

# Guidance for teachers

**Statistics**  
**Standard deviation**

# Teacher guidance

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Please use the following guidance to structure the session

Prior learning of statistical techniques (GCSE Maths) would be beneficial, but it is not essential.

Resources required:

- Standard deviation (SD) worksheet
- Lesson 2 standard deviation (ppt)
- Mini whiteboards (recommended)

Slide 3 should be used to help learners to understand the importance of the topic.

## Introduction (5 minutes)

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The session begins by informing learners of the topic. Learners will be introduced to the following learning outcome from the T Level specification:

A6.9 The purpose of the following statistical techniques when analysing data:  
Standard deviation – to measure the dispersion of a set of values from the mean

The introduction will then transition into the importance of using these techniques in industry.

Lesson development opportunities:

Learners could also be asked to map employability skills, such as collaboration, analytical thinking and evaluation, that they will develop from this.

Learners could be asked to give examples of settings where standard deviation (SD) could be used. SD in healthcare would be particularly important in identifying outliers following courses of treatment. For example, do the majority of patients' heart rate measurements return to close to the average value following a course of statins?

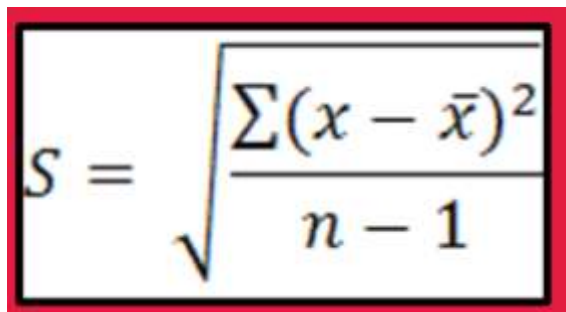
## Starter (10 minutes)

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Slide 4 demonstrates the starter question where learners are asked to recall the SD formula. Learners could be asked to demonstrate this on a mini whiteboard or the back of their books. Learners will be asked to hold their answers up so that the teacher is able to see their work. Throughout the task, the teacher could navigate the room to measure learner progress with the task and assist learners who are struggling with it.

Learners that further struggle with this activity can be directed to the videos on slide 5.

Feedback at the end of the activity could be drawn in various ways, including verbal feedback or Q&A. A visual of the formula should be displayed on the board for learners to see whether they were able to recall the formula successfully.

A photograph of a whiteboard with a red border. On the whiteboard, the formula for standard deviation is written in black marker. The formula is 
$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

The formula is written in a clear, legible font. The summation symbol is represented by the Greek letter sigma. The mean is represented by a bar over the x. The denominator is n minus 1.

Equipment required for the activity: mini whiteboards or exercise books.

## Delivery (25 minutes)

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The session will begin with comparing the definitions of SD and variance. The formula will then be displayed so that learners can familiarise themselves with them. Due to the number of steps required for learners to apply the formula to datasets, the delivery will use slide 7 to break down what each part of the formula means. Following this, learners will be given an explanation of the relationship between variance and SD.

The values are open to interpretation by the students themselves, but typically those giving a rating of “4” would be secure in their understanding, whereas a “1” would suggest the learner has too many gaps in their knowledge or ability to apply the information.

Following on from this, learners will be given a worked example (slides 10–14).

Following on from the worked example, the teacher will use the interpretation on slide 16 to explain how SD results are interpreted.

This will help to establish techniques before learners are able to apply them to contextualised questions independently.

Please note that two videos have been provided in the corner of slide 5 to guide learners who need further assistance with the topic.

## Questions 1 (25 minutes)

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This section of delivery references slides 15–16. Slide 15 will be tasked out to learners to complete in pairs. The teacher could further enhance collaborative learning by asking paired learners to deliver their answer to other paired learners at their tables to maximise the learning potential on the topic and share practice of different approaches to the question.

Learners who manage to complete the task will be asked to further challenge their learning by working on the datasets provided on slide 16. The teacher should reference how the spread of data around the mean value can give an idea of the accuracy of the results or, in this case, the effectiveness of a vaccination programme.

Feedback for the session should be offered through written feedback. After the allocated time, the solutions should be made available to learners to either peer mark their work or complete their marking independently. Further review of feedback can be undertaken once the tutor has collected the learners' work.

## **Delivery, worksheet and presentation task (50 minutes)**

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This part of the session will be split into delivery for learners that are struggling and tasking learners who have completed all the tasks on the SD worksheet. The worksheet tasks will then be followed up with a presentation task of demonstrating their interpretation of the results.

Learners with lower ability will be led through slide 15. Worked examples could be collected from learners who were able to complete this task during the previous part of this session or alternatively the teacher could complete a worked example on the board.

Learners who have completed question 1 and slide 16's stretch and challenge activity will be directed to the SD worksheet.

All tasks will ask learners to interpret their results. A small SD value is attributed to a smaller variance in the results and can be linked to increased accuracy/efficacy/validity.

When learners have completed these tasks, they will be asked to present their interpretations to their peers. This part of the session will be assessed through verbal feedback and Q&A.

## **Plenary (5 minutes)**

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Plenary activity: Maths riddle

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'how many 9s are there between 1 and 100?'

This task is a maths riddle that maps maths skills, digital skills and English skills. Learners will be expected to calculate the answer and highlight the lowercase letter mistake at the beginning of the sentence.

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