WALT Find the Mean, Mode, Median and Range

Success Criteria - I can
- Order numbers from smallest largest
- Find the smallest and largest number
- Divide numbers to find the 'mean'
- Locate the middle number to find the 'median'
- If there are two middle numbers when calculating the 'median', I know that I need to find the average of the two.

1. Teaching in class and practice

- The **range** of a set of **data** is given by:
  Range = highest number − lowest number

  $$1 \quad 5 \quad 2 \quad 7 \quad 5 \longrightarrow \text{range} = 6$$

  lowest ↑   highest ↑

- The **mean** of a set of data is given by:
  Mean = (sum of all the values) ÷ (total number of values)

  $$1 + 5 + 2 + 7 + 5 = 20 \longrightarrow \text{mean} = 4$$

- The **median** is the middle value if the values are sorted from lowest to highest. If there are two middle values, then add them together and divide by 2.

  $$1 \quad 2 \quad (5) \quad 5 \quad 7$$

  middle ↑ → median = 5

- The **mode** is the most common value. It is the value that occurs most frequently. We also say that it is the value with the highest frequency.

  $$1 \quad 2 \quad (5)(5) \quad 7 \longrightarrow \text{mode} = 5$$

Range The difference between the highest and lowest numbers in a set

Data Information (often numerical) gathered by observation, survey or measurement

Mean An average value calculated by dividing the total of a set of numbers by the number of values

Median The middle score when all the numbers in a set are arranged in order

Mode The score that appears most often in a set of numbers

ISBN: 9781107630833   © David Greenwood et al. 2013   Cambridge University Press

Warm-up activity

1   Write the numbers 1, 8, 3, 7, 2 from smallest to largest.

2   John finds that the ages of people in a room are 12, 35, 17, 8, 10 and 26 years.
   a   What is the age of the youngest person?
   b   How old is the oldest person?

Example 1

Finding the range, mean, median and mode

Consider the ages of seven people who are surveyed in a shop:
15, 31, 12, 47, 21, 65, 12

a Find the range of values.
b Find the mean of this set of data.
c Find the median of this set of data.
d Find the mode of this set of data.

Solution	Explanation
a Range = 65 − 12 = 53	Largest number = 65 Smallest number = 12
b Mean = 203 ÷ 7 = 29	Sum of values = 15 + 31 + 12 + 47 + 21 + 65 + 12 = 203 Number of values = 7
c Values: 12, 12, 15, **21**, 31, 47, 65 Median = 21	Place the numbers in ascending order. The middle value is 21.
d Mode = 12	The most common value is 12.

Practice in class

3 Consider the set of numbers 1, 5, 2, 10, 3.
  a Write the numbers from smallest to largest.
  b State the largest number.
  c State the smallest number.
  d What is the range?

4 Consider the numbers 5, 6, 1, 10, 8.
  a What is the sum of these numbers?
  b How many numbers are there?
  c Find the mean of the numbers.

> Add the numbers to find the sum.

5 Consider the data 2, 5, 6, 9, 10, 12, 20.
  a Copy and complete:
    When the numbers are listed in order, the middle number is called the _____.
  b State the median of the numbers.

6 The values in a set of data are 2, 8, 3, 5, 2, 7, 2.
  a Copy and complete:
    The most common value is called the _____.
  b State the mode of the values.

Finding the median with an even number of values (practice)

Find the median of 2, 7, 10, 12, 15, 23.

Solution	Explanation
10 and 12 are in the middle. Median = 11	Once the numbers are in ascending order, the two middle values are 10 and 12. The median is $(10 + 12) \div 2 = 11$

9 Find the median of:
  a 3, 8, 10, 14, 16, 19   **b** 2, 7, 8, 10, 13, 18
  c 1, 5, 2, 9, 13, 17   **d** 5, 2, 3, 11, 7, 15

10 For each of the following sets of data, calculate the mean and the mode.
  a 1, 7, 1, 2, 4   **b** 2, 2, 10, 8, 13
  c 3, 11, 11, 14, 21   **d** 25, 25, 20, 37, 25, 24
  e 1, 22, 10, 20, 33, 10   **f** 55, 24, 55, 19, 15, 36

> The mode is the most common value. The mean is the sum of all values divided by the number of values.

Printing

Challenge card one

11 Brent and Ali make a table to show their test marks for a number of topics in Maths.

Test	1	2	3	4	5	6	7	8	9	10
Brent	58	91	91	75	96	60	94	100	96	89
Ali	90	84	82	50	76	67	68	71	85	57

a   Which boy has the higher mean?
b   Which boy has the higher median?
c   Which boy has the smaller range?
d   Which boy do you think is better at tests? Explain why.

Challenge Card Two

12 The number of aces that a tennis player serves per match is recorded over eight matches.

Match	1	2	3	4	5	6	7	8
Number of aces	11	18	11	17	19	22	23	12

a   What is the mean number of aces the player serves per match? Round your answer
    to 1 decimal place.
b   What is the median number of aces the player serves per match?
c   What is the range of this set of data?

13 The children playing in a room are aged 3, 7, 8 and 10 years.
   a   What is the mean of these ages?
   b   An adult enters the room and the mean age is doubled.
       How old is the adult?

You could guess the
adult's age and find the
mean. Keep adjusting your
guess until you get the
correct mean.

Challenge three

14 A soccer goalkeeper records the number of saves he makes per game during a season. He presents his records in a table.

Number of saves	0	1	2	3	4	5
Number of games	4	3	0	1	2	2

a In how many games did the keeper make 5 saves?

b How many games did he play this season?

c How many saves in total did he make this season?

d What is the mean number of saves per game this goalkeeper made?

e What is the most common number of saves that he had to make during a game?

f Do these statistics tell you whether the goalkeeper's team was good or bad? Why?

1 1, 2, 3, 7, 8

2 a 8   **b** 35

3 a 1, 2, 3, 5, 10   **b** 10   **c** 1   **d** 9

4 a 30   **b** 5   **c** 6

5 a median   **b** 9

6 a mode   **b** 2

7 a 9   **b** 12   **c** 9   **d** 7

8 a 10   **b** 8   **c** 3

  d 7   **e** 15   **f** 56

9 a 12   **b** 9   **c** 7   **d** 6

10 a mean = 3, mode = 1   **b** mean = 7, mode = 2

   c mean = 12, mode = 11   **d** mean = 26, mode = 25

   e mean = 16, mode = 10   **f** mean = 34, mode = 55

11 a Brent   **b** Brent   **c** Ali   **d** Brent

12 a 16.6   **b** 17.5   **c** 12

13 a 7   **b** 42

14 a 2   **b** 12   **c** 24

  d 2   **e** 0 saves   **f** Answers will vary.