

Standard Deviation (AS Ma)

Starter

1. **(Review of last lesson)** Four persons are chosen at random from a group of 10 persons consisting of 4 men and 6 women. Three of the women are sisters. Calculate the probabilities that the 4 persons chosen will:
- consist of 4 women
 - consist of 2 women and 2 men
 - include the 3 sisters.

Working:

(a) Number of committees of 4 women: 6C_4
 Possible number of committees: ${}^{10}C_4$
 Probability = $\frac{{}^6C_4}{{}^{10}C_4} = \frac{15}{210} = \frac{1}{14}$

(b) Ways of choosing 2 women from 6: 6C_2
 Ways of choosing 2 men from 4: 4C_2
 Probability = $\frac{{}^6C_2 \times {}^4C_2}{{}^{10}C_4} = \frac{15 \times 6}{210} = \frac{3}{7}$

(c) Including the 3 sisters means there are only 7 people to choose from
 4th choice is a woman: 3 ways
 4th choice is a man: 4 ways
 Probability = $\frac{3+4}{{}^{10}C_4} = \frac{7}{210} = \frac{1}{30}$

E.g. 1 Consider the data values 2, 3, 7, 4 and 9.

- Calculate the mean for this data set.
- Write down the deviation of each data value from the mean. If the value is below the mean, the deviation would be negative; if above the mean, positive.
- Find the sum of the deviations. Comment on your answer

Working:

- The mean is 5.
- The deviations from the mean are $-3, -2, +2, -1$ and $+4$.
- The sum of the deviations is $-3 + (-2) + 2 + (-1) + 4 = 0$
 This tells us nothing because the sum of the deviations from the mean will always be zero.

E.g. 2 Find the standard deviation for these datasets.

- (a) 24, 19, 17
(b) 11, 14, 3, 8
(c) 73, 65, 89, 68, 59, 82

Working:

(a) Mean = 20
Variance, $\sigma^2 = \frac{24^2 + 19^2 + 17^2}{3} - 20^2 = \frac{26}{3}$
Standard deviation = $\frac{\sqrt{78}}{3}$ (3 s.f.)

(b) Mean = 9
Variance, $\sigma^2 = \frac{11^2 + 14^2 + 3^2 + 8^2}{4} - 9^2$
Standard deviation $\sigma = \frac{\sqrt{66}}{2} = 4.06$ (3 s.f.)

(c) Mean = $72\frac{2}{3}$
Variance, $\sigma^2 = \frac{73^2 + 65^2 + 89^2 + 59^2 + 82^2}{6} - 20^2$
Standard deviation, $\sigma = 10.2$ (3 s.f.)

Video: [Calculating standard deviation on the Classwiz](#)

E.g. 3 Use your calculator to find the mean and standard deviation for the following data:

- (a) 165, 183, 167, 174, 192, 186, 195, 171
(b) 6958, 7492, 5638, 4529, 3945, 4957, 4639

Working:

(a) Mean = 179.125
Standard deviation = 10.7 (3 s.f.)

(b) Mean = 5451 (4 s.f.)
Standard deviation = 1224 (4 s.f.)

Video: [Standard deviation](#)

[Standard deviation \(discrete\) EQ](#)

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

Exercise
No exercise