TIME & WORK

A ⟶ 16 d

1 day work of A ⟶ 1/16

13 day work of A ⟶ 13/16

Left over work = $1 - \frac{13}{16}$

$= 3/16$

$1/2 \times 10$ ↙ A = 2 B ⟶ (10 days)

↳ (5 days)

A = 1/2 B ⟶ (10 days)

↙

$2 \times 10 = 20$ days

Q A is 4 times as eff. as B and takes 15 days less than B to finish a work. in how many days will the work get finished / done if A and B are working together

Sol

$\frac{1}{4}(4x)$ (A, x days) = 4 B ⟶ ($4x$) days

$3x = 15$

$\boxed{x = 5}$

A ⟶ 5 days ⟶ one day work ⟶ 1/5

B ⟶ 20 days ⟶ 〃 ⟶ 1/20

$$\boxed{\left[\frac{1}{5} + \frac{1}{20}\right] = \left[\frac{1}{4}\right]}$$

in one day, 1/4 th of work is completed

so 4 days

Ans ∴

Alternate work concept

alone → A = 12 days
↳ B = 16 days

Q In how many days will the work be done if A and B are working alternatively, begining with A.

Sol

1st day of A, 2nd day of B

$$2 \text{ day work} = \left[\left(\frac{1}{12}\right) + \left(\frac{1}{16}\right)\right] = \frac{7}{48} \times 6 = \frac{42}{48} = \frac{7}{8}$$

($\frac{1}{12} = \frac{4}{48}$, $\frac{1}{16} = \frac{3}{48}$)

12 days work = $\frac{7}{8}$ || (LOW) = $\frac{1}{8}$

on 13th day (A): $\frac{1}{8} - \frac{1}{12} = \frac{1}{24}$ (LOW)

on 14th day (B): $\frac{1/24}{1/16} = \frac{2}{3}$

$13\frac{2}{3}$ A starts

Q if B starts the work.

Sol 12 days work = $\frac{7}{8}$, LOW = $\frac{1}{8}$

on 13th day (B)

Sir

1st day of B 2nd day of A

2dw × 6 = [1/16 + 1/12] = 7/48 × 6 = 42/48 = 7/8

12dw = 7/8 | LOW = 1/8

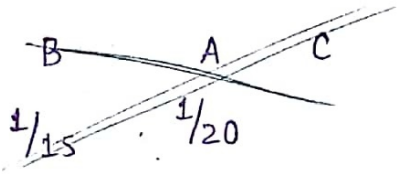
on 13th day (B) → 1/8 − 1/16 = 1/16 [LOW]

on 14th day (A) → 1/16 / 1/12 = 3/4 → 13 3/4 days Ans

if B starts

Pg 47
Q6

A → 20
B → 15
C → 12



SIR

2dw

1st day work of (A & B) [1/20 + 1/15] = [3/60 + 4/60] = 7/60

2nd day work of (A & C) [1/20 + 1/12] = [3/60 + 5/60] = 8/60

7/60 + 8/60 → 2dw = 15/60

2dw × 4 = 1/4th × 4

8 dw = 1

2 days → 1/4th work

Q A = 10 days
alone, B = 12 days
↳ C = 15 days

maxm. 2 people are allowed to work in any single day with no two consecutive day having same pair of people repeating

Then the minimum no. of days in which work can be done?

Sol

Mon → 1st dw of (A and B) $\left(\left(\frac{1}{10}\right) + \left(\frac{1}{12}\right)\right) = \frac{11}{60}$ (most efficient, lesser efficient)

Tues → 2nd dw of (A & C) $\left(\frac{1}{10} + \frac{1}{15}\right) = \frac{10}{60}$

$+$

2 dw $= \frac{21}{60}$

$\times 2$ $\times 2 = \frac{42}{60}$

4 dw $= \frac{42}{60}$ | LOW $= \frac{18}{60}$

on 5th day A & B $\frac{18}{60} - \frac{11}{60} = \frac{7}{60}$ (LOW)

