

What is the method for calculating quartiles for grouped data?

Authored by
stats writer

June 27, 2024

RECOMMENDED CITATION

stats writer (2024). *What is the method for calculating quartiles for grouped data?*.
PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=154981>

The method for calculating quartiles for grouped data involves dividing the data into four equal groups, with each group containing an equal number of data points. The first quartile (Q1) is the median of the first half of the data, the second quartile (Q2) is the overall median, and the third quartile (Q3) is the median of the second half of the data. These quartiles can be determined by finding the cumulative frequency of the data and using a formula to calculate the position of each quartile. This method is used to summarize and analyze large sets of data in a concise manner.

Calculate Quartiles for Grouped Data

Quartiles are values that split up a dataset into four equal parts.

You can use the following formula to calculate quartiles for grouped data:

$$Q_i = L + (C/F) * (iN/4 - M)$$

where:

L: The lower bound of the interval that contains the *i*th quartile
C: The class width
F: The frequency of the interval that contains the *i*th quartile
N: The total frequency
M: The cumulative frequency leading up to the interval that contains the *i*th quartile

The following example shows how to use this formula in practice.

Example: Calculate Quartiles for Grouped Data

Suppose we have the following frequency distribution:

Class Interval	Frequency	Cumulative Frequency
1-5	6	6
6-10	19	25
11-15	13	38
16-20	20	58
21-25	12	70
26-30	11	81
31-35	6	87
36-40	5	92

Now suppose we'd like to calculate the value at the third quartile (Q3) of this distribution.

The value at the third quartile will be located at position $(iN/4)$ in the distribution.

Thus, $(iN/4) = (3 \cdot 92/4) = 69$.

The interval that contains the third quartile will be the 21-25 interval since 69 is between the cumulative frequencies of 58 and 70.

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Knowing this, we can find each of the values necessary to plug into our formula:

L: The lower bound of the interval that contains the *i*th quartile

The lower bound of the interval is 21. The class width is calculated as $25 - 21 = 4$.

F: The frequency of the interval that contains the *i*th quartile

The frequency of the 21-25 class is 12

N: The total frequency

The total cumulative frequency in the table is 92.

M: The cumulative frequency leading up to the interval that contains the i th quartile

The cumulative frequency leading up to the 21-25 class is 58.

We can then plug in all of these values into the formula from earlier to find the value at the third quartile:

$$Q_i = L + (C/F) * (iN/4 - M) \\ Q_3 = 21 + (4/12) * ((3)(92)/4 - 58) \\ Q_3 = 24.67$$

The value at the third quartile is 24.67.

You can use a similar approach to calculate the values for the first and second quartiles.

The following tutorials provide additional information for working with grouped data: