

Measures of Centrality

- The mode of nine numbers 2, 3, 7, 4, 9, 2, x , 3, 5 is x .
 - How many different vales of x are possible?
 - Given that x is also the median of nine values, what is the exactly value of x ?

Week	One	Two	Three	Four	Five
Test result	2	7	9	2	8

- Which of the three measures of average (mean, mode, median) would Dani use to describe her results to her parents if she wants to show her results in the best possible light?
Give a reason for your answer.

- Ten people state their approximate annual incomes.

€150k	€35 k	€500 k	€35 k	€200 k
€35 k	€50 k	€100 k	€28 k	€80 k

- What is the mode? Why is it not a very meaningful average?
 - What is the mean? Why is it not a very meaningful average?
 - What is the median?
- Four numbers are 7, 18, W , 10.
 - If their median is 12, find the value of W .
 - If their mean is 12, find the value of W .
 - if their range is 17, find the possible values of W .
 - The mean height of a group of students is 181cm. Another student whose height is 163cm joins the group. The mean height of the group is now reduced to 179cm. What was the number of students in the original group?
Find (a) the mean, (b) the median, (c) the mode, and (d) the midrange of the following questions.
 - Twelve secretaries were given a typing test, and the times (in minutes) to complete it were:
8,12,15,9,6,8,10,9,8,6,7,8

7. ten novels were randomly selected, and the numbers of pages were recorded as:
415, 398, 402, 399, 400, 405, 395, 401, 412, 407
8. The following data are the number of burglaries reported in 1996 for nine western Pennsylvania universities. Which measure of average might be the best in this case? Explain your answer.
61, 11, 1, 3, 2, 30, 18, 3, 7
9. The number of hospitals for the five largest hospital systems is shown here.
340, 75, 123, 259, 151
10. The calories per serving of 11 fruit juices are shown here.
150, 110, 100, 35, 60, 130, 40, 140, 120, 160, 110
11. The exam scores of 18 English composition students were recorded as: 78, 62, 98, 90, 88, 73, 79, 86, 81, 84, 93, 97, 63, 59, 78, 82, 87, 93
12. During 1993, the major earthquakes had Richter magnitudes as shown here.
7.0, 6.2, 7.7, 8.0, 6.4, 6.2, 7.2, 5.4, 6.4, 6.5, 7.2, 5.4

1 Tables

1. A department store carried out a survey on the length of time a number of people spent shopping in their store. The table shows the length of time spent shopping, in 10-minute intervals.

Time interval in minutes	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of Shoppers	30	x	24	30	40	20	10

Note: 0-10 means 0 is included but 10 is not etc.

- (a) If the average number of shoppers for the first, second and third intervals was 30, calculate the value of x .
 - (b) Using mid-interval values, calculate the average shopping time in the store.
 - (c) What is the least number of shoppers who completed their shopping within 35 minutes?
 - (d) In which class interval does the median lie?
 - (e) Name the modal class.
 - (f) Comment on the mean, mode and median values you found. Do you consider that any one of the three averages is better or worse than the others to help describe the situation? Explain your reasoning.
 - (g) Describe two difficulties the store may have encountered while carrying out this survey.
2. The result of a survey of the number of passengers carried by taxi in a town was recorded as follows.

Number of passengers	1	2	3	4	5
Number of taxis	3	t	9	6	4

- (a) If the mean number of passengers carried by taxi was 3, find the value of t .
- (b) How many taxis were in the survey?
- (c) Is the given data discrete or continuous?
3. The following grouped frequency distribution table shows the number of hours secondary school students spent watching TV in one particular week.

Time in hours	4-6	6-8	8-10	10-12	12-14
Number of students	2	8	5	x	3

Note: 4-6 means 4 is included but 6 is not, etc.

- (a) Using mid-interval values, the mean time spent watching TV was calculated to be 9 hours. Find the value of x .
- (b) A comment was made that this frequency distribution table was not representative of the time spent by secondary school students watching TV. By doing a survey in your own class or otherwise, make a statement in response to the comment.
4. People attending a course were asked to choose one of the whole numbers from 1 to 12. The results were recorded as follows.

