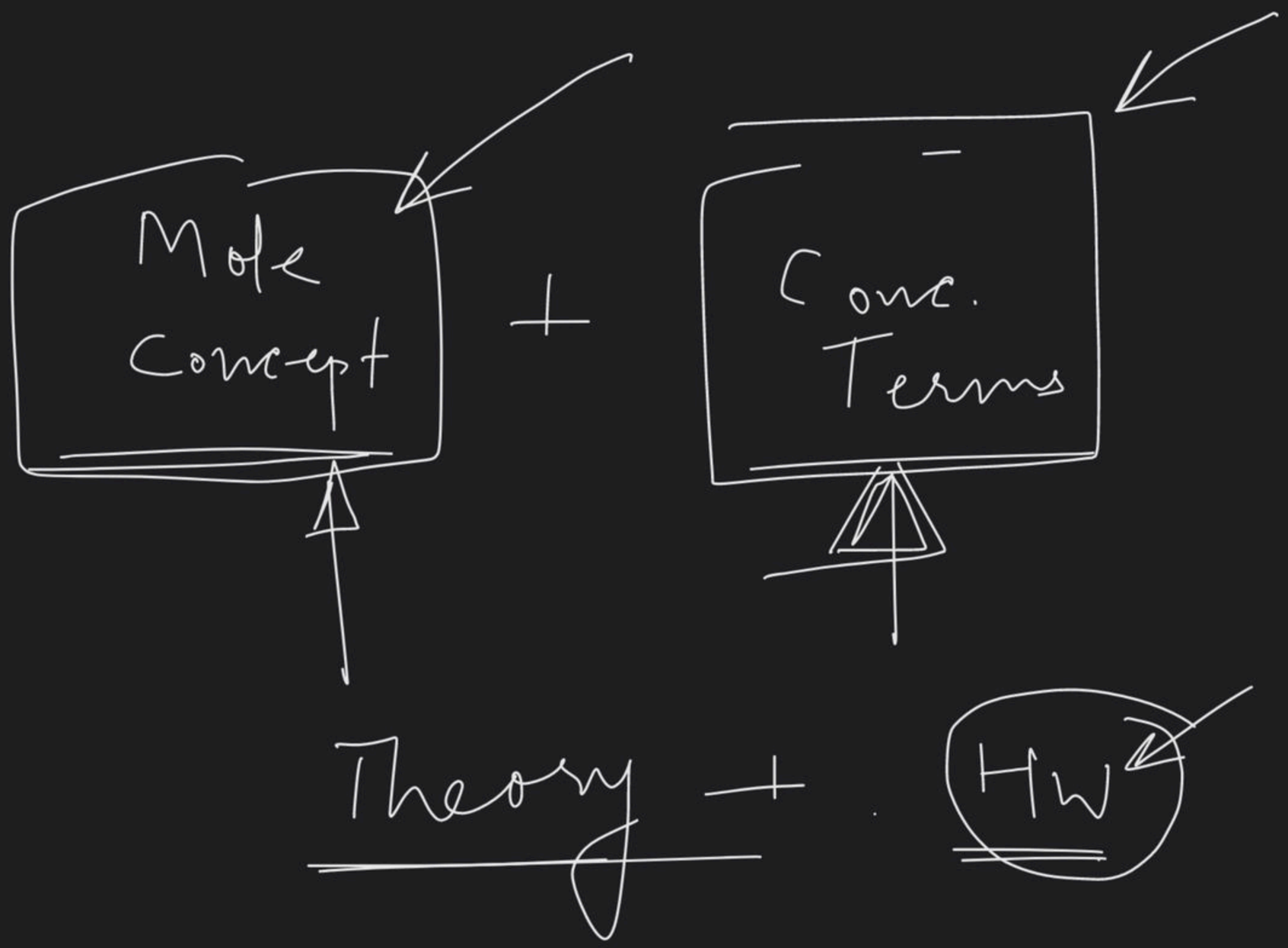
Introduction of Concentration Terms

Course on Concentration Terms for Class XI

akhilesh • Lesson 1 • May 12, 2021


Mole Concept
+
Conc. Terms
Theory + HW

Concentration terms :—

$[H_2SO_4 + H_2O]$ Mixture

It tell us about the amount of a component in its mixture

Mixture

Homogeneous

(salt + H_2O)

