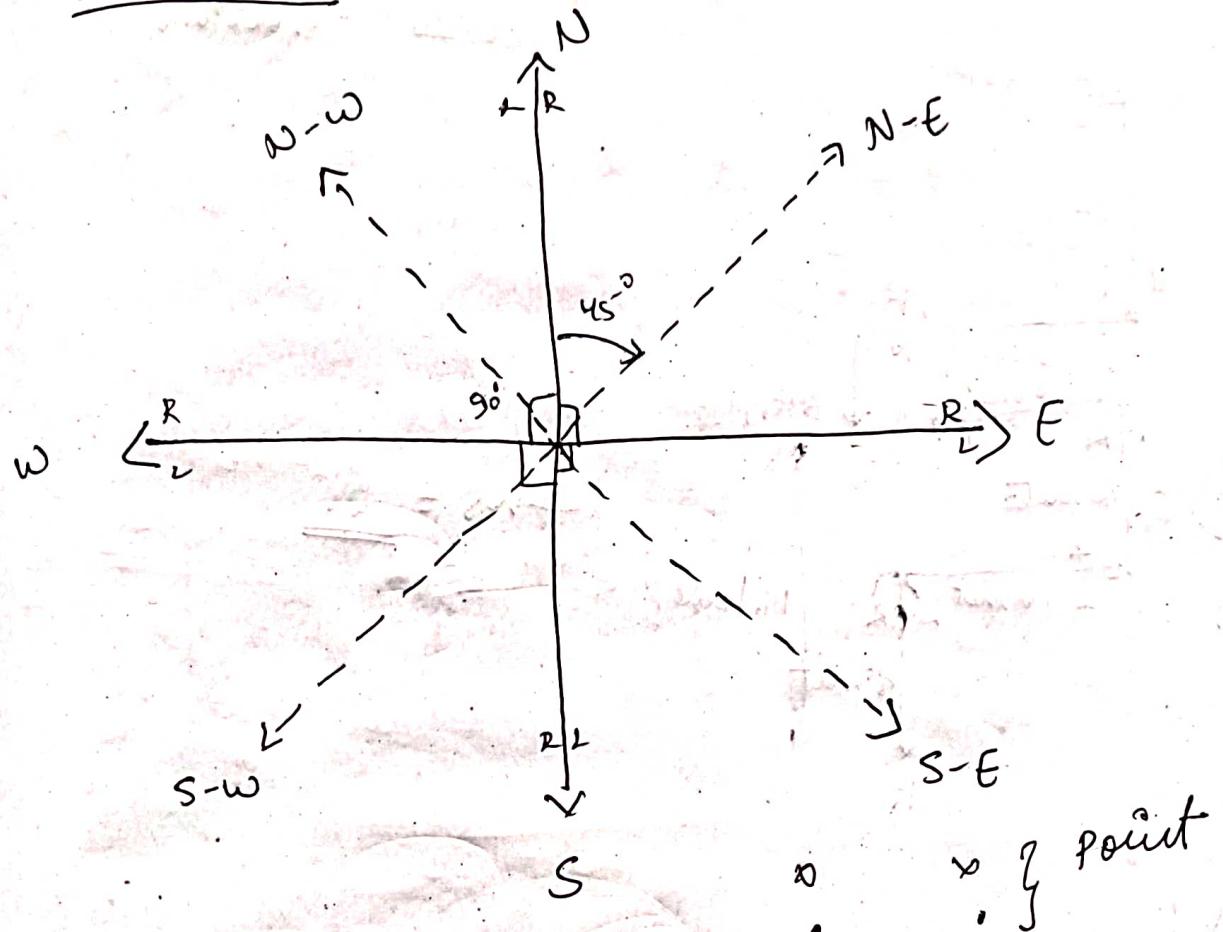


1) All cats are pigs

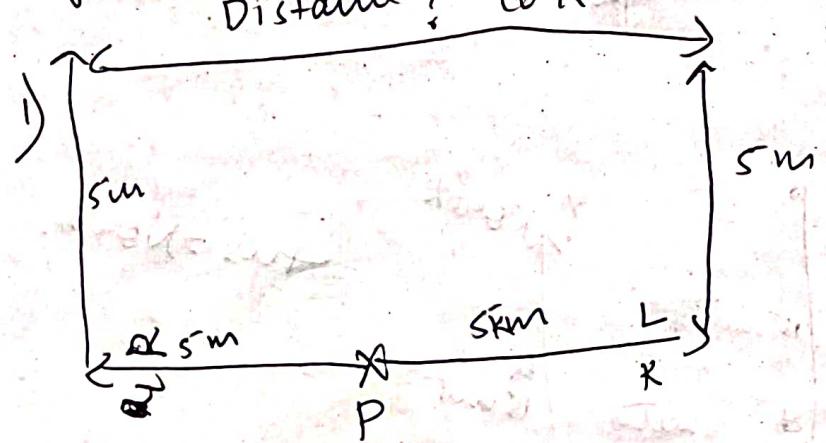


Direction

slutte

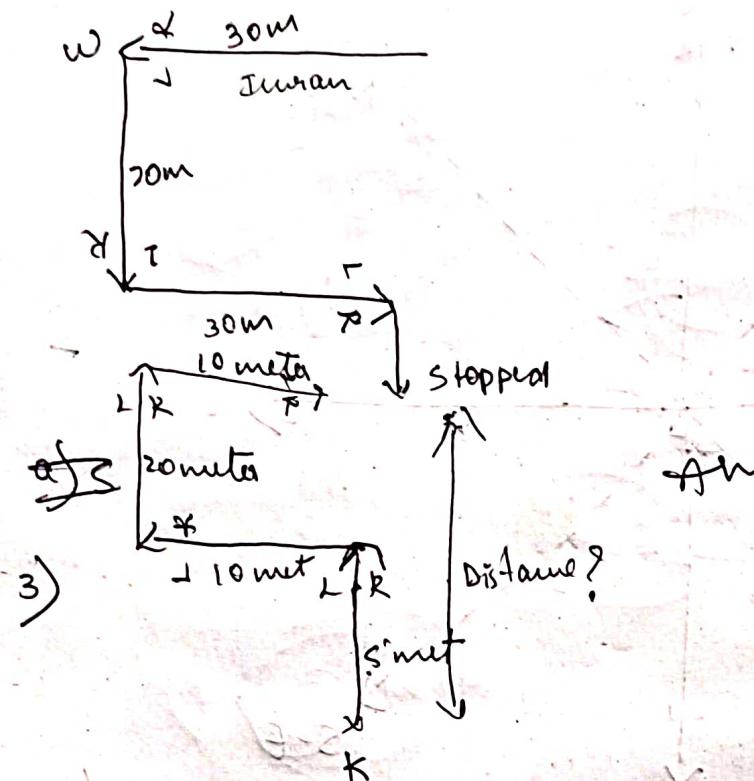


If there
Distance? 10 km
 $\text{Ans} = \underline{\underline{10}} \text{ km}$

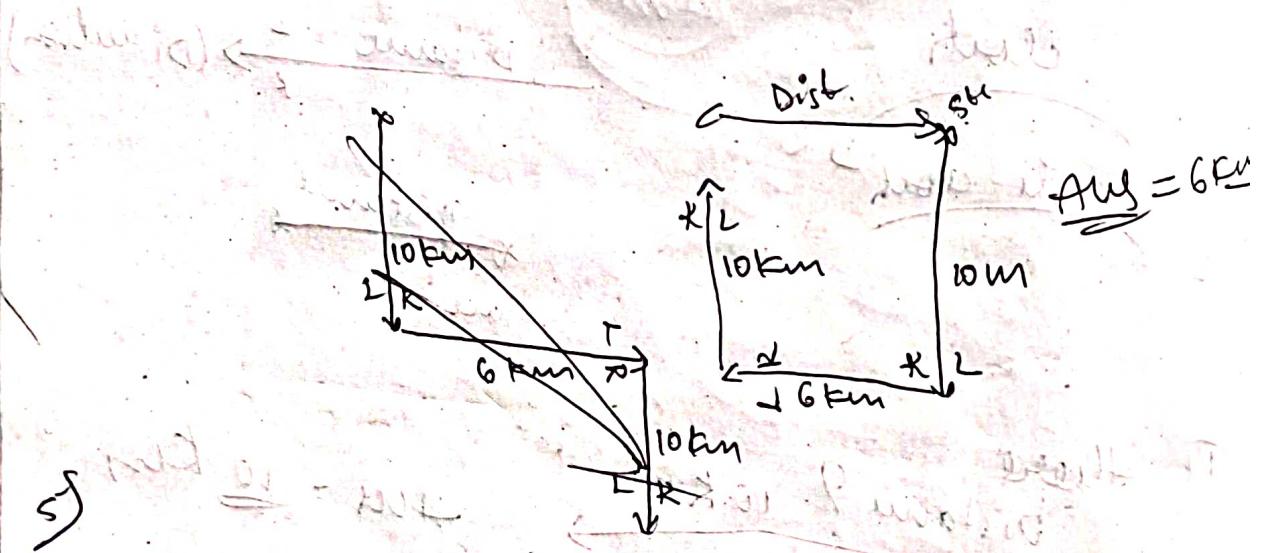


6)

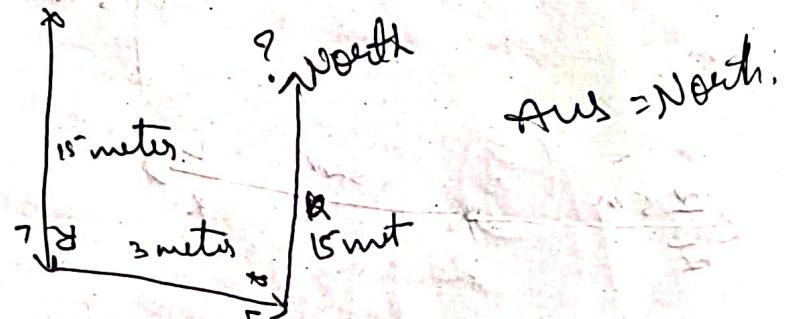
Ans : - South.

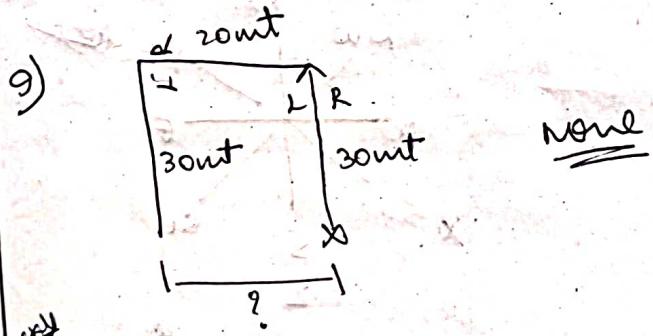
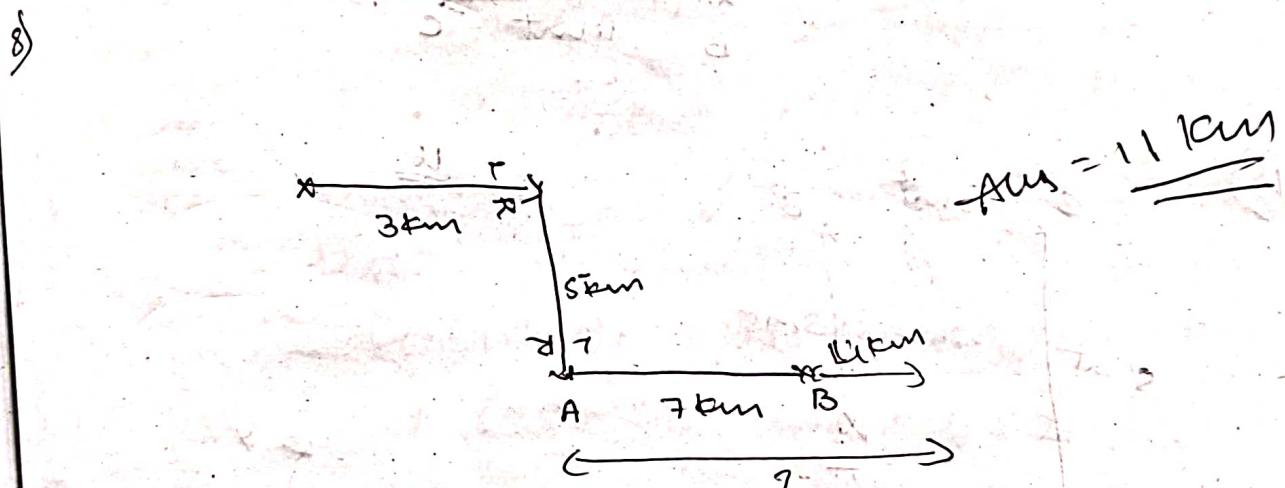
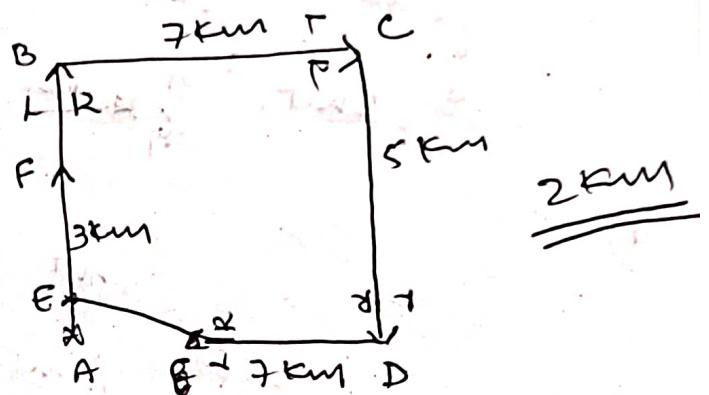
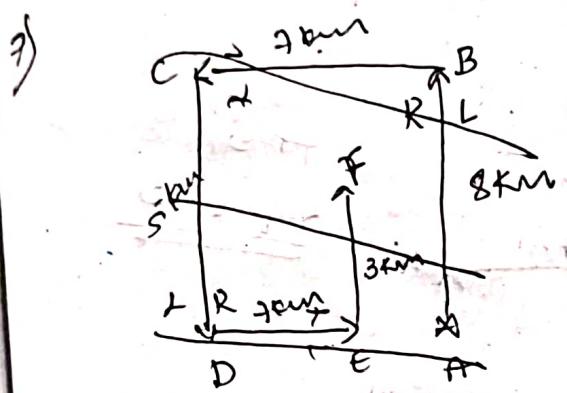
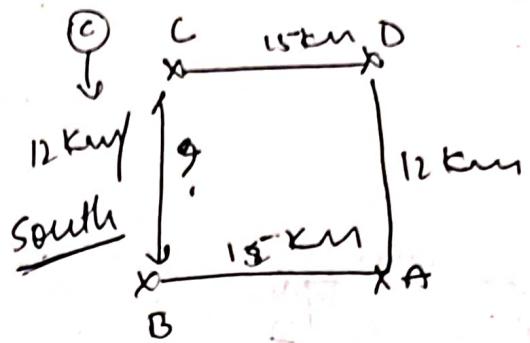
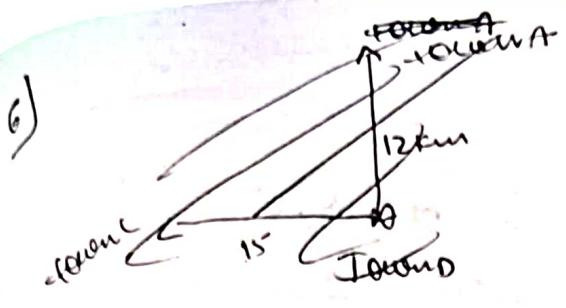


4)

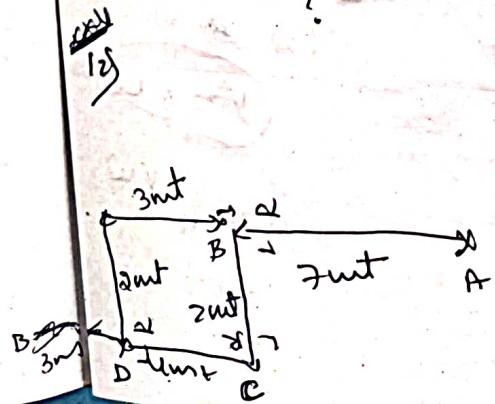


5)





10, 11

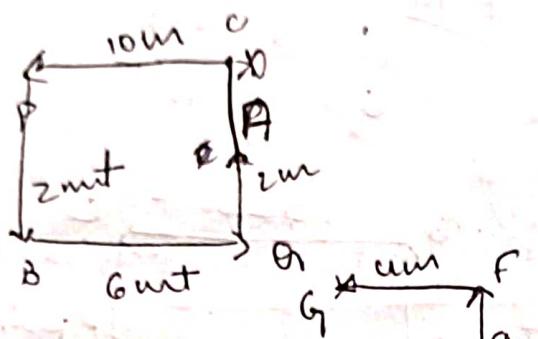


Aus :- 8 m towards east

Aus :- 8 m towards east

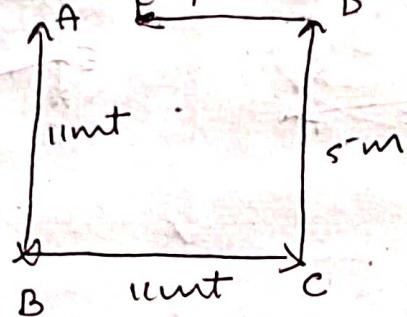
13)

a) A, C, P

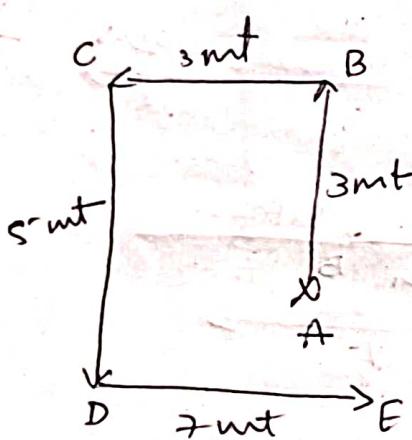


ans
S-E GAB

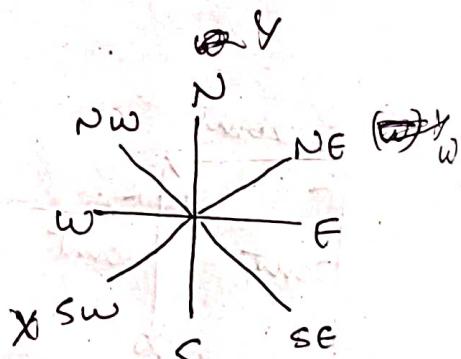
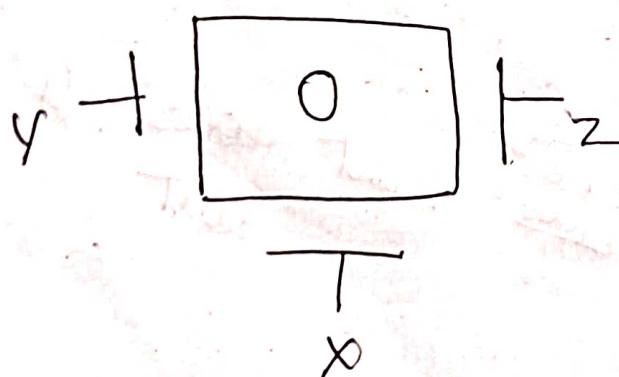
14)



15)

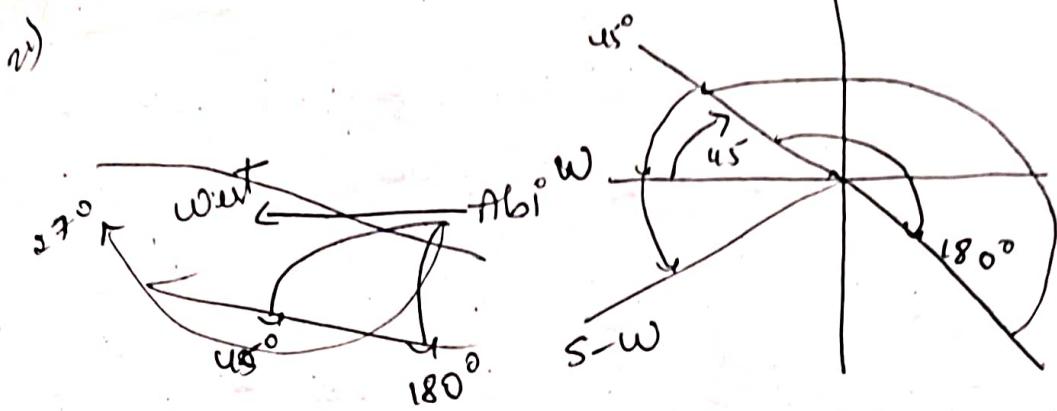
16

17)



$y_{2x} x_w$

$x_{2y} y_w$

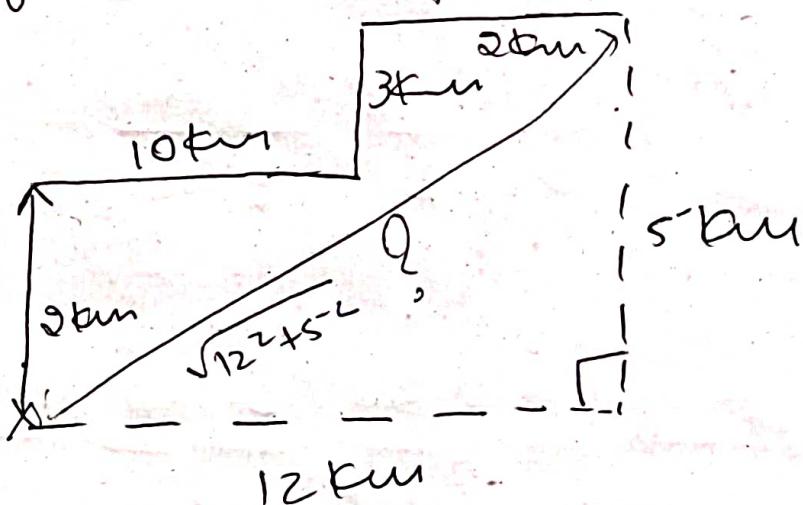


south west

or

$$\begin{array}{r}
 w_g \\
 +45^\circ \\
 +180^\circ \\
 -270 \\
 \hline
 -45^\circ
 \end{array}$$

1) A man walks 2km toward North then he turns to east & walks 10km. After this he turns to north walks 3km again he turns to east & walks 2km how far is he from starting point.



$$\sqrt{144 + 25}$$

$$\sqrt{169}$$

$$= \underline{\underline{13}}$$

Seating Arrangement

6/12/22

1. Linear
2. Parallel
3. Circular

If no direction mention,
default direction is North

AND/BUT/ WHILE \rightarrow 1st person of statement

WHO/WHOM \rightarrow 2nd person of statement

i) A is Second To Right of B, and
Immediate to left of C

↑
R
N

— B — A — C —

ii) A is second to right of B, who is
Immediate to left of C

↑
R
N

— B — C — A — —

iii) F D B C A E

D

A

A

X

X

B

F

B

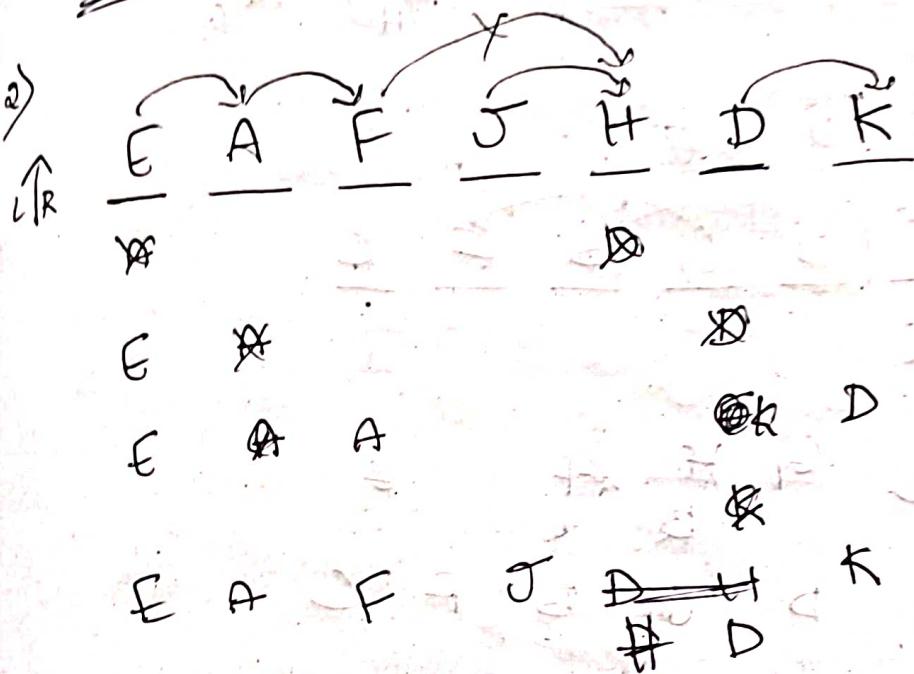
C

E

1) who sat at the extreme right hand corner
of the line?