on 6th day A & C $\frac{7/60}{1/60} = \frac{7}{10}$

$5\frac{7}{10}$ days

Ans ∴

* Men days Concept

Inversely proportional

$\uparrow a \propto \frac{1}{b \downarrow}$

$a = \frac{k}{b}$

$a \times b = k$

$a_1 \times b_1 = a_2 \times b_2$

$\uparrow m \propto \frac{1}{d \downarrow}$

$m \times d = k$

$m_1 \times d_1 = m_2 \times d_2$

if (200 m x 10 days) = 2000 md

90 m	⟶	270 d	3 times
30 m	⟶	x	

1/3rd

$90 \times 270 = 30 \times x$

$x = 810$

Q5

$(4m + 3w)^2 = (6m + 9w) \times 4$

$(8m + 6w) = (6m + 9w)$

$2m = 3w$, $1m = 1.5w$

$(20M + 6w)x = (6m + 9w) \times 4$

$(30w + 6w)x = (9w + 9w) \times 4$

$(36w)x = (18w \times 4)$

$x = 2$ days

Q11

$(5M + 7B) 24 =$

$(9m + 18b) \times 15 \times 8 = (3m + 6b) \times x \times 8$

$3(3m + 6b) \times 15 = (3m + 6b)x$

$x = 45$ days

Q8

$A = 15 \times 8 = 120$ hrs

$B = 6\frac{2}{3} \times 9 = 60$ hrs

$$10\left[\frac{1}{120} + \frac{1}{60}\right]x = 1$$

$$10\left[\frac{3}{120}\right]x = 1$$

$$x = 4$$

Q9

$A = 24$ days

$B = 36$ days

$$\left(\frac{1}{24}\right)x + \left(\frac{1}{36}\right)x = 6$$

$$\left(\frac{1}{24}\right)x + 6\left[\frac{1}{24} + \frac{1}{36}\right] = 1$$

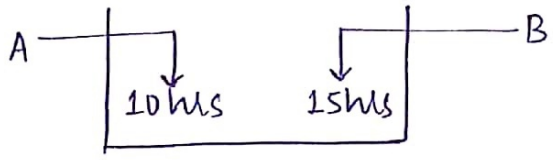
$$\frac{x}{24} = \frac{7}{12}$$

$$x = 14 \text{ days}$$

Q

$$\left[\frac{1}{10} + \frac{1}{15}\right] = \frac{1}{6}$$

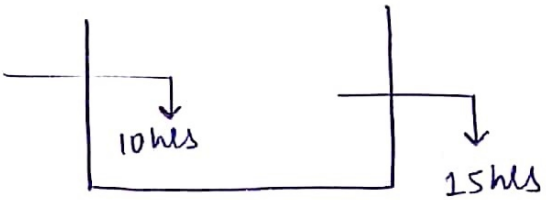
6 hrs



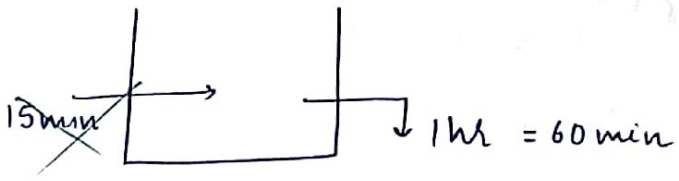
$$\left[\frac{1}{10} - \frac{1}{15}\right] = \frac{1}{30}$$

