

Y8 Maths Knowledge Organiser Topic 6: Averages

What must I be able to do?	Key vocabulary
<ul style="list-style-type: none"> <input type="checkbox"/> Find the mode ➤ Sparx M841 <input type="checkbox"/> Median ➤ Sparx M934 <input type="checkbox"/> Find the mean average, interpreting average as "total amount ÷ number of items" ➤ Sparx M940 <input type="checkbox"/> Reverse mean questions <input type="checkbox"/> Solve word problems involving averages ➤ Sparx M440 <input type="checkbox"/> Range ➤ Sparx M328 <input type="checkbox"/> Compare using averages 	<p>Average A value that is <u>representative</u> of a <u>set of data</u>. The mean, median and mode are all types of average.</p> <p>Mean A single value used to represent a set of numbers. The mean is calculated by taking the <u>sum</u> of the set of numbers and <u>dividing by the amount of numbers</u> in the list.</p> <p>Median The <u>middle value</u>, when a list of numbers is written in <u>ascending order</u>. If there is an even amount of numbers, the median is the mean of the two middle numbers.</p> <p>Mode The value that <u>occurs the most</u> in a set of values. The values do not need to be numbers.</p> <p>Range The <u>difference</u> between the <u>highest</u> value and the <u>lowest</u> value in a set of numbers. Calculated by subtracting the smallest from the highest value. The range is a measure of spread, not an average.</p>

Types of averages

e.g. Given this list of numbers 3, 7, 5, 4, 7

Mean: $3 + 7 + 5 + 4 + 7 = 26$

$26 \div 5 = 5.2$

The mean value is 5.2

Median: First, write in ascending order

3, 4, 5, 7, 7

Only 5 in the middle

The median value is 5.

Mode: The number which appears the most is 7. (7 appears twice)

The modal value is 7.

e.g. Given this list of numbers 7, 9, 3, 5

Mean: $7 + 9 + 3 + 5 = 24$

$24 \div 4 = 6$

The mean value is 6

Median: First write in ascending order

3, 5, 7, 9

5 and 7 in the middle.

The median value is 6

$5 + 7 = 12$

$12 \div 2 = 6$

Mode: Each number appears an equal number of times (only once)

There is no mode.

Range

e.g. Given the list of numbers 3, 6, 10, 3, 5, 8 the range is the largest (10) subtract the smallest (3). $10 - 3 = 7$. The range is 7.

Comparing data

When comparing data you should write two statements, one comparing an average (mean, median or mode) and another comparing the spread (range).

E.g. Joe and Emma are testing frisbees. They each throw their frisbee 3 times and measure how far it travels in metres.

Joe's results are: 13.2, 17.6 and 11.5

Emma's results are: 14.5, 13.9 and 14.8.

Compare the results.

Joe's mean average: $13.2 + 17.6 + 11.5 = 42.3$ $42.3 \div 3 = 14.1\text{m}$

Joe's range is $17.6 - 11.5 = 6.1\text{m}$

Emma's mean average: $14.5 + 13.9 + 14.8 = 43.2$ $43.2 \div 3 = 14.4\text{m}$

Emma's range is $14.8 - 13.9 = 0.9$.

So, on average Emma's frisbee went further as $14.4 > 14.1$.

Emma's frisbee was also more consistent as her range was only 0.9 while Joe's range was 6.1m.

Reverse mean questions

With these you need to find the total amount by working backwards. It usually involves multiplying the mean by the number of values.

e.g. The mean height of 4 basketball players is 1.88m. A 5th player joins who is 1.96m tall. What is the new mean height of all 5 players?

First, find the total height of the original 4. $4 \times 1.88 = 7.52\text{m}$

New total height is therefore $7.52 + 1.96 = 9.48\text{m}$

New mean height is $9.48 \div 5 = 1.896\text{m}$