E

2)



1) b)

g) a)

3) e)

3)

↑ f

C * — — — —

C L w P

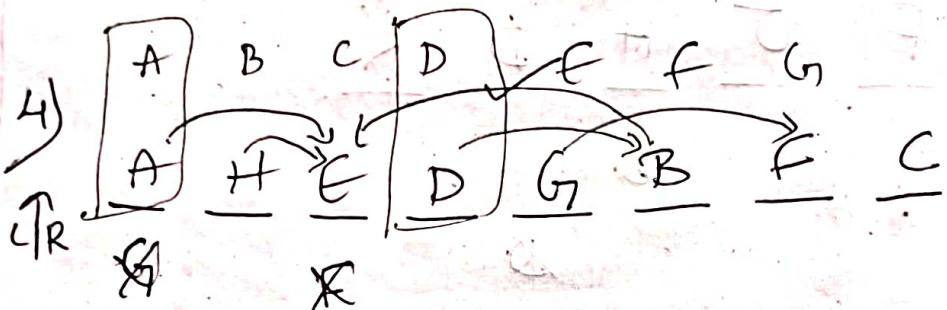
C L w P w

— — — — — — —

C w P

L C S w P G

$$3) \frac{L_G}{L_G} \frac{C}{C} \frac{T}{T} \frac{S}{S} \frac{W}{W} \frac{P}{P} \frac{G}{G}$$



A H G F
B E D G B F C

A H E D G B F C

LR

$$\begin{array}{rcl} \textcircled{1} & A + B = 14 & A = 1.5 \\ & C - D = 10 & B = 12.5 \\ & + + & C = 13.5 \\ & \textcircled{2} & D = 3.5 \\ & \parallel & \\ & 15 - 16 & \end{array}$$

$$\begin{array}{l} A + B = 14 \rightarrow \textcircled{1} \\ A + C = 15 \rightarrow \textcircled{2} \\ C - D = 10 \rightarrow \textcircled{3} \\ B + D = 16 \rightarrow \textcircled{4} \end{array}$$

Substituting $\textcircled{2}$ by $\textcircled{1}$

$$A + C - A + B = 1$$

$$C - B = 1$$

Add $\textcircled{3}$ & $\textcircled{4}$

$$C - D + B + D = 26$$

$$C + B = 26$$

$$\begin{array}{r} C + B = 26 \\ C - B = 1 \\ \hline 2C = 27 \end{array}$$

$$\begin{array}{r} C = 12.5 \\ C = 27/2 \end{array}$$

$$C = 12.5$$

$$A + 12.5^\circ = 15^\circ$$

$$A = 15^\circ - 12.5^\circ$$

$$= 2.5^\circ$$

~~15~~
12.5

$$13.5^\circ - B = 1$$

$$B = 13.5^\circ - 1$$

$$\boxed{B = 12.5^\circ}$$

$$13.5^\circ - D = 10$$

$$D = 13.5^\circ - 10 = D$$

$$\boxed{D = 3.5^\circ}$$

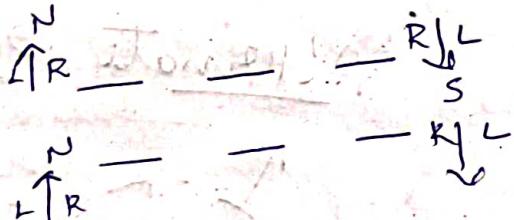
$$A + B = 14$$

$$A + 12.5^\circ = 14$$

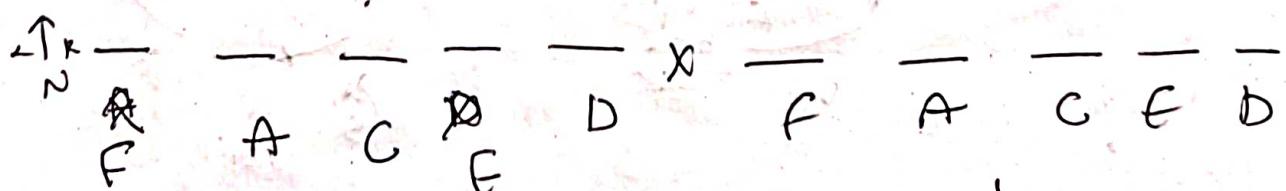
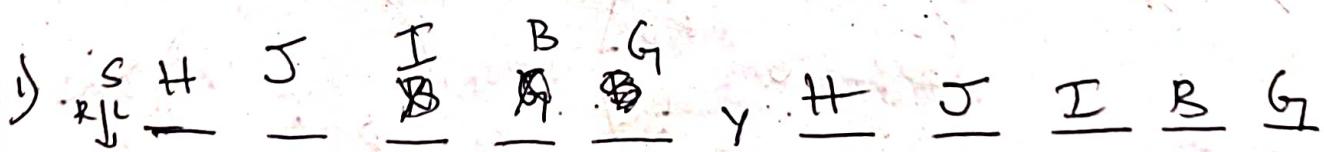
$$\boxed{A = 1.5^\circ}$$

Parallel Arrangement

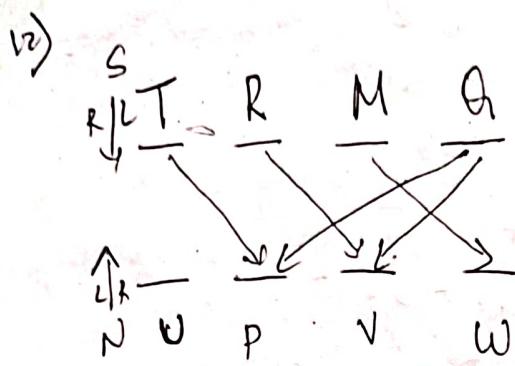
a) Facing Same Direction



b) Facing each other

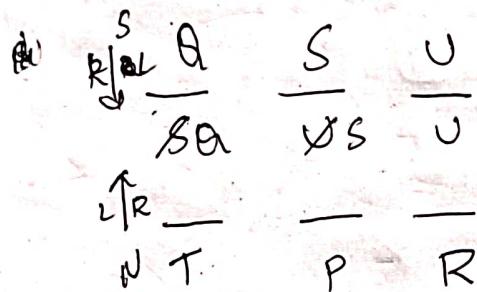


- 1 a) 3 c) 5 b)
2 d) 4 e)



- 1) C
2. a
3. c
4. b
5. d

13) Ans

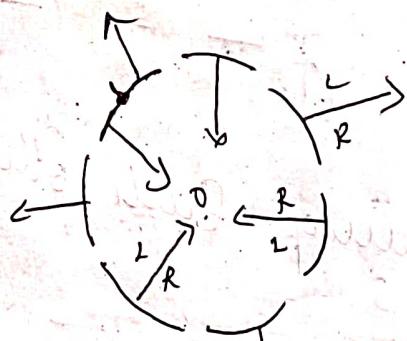


- 1) a
2. b
3. c
4. d

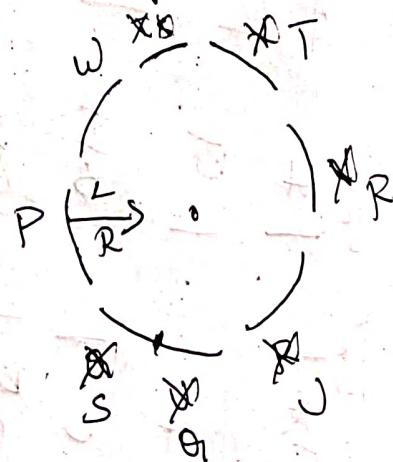
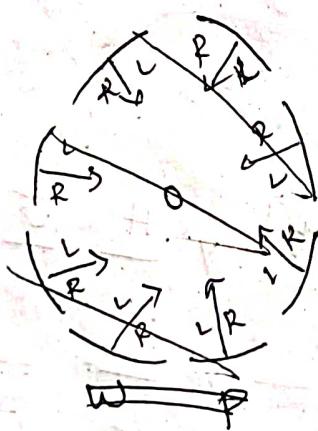
Circular Arrangement

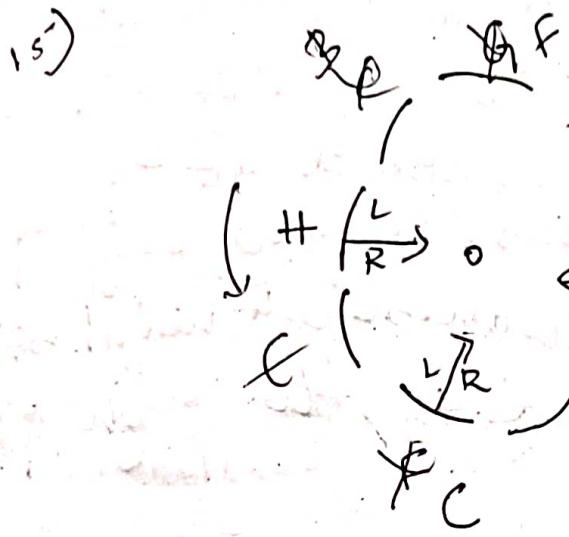
Facing Center

Alternate Direction



14)

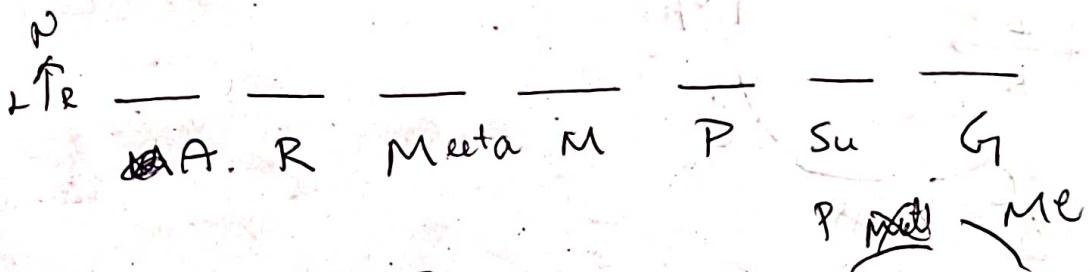




1 b)

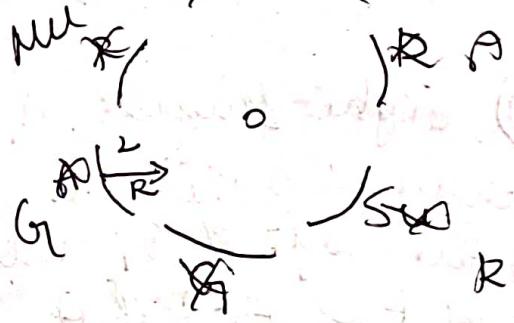
- 2 c)
- 3 a)
- 4 b)
- 5 b)
- 6 e)

16)

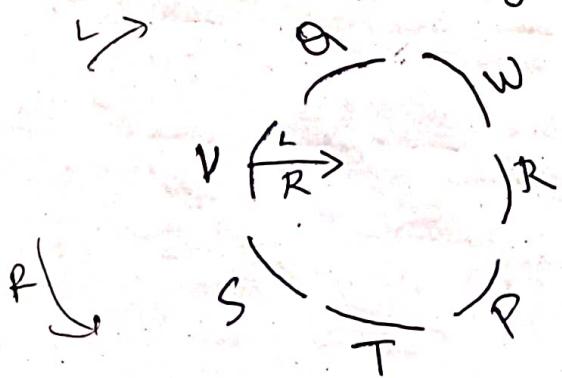


1 b)

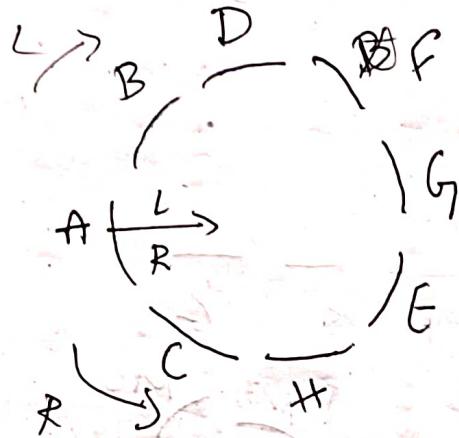
2 c)



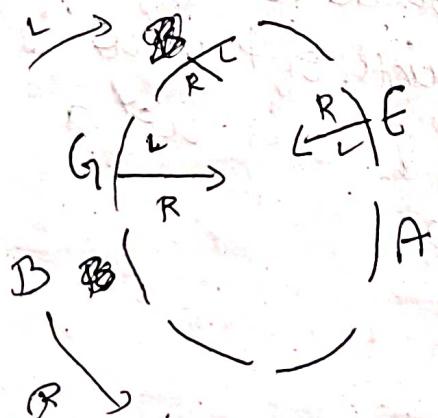
b) P, Q, R, S, T, V & W are sitting around a circle facing at the center. R is third to the left of V who is second to the left of T. W is second to the right of P who is not immediate neighbor of V. S is not a immediate neighbor of W.



8) A, B, C, D, E, F, G & H are sitting around a circle facing at the center. G is fourth to the right of A who is second to the right of D. E is second to the right of C who is not an immediate neighbor of G or D. B is second to the right of



9) Eight friends A, B, C, D, E, F, G & H are sitting around a circle facing the center. F is third to the left of G who is to the immediate right of B who is third to the left of A. H is second to the right of F who is not an immediate neighbor of E. D is not an immediate neighbor for B.



Puzzle

$$\begin{array}{r} \boxed{A} \times \boxed{B} = 1 \\ - \quad \quad \quad \div \\ \boxed{C} + \boxed{D} = 1 \\ \hline 1 \quad \quad \quad 1 \end{array}$$

$$\begin{aligned} A &= 1 \\ B &= 1 \\ C &= 0 \\ D &= 1 \end{aligned}$$

8/12/22

Percentage

20% of 200

Per cent
for every $\frac{1}{100}$

$$\frac{20}{100} \times 200 = 40$$

$$\text{Number} \xrightarrow{\times 100} \% \quad \% \xrightarrow{\div 100} \text{Number}$$

$$\frac{20}{100} \times 200$$

$$\frac{2}{1} \times 20 = 20$$

Fast fraction as %

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

$$\frac{4}{7} \times 100 = 14.28\%$$

$$\frac{1}{2} \times 100 = 50\%$$

$$\frac{1}{11} \times 100 = 9.09\%$$

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

$$\frac{1}{13} \times 100 = 7.69\%$$

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

$$\frac{1}{17} \times 100 = 5.88\%$$

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

$$\frac{1}{19} \times 100 = 5.26\%$$

$$\frac{1}{6} \times 100 = 16.66\%$$

$$\frac{1}{23} \times 100 = 4.34\%$$

$$\begin{aligned} ① \quad \frac{4}{39} &\quad \cancel{4 \times 1} \cancel{\frac{1}{39}} \quad \frac{4}{39} \times 100 \quad \cancel{\frac{1}{36}} \cancel{\frac{1}{6 \times 6}} \quad \frac{1}{6} \times 16.66 \\ &\quad \cancel{16.66 \times 16.66} \\ \frac{4}{3 \times 13} \times 100 &\quad \frac{4}{3} \times \cancel{2.66}^{\frac{2.66}{3}} = 10.20\% \end{aligned}$$

$$N = \frac{10\%}{5\%} \left(\frac{900}{9000} \right)^{\frac{10\%}{2}} = 0.2$$

$$60\%$$

Puzzles	
160	one =
168	two =
174	three =
180	four =
186	five =
192	six =
198	seven =
204	eight =
210	nine =
216	ten =
222	eleven =
228	twelve =
234	thirteen =
240	fourteen =
246	fifteen =
252	sixteen =
258	seventeen =
264	eighteen =
270	nineteen =
276	twenty =
282	twenty-one =
288	twenty-two =
294	twenty-three =
300	twenty-four =
306	twenty-five =
312	twenty-six =
318	twenty-seven =
324	twenty-eight =
330	twenty-nine =
336	thirty =
342	thirty-one =
348	thirty-two =
354	thirty-three =
360	thirty-four =
366	thirty-five =
372	thirty-six =
378	thirty-seven =
384	thirty-eight =
390	thirty-nine =
396	forty =
402	forty-one =
408	forty-two =
414	forty-three =
420	forty-four =
426	forty-five =
432	forty-six =
438	forty-seven =
444	forty-eight =
450	forty-nine =
456	fifty =
462	fifty-one =
468	fifty-two =
474	fifty-three =
480	fifty-four =
486	fifty-five =
492	fifty-six =
498	fifty-seven =
504	fifty-eight =
510	fifty-nine =
516	sixty =
522	sixty-one =
528	sixty-two =
534	sixty-three =
540	sixty-four =
546	sixty-five =
552	sixty-six =
558	sixty-seven =
564	sixty-eight =
570	sixty-nine =
576	seventy =
582	seventy-one =
588	seventy-two =
594	seventy-three =
600	seventy-four =
606	seventy-five =
612	seventy-six =
618	seventy-seven =
624	seventy-eight =
630	seventy-nine =
636	eighty =
642	eighty-one =
648	eighty-two =
654	eighty-three =
660	eighty-four =
666	eighty-five =
672	eighty-six =
678	eighty-seven =
684	eighty-eight =
690	eighty-nine =
696	ninety =
702	ninety-one =
708	ninety-two =
714	ninety-three =
720	ninety-four =
726	ninety-five =
732	ninety-six =
738	ninety-seven =
744	ninety-eight =
750	ninety-nine =

$$\% \text{ change} = \frac{\text{Change in value}}{\text{original value}} \times 100$$

9/12/22

100 - 120

$$\% \text{ ch} = \frac{20}{100} \times 100$$

$$= \underline{\underline{20\%}}$$

$$\begin{array}{ccc} 0 & 100 & \rightarrow 120 \\ & \swarrow & \searrow \\ & \text{original value} & \end{array}$$

$$\begin{array}{ccc} 0 & 80 & \rightarrow 100 \\ & \swarrow & \searrow \\ & & \end{array}$$

$$\begin{aligned} \% \text{ ch} &= \frac{20}{80} \times 100 \\ &= \underline{\underline{25\%}} \end{aligned}$$

$$\begin{array}{ccc} 0 & 50 & \rightarrow 70 \\ & \swarrow & \searrow \\ & & \end{array}$$

$$\begin{aligned} \% \text{ ch} &= \frac{20}{50} \times 100 \\ &= 2 \times \frac{1}{5} \times 100 \\ &= 2 \times 20 \\ &= \underline{\underline{40\%}} \end{aligned}$$

$$\begin{array}{ccc} 0 & 3000 & \rightarrow 2700 \\ & \swarrow & \searrow \\ & & \end{array}$$

$$\begin{aligned} \% \text{ ch} &= \frac{300}{3000} \times 100 \\ &= \underline{\underline{10\%}} \end{aligned}$$

↳ Increase / Decrease

↳ Comparison

↳ Successive %.

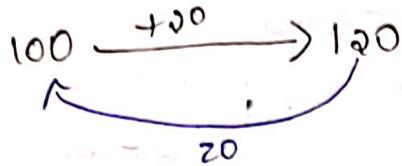
↳ Increase / decrease

a) + 25%

$$\begin{array}{ccc} 100 & \xrightarrow{+25} & 125 \\ & \swarrow & \searrow \\ & 25 & \end{array}$$

$$\begin{aligned} \% \text{ ch} &= \frac{25}{125} \times 100 \\ &= \underline{\underline{20\%}} \end{aligned}$$

b) +20%



$$\% \text{ Ch} = \frac{20}{120} \times 100$$

$$= 16.66\%$$

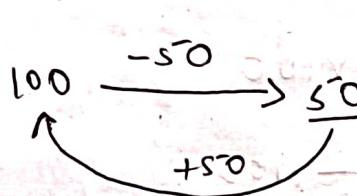
c) -20%



$$\% \text{ Ch} = \frac{-20}{80} \times 100$$

$$= -25\%$$

d) -50%



$$\% \text{ Ch} = \frac{-50}{50} \times 100$$

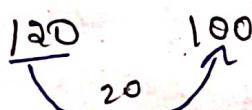
$$= -100\%$$

Comparison

a) A > B = 20%

B < A = ?

A B

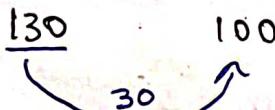


$$\% \text{ Ch} = \frac{20}{120} \times 100 = 16.66\%$$

b) A > B = 30%

B < A = ?