drainage pipe

30 hrs



Q



$$\left[\frac{1}{15} - \frac{1}{60}\right] = \frac{3}{60}$$

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

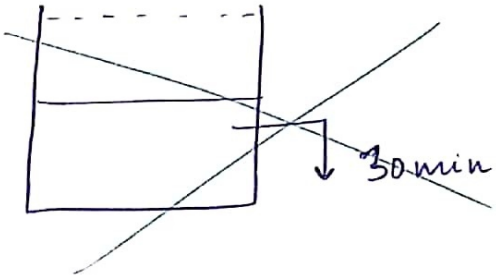
SIR

$x \longrightarrow$ mins

$$15\left[\frac{1}{x} - \frac{1}{60}\right] = 1$$

$\frac{1}{60}$ → 1 min work

Pg77
Q71

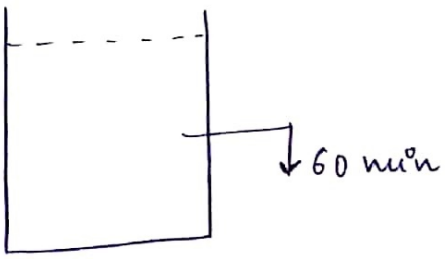


$\frac{1}{30}$

$$10\left[\frac{1}{x} - \frac{1}{30}\right] = 1$$

$$\frac{1}{x} = \frac{1}{10} + \frac{1}{30}$$

$$\frac{1}{x} = \frac{3+1}{300}$$



SIR

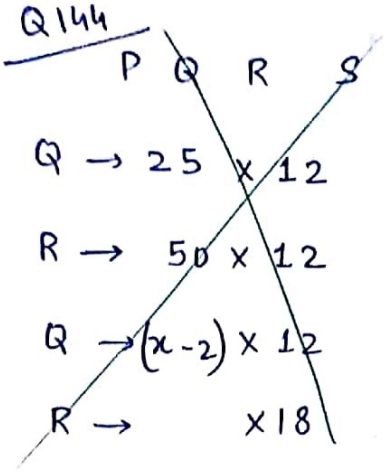
$x \longrightarrow$ mins

$$10\left[\frac{1}{x} - \frac{1}{60}\right] = 1/2$$

$$\frac{1}{x} - \frac{1}{60} = \frac{1}{20}$$

$$\frac{1}{x} = \frac{1}{20} + \frac{1}{60} =$$

Q144



Previous Qn.

$y \rightarrow$ min

$10\left[\frac{1}{y} - \frac{1}{30}\right] = 1$

half the tank

$y = 7.5$ min

25
12
50
25×
300

SIR $Q = 25 \times 12 = 300$ hls.

$\frac{1}{300} \rightarrow$ 1 hr work of Q

$\left(\frac{5 \times 12}{300}\right) \rightarrow$ 1/5th of work

$\frac{60}{300}$

R

$50 \times 12 = 600$ hls

$\frac{1}{600} \leftarrow$ 1 hr work of R

$\left(\frac{18 \times 7}{600}\right) \rightarrow$ own fraction of work

$\frac{126}{600}$

$\frac{60}{300} : \frac{63}{600}$

$20 : 21$ ✓

Q173
G2016

A → 6 hr

B → 4 hr

A: $\frac{1}{6}$ B: $\frac{1}{4}$

$\frac{1}{6}$

SIR

A $3\left(\frac{1}{6}\right) = \frac{1}{2}$ Re A = 1/2

B $3\left(\frac{1}{4}\right) = \frac{3}{4}$ Re B = 1/4

Pg 24

A = 3×4 = 12 Re A = 12

B = 3×6 = 18 Re B = 6

$\left[1 - x\left(\frac{1}{6}\right)\right] = 2\left[1 - x\left(\frac{1}{4}\right)\right]$ $(x = 3)$

