SPLIT Function

https://support.google.com/docs/answer/3094136

cell_context	delimiter	Result				Formula
Google	o	G	gle			=SPLIT(A2, "o")
Google	oo	G	gle			=SPLIT(A3, "oo")
DmOnCmSn	mn	D	O	C	S	=SPLIT(A4, "mn")
DmOnCmSn	mn	D	O	C	S	=SPLIT(A5, "mn", TRUE)
DmOnCmSn	mn	DmOnCmSn				=SPLIT(A6, "mn", FALSE)

Sample Usage

```
SPLIT("1,2,3", ",")

SPLIT("Alas, poor Yorick"," ")

SPLIT(A1, ",")
```

Syntax

```
SPLIT(text, delimiter, [split_by_each], [remove_empty_text])
```

- `text` - The text to divide.
- `delimiter` - The character or characters to use to split `text`.
  - By default, each character in `delimiter` is considered individually, e.g. if `delimiter` is `"the"`, then `text` is divided around the characters `"t"`, `"h"`, and `"e"`. Set `split_by_each` to `FALSE` to turn off this behavior.
- `split_by_each` - [OPTIONAL - `TRUE` by default] - Whether or not to divide `text` around each character contained in `delimiter`.
- `remove_empty_text` - [OPTIONAL - `TRUE` by default] - Whether or not to remove empty text messages from the split results. The default behavior is to treat consecutive delimiters as one (if `TRUE`). If `FALSE`, empty cells values are added between consecutive delimiters.

Notes

- Note that the character or characters to split the string around will not be contained in the result themselves.

Join Function

https://support.google.com/docs/answer/3094077?hl=en

One-dimensional array in a row				Result	Formula
D	O	C	S	DOCS	=join("",I4:L4)
Separate	this	with	comma	Separate,this,with,comma	=join(",",I5:L5)
Separate	this	with	spaces	Separate this with spaces	=join(" ",I6:L6)

JOIN function

Concatenates the elements of one or more one-dimensional arrays using a specified delimiter.

Sample Usage

```
JOIN(" and-a ",{1,2,"1 2 3 4"})

JOIN(",",{1,2,3},{4;5;6})

JOIN("-",A1:A100)
```

Syntax

```
JOIN(delimiter, value_or_array1, [value_or_array2, ...])
```

- `delimiter` - The character or string to place between each concatenated value.
  - `delimiter` may be specified as blank, e.g. `JOIN(,{1,2,3})`.
- `value_or_array1` - The value or values to be appended using `delimiter`.
- `value_or_array2, ...` - [OPTIONAL] - Additional value or array to be appended using `delimiter`.

Notes

- When `delimiter` is omitted, the result of `JOIN` is similar to that of `CONCATENATE`.

Additional Skills: CONCATENATE Function

The CONCATENATE() function serves largely the same purpose as join but allows for more flexibility in adding unique characters between strings

One-dimensional array in a row				Result	Formula
D	O	C	S	DOCS	=concatenate(K45:N45)
Separate	this	with	comma	Separate this with comma	=concatenate(K46&" "&L46&" "&M46&" "&N46)
Separate	this	with	spaces	Separate,this,with,spaces	=concatenate(K47&","&L47&","&M47&","&N47)
One	Comma	Two	Spaces	One Comma, Two Spaces	=concatenate(K48&" "&L48&", "&M48&" "&N48)

Proper Function

https://support.google.com/docs/answer/3094133?hl=en

Input	Result	Formula
google docs	Google Docs	=proper(T4)
gOOGLE docS	Google Docs	=proper(T5)
googledocs	Googledocs	=proper(T6)

PROPER

Capitalizes each word in a specified string.

Sample Usage

```
PROPER("united states")
```

```
PROPER(A2)
```

Syntax

```
PROPER(text_to_capitalize)
```

- `text_to_capitalize` - The text which will be returned with the first letter of each word in uppercase and all other letters in lowercase.

Notes

- `PROPER` is useful for proper nouns, such as names of people or geographic locations.
- `PROPER` capitalizes each word in `text_to_capitalize` rather than the beginning of each sentence, and is therefore likely not the correct tool to use for paragraphs or other blocks of text.
- `PROPER` will convert all characters not at the beginning of words to lowercase, which may cause problems with certain strings. For example, using `PROPER("mcLeod")` to capitalize the surname McLeod results in "Mcleod" instead.

See Also

`UPPER`: Converts a specified string to uppercase.

`SUBSTITUTE`: Replaces existing text with new text in a string.

`LOWER`: Converts a specified string to lowercase.

Guest Name	Address	Sent Invitation
Rob	New York	No
David	New Jersey	No
Jack	California	Yes
Nancy	Florida	No
Mary	New York	Yes
Rob	New York	No

Unique Address	Formula
New York	=UNIQUE(B2:B7)
New Jersey	
California	
Florida	

Unique Rows			Formula
Rob	New York	No	=UNIQUE(A2:C7)
David	New Jersey	No	
Jack	California	Yes	
Nancy	Florida	No	
Mary	New York	Yes	

UNIQUE

Returns unique rows in the provided source range, discarding duplicates. Rows are returned in the order in which they first appear in the source range.

Sample Usage

```
UNIQUE(A2:B26)
```

```
UNIQUE({1, 2; 3, 4; 5, 6})
```

Syntax

```
UNIQUE(range)
```

- `range` - The data to filter by unique entries.

