



THE CENTRAL LINE

handout number

6.26

Activity type Consolidation

This is an exercise on various aspects of measures of central tendency. Firstly, students have to write advantages and disadvantages into a table, and then

have to apply other knowledge about these measures to answer questions.

Practical use

Individual: useful as assessment but could be homework.

Answers

- mean = 12 median = 12 mode = 12
 - mean = 5.7 median = 5.5 mode = 5
- The median score. The mean would be distorted by a single high score (49) and there is no modal score.
- The pocket money would be calculated by using the most frequent amount given to class members. It has the advantage over the mean of not being distorted by extreme scores, e.g. by a child (or few children) being given very large amounts of pocket money or none at all.
- The mode. With category data (nominal data) this is the only measure of central tendency available.
- If you have individual data and no extreme scores, use the mean because it is the only measure of central tendency which takes account of all the results.
 - If you have a few extreme scores (especially if they are in one direction) use the median because the mean may be distorted.
 - The mode is never the best option on its own unless the data is in categories. However, it is sometimes useful to express the modal score (e.g. which was the most common score on how many words people could recall) *in addition to* other measures of central tendency.

(this advice comes mainly from the exam tip on page 192)

SPREAD THE WORD

handout number

6.27

Activity type Application

An exercise to help students become aware of what measures of dispersion (range and standard deviation) imply.

Practical Use

Individual: homework or classwork

Answers

- The mean score for each clown is very similar but the range and standard deviation differ widely. What does this tell us about the ratings for Krusty as compared to the ratings for Bozo? Give as much information as you can. (3)

As indicated by both the range and standard deviation, the ratings for Krusty are far more variable than the ratings for Bozo. Using the range alone, this could be due to one anomalous result but the difference in sd indicates that this is not the case and the variation is consistently more extreme for Krusty than for Bozo. Since the means are very similar, this indicated that Krusty had both higher and lower scores than Bozo. Bozo's ratings are likely to have been very consistent, not extreme, clustering around the mean.
 - If you wanted to be confident that the clown would not hugely disappoint, which one would you choose and why? (2)

Bozo because very few people rated him very low so he is less likely to *hugely* disappoint.

There is a maximum score of 10 and Krusty's range is 9, therefore his scores are 1 to 9 or 2 to 10. Bozo's top score must be above the mean so the range is going to be 4 to 6 or 5 to 8.



c) If you had to select one of these clowns for a national competition for the funniest clown, which would it be and why? (2)

Krusty because some people obviously rated him very highly indeed (you can tell this from the range) whereas few people rated Bozo very highly (or very low). So Krusty is more likely to get a very high score.

(You might select the more reliable clown but he is never going to be best with a maximum possible score of 7.)

2. a) What is the advantage of using the range rather than the standard deviation? (1)

The range is much easier to calculate than the standard deviation.

b) What is the advantage of using standard deviation rather than range? (1)

The standard deviation takes account of all scores and is not as distorted by anomalous scores. It is therefore more representative of the general spread than is the range.

3. Matthew carries out a study of conformity using a questionnaire that gives scores between 0 and 20. He finds that the mean score is 7, the mode is 10 and the median is 8. If he draws a distribution curve will the data have a normal distribution, a positive skew or a negative skew? Give a reason for your answer. (2)

It gives a negative skew because the mode is higher than the mean or median.

4. Using the graph, answer the following questions:

In the total population of the U.K. the arithmetic mean of I.Q. scores is 100 and the standard deviation is 15.

a) What approximate percentage of the U.K. population have I.Q. scores between 100 and 115? (2)

b) Between which two scores do approximately 95% of the population of the U.K. fall? (2)

c) What approximate percentage of the U.K. have scores above 115? (2)

a). 34% b) 70 and 130 c) 16%

5. An arithmetic test is given to 200 children. The test has been standardised and scores are normally distributed. The mean of the test is 50 and the standard deviation is 6.

a) Approximately how many children will score between 44 and 56 on this test? (1)

b) Approximately how many children will score above 56? (1)

c) What is likely to be the median score for the 200 children? (1)

a) 136 (68% of 200 = $68/100 \times 200$)

b) 32 (16% of 200 = $16/100 \times 200$)

c) 50 (the same as the mean).