

## § 4.3 THE RANGE AND THE MODE

- ✦ The **range** is a measure of spread. It is the difference in value between the highest and the lowest values. **Range = highest value – lowest value.**
- ✦ The **mode** is the value that occurs most often amongst all the data items. It is the value having the greatest frequency.

EXAMPLES	SOLUTIONS										
1) Find the <b>range</b> and the <b>mode</b> of the following raw data: 2, 3, 1, 2, 4, 4, 1, 3, 2, 4, 2, 2, 1	<p>We can arrange the data in ascending order: 1, 1, 1, <u>2, 2, 2, 2</u>, 3, 3, 4, 4, 4</p> <p>OR we can use a frequency table:</p> <table border="1"> <tr> <td><b>data</b></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td><b>frequency</b></td> <td>3</td> <td>4</td> <td>2</td> <td>3</td> </tr> </table> <p>Range = highest value – lowest value = 4 – 1 = 3</p> <p>The data item occurring most often (having the greatest frequency) is 2, so the <b>Mode = 2.</b></p>	<b>data</b>	1	2	3	4	<b>frequency</b>	3	4	2	3
<b>data</b>	1	2	3	4							
<b>frequency</b>	3	4	2	3							
2) Find the <b>range</b> and the <b>mode</b> of the following data: 3, 4, 6, 4, 1, 5, 6, 1, 3, 5	<p>Arrange the data in ascending order: 1, 1, 3, 3, 4, 4, 5, 5, 6, 6,</p> <p>Range = highest value – lowest value = 6 – 1 = 5</p> <p>There is <b>no mode</b>, since no one data item occurred more frequently than any of the others.</p>										
3) Find the <b>range</b> and the <b>mode</b> of the data on the frequency table:	<p>Range = highest data value – lowest data value = 5 – 1 = 4</p> <p>The outcomes 2 and 4 each have the greatest frequency of <b>5</b>, so there are <b>two</b> modes. We say that the set of data is <b>bimodal</b>. The <b>Modes</b> are <b>2</b> and <b>4</b>.</p>										

### Note:

- It is not the frequency that is the mode, it is the data item

### Exercise 4.3

1) Find the range and the mode of the following set of raw data: 4, 2, 6, 3, 3, 2, 4, 3, 7, 2, 7, 6, 6, 7, 6

2) Use the frequency table to find the range and the mode of the data:

<b>data</b>	1	2	3	4	5	6
<b>frequency</b>	3	2	4	3	1	2

3) Organise the following raw data in a frequency table and then find the mode:  
A, B, B, D, C, E, B, D, C, C, A, B, A, C, D, D, D, E, A, D, B, A, B

## § 4.4 THE MEDIAN

- ✦ The **median** is the value of the middle item in a distribution once all the data has been arranged in order of size.
- ✦ The median does not have to be one of the data items.

EXAMPLES	SOLUTIONS														
1) Find the median of the following set of data: 6, 3, 4, 7, 2, 5, 3, 4, 5	Arrange the data in ascending order: 2, 3, 3, 4, <u>4</u> , 5, 5, 6, 7 There are 9 data items, an <b>odd</b> number. The <b>5<sup>th</sup> data item</b> , the middle item, is the <b>median = 4</b>														
2) Find the median of the following set of data: 5, 9, 1, 7, 2, 6, 9, 3.	Arrange the data in ascending order: 1, 2, 3, <u>5</u> , <u>6</u> , 7, 9, 9 There are 8 data items, an <b>even</b> number. The middle item is the <b>average of the 4<sup>th</sup> and 5<sup>th</sup> terms</b> So the <b>median</b> = $\frac{5+6}{2} = \frac{11}{2} = 5,5$														
3) Find the median of the data on the frequency table: <table border="1" style="margin: 10px auto; width: 60%;"> <thead> <tr> <th>Data</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Frequency</td> <td>2</td> <td>4</td> <td>1</td> <td>3</td> <td>2</td> <td>12</td> </tr> </tbody> </table>	Data	1	2	3	4	5	Total	Frequency	2	4	1	3	2	12	We can write the data items in a list: 1, 1, 2, 2, 2, <u>2</u> , <u>3</u> , 4, 4, 4, 5, 5. There are 12 data items, an <b>even</b> number. The middle item is the <b>average of the 6<sup>th</sup> and 7<sup>th</sup> terms</b> So the <b>median</b> = $\frac{2+3}{2} = \frac{5}{2} = 2,5$
Data	1	2	3	4	5	Total									
Frequency	2	4	1	3	2	12									

### Exercise 4.4

- 1) Find the median of the raw data: 3, 6, 1, 0, 2, 5, 2, 3, 1

Write the data in numerical order: .....

Number of data items = .....

Median = .....

- 2) Find the median of the raw data: 9, 2, 1, 9, 7, 4, 2, 3

Write the data in numerical order: .....

Number of data items = .....

Median = .....

- 3) Find the median of the data in the frequency table :

DATA	FREQUENCY
0	2
1	2
3	2
4	5
5	3
<b>TOTAL</b>	

List of data items: .....

Number of data items = .....

Median = .....

## § 4.5 THE MEAN

- ✦ The **mean** is found by dividing the sum of all the data by the number of data items.
- ✦ It is called the **equal shares** average.
- ✦ When finding the mean, it is not necessary to first arrange the data items in order.

EXAMPLES	SOLUTIONS
1) Find the mean of the data: 2, 3, 4, 5, 6, 7, 8	Mean = $\bar{x} = \frac{2+3+4+5+6+7+8}{7} = \frac{35}{7} = 5$
2) Find the value of $x$ so that the mean of the given data: 8, 3, 1, $x$ , 4, 6, 2, 6, is 4	Mean = $\bar{x} = \frac{8+3+1+x+4+6+2+6}{8} = 4$ $\frac{30+x}{8} = 4$ $\frac{30+x}{8} \times 8 = 4 \times 8$ $30+x = 32$ $x = 2$
3) Find the mean, correct to 1 decimal place, of the data in the following frequency table:	Raw data: 2, 2, 2, 2, 3, 4, 4, 5, 5 $\bar{x} = \frac{2+2+2+2+3+4+4+5+5}{9} = \frac{29}{9} = 3,2$ <b>OR</b> $\bar{x} = \frac{(4 \times 2) + (1 \times 3) + (2 \times 4) + (2 \times 5)}{9} = \frac{29}{9} = 3,2$

### Exercise 4.5

1) Calculate the mean of the data: 7, 3, 5, 2, 9, 3, 1, 2

2) Find the mean, to 1 decimal place, of the data whose frequency table is given.

data	1	2	3	4	5	Total
frequency	3	1	4	2	4	

List of raw data: .....

Mean =  $\bar{x} =$

3) The following data items are given: 7, 3, 1,  $x$ , 6. The mean of the data is 5. Find the value of  $x$ .

4) Find the range, mode, median and mean of the following set of data correct to 1 decimal place:  
32; 32; 33; 35; 37; 40; 40; 42; 46; 54; 57; 57; 57; 57; 61; 62; 62; 63; 65; 66; 70