

## Averages and range from a list of values

### Starter

1. (Review of last lesson)

Work out the 4–point moving averages for this data: 5, 10, 11, 14, 13, 22, 27, 26

**Working:** 1st moving average =  $\frac{5 + 10 + 11 + 14}{4} = 10$

The 4–point moving averages are: 10, 12, 15, 19, 22

2. (Review of previous material)

Twenty customers gave a restaurant a mark out of 10. Their marks are below:

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

Find:

- (a) the mode.
- (b) the median mark.
- (c) mean mark.
- (d) range

**Working:** (a) The mode is 7 as it the most common mark.

(b) Put in increasing order:

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

Cross out from front and back:

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

Median = 5.5 (the mean average of the 2 middle values)

(c) Mean =  $\frac{3+7+4+8+3+7+5+2+8+9+9+6+1+3+4+5+6+5+7+7}{20}$   
 $= \frac{109}{20}$   
 $= 5.45$

(d) Range = largest value – smallest value = 9 – 1 = 8

**E.g. 2** The mean average salary of 6 employees at a company is £23,000. The boss earns £43,000. What is the mean average, to the nearest £, of all people at the company?

**Working:** Total salaries =  $6 \times 23000 + 43000 = 181000$

Mean average of employees =  $\frac{181000}{7} = \text{£}25857$  (nearest pound)

**E.g. 3** The mean average for the first 7 long jump competitors was 4.52 m. After the 8th competitor the mean changed to 4.56 m. How far did the 8th competitor jump?

**Working:** Let  $x$  be the length of the final jump.

$$x + 7 \times 4.52 = 8 \times 4.56$$

$$x = 8 \times 4.56 - 7 \times 4.52$$

$$x = 4.84$$

The 8th jump was 4.84 m long.

**N.B.**  $7 \times 4.52$  is the total distance of the first 7 jumps

$8 \times 4.56$  is the total distance of all 8 jumps

**E.g. 4** For a set of six data values the mode is 12, the median is 13, the mean is 14 and the range is 11. Given that the maximum value is 20, find the other values.

**Working:** Maximum value is 20:  $\underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{\quad}, 20$   
Range is 11 so minimum value is  $20 - 11 = 9$   
Mode is 12: so there must be at least two 12s  
 $9, 12, 12, x, y, 20$   
Median is 13 so the the middle two values must average 13 i.e.  $x = 14$   
 $9, 12, 12, 14, y, 20$   
**Mean is 14:** 
$$\frac{9 + 12 + 12 + 14 + y + 20}{6} = 14$$
  
**Multiply by 6 and simplify:**  $y + 67 = 84$   
Subtract 67 from both sides:  $y = 17$   
The **other** values are 9, 12, 12, 14 and 17.

**Video:** [Mean](#)  
**Video:** [Mode](#)  
**Video:** [Median](#)  
**Video:** [Range](#)

[Solutions to Starter and E.g.s](#)

### Exercise

9-1 class textbook: p469 M14.1 Qu 1-3, 5-13 (Qu 4 needs simultaneous equations)  
A\*-G class textbook: p423 M14.1 Qu 1-6, 8-15 (Qu 7 needs simultaneous equations)  
9-1 homework book: p160 M14.1 Qu 1-4, 6-11 (Qu 5 needs simultaneous equations)  
A\*-G homework book: p117 M14.1 Qu 1-4, 6-10 (Qu 5 needs simultaneous equations)