Solution

Heterogeneous

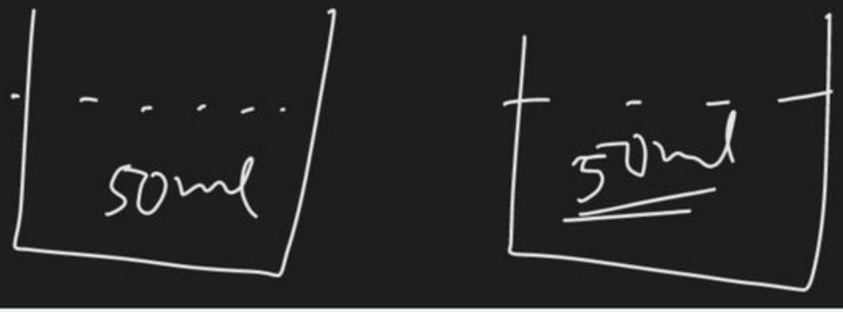
(Salt + Sugar)

Two component ⟶ Binary

Three " ⟶ tertiary

⟶ quaternary

Binary soln = solute + Solvent



Solute — less amount

Solvent — more amount

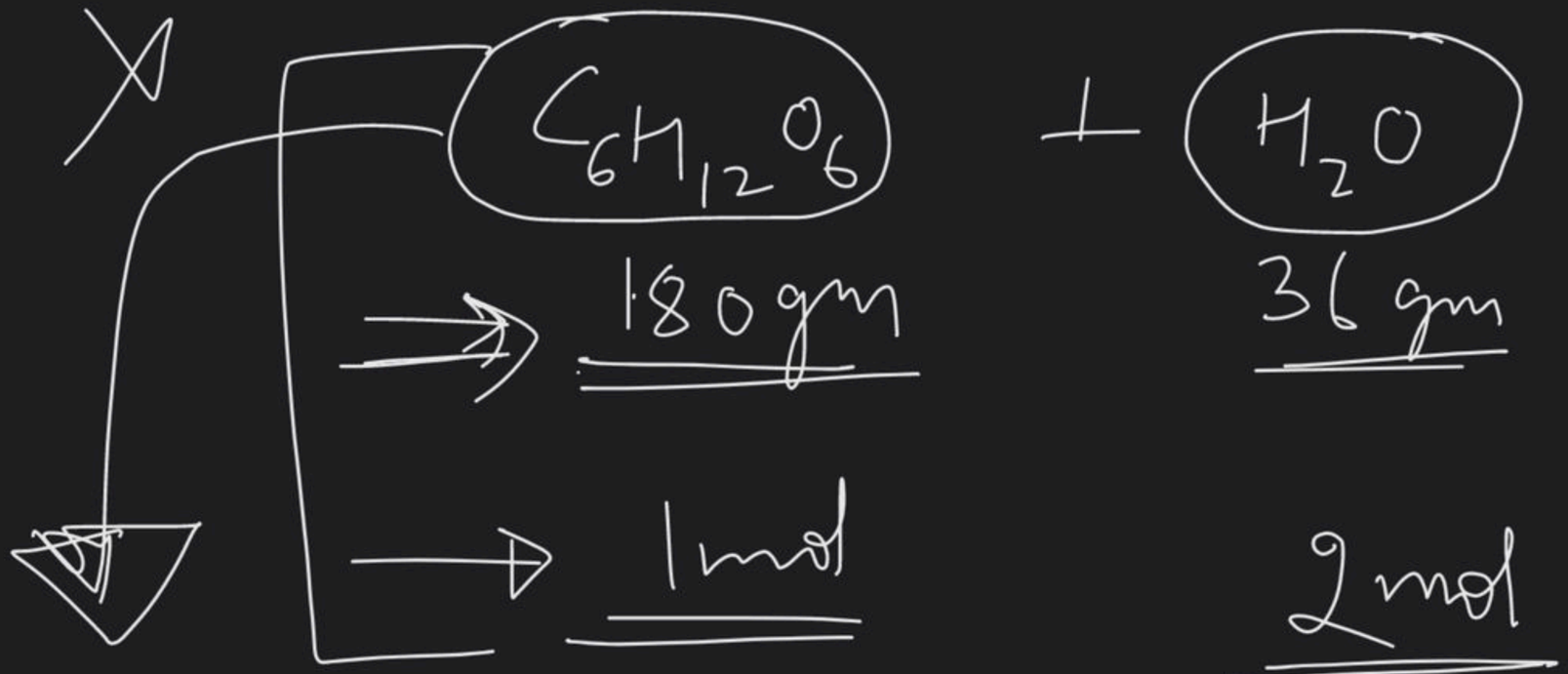
mass

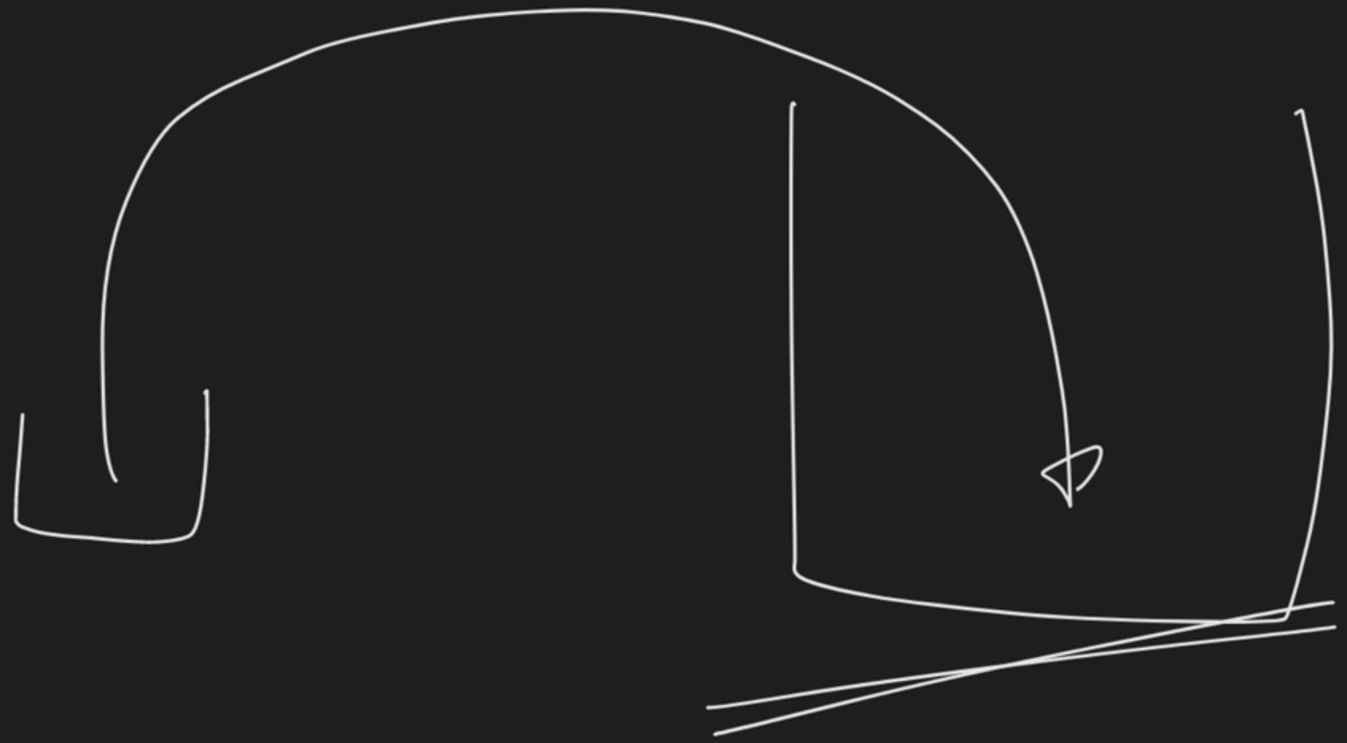
moles

Salt + H_2O

$H_2O = 18\,gm$

1 mol





Solution Physical state

X Y

Solute Solvent

Solute : which is less in amount

Solute → $C_6H_{12}O_6$ | H_2O

1.8 gm | 36 gm

$\frac{1.8}{180}$ | $\frac{36}{18}$

$= 0.01$ | 2

Types of concentration terms

W = mass

M = m.mass

① % W/W (% by mass)

