

# Measures of Location and Spread

## Median and Inter quartile Range

To identify the median put data in order and choose middle item or halfway between middle 2 items.

For  $n$  items  $\frac{n+1}{2}$  can be used to identify the median.

Ex 5 items  $\frac{5+1}{2} = 3$  median = 3rd item

6 items  $\frac{6+1}{2} = 3.5$  median is halfway between 3rd and 4th items

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## Quartiles

$Q_1$  lower quartile

$Q_2$  median

$Q_3$  upper quartile

## Examples

Ex 1  $\underline{1, 2, 3, 4, 5, 6}$

$\uparrow$                        $\uparrow$

$Q_1$                        $Q_3$

Median = 3.5

$Q_1 = 2$

$Q_3 = 5$

Ex2      1, 2, 3, 4, 5, 6, 7      Median = 4

$\overline{\quad\quad\quad}$        $\overline{\quad\quad\quad}$   
 $\uparrow$        $\uparrow$   
 $Q_1$        $Q_3$

$Q_1 = 2$   
 $Q_3 = 6$

Ex3      1, 2, 3, 4, 5, 6, 7, 8      Median = 4.5

$\overline{\quad\quad\quad}$        $\overline{\quad\quad\quad}$   
 $\uparrow$        $\uparrow$   
 $Q_1$        $Q_3$

$Q_1 = 2.5$   
 $Q_3 = 6.5$

Ex4      1, 2, 3, 4, 5, 6, 7, 8, 9      Median = 5

$\overline{\quad\quad\quad}$        $\overline{\quad\quad\quad}$   
 $\uparrow$        $\uparrow$   
 $Q_1$        $Q_3$

$Q_1 = 2.5$   
 $Q_3 = 7.5$

Interquartile Range      =  $Q_3 - Q_1$

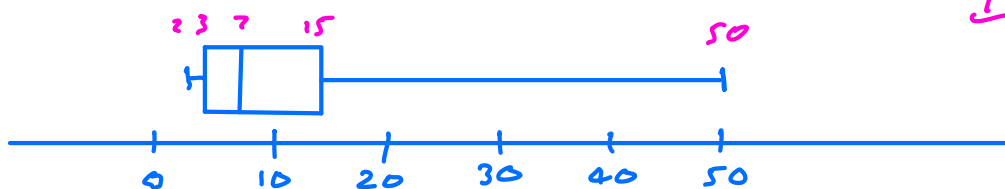
it measures the spread of the middle 50% of the data

Ex1  
Sample 1      2, 3, 3, 7, 10, 15, 50      Median = 7

$Q_1 = 3$   
 $Q_3 = 15$

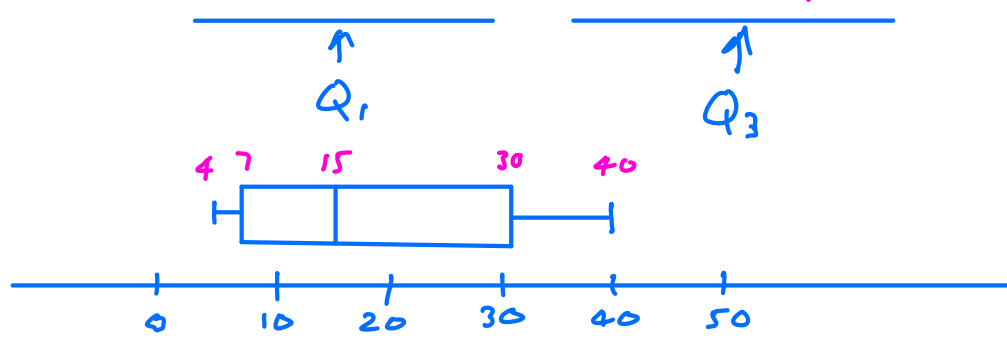
$IQR = 15 - 3 = 12$

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Ex 2  
Sample 2

4, 7, 7, 10, 20, 30, 30, 40



Median = 15

$Q_1 = 7$

$Q_3 = 30$

$IQR = 30 - 7$   
 $= 23$

Compare and contrast the two samples

On average, the data in Sample 2 is greater than the data in Sample 1. Sample 2 has a median of 15 compared to the Sample 1's median of 7

The Sample 2 data items showed more variation having an IQR 23 almost twice as big as Sample 1's IQR of 12

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