# The Standard Deviation Worksheet

* The standard deviation is used to tell how far on average any data point is from the mean.
* The smaller the standard deviation, the closer the scores are on average to the mean.
* When the SD is large, the scores are more widely spread out on average from the mean.
* The SD tells you the variation in your data – the higher the SD, the more the variation

**You won’t have to calculate the standard deviation yourself in the exams, but you do need to know what is shows about the data you are presented with.**

**This worksheet will take you through the calculation for your own study data so you can understand where the standard deviation comes from.**

**The full formula for standard deviation is:**

$$\sqrt{\frac{\sum\_{}^{}\left(x-\overbar{x}\right)^{2}}{n}}=$$

**Where:**

*n = number of participants in the sample, x = result for that participant,*

$\overbar{x}=the mean for that condition$

$$\sum\_{}^{}=sum of everything after the symbol$$

To calculate standard deviation, we break the formula down into smaller sections:

1. Difference from the mean: $(x-\overbar{x)}$
2. (Difference from the mean)2: $(x-\overbar{x)}$
3. Sum of (differences from the mean) 2: $\sum\_{}^{}(x-\overbar{x})^{2}$
4. The variance: $\frac{\sum\_{}^{}(x-\overbar{x})^{2}}{n}= $
5. The standard deviation is the square root of the variance: $\sqrt{\frac{\sum\_{}^{}(x-\overbar{x})^{2}}{n}}$

## Your own study data

### Condition A: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Condition A had a mean of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with \_\_\_\_\_\_\_\_\_ participants.

Follow the steps to work out the standard deviation for Condition A.

Step 1 – write down $\overbar{x}= \\_\\_\\_\\_\\_\\_$ and *n = \_\_\_\_\_\_\_\_\_\_* for Condition A

Step 2 – complete this table

|  |  |  |  |
| --- | --- | --- | --- |
| P | Data | $$(x-\overbar{x})$$ | $$(x-\overbar{x})^{2}$$ |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| $$\sum\_{}^{}(x-\overbar{x})^{2}$$ |  |

Step 3 – work out the **variance** using this formula:

$$\frac{\sum\_{}^{}(x-\overbar{x})^{2}}{n}= $$

Step 4 – the standard deviation is the **square root** of the **variance (2 decimal places)**:

$Standard Deviation for Condition A= \sqrt{\frac{\sum\_{}^{}(x-\overbar{x})^{2}}{n}}=$ **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

### Condition B: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Condition B had a mean of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with \_\_\_\_\_\_\_\_\_ participants.

Step 1 – write down $\overbar{x}= \\_\\_\\_\\_\\_\\_$ and *n = \_\_\_\_\_\_\_\_\_\_* for Condition B

Step 2 – complete this table

|  |  |  |  |
| --- | --- | --- | --- |
| P | Data | $$(x-\overbar{x})$$ | $$(x-\overbar{x})^{2}$$ |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| $$\sum\_{}^{}(x-\overbar{x})^{2}$$ |  |

Step 3 – work out the **variance** using this formula:

$$\frac{\sum\_{}^{}(x-\overbar{x})^{2}}{n}= $$

Step 4 – the standard deviation is the **square root** of the **variance (2 decimal places)**:

$Standard Deviation for Condition B= \sqrt{\frac{\sum\_{}^{}(x-\overbar{x})^{2}}{n}}=$ **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

## Summary and Comparisons

|  |  |  |
| --- | --- | --- |
| Condition | Mean | Standard Deviation |
| A: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |
| B: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |

Compare the means – what do they tell you about the results?

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Compare the standard deviations – what do they tell you about the spread of the data?

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