Pg47
Q12

$m + B = 160$ Rs

$m = 3B$

$3B + B = 160$ Rs

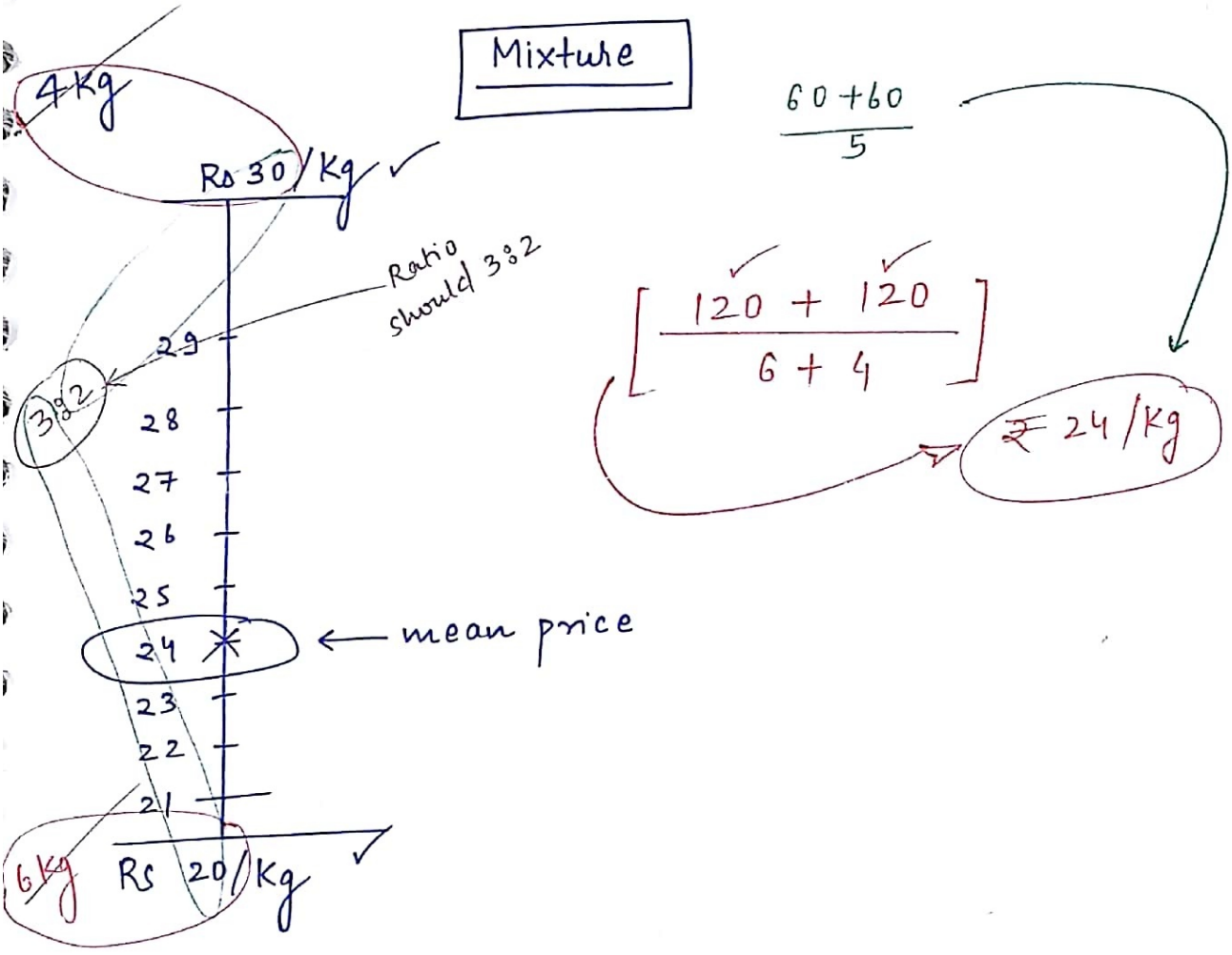
$B = 40$ Rs

$m = 3 \times 40 = 120$ Rs

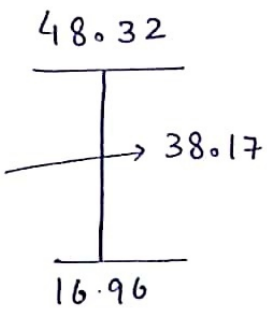
Q2

$4m \times 40 = 7w \times 40$

$4m = 7w$



Q



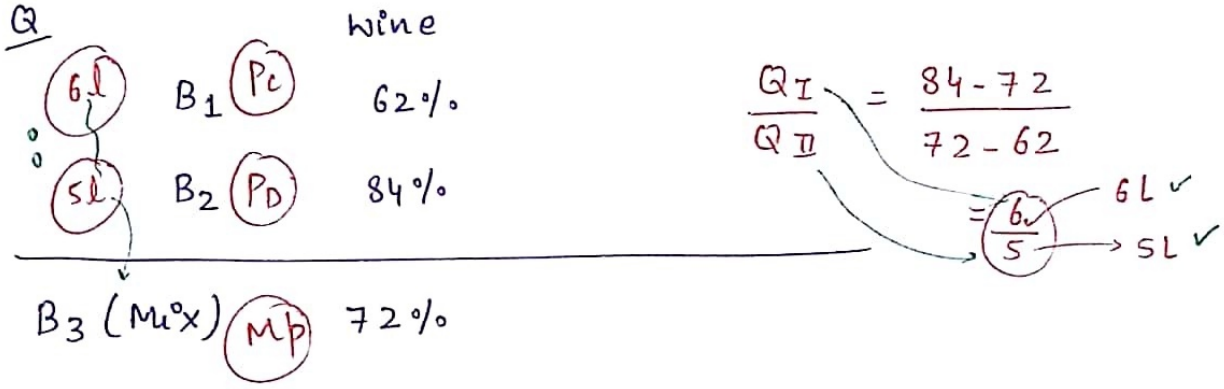
① $\frac{Q_C}{Q_D} = \frac{P_D - mP}{mP - P_C}$

quantity cheaper → Q_C; dearer → Q_D; dearer price → P_D; mean price → mP; cheaper price → P_C; aavara formulae

