MIXTURE AND ALLIGATION

Mixture → combined

Alligation → Rule

The quantity of cheaper quality = x kg

The quantity of superior quality = y kg

The cost price of cheaper quality per kg = c

The cost price of superior quality per kg = d

The total cost price of cheaper quality = cx

The total cost price of superior quality = dy

The total cost price of the mixture = cx+dy

The cost price of mixture per kg = $\frac{cx+dy}{x+y}$ = m = mean cost price

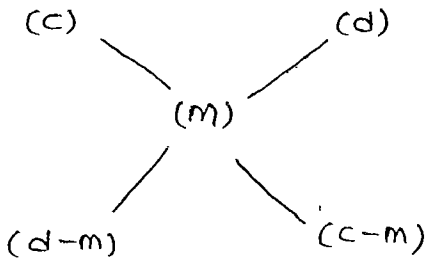
$$\frac{cx+dy}{x+y} = m$$

$$cx+dy = mx+my$$

$$dy-my = mx-cx$$

$$y(d-m) = x(m-c)$$

$$\boxed{\frac{y}{x} = \frac{(m-c)}{(d-m)}}$$



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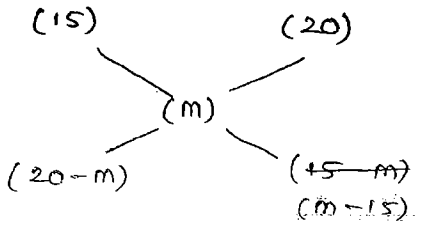
1. Type - 1 Type - 2

Rs. 15 Rs. 20

2 : 3



$\frac{(m-15)}{(20-m)} = \frac{3}{2}$ (relevant to superior)

$m = 18$

2. $? \longrightarrow 9/-$

$27\ kg \longrightarrow 7/-$

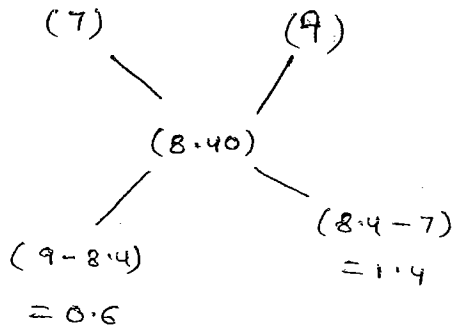
gain = 10%

S.P = 9.24 Rs

$\frac{S.P - C.P}{C.P} \times 100 = Gain$

$C.P = \frac{100}{110} \times 9.24$

$= 8.40$

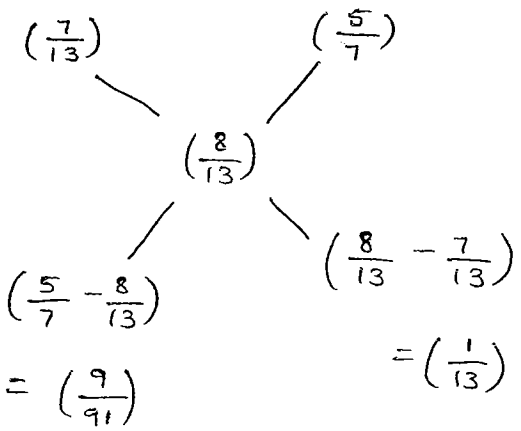


$\frac{1.40}{0.6} = \frac{y}{27}$ (based on superior cost)

$y = 63\ kg$

3.

A		B		C	
S	W	S	W	S	W
5	: 2	7	: 6	8	: 5
$\frac{5}{7=(5+2)}$		$\frac{7}{13}$		$\left(\frac{8}{13}\right)$	
$= 0.714$		$= 0.538$		$=$	

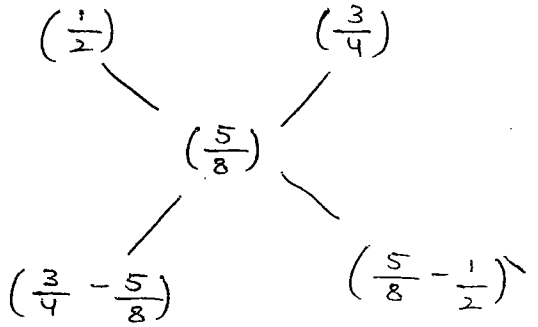


$\frac{\frac{1}{13}}{\left(\frac{9}{91}\right)} \Rightarrow \frac{7}{9} \Rightarrow 7:9$

Level - 2 :-

1.

1st		2nd		
M	W	M	W	W : M
$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	3 : 5

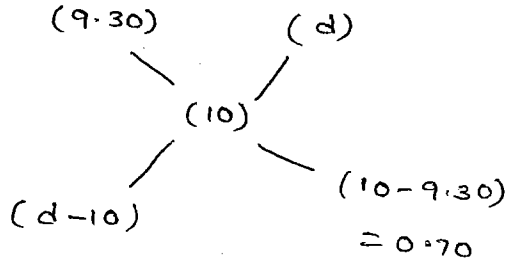


$= 6.42$ lit $\qquad = 6.1$ lit

2.

9.30 /- ? Mixture = 10 Rs.

8 : 7



$\frac{0.7}{d-10} = \frac{7}{8}$

$d = 10.80$

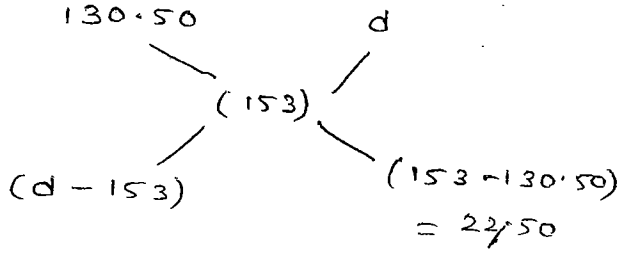
3.

126 Rs 135 Rs x Mixture = 153 Rs.

1 : 1 : 2 ₹ ₹

$\frac{126 \times 1 + 135 \times 1}{2}$

$= 130.50$



$\frac{22.50}{d-153} = \frac{2}{2} = 1 \Rightarrow d = 175.50$

Replacement of pure liquid:-

The amount of purely ~~fit~~ liquid = x lit

The amount of replaced liquid = a lit

No. of operations = n (taken out + fill it)

The amount of pure liquid remained = $x\left(1-\frac{a}{x}\right)^n$

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4. Given $x = 40$ lit, $a = 4$, $n = 3$

$$x\left(1-\frac{a}{x}\right)^n$$

$$40\left(1-\frac{4}{40}\right)^3$$

$$= 29.16 \text{ lit.}$$

5. Given $x = ?$ $n = 4$ $a = 8$ lit

16 : 65

$$\frac{x\left(1-\frac{a}{x}\right)^n}{x} = \frac{16}{81} = \left(\frac{2}{3}\right)^4$$

(16+65)

$$1-\frac{8}{x} = \frac{2}{3}$$

$$1-\frac{2}{3} = \frac{8}{x}$$

$$\frac{1}{3} = \frac{8}{x}$$

$$x = 24 \text{ lit.}$$