Quiz

$x = A$, $y = B$ $2x$

let x, y and z be the cost/kg of Pakistani, Egyptian and American Cotton respectively

According to the

$\frac{1}{4}x + \frac{2}{4}y + \frac{1}{4}x = 40 \rightarrow ①$.

Sum of Ratio = 4.

$\frac{2}{4}x + \frac{1}{4}y + \frac{1}{4}x = 50 \rightarrow ②$

$\frac{2}{4}x + \frac{2}{4}x = 60 \rightarrow ③$.

$x, y = 4$' both sides on equation ① ② and ③ we got

① $\Rightarrow$ $x + 2y + z = 160$

② $\Rightarrow$ $2x + y + z = 1200$

③ $\rightarrow$ $x + wy + z = 120$

Now we use these equation in matrix form.

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 2 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 160 \\ 200 \\ 120 \end{bmatrix}$$

So

$$A \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 2 & 0 & 1 \end{bmatrix} \quad x = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \quad B_1 = \begin{bmatrix} 160 \\ 200 \\ 120 \end{bmatrix}$$

$\Rightarrow A_1 \times B_1$

Now using Cramer's Rule

$$A_1 x = \begin{bmatrix} 160 & 2 & 1 \\ 200 & 1 & 1 \\ -120 & 0 & 1 \end{bmatrix}$$ we just replace B_1 in 1st Column of A_1

$$|Ax| = 160 \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} - 2 \begin{bmatrix} 200 & 1 \\ 120 & 1 \end{bmatrix}$$

$$+ \begin{bmatrix} 200 & 1 \\ 120 & 0 \end{bmatrix}$$

$$= 160 (1 - 0) - 2 (200 - 120)$$

$$|A_1 x| = -120$$

Now

$$x \frac{|A_1 x|}{|A_1|}$$

Now find $|A_1|$

$$|A_1| = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix} = 1(1-0) - 2(2-1) + 1(0-1).$$

$$= 1 - 2 - 1 = -2.$$

Now

$$④ \Rightarrow x = \frac{|A_1 x|}{A_1} = \frac{-120}{-2} = 60$$

$$x = A = 60$$

also

$$y = \frac{|A_1 y|}{|A_1|} \Rightarrow ⑤.$$

$$A_1 y \begin{bmatrix} 1 & 160 & 1 \\ 2 & 200 & 1 \\ 1 & 120 & 1 \end{bmatrix}$$ Just replace B_1 in 2nd Column of A_1

$$|A_1 y| = 1(200 - 120) - 160(2-1) + 1(240 - 200)$$

$$= 80 - 160 + 40$$

$$|A_1 y| = -40$$

$$⑤ \Rightarrow y = \frac{|A_1 y|}{|A_1|} = \frac{-40}{-2} = 20$$

$y = B = 20$

again $z = |A, z| \rightarrow ⑥$

$$|A, z| = \begin{matrix} 1 \\ (0-1) \end{matrix} (120 - 0) - 2(240 - 200) + 160$$

$$= 120 - 80 - 160$$

$$= 120$$

$$⑥ \Rightarrow z = \frac{|A, z|}{|A, 1|} = \frac{-120}{-2} = 60$$

$$z = C = 60$$

Hence

$$(x, y, z) = (60, 20, 60)$$

or

$$(A, B, C) = (60, 20, 60).$$

is means that

Pakistani blend Cost/kg of Cotton = 60
Egyptian blend Cost/kg of Cotton = 20
American blend Cost/kg of Cotton = 60.