

How To Calculate Percentiles in Microsoft Excel, Google Sheets, or Apple Numbers

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Let's say we've collected data on the number of hours that each member of a sample of college students sleep each night. In Figure 1 below, these data are illustrated in Column A with the Column Heading "Sleep (in hours)."

First, we need to calculate the Mean (illustrated in cell D2 in Figure 1 below) and the Standard Deviation (illustrated in cell E2 below) because we'll need the Mean and Standard Deviation to calculate the percentile of each value in our data set.

Then, to calculate each percentile, we create a new Column Header called Percentiles, as illustrated in Column B of Figure 1 below. Next, we use the NORMDIST function.

	A	B	C	D	E
1	Sleep (in hours)	Percentiles		Mean	Stdev
2	4	=NORMDIST(A2,\$D\$2,\$E\$2,TRUE)			1.749
3	7				
4	5				
5	8				
6	3				
7	9				
8	7				
9	6				
10	5				
11	8				
12	4				
13	6				
14	7				
15	8				
16	5				
17	9				
18	7				
19	6				

Figure 1 - Microsoft Excel and Google Sheets

	A	B	C	D	E
1	Sleep (in hours)	Percentiles		Mean	Stdev
2	4	...		6.333	1.749
3	7				
4	5				
5	8				
6	3				
7	9				
8	7				
9	6				
10	5				
11	8				
12	4				
13	6				
14	7				
15	8				
16	5				
17	9				
18	7				
19	6				

Figure 1 - Apple Numbers

For any function, we start by typing an equal sign = in the cell where we're building our formula. Immediately after typing the equal sign, we type the name of the function, in this case NORMDIST, then we type an open parenthesis and begin building our formula.

As shown in Figure, 1, the formula for calculating the percentile of the first data value in our data set is =NORMDIST(A2,\$D\$2,\$E\$2,TRUE).

The NORMDIST function requires four arguments, enclosed in parentheses and separated by commas. The first argument (e.g., A2) tells the formula which cell we want to calculate a percentile for.

The second argument tells the formula which cell contains our Mean. In Figure 1, our Mean is in cell D2. We place a dollar sign \$ around both the letter D and the number 2 of the cell name D2 (e.g., \$D\$2) to tell our formula to always look in cell D2 for the Mean.

The third argument tells the formula which cell contains our Standard Deviation. In Figure 1, our Standard Deviation is in cell E2. We again place a dollar sign \$ around **both** the letter E and the number 2 of the cell name E2 (e.g., **\$E\$2**) to tell our formula to **always** look in cell E2 for the Standard Deviation.

The dollar signs in this formula are what are known as absolute markers. If we didn't type the dollar signs, and we copied the formula to another cell, the formula wouldn't know to always look in the cells that we want it to look in (for the Mean and for the Standard Deviation).

The fourth argument of the NORMDIST function tells the formula whether we want our formula to be cumulative or not. Because we are calculating percentiles, we want our formula to be cumulative, so we type in the word **TRUE** for our fourth argument.

After typing the formula **=NORMDIST(A2,\$D\$2,\$E\$2,TRUE)**, we press return or enter and we get the percentile for the first data value in our data set.

Once we've calculated the percentile for the first data value in our data set, we can calculate the percentiles for all the other values in our data set.

Because we used the dollar signs in our formula to tell our formula to always look in a specific cell for the Mean and to always look in another specific cell for the Standard Deviation, we can take advantage of a short cut to fill in all the other percentiles.