A B



$$\% \text{ Ch} = \frac{30}{130} \times 100$$

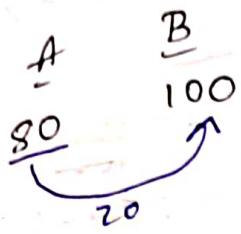
$$= 3 \times \frac{1}{B} \times 100$$

$$= 3 \times 7.69\%$$

$$= \underline{\underline{23.07\%}}$$

c) $A < B = 20\%$
 $B > A = ?$

$$\% \text{ ch} = \frac{20}{200} \times 100 = 25\%$$



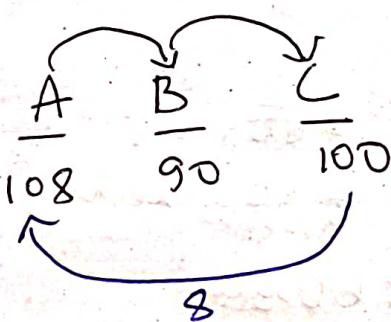
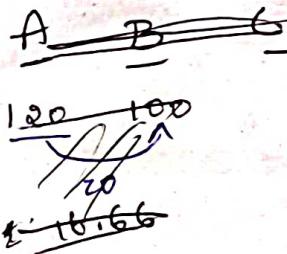
d) $A < B = 40\%$
 $B > A = ?$

$$\begin{aligned} \% \text{ ch} &= \frac{40}{60} \times 100 \\ &= 2 \times \frac{1}{3} \times 100 \\ &= 2 \times 33.33 \\ &= 66.66 \end{aligned}$$

e) $A > B = 20\%$

$B < C = 10\%$

$A > C = ?$



$$\begin{aligned} \% \text{ ch} &= \frac{8}{100} \times 100 \\ &= 8\% \end{aligned}$$

Succesive % $\left[\% \text{ ch} = x + y + \frac{xy}{100} \right]$

a) $+25\% \quad +20\%$
 $x \qquad \qquad y$

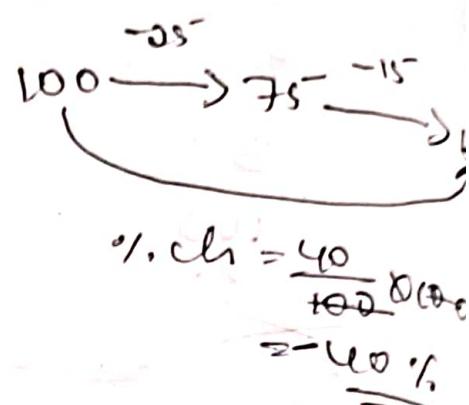
$$\begin{aligned} \% \text{ ch} &= +25 + 20 + \frac{25 \times 20}{100} \\ &= 45 + 5 \\ &= 50\% \end{aligned}$$

b) $+25\% \quad -20\%$

$$\begin{aligned} \% \text{ ch} &= +25 - 20 - \frac{25 \times 20}{100} \\ &= 5 - 5 = 0\% \end{aligned}$$

$$c) -25\% \quad -20\%$$

$$\begin{aligned} \% \text{ ch} &= -25 - 20 + \frac{20 \times 25}{100} \\ &= -45 - 5 \\ &= \underline{\underline{-40\%}} \end{aligned} \quad (01)$$



Application Problems

$$1) \quad 8344 \quad \begin{array}{r} 8 \\ \hline 8344 \\ \hline 10 \end{array}$$

$$N = 8344$$

$$S = 25\%$$

$$\frac{25}{100} \times 8344 = 2086$$

$$2) \quad 1 \text{ hr } 45 \text{ min} = \frac{60 + 45}{60} = 105 \text{ min}$$

$$1 \text{ day} = 24 \times 60 \text{ min}$$

$$\begin{aligned} \% \text{ ch} &= \frac{105}{24 \times 60} \times \frac{5}{3} \times 100 = 7.25\% \approx 7.25 \end{aligned}$$

$$3) \quad \begin{array}{c} 10\% \\ x \\ 20\% \\ y \end{array}$$

$$\begin{aligned} \% \text{ ch} &= +10 + 20 + \frac{10 \times 20}{100} \\ &= 30 + 2 \\ &= \underline{\underline{32}} \end{aligned}$$

$$100 \xrightarrow{-10\%} 75 \xrightarrow{-15\%} 50$$

$\% \text{ ch} = \frac{40}{100} = -40\%$

12/12/22

$$\begin{array}{r} 10) 8344 \\ \underline{80} \quad 344 \\ 30 \quad \underline{44} \\ \end{array}$$

$$3) +10\% \quad +20\% \quad -30\%$$

$$\begin{aligned} \% \text{ ch} &= +10 + 20 + \frac{20 \times 10}{100} \\ &= 32\% \quad \frac{100}{100} \\ &\quad x \quad -30\% \\ &\quad y \end{aligned}$$

$$\% \text{ ch} = +32 - 30 - \frac{32 \times 30}{100}$$

$$= 2 - 9.6$$

$$= -7.6$$

$$\begin{array}{r} 10000 \\ \underline{760} \\ \hline 9240 \end{array}$$

$$(g) \quad \begin{array}{ccc} 1 & 2 & 3 \\ \hline +10\% & +20\% & -30\% \end{array}$$

$$10,000 \xrightarrow{+1000} 11,000 \xrightarrow{+2200} 13200 \xrightarrow{-3960} 9240$$

$$5) -10\% \quad -20\%$$

$$\begin{aligned} \% \text{ ch} &= -10 - 20 + \frac{10 \times 20}{100} \\ &= -30 - 20 + 2 \\ &= -28\% \end{aligned}$$

$$6) -10\% \quad -15\% \quad -20\%$$

$$\begin{aligned} \% \text{ ch} &= -10 - 15 + \frac{10 \times 15}{100} \\ &= -25 + 1.5 \\ &= -26.5 \end{aligned}$$

$$\begin{aligned} &= -26.5 - 20 + \frac{26.5 \times 20}{100} \\ &= -26.5 - 20 + 5.3 \end{aligned}$$

$$= -38.8\%$$

≈ 7.287

$$\frac{1}{4} \times \frac{1}{3} \times \frac{1}{5} \times x = 15$$

$$x = 15 \times 30$$

$$x = 450 \rightarrow 40\%$$

$$\underline{\underline{180}}$$

$$10\% = 45 -$$

$$\frac{45}{100}$$

$$\frac{45 \times 2}{180}$$

8) If 37% of a number is approximately 990.86, what will be approximately 19% of that number?

$$37\% \longrightarrow 990.86$$

$$38\% \longrightarrow 1000$$

$$19\% \longrightarrow ?$$

$$19\% \longrightarrow \underline{\underline{500}}$$

9) 15% of 45% of a number is 105.3 what is the 04% of that number

$$+ 15\% + 45\%$$

$$1. Ch = 15 + 45 + \frac{15 \times 45}{100}$$

$$= 60 + 6.75$$

$$= 66.75 \rightarrow 105.3$$

$$\begin{array}{r} 15 \times 45 \\ \hline 7.5 \\ 60 \\ \hline 675 \\ 100) 675 (6.75 \\ \underline{600} \\ 750 \\ \underline{750} \\ 000 \\ \hline 000 \\ 60.00 \\ 6.75 \\ \hline 66.75 \end{array}$$

$$15\% \times 45\% \times N = 105.3$$

$$\frac{15}{100} \times \frac{45}{100} \times N = \frac{3.375}{100} \times 0.34 \times N = 105.3$$

$$N = \frac{20}{2.34} \times 100 \times 100$$

$$\cancel{\cancel{71}}$$

$$= 1.5 + \\ 20 +$$

$$10) \underline{\underline{22.00}}$$

$$22\%$$

$$11) \underline{\underline{75.00}}$$

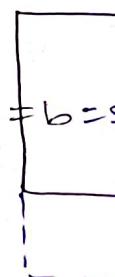
$$75\%$$

$$75 \\ 100$$

$$13)$$

$$+ 20$$

Rectang



$$= 1.56 \times 1000 = \underline{\underline{1560}}$$

$$(20+4\%) = 312 + 62.4$$

$$= \underline{\underline{374.4}}$$

$$10\% = 45 -$$

$$\frac{as}{100}$$

$$\frac{450}{100}$$

$$\frac{450^2}{180}$$

90.86, what will
of that number,

10) $22.005\% \text{ of } 449.999 = ?$

$$22\% \times 450 = 99 + 9$$

$$= 99 \approx \underline{\underline{100}}$$

11) If 75% of a number is added to 75, the result
is the number itself. Then, the number is

$$75\% N + 75 = \underline{\underline{N}}$$

$$\frac{75}{100} N + 75 = N$$

$$75 = N - \frac{3}{4} N$$

$$75 = \frac{1}{4} N$$

$$\boxed{N = 300}$$

$$75\%.N + \frac{25\%.N}{75} = 100\%.N$$

$$\frac{1}{4} N = 75$$

$$\boxed{N = 300}$$

12) what is the

$$\frac{18\% \text{ sur.}}{75}$$

$$\frac{7.5}{100} \times 6.75 = 6.75$$

$$\frac{6.75}{600} = 6.75$$

$$\frac{6.75}{750} = 6.75$$

$$\frac{6.75}{600} = 6.75$$

$$\frac{6.75}{500} = 6.75$$

$$60.00$$

$$6.75$$

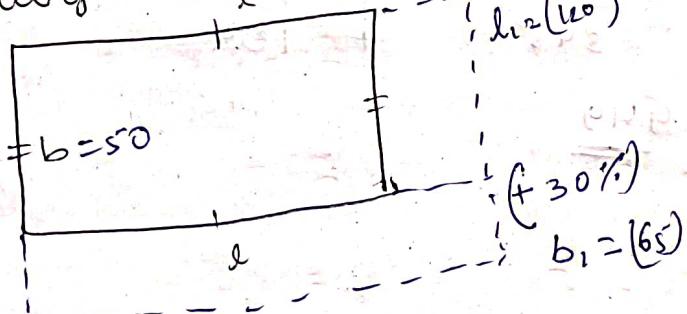
$$66.75$$

13) $+20\% + 30\%$

$$20 + 30 + \frac{20 \times 30}{100}$$

$$= 56\% \quad A = lb$$

rectangle

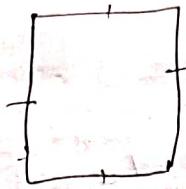


$$A = l \times b = 5000$$

$$A_1 = l_1 \times L = 120 \times 50 = 6000$$

$$A_2 = l_2 \times b_1 = 120 \times 65 = 7800$$

Square



$$\text{Area} \quad A = +20\%$$

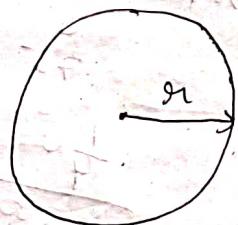
$$A = a^2 = a \cdot a / A_{\text{original}}$$

$$+20\% \quad +20\%$$

$$\% \Delta h = +20 + 20 + \frac{20 \times 20}{100}$$

$$= 44\% \quad \underline{\underline{}}$$

Circle



$$A = \pi r^2 \quad \Delta = +20\%$$

$$A = r \cdot r$$

$$+20\%$$

$$\% \Delta h = +20 + 20 + \frac{20 \times 20}{100}$$

$$= 44\% \quad \underline{\underline{}}$$

$$18) \text{ stocks} = \underline{\underline{65.8}} \quad \text{HT}$$

$$18 = 20\% (65) \quad 40\% (65)$$

$$= 13 \quad \text{each student} \quad = 26 \quad \text{each teacher}$$

$$\frac{65 \times 13}{845}$$

$$26 \times 4 \\ + 104$$

$$= \underline{\underline{949}}$$

$$19) \frac{1}{3} \pi = \frac{1}{2} \times \pi$$

$$B = 30$$

$$\underline{\underline{T_B = 60}}$$

$$\frac{46.2}{60.3} \times 100 =$$

$$20) \quad \underline{\underline{B}}$$

$$P: 40\%. N$$

$$B = \frac{483}{717} \times 100 \\ = 60.0$$

$$16) \text{ detail } Q$$

A:

C

$$19) \frac{1}{3} B = \frac{1}{2} \times 40^{20}$$

$$B = 20 \times 3$$

$$\boxed{T_B = 60}$$

$$\frac{46^2}{603} \times 100 = \frac{300}{3} = 66 \frac{2}{3}$$

$$\begin{array}{r} 9 \\ \times 2 \\ \hline 18 \\ -9 \\ \hline 1 \end{array}$$

$$20) \quad \underline{B} \quad \underline{G}$$

$$P: 40\% N \quad 35\% N$$

$$45^{\circ} + 75^{\circ}$$

$$\frac{117}{60.0}$$

$$\begin{aligned} 40\% N &= 600 \\ \frac{40}{100} N &= 600 \\ N &= 1500 \end{aligned}$$

$$\boxed{N = 1500} \rightarrow \boxed{35\%}$$

16) detail Question 25°

$$\begin{array}{ccc} 125^{\circ} & 125^{\circ} & 60\% (25^{\circ}) \\ A: 40\% & 100\% & \Rightarrow 15\% \end{array}$$

$$= \underline{\underline{50\%}}$$

$$\begin{array}{r} \frac{125^{\circ}}{125^{\circ}} \times 100 = 100\% \\ - 20\% \\ \hline \underline{\underline{80\%}} \end{array}$$

<u>Pnadeep</u>	<u>Molit</u>	<u>Raghul</u>
108	90	100

$$100 \longrightarrow 298$$

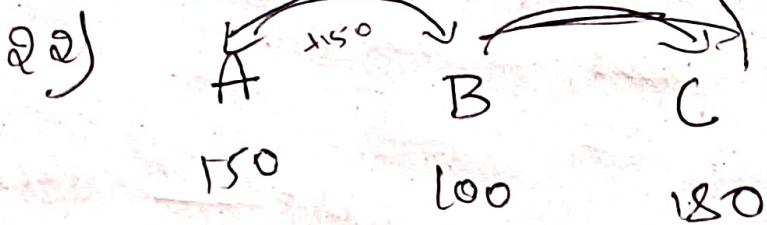
$$? \longrightarrow 17880$$

$$\frac{17880 \times 100}{298} = \underline{\underline{6000}}$$

$120\% (150)$

$150 + 30$

180



$$180 \longrightarrow 430$$

$$? \longrightarrow 86000$$

$$\frac{86000 \times 180}{430} = \underline{\underline{36000}}$$

10/12/22

18) Mer. X = 80% of Mer. Y

Mer. Z = 120% of Mer. X

$$\begin{array}{r} X \\ \hline 80 \end{array} \quad \begin{array}{r} Y \\ \hline 100 \end{array} \quad \begin{array}{r} Z \\ \hline 96 \end{array}$$

$$120\% (80)$$

$$(100 + 20) (80)$$

$$(80 + 8 + 8)$$

$$(80 + 16)$$

$$X : Y : Z = 80 : 100 : 96 = \underline{\underline{96}}$$

$$= 20 : \underline{\underline{25}} : 24$$

19)

$$\begin{array}{c} 70\% \xrightarrow{3} \frac{3}{5} \\ \cancel{100} \quad \cancel{5} \end{array}$$

$$\begin{array}{c} X \quad Y \\ \hline 289 \quad 350 \\ \cancel{7} \quad \cancel{3} \end{array}$$

$$70\% = \frac{3}{5} Y$$

$$\frac{70}{100} X = \frac{3}{5} Y$$

$$\frac{6}{4} = \frac{3}{5} \times \frac{109}{70}$$

$$\frac{X}{Y} = \frac{6}{7}$$

6:7

20) A B C

A+B+C

$$A+B+C = 98$$

$$A:B = (2:3)_{xs^{-1}} = 10:15$$

$$B:C = (5:8)_{xs^{-1}} = 15:24$$

$$A:B:C = 10:15:24$$

$$B = \frac{15}{49} \times 98^2 = \underline{\underline{30}}$$

2) In a bag there are coins of 25P, 10P & 5P in the ratio of 1:2:3. If there is Rs. 3 in all, how many 5P coins are there?

25P 10P 5P

$$(1 : 2 : 3)x$$

$$\frac{x}{25x} + \frac{2x}{20x} + \frac{3x}{15x} = 3 \times 50 = \underline{\underline{150}}$$

$$x + 2x + 3x = 30 \times 100$$

$$6x = 30 \times 100$$

$$\boxed{x = 50}$$

Q2)

100P: 50P 25P

$$\frac{10x50}{50} = \frac{25x7}{175}$$

$$(12 : 10 : 7)x = 75$$

$$\frac{120x}{1200} + \frac{10x}{500} + \frac{7x}{175} = 75 \times 100$$

$$1200x + 500x + 175x = 75 \times 100$$

$$1875x = 7500$$

$$\boxed{x=4}$$

$$25P \Rightarrow 7x \rightarrow 7 \times 4 = \underline{\underline{28}}$$

Q4) A : B

5 : 7 If 5 times the marks obtained by A is 12 more than twice the marks obtained by B, find marks of A & B.

A : B

5 : 7

A B

$$(5^{\circ} : 7) x$$

$$5x \quad 7x$$

$$5(5x) = 12 + 3(7x)$$

$$25x = 12 + 21x \quad 25x - 21x = 12$$

$$4x = 12$$

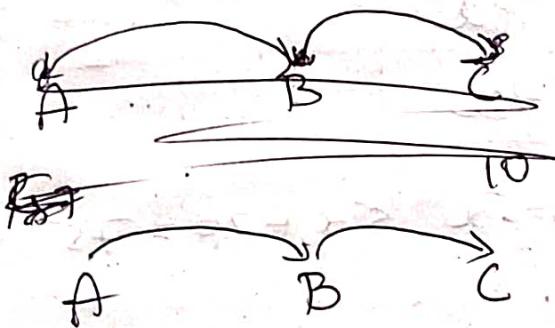
$$x = 12 / 4$$

$$\boxed{x = 3}$$

$$5x_3 + 7x_3$$

$$\underline{15 + 21}$$

(25)



$$x + 8 + 7, \quad x + 8 \quad x$$

$$\underline{25 : 18 : 10}$$

$$x + 15$$

$$x + 15 + x + 8 + x = 53$$

$$3x + 23 = 53$$

$$3x = 53 - 23$$

$$3x = 30$$

$$x = 30 / 3$$

$$\boxed{x = 10}$$

27) The student are in the ratio $2:3:5$.
 If 20 students are increased in each class,
 the ratio changes to $4:5:7$. Find the
 total number in the three class before
 the increase.

$$(2:3:5)_s^-$$

$$\begin{array}{r} 2x \quad 3x \quad 5x \\ + \quad + \quad + \\ \hline 20 \quad 20 \quad 20 \end{array} = 10x = 10 \times 10 = 100$$

$$(4:5:7)_s^-$$

$$\underline{4x} \quad \underline{5x} \quad \underline{7x}$$

$$2x + 20 = 4x \quad 3x + 20 = 5x \quad 5x + 20 = 7x$$

~~$20 = 4x - 2x$~~

$$20 = 2x$$

$$x = \frac{20}{2}$$

$$\boxed{10}$$

28) The incomes of A & B are the ratio $3:2$ and their expenditures are in the ratio $5:3$, if each saves Rs 2000, what are their expenditures.

A \diagdown B

$$(3:2)x$$

$$\underline{3x} \quad \underline{2x}$$

$$\begin{array}{l}
 A \quad B \\
 (3 : 2)x \\
 3x \quad 2x \\
 (5 : 3)y \\
 10000 / 5y : 3y / 6000
 \end{array}$$

$$3x - 5y = 2000 \quad \cancel{2x} \quad 2x - 3y = 2000$$

$$2(3x - 5y = 2000)$$

$$3(2x - 3y = 2000)$$

$$6x - 10y = 4000$$

$$\begin{array}{r} 6x - 10y = 4000 \\ 6x - 9y = 6000 \\ \hline -y = 2000 \end{array}$$

$$3x - 10000 = 2000$$

$$3x = 2000 + 10000$$

$$3x = 12000$$

$$x = \frac{12000}{3}$$

$$x = 4000$$

25) A hostel kitchen has sufficient food for 75 students for a period of 90 days. After 10 days, one third of leaving the hostel.

$$\begin{array}{r}
 \text{at} \quad 1 \text{ meal / Day} \\
 \hline
 \text{S} \quad \{ 75 \quad 6750 \quad (75 \times 90) \\
 10 D \quad \{ 50 \quad -750 \\
 \hline
 10 \quad \{ 55 \quad 6000 \\
 \hline
 \quad \quad \quad -5000 \\
 \hline
 \quad \quad \quad 5500
 \end{array}$$

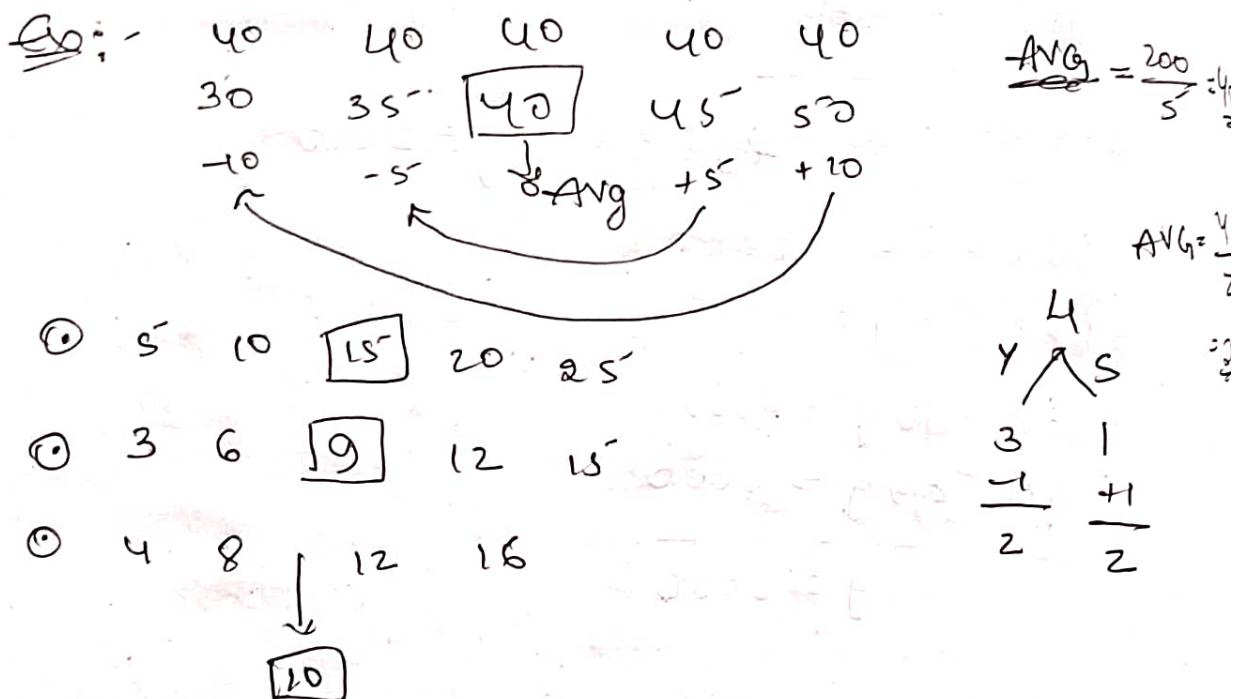
$\frac{5500}{55} = 100 \text{ Days}$

20/12/22

Average

$$\text{Avg} = \frac{\text{Sum}}{n}$$

- ↳ Equal Distribution from more to less
 ↳ when in Arithmetic Progression Avg should be in center



- i) Find the Avg of 1st five
- Consecutive odd numbers
 - Consecutive even numbers
 - Consecutive prime numbers

- 1, 3, **5**, 7, 9
- 2, 4, **6**, 8, 10
- ~~2, 3, 5, 7, 11, 13~~
- 2, 3, 5, 7, 11

$$\frac{28}{8} = \underline{\underline{5.6}}$$

2) 568, 460, 349, 987, 108, 178, 426

$$\frac{3073}{3} = \underline{\underline{439}}$$

3) If $36a + 36b = 576$ then what is the avg of $a \& b$

$$36a + 36b = 576$$

$$36(a+b) = 576$$

$$a+b = \frac{576}{36}$$

$$\frac{a+b}{2} = 16.8$$

$$a+b = \underline{\underline{16.8}}$$

1) The Avg of 1st 5 positive no. is 213. The Avg of the first two no. is 233.5 and the Avg of last two numbers is 271, what is the third no?

$$\text{Avg} = 213$$

A B C D E

$$n = 5$$

$$\frac{A+B+C+D+E}{5} = 213 \text{ or}$$

$$A+B+C+D+E = 1065 \rightarrow ①$$

$$467 + C + 542 = 1065$$

$$C = 1065 - 1009$$

$$\frac{A+B}{2} = 233.5$$

$$\boxed{C = 56}$$

$$A+B = 467 \rightarrow ②$$

$$\frac{D+E}{2} = 271$$

$$D+E = 542 \rightarrow ③$$

$$4) \quad n = 65 \quad \text{Avg} = \frac{\text{Sum}}{n}$$

$$\text{Avg} = 15^{\circ}0$$

$$\text{Sum} = \text{Avg} \times n$$

$$= 15^{\circ}0 \times 65$$

$$= 975^{\circ}0$$

$$\boxed{\text{Sum} = 9760}$$

(89)

$$\begin{array}{ccc}
 1 & \boxed{2} & 3 \\
 \downarrow & \downarrow & \downarrow \\
 15^{\circ}0' & 15^{\circ}0' & 15^{\circ}0' \\
 \underline{0.15'} & & \underline{0.15'} \\
 150.15' & + 10' & = 160.15' \\
 & \hline & 65' \\
 & \hline
 \end{array}$$

$$65^\circ$$

\downarrow

$$\begin{array}{r} 150 \\ 0.15 \\ \hline 150,15 \end{array}$$

(S) The Avg of four positive integers is 73.5. The highest integer is 108 & the lowest integer is 29. The difference b/w the remaining two integers is 15, which of the following is the smaller of the remaining two integers?

