CAT 2025

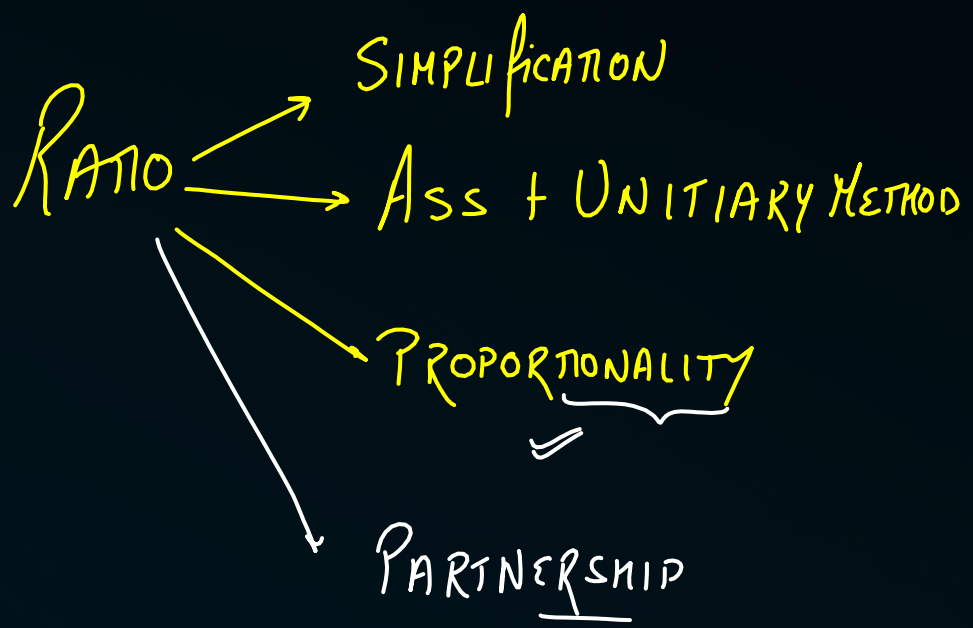
MBA ELITE WEEKEND

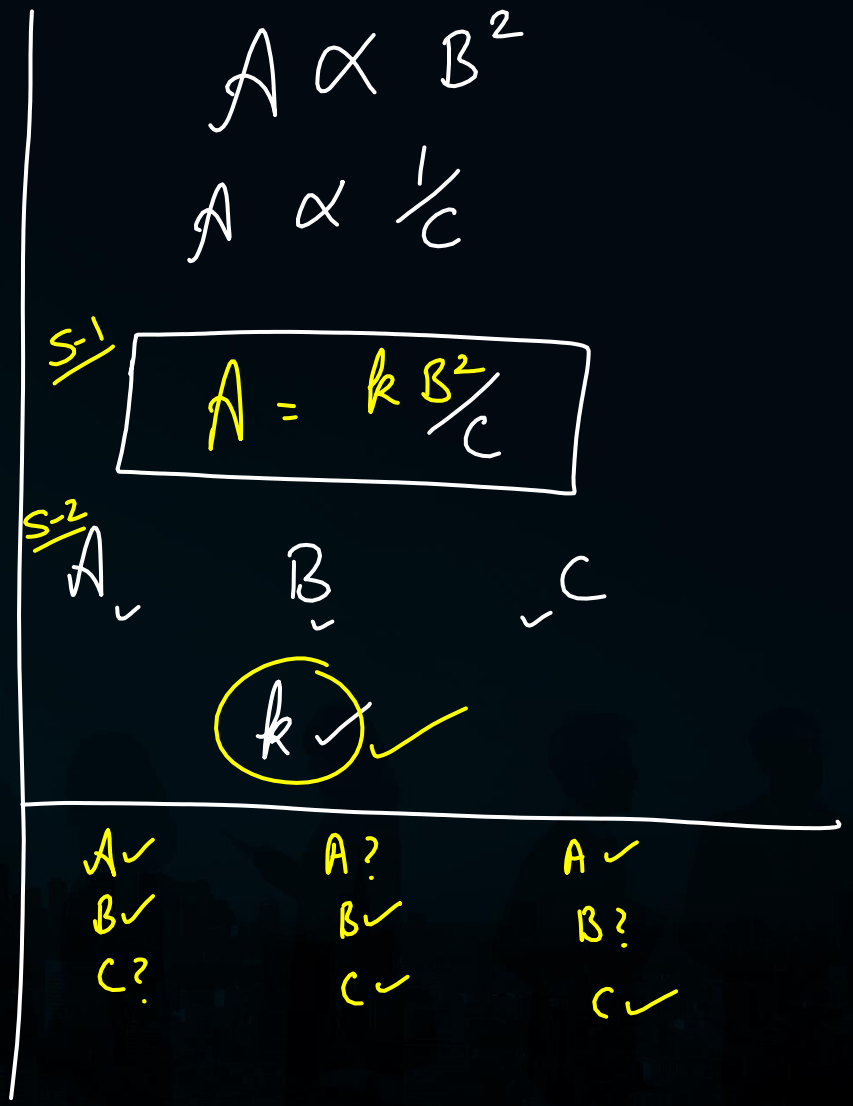
Lecture -3 | **Arithmetic**

Partnership + Work Rate and Time

By- RAHUL BATHLA

Recap of the Previous Lecture





TOPICS *to be covered*

1. Proportionality
2. Partnerships
3. Work Rate and Time
4. Work Rate and Time - Rate Equation
5. Multiple A and B

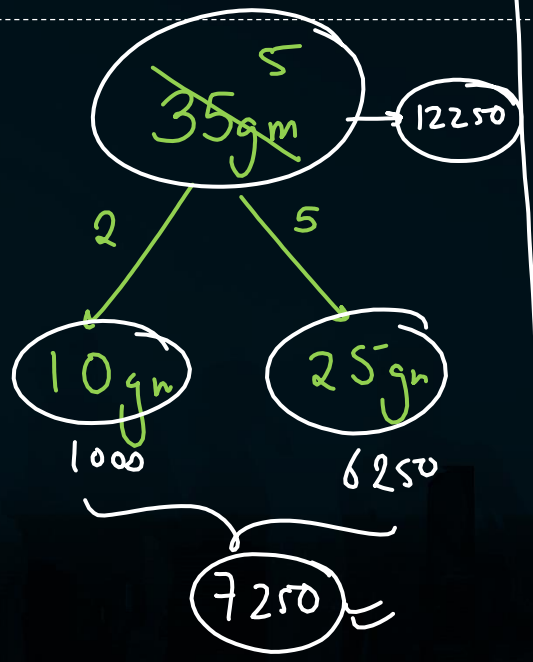
Topic: Proportionality

QUESTION- 1

#Q. A precious stone weighing 35 grams worth Rs. 12250 is accidently dropped and gets broken into two pieces having weights in the ratio of 2 : 5. If the price varies as the square of the weight then find the loss incurred.`

loss = OLD − PRES
= 12250 − 7250 = 5000 ✓

(A) 5750 (B) 6000 (C) 5500 ✓ (D) 5000



wt → Cost

35gm → 12250 (OLD COST)

$C = kw^2$

$12250 = k(35)^2$

$12250 = k(1225)$

$10 = k$ ✓

10gm

$C = kw^2$

$= 10(10)^2$

$= 1000$

25gm

$C = kw^2$

$= 10(25)^2$

$= 6250$

7250 PRESENT Cost

QUESTION- 2

#Q. The cost of Coal block varies directly with the square of its weight. The Coal block is divided into three parts whose weights are in the ratio of 5 : 6 : 7. If the loss of Rs. 4280 has occurred. Then what is the actual cost of Coal Block?