20 % W/W NaOH (aq)

100 gm solution contains 20 gm NaOH

W_{H_2O} = 80 gm

② % W/V

20 % W/V NaOH (aq)

100 ml solution contains 20 gm NaOH

density of soln = 1.5 gm/ml

Solute

Solvent

Soln

mass of soln = 100 × 1.5

= 150 gm

mass of H_2O = 130 gm

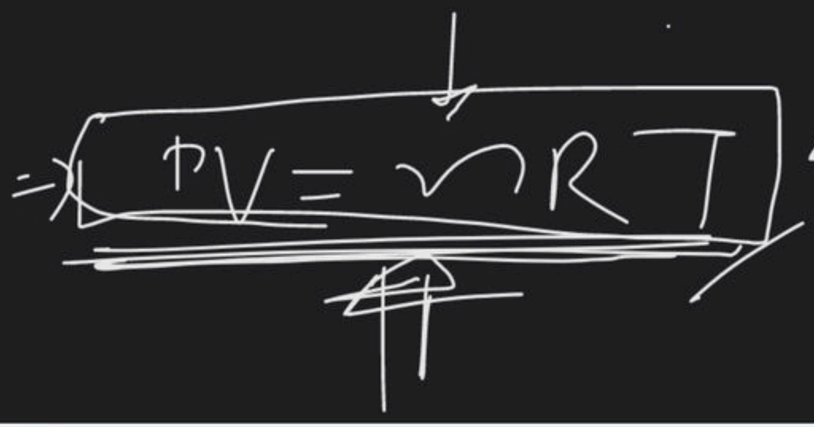
(iii) % V/V (% by volume)

Generally it is used for gaseous mix

20 % V/V O_2 in air ($N_2 + O_2$)

100 ml air contains 20 ml O_2

V_{N_2} = 80 ml



% W/W

mass by mass

% VV/V

mass by volume

% V/V

volume by volume

(4) gm/lit

(mass by volume)

% W/V

20 gm/lit NaOH

1 lit solution contains 20 gm NaOH

1000 ml → 20

100 ml → 2 gm

% W/V = 2

~~% W/V~~

(5) ppm (Parts per million) (w/w) w/v v/v

Case-I for solid/liq mixture

200 ppm $CaCO_3$ in H_2O

10^6 gm solution contains 200 gm ($CaCO_3$)

$W_{solvent} = 10^6 - 200$

$\simeq 10^6$

10^6 gm soln ⟶ 200 gms

100 gm ⟶ $\frac{200}{10^6} \times 100$

2 ppm

% W/W $= 2 \times 10^{-2} = 0.02$

ppb

ppt

$$ppm = \frac{\text{mass of solute}}{\text{mass of solution}} \times 10^6$$

$$1b = 10^9$$

$$\frac{ppm}{\%\ w/w} = 10^4$$

$$\frac{ppb}{\%\ w/w} = 10^7$$

$$\frac{ppb}{ppm} = 10^3$$

$\%\ w/v = \frac{\text{mass of solute}}{\text{vol of soln}} \times 100$

gm/lit

Q 200 gm H_2SO_4 was mixed in H_2O to form 500 ml soln.

Given d_{soln} is = 2 g/ml

Find
1. % W/W of H_2SO_4
2. % W/V "
3. gm/lit
4. ppm

A) 4

B) 40

C) 2

D) 80

E) None.