15) ~~Yash~~ ~~A~~ ~~to~~ ~~coicter~~ has an avg. score of 49 runs
in 24 inning

$$\begin{array}{ccccccc}
 1 & 2 & 3 & - & - & - & 24 \quad 25 \\
 49 & 49 & 49 & & & 49 & 4 \\
 50 & 50 & 50 & - & - & 50 & 24 \\
 1 & 1 & 1 & & & 1 & \boxed{74}
 \end{array}$$

23) The avg marks in Science Sub of a class of 20 students is 68. If the marks of two student were misread as 48 & 65 of the actual marks 72 & 61 respectively then what would the correct avg?

$$\begin{array}{ccccccc}
 1 & 2 & 3 & - & - & - & 20 \\
 68 & 68 & 68 & - & - & 68 & 48 \quad 65 \\
 1 & 1 & 1 & & & 1 & 72 \quad 61 \\
 69 & 69 & 69 & & & 1 & +24 \quad -4 \\
 & & & & & & \boxed{69} \\
 & & & & & & \underline{\underline{24}} \\
 & & & & & & \underline{\underline{4}} \\
 & & & & & & 20
 \end{array}$$

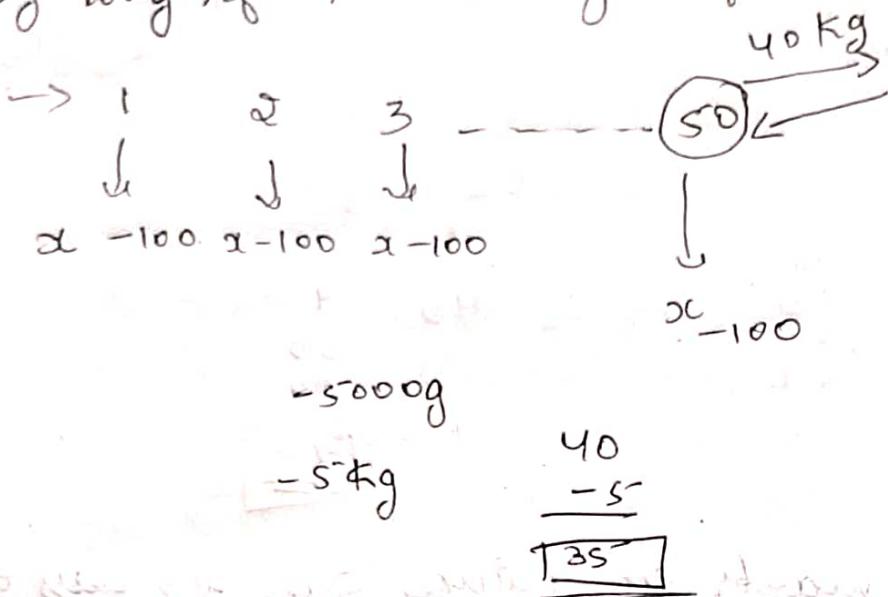
25) ~~1~~ ~~2~~ ~~3~~ ~~-~~ ~~-~~ ~~-~~ ~~~~76~~ 54~~

$$\begin{array}{ccccccc}
 76 & 76 & 76 & - & - & - & 76 \\
 -1 & -1 & -1 & & & -1 & 60 \quad 77 \\
 \hline
 75 & 75 & 75 & & & 75 & 36 \quad 47 \\
 & & & & & & -24 \quad -30 \\
 & & & & & & -54 \\
 & & & & & & \cancel{-54} \\
 & & & & & & = -1
 \end{array}$$

$$\boxed{75}$$

26) There are 50 boys in a class. One boy weighing 40 kg goes away and at the same time another boy joins the class. If the avg weight of the class is thus decreased

by 100g, find the weight of the new boy



(2) Avg. sal of 19 workers in an industry
Rs 2500. The sal of supervisor is Rs 5555.
find the avg sal of all the 20 employes

$$\begin{array}{r}
 1 \ 2 \ 3 \dots 19 \quad 5 \ 6 \ 7 \ 8 \ 10 \\
 \hline
 2500 \ 2500 \ 2500 \dots - \ 2500 \\
 152.5 \ 152.5 \ 152.5 \dots 152.5 \\
 \hline
 12652.5
 \end{array}$$

↓
 $\frac{55550}{2050} = 152.5$

6) The Avg of 5 consecutive even no's A, B, C, D & E respectively is 74, what is the product of A and E?

$$\begin{array}{ccccccc}
 A & B & C & D & E \\
 \downarrow & & \boxed{C} & \hline
 74 & & 76 & 78
 \end{array}$$

$$74 \times 78$$

$$= \underline{\underline{5772}}$$

7) Avg of 4 consecutive odd nos. is 106, what is the third no. in ascending order.

$$A \quad B \quad \downarrow \quad C \quad D$$

$$\frac{107}{109}$$

106

107

8)

A	B	C	D	E	F	G	H	I	J	K
<u>7</u>	9	11	13	15	<u>17</u>	19	21	23	25	<u>27</u>

b) 20

9) Of the three no., the avg of the first and the second is greater than the avg of the second and the third by 15. what is the difference b/w 1st & 3rd of the three numbers.

$$\overline{A \quad B \quad C}$$

$$\frac{A+B}{2} - \frac{B+C}{2} = 15$$

$$\frac{A+B-B-C}{2} = 15$$

30

$$\boxed{\underline{\underline{A-C=30}}}$$

10) The ratio of roses & lilies in a garden is 3:2 respectively. The Avg no of roses & lillies is 180. what is the no of lillies in the garden?

$$R:L = 3:2$$

$$\begin{array}{l} R = 180 \\ L = \frac{180}{3} \\ \hline 360 \end{array} \quad L = \frac{2}{3} \times \frac{72}{360} = \underline{\underline{144}}$$

11) The Avg monthly income of a family of four earning was Rs. 15130. One of the daughters in the family got married and left home, so the monthly income of the family came down to Rs. 14660. What is the monthly income of married daughter?

$$\begin{array}{ccc|c} A & B & C & D \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 15130 & 15130 & 15130 & 15130 \\ \hline 14660 & 14660 & 14660 & 1410 \\ \hline 470 + 470 + 470 & & & \underline{\underline{16540}} \\ & & & 1410 \end{array}$$

12) The Avg of three even consecutive no's is 24. What is the Summation of the three no's?

$$\begin{array}{ccc} A & B & C \\ & \downarrow & \\ 22 & 24 & 26 \end{array}$$

$$\begin{array}{r} 22 \\ 24 \\ 26 \\ \hline 72 \end{array}$$

19) The sum of Seven consecutive even no. of a set is 532 what is the avg of 1st four consecutive even no. of the same set

$$\begin{array}{ccccccc}
 A & B & C & \boxed{D} & E & F & G \\
 \downarrow & & & & & & \\
 \cancel{526} & \cancel{528} & \cancel{530} & \cancel{532} & & & \\
 70 & 72 & \downarrow 74 & 76 & \text{avg} = \frac{2092}{4} = 73 & & \\
 & & 73 & & & & \\
 \underline{\underline{73}} & & & & & &
 \end{array}$$

20) There are 50 boys in a class. One boy weighing 40 kg goes away and at the same time another boy joins the class. If the avg weight of the class is thus decreased by 100 g find the weight of the new boy

$$\begin{array}{ccc}
 40 \text{ kg} & 50 \text{ m} & 50 \times 100 \\
 & & = 5000 \rightarrow 5 \text{ kg}
 \end{array}$$

$$\begin{array}{c}
 40 - 5 \\
 = 35 \text{ kg} \\
 \underline{\underline{=}}
 \end{array}$$

5) 1 2 3 - - - 32 boys

↓
14

1 2 3 - - - 28 girls

↓
13

$$\text{Boys} = 32 \quad \text{Girls} = 28$$

$$\text{Age} = 14 \quad \text{Age} = 13$$

$$\begin{aligned}\text{Sum} &= 32 \times 14 \\ &= 448\end{aligned}$$

$$\begin{aligned}\text{Sum} &= 28 \times 13 \\ &= 364\end{aligned}$$

$$448 + 364 = 812$$

$$32 + 28 = 60$$

$$\text{Avg} = \frac{\text{Sum}_1 + \text{Sum}_2}{B + G} = \frac{812}{60} = \underline{\underline{13.53}}$$

Weighted Avg. ~~Avg.~~

$$\boxed{A' = \frac{n_1 A_1 + n_2 A_2}{n_1 + n_2}}$$

Q) Kamlesh bought 65 books for Rs 1050 from one shop and 50 books for Rs 1020 from another. what is the avg price he paid per book

$$n_1 = 65 \quad n_2 = 50$$

$$\text{Sum}_1 A_1 = 1050 \quad \text{Sum}_2 A_2 = 1020$$

$$A' = \frac{\text{Sum}}{n} = \frac{1050 + 1020}{50 + 65} = \frac{2070}{115} = \underline{\underline{18}}$$

AGE

<u>Past (-s)</u>	<u>Present</u>	<u>future (+s)</u>
17	22	27

1) In 5 years father will be twice his son's age

$$\begin{array}{lll}
 P & P & F(+s) \\
 & & \boxed{f+s = 2(s+s)} \\
 F & f+s & \\
 S & s+s &
 \end{array}$$

2) In 5 years father will be twice his son's Present age

$$\begin{array}{lll}
 P & P & F(+s) \\
 & & \boxed{f+s = 2.s} \\
 F & f+s & \\
 S & s+s &
 \end{array}$$

Puzzle

16 : 50 : : 49 : ? : : 144 : 338

$4^2 : 2 \times 5^2 : 7^2 : (2 \times 8^2) : : 12^2 : 2013^2$

\downarrow

128

3) 3 years ago, the avg age of A & B was 18 years. With C joining them, the avg age becomes 22 years. How old is C now?

$$\frac{(34 \times 4) + x + x+2}{6} = 24$$

$$\frac{136 + x + x+2}{6} = 24 \quad 18+22+30$$

$$136 + x + x+2 = 144$$

$$\underbrace{38 + 2x}_{\$38 + 2x = 144}$$

$$2x = 6$$

$$x = 3$$

Zyfary

4)

$$G_1 \rightarrow 67$$

$$G_2 \rightarrow 67$$

$$P_1 \rightarrow 35$$

$$P_2 \rightarrow 35$$

$$C_1 \rightarrow 6$$

$$C_2 \rightarrow 6$$

$$C_3 \rightarrow 6$$

$$\text{AVG} = \frac{222}{7} \quad 31 \frac{5}{7}$$

$$31 \frac{5}{7} \text{ years}$$

$$\begin{array}{r} 67 \\ 35 \\ \hline 107 \\ \hline 35 \end{array}$$

$$\begin{array}{r} 3 \\ 67 \\ 67 \\ 35 \\ \hline 6 \\ 6 \\ 6 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 35 \\ 6 \\ 6 \\ 6 \\ \hline 210 \\ \hline 1 \end{array} \quad 30.1$$

$$\frac{9}{4} \text{ mixed fraction} = 2 \frac{1}{4}$$

$$\begin{array}{r} 2 \\ 4 \overline{) 9} \\ 8 \\ \hline 1 \end{array}$$

$$\frac{5}{4} \quad 4 \overline{) 5} \quad \Rightarrow 1 \frac{1}{4}$$

5) The avg age of three boys is 16 year

$$B_1 \rightarrow 16$$

$$B_2 \rightarrow 16$$

$$B_3 \rightarrow 16$$

$$(4: 5: 7) x$$

$$16 \quad 16 \quad 16$$

$$\frac{3+3+3}{16} \times 4$$

$$4x+16 \quad 5x+16 \quad 7x+16$$

$$x = 16 \quad \boxed{16+16}$$

s) The avg age of 3 boys is 16 years, ratio
is 4:5:7 then the age of youngest boy

$$\begin{array}{r} P \quad P \quad F \\ - \quad - \quad - \\ 16 \\ 16 \\ 16 \\ \hline \text{Sum} = 48 \end{array}$$

$$4:5:7$$

$$Y = \frac{4}{16} \times 48^{\frac{3}{4}}$$

$$Y = \underline{12 \text{ years}}$$

b)

$$\begin{array}{r} P \quad P \quad F \\ - \quad - \quad - \\ 8 \\ 8 \\ 9 \\ 9 \\ 8 \\ 8 \\ 8 \\ \hline 6C = 48 \end{array}$$

$$\frac{6C + P}{8} = 22$$

$$\frac{48 + P}{8} = 22$$

$$48 + P = 176$$

$$P = 172 - 48$$

$$\boxed{P = 128}$$

F M

~~F~~

$$F = 8 + M$$

$$F + M = 128$$

$$8 + M + M = 128$$

$$2M = 120$$

$$M = \frac{120}{2}$$

$$\boxed{M = \underline{60 \text{ years}}}$$

7) P P F

$$\begin{array}{r}
 -5 \quad 129 \\
 -5 \quad 12 \\
 \hline
 12 \\
 +30 \\
 \hline
 \underline{\underline{42 \text{ years}}}
 \end{array}$$

8) the avg age of A & B, C is 7 year. The avg age of A & B is 6 year and that of B & C is 8 years. Find the age of B

$$\frac{A+B+C}{3} = 7$$

$$A+B+C = 21 \rightarrow \textcircled{I}$$

$$\frac{A+B}{2} = 6 \quad A+B = 12 \rightarrow \textcircled{II}$$

$$\frac{B+C}{2} = 8 \quad B+C = 16 \rightarrow \textcircled{III}$$

Add \textcircled{II} & \textcircled{III}

$$A+B+B+C = 28$$

$$\underline{A+B+C+B} = 28$$

$$21+B=28$$

$$B = 28 - 21$$

$$\underline{\underline{B = 7 \text{ years}}}$$

9) 23 years

10) At present the sum of age of R & S is 63 year the ratio of their age after 7 years will be 7:4. Is the present age of R ?

$$\begin{array}{c} P \quad P \quad f \\ R \quad K \quad C \\ R+K+C=63 \end{array}$$

$$R+K=63$$

$$\boxed{R+K=63}$$

$$\frac{R+7}{K+7} = \frac{7}{4} \quad \underline{\text{4 years}}$$

$$\frac{R+7}{K+7} = \frac{6}{4}$$

$$R+7 = \frac{6}{4} \times K+7 \Rightarrow R = \frac{7}{14} \times 7 = 49$$

\Rightarrow The age of R, K, C are in ratio $3:7$
After 2 years their age will be in the ratio $1:2$ the sum of their ages is

$$\frac{P}{K} = \frac{P}{K+2} = \frac{F(7)}{C+2}$$

$$\frac{P}{K} = \frac{3}{7}$$

$$\frac{P}{C} = \frac{3}{7}$$

$$\frac{K}{C} = \frac{3}{7}$$

$$\frac{K+2}{C+2} = \frac{1}{2}$$

$$K = \frac{3}{7}C$$

$$2K+4 = C+2$$

$$2 \times \frac{3}{7}C + 4 = C+2$$

$$K = \frac{3}{7} \times 14$$

$$\frac{6}{7}C + 2 = C$$

$$\boxed{K=6}$$

$$2 = \frac{1}{7}C$$

$$\boxed{C=14}$$

$$\frac{6}{14} \quad \underline{20 \text{ years}}$$

(Q9)

$$P \quad P \quad f$$

$$k: \quad 3x \quad 3x+2$$

$$k:C = (3:7)x$$

$$= 3x:7x$$

$$C:$$

$$\frac{7x}{10x} \quad 7x+2$$

$$10x = \underline{20 \text{ years}}$$

$$\frac{3x+2}{7x+2} = \frac{1}{2}$$

$$6x+4 = 7x+2$$

$$x=2$$

Profit & Loss

23/12/22

	<u>Cost Price</u>	<u>Selling Price</u>	$(SP > CP)$	<u>Profit</u> $(SP - CP)$
①	100	110		10
②	100	90		

$$\begin{array}{l} CSP < CP \\ \text{loss } (CP - SP) \end{array}$$

$$P\% \left[\frac{P}{CP} \times 100 \right]$$

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

$$L\% \left[\frac{L}{CP} \times 100 \right]$$

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

$$\begin{array}{cccccc} \textcircled{2} & \underline{CP} & \underline{SP} & \cancel{2500} & \cancel{2500} & \cancel{2500} \\ 2000 & 2500 & & 2000 - 2500 & \frac{500}{2000} & 100 \\ & & & & 500 & \\ & & & & & 2000 \end{array}$$

$$\begin{array}{cc} \underline{CP} & \underline{SP} \\ 5000 & 2000 \\ & 5000 - 2000 \end{array}$$

$$\begin{array}{c} 3000 \\ \frac{3000}{5000} \times 100 \end{array}$$

$$\begin{array}{c} 2000 \\ \frac{2000}{5000} \times 100 \\ 60\% \end{array}$$

Profit (Relationship) Sp to CP

$$\begin{array}{l} P = 20\% \\ CP \end{array}$$

$$P = 20\% CP$$

$$SP = 100\% CP + 20\% CP$$

$$SP = 120\% CP$$

$$\boxed{SP = CP + P}$$

$$\textcircled{1} \quad P = 30\%$$

'CP'

$$P = 30\% \text{ CP}$$

$$SP = CP + P$$

$$= 100\% CP + 30\% CP$$

$$\boxed{SP = 130\% CP}$$

$$\textcircled{2} \quad P: 50\%$$

$$\boxed{SP = 150\% CP}$$

$$\textcircled{3} \quad P: 35\%$$

$$\boxed{SP = 135\% CP}$$

$$\textcircled{4} \quad P: 25\%$$

$$\boxed{SP = 125\% CP}$$

Loss

$$\textcircled{1} \quad L = 20\%$$

CP

$$L = 20\% CP$$

$$SP = CP - L$$

$$SP = 100\% CP - 20\% CP$$

$$\boxed{SP = 80\% CP}$$

$$\textcircled{2} \quad L = 30\%$$

$$\boxed{SP = 70\% CP}$$

$$\textcircled{3} \quad L = 25\%$$

$$\boxed{SP = 75\% CP}$$

$$\textcircled{4} \quad L = 45\%$$

$$\boxed{SP = 55\% CP}$$

Profit & Loss + Discount

↳ Marked Price / MRP / Labeled price / Listed Price

$$\textcircled{1} \ CP = 100 \quad D = 20\%$$

$$P = 20 \quad MRP = 150$$

$$SP = 120 \quad SP = \frac{150 - 30}{120}$$

Profit

$$CP < SP < MRP$$

↗ SP & MP Relationship

$$\textcircled{1} \ D = 20\%$$

'MP'

$$\textcircled{1} \ D = 15\%$$

$$SP = 85\% MP$$

$$SP = MP - D$$

$$= MP - 20\% MP$$

$$= 100\% MP - 20\% MP$$

$$\textcircled{1} \ D = 30\%$$

$$SP = 70\% MP$$

$$SP = 80\% MP$$

$$\frac{100 \times 5}{200}$$

$$\frac{70}{100}$$

) CP \rightarrow 1400 15%

$$10\% \leftarrow \\ 140 + 70 = 210 \rightarrow$$

$$\begin{array}{r} 1400 \\ 210 \\ \hline 1190 \end{array}$$

$$2) SP \rightarrow 3000$$

300 PZ 600 PZ

1200

$$SP(h) \rightarrow 20\%$$

$$SP(c) \rightarrow -10\%$$

$$CP = 3000 (H + C)$$

$$H \swarrow C$$

$$x \quad (3000-x)$$

$$P: 20\% \quad L: 10\%$$

$$3000(2\%) \downarrow$$

$$SP = 120\% x \quad SP = 90\% (3000-x)$$

3060

$$\frac{100}{100}$$

$$SP_H + SP_C = SP$$

$$90\% (3000)$$

$$120\% x + 90\% (3000-x) = 3060$$

$$\frac{3000}{300} \\ 2700$$

$$120\% x + 90\% (3000) - 90\% x = 3060$$

$$30\% + 2700 = 3060$$

$$30\% = 3060 - 2700$$

$$30\% = 360$$

$$x = \frac{12}{360} \times \frac{100}{30}$$

$$\boxed{x=1200}$$

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

$$SP \rightarrow 18,700$$

$$L: 15\%$$

$$S \rightarrow ?$$

$$P: 15\%$$

$$SP = 85\% CP$$

$$18,700 = 85\% CP$$

$$18,700 = 85\% CP$$

$$\frac{1100}{18700} = \frac{85}{100} CP$$

$$\boxed{22000 = CP}$$

$$R = 15\% (22000)$$

$$= 22000 + 1100$$

$$= 3300$$

$$SP = \frac{18700}{3300}$$

$$\cancel{22000}$$

$$\frac{18700 + 9(15)}{9(15)} = 2805$$

$$\frac{18,700}{2} = 21505$$

$$\cancel{3300} = 25300$$

SP

$$\begin{aligned}
 & 85\% \text{ CP} \xrightarrow{\cancel{23}} 18700 \\
 & 115\% \text{ CP} \xrightarrow{\cancel{23}} \left(\frac{115\% \text{ CP} \times 18700}{85\% \text{ CP}} \right) \\
 & = \underline{\underline{25,300}}
 \end{aligned}$$

Q) A shopkeeper sells one transistor for Rs. 840 at a gain 20% & another for Rs 960 at a loss of 4%. His total gain or loss % is:

$$SP_1 = 840$$

$$SP_2 = 960$$

$$P = 20\%$$

$$L = 4\%$$

$$CP_1$$

$$CP_2$$

$$SP_1 = 120\% \text{ CP}_1$$

$$\cancel{SP}_2 = 96\% \text{ CP}_2$$

$$840 = 120\% \text{ CP}_1$$

$$960 = 96\% \text{ CP}_2$$

$$840 = \frac{120}{100} \text{ CP}_1$$

$$\boxed{TCP_2 = 1000}$$

$$\boxed{700 = CP_1}$$

$$SP = 1800$$

$$CP = 1700$$

$$P\% = \frac{100}{1700} \times 100$$

$$= 5.88\%$$

Q) Even after reducing marked price of a transistor by Rs 32, a shopkeeper makes a profit of 15%. If the cost price be Rs 320, what percentage of profit would he have made if he had sold the transistor at the marked price?

$$P = 18\%$$

$$MP = 368 + 3^2$$

$$D = 32$$

$$\boxed{CP = 320}$$

$$SP = 320 + 48$$

$$\boxed{SP = 368}$$

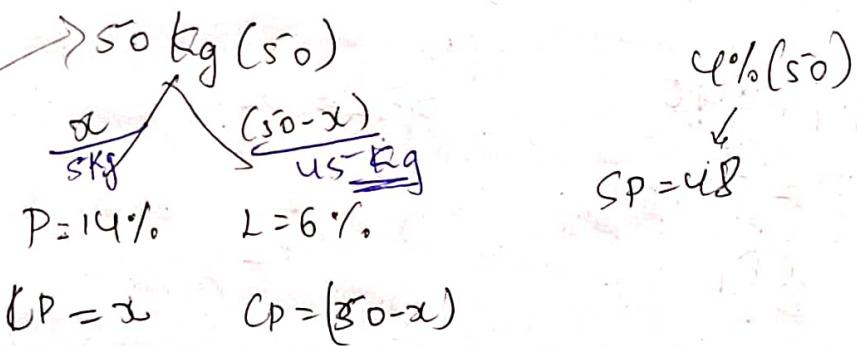
$$\boxed{MP = 400}$$

$$P = \frac{80}{80+100} \times 100$$

$$320 \text{ } 4$$

$$P = \underline{\underline{25\%}}$$

6) A trader has 50kg of rice, a part of which sells at 14% profit and rest at 6% loss. On the whole his loss is 4%. what is the quantity sold at 14% profit and that at 6% loss?