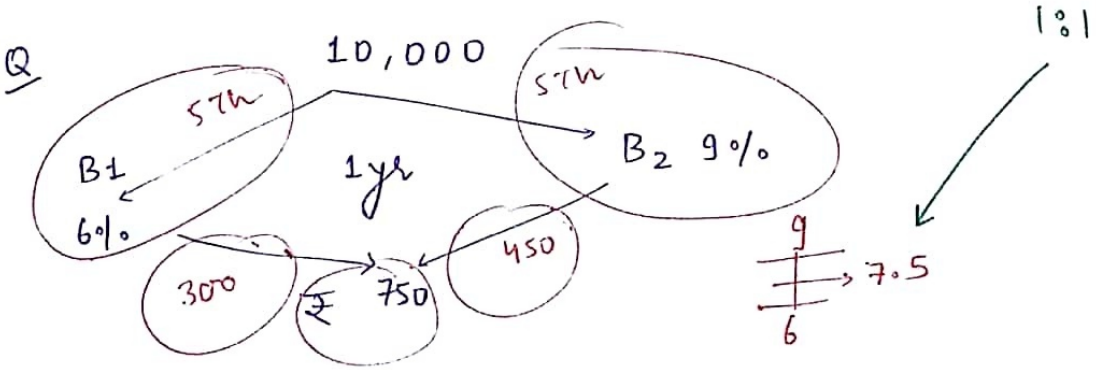
$$\frac{Q_{20}}{Q_{30}} = \frac{30-24}{24-20} = \frac{6}{4} = \frac{3}{2}$$

