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### Percentile and Quartile

A percentile (or a centile) is a measure used in statistics indicating the value *below which* a given percentage of observations in a group of observations fall. For example, the 20th percentile is the value (or score) below which 20% of the observations may be found. The term percentile and the related term *percentile rank* are often used in the reporting of scores from norm-referenced tests. For example, if a score is at the 86th percentile, where 86 is the percentile rank, it is equal to the value below which 86% of the observations may be found. In contrast, if it is in the 86th percentile, the score is at or below the value of which 86% of the observations may be found.

The 25th percentile is also known as the first quartile (Q1), the 50th percentile as the median or second quartile (Q2), and the 75th percentile as the third quartile (Q3). In general, percentiles and quartiles are specific types of quantiles.

**Percentage** is different from percentile which include the characterisation of interest divided by the total number of observations

For example: if you have three positive samples from the total of 30, that means  $3/30 \times 100$  Which give equal to 10%

#### 1-Percentile

- Percentiles are used to understand and interpret data. They indicate the values below which a certain percentage of the data in a data set is found.
- Percentiles can be calculated using the formula  $n = (P/100) \times N$ , where P = percentile, N = number of values in a data set (sorted from smallest to largest), and n = ordinal rank of a given value.
- Percentiles are frequently used to understand test scores and biometric measurements.

#### Percentile Formula

Percentiles for the values in a given data set can be calculated using the formula:  
 $n = (P/100) \times N$

where N = number of values in the data set, P = percentile, and n = ordinal rank of a given value (with the values in the data set sorted from smallest to largest). For example, take a class of 20 students that earned the following scores on their most recent test: 75, 77, 78, 78, 80, 81, 81, 82, 83, 84, 84, 84, 85, 87, 87, 88, 88, 88, 89, 90. These scores can be represented as a data set with 20 values: {75, 77, 78, 78, 80, 81, 81, 82, 83, 84, 84, 84, 85, 87, 87, 88, 88, 88, 89, 90}.

**Note:** We should organise the data base on descending level

We can find the score that marks the 20th percentile by plugging in known values into the formula and solving for *n*:

$$n = (20/100) \times 20$$

n = 4

**Interpretation the result:** The fourth value in the data set is the score 78. This means that 78 marks the 20th percentile; of the students in the class, 20 percent earned a score of 78 or lower.

## Quartile

Quartiles often are **used in sales and survey data to divide populations into groups**. For example, you can use QUARTILE to find the top 25 percent of incomes in a population.

### Mean divided the data point into four parts or quarter

- The first quartile ( $Q_1$ ) is defined as the middle number between the smallest number (minimum) and the median of the data set. It is also known as the *lower* or *25th empirical* quartile, as 25% of the data is below this point.
- The second quartile ( $Q_2$ ) is the median of a data set; thus 50% of the data lies below this point.
- The third quartile ( $Q_3$ ) is the middle value between the median and the highest value (maximum) of the data set. It is known as the *upper* or *75th empirical* quartile, as 75% of the data lies below this point

**1, 3, 3, 4, 5, 6, 6, 7, 8, 8**

The numbers are already in order

Cut the list into quarters:

1,3,3,4,5,6,6,7,8,8



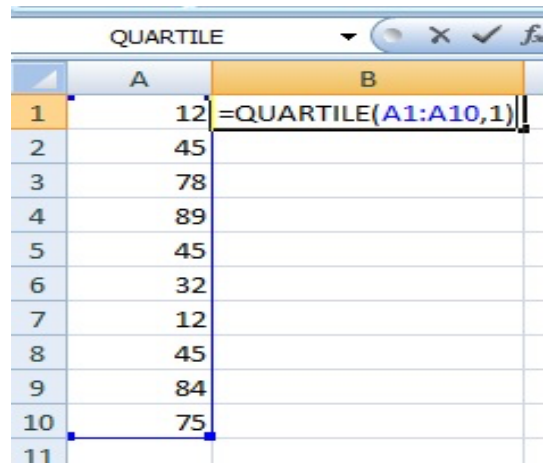
In this case Quartile 2 is half way between 5 and 6:

$$Q2 = (5+6)/2 = \mathbf{5.5}$$

And the result is:

- Quartile 1 ( $Q_1$ ) = **3**
- Quartile 2 ( $Q_2$ ) = **5.5**
- Quartile 3 ( $Q_3$ ) = **7**

Use quartile in an excel sheet  
(25%,50%,75%)



The image shows a screenshot of an Excel spreadsheet. The title bar at the top reads "QUARTILE". The spreadsheet has two columns, A and B, and rows numbered 1 through 11. Column A contains the following values: 12, 45, 78, 89, 45, 32, 12, 45, 84, 75. Column B contains the formula "=QUARTILE(A1:A10,1)" in row 1. The formula bar at the top right shows the formula being entered.

	A	B
1	12	=QUARTILE(A1:A10,1)
2	45	
3	78	
4	89	
5	45	
6	32	
7	12	
8	45	
9	84	
10	75	
11		