Let per kg ₹ 1

$$114\% \cdot x + 94\% \cdot (50) - 94\% \cdot x = 48$$

$$20\% \cdot x + 47 = 48$$

$$\frac{20}{100} x = 1$$

S
[$x = 5$]

7) A milkman purchases the milk at Rs. x per liter and sells it at Rs. 2x per liter. still he mixes 2 liters water with every 6 litres of pure milk. what is the profit percentage?

$$\text{Total CP} = \frac{x}{15}$$

$$SP = \frac{2x}{15}$$

$$\begin{aligned} CP &= 6x \\ &\quad + 2L \\ &= (8L) \end{aligned}$$

$$SP = 16x (8L)$$

$$P = \frac{10x}{6x} \times 100\%$$

$$\begin{aligned} &= 10 \times 16.66 \\ &= \underline{\underline{166.6\%}} \end{aligned}$$

8) If the cost price is 25% of selling price. Then what is the profit percentage.

$$CP = 25\% SP$$

$$\text{Let } SP = 100$$

$$25\% (100)$$

$$CP = 25$$

$$P\% = \frac{75}{25} \times 100$$

$$= \underline{\underline{300\%}}$$

NOTE :- When all the given values in the question are in:

a) Percentage (%) \rightarrow consider any value to be 100

b) Quantity \rightarrow assume 1/Quantity

c) when there are in numerical value assume value as x

9) With the money I have, I can buy 50 pens or 150 pens. I kept 10% aside for taxi fare. With the remaining I purchased 54 pencils and P pens. What is the value of P?

$$\rightarrow 50 \text{ pen} / 150 \text{ pen}$$

$$\text{Let } CP/\text{of Pen} = E_1$$

$$150 \quad (10\%) \quad CP/\text{Pen} = E_3$$

$$135 = 54 + 3P$$

$$81 = 3P$$

$$P = \cancel{3}x^{27}$$

$$\underline{P = 27}$$

10) If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is?

$$CP = 12 \text{ pens}$$

$$SP = 8 \text{ pens}$$

$$SP \rightarrow 8 \rightarrow 12$$

$$1 \rightarrow ? \frac{12}{8} = 1.5$$

$$CP/1 = 1.5 - 1 = 0.5$$

$$P\% = \frac{0.5}{1} \times 100$$

$$\underline{P\% = 50\%}$$

$$\text{let } CP_1 = E_1/\text{pen}$$

$$CP_{12} = 12$$

$$SP_8 = 12$$

$$SP_1 = \frac{12}{8} = 1.5$$

$$P\% = \frac{0.5}{1} \times 100$$

$$\underline{\underline{= 50}}$$

11) The Price of a jewel, passing through three hands, rises on the whole by 65%. If the first and second sellers earned 20% & 25% profit respectively find the percentage

profit earned by the travel seller

$$100 \xrightarrow[+20]{+20\%} 120 \xrightarrow[+30]{+25\%} 150 \xrightarrow[+15]{+25\%} 165$$

$$D\% = \frac{15}{180} \times 100 \underline{\underline{10\%}}$$

(Q1)

$$+20\% \quad +25\% \quad +x\% = 65\%$$

$$\text{each} = +20 + 25 + \frac{50x}{100}$$
$$= \underline{\underline{+50\%}} \quad x\% = 65\%$$

$$+50 + x + \frac{50x}{100} = 65\%$$

$$= x + \frac{75}{2} = 15$$

$$\frac{2}{2}x = 15 - 5$$
$$\underline{\underline{x = 10\%}}$$

$$CP = 250$$

13) 150 calculators $\xrightarrow[1^{\text{ calculate}}]{Rs 250}$

9500 $\xrightarrow[1^{\text{ calculate}}]{\text{spur}} \text{transport \& packing}$

label price $\xrightarrow[1^{\text{ calculate}}]{320}$ Profit $\Rightarrow ?$

$$D \rightarrow 5\%$$

$$\Rightarrow CP = 250 \times 150$$
$$= 37500$$
$$+ 2500$$
$$\underline{\underline{CP = 40000}}$$

$$MP = 320$$

$$D = 5\%$$

$$SP = 304 \times 150$$
$$= \underline{\underline{45600}}$$

$$320(5\%) \rightarrow 16$$

$$P = \frac{5600}{40000} \times 100$$

$$\boxed{P = 14\%}$$

$$\text{Q) CP: } \text{₹ } 5/\text{lb} = \text{₹ } 4/\text{lb} : \text{₹ } 9/\text{ad}$$

$$\text{SP: } \text{₹ } 5.50/\text{lb} : \frac{11/\text{ad}}{2/\text{ad}} \quad P_{25\%}$$

$$\frac{P}{2} = \frac{D}{2\text{D}} \quad \text{so } \underline{\text{dozen}}$$

$$5\% \rightarrow \underline{\underline{95\%}}$$

2) At what percentage above the C.P. must an article be marked so as to gain 5% after allowing a customer a discount of 5%.

$$P = 5\% \quad D \rightarrow 5\%$$

$$\text{CP} = \underline{100}$$

$$MP = \underline{160}$$

$$SP = \underline{152}$$

$$SP = MP - D$$

$$= 100\% - 5\%$$

$$= 95\% \text{ of } MP$$

$$\% \frac{60}{100} \times 100 = \boxed{60\%}$$

$$MP = \frac{152 \times 100}{95} = \underline{\underline{160}}$$

$$\underline{\underline{30\%}}$$

Mixture & Alligation

$$A' = \frac{n_1 A_1 + n_2 A_2}{n_1 + n_2}$$

$$n_1 A'_1 + n_2 A'_2 = n_1 A_1 + n_2 A_2$$

$$n_1 A' - n_1 A_1 = n_2 A_2 - n_2 A'$$

$$n_1 (A' - A_1) = n_2 (A_2 - A')$$

~~n_1~~

$$\boxed{\frac{n_1}{n_2} = \frac{A_2 - A'}{A' - A_1}}$$

$$A_1 < A' < A_2$$

Ex :- $n_1 = 20$ $n_2 = 30$

$$A_1 = 30 \text{ kg} \quad A_2 = 40 \text{ kg}$$

$$A' = \frac{n_1 A_1 + n_2 A_2}{n_1 + n_2}$$

$$= \frac{600 + 1200}{50} = \frac{1800}{50} = 36 \text{ kg}$$

$$\boxed{A' = 36 \text{ kg}}$$

$$n_1 : n_2$$

$$\frac{n_1}{n_2} = \frac{A_2 - A'}{A' - A_1}$$

$$= \frac{40 - 36}{36 - 30} = \frac{4}{6} = \underline{\underline{2 : 3}}$$

(f) Alligation

$$A_1 = 30 \quad A_2 = 40 \quad A' = 36 \text{ kg}$$

$$A_1 = 30 \text{ kg}$$

$$A_2 = 40 \text{ kg}$$

$$A' = 36 \text{ kg}$$

$$n_1 = 4$$

$$n_2 = 6$$

$$\frac{n_1}{n_2} = \frac{4}{6} = \boxed{\frac{2}{3}}$$

* $A_1 < A' < A_2$

* Consider same Quantity

$$d) A_1 = 50 \text{ kg} \quad A_2 = 70 \text{ kg} \quad A' = 65 \text{ kg}$$

$$A_1 = 50 \text{ kg}$$

$$A_2 = 70 \text{ kg}$$

$$A' = 65 \text{ kg}$$

$$n_1 = 5^-$$

$$n_2 = 15^-$$

$$\frac{n_1}{n_2} = \frac{5^1}{15^3} = \underline{\underline{\frac{1}{3}}} \quad 1:3$$

$$e) A_1 = 1.15 \quad A_2 = 1.24 \quad A' = 1.50 \quad \text{gain} = 25\%$$

$$1.15^-$$

$$1.24$$

$$Sp = 1.50$$

$$Sp = 125\% CP$$

$$\frac{0.30}{1.50} = \frac{125}{100} CP$$

$$\underline{\underline{1.20}} = CP$$

$$n_1 = 0.04$$

$$n_2 = 0.05^-$$

$$\frac{n_1}{n_2} = \frac{0.04}{0.05^-} = \underline{\underline{4:5}}$$

$$f) A_1 = \cancel{50P} \quad A_2 = \cancel{50P}$$

$$A' = 44P \quad \text{gain } 10\%$$

$$34P$$

$$50P$$

$$Sp = 44$$

$$Sp = 110 CP$$

$$44 = \frac{110}{100} CP$$

$$n_1 = 10$$

$$n_2 = 6$$

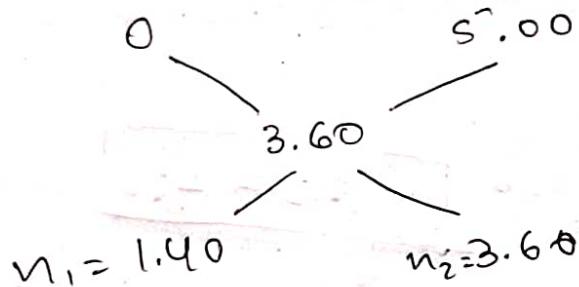
$$\frac{n_1}{n_2} = \frac{10^5}{6^3} = \underline{\underline{\frac{5}{3}}} \quad 5:3$$

$$CP = 40P$$

1) How much water be mixed in 36 ltrs of milk worth Rs 5.00 / lt, so that value of mixture is Rs 3.60 / lt.

$$n_2 = 36 \quad A_2 = 5.00 \quad A_1 = 0 \quad A' = 3.60$$

$$n = ?$$



$$\frac{n_1}{n_2} = \frac{1.40}{3.60} = \frac{14}{36} \quad \boxed{n_1 = 14}$$

$$= 7 : 18$$

$$\frac{n_1}{36} = \frac{7}{18} \quad \boxed{n_1 = 14 \text{ L}}$$

~~$$n_1 = \frac{7}{18} \times 36^2$$~~

2) A container contains 50 lt of milk from this container 10 lt of milk was taken out and replaced by water. This process is repeated one more time. How much is now left in the container.

$$A = 50 \quad B = 10 \quad n = 2$$

$$\boxed{A \left(1 - \frac{B}{A}\right)^n}$$

when Replace
and for 3 time

B → Replaced vol

A → Original vol

n → Number of Times Replaced

$$50 \left(1 - \frac{10}{50}\right)^2 = \left(\frac{4}{5}\right)^2 \times 50 = 32 \text{ L}$$

31/12 22

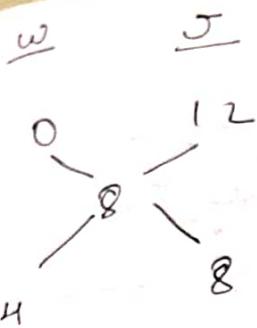
Q) How much sugar at Rs 9.5/kg should be added to 17 kg of tea at Rs. 20/kg so that the mixture be worth Rs. 13/kg?

<u>S</u>	<u>T</u>	
$A_1 = 9.5$	$A_2 = 20$	$m_1 : m_2 = 2 : 1$
$13(A')$		
7	3.5	$m_1 : \cancel{17} = 2 : 1$
(m ₁)	(m ₂)	$\frac{m_1}{17} = \frac{2}{1} \cdot \frac{m_1}{10} = 2x$
		$m_1 = 34 \text{ kg}$

Q) A mixture contains 88% of Sulphur, another mixture contains 70% of sulphur, another 84% of sulphur. In what ratio these two must be mixed.

70%	88%	
		$m_1 : m_2 = 2 : 7$
84%		
4	14	
$\frac{x^2}{14x}$		

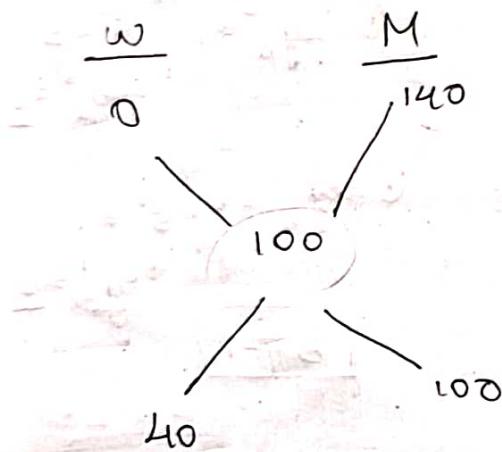
Q) In what ratio water be mixed with juice costing Rs. 12 per litre to obtain a mixture worth of Rs. 8 per litre?



$$n_1 : n_2 = 4 : 8$$

$$\frac{n_1}{n_2} = \frac{4}{8} \quad \boxed{n_1 : n_2 = 1 : 2}$$

(12) In what proportion must water be mixed with milk to gain 40% by selling it at cost price?



$$SP_{\text{mixture}} = CP_{\text{pure milk}}$$

$$SP = 140\% \text{ of } CP$$

$$SP = 140(\frac{100}{100})$$

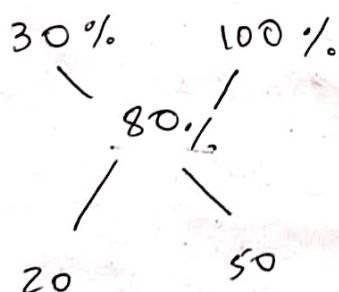
$$\underline{\underline{= 140}}$$

$$n_1 : n_2 = 40 : 100$$

$$\boxed{n_1 : n_2 = 2 : 5}$$

$$\frac{n_1}{n_2} = \frac{40}{100}$$

(13)



$$\frac{2d}{5d}$$

$$\boxed{n_1 : n_2 = 2 : 5}$$

$$n_1 : n_2 = 20 : 50$$

Logarithm

$$a^m = n \quad | \quad a^3 = 8$$

$$\textcircled{1} \quad 2^4 = 8$$

$$\textcircled{1} \quad 10^1 = 10$$

$$\log_a^n = m \quad | \quad \log_2 8 = 3$$

$$\log_2 8 = 3$$

$$\log_{10}^{10} = 1$$

$$\textcircled{1} \quad 3^3 = 27$$

$$\log_3 27 = 3$$

$$\textcircled{1} \quad \log_a^m + \log_a^n = \log_a^{(m+n)}$$

$$\textcircled{2} \quad \log_a^m - \log_a^n = \log_a^{(m-n)}$$

$$\textcircled{3} \quad \log_a^{(m)^n} = n \log_a^m$$

$$\textcircled{4} \quad \frac{1}{\log_a^b} = \log_b^a$$

$$\textcircled{1} \quad \log_b^b = 1 \quad | \quad 5^1 = 5$$

$$\log_5^5 = 1$$

$$\textcircled{1} \quad \log_b^1 = 0 \quad | \quad 5^0 = 1$$

$$\log_5^1 = 0$$

$$\boxed{b \neq 1}$$

$$1) \log_7 (7^{343})$$

$$= \log_7^1 - \log_7^{343}$$

$$\cancel{-} \quad \cancel{7}$$

$$a^m = n$$

$$7^1 = 7$$

$$2) \log_7 (7^{-3})$$

$$= \log_7 7^{-3}$$

$$= -3 \log_7^7$$

$$= \underline{\underline{-3}}$$

$$3) \log_{100}^{0.01}$$

$$= \log_{100}^{\left(\frac{1}{100}\right)}$$

$$= \log_{100}^{(100)^{-1}}$$

$$= -1 \log_{100}^{100 \cancel{51}}$$

$$= \underline{\underline{-1}}$$

$$3) \log_{\sqrt{8}}^{10} = \frac{10}{3} \text{ (find } x)$$

$$= (\sqrt{8})^{\frac{10}{3}} = x$$

$$= ((2^3)^{\frac{1}{2}})^{\frac{10}{3}} = x$$

$$= (2)^{\cancel{\frac{1}{2}} \times \cancel{\frac{10}{3}}} = x$$

$$\therefore x = 2^5 \Rightarrow x = \underline{\underline{32}}$$

$$4) \log_2 \left(\frac{75}{16}\right) - 2 \log_2 \left(\frac{5}{9}\right)^2 + \log_2 \left(\frac{32}{243}\right)$$

$$= \log_2 \frac{75}{16} - \log_2 \left(\frac{5}{9}\right)^2 + \log_2 \left(\frac{32}{243}\right)$$

$$= \log_2 \frac{75}{16} - \log_2 \frac{(25/81)}{25} + \log_2 \left(\frac{32}{243}\right)$$

$$= \log_2 \frac{\cancel{75} \times 81}{\cancel{16} \times 25} + \log_2 \left(\frac{32}{243}\right)$$

$$= \log_2 \left(\frac{25}{16} \times \frac{81}{25} \times \frac{32}{243}\right)$$

$$= \log_2 \cancel{25}^2 \cancel{71}^1$$

$$= \underline{\underline{1}}$$

4) If $\log_a m = n$, express a^{n-1} in terms of a & m

$$= a^n = m$$

$$= a^{(n-1)} \cdot a^1 = m$$

$$= a^{n-1} = \underline{\underline{\frac{m}{a}}}$$

$$8) 2 \log \left(\frac{15}{18}\right) - \log \left(\frac{25}{102}\right) + \log \left(\frac{4}{9}\right) = \log x$$

Find x

$$= \log \left(\frac{15}{18}\right)^2 - \log \left(\frac{25}{102}\right) + \log \left(\frac{4}{9}\right) = \log x$$

$$= \log \left(\frac{225}{324}\right) - \log \left(\frac{25}{102}\right) + \log \left(\frac{4}{9}\right) = \log x$$

$$= \log \left(\frac{225}{324} \times \frac{162}{25}\right) + \log \left(\frac{4}{9}\right) = \log x$$

$$= \log \left(\frac{225}{324} \times \frac{162}{25} \times \frac{4}{9}\right) = \log x$$

$$= \log 2 = \log x$$

$$\boxed{x=2}$$

CAPGEMINI

Blood Relation

2/1/23

◻ → Boys ○ → Girls

◻ —○ → Married Couple

— → ~~to~~ Same generation

| → Next / Previous generation

① Bro/ Sis

Son



NEPHEW

① Bro/ sis

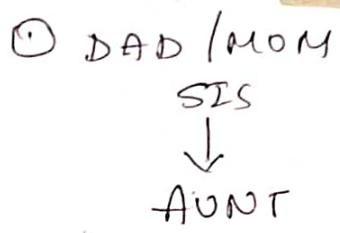
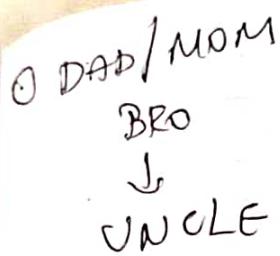
Daughter



Niece

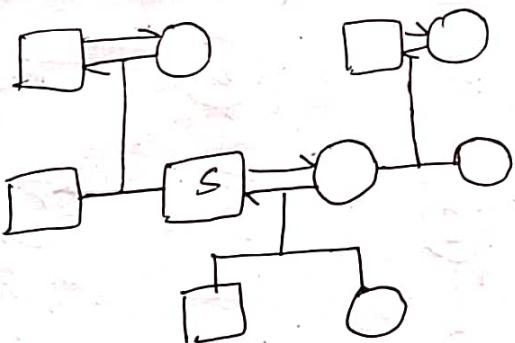
Spouse → wife /

husband

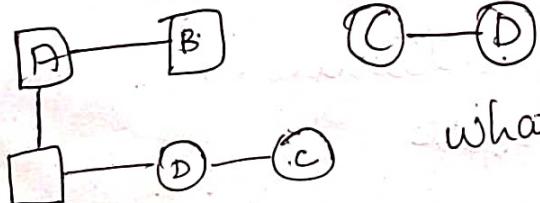


- ① Father's Relatives → Paternal
- ② Mother's Relative → Maternals

Ex

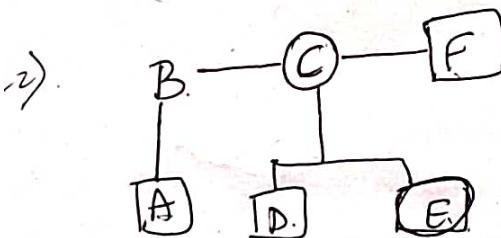


5)



what is the relation b/w
B to C

d) Uncle

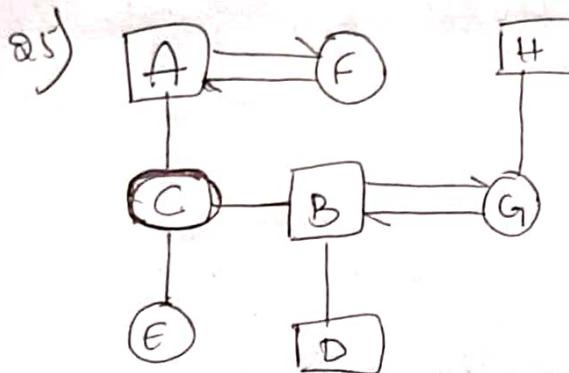


How is A Related to D

a) Cousin

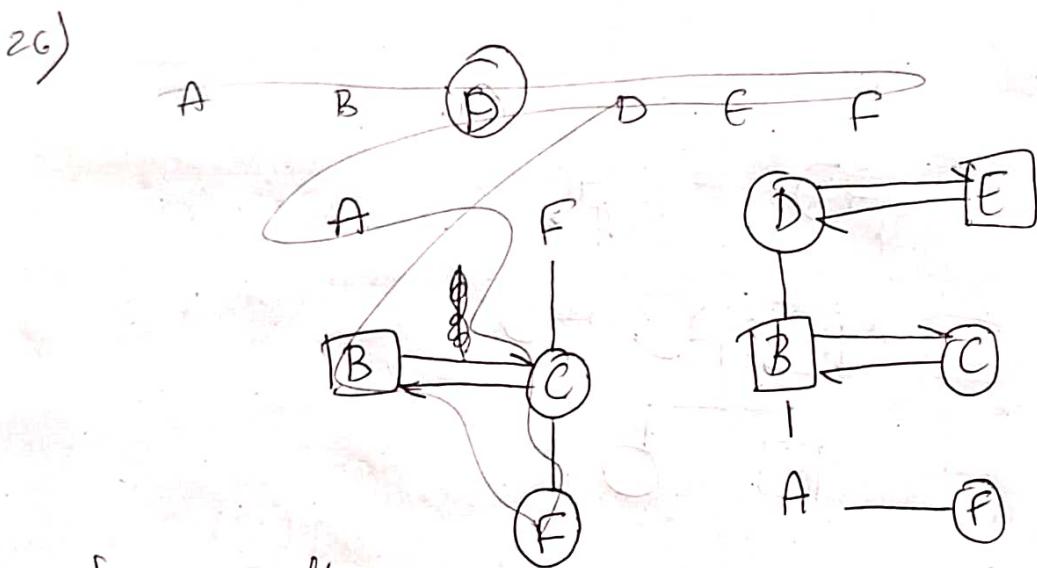
How is E related to F

c) Niece



25) ~~F~~ F

a.) B



27) c) Mother

28) d) Can not be determined

29) c) None of these

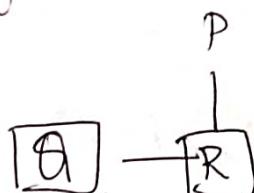
30) b) DE

13) $\theta \rightarrow \text{Bro}$

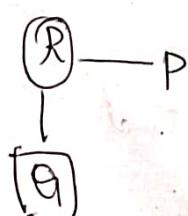
$\frac{\circ}{\circ} \rightarrow \text{son}$

- $\rightarrow \text{Sis}$

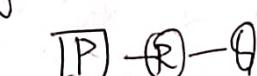
a) $\theta \times R \div R$
X



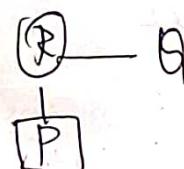
b) $\theta \div R - P$
X



c) $P \times R - \theta$



d) $P \div R - \theta$



3) $P @ A \neq M \# T$ indicates what relation of P with T

$A \# B$ means A is mother of B

$A \# B$ means A is father of B

$A @ B$ means A is husband of B

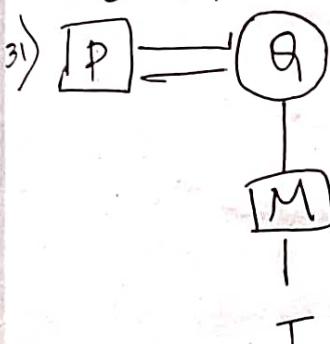
$A \% B$ means A is daughter of B

$\frac{1}{2} \rightarrow$ mother $\frac{1}{2} \rightarrow$ daughter.