500 ml

400 gm

(3) 500 ml → 20 gm

1000 ml → 40 gm

400 gm/lit

200 gm H_2SO_4 → in 500 ml soln

500 ml soln contains 20 gm H_2SO_4

(500 × 2) gm soln → 20 gm H_2SO_4

(4) 10^3 gm → 200 gm

10^6 gm → $\frac{20}{10^3} \times 10^6$

(1) % W/W = 1000 → 20

100 gm → 20 gm

(2) 500 ml soln → 20 gm

100 ml soln → $\frac{20}{500} \times 100$

= 4

$$d_{soln} = \frac{\text{mass of soln}}{\text{Vol. of soln}}$$

gm/lit

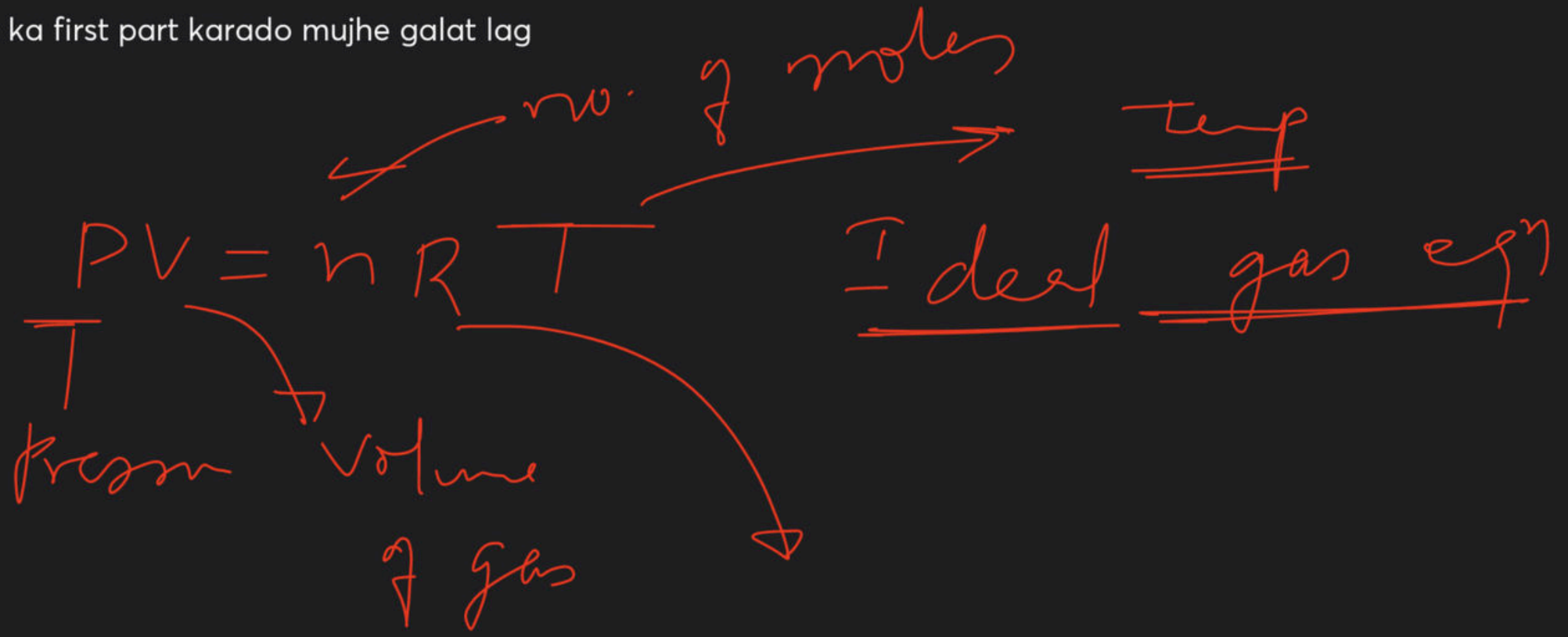
Mole concept $PV = nRT$

% W/W = 20

20 %

Question
from Maneekiran Bali

sir plss last question ka first part karado mujhe galat lag raha hain



