Problem of the Week
Problem D and Solution
All Mixed Up

Problem

A large bowl contains a mixture of Himalayan Pink Salt and common salt. When 1 kg of common salt is added to the bowl, the ratio, by mass, of Himalayan Pink Salt to common salt becomes $1 : 2$. When 1 kg of Himalayan Pink Salt is added to the new mixture, the ratio becomes $2 : 3$. Find the ratio of Himalayan Pink Salt to common salt in the original mixture.

Solution

Let h be the amount of Himalayan Pink Salt, in kgs, in the original mixture.
Let c be the amount of common salt, in kgs, in the original mixture.

When 1 kg of common salt is added, the ratio of Himalayan Pink Salt to common salt is $1 : 2$. Therefore,

$$\frac{h}{c+1} = \frac{1}{2}$$

Simplifying, we obtain $c + 1 = 2h$ and $c = 2h - 1$ follows.

When 1 kg of Himalayan Pink Salt is added to the new mixture, the ratio becomes $2 : 3$. Therefore,

$$\frac{h+1}{c+1} = \frac{2}{3}$$

Since $c = 2h - 1$, we have

$$\begin{aligned}
\frac{h+1}{(2h-1)+1} &= \frac{2}{3} \\
\frac{h+1}{2h} &= \frac{2}{3} \\
2(2h) &= 3(h+1) \\
4h &= 3h+3 \\
h &= 3
\end{aligned}$$

Substituting $h = 3$ in $c = 2h - 1$, we obtain $c = 2(3) - 1 = 5$.

Therefore, there was originally 3 kgs of Himalayan Pink Salt in the bowl and 5 kgs of common salt. Thus, the ratio of Himalayan Pink Salt to common salt in the original mixture was $3 : 5$.