$\# \rightarrow$ father

$@ \rightarrow$ husband relations of P with T

$P @ A \neq M \# T$ c) Paternal grandfather



3/1/22

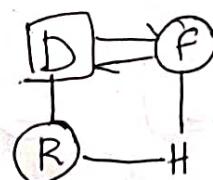
3) $F @ D \% K \# H$ F related to H



a) Brother in law

3)

~~b) $R \% D @ F \$ H$~~

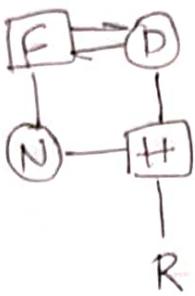


34) H is a brother of N

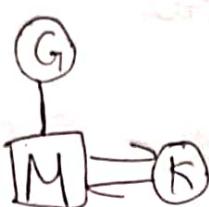
a) $H \# R \neq D \neq N$



Q) N % F @ D & H @ # R



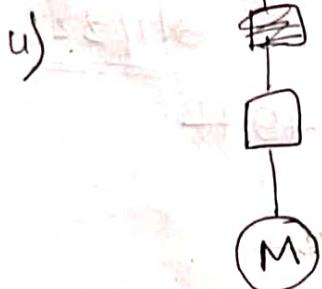
3) G fm @ K, how is K related to G



a) daughter-in-law

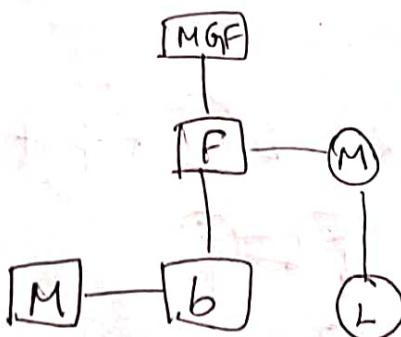


c) Niece.



a) Mother

5)



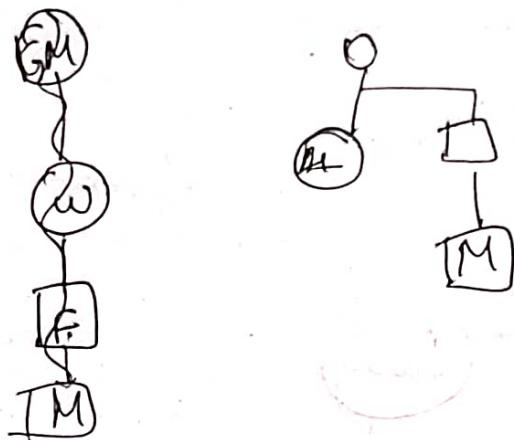
Cousin

ii) c) None of these

ii) ~~c) None of these~~ d) Brother

g)

a) Nephew.



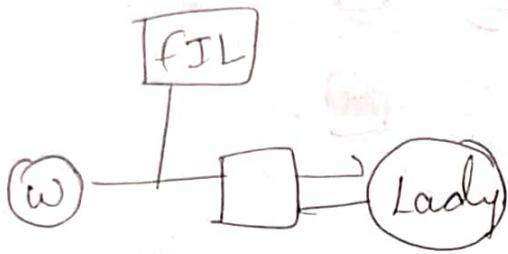
10) c) wife

Number Systems

- 1) Classification
- 2) ~~De~~ converting Decimal to fraction
- 3) Divisibility Rule
- 4) ~~Patten~~ Factorization
- 5) Power of Factor / Factor in factorial
- 6) Trailing zero
- 7) Cyclicity
- 8) Remainder Theorems
- 9) Unit Digit
- 10) Number factor's / Odd factors / Even factors
- 11) HCF & LCM
- 12) AP & GP

14) A lady pointing to a woman in a photograph says "she is the only daughter of my father-in-law" How is woman related to the lady?

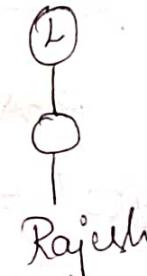
c) none of these



1) a) b)

2)

c) Maternal grand son



3)



d) Maternal grandfather.

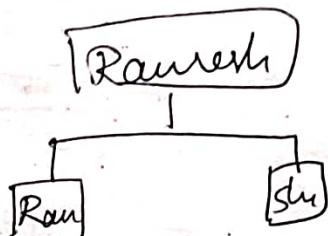
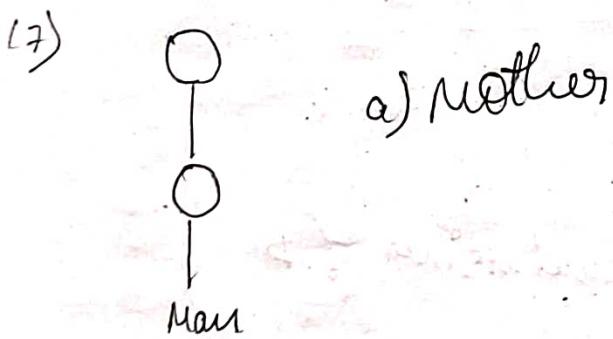
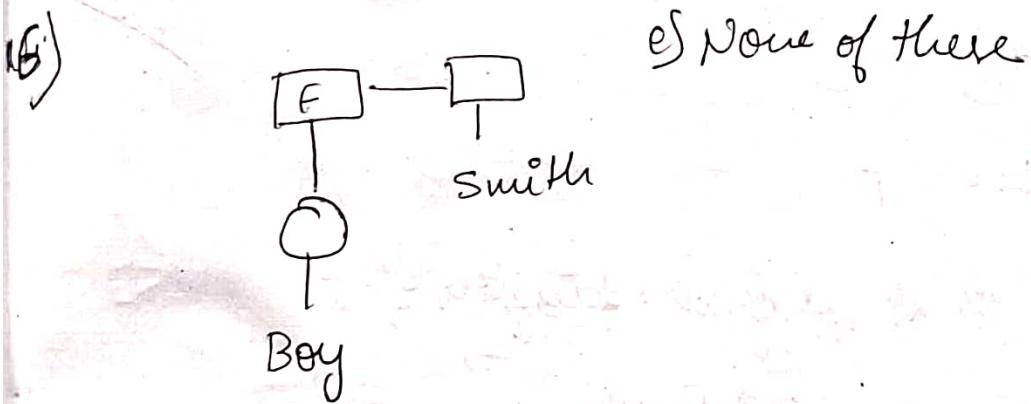
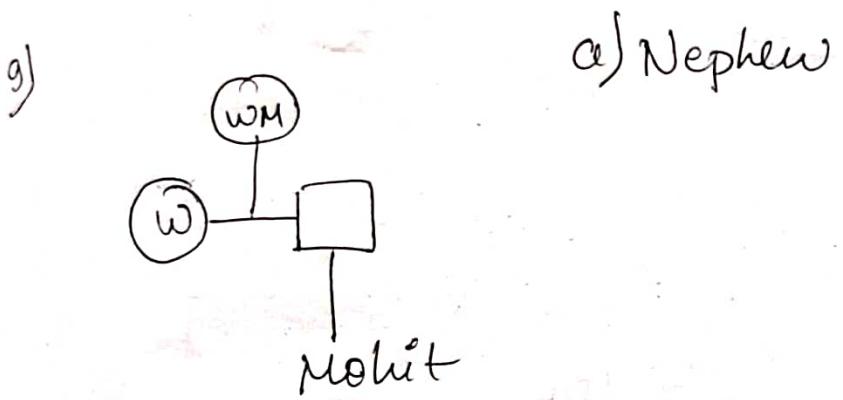
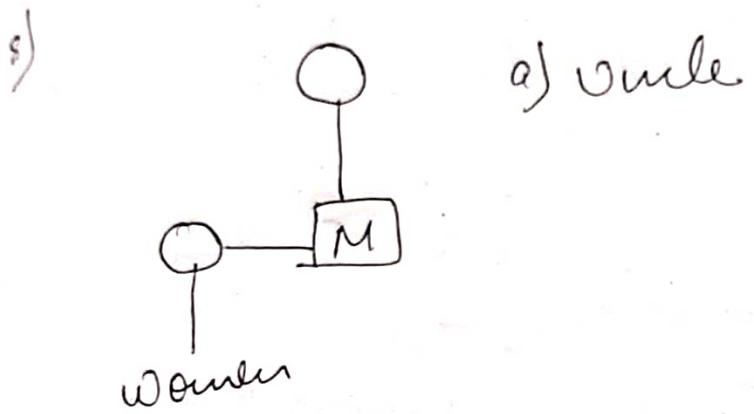


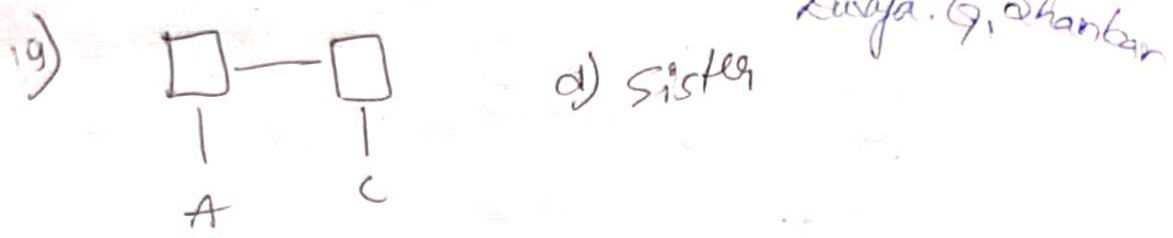
4)



e) none of these.



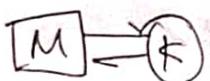




Direction

35) G \$ m @ R

G → Daughter in law



36) a) R # S ? T

T → R is grand daughter of T
⇒ True

b) P = Q ? R

R → R is grandmother of P
⇒ True

c) L # n # o → mean. o is sister of L
⇒ True

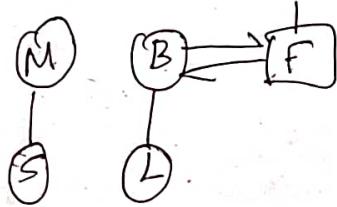


$$M \neq 0 @ \Phi = \emptyset$$

∴ $M - 0 = \emptyset$ → Q & 0 are husband and wife
⇒ True

6) e All are ~~not~~ true

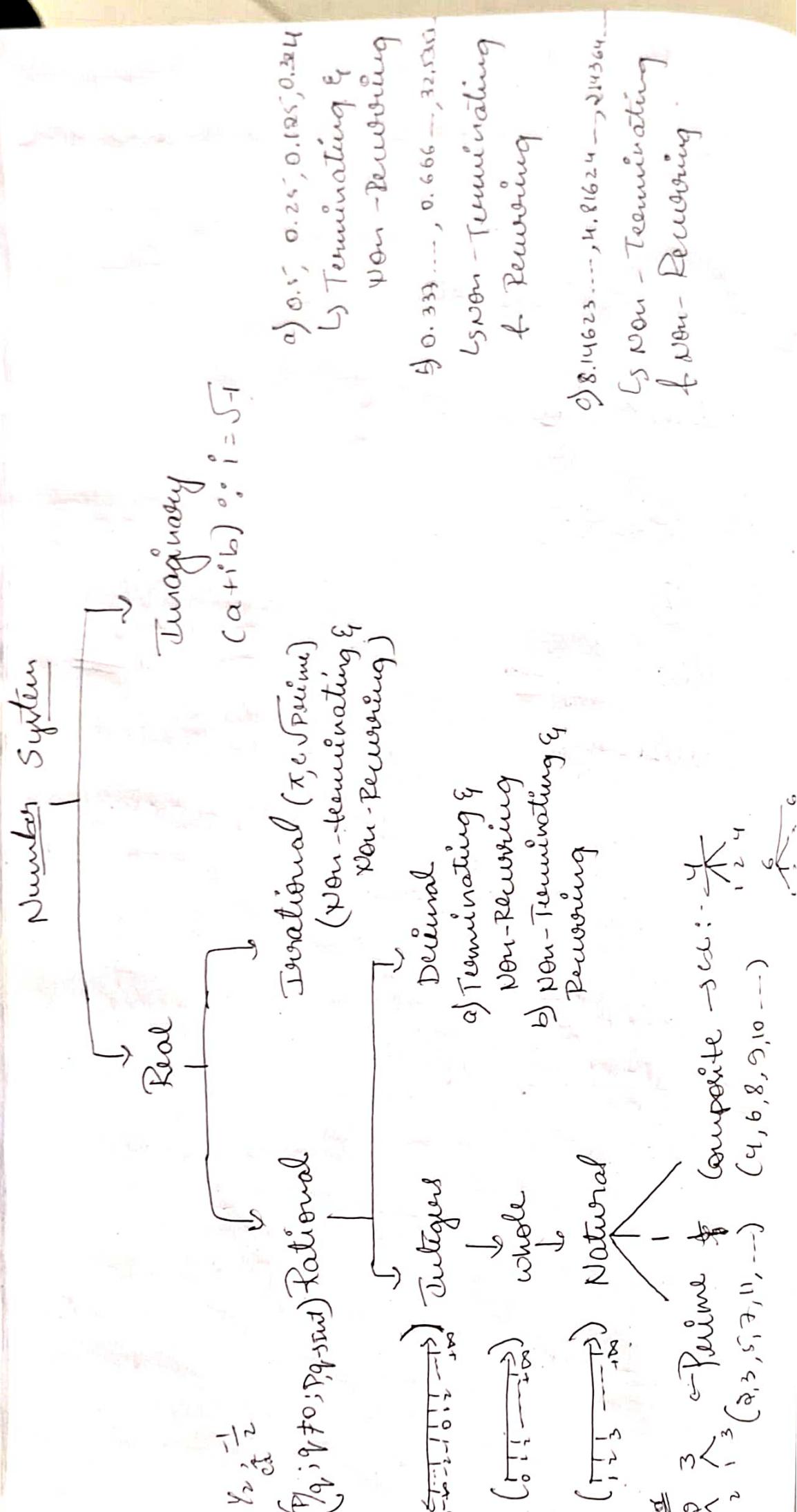
$$10) S \# m * B @ L = F ? Q$$



5/1/23

Number System

1) classification:



(Q - Prime)

i) Set of Prime

$$(2, 3) (3, 5) (5, 7) (4, 19)$$

ii) set of consecutive

$$(3, 4) (4, 5) (6, 7) (11, 12), (101, 102)$$

Highest common factor $(x, y) = 1$

$$\begin{array}{ccc} (3, 4) \checkmark & (4, 16) \times & (11, 18) \checkmark \\ (1, 3) \cancel{(1, 2, 4)} & (4, 2, 7, 14) \cancel{(1, 2, 4, 8, 16)} & (1, 11) \cancel{(1, 2, 3, 6, 9, 18)} \end{array}$$

6/11/23

Decimal \rightarrow Fraction

i) T & NR

ii) NT & R

$$i) 0.5 \rightarrow \frac{1}{2}$$

$$ii) 0.25 \rightarrow \frac{1}{4}$$

$$iii) 0.125 \rightarrow 0.125 \times \frac{1000}{1000} \Rightarrow \frac{125}{1000} = \frac{1}{8}$$

$$iv) 2.563 \rightarrow 2.563 \times \frac{1000}{1000} = \frac{2563}{1000}$$

$$v) 0.333\ldots = \frac{1}{3} \text{ (purely)}$$

$$vi) 42.111\ldots = x \times 10$$

$$vii) 0.16666\ldots = \frac{1}{6} \text{ (Impure recurring)}$$

$$viii) 3.\underline{2}222\ldots = x \times 10$$

$$- x \underline{-} 3.\underline{2}222\ldots$$

$$9x = 379$$

$$9x = 32.\underline{2}222\ldots$$

$$- x \underline{-} 3.\underline{2}222\ldots$$

$$9x = 29$$

$$x = \frac{29}{9}$$

$$\frac{32 - 3}{9} = \boxed{\frac{29}{9}}$$

$$x = \frac{379}{9}$$

$$\begin{aligned}
 & \text{9) } 32.\underline{35}\,\underline{35}\,\underline{35}\dots = x \quad \times 10 \\
 & 3235.\underline{35}\,\underline{35}\,\underline{35}\dots = 100x \\
 & \begin{array}{r} 100x \\ - x \\ \hline 99x \end{array} \quad \begin{array}{r} 3235.\underline{35}\,\underline{35}\,\underline{35}\dots \\ - 32.3\underline{35}\,\underline{35}\,\underline{35}\dots \\ \hline 3203 \end{array} \\
 & \boxed{x = \frac{3203}{99}} \quad (\text{Q1})
 \end{aligned}$$

$$\overrightarrow{3.2} \underline{\underline{2}} \underline{\underline{2}} \dots$$

$$\frac{32 - 3}{9} = \frac{29}{9}$$

10) 28. 123123123 - - - -

$$\frac{2123 - 2}{999} = \frac{2121}{999}$$

Improperly Pervading

$$\text{ii) } 0,16666\ldots = x \times 10$$

$$1.666 - \dots = \underline{\underline{10x}} \quad \times 10$$

16: 666 = 100?

$$\begin{array}{r} \overline{0.16} \\ \overline{16} \end{array} \left| \begin{array}{r} 6.6 \\ -16 \\ \hline 0.6 \end{array} \right. \quad \frac{16-1}{90} = \frac{15}{90}$$

$$\frac{100x}{10x} = \frac{16.666\ldots}{1.666\ldots}$$

$$dl = \frac{15}{906} \rightarrow \frac{1}{6}$$

$$12) 13.24 \text{ ии} 4 = 8 \quad \text{у} 15$$

133.444 1-12-2011

1324. ԿԿԿ

$$\frac{1384 - 132}{90} = \frac{1192}{90} =$$

$$\begin{array}{r} 100x \\ - 10x \\ \hline 90x = \end{array} \quad \begin{array}{r} 1324.444\ldots \\ - 132.444\ldots \\ \hline 1192 \end{array}$$

$$x = \frac{1192}{90}$$

$$1) 13148888\ldots = x \times 100$$

$$1314.888\ldots = 100x \times 10$$

$$13148.888\ldots = 1000x$$

$$\begin{array}{r} 1000x \\ - 100x \\ \hline 900x = \end{array} \quad \begin{array}{r} 13148.888\ldots \\ - 1314.888\ldots \\ \hline 11834 \end{array}$$

$$x = \frac{11834}{900}$$

$$1314\boxed{8}88$$

$$\frac{13148 - 1314}{900}$$

$$= \frac{11834}{900}$$

Divisibility Rule

2 → Last digit is 0, 2, 4, 6, 8, ~~10~~...

3 → Sum of all digits $\div 3$

4 → Last 2 digits of num $\div 4$

5 → Last digit as ~~not~~ 0 or 5

(2x3) → Divisible by both 2 & 3 and 6

7 → x

8 → Last 3 digits of number $\div 8$

9 → Sum of digits $\div 9$

10 → Last digit 0

11 → $(\sum \text{of digits } @ \text{ odd place's}) - (\sum \text{of digits } @ \text{ even place's}) = 0 \text{ or } 11$

Ex:- $\bar{6} \overline{3} \overline{6} \overline{8} \overline{1} \overline{2} \overline{x}$ $= 13 - 11 = \underline{\underline{2}}$

$$\text{Ex:- } \frac{9}{7} \frac{9}{5} \frac{2}{3} \frac{7}{6} \frac{3}{1} = 28 - 9 = \underline{\underline{19}}$$

12 → If the number divisible by Both 4 & 3

10 1 23

Factorization :- Expressing a number as product of Prime numbers

$$1) 60 : 2^1 \times 3^1$$

$$\begin{array}{c} \diagup \\ 2 \times 3 \end{array}$$

$$2) 12 : 3^1 \times 2^2$$

$$\begin{array}{c} \diagup \\ 3 \times 4 \\ \diagdown \\ 2 \times 2 \end{array}$$

$$3) 40 : 2^2 \times 2^1 \times 5^1$$

$$\begin{array}{c} \diagup \\ 4 \times 10 \\ | \quad \diagdown \\ 2^2 \times 5 \end{array}$$

$$4) 96 : 2^5 \times 3^1$$

$$\begin{array}{c} \diagup \\ 8 \times 12 \\ \downarrow \quad | \\ 2^3 \times 4 \times 3 \\ | \\ 2^2 \end{array}$$

$$5) 250 : 5^3 \times 2^1$$

$$\begin{array}{c} \diagup \\ 25 \times 10 \\ \downarrow \quad \diagdown \\ 5^2 \times 5 \times 2 \end{array}$$

$$6) 484 : 2^2 \times 11^2$$

$$\begin{array}{c} \diagup \\ 4 \times 121 \\ | \quad | \\ 2^2 \quad 11^2 \end{array}$$

$$7) 900 : 3^2 \times 2^2 \times 5^2$$

$$\begin{array}{c} \diagup \\ 9 \times 100 \\ \downarrow \quad \diagup \\ 3^2 \times 10 \times 10 \\ \diagdown \quad \diagdown \\ 2 \times 5^1 \times 2 \times 5^1 \end{array}$$

$$8) 824 : 2^3 \times 103^1$$

$$\begin{array}{c} \diagup \\ 4 \times 206 \\ \downarrow \quad \diagdown \\ 2^2 \times 2 \times 103^1 \end{array}$$

$$9) 488 : 2^3 \times 61^1$$

$$\begin{array}{c} \diagup \\ 8 \times 61^1 \\ \diagdown \\ 2^3 \times 61^1 \end{array}$$