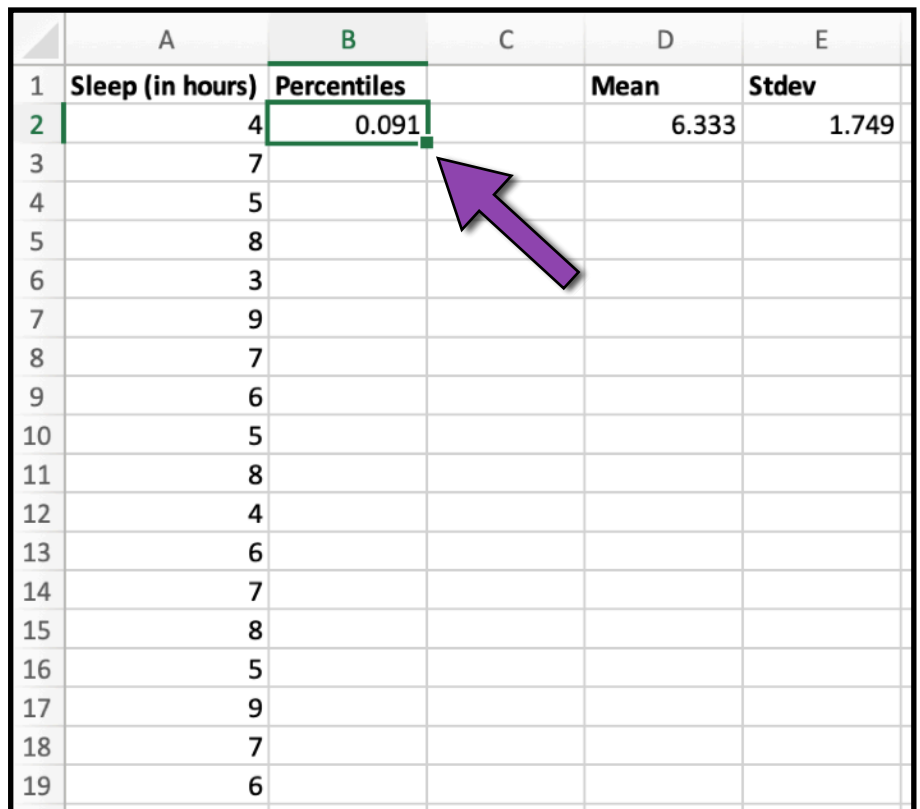
Figure 2 - Microsoft Excel and Google Sheets

Shortcut in Microsoft Excel or Google Sheets:

To compute all the other percentiles, first, we click on the cell that contains the formula we want to copy (in this example, B2).

Second, we place our cursor over the bottom left corner of the cell until a cross appears.

Third, once the cross appears, we double-click the cross and drag it down the column. As we drag the cross down Column B, percentiles will be computed for each data value in Column A!



	A	B	C	D	E
1	Sleep (in hours)	Percentiles		Mean	Stdev
2	4	0.091		6.333	1.749
3	7				
4	5				
5	8				
6	3				
7	9				
8	7				
9	6				
10	5				
11	8				
12	4				
13	6				
14	7				
15	8				
16	5				
17	9				
18	7				
19	6				

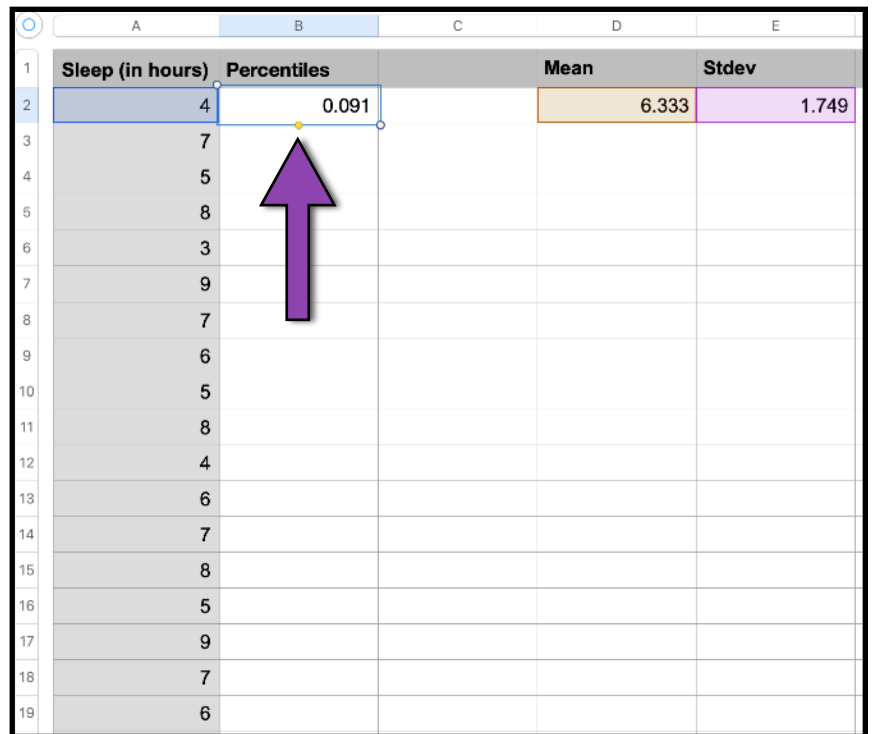
Shortcut in Apple Numbers:

To compute all the other percentiles, first we click on the cell that contains the formula we want to copy (in this example, the cell is B2).

Second, we place our cursor over the bottom center of the cell until a vertical line with arrows appears.

Third, once the vertical line with arrows appears, we click and drag it down the column. As we drag down Column B, percentiles will be computed for each data value in our Column A!

Figure 2 - Apple Numbers



The screenshot shows a spreadsheet with columns A through E. Column A is labeled 'Sleep (in hours)' and contains values: 4, 7, 5, 8, 3, 9, 7, 6, 5, 8, 4, 6, 7, 8, 5, 9, 7, 6. Column B is labeled 'Percentiles' and contains the value 0.091 in cell B2. A purple arrow points to the bottom center of cell B2, where a vertical line with arrows is visible, indicating the drag handle. Column C is labeled 'Mean' and contains the value 6.333. Column D is labeled 'Stdev' and contains the value 1.749.

	A	B	C	D	E
1					
2	Sleep (in hours)	Percentiles		Mean	Stdev
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					

IMPORTANT: In Microsoft Excel, Google Sheets, and Apple Numbers, the percentiles we've calculated are formatted as proportions (e.g., 0.091). Because percentiles are always reported as percentages (e.g, 9.107%), we need to convert our proportions to percentages.

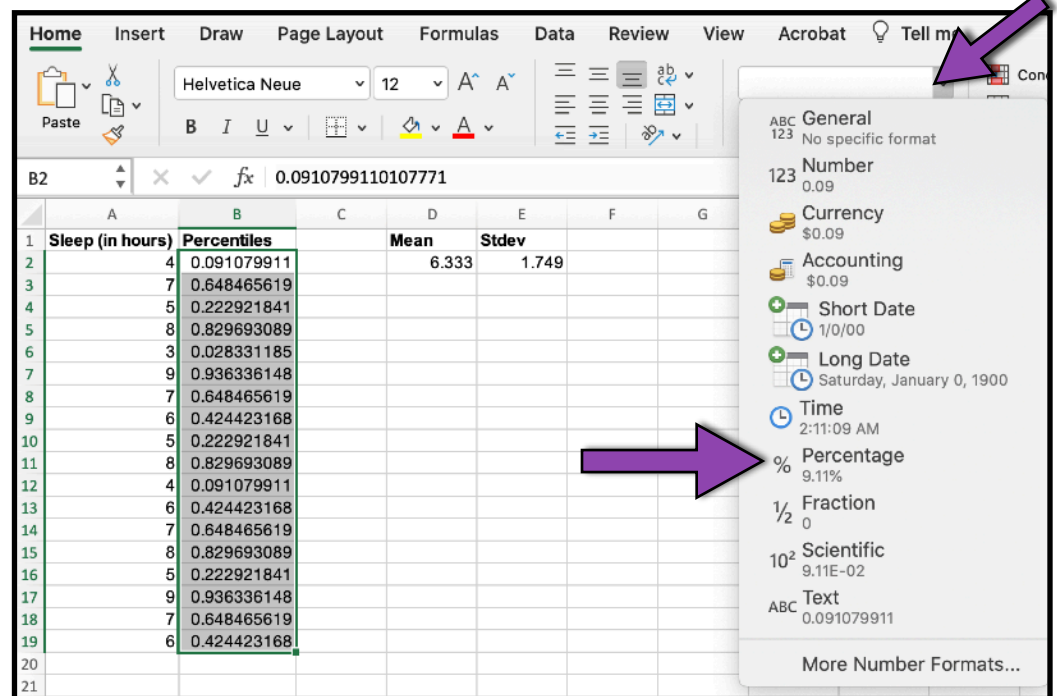
To Convert Proportions to Percentages in Microsoft Excel or Google Sheets:

Figure 3 - Microsoft Excel and Google Sheets

First, we select the values we calculated in our Percentiles column.