Notes

- If rows are returned which appear to be duplicates, ensure that cells including text do not have differing hidden text such as trailing spaces.
- Ensure that numeric values are formatted in the same way - percentages as percentages, currency values as currency values, etc.

See Also

`SORT`: Sorts the rows of a given array or range by the values in one or more columns.

`FILTER`: Returns a filtered version of the source range, returning only rows or columns that meet the specified conditions.

IF Function

https://support.google.com/docs/answer/3093364?hl=en

Result	Formula
True_Value	=IF(1=1, "True_Value", "False_Value")
Smaller	=IF(-1>0, "Greater", "Smaller")
Equal	=IF("Google"="google", "Equal", "Unequal")
	=IF(TRUE, , "False")
	=IF(FALSE, "True",)
Nested_Outcome	=IF(IF(1>0, TRUE, FALSE), "Nested_Outcome", IF(TRUE, "Reached", "Unreached"))

IF function

Returns one value if a logical expression is `TRUE` and another if it is `FALSE`.

Sample Usage

```
IF(A2 = "foo","A2 is foo")

IF(A2,"A2 was true","A2 was false")

IF(TRUE,4,5)
```

Syntax

```
IF(logical_expression, value_if_true, value_if_false)
```

- `logical_expression` - An expression or reference to a cell containing an expression that represents some logical value, i.e. `TRUE` or `FALSE`.
- `value_if_true` - The value the function returns if `logical_expression` is `TRUE`.
- `value_if_false` - **[** OPTIONAL - blank by default **]** - The value the function returns if `logical_expression` is `FALSE`.

Notes

- Ensure that `value_if_true` and `value_if_false` are provided to the function in the correct order - this is the single most common source of problems with `IF`.

See Also

- IFERROR: Returns the first argument if it is not an error value, otherwise returns the second argument if present, or a blank if the second argument is absent.
- IFS: Evaluates multiple conditions and returns a value that corresponds to the first true condition.

VLOOKUP Function

https://support.google.com/docs/answer/3093318?hl=en

Student ID	Grade
N444	90
N333	100
N222	85
N111	80

Student ID	Grade	Formula
N111	80	=vlookup(P11,$P$3:$Q$7,2,false)
N222	85	=vlookup(P12,$P$3:$Q$7,2,false)
N333	100	=vlookup(P13,$P$3:$Q$7,2,false)
N444	90	=vlookup(P14,$P$3:$Q$7,2,false)

Lower bound	Upper bound	Tax Rate
$0	$2,999.99	1%
$3,000	$5,999.99	2%
$6,000	$9,999.99	3%
$10,000	$13,999.99	4%
$14,000		5%

Title	Income	Tax Rate	Formula
Associate	$3,300	2%	=vlookup(Q26,$P$18:$R$22,3,true)
Vice President	$6,500	3%	=vlookup(Q27,$P$18:$R$22,3,true)
Director	$9,000	3%	=vlookup(Q28,$P$18:$R$22,3,true)
Managing Director	$11,000	4%	=vlookup(Q29,$P$18:$R$22,3,true)

VLOOKUP

Vertical lookup. Searches down the first column of a range for a key and returns the value of a specified cell in the row found.

Sample Usage

```
VLOOKUP(10003, A2:B26, 2, FALSE)
```

Syntax

```
VLOOKUP(search_key, range, index, [is_sorted])
```

- `search_key` - The value to search for. For example, `42`, `"Cats"`, or `I24`.
- `range` - The range to consider for the search. The first column in the range is searched for the key specified in `search_key`.
- `index` - The column index of the value to be returned, where the first column in `range` is numbered 1.
  - If `index` is not between 1 and the number of columns in `range`, `#VALUE!` is returned.
- `is_sorted` - [`TRUE` by default] - Indicates whether the column to be searched (the first column of the specified range) is sorted. FALSE is recommended in most cases.
  - It's recommended to set `is_sorted` to FALSE. If set to FALSE, an exact match is returned. If there are multiple matching values, the content of the cell corresponding to the first value found is returned, and `#N/A` is returned if no such value is found.
  - If `is_sorted` is `TRUE` or omitted, the nearest match (less than or equal to the search key) is returned. If all values in the search column are greater than the search key, `#N/A` is returned.

Notes

- If `is_sorted` is set to `TRUE` or omitted, and the first column of the range is not in sorted order, an incorrect value might be returned. If `VLOOKUP` doesn't appear to be giving correct results, check that the last argument is set to FALSE. If the data is sorted and you need to optimize for performance, set it to TRUE. In most cases it should be set to FALSE.
- When searching for numeric or date values, make sure that the first column in the range is not sorted by text values. For example, correctly sorted numbers should appear as (1, 2, 10, 100) rather than (1, 10, 100, 2) as they would be if they were sorted as strings. Using an incorrect sort type may cause incorrect values to be returned.
- Search keys based on regular expressions are NOT supported. Use `QUERY` instead.
- `VLOOKUP` has much better performance with sorted ranges and `is_sorted` set to `TRUE`. Consider sorting the column being searched.
- You can also find matches using pattern strings that include wildcards. The question mark (?) and asterisk (*) are the wildcards for `search_key`, with the question mark standing in for a single character and the asterisk standing in for any series of characters. If you need to match an actual question mark or asterisk, add a tilde (~) before the character and add an extra tilde if you're looking for something with an actual tilde in it.

Pivot Tables