Number	1-3	4-6	7-9	10-12
Number of people	4	7	x	8

- (a) Using mid-interval values, 7 was calculated as the mean of the numbers chosen. Find the value of x .
- (b) Is the given data discrete or continuous?
- (c) Carry out a similar class survey. Construct a suitable frequency distribution table and find (a) the mean (b) the mode (c) the median.

5. The stem-and-leaf diagram below records the weights (in grams) of 35 plums.

2	6
3	1, 3, 4
3	6, 6, 8, 8, 9
4	2, 2, 2, 3, 4, 4, 4, 4
4	5, 5, 5, 6, 6, 7, 7, 7, 7, 9
5	0, 1, 2, 2
5	6, 7, 8
6	1

- (a) Describe the shape of the distribution.
- (b) What are the mean and the median of the distribution?
6. the following frequency distribution shows the time (in minutes) taken by a group of people to complete a five-mile run.

Time	30-35	35-40	40-45	45-50	50-55
Frequency	10	6	22	29	7

Note: 30-35 means 30 is included but 35 is not, etc.

- (a) Using mid-interval values, calculate the mean time.
- (b) What is the maximum number of people who could have completed the run in less than 37 minutes?
7. The frequency distribution shows the ages of people living in a street.

Age	0-20	20-30	30-50	50-80
Frequency	24	16	41	15

Note: 0-20 means 0 is included but 20 is not.

- (a) How many people are living on the street?
- (b) Estimate the mean age.
- (c) What percentage of the people are less than 20 years old?

8. The following are the daily maximum temperatures in Dubai for the month of June (in degrees Celsius).

29.2	29.4	34.1	36.3	36.5	32.1	32.0	35.7	35.6	34.9
36.2	32.3	32.6	36.5	33.8	32.1	32.2	38.8	36.5	35.7
31.1	33.9	34.7	34.3	37.3	40.9	33.8	32.2	40.9	34.2

- (a) Is this data discrete or continuous? Explain.
 (b) Complete the frequency table below.

Temperature	29-31	31-33	33-35	35-37	37-39	39-41
Tally						
No.of Days						

Note: 29-31 means that 29 is included but 31 is not, etc.

- (c) Draw a histogram of the distribution.
 (d) Describe the distribution.
 (e) Rank the raw data and find the median.
 (f) Using mid-interval values, estimate the mean of the distribution.
 (g) Now using the raw data, calculate the mean.
 (h) What is the percentage error in the estimated mean?

2 Mean, Median, Mode

- Describe which average you would use for each of the following. Give a reason for your answer.
 - The average height of students in your class.
 - The average eye colour of all teachers in the school.
 - The average mark in a maths exam.
 - The average colour of all cars in the school car park.
 - The average wage of 100 workers in a company, given that 90 of the workers earn between EUR30,000 and EUR40,000 per annum, five workers earn between EUR60,000 and EUR80,000 and the remaining five workers earn over EUR600,000 per annum.
- Write down the type of average in each case:
 - This average uses all values of data.
 - This average is used with categorical data.
 - This average is useful with data that contains extreme values.
- Below is some data selected at random from the CensusAtSchools database. The data gives the different modes of transport the group uses to go to school.

walk	bus	walk	walk	walk
bus	walk	car	car	bus
walk	bus	car	walk	walk
car	rail	bus	walk	rail

- (a) What type of data is contained in this sample?
- (b) What average are you using when you refer to the most popular mode of transport used by these students?
4. Rex has just been given the result of his last maths test. He does not know the results his classmates received, but would like to know how his result compares with those of his friends. The teacher has given the class the modal mark, the mean mark and the median mark for the test.
- (a) Which average tells Rex whether he is in the top half or the bottom half of the class?
- (b) Is the modal mark useful to Rex? Explain.
- (c) Which average tells Rex how well he has done in comparison to everyone else?
5. Find the mean and the median of the following set of numbers:

1, 2, 12, 12, 18, 19, 20, 24, 188

Which average would you use to describe these numbers? Give a reason for your answer.

7 was calculated as the mean of the numbers chosen. Find the value of x .

- (a) Is the given data discrete or continuous?
- (b) Carry out a similar class survey. Construct a suitable frequency distribution table and find (a) the mean (b) the mode (c) the median.