Second, from the formatting ribbon in the data type dropdown menu select "Percentage."

Now, we have converted all of our selected values into percentages!



The screenshot shows the Microsoft Excel interface. The ribbon is set to 'Home'. The 'Number' dropdown menu is open, and the 'Percentage' option is selected. The spreadsheet shows the same data as Figure 2, but the values in column B are now formatted as percentages: 0.091079911, 0.648465619, 0.222921841, 0.829693089, 0.028331185, 0.936336148, 0.648465619, 0.424423168, 0.222921841, 0.829693089, 0.091079911, 0.424423168, 0.648465619, 0.829693089, 0.222921841, 0.936336148, 0.648465619, 0.424423168. A purple arrow points to the 'Percentage' option in the dropdown menu.

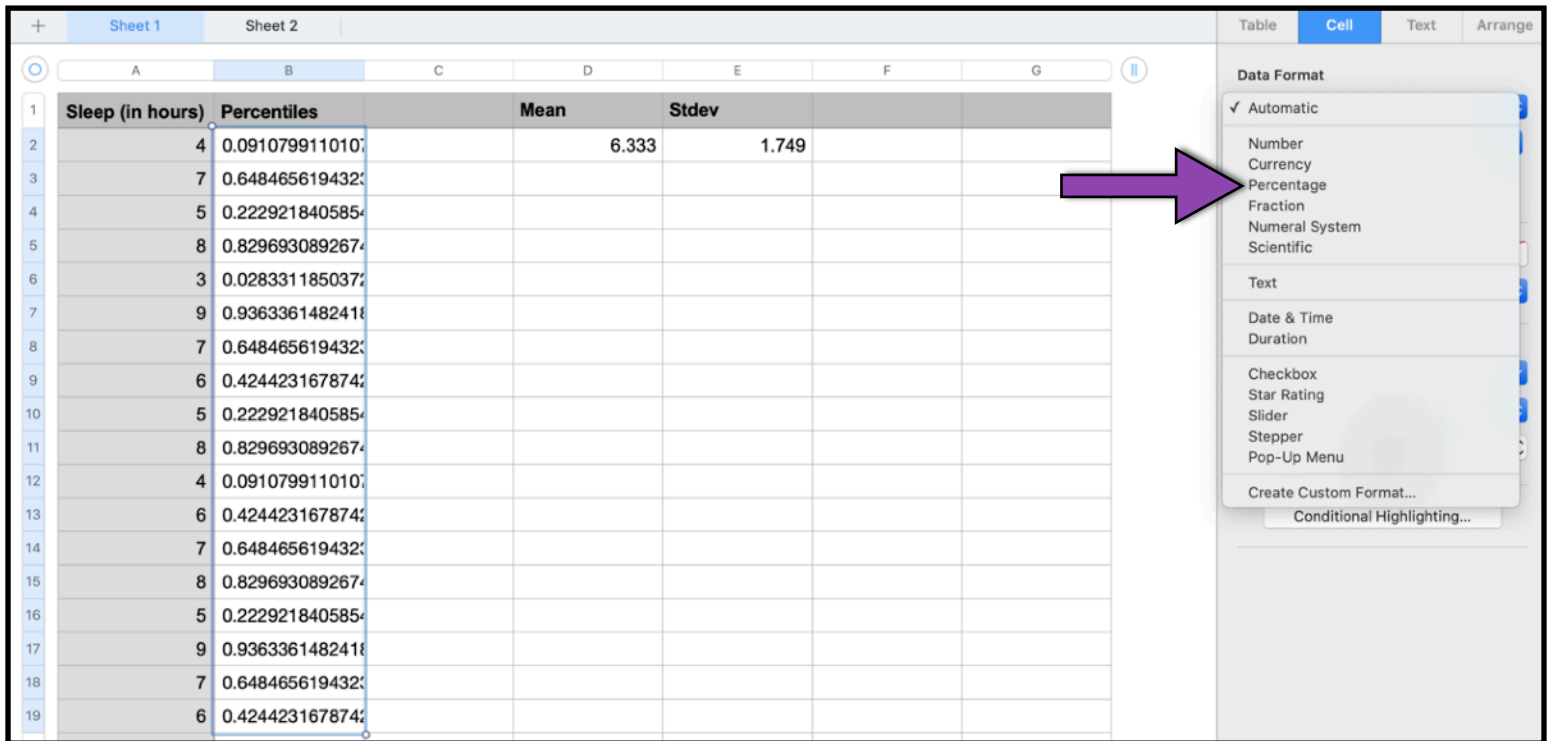
	A	B	C	D	E	F	G
1	Sleep (in hours)	Percentiles		Mean	Stdev		
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							