(A) 81200 (B) 6480 (C) 8120 (D) 648200

$C = kw^2$

Wt = 5+6+7 = 18kg

$C = k(18)^2$

$C = 324k$

OC = 324k

= 324(20)

= 6480

5kg

$C = 25k$

6kg

$C = 36k$

T.N.C = 110k

7kg

$C = 49k$

loss = 324k − 110k

= 214k

214k = 4280

k = 20

Topic: Partnerships

Partnership Foundational Concept

$P_A : P_B = I_A : I_B \longrightarrow$ CASE 1 [Time for inv. is same]

$P_A : P_B = I_A T_A : I_B T_B \longrightarrow$ CASE 2 [Time is Diff]

$T_A = 2Y_R / T_B = 3Y_R$

$I_A : I_B$

$\frac{7}{3} = \frac{I_A\ 2}{I_B\ 3}$

$\frac{7}{2} = \frac{I_A}{I_B}$

$A_i = 2000$
$B_i = 4000$ } 1YR

	A	B
	I T	I T
	~~2000~~ X1	~~4000~~ X1

P ⟶ 1 : 2

$A_i \longrightarrow 2000 \times 3Y_R$

$B_i \longrightarrow 4000 \times 1Y_R$

A	B
~~2000~~ X3	~~4000~~ X1

P ⟶ 3 : 2

1000

A = 700 B = 300

$\frac{P_A}{P_B} = \frac{7}{3} = \frac{I_A T_A}{I_B T_B}$

QUESTION- 3

#Q. A and B invest Rs. 7000 and Rs. 2000 respectively in a business. What should be the share of B in a profit of Rs. 900, at the end of a year?

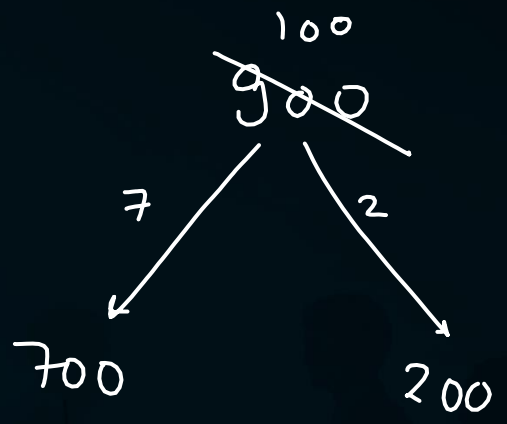
(A) 200 ✓

(B) 140

(C) 120

(D) 300

$P = 7 : 2$

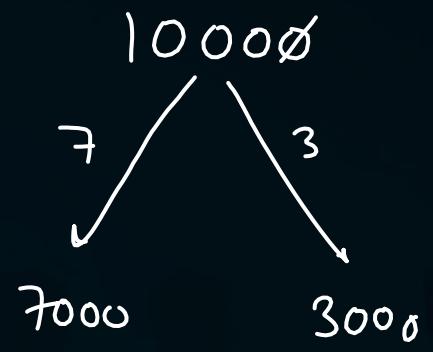


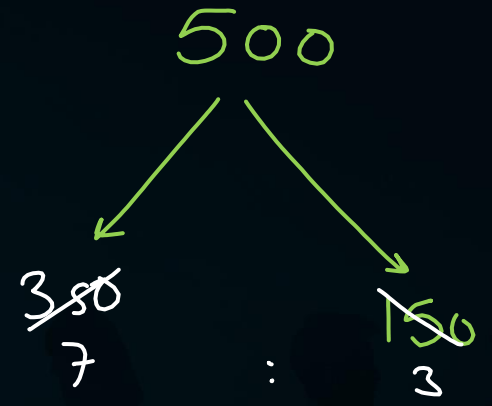
QUESTION- 4

#Q. A and B together invested Rs. 10000 in a business. At the end of the year, out of a profit of Rs. 500, B's share was Rs. 150. What was A's investment?

(A) 7000 (B) 5500 (C) 5200 (D) none

$$\frac{7}{3} = \frac{I_A \cancel{T_A}}{I_B \cancel{T_B}}$$





QUESTION- 5

#Q. In a partnership business, A invests Rs. 20000 for two years, B invests Rs. 40000 for $1\frac{1}{2}$ years, C invests Rs. 30000 for one year and D invests Rs. 35000 for two years. What would be the share of C in the total profit of Rs. 25000 ?

