

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 = $\frac{cx + dy}{x + y} = m = \text{mean cost price}$

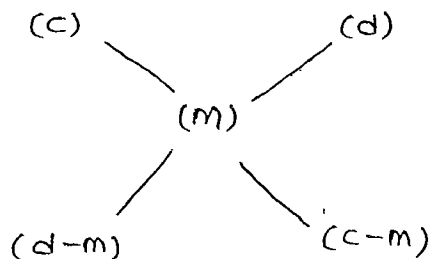
$$\frac{cx + dy}{x + y} = m$$

$$cx + dy = mx + my$$

$$dy - my = mx - cx$$

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

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



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1. Type - 1

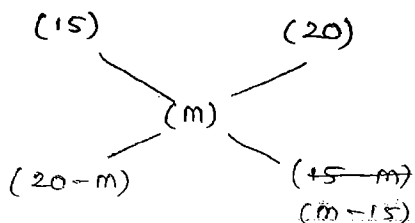
Rs. 15

2

Type - 2

Rs. 20

3



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

$$m = 18$$

2. $? \rightarrow 9/-$

$27 \text{ kg} \rightarrow 7/-$

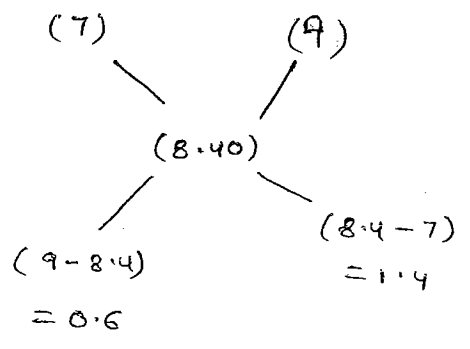
gain = 10%

S.P = 9.24 RS

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

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

$$= 8.40$$



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

$y = 63 \text{ kg}$

3.

A

B

C

$\frac{S}{5} : \frac{W}{2}$

$\frac{S}{7} : \frac{W}{6}$

$\frac{S}{8} : \frac{W}{5}$

$$\frac{5}{7 = (5+2)}$$

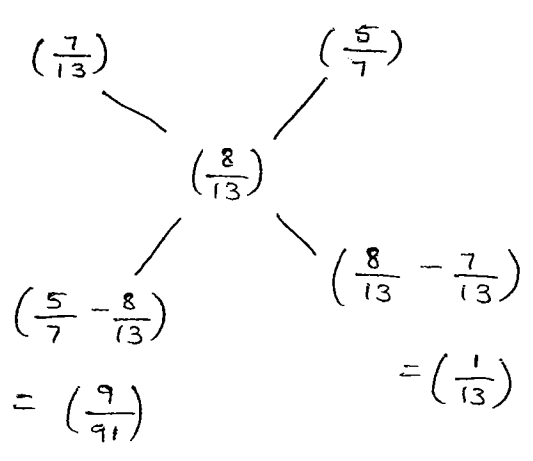
$$\frac{7}{13}$$

$$\left(\frac{8}{13}\right)$$

= 0.714

= 0.538

=

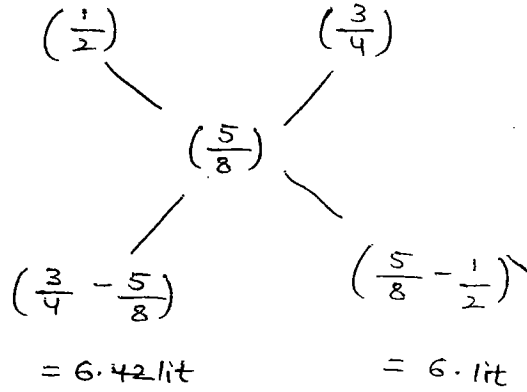


$$\frac{\frac{1}{13}}{\left(\frac{9}{91}\right)} \Rightarrow \frac{7}{9} \Rightarrow 7:9$$

Level-2 :-

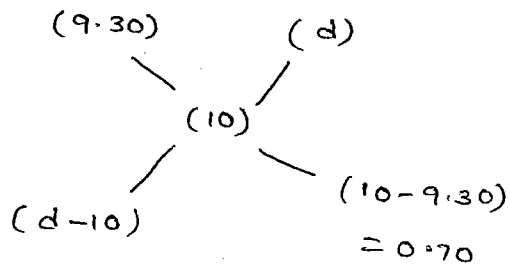
1.

	<u>1st</u>		<u>2nd</u>		
	M	W	M	W	W : M
	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	3 : 5



2.

9.30/- ?
8 : 7
Mixture = 10 Rs.



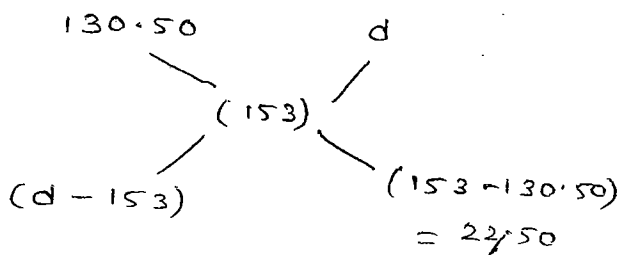
$$\frac{0.7}{d-10} = \frac{7}{8}$$

$$d = 10.80$$

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

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

$$x \left(1 - \frac{8}{x}\right)^4$$

$$\frac{x \left(1 - \frac{8}{x}\right)^4}{x} =$$

$$\frac{16}{81} = \left(\frac{2}{3}\right)^4$$

(16:65)

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

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

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

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