

A herd of cows in a field (some standing and some lying down) was observed and the following behaviour recorded...

Observation 1: When it rained, two-thirds of the cows which had been standing actually lay down, whilst three-quarters of those lying down stood up. The overall number of cows standing didn't alter, as a result.

Observation 2: When the rain stopped, one-third of the standing cows actually lay down, whilst a quarter of those lying down, stood up. After this there were now three more cows lying down rather than standing up.

How many cows were in the observed herd?

Suppose at the start there were L lying down and S standing up.

	<u>Standing Up</u>	<u>Lying Down</u>
<i>After Observation 1:</i>	$\frac{1}{3}S + \frac{3}{4}L$	$\frac{2}{3}S + \frac{1}{4}L$

Hence... $\frac{1}{3}S + \frac{3}{4}L = S$ or $9L = 8S$

	<u>Standing Up</u>	<u>Lying Down</u>
<i>After Observation 2:</i>	$\frac{2}{3}\left[\frac{1}{3}S + \frac{3}{4}L\right] + \frac{1}{4}\left[\frac{2}{3}S + \frac{1}{4}L\right]$	$\frac{1}{3}\left[\frac{1}{3}S + \frac{3}{4}L\right] + \frac{3}{4}\left[\frac{2}{3}S + \frac{1}{4}L\right]$

Hence... $\frac{1}{3}\left[\frac{1}{3}S + \frac{3}{4}L\right] + \frac{3}{4}\left[\frac{2}{3}S + \frac{1}{4}L\right] = \frac{2}{3}\left[\frac{1}{3}S + \frac{3}{4}L\right] + \frac{1}{4}\left[\frac{2}{3}S + \frac{1}{4}L\right] + 3$

Solving, we get $S=27$ & $L=24$, giving 51 cows altogether.