(A) 9000 (B) 7800 (C) 3750 (D) 8000

A B C D

20000×2 $40000 \times \frac{3}{2}$ 30000×1 35000×2

4 : 6 : 3 : 7

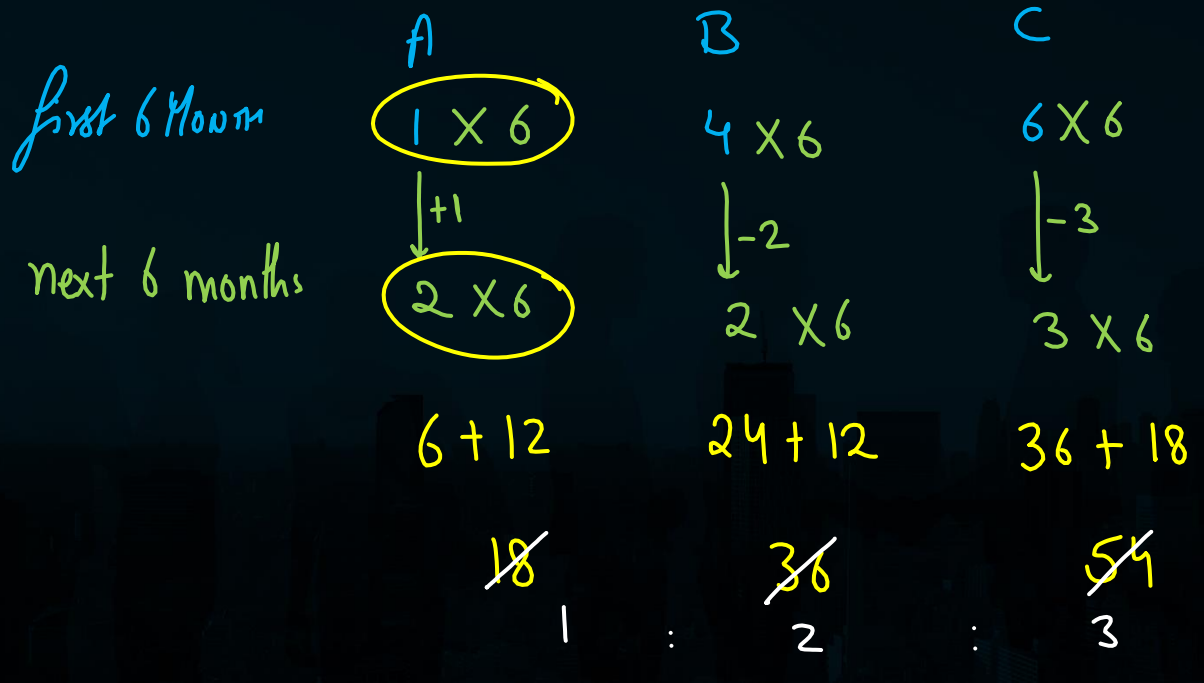
$\frac{3}{20} \times 25000 = 3750$

$= \frac{7500}{2}$

QUESTION – 6

#Q. A, B, C, started a business with their investment in the ratio 1 : 4 : 6. After 6 months, A added the investment of the same amount more as before and B as well as C, withdrew half of their investments. The ratio of their profits at the end of the year is:

(A) 1 : 2 : 3 (B) 3 : 4 : 15 (C) 3 : 5 : 10 (D) 3 : 6 : 8



QUESTION- 7

#Q. In a partnership business, A invests Rs. 20000 for two years, B invests Rs. 40000 for $1\frac{1}{2}$ years, C invests Rs. 30000 for one year and D invests Rs. 35000 for two years. Out of the total profit made, C gets a share of 20% as a 'working partner' before the profit is further distributed amongst all of them. What would be the share of C in the total profit of Rs. 25000 ?