To Convert Proportions to Percentages in Apple Numbers

First, we select the values we calculated in our Percentiles column.

Second, in the Cell tab of the formatting pane, we look for Data Format. From the Data Format dropdown menu, we change the data format to “Percentage.”

Now, we have converted all of our selected values into percentages!



The screenshot shows a spreadsheet with the following data:

	A	B	C	D	E	F	G
1	Sleep (in hours)	Percentiles		Mean	Stdev		
2	4	0.0910799110107		6.333	1.749		
3	7	0.648465619432					
4	5	0.222921840585					
5	8	0.829693089267					
6	3	0.028331185037					
7	9	0.936336148241					
8	7	0.648465619432					
9	6	0.424423167874					
10	5	0.222921840585					
11	8	0.829693089267					
12	4	0.0910799110107					
13	6	0.424423167874					
14	7	0.648465619432					
15	8	0.829693089267					
16	5	0.222921840585					
17	9	0.936336148241					
18	7	0.648465619432					
19	6	0.424423167874					

The 'Data Format' dropdown menu is open, showing the following options:

- Automatic (checked)
- Number
- Currency
- Percentage
- Fraction
- Numeral System
- Scientific
- Text
- Date & Time
- Duration
- Checkbox
- Star Rating
- Slider
- Stepper
- Pop-Up Menu
- Create Custom Format...
- Conditional Highlighting...

A purple arrow points from the 'Percentage' option in the dropdown menu to the 'Percentiles' column in the spreadsheet.

FINALLY AND IMPORTANT: To adhere to good scientific practice, we always want to use three decimal places for our Percentiles (and for any other time we use decimals). We can use the tool provided by each of our data management systems. Those tools are outlined in purple in Figure 4 (on the next page).

Figure 4 - Microsoft Excel

The screenshot shows the Microsoft Excel interface. The ribbon includes Home, Insert, Draw, Page Layout, Formulas, Data, Review, View, Acrobat, and Tell me. The Home ribbon is active, showing font settings (Helvetica Neue, size 12) and the Number group with the Percentage format selected. The formula bar shows the value 9.10799110107771%. The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I
1	Sleep (in hours)	Percentiles		Mean	Stdev				
2	4	9.108%		6.333	1.749				
3	7	64.847%							
4	5	22.292%							
5	8	82.969%							
6	3	2.833%							

Figure 4 - Google Sheets

The screenshot shows the Google Sheets interface. The menu bar includes File, Edit, View, Insert, Format, Data, Tools, Add-ons, and Help. The toolbar shows the Percentage format selected. The formula bar shows the value 9.112%. The spreadsheet data is as follows:

	A	B	C	D
1	Sleep (in hours)	Percentiles	Mean	Stdev
2	4	9.112%	6.333	1.749
3	7	64.853%		
4	5	22.299%		
5	8	82.973%		
6	3	2.835%		
7	9	93.635%		

Figure 4 - Apple Numbers

The screenshot shows the Apple Numbers interface. The spreadsheet data is as follows:

	A	B	C	D	E	F	G
1	Sleep (in hours)	Percentiles		Mean	Stdev		
2	4	9.108%		6.333	1.749		
3	7	64.847%					
4	5	22.292%					
5	8	82.969%					
6	3	2.833%					

The Data Format panel on the right shows the Percentage format selected and Decimals set to 3.