11 1 23

Power

of factors

Composite

$$1) 5^1$$

(only for prime no)
Softei successive division

$$\frac{5}{1} = \frac{5 \times 10 \times 3 \times 2 \times 1}{2^2 \times 3 \times 2^1}$$

$$2^n = 2^3 / \frac{5^1}{2^2} = 2 + 1$$

$$3^n = 3^1 / \frac{5^1}{2^3} = 1$$

$$5^n = 5^1 / \frac{5^1}{3^1} = 1$$

$$S^n = S^1 / \frac{5^1}{5^1} = 1$$

$$3) 5^0 = 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4$$

$$4 \times 3 \times 2 \times 1$$

$$2^n = 2^8 / \frac{10}{2} = 5^4 + 2 + 1 = 8$$

$$3^n = 3^8 / \frac{100}{3} = 33 + 11 + 3 + 1 = 48$$

$$5^n = 5^8 / \frac{100}{5} = 20 + 4$$

$$S^n = S^2 / \frac{10}{6} = 2 - 5^2$$

$$1) 5^1 = 5 \times 4 \times 3 \times 2 \times 1$$

$$2) 10^1 = 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4$$

$$3) 10^0 = 100 / 10 = 10$$

$$4) 5^0 = 50 / 5 = 10$$

$$5) 2^0 = 2^3 / 2^3 = 1$$

$$1) 2^5 = 2^5 / \frac{5^0}{2^2} = 2^5 + 12 + 6 + 3 + 2 + 1$$

$$2) 3^5 = 3^5 / \frac{5^0}{3^2} = 3^5 + 16 + 8 + 4 + 2 + 1$$

$$3) 5^5 = 5^5 / \frac{5^0}{3^3} = 5^5 + 25 + 12 + 6 + 3 + 1$$

$$4) 10^5 = 10^5 / \frac{5^0}{3^4} = 10^5 + 25 + 12 + 6 + 3 + 1$$

$$5) 20^5 = 20^5 / \frac{5^0}{3^5} = 20^5 + 100 + 50 + 25 + 12 + 6 + 3 + 1$$

$$6) 50^5 = 50^5 / \frac{5^0}{3^6} = 50^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$7) 100^5 = 100^5 / \frac{5^0}{3^7} = 100^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$8) 200^5 = 200^5 / \frac{5^0}{3^8} = 200^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$9) 500^5 = 500^5 / \frac{5^0}{3^9} = 500^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$10) 1000^5 = 1000^5 / \frac{5^0}{3^{10}} = 1000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$11) 2000^5 = 2000^5 / \frac{5^0}{3^{11}} = 2000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$12) 5000^5 = 5000^5 / \frac{5^0}{3^{12}} = 5000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$13) 10000^5 = 10000^5 / \frac{5^0}{3^{13}} = 10000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$14) 20000^5 = 20000^5 / \frac{5^0}{3^{14}} = 20000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$15) 50000^5 = 50000^5 / \frac{5^0}{3^{15}} = 50000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$16) 100000^5 = 100000^5 / \frac{5^0}{3^{16}} = 100000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$17) 200000^5 = 200000^5 / \frac{5^0}{3^{17}} = 200000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$18) 500000^5 = 500000^5 / \frac{5^0}{3^{18}} = 500000^5 + 150 + 100 + 60 + 30 + 10 + 3 + 1$$

$$1) 5^1 = 5 \times 4 \times 3 \times 2 \times 1$$

$$2) 10^1 = 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4$$

$$3) 20^1 = 20 \times 19 \times 18 \times 17 \times 16 \times 15 \times 14$$

$$4) 50^1 = 50 \times 49 \times 48 \times 47 \times 46 \times 45 \times 44$$

$$5) 100^1 = 100 \times 99 \times 98 \times 97 \times 96 \times 95 \times 94$$

$$6) 200^1 = 200 \times 199 \times 198 \times 197 \times 196 \times 195 \times 194$$

$$7) 500^1 = 500 \times 499 \times 498 \times 497 \times 496 \times 495 \times 494$$

$$8) 1000^1 = 1000 \times 999 \times 998 \times 997 \times 996 \times 995 \times 994$$

$$9) 2000^1 = 2000 \times 1999 \times 1998 \times 1997 \times 1996 \times 1995 \times 1994$$

$$10) 5000^1 = 5000 \times 4999 \times 4998 \times 4997 \times 4996 \times 4995 \times 4994$$

$$11) 10000^1 = 10000 \times 9999 \times 9998 \times 9997 \times 9996 \times 9995 \times 9994$$

$$12) 20000^1 = 20000 \times 19999 \times 19998 \times 19997 \times 19996 \times 19995 \times 19994$$

$$13) 50000^1 = 50000 \times 49999 \times 49998 \times 49997 \times 49996 \times 49995 \times 49994$$

$$14) 100000^1 = 100000 \times 99999 \times 99998 \times 99997 \times 99996 \times 99995 \times 99994$$

$$15) 200000^1 = 200000 \times 199999 \times 199998 \times 199997 \times 199996 \times 199995 \times 199994$$

$$16) 500000^1 = 500000 \times 499999 \times 499998 \times 499997 \times 499996 \times 499995 \times 499994$$

Trailing zeros (Have to find 10 power value)

$$\textcircled{1} \quad 400! = 4^{100} / 10^{100}$$

$$\textcircled{2} \quad (2^2)^n = 6^n = 8^n + 2^n$$

$$\textcircled{3} \quad (2^2)^n = 8^n$$

$$10^{\textcircled{1}}$$

$$(2^2)^n = 8^n$$

$$\textcircled{4} \quad 10^n = 10^{\frac{n}{2}} / (5^2 \cdot 2^2)$$

$$\textcircled{5} \quad 10^n = 6^n = 8^n + 2^n$$

Value of highest power of 6 in
equivalent product power of 2

Ans

$$\textcircled{6} \quad 10^n = 10^{\frac{n}{2}} / (5^2 \cdot 2^2)$$

$$\textcircled{7} \quad 100!$$

$$\textcircled{8} \quad 10^n = \frac{70}{2^n} = 35 \cdot 2^{-n} + 1 / 2^{n+7}$$

$$\textcircled{9} \quad 10^n = 2 + 10^{\frac{n}{2}}$$

$$(5 \cdot 2^{\frac{n}{2}})^{12}$$

$$\textcircled{10} \quad 10^n = 10^{\frac{n}{2}} / (5^2 \cdot 2^2)$$

$$\textcircled{11} \quad 10^n = 10^{\frac{n}{2}} / (5^2 \cdot 2^2)$$

$$(5 \cdot 2^{\frac{n}{2}})^{12}$$

Cyclicity

finding unit digit

$$\begin{array}{l} 1^1 - 1 \\ 1^2 - 1 \\ 1^3 - 1 \end{array}$$

$$1^4 - 1$$

⋮

$$1^n - 1$$

$$5^1 - 5$$

$$5^2 - 25$$

$$5^3 - 125$$

$$5^4 - 625$$

$$5^5 - \underline{\quad} 5$$

$$5^n - \underline{\quad} 5$$

$$6^1 - 6$$

$$6^2 - 36$$

$$6^3 - 216$$

$$6^4 - \underline{\quad} 6$$

$$6^5 - \underline{\quad} 6$$

$$6^n - \underline{\quad} 6$$

Cyclicity $(1, 5, 6) = 1$

$$1) (35)^{38}$$

$$(5)^{38} - \underline{\quad} 5$$

$$2) (31)^{31} + (85)^{85} + (366)^{366}$$

$$= (1)^{31} + (5)^{85} + (6)^{366}$$

$$= 1 + 5 + 6$$

$$= \boxed{12} \quad \underline{\textcircled{3}}$$

$$0) 4^1 - 4$$

$$+2) 4^2 - 16$$

$$+2) 4^3 - 64$$

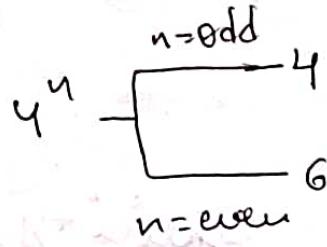
$$+2) 4^4 - 256$$

$$+2) 4^5 - \underline{\quad} 4$$

$$4^6 - \underline{\quad} 6$$

⋮

⋮



Cyclicity $(4, 6) = 2$

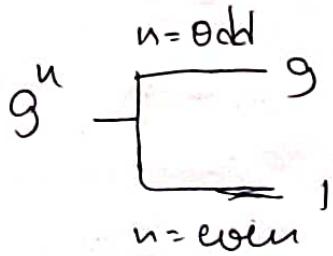
$$0) 9^1 - 9$$

$$+2) 9^2 - 81$$

$$+2) 9^3 - 729$$

$$+2) 9^4 - \underline{\quad} 1$$

$$9^5 - \underline{\quad} 9$$



$$1) (399)^{399} + (864)^{483}$$

$$= (9)^{399} + (4)^{483}$$

$$= 9 + 4$$

$$= 13$$

$$2) (39)^{39} + (36)^{36} + (81)^{81} + (34)^{34}$$

$$= (9)^{39} + (6)^{36} + (1)^{81} + (4)^{34}$$

$$= 9 + 6 + 1 + 6$$

$$= 22$$

$$3) (45)^{45} \times (34)^{31} \times (69)^{32} \times (46)^{46}$$

$$= 5 \times 4 \times 1 \times 6$$

$$= 120$$

$$\begin{cases} 2^1 = 2 \\ 2^2 = 4 \\ 2^3 = 8 \\ 2^4 = 16 \\ 2^5 = 32 \\ 2^6 = 64 \\ 2^7 = 128 \\ 2^8 = 256 \\ \vdots \end{cases}$$

$$\begin{cases} 3^1 = 3 \\ 3^2 = 9 \\ 3^3 = 27 \\ 3^4 = 1 \\ 3^5 = -3 \\ 3^6 = -9 \\ 3^7 = -27 \\ 3^8 = -1 \\ \vdots \end{cases}$$

$$\begin{cases} 8^1 = 8 \\ 8^2 = 64 \\ 8^3 = 512 \\ 8^4 = 4096 \\ 8^5 = -8 \\ 8^6 = -4 \\ 8^7 = -2 \\ 8^8 = -6 \\ \vdots \end{cases}$$

$$\text{cyclicity } (2, 7, 3, 8) = 4$$

Remainder Theorem

$$\textcircled{1} R\left(\frac{5}{2}\right) = 1$$

$$\textcircled{1} R\left(\frac{12}{3}\right) = 0 \Rightarrow R\left(\frac{3}{3}\right) = 0$$

$$\textcircled{1} R\left(\frac{9}{2}\right) = 1$$

$$\textcircled{1} R\left(\frac{122}{3}\right) = 2 \Rightarrow R\left(\frac{5}{3}\right) = 2$$

$$\textcircled{1} R\left(\frac{1867}{2}\right) = 1$$

$$\textcircled{1} R\left(\frac{\bar{3}\bar{9}\bar{6}4}{3}\right)\left(\frac{4}{3}\right) = 1$$

$$\textcircled{1} R\left(\frac{1888}{2}\right) = 0$$

$$\textcircled{1} R\left(\frac{\bar{3}\bar{6}\bar{6}}{3}\right) = \left(\frac{6}{3}\right) = 0$$

$$\textcircled{1} R\left(\frac{3888}{3}\right) = R\left(\frac{27}{3}\right) = 0$$

$$\textcircled{1} R\left(\frac{16}{4}\right) = 0$$

$$\textcircled{1} R\left(\frac{166}{4}\right) \Rightarrow R\left(\frac{66}{4}\right) = 2$$

$$\textcircled{1} R\left(\frac{4832}{4}\right) = R\left(\frac{32}{4}\right) = 0$$

$$\textcircled{1} R\left(\frac{3874}{4}\right) = R\left(\frac{74}{4}\right) = 2$$

$$\textcircled{1} R\left(\frac{356}{5}\right) = 1$$

$$\textcircled{1} R\left(\frac{332}{5}\right) = 2$$

$$\textcircled{1} R\left(\frac{455}{5}\right) = 0$$

$$\textcircled{1} R\left(\frac{399}{5}\right) = 4$$

$$1) (32)^9 \Rightarrow 2$$

$$(2)^9 \rightarrow R\left(\frac{9}{4}\right) \rightarrow 1$$

$$2^1 = 2$$

$$2) (32)^{31} \Rightarrow$$

$$(2)^{31} \Rightarrow \left(\frac{31}{4}\right) = 3$$

$$2^3 = 8$$

$$3) (32)^{91} \Rightarrow 8$$

$$(2)^{91} \Rightarrow \left(\frac{91}{4}\right) = 3$$

$$2^3 = 8$$

$$4) (377)^{75} \rightarrow (7)^{75}$$

$$\left(\frac{75}{4}\right) = 3$$

$$7^3 = 3$$

$$5) (358)^{86} = 4$$

$$R\left(\frac{86}{4}\right) = 2$$

$$8^2 = 6 \boxed{4}$$

$$6) (352)^{355} \Rightarrow 8$$

$$(2)^{355}$$

$$\downarrow$$

$$2^3$$

$$R\left(\frac{355}{4}\right) = 3$$

$$\underline{\underline{=8}}$$

$$7) (377)^{333}$$

$$(7)^{333}$$

$$(7)^{33} \Rightarrow R\left(\frac{33}{4}\right) = 1$$

$$\downarrow$$

$$7^1$$

$$= 7$$

$$\underline{\underline{=}}$$

$$8) (377)^{334}$$

$$(7)^{334}$$

$$\downarrow$$

$$7^2$$

$$= 9$$

$$\underline{\underline{=}}$$

$$9) (377)^{335}$$

$$(7)^{335}$$

$$(7)^{35} \Rightarrow R\left(\frac{35}{4}\right) = 3$$

$$7^3 \rightarrow 3$$

$$\underline{\underline{=}}$$

$$10) (337)^{336}$$

$$(7)^{336}$$

$$\downarrow$$

$$7^4$$

$$\downarrow$$

$$7^1$$

$$\underline{\underline{=}}$$

Number's factors

$$\textcircled{1} \quad 6 \quad (1, 2, 3, 6)$$

Authorization \rightarrow a^3x^3

$$\textcircled{2} \quad 84 \quad \textcircled{1} 144$$

$$\rightarrow a^3x^3 \rightarrow 12^4 \left| \begin{array}{c} 3^2 \\ (3x2)^2 \end{array} \right. \quad \begin{matrix} 1^2 \\ 2^2 \\ 3^2 \\ 4^2 \end{matrix}$$

$$(3+1)(1+1)$$

Num of fact : $(1+1)(1+1)$

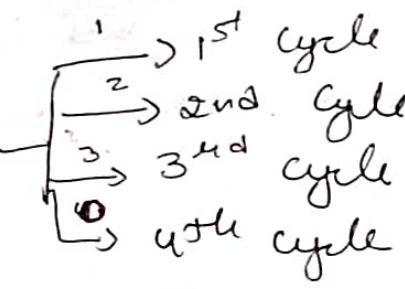
$$4x^2$$

$$= 8 \text{ fact}$$

$$\begin{matrix} 1 \\ 2 \\ 4 \end{matrix}$$

$$\textcircled{3} \quad 400$$

$$\rightarrow ux10^2$$



$$(13x5)(5x2)$$

$$13^1x5^2x2^1$$

$$(1+1)(2+1)$$

$$(2+1)(1+1)$$

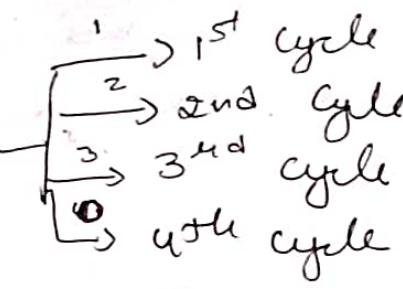
$$2^4x5^2$$

$$= 15 \text{ fact}$$

$$= 15 \text{ fact}$$

$$\textcircled{4} \quad 650$$

$$\rightarrow 65x10$$



$$(13x5)(5x2)$$

$$13^1x5^2x2^1$$

$$(1+1)(2+1)$$

$$(2+1)(1+1)$$

$$2^4x5^2$$

$$= 12 \text{ fact}$$

$$= 12 \text{ fact}$$

Num of DDD :- ~~x^3~~
Fact

$$\begin{matrix} 1 \\ (1+1) \\ = 2 \end{matrix}$$

$$\begin{matrix} 0 \\ - \cancel{x^3} \\ (1+1) \\ = 2 \end{matrix}$$

$$\begin{matrix} 1 \\ -3^2x^2 \\ (1+1) \\ = 3 \end{matrix}$$

$$\begin{matrix} 0 \\ - \cancel{x^2} \\ (1+1) \\ = 2 \end{matrix}$$

$$\begin{matrix} 0 \\ - \cancel{x^2} \\ (2+1) \\ = 3 \end{matrix}$$

$$\begin{matrix} 0 \\ - \cancel{x^2} \\ (3+1) \\ = 4 \end{matrix}$$

Num of Even :- x^3
Fact

$$\begin{matrix} 1 \\ \cancel{(3)} \\ (1+1) \\ = 2 \end{matrix}$$

$$\begin{matrix} 0 \\ \cancel{(a^3x^2)} \\ (3+1)(2+1) \\ = 12 \end{matrix}$$

$$\begin{matrix} 0 \\ \cancel{(a^3x^2)} \\ (3+1)(2+1) \\ = 12 \end{matrix}$$

$$\begin{matrix} 0 \\ \cancel{(a^3x^2)} \\ (3+1)(2+1) \\ = 12 \end{matrix}$$

$$\begin{matrix} 0 \\ \cancel{(a^3x^2)} \\ (3+1)(2+1) \\ = 12 \end{matrix}$$

Note:- Total no. of factors is equal to
no. of odd factors + no. of even factors
(exceptional case)

1) 32

No. of factors

Factorization: 2^5

num of factors :- $(5+1) \Rightarrow 6$

num of odd :- ~~$2^0 \Rightarrow 1$~~ $3^0 \Rightarrow 0+1 = \underline{\underline{1}}$

num of even :- ~~2^4~~ $\Rightarrow 4+1 = \underline{\underline{5}}$

2) 1024

Factorization: 2^{10}

Num of factors :- $(10+1) = \underline{\underline{11}}$

Num of odd : $2^{10} \cdot 1 = 3^0 = (0+1) = \underline{\underline{1}}$

Num of even : ~~2^9~~ $\Rightarrow (9+1) = \underline{\underline{10}}$

LCM & HCF

1) $(6, 24)$

HCF

$\{2, 3, 6\}$ $6 - 6, 12, 18, \boxed{24}, 30, 36, 42, 48, 54, 60, 66.$
 $(1, 2, 3, 4, 6, 8, 12, 24) - 24 - \boxed{64}, 48, 72, 96, 120, \dots$

HCF

$$\begin{array}{r} 2 \\ \boxed{6, 24} \\ \hline 3 \\ \boxed{3, 12} \\ \hline 1, 4 \end{array}$$

$$3 \times 2 = \underline{\underline{6}}$$

LCM

$$\begin{array}{r} 2 \\ \boxed{6, 24} \\ \hline 3 \\ \boxed{3, 12} \\ \hline 2 \\ \boxed{1, 4} \\ \hline 3 \\ \boxed{1, 2} \\ \hline 1, 1 \end{array}$$

$$2^3 \times 3^1 = \underline{\underline{24}}$$

1) (6, 24)

$$\Rightarrow 6 \rightarrow 2^1 \times 3^1$$

$$\Rightarrow 24 \rightarrow 2^3 \times 3^1$$

* HCF (n) // Lowest Power

$$2^1 \times 3^1 \Rightarrow \underline{\underline{6}}$$

2) LCM (n) / Highest Power

$$2^3 \times 3^1 \Rightarrow \underline{\underline{12}}$$

3) (48, 64)

$$48 \rightarrow 2^4 \times 3^1$$

$$64 \rightarrow 2^6 \times \cancel{3}^2$$

* HCF (n) / Lowest Power

$$2^4 \Rightarrow \underline{\underline{16}}$$

* LCM (n)

$$2^6 \times 3^1 \Rightarrow 64 \times 3 = \underline{\underline{192}}$$

4) (122, 400)

$$122 \rightarrow 2^1 \times 61^1$$

$$400 \rightarrow 4 \times 100$$

$$\begin{aligned} & 2^2 \times (5 \times 2)^2 \\ & = 2^4 \times 5^2 \end{aligned}$$

* HCF (n) / Lowest Power

$$2^1 \rightarrow \underline{\underline{2}}$$

* LCM (n) / Highest Power

$$2^2 \times (5 \times 2^2) \Rightarrow \underline{\underline{2400}}$$

3) (100, 150)

$$100 \rightarrow 2^2 \times 5^2$$

$$150 \rightarrow 15 \times 10$$

$$3 \times 5^2 \times 2^1$$

HCF (n) / Lowest

$$\cancel{2} \cancel{2} \Rightarrow 5^2 \times 2^1 \Rightarrow \underline{\underline{150}}$$

LCM (v) / Highest

$$2^2 \times 3^1 \times 5^2 \Rightarrow \underline{\underline{300}}$$

4) (480, 880)

$$480 \rightarrow 6 \times 8 \times 10 \rightarrow 2^4 \times 3 \times 2^3 \times 5 \rightarrow 2^5 \times 3^1 \times 5^1$$

$$880 \rightarrow 11 \times 8 \times 10 \rightarrow 11^1 \times 2^4 \times 5^1$$

HCF (n) / Lowest Power

$$2^4 \times 5^1 \rightarrow \cancel{16} \underline{\underline{80}}$$

LCM (v) / Highest Power

$$2^5 \times 3^1 \times 5^1 \times 11^1 \Rightarrow 160 \times 3^3 \Rightarrow \underline{\underline{1280}}$$

Exceptional Case

13 | 1 | 23

1) (12, 30)

$$12 \rightarrow 2^2 \times 3^1$$

$$30 \rightarrow 3 \times 2 \times 5^1$$

$$\begin{array}{l} \text{HCF (n)} \rightarrow 2^1 \times 3^1 = \underline{\underline{6}} \\ \boxed{\text{LP}} \end{array}$$

$$\begin{array}{l} \text{LCM (v)} \rightarrow 2^2 \times 3^1 \times 5^1 = \underline{\underline{60}} \\ \boxed{\text{HP}} \end{array}$$

$$i) (48, 49)$$

Set of consecutive no
is Co-Prime no

$$\text{HCF} \rightarrow \underline{\underline{1}}$$

$$48 \rightarrow 2^2 \times 12$$

$$2^4 \times 3^1$$

$$49 \rightarrow 7^2$$

$$\underline{\underline{\text{LCM}(v) HP}}$$

$$2^4 \times 3^1 \times 7^2$$

$$\underline{\underline{2^2 3^2 5^2}}$$

$$ii) (13, 17)$$

$$\underline{\underline{\text{LCM}(v) (HP)}}$$

$$13^1 \times 17^1$$

$$\underline{\underline{= 221}}$$

$$\underline{\underline{\text{HCF}(n) :- } \underline{\underline{1}}}$$

Co-Prime numbers

* LCM : $N_1 \times N_2$

* HCF :

Non - Co-prime number to find a Number

(When only HCF & LCM given)

$$\boxed{\text{LCM} \times \text{HCF} = N_1 \times N_2}$$

$$iii) (19, 36) \rightarrow \text{it is Co-Prime no}$$

$$\text{HCF} \rightarrow 1$$

$$19 \rightarrow 19^1$$

$$36 \rightarrow 6^2$$

$$2^2 \times 3^2$$

$$\underline{\underline{\text{LCM}(v) HP}}$$

$$2^2 \times 3^2 \times 19^1$$

$$= \underline{\underline{684}}$$

$$\underline{\underline{\text{HCF}(n) \rightarrow } \underline{\underline{1}}}$$

Arithmetische Progression

$$1) 5, 10, 15, 20, 25, \dots, \text{20th term}$$

$$2) 4, 8, 12, 16, 20, \dots$$

$$a, a+d, a+2d, a+3d, \dots - a+(n-1)d$$

$a \rightarrow 1^{\text{st}}$ term
 $n \rightarrow \text{no. of terms}$

$$d \rightarrow \text{Common Difference}$$

$$a_n = a + (n-1)d$$

$$\text{Summ} = \frac{n}{2} [2a + (n-1)d]$$

$$\begin{aligned} (\text{or}) \\ &= \frac{n}{2} [a + a + (n-1)d] \\ &= \frac{n}{2} (2a + (n-1)d) \end{aligned}$$

$$\begin{aligned} \text{Summ}_{20} &= \frac{20}{2} (2 \cdot 5 + (20-1)5) \\ &= 10[10 + 19(5)] \\ &= \underline{\underline{1050}} \end{aligned}$$