(A) 9000 (B) 7800 (C) 3750 (D) 8000

Ratio

A	B	C	D
4	6	3	7

$\frac{3}{20}(20000) = 3000$

$C_{WP} = \frac{1}{5}(25000)$

$= 5000$

$C_{PR} = 3000$

$C \rightarrow 5000 + 3000$

$= 8000$

Topic: Work Rate and Time

SATURDAY EVE

[Ratio + % Basics + Re
Youtube]

Work – Rate - Time

$\text{Work} \propto \text{Rate}$

$\text{Work} \propto \text{Time}$

$$\boxed{\text{Work} = \text{Rate} \times \text{Time}}$$

$W_A = R_A T_A$

$W_B = R_B T_B$

$$\boxed{W_T = W_A + W_B = R_A T_A + R_B T_B}$$

If $T_A = T_B$

$W_T = R_A T + R_B T$

$W_T = \underbrace{(R_A + R_B)}_{R_{eff}} T$

Rate		Time		Work
2 pages/min	×	5 min	=	10 pages
1 page/min	×	5 min	=	5 pages
R_{eff} = 3 pages/min				= 15 pages

QUESTION – 8

#Q : A, B, C and D can do a piece of work in 6, 12, 20 and 30 days respectively. Working together, they complete the work in how many days ?

A) 3 Days ✓

B) 2 Days

C) 4 Days

D) 5 Days

	TIME	WORK	RATE
A →	6 DAYS	60	10
B →	12 DAYS	60	5
C →	20 DAYS	60	3
D →	30 DAYS	60	2
A+B+C+D →	3	60	20

WORK → ASS.

Only fixed TIME is Given for ind. or GROUP

A takes 3 MORE DAYS

A → 2 WORK/Day

×

QUESTION – 9

#Q: A' and 'B' can together complete a piece of work in 12 days while 'A', 'B' and 'C' together can do it in 8 days. How many days would 'C' take to complete the same work alone ?

(A) 26 (B) 24 (C) 34 (D) 36

	A + B (2)	A + B + C (2, 1)	C (1)
Work	24	24	24
Rate	2	3	1
Time	12	8	?? 24

QUESTION – 10

#Q : Moyukh can finish a work in 8 Days while Sayon, Anshika and Bhupesh in 6 Days, 12 Days and 4 Days repsctively. Moyukh starts the work along with Bhupesh on Day 1. They are joined by Anshika on Day 2. On Day 3, All three leave and Sayon comes and finishes the left over work alone. What Percentage of the work is done by Sayon.

(A) 33.33 %

(B) 16.67 %

(C) 8.33%

(D) none

	Time	Work	Rate
Mo	8	24	3
SA	6	24	4
AN	12	24	2
BH	4	24	6

$\frac{4}{24} \times 100 = \frac{1}{6} \times 100 = 16.67\%$

	M + B (3, 6)	M + B + A (3, 6, 2)	S
Work	9	11	4
Rate	9	11	4
Time	1	1	1

24

QUESTION – 11 (CAT 2021 – SLOT 2)

#Q: Anil can paint a house in 60 days while Bimal can paint it in 84 days. Anil starts painting and after 10 days, Bimal and Charu join him. Together, they complete the painting in 14 more days. If they are paid a total of ₹ 21000 for the job, then the share of Charu, in INR, proportionate to the work done by him, is

$W_C = R_C \times T_C$
$= 13 \times 14$

$C_C = \frac{13 \times 14}{420} \times 2100$

(A) 9000 (B) 9100 ✓ (C) 9200 (D) 9150

	T	W	R
A	60	420	7
B	84	420	5

$60 = 12 \times 5$
$84 = 12 \times 7$
$LCM = 12 \times 5 \times 7$

25
50
350
$\frac{350}{14} = 25$ = Reff

$\frac{420}{}$

$A + B + C = 25$
$7 + 5 + C = 25$
$C = 25 - 12$
$C = 13$

	A	A + B + C (25) (7 5 13)
Work	70	350
Rate	7	25
Time	10	14

$W_X = R_A T_A$

$W_X = R_B T_B$

$R_A T_A = R_B T_B$

$$\frac{R_A}{R_B} = \frac{T_B}{T_A}$$

Topic : RATE EQUATION CONCEPT

20 pages

$\times 2$ (2 page/sec

1 page/sec

10 sec

20 sec) $\times 2$

A is twice eff. of B

$A = 2 \quad T_A = 1$

$B = 1 \quad T_B = 2$

$A = 2B \quad \frac{A}{B} = \frac{2}{1} = \frac{T_B}{T_A}$

- A is twice efficient than B

$$\frac{A}{B} = \frac{2}{1} = \frac{T_B}{T_A}$$

- Efficiency of A is 80 % of B

$$\frac{A}{B} = \frac{\overset{4}{\cancel{80}}}{\underset{5}{\cancel{100}}} = \frac{T_B}{T_A}$$

