

Is how spread out the data is from the mean.

Symbol  $\sigma$  "sigma" calculator  $\sigma x$  Standard deviation

Mean  $\mu$  "m" "mu" calc.  $\bar{x}$  x bar

The larger the standard deviation, the more spread out the data.

Q1) Find the mean  $\bar{x}$  and  $\sigma x$  (SD) from the data set  
1, 3, 5, 8, 9  $\bar{x} = 5.2$

**PROJECT MATHS**

# Text & Tests

**Leaving 3 Certificate**

Chapter

**8**

## Measures of Location and Spread

**Section 8.6** Standard deviation

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### Example 2

These are the test marks of 11 students:

52, 78, 61, 49, 79, 47, 54, 58, 72, 62, 73

- Find
- (i) the median
  - (ii) the lower quartile
  - (iii) the upper quartile
  - (iv) the interquartile range.

227

### Example 2

Find the standard deviation of the following frequency distribution:

<b>Variable (<math>x</math>)</b>	1	2	3	4	5	6
<b>Frequency (<math>f</math>)</b>	9	9	6	4	7	3

227

### Example 3

Find (a) the mean (b) the standard deviation of the following sets of numbers:

(i) 5, 3, 1, 8, 2

(ii) 10, 6, 2, 16, 4

228

### Example 4

The following frequency distribution table shows the number of birdies scored per round of golf.

<b>No. of birdies</b>	0	1	2	3	4	5	6
<b>Frequency</b>	5	6	4	6	3	1	0

Find the mean and standard deviation, correct to one decimal place.

229

### Exercise 8.6

1. Calculate the standard deviation of each of the following arrays of numbers, giving your answer correct to one decimal place:

(i) 2, 5, 6, 7

(ii) 3, 6, 7, 9, 10

(iii) 2, 4, 6, 8, 10

(iv) 1, 3, 7, 9, 10

(v) 8, 12, 15, 9

(vi) 1, 3, 4, 6, 10, 12

Use your calculator to verify your answer in each case.

230

### Exercise 8.6

2. Show that the following sets of numbers have the same standard deviation:

(a) 2, 3, 5, 7, 8

(b) 6, 7, 9, 11, 12

230

### Exercise 8.6

3. Find the standard deviation of the numbers

2, 3, 4, 5, 6.

Now find the standard deviation of these numbers

12, 13, 14, 15, 16.

- (i) What is the relationship between the two sets of numbers?
- (ii) What is the relationship between their standard deviations?
- (iii) What conclusion can you draw from the results?

230

### Exercise 8.6

4. Verify that 2 is the mean of this distribution.  
Hence calculate the standard deviation,  
correct to 1 decimal place.

<b>Variable</b>	0	2	3	4
<b>Frequency</b>	4	3	2	3

230

### Exercise 8.6

5. Show that the mean of the given frequency distribution is 3 and hence find the standard deviation, correct to 2 decimal places.

<b>Variable</b>	1	2	3	4
<b>Frequency</b>	1	4	9	6

230

### Exercise 8.6

6. Calculate the standard deviation of the following frequency distribution, correct to 1 decimal place.

<b>Variable</b>	2	4	6	8
<b>Frequency</b>	4	3	0	2

230

### Exercise 8.6

7. Calculate the mean and hence the standard deviation of the following frequency distribution.

<b>Variable</b>	0	4	6	8
<b>Frequency</b>	4	3	2	3

230

### Exercise 8.6

8. Ms Byrne gave the 30 students in her class a quick spelling test. The marks obtained are presented in the table below.

<b>Mark</b>	0	1	2	3	4	5
<b>Number of students</b>	3	3	3	6	12	3

Calculate the mean and standard deviation of the distribution, correct to one decimal place.

231



### Exercise 8.6

9. The number of letters delivered to a business premises on each day of the 5-day working week were as follows:

18, 26, 22, 34, 25

- (i) Calculate the mean number of letters delivered.
- (ii) Calculate the standard deviation, correct to one decimal place.
- (iii) If  $\bar{x}$  is the mean and  $\sigma$  is the standard deviation, find the values of  $\bar{x} + \sigma$  and  $\bar{x} - \sigma$ .
- (iv) On how many days is the number of letters delivered within one standard deviation of the mean?

231

### Exercise 8.6

10. The data below gives the number of books read in the last month by a class of 20 students.

Number of books, $x$	0	1	2	3	4
Number of students, $f$	2	5	6	5	2

Find the mean and standard deviation of the number of books.

231



### Exercise 8.6

13. There are two routes for a worker to get to his office. Both the routes involve delays due to traffic lights. He records the time it takes over a series of six journeys for each route. The results are shown in the table.

Route 1	15	15	11	17	14	12
Route 2	12	15	18	16	17	12

- Work out the mean time taken for each route.
- Calculate the standard deviation of each of the two routes.
- Using your answers to (i) and (ii), suggest which route you would recommend. State your reason clearly.

231

### Answers 8.6

- 1.9
  - 2.4
  - 2.8
  - 3.5
  - 2.7
  - 3.9
- 10 is added to each number
  - Same (both =  $\sqrt{2}$ )
  - equal standard deviations
- 1.6
- 0.84
- 2.3
- Mean = 4;  $\sigma = \sqrt{10}$
- Mean = 3;  $\sigma = 1.14$
- 25
  - 5.3
  - 30.3; 19.7
  - 3
- Mean = 2;  $\sigma = 1.5$
- 2.3
- 6
  - 2
- Route 1 = 14; Route 2 = 15
  - Route 1 = 2; Route 2 = 2.3
  - Route 1 recommended