$$\frac{15}{10} = \frac{15}{1} = \frac{12}{8} = - - - - -$$

Q



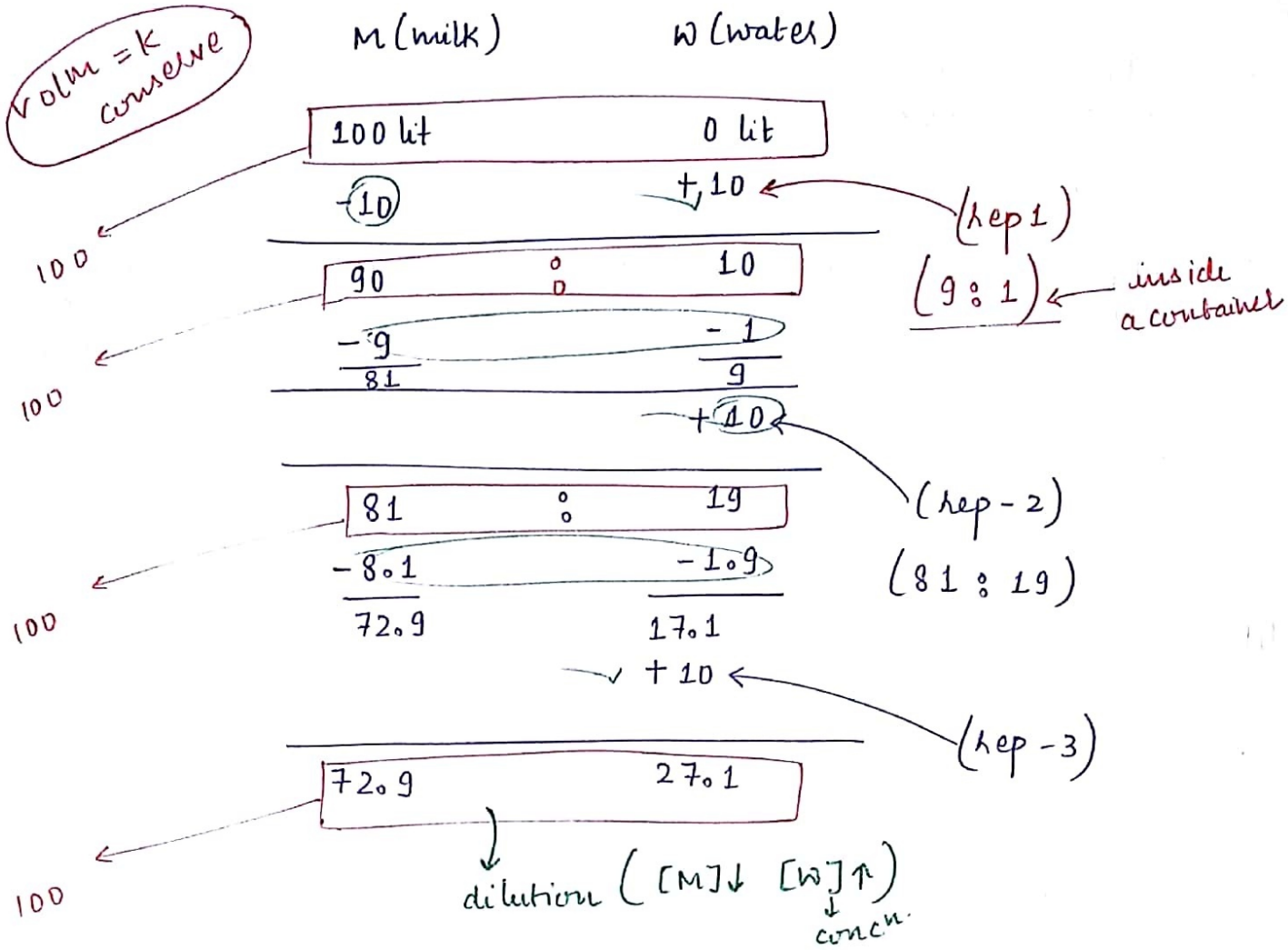
Q



10,000 → 750

100 → 7.5%

(2) Replacement's formulae / Replacements.



Quantity of milk left after n^{th} operation

Initial ~~limited~~ quantity of milk [I.Q.] $= \left[\frac{a-b}{a}\right]^n = \left[1-\frac{b}{a}\right]^n$.

Qu. of Milk left after n^{th} opr = $IQ \times \left[1-\frac{b}{a}\right]^n$.

where a is initial quantity, b is quantity taken out everytime & replaced by water, n = no. of replacements/operations.

$\left[x - \frac{10}{100}x\right]$ $\quad x[1-0.1]$

$\uparrow$ $\quad\quad$ $\downarrow$

$1.10x \quad\quad 0.90x$

$1.20x \quad\quad 0.80x$

$1.30x \quad\quad 0.77x$

$1.23x$

Quantity ---- of milk after 1st opr $= 100\left[1 - \frac{10}{100}\right]^1 = 100 \times 0.9 = 90$ ✓

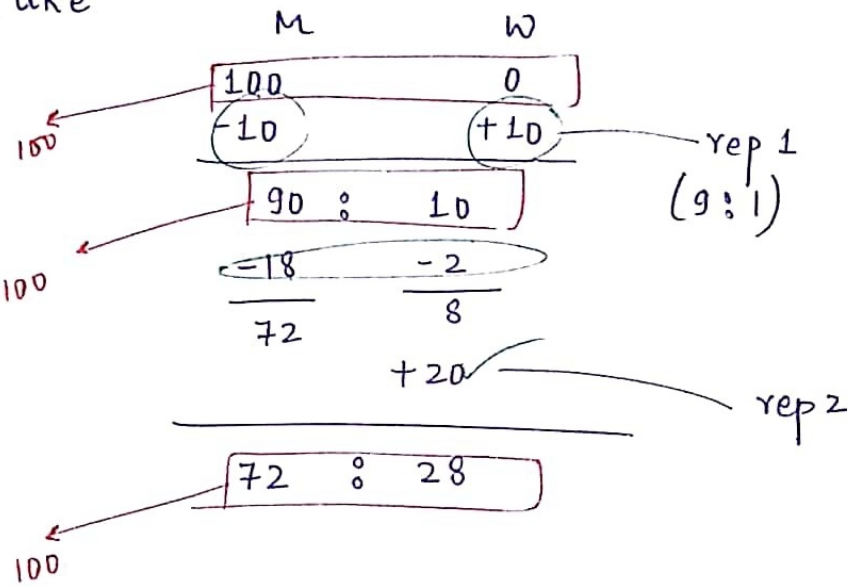
—— ,, —— ,, —— ,, —— 2nd ,, $= 100 \times 0.9^2$

$= 100 \times 0.9 \times 0.9$

$= 81$ ✓

3rd —— ,, —— ,, —— and so on $= 72.9$

like



Now

—— ,, —— ,, —— 2nd opr $= 100\left[1 - \frac{10}{100}\right]\left[1 - \frac{20}{100}\right]$

$= 100 \times 0.9 \times 0.8$

$= 72\%$

Q Milk left $= 40\left[1-\frac{4}{40}\right]\left[1-\frac{5}{40}\right]\left[1-\frac{6}{40}\right]$

$= (A)$

water left $= 40 - (A)$

Pg 69
Q 7

$10\left[1-\left(\frac{1}{10}\right)\right]^3 = 7.29$

→ 1 is 10% of 10.