- B needs 25% more time to finish a job than A does

$$\frac{T_B}{T_A} = \frac{\overset{5}{\cancel{125}}}{\underset{4}{\cancel{100}}} = \frac{A}{B}$$

Let's Understand the Trick

- A is 80% as efficient as B. Find the relation between Rate of A and Rate of B

$A = \frac{4}{5}B$ $\quad$ $5A = 4B$

- A is 80% as efficient as B. Find the number of days taken by A if B takes 20 Days.

$20 = 20$ $\quad$ $5A = 4B$ $\quad$ $A = 4$, $B = 5$

	A	B
W	100	100
R	4	5
T	25	20

- A is 50% more efficient than B. Find the number of days taken by A if B takes 3 more Days than A.

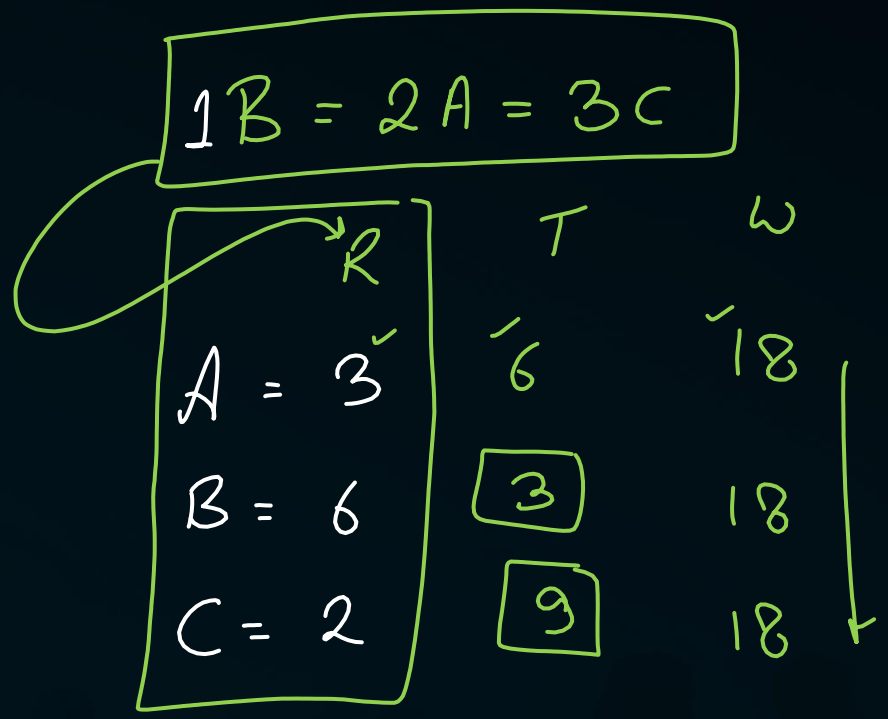
$A = \frac{150}{100}B$ $\quad$ $2A = 3B$

$A = \frac{3}{2}B$ $\quad$ $A = 3$, $B = 2$

	A	B
W	$3x$	$= 2(x+3)$
R	3	2
T	x	$\xrightarrow{+3}$ $x+3$

$3x = 2x + 6$ $\quad$ $x = 6$

- If A can finish a work in 6 Days, and B is twice fast as A and thrice as fast as C. Find the number of days taken by B and C to finish the work alone.



QUESTION – 12 (CAT 2023 – SLOT 3)

#Q: Gautam and Suhani, working together, can finish a job in 20 days. If Gautam does only 60% of his usual work on a day, Suhani must do 150% of her usual work on that day to exactly make up for it. Then, the number of days required by the faster worker to complete the job working alone is.

