KNOWLEDGE CHECK

41

MEDIANS

A cohort of 99 children in Year 5 of a primary school took a test of basic mathematics skills for which each of them was given a score out of 100. The median score was 60. Which of the following statements must be true for these children?

A None of them scored more than 60.

B 60 was the most common score obtained by the children in this cohort.

C A child with a score of 62 would have scored higher than at least 49 other children.

D A child with a score of 59 would have scored lower than at least 49 children.

ANSWERS TO KNOWLEDGE CHECK 41

C and D must be true.

DISCUSSION AND EXPLANATION OF KNOWLEDGE CHECK 41

The *median* has become a very popular kind of average (that is, a representative figure for a set of numerical data) in government education statistics. Some of the reasons for this are: it can be calculated easily; it is appropriate for use with a large set of data; it is not affected by strange behaviour at the extremes; and it can be used in harness with other measures such as quartiles and percentiles to provide a feel for how the values in the set are distributed.

The median of a set of numerical data is a simple concept. Just imagine all the data in the set lined up in order from smallest to largest. The one in the middle is the median. So, if all the children in the school were lined up in order of height, from the smallest to the tallest, the height of the child in the middle, say 148 cm, would be the median height. This means that someone who is taller than 148 cm is 'taller than average', in the sense that they are in the top 50% for height. Someone shorter than 148 cm is 'shorter than average' in the sense that they are in the bottom 50% for height.

In the example in this knowledge check, the median score is 60 points. This means that if all the children in this set were lined up in order from the lowest score to the highest, the child standing in the middle of the line would have a score of 60. (No doubt there will be a number of children either side of this child who have also scored 60.) Anyone scoring more than 60 points is therefore in the top half of scores and anyone scoring less than 60 points is in the bottom half. A child scoring 62 has definitely scored higher than at least 50% of the group. A child scoring 59 has definitely scored lower than at least 50% of the group. So, the median simply enables us to relate an individual value to the one in the middle. That's all it does!

People can get in a tangle trying to decide precisely where *is* the middle of a set of data. For a set of 99 items, for example, the middle one is clearly the 50th, because there are 49 other items either side of this one. But what about a set with an even number of items, such as 100 items? There isn't a middle item now. In this case, technically, the median is taken to be halfway between the two values in the middle, i.e. halfway between the 50th and 51st.

But, in practice, since the median is normally used for a large set of data, this is neither here nor there. The two values in the middle will probably be the same anyway.

SUMMARY OF KEY IDEAS

- For a (large) set of numerical data, the median is the value of the item in the middle when they are arranged in numerical order from lowest to highest.
- A value higher than the median is greater than at least 50% of the items in the set.
- A value lower than the median is less than at least 50% of the items in the set.

FURTHER PRACTICE

41.1 St Anne's School has English timetabled for $4\frac{3}{4}$ hours a week for its Year 3 classes, out of a total teaching timetable of $21\frac{1}{2}$ hours per week. National data indicates that the median percentage of the teaching week for all primary schools that is devoted to English in Year 3 classes is 25.0%. What does this tell us about St Anne's?