$A = 16d$

$\left(\frac{1}{A} + \frac{1}{B} = \frac{1}{12}\right)$ $\left(\frac{1}{B} + \frac{1}{C} = \frac{1}{16}\right)$ $\rightarrow B = 48$

$Ts \rightarrow 48$

$$\frac{5}{A} + \frac{7}{B} + \frac{13}{C} = 1$$

$$5\left[\frac{1}{A} + \frac{1}{B}\right] + 2\left[\frac{1}{B} + \frac{1}{C}\right] + \frac{11}{C} = 1$$

$$5\left(\frac{1}{12}\right) + 2\left(\frac{1}{16}\right) + \frac{11}{C} = 1$$

$C = 24$

PERCENTAGE

Q. A's salary is 20% more than that of B. By how much % is B's salary is less than that of A.

Sol

$B = 100$, $A = 120$ (20% ↑)

$\frac{-20}{120} = -\frac{1}{6} \approx 16.6\%$ ↓

let $100 \xrightarrow{10\% \uparrow} 110$

$\frac{-10}{110} = \frac{-1}{11} \approx 9.09$ ↓

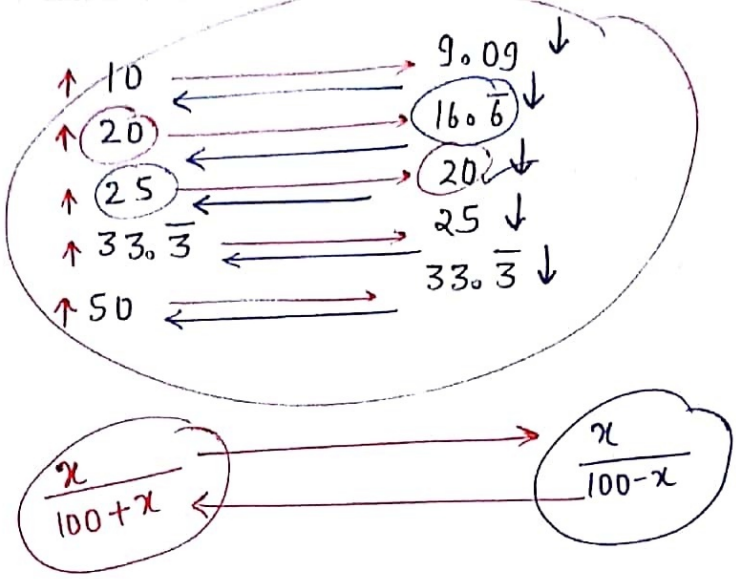
Q. A's salary is 20% less than that of B. By how much % is B's salary is more than that of A.

$B = 100$, $A = 80$ (20% ↓)

$\frac{+20}{80} = \frac{1}{4} \approx 25\%$ ↑

Let $B = 100 \xrightarrow{25\% \downarrow} 75$

$\frac{+25}{75} = \frac{1}{3} \approx 33.\overline{3}$ ↑



$\frac{20}{80} = \frac{1}{4}$

25%

* $R = a \times b$

a changes by x%

b changes by y%

$$\Delta R = x + y + \frac{xy}{100}$$

Ex:- $A = l \times b$

$P = n \times t$

Revenue (R) = Price of car (P) × (N) No. of car

* $l = 20\uparrow \quad b = 10\uparrow$

$A = l \times b$

$A' = 1.2l \times 1.1b$

$A' = 1.32\,lb$ → 32%

→ others

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

$= 32\%$

$l = 20\uparrow \quad b = 10\downarrow$

$A = l \times b$

$A' = 1.2l \times 0.9b$

$A' = 1.08\,lb$ → 8%

(or)

for every ↑ ↓ 20 — 10 + $\frac{20(-10)}{100}$

every for decrease

$= 8\%$