Check-Up

36

Calculating means

Two parallel mathematics classes in Year 7 took the same test. Their marks out of 50 were recorded as follows:

Class A: 43, 23, 26, 49, 40, 35, 37, 38, 25, 26, 47, 35, 38, 35, 33, 34, 39, 27, 29, 21

Class B: 32, 35, 38, 27, 32, 34, 23, 37, 21, 45, 42, 30, 40, 34, 32, 37, 21, 30, 29, 31, 20

Their teachers calculate the mean marks scored by each class in the test.

a) What is the mean mark of the pupils in Class A?

b) What is the mean mark of the pupils in Class B?

c) What can you deduce from the comparison of these two means?

Answers to check-up 36

a) 34. b) 31.9. c) very little.

Discussion and explanation of check-up 36

Given a set of data, such as those in this example, we often find it helpful to use some kind of figure that is representative of the whole set. Such a figure is called an *average*. The *mean* (also called the *arithmetic mean*) is a kind of average. To calculate the mean of a set of numbers, you simply add them all up and divide by however many of them there are. We might want to calculate the mean of a set of data for a number of reasons. For example, we might want to know how well a particular set of pupils is doing compared to some national norms or targets. Or, we might want to compare the performance of one group with another as part of an evaluation of some factor that we suspect might be related to their achievements.

The total of the scores for Class A is 680. There are 20 pupils in this class who took the test, so we divide this 680 by 20, giving the mean score to be 34. Imagine giving a counter to each pupil for each mark they score, then putting all the counters into a pot and sharing them out again equally between all the pupils. Each pupil would finish up with 34 counters. That's why the mean is calculated in this way and why it is used as one score to represent all the scores in the set.

The total of the scores for Class B is 670. There are 21 marks in this set. So the mean mark is 670 ÷ 21, which, using a calculator, comes to 31.9 (rounded to one decimal place). If you have to round a calculator answer, good practice is to give the value of the mean to one more decimal place than is used for the original numbers in the set. Since our set contains only whole numbers I have therefore rounded the mean to just one decimal place.

Comparing these two means we note that Class A achieved a higher mean score (34) than Class B (31.9) in this test on this occasion. But that's about all we can say. If the classes are parallel then we might expect the means to be about the same. But is 34 about the same as 31.9 or not? To judge whether the difference of 2.1 in their mean scores is significant we would have to examine the data more closely. We would consider, for example, the spread (dispersion) of scores achieved in the test. We might also gather more data about the classes' mathematical performance on a number of different occasions, using a

range of assessment procedures. It also depends on what the reason is for finding the means.

Summary of key ideas

- An average is a value used as a representative figure for all the values in a set.
- The mean, also called the arithmetic mean, is one kind of average.
- To find the mean, add up all the values in the set and divide by the number of values.
- If you have to round the answer, give it to one more decimal place than is used for the values in the set.
- Be cautious in reading significance into comparisons based only on mean scores.

Further practice

36.1 School X has 12 classes, with the following numbers of pupils in them: 23, 35, 30, 32, 31, 29, 27, 28, 24, 26, 33, 25. School Y has 16 classes, with the following numbers of pupils in them:24, 25, 26, 28, 27, 31, 24, 28, 25, 24, 27, 29, 32, 30, 30, 24. Find the mean class-size for each of the two schools. Why might these means be calculated?

36.2 To evaluate the progress of their pupils from one national assessment to the next, schools are encouraged to calculate the 'average (mean) points score' for each subject in each assessment. The table shows the points awarded for each level in the Key Stage 3 English tests, as prescribed by the DfES Standards and Effectiveness Unit, and the numbers of pupils in one secondary school achieving these levels. Calculate the mean points score. When this statistic has been calculated, what kind of meaning does it have?

Level	3 or below	4	5	6	7	8	Exceptional performance
Points	21	27	33	39	45	51	57
No.of pupils	16	32	40	25	8	6	2