

## The Correct Percentile Rank Formula

If you have ever studied Descriptive Statistics, you would have come across Percentiles and Percentile Ranks. The formula for calculating Percentile Rank using given Percentile is given by:

$$\text{Percentile Rank} = \text{Percentile} \times (n+1)$$

where 'n' is total number of data samples.

But the correct formula is:

$$\text{Percentile Rank} = (n \times \text{Percentile}) + 1$$

### Derivation

We know that,

$$\text{Percentile} = \frac{\text{Number of values less than } X}{\text{Total Number of values}} \times 100\%$$

In other words,

$$\text{Percentile} = \frac{\text{Number of values existing before Rank}}{\text{Total number of values } (n)} \times 100\%$$

And we also know that,

$$\text{Number of values existing before Rank} = \text{Rank} - 1$$

By substituting in the formula,

$$\text{Percentile} = \frac{\text{Rank} - 1}{n} \times 100\%$$

$$\Rightarrow \text{Rank} - 1 = n \times \text{Percentile}$$

$$\therefore \text{Rank} = (n \times \text{Percentile}) + 1$$