G.P

$$1) 2, 4, \underbrace{8, 16, 32}_{\times 2}, \dots, 10^{\text{th}} \text{ term}$$

$$\begin{aligned} a, a \cdot r, a \cdot r^2, a \cdot r^3, a \cdot r^4, \dots, a \cdot r^{(n-1)} \\ a \rightarrow 1^{\text{st}} \text{ term} \\ n \rightarrow \text{no. of terms} \\ \Rightarrow r \rightarrow \text{common difference} \end{aligned}$$

$$a_n = a \cdot r^{(n-1)}$$

$$\text{Summ} = \frac{a(r^n - 1)}{(r-1)}$$

$$a = 2 \quad r = 2 \quad n = 10$$

$$\begin{aligned} a_{10} &= 2 \cdot 2^{(10-1)} = 2 \cdot 2^{(9)} = \underline{\underline{512}} \\ \text{Summ}_{10} &= \frac{2(2^{10} - 1)}{1} = \underline{\underline{2046}} \end{aligned}$$

2) the difference b/w the squares of 2 consecutive odd integers is always divisible by:

$$A^2 - B^2$$

$$1^2 - 3^2 = -8$$

$$-5^2 - (-3)^2 = \underline{16} \quad 3^2 - 5^2 = -16$$

$$-3^2 - (-1)^2 = \underline{8} \quad \textcircled{D} 18$$

3) If P & Q are the 2 digits of the no, $653PQ$, such that \overline{PQ} is divisible by 80, then $P+Q$ is equal to

$$653 \overline{PQ}$$



$$\overline{653PQ}$$

$$\overline{8P}$$

$$\begin{array}{c} 80 \\ \diagdown \\ 8 \times 10 \end{array}$$

$$\begin{array}{l} 53P \\ 536 \checkmark \end{array}$$

$$533X$$

$$535X$$

$$537X$$

$$\text{a) } 3 \quad \text{b) } 5$$

$$\text{c) } 2 \quad \text{d) } 6$$

4) A 3-digit no, $4P3$ is added to another 3-digit no, 984 to give the four-digit no, 1397 , which is divisible by 11. Then $(P+q)$ is

$$\begin{array}{r} 4P3 \\ 984 \\ \hline 1397 \end{array}$$

$$\cancel{P+8=9}$$

$$P+8=q$$

$$\begin{array}{r} 4 \\ 1 \\ 3 \\ \hline 1 \\ 3 \\ 9 \\ 1 \\ \hline 11 \end{array}$$

$$10 - (q_1 + 1) = 0/4 \quad \text{a) } \cancel{10}$$

$$10 - q_1 - 1 = 0/11$$

$$P+8=q \quad 9$$

$$\textcircled{B} \quad q - q_1 = 0/11$$

$$\boxed{P=1}$$

$$\boxed{P+q=10}$$

$$\boxed{q=9}$$

5) What should be the max value of θ in the following equation?

$$\underline{SP9} - \underline{7Q2} + \underline{9R6} = \underline{823}$$

$$\begin{array}{r}
 \underline{SP9} & \underline{500+10P+9} \\
 - \underline{7Q2} & -(700+10Q+2) \\
 + \underline{9R6} & +(900+10R+6) \\
 \hline
 \underline{823} & \underline{800+20+3}
 \end{array}$$

$$700 + (10P - 10Q + 10R) + \underline{13} = 800 + 20 + 3$$

~~$$10P - 10Q + 10R = 100 + 7 + 3$$~~

~~$$10(P - Q + R) = \cancel{100} \cancel{11} \cancel{0}$$~~

~~$$P - Q + R = 11$$~~

~~$$\boxed{Q = P + R - 11}$$~~

$$9 + 9 - 11 \Rightarrow 7$$

$$8 + 8 - 11 \Rightarrow 5$$

$$9 + 8 - 11 \Rightarrow 6$$

B) 6

6) Find the sum to 200 terms of the series

$$1 + 4 + \underline{6} + \underline{5} + \underline{11} + \underline{6} + \underline{8} + \dots + \underline{9}$$

$$\text{Sum } n = \frac{n}{2} [2a + (n-1)d]$$

$$\begin{aligned}
 d &= 3 \\
 a &= 1 \\
 n &= 200
 \end{aligned}$$

$$\begin{aligned}
 d &= 5 \\
 n &= 100 \\
 a &= 1 \\
 \text{Sum}_{100} &= \frac{100}{2} \left[2(1) + (99)5 \right] \\
 &= 50(2 + 495) \\
 &= 50(500) \\
 &= 25000
 \end{aligned}$$

$$\begin{aligned}
 d &= 3 \\
 n &= 200 \\
 a &= 8 \\
 \text{Sum}_{200} &= \frac{200}{2} (8 + 197) \\
 &= 100(205) \\
 &= 20500
 \end{aligned}$$

$$\begin{array}{r}
 54850 \\
 5350 \\
 \hline
 30200
 \end{array}$$

A) $\underline{\underline{30200}}$

?) $-1 \leq a \leq 2$ $1 \leq b \leq 3$

$$(2a - 3b) \Rightarrow (2a + 3(-b))$$

$$a = -1 \quad b = 3$$

$$(2(-1) + 3(-3))$$

$$-2 - 9 = \underline{\underline{-11}}$$

~~280~~
8

$$\begin{array}{r}
 987 \\
 \times \\
 \hline
 55\textcircled{9}81
 \end{array}$$

$$987 : 3'x7'x47'$$

$$3x329$$

$$7x47$$

a) ~~555-181 (16) 7 x~~

~~555-681 (21) (3)~~

~~555-213~~

~~555-621~~

$$\parallel (729)^{5^9}$$

$$(9)^{5^9}$$

$$\underline{\underline{9}}$$

$$10) 653 \overline{ab}$$



$$653 \overline{a} \overline{0}$$

$$\begin{array}{r} 90 \\ \times 10 \\ \hline 900 \end{array}$$

$$14a = \frac{1}{9}$$

$$14 + a = \frac{1}{9}$$

$$a+b \Rightarrow a+0$$

$$5 + a = \frac{1}{9}$$

$$\boxed{a=4}$$

$$\boxed{b=0}$$

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

$$\begin{array}{r} 4=2 \quad b=2 \\ - \quad - \\ \hline n=0 \end{array}$$

$$9) \frac{1}{4} \times \frac{1}{7} \times x = 30,000$$

$$\frac{8}{35} \times x$$

$$\Rightarrow \frac{1}{28} \times x = 30,000$$

$$\frac{24000}{12000}$$

$$\boxed{x = 8,40,000}$$

$$\frac{8}{35} \times \underline{\cancel{8,40,000}} = \underline{\underline{192000}}$$

12) $(y^n - b^n)$ is completely divisible by $(y-b)$, where

$$n=0; (y^0 - b^0) = 0 \quad \text{X}$$

$$n=1; (y-b)$$

$$n=2; (y^2 - b^2) = (y-b)(y+b)$$

$$n=3; (y^3 - b^3) = (y-b)(y^2 + yb + b^2)$$

b) any natural no,

$$13) 6^7 \times 35^3 \times 11^{10} ?$$

$$(2 \times 3)^7 \times (5 \times 7)^3 \times 11^{10}$$

$$2^7 \times 3^7 \times 5^3 \times 7^3 \times 11^{10} = \underline{\underline{30}}$$

14) The difference b/w two no's is 2395 when the larger no is divided by the smaller one, the quotient is 6 and the remainder is 15 - the smaller no is :

$$X - Y = 2395 \rightarrow ①$$

$$\frac{X}{Y}; Q=6 \quad R=15$$

$$X = Y \times 6 + 15$$

$$X - 6Y = 15 \rightarrow ②$$

~~$$X - Y = 2395$$~~

~~$$\begin{array}{r} X - 6Y \\ \hline (+) \quad (-) \end{array} = 15$$~~

$$5Y = 2380$$

$$Y = \frac{2380}{5} = \underline{\underline{476}}$$

$$\begin{array}{r} 15 \\ \hline 7) \quad \quad \quad 15 \\ \underline{14} \\ \hline 1 \end{array}$$

Q R

$$D \times Q + R = N$$

$$15) 2, 4, 8, 16, \dots 1024$$

$$a=2 \quad n=? \quad m=? \quad / \quad a^n = 1024$$

$$a_n = a \cdot r^{n-1}$$

$$1024 = 2 \cdot 2^{(n-1)}$$

$$1024 = 2^{(n-1+1)}$$

$$2^{10} = 2^n$$

$$\underline{\underline{n=10}}$$

$$17) \quad 71872873874875 - 879$$

20

0

$$18) \quad \begin{array}{r} 11158 \\ a \\ \hline \end{array} \quad \begin{array}{r} \div 77 \\ \diagdown \\ 7 \quad 11 \end{array}$$

~~8a~~

$$(8+a)+2 - 6 = 0/11$$

$$10a + a - 6 = 0/11$$

$$4 + a = 11$$

$$a = 11 - 4$$

$$\boxed{a = 7}$$

$$19) \quad \begin{array}{r} 9321 \\ \downarrow \end{array}$$

$$\begin{array}{r} 3 \times 3107 \\ \downarrow \end{array}$$

$$3 \times 13 \times 239$$

$$(1+1)(1+1)(1+1)$$

$$= \underline{\underline{8}} 8$$

$$20) \quad \underline{\underline{6534}}$$

$$\begin{array}{r} 65776^{759} + 54697^{467} \\ (6)^{759} + (7)^{467} \end{array} \quad R\left(\frac{67}{4}\right) = 3$$

$$\begin{array}{r} 6 + 7^3 \\ = 6 + 3 = \underline{\underline{9}} \end{array}$$

17/11/23

Time, Speed & Distance

$$\text{Speed} = \frac{\text{Distance}}{\text{time}}$$

D

km

t

hr

S

km/hr

m

$$1\text{km} = 1000\text{m}$$

sec

$$1\text{hr} = 60 \times 60 \\ \underline{3600\text{ sec}}$$

m/sec

$$1\text{km/hr} = \frac{1\text{km}}{1\text{hr}} = \frac{1000\text{m}}{3600\text{ sec}} = \frac{5}{18}\text{ m/sec}$$

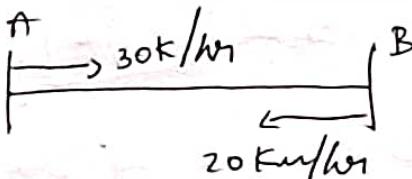
$$1\text{km/hr} = \frac{5}{18}\text{ m/sec.}$$

$$\text{km/hr} \xrightarrow{x \frac{5}{18}} \text{m/s}$$

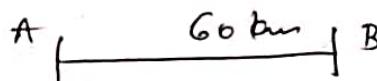
$$x \frac{18}{5}$$

Speed Average Speed
Relative Speed

$$1) \boxed{\text{Avg Speed} = \frac{\text{Total Distance}}{\text{Total time}}}$$

Ex :-

$$\text{LCM}(30, 20) = 60\text{ km}$$



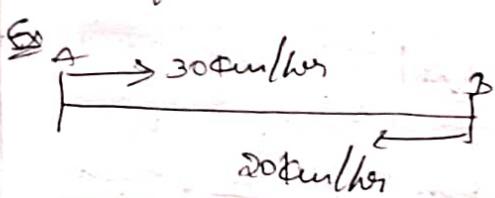
$$\text{t}_{A \rightarrow B} = \frac{D}{S} = \frac{60}{30} = 2\text{ hr} \quad \text{t}_{B \rightarrow A} = \frac{D}{S} = \frac{60}{20} = 3\text{ hr}$$

$$\text{AVG speed} = \frac{120}{5} = \underline{\underline{24\text{ km/hr}}}$$

$$3) \boxed{\text{Avg Speed} = \frac{2AB}{A+B}}$$

when to use

- * A & B have different speed
- * Speed on same object
- * Equal distance



$$A = 30$$

$$B = 20$$

$$\text{Avg Speed} = \frac{2 \times 30 \times 20}{30 + 20} = \frac{2 \times 30 \times 20}{50} = 24 \text{ km/h}$$

~~Max~~

Distance = Constant

$$\frac{s}{t}$$

↑ ↓

$$S \propto \frac{1}{t}$$

Speed is inversely
proportional to
time

Speed = Constant

$$\frac{d}{t}$$

↑ ↓

$$D \propto t$$

Distance is directly
proportional to time

Time = Constant

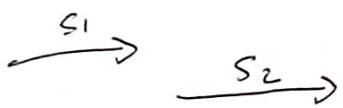
$$\frac{s}{d}$$

↑ ↓

$$S \propto D$$

Relative Speed

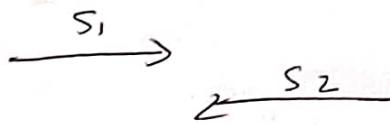
a) Same Direction



$$s_1 > s_2$$

$$R_s = s_1 - s_2$$

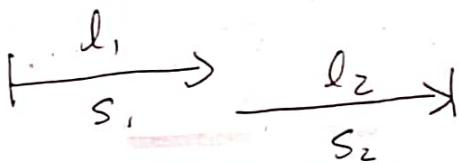
b) Opposite Direction



$$R_s = s_1 + s_2$$

$R_s \rightarrow$ Relevant Speed

Case 1: 2 Train's Same Direction

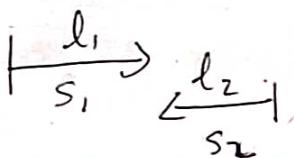


$$t = \frac{D}{s} = \frac{l_1 + l_2}{s_1 - s_2}$$

$$R_s = s_1 - s_2$$

$$D = l_1 + l_2$$

Case 2: 2 Train's Opposite Direction

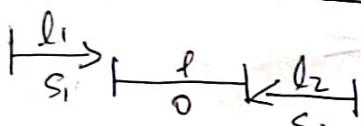


$$t = \frac{D}{s} = \frac{l_1 + l_2}{s_1 + s_2}$$

$$R_s = s_1 + s_2$$

$$D = l_1 + l_2$$

Case 3: 2 Train's & Platform (Cross each other)



$$t = \frac{D}{s} = \frac{l_1 + l + l_2}{s_1 + s_2}$$

$$R_s = s_1 + s_2$$

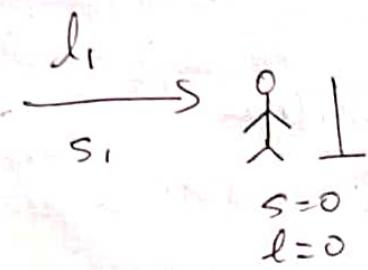
$$D = l_1 + l + l_2$$

Case 4 :- Train & platform (Meet each other)



$$t = \frac{D}{s} = \frac{l}{s_1 + s_2} \quad D_s = s_1 + s_2 \\ \underline{\underline{D = l}}$$

Case 5 : Train & Man / Pole



$$t = \frac{D}{R_s} = \frac{l_1}{s_1} \quad D = l_1 \\ \underline{\underline{R_s = s_1}}$$

Case 6 : 2 Train & Man

$$\frac{l_1}{s_1} \rightarrow \frac{l_2}{s_2} \rightarrow \frac{l}{s} \quad R_s = s_1 - s_2 \\ t = \frac{D}{s} = \frac{l}{s_1 - s_2} \quad D = l \\ \underline{\underline{R_s = s_1 - s_2}}$$

D = 600 m \rightarrow 5 m

$\frac{600 \text{ m}}{300 \text{ s}} \times \frac{18 \text{ km}}{5 \text{ s}} = 7.2 \text{ km/h}$

$\frac{60 \times 5}{300}$

$$3) S = 240 \text{ km/hr}$$

$$t = s^{-1} \text{ hr}$$

$$D = S \times t$$

$$= 1200 \text{ km}$$

$$t = \frac{5}{3} \text{ hrs}$$

$$S = \frac{\frac{940}{8/3}}{1200} = 720 \text{ km/hr}$$

19/1/23

3) A cyclist cover a distance of 800 meter in 4 min 20 sec. what is the speed in km/hr of the cyclist?

$$d \rightarrow 800 \text{ meter}$$

$$t = 4 \text{ min } 20 \text{ sec}$$

$$\text{Speed} = \frac{800}{\cancel{60} \cancel{60} \cancel{40}}$$

$$\frac{60 \times 4}{940} \\ 260$$

$$\text{Speed} = \frac{800}{260} \times \frac{18}{5} \text{ km/hr} = 11.08 \text{ km/hr}$$

4) A man walking at the rate of 6 km/hr crosses a bridge in 15 min. the length of the bridge is

$$S \rightarrow 6 \text{ km/hr} \times \frac{15}{18} = \frac{5}{3} \text{ m/s}$$

$$t \rightarrow 15 \text{ min}$$

$$D = \frac{15 \times 60}{3} = 900$$

$$D = S \times t = \frac{5}{3} \times \frac{300}{60} = 1500 \text{ m}$$

6) If a person walk at 14 km/hr instead of 10 km/hr he would have walked 20 km more. The actual distance travelled by him is

$$\begin{array}{ll}
 S: 10 \text{ km/hr} & 14 \text{ km/hr} \\
 'O' & 'I' \\
 t: 't' & 't' \\
 t = \text{const} & + 20 \text{ km}
 \end{array}$$

$$D \Rightarrow 10t - 14t \quad \text{original time}$$

$$14t - 10t = 20 \quad 10 \times 5$$

$$\begin{aligned}
 4t &= 20 \\
 t &= \frac{20}{4} \text{ s} \\
 t &= 5 \text{ s}
 \end{aligned}$$

8) $D = 600 \text{ km}$ Time increase by 30 min

Speed will reduced by 200 km/hr

$$\Rightarrow 200 \text{ km/hr}$$

200 km	$- 1 \text{ hr}$	$\because 30 \text{ min}$
200 km	$- 1 \text{ hr}$	$\because 30 \text{ min}$
200 km	$-$	$\because 30 \text{ min}$

(Q)

$1:30 \text{ hr}$
1.5 hr

$$D = 600 \text{ km}$$

$$\begin{array}{c}
 \frac{S}{x} \quad \frac{t}{600} \\
 x - 200 \quad x \\
 \frac{600}{x - 200}
 \end{array}$$

$$\frac{600}{x-200} = \frac{600}{x} + \frac{30}{60}$$

$$\frac{600}{x-200} - \frac{600}{x} = \frac{1}{2}$$

$$600 \left(\frac{1}{x-200} - \frac{1}{x} \right) = \frac{1}{2}$$

$$600 \left(\frac{x-x+200}{x^2-200x} \right) = \frac{1}{2}$$

$$\frac{120000}{x^2-200x} = \frac{1}{2}$$

$$240000 = x^2 - 200x$$

$$x^2 - 200x - 240000 = 0$$

$$x^2 - 600x + 400x - 240000 = 0$$

$$x(x-600) + 400(x-600) = 0$$

$$(x-600)(x+400) = 0$$

$$\boxed{x=600}$$

$$\begin{array}{r} 240000 \\ - 600x + 400x \\ \hline \end{array}$$

$$\frac{600}{x-200} = \frac{600}{600-200} = \frac{600}{400} = 1.5 \text{ km}$$

10) $\frac{s_1}{s_1 + s_2} = \frac{950\text{m}}{250\text{m}} = 3.8$

$s_1 = 80\text{kmph}$ $s_2 = 70\text{kmph}$

$D = 500\text{m}$

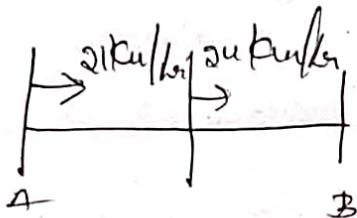
$$\textcircled{1} = 500\text{m}$$

$$R_s = s_1 + s_2 = 80\text{kmph} + 70$$

$$= 150\text{kmph} \times \frac{5}{18}$$

$$t = \frac{D}{R_s} = \frac{\frac{100^2}{500}}{\frac{100 \times 5}{3 \times 18.6}} = 12 \text{ sec}$$

ii) $t = 10 \text{ hr}$



$$\text{AVG}_s = \frac{2AB}{A+B} = \frac{2 \times 21 \times 24}{45}$$

$$\begin{aligned} D &= SX + \\ &= \frac{2 \times 21 \times 24}{45} \times 10^2 = 2.24 \text{ km} \end{aligned}$$

$$10) S_1 : S_2 = 7 : 8$$

$$D = 400 \text{ km}$$

$$t = 4 \text{ hr}$$

$$S_2 = \frac{D}{t} = \frac{400}{4}$$

$$S_2 = 100 \text{ km/hr}$$

$$S_1 : S_2 = 7 : 8$$

$$\frac{S_1}{S_2} = \frac{7}{8} \quad \frac{S_1}{100} = \frac{7}{8}$$

$$S_1 = \frac{7}{8} \times \frac{100}{100} = 87.5 \text{ km/hr}$$

BOAT'S & STREAM

$s_b \rightarrow$ Speed of Boat in
still water

$s_w \rightarrow$ Speed of River

$D_s \rightarrow$ Down Speed

$U_s \rightarrow$ Up speed

Current / stream

River \rightarrow same

$$D_s = s_b + s_w$$

$$U_s = s_b - s_w$$

$$\textcircled{1} D_s \quad \textcircled{2} U_s$$

$$D_s + U_s = s_b + s_w + s_b - s_w \\ = 2s_b$$

$$s_b = \frac{D_s + U_s}{2}$$

$$D_s - U_s = s_b + s_w - s_b + s_w \\ = 2s_w$$

$$s_w = \frac{D_s - U_s}{2}$$

Q6) A motor boat, whose speed in still water is 15 km/hr. goes 30 km downstream & comes back in a total of 4 hours.

$$D_s = 15 \text{ km/hr}$$

$$s_w = ? \text{ km/hr}$$

$$U_s = ?$$

$$s_w = \frac{D_s - U_s}{2} = 9.5 = \frac{15 - U_s}{2}$$

$$\frac{s}{U_s} = \frac{15 - U_s}{10} = 10 \text{ km/hr}$$

$$28) D_s = 11 \text{ km/hr}$$

$$U_s S_w = 5 \text{ km/hr}$$

$$S_b = \frac{D_s + U_s}{2} = \frac{11 + 5}{2} = \frac{16}{2} = 8 \text{ kmph}$$

$$27) D_s = 30 \text{ km} \xrightarrow{\text{down}} \text{Distance} = 30 \text{ km} = 0$$

$$S_b = 15 \text{ km/hr}$$

$$t_f = 4.30 \text{ min / 4.s^-}$$

$$t_D + t_U = 4.s^-$$

$$D_s = S_b + S_w \\ = 15 + S_w$$

$$U_s = S_b - S_w \\ = 15 - S_w$$

$$t_D = \frac{D}{D_s} = \frac{30}{15 + S_w}$$

$$t_U = \frac{D}{U_s} = \frac{30}{15 - S_w}$$

$$t_D + t_U = 4.s^-$$

$$\left[\frac{30}{15 + S_w} + \frac{30}{15 - S_w} \right] = 4.s^-$$

$$30 \left[\frac{1}{15 + S_w} + \frac{30}{15 - S_w} \right] = 4.s^-$$

$$\left[\frac{15 - S_w + 15 + S_w}{225 - S_w^2} \right] = \frac{0.3}{2}$$

$$\frac{30}{225 - S_w^2} = 0.15$$

$$225 - S_w^2 = 200$$

$$sw^2 = 2s'$$

$$\boxed{sw = s'}$$