

Mean, median and mode

About 55 minutes Calculator allowed 49 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/stats-mean-median-and-mode/

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks]

A class has 10 boys and 20 girls. The boys' mean test mark is 80 and the girls' mean test mark is 74. Find the mean mark for the whole class.

Answer

A2 Last lesson [2 marks]

A cumulative frequency graph shows the marks of 200 students. Reading up from 40 gives a cumulative frequency of 71. How many of the students had 40 or less, and what percentage of the students is that?

Answer

- A3** Maths skill [2 marks]

Write 480 g : 0.4 kg as a ratio in its simplest form.

Answer

A4 Maths skill [2 marks]

$\frac{3}{8}$ of 40 is equal to $\frac{1}{4}$ of B . Find B .

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

The prices, in £1000s, of seven houses in a street are 185, 192, 198, 204, 210, 215 and 960. Work out the mean and the median. Which average better represents a typical price? Give a reason.

Hint Look for a value far from the rest.

- B1** [4 marks]
- Eight students did a puzzle. Their times, in minutes, were 12, 14, 15, 15, 17, 18, 19 and 58. Work out the mean and the median. Which average better represents a typical time? Give a reason.
- _____
- _____

EXAMPLE 2

The table shows the number of goals scored in 30 football matches. Work out the mean, the median and the mode.

Goals	0	1	2	3	4
Frequency	6	9	7	5	3

Hint Mean = $\Sigma fx \div \Sigma f$. The median is the middle of the 30 matches.

EXAMPLE 3

In a test, 24 students in Group A had a mean mark of 62, and 26 students in Group B had a mean mark of 70. Work out the mean mark of all 50 students.

Hint Find each group's total mark first.

EXAMPLE 4

A job applicant is scored on an interview (weight 50%), a test (30%) and a reference (20%). She scores 72, 85 and 60. Work out her weighted mean score.

Hint Multiply each score by its weight, then add.

EXAMPLE 5

A shop's sales rose by 10%, rose by 25%, then fell by 4% over three years. Use the geometric mean to find the average yearly percentage change. Explain why the mean of 10, 25 and -4 is not used.

Hint The multipliers are 1.10, 1.25 and 0.96.

B2 The table shows the number of pets in each of 40 homes. [4 marks]

Work out the mean, the median and the mode.

Pets	0	1	2	3	4
Frequency	5	12	11	8	4

Answer

B3 A running club has 18 members in the morning [2 marks]

group, with a mean 5 km time of 31.5 minutes, and 12 in the evening group, with a mean of 28 minutes. Work out the mean time of all 30 members.

Answer

B4 A café sold 120 teas at £1.80, [2 marks]

200 coffees at £2.40 and 80 hot chocolates at £2.75 in a day. Work out the mean price of a drink sold.

Answer

B5 The number of members of a gym changed by +2%, +15% [3 marks]

and -6% in three years. Work out the geometric mean of the multipliers, and interpret it. Give the percentage to 1 decimal place.

C Practice

- C1** The mean mass of 9 parcels is 4.2 kg. One of them, of 11.4 kg, was weighed wrongly and is removed. Work out the mean mass of the other 8 parcels. [2 marks]

Answer

- C2** Leo says, "The shop should use the mean shoe size to decide which size to order most of." [2 marks]

A shoe shop records the size of every pair it sells. Is Leo right? Give a reason.

- C3** The mean of six test marks is 15. [2 marks]
A seventh mark is added and the mean becomes 16. Work out the seventh mark.

Answer

- C4** A firm has 20 workers who earn between £21 000 and £34 000 a year, and a director who earns £240 000. Explain why the median is a better average than the mean for the salaries at this firm. [2 marks]

- C5** In a survey, 4 students read no books, x students read 1 book, 10 read 2 books and 6 read 3 books last month. The mean number of books read was 1.6. Work out x . [3 marks]

Answer

D Exam-style questions

- D1** The manager says, "The mean output of all 40 workers is $(46 + 38) \div 2 = 42$ units." [3 marks]

At a factory, 30 day-shift workers made a mean of 46 units each, and 10 night-shift workers made a mean of 38 units each. Is the manager correct? You must show your working.

D2 The table shows the number of days that each of 40 pupils was absent in a term.

Days absent	0	1	2	3	4	20
Frequency	12	10	8	5	4	1

(a) Work out the mean number of days absent. [2 marks]

Answer

(b) The head teacher wants one number to describe a typical pupil's absence. [2 marks]
Should she use the mean or the median? Give a reason.

Total for D2: 4 marks

D3 A bus ticket's price changed over three years. Its chain base index numbers were 112, 95 and 108.

(a) Work out the geometric mean of the index numbers, to 1 decimal place. [3 marks]
Interpret your answer in context.

(b) Mia says, "The mean of 112, 95 and 108 gives a 5% rise a year, so it is just as good." Explain why the geometric mean is better. [2 marks]

Total for D3: 5 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1

The value of a painting rose by the same percentage in each of two years, then fell by 20% in the third year. The geometric mean yearly change over the three years was +2%. Work out the percentage rise in each of the first two years, to 1 decimal place.

[3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1**

Hint 1

Write the three multipliers: m , m and 0.8.

Hint 2

$m \times m \times 0.8 = 1.02^3$.

Hint 3

$m^2 = 1.061208 \div 0.8 = 1.32651$, so $m = 1.1517$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can choose the best average and say why.
- I can find averages from a frequency table, and combined and weighted means.
- I can find and interpret a geometric mean.