$PV = nRT$ → Kelvin

atm lit 0.0821 atm. lit/mol/k

Pa m^3 8.314 J/k/mol

$P = 8.21\ atm$ $V = 10\ L$

$T = 300\ K$

$n = ?$

$8.21 \times 10 = n \times 0.0821 \times 300$

$n = 10/3$

Question
from Priyanshu Prakhar

SIR HW JAB BHI KARNA HAI USME QUESTION BHI LIKHENGE YA PHIR SIRF QUESTION NUMBER LIKH KE SOLUTION KAREIN

A] 40

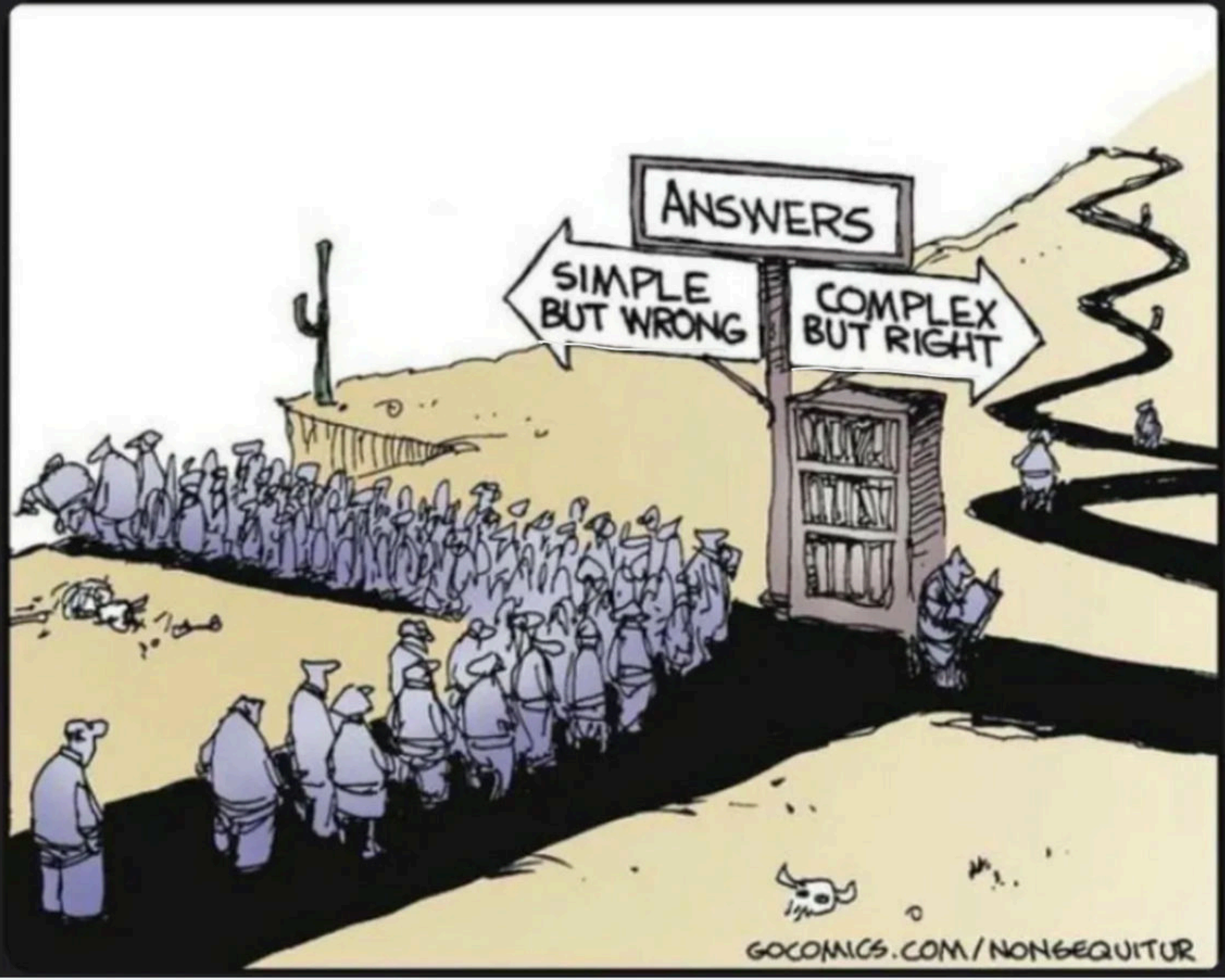
B] 20

C] 10

D] 80

~~% w/w~~

% w/v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COMPLEX BUT RIGHT
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