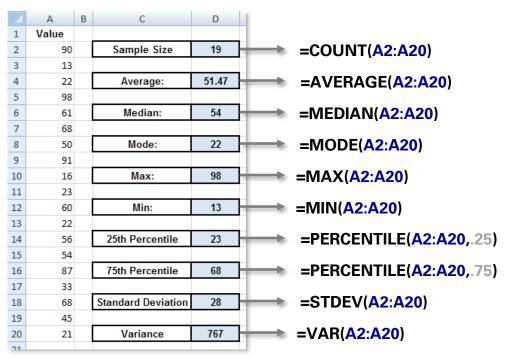
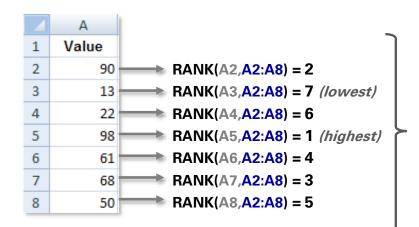
The Count, Average, Median, Mode, Max/Min, Percentile and Standard Deviation/Variance functions are used to perform basic calculations on a data array

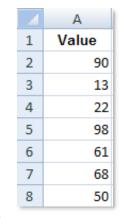






The RANK function returns the rank of a particular number among a list of values

The **SMALL/LARGE** functions return the nth smallest/largest values within an array



LARGE(A2:A8,2) = 90

(the 2nd largest number in the array is 90)

SMALL(A2:A8,3) = 50

(the 3rd smallest number in the array is 50)



	Α	В
1	Value	Percent Rank
2	2,717	18%
3	3,485	24%
4	5,202	76%
5	3,612	29%
6	4,432	59%
7	2,699	12%
8	4,585	65%
9	6,003	94%
10	4,820	71%
11	2,550	6%
12	5,795	88%
13	4,240	41%
14	6,827	100%
15	4,359	53%
16	2,320	0%
17	5,775	82%
18	4,241	47%
19	3,966	35%

PERCENTRANK returns the rank of a value as a percentage of a given array or dataset

=PERCENTRANK(array, x)



What range of data are you looking at?

Which **value** within the range are you looking at?

PERCENTRANK(\$A\$2:\$A\$19, A14) = **100**% (highest)

PERCENTRANK(\$A\$2:\$A\$19, A16) = **0**% (*lowest*)



RAND() and RANDBETWEEN act like random number generators in Excel:

\mathcal{A}	Α	В	C	D	E
1	0.5173	0.4091	0.7560	0.9012	0.2167
2	0.0906	0.2317	0.0906	0.5856	0.8646
3	0.1544	0.8240	0.4279	0.8782	0.7795
4	0.0097	0.0872	0.7740	0.9137	0.7815
5	0.2089	0.7028	0.0449	0.8173	0.9983
6	0.0761	0.4388	0.4056	0.5639	0.0668

The RAND() function returns a random value between 0 and 1 (to 15 digits)

The RANDBETWEEN function returns an integer between two values that you specify

4	Α	В	С	D	Е
1	83	23	64	62	92
2	59	45	40	50	91
3	24	37	70	30	32
4	54	85	69	55	3
5	73	12	36	53	2
6	29	72	68	59	99

=RANDBETWEEN(0,100)



The **SUMPRODUCT** formula multiplies corresponding cells from multiple arrays and returns the sum of the products (*Note: all arrays must have the same dimensions*)

=SUMPRODUCT(array1, array2 ... array_N)

Example: Total Revenue

	Α	В	С	D
1	Product	Quantity	Price	Revenue
2	Apple	2	\$0.50	\$1.00
3	Banana	4	\$1.00	\$4.00
4	Orange	3	\$0.80	\$2.40
5	Total			\$7.40

	Α	В	С	D
1	Product	Quantity	Price	Revenue
2	Apple	2	\$0.50	
3	Banana	4	\$1.00	
4	Orange	3	\$0.80	
5	Total			\$7.40

Without using SUMPRODUCT, you could multiply quantity*price in each row and sum the products

SUMPRODUCT(B2:B4,C2:C4) = \$7.40



SUMPRODUCT is often used with filters to calculate products *only* for rows that meet certain criteria:

	Α	В	С	D
1	Store	Product	Quantity	Price
2	Stop & Shop	Apple	2	\$0.50
3	Shaws	Banana	4	\$1.00
4	Market Basket	Banana	3	\$1.00
5	Trader Joe's	Pineapple	8	\$2.50
6	Stop & Shop	Orange	2	\$0.80
7	Shaws	Apple	1	\$0.50
8	Market Basket	Apple	5	\$0.50
9	Trader Joe's	Banana	6	\$1.00
10	Market Basket	Pineapple	3	\$2.50
11	Trader Joe's	Orange	8	\$0.80
12	Stop & Shop	Pineapple	3	\$2.50
13	Shaws	Pineapple	5	\$2.50
14	Stop & Shop	Banana	2	\$1.00
15	Shaws	Orange	6	\$0.80
16	Market Basket	Orange	7	\$0.80
17	Trader Joe's	Apple	3	\$0.50