(A) 12 (B) 24 (C) 36 (D) 45

$0.6G + 1.5S = 1G + 1S$

$0.4G = 0.5S$

$0.4\,G = 0.5\,S$

$4\,G = 5\,S$

$S = 4$

$G = 5$

faster

	R	T	W
S+G	9	20	180
G	5	36	180

QUESTION – 13

#Q: Time taken by A to finish the work together with the help of B is same as what A will take with the help of C working at it's 70% efficiency. If B can finish the work in 20 Days. Find the time taken by C to finish the work.

(A) 10 (B) 7 (C) 14 (D) 20

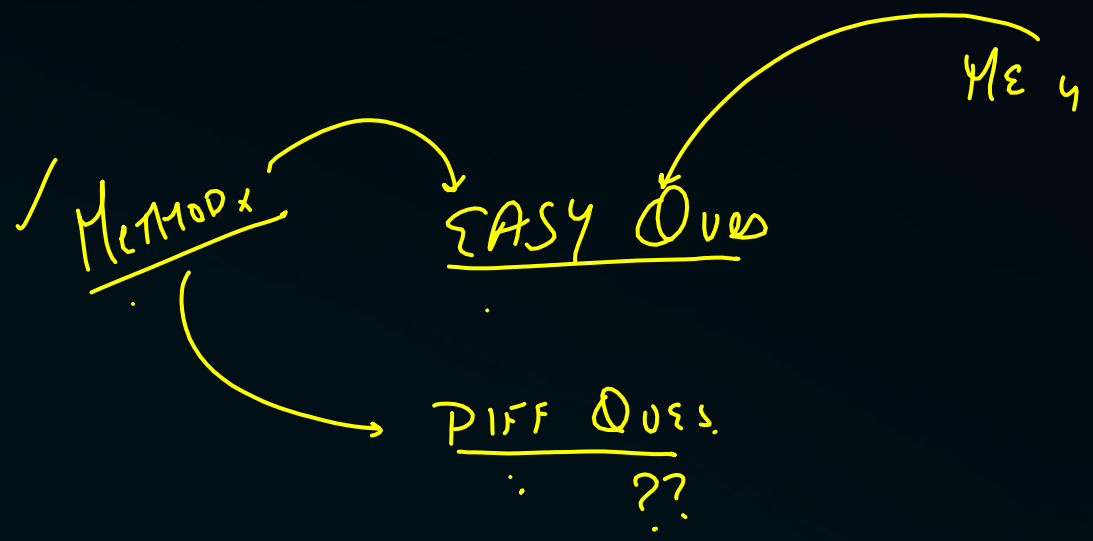
$A + B = A + 0.7C$

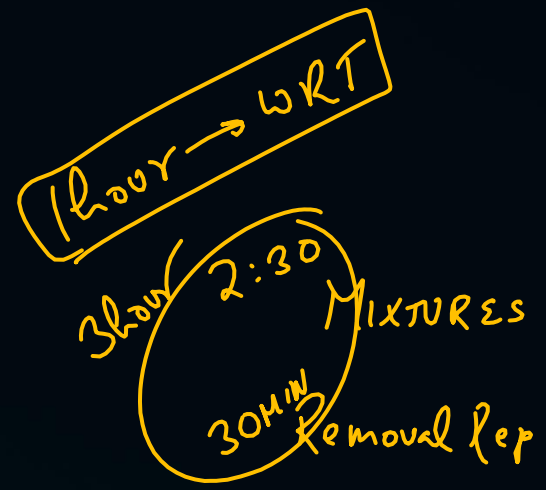
$B = 0.7C$

$10B = 7C$

	R	T	W
B	7	20	140
C	10	14	140

SUMMARY





https://www.youtube.com/live/xbAfOIY3PnE?si=hwpTjSLqErlNbaV8 → Ratio — DPP-1

https://youtu.be/5M5gRXmbLGc?si=KihnBm0_u4tjiydw → Percentage — DPP-2

https://youtu.be/XG2lFdo1l3M?si=iKPKws3OoRu1CqyZ → Work Rate and Time

https://www.youtube.com/live/mB0Lvu6fSrY?si=FwNus_ChfY34pMc9 → Mixtures


THANK
You
52%
64%
85%
26,465.54
28,161.92
26,465.54
198.45
37,492.43
201.55
1,097.95
0.00
26,717.43
7,534.44
12,512.54
28,875.56