Measure of Central Tendency: Mean, Median, Mode

Non-grouped data (Without frequency)

1 Below are the points scored by two basketball teams over a 12 match series:

       Team A: 91, 76, 104, 88, 73, 55, 121, 98, 102, 91, 114, 82

       Team B: 87, 104, 112, 82, 64, 48, 99, 119, 112, 77, 89, 108

Which team had the higher mean score?

2 Calculate the median value for each of the following data sets:

   a   21, 23, 24, 25, 29, 31, 34, 37, 41

   b   105, 106, 107, 107, 107, 107, 109, 120, 124, 132

   c   173, 146, 128, 132, 116, 129, 141, 163, 187, 153, 162, 184

5 The selling prices of the last 10 houses sold in Wulverhampton were:

£146 400,   £127 600,   £211 000,   £192 500,

£256 400,   £132 400,   £148 000,   £129 500,

£131 400,   £162 500

   a   Calculate the mean and median selling prices of these houses and comment on the results.

   b   Which measure would you use if you were:

       i   a vendor wanting to sell your house

      ii   looking to buy a house in the district?

In a set of data, an **outlier** or **extreme value** is a value which is much greater than or much less than the other values. In this investigation we will examine the effect of an outlier on the two measures of central tendency.

What to do:

1 Consider the set of data: 4, 5, 6, 6, 6, 7, 7, 8, 9, 10. Calculate:

   a the mean   **b** the median.

2 Introduce the extreme value 100 to the data set. It is now 4, 5, 6, 6, 6, 7, 7, 8, 9, 10, 100. Calculate:

   a the mean   **b** the median.

3 Comment on the effect that this extreme value has on:

   a the mean   **b** the median.

4 Which of the measures of central tendency is most affected by the inclusion of an outlier? Discuss your findings with your class.

Some Thinking Questions:

9 Towards the end of the season, a netballer had played 14 matches and had an average of 16.5 goals per game. In the final two matches of the season the netballer threw 21 goals and 24 goals. Find the netballer's new average.

10 A sample of 12 measurements has a mean of 16.5 and a sample of 15 measurements has a mean of 18.6. Find the mean of all 27 measurements.

11 15 of 31 measurements are below 10 cm and 12 measurements are above 11 cm. Find the median if the other 4 measurements are 10.1 cm, 10.4 cm, 10.7 cm and 10.9 cm.

12 The mean and median of a set of 9 measurements are both 12. If 7 of the measurements are 7, 9, 11, 13, 14, 17 and 19, find the other two measurements.

Solutions:

1 Team A 91.25, Team B 91.75, $\therefore$ Team B

2 a 29 b 107 c 149.5

3 a 1.7 siblings b 1.5 siblings 4 $\approx$ 203 mm

5 a mean $=$ £163 770, median $=$ £147 200 (differ by £16 570)
The mean is affected by extreme values whereas the median is not. Thus the mean has been 'pushed up' higher than the median.

   b   i mean selling price   ii median selling price

9 17.3 goals per game   10 $\approx$ 17.7   11 10.1   12 6 and 12