Quantity of goods sold at Shaws:

SUMPRODUCT((A2:A17="Shaws")*C2:C17) = 16

Total revenue from Shaws:

SUMPRODUCT((A2:A17="Shaws")*C2:C17*D2:D17) = \$21.80

Revenue from apples sold at Shaws:

SUMPRODUCT((A2:A17="Shaws")*(B2:B17="Apple")*C2:C17*D2:D17) = \$0.50



PRO TIP:

When you add filters to a SUMPRODUCT, you need to change the commas to multiplication signs



Great, but how does it *really* work?

SUMPRODUCT((A2:A17="Shaws")*(B2:B17="Apple")*C2:C17*D2:D17) = \$0.50

	А	В	С	D
1	Store	Product	Quantity	Price
2	Stop & Shop	Apple	2	\$0.50
3	Shaws	Banana	4	\$1.00
4	Market Basket	Banana	3	\$1.00
5	Trader Joe's	Pineapple	8	\$2.50
6	Stop & Shop	Orange	2	\$0.80
7	Shaws	Apple	1	\$0.50
8	Market Basket	Apple	5	\$0.50
9	Trader Joe's	Banana	6	\$1.00
10	Market Basket	Pineapple	3	\$2.50
11	Trader Joe's	Orange	8	\$0.80
12	Stop & Shop	Pineapple	3	\$2.50
13	Shaws	Pineapple	5	\$2.50
14	Stop & Shop	Banana	2	\$1.00
15	Shaws	Orange	6	\$0.80
16	Market Basket	Orange	7	\$0.80
17	Trader Joe's	Apple	3	\$0.50

What YOU see

What EXCEL sees

When you apply a condition or filter to a column, Excel translates those cells as **0**'s (if false) and **1**'s (if true)

If you multiply all four columns, ONLY ROWS THAT SATISFY ALL CONDITIONS WILL PRODUCE A NON-ZERO SUM

	А	В	С	D
1	Store	Product	Quantity	Price
2	0	1	2	\$0.50
3	1	0	4	\$1.00
4	0	0	3	\$1.00
5	0	0	8	\$2.50
6	0	0	2	\$0.80
7	1	1	1	\$0.50
8	0	1	5	\$0.50
9	0	0	6	\$1.00
10	0	0	3	\$2.50
11	0	0	8	\$0.80
12	0	0	3	\$2.50
13	1	0	5	\$2.50
14	0	0	2	\$1.00
15	1	0	6	\$0.80
16	0	0	7	\$0.80
17	0	1	3	\$0.50



COUNTIF/SUMIF/AVERAGEIF

The COUNTIF, SUMIF, and AVERAGEIF formulas calculate a sum, count, or average based on specific criteria



=COUNTIF(range, criteria)

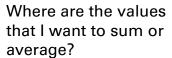
=SUMIF(range, criteria, sum_range)

=AVERAGEIF(range, criteria, average_range)



Which cells need to match your criteria?

Under what condition do I want to sum, count, or average?



COUNTIF(B2:B20,22) = 2

SUMIF(A2:A20, "Ryan", B2:B20) = 190

SUMIF(A2:A20,"<>Tim",B2:B20) = 702

AVERAGEIF(A2:A20, "Maria", B2:B20) = 45.75



COUNTIFS/SUMIFS/AVERAGEIFS

COUNTIFS, SUMIFS, and AVERAGEIFS are used when you want to evaluate a count, sum, or average based on *multiple* conditions or criteria

=COUNTIFS(criteria_range1, criteria1, criteria_range2, criteria2...)

=SUMIFS(sum_range, criteria_range1, criteria1, criteria_range2, criteria2...)

=AVERAGEIFS(average_range, criteria_range1, criteria1, criteria_range2, criteria2...)

4	Α	В	С	D
1	Month	Tactic	Campaign	Clicks
2	Jan	Search	Google	166
3	Jan	Search	MSN	263
4	Jan	Display	Contextual	289
5	Jan	Display	Retargeting	137
6	Feb	Search	Google	124
7	Feb	Search	MSN	311
8	Feb	Display	Contextual	350
9	Feb	Display	Retargeting	384
10	Mar	Search	Google	168
11	Mar	Search	MSN	358
12	Mar	Display	Contextual	347
13	Mar	Display	Retargeting	390

COUNTIFS(B2:B13, "Search", D2:D13, ">200") = 3 SUMIFS(D2:D13, A2:A13, "Feb", B2:B13, "Display") = 734 AVERAGEIFS(D2:D13, A2:A13, "Jan", C2:C13, "MSN") = 263



PRO TIP:

If you use < or >, you need to add quotation marks as you would with text (i.e. ">200")

