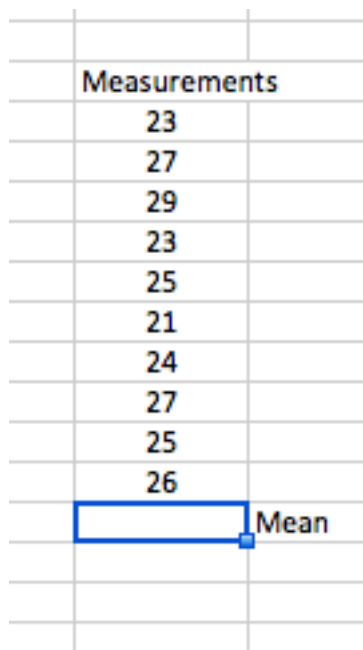


How to Calculate Mean, Standard Deviation (SD), Standard Error of the Mean (SEM), and 95% Confidence Interval Using Excel

1. Enter your measurements or values in a column in an Excel spreadsheet.

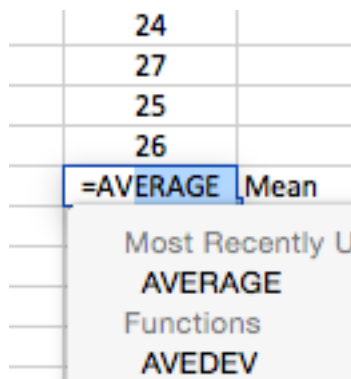


Measurements	
23	
27	
29	
23	
25	
21	
24	
27	
25	
26	
	Mean

Choose a label for your measurements. In this example, the label is “Measurements,” but it should be something more descriptive like “Relative Hindlimb Length.”

Select the cell where you want the mean to appear and label the cell next to it “Mean.”

2. Start typing “=AVERAGE” in the cell where you want the mean to appear.



24	
27	
25	
26	
=AVERAGE	Mean
Most Recently U	
AVERAGE	
Functions	
AVEDEV	

As you start typing, Excel will display matching functions in a drop-down menu. Click on “AVERAGE” when it appears.

3. After you select “average,” select the values you will use to calculate the mean.

Measurements
23
27
29
23
25
21
24
27
25
26
=AVERAGE(D9:D18)
AVERAGE(number1, [number2])

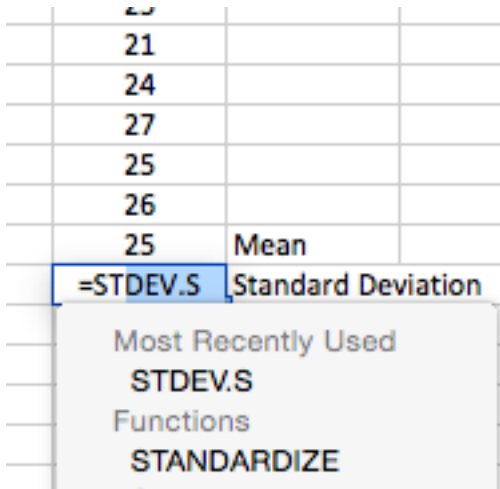
Use your cursor to highlight the range of values and press “Return.” Alternatively, you can type in cell numbers. In this example, you would type “=AVERAGE(D9:D18)” and press “Return.”

4. The mean will appear in the cell you selected.

Measurements	
23	
27	
29	
23	
25	
21	
24	
27	
25	
26	
25	Mean
	Standard Deviation

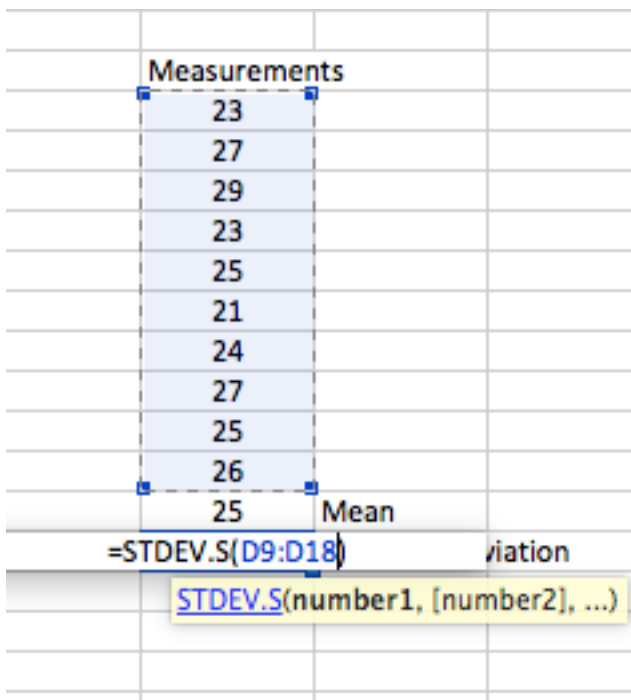
The sample mean is 25. Now, select the cell where you want the standard deviation to appear and type “Standard Deviation” next to it.

5. Start typing “=STDEV.S” in the cell where you want the standard deviation to appear.



As you type, Excel will display matching functions in a drop-down menu. Click “STDEV.S” when it appears. (Note that “STDEV.S” is the function for sample standard deviation. Excel has another function, “STDEV.P,” for the population standard deviation.)

6. Select the values that you want to use to calculate the standard deviation—the same ones you used for the mean.



After you select the values, press “Return.” Be careful not to include the value for the mean in your selection.

7. The standard deviation will appear in the cell you selected. Next you will calculate the standard error of the mean (SEM).

	Measurements	
	23	
	27	
	29	
	23	
	25	
	21	
	24	
	27	
	25	
	26	
	25	Mean
	2.3570226	Standard Deviation
		SEM

Select the cell where you want the standard error of the mean to appear and type "SEM" next to it.

8. Excel does not have a built-in function for calculating SEM, so you will enter this calculation manually.

	Measurements	
	23	
	27	
	29	
	23	
	25	
	21	
	24	
	27	
	25	
	26	
	25	Mean
	2.3570226	Standard Devi
	<code>=STDEV.S(D9:D18)/SQRT(COUNT(D9:D18))</code>	

SEM is the standard deviation divided by the square root of the sample size, which is 10 in this example. To calculate SEM, type "`=STDEV.S(range)/SQRT(COUNT(range))`." Range is the range of values, which here is D9 to D18. You can also type in "`=D20/SQRT(10)`." D20 is the cell with the standard deviation. Press "Return."

9. The SEM will appear in the cell you selected. You will now calculate the 95% confidence interval (95% CI).

	Measurements	
	23	
	27	
	29	
	23	
	25	
	21	
	24	
	27	
	25	
	26	
	25	Mean
	2.3570226	Standard Deviation
	0.74535599	SEM
		95% CI

Select the cell where you want the 95% confidence interval to appear and type "95% CI" next to it.

10. In this lab, we are estimating the 95% CI as 2 times SEM.

	25	
	26	
	25	Mean
	2.3570226	Standard Deviation
	0.74535599	SEM
	=2*(D21)	95% CI

You can calculate this in Excel by typing " $=2*(D21)$." D21 is the cell with the SEM value.

	25	
	26	
	25	Mean
	2.3570226	Standard Deviation
	0.74535599	SEM
	1.49071198	95% CI

Press "Return" and the 95% CI will appear in the cell you selected.

11. You can also calculate 95% CI using Excel's built-in function.

26	
25	Mean
2.3570226	Standard Deviation
0.74535599	SEM
=CONF	95% CI

Start typing in “=CONFIDENCE.” When the function appears, click on it.

25	
26	
25	Mean
2.3570226	Standard Deviation
0.74535599	SEM
=CONFIDENCE(0.05,D20,10)	
CONFIDENCE(alpha, standard_dev, size)	

You will then type in “=CONFIDENCE(0.05, standard_dev, size).” In this example, the values are “=CONFIDENCE(0.05, D20, 10).”

Measurements	
23	
27	
29	
23	
25	
21	
24	
27	
25	
26	
25	Mean
2.3570226	Standard Deviation
0.74535599	SEM
1.4608709	95% CI

Press “Return” and the 95% CI will appear. You will see that the number is not exactly the same as the estimate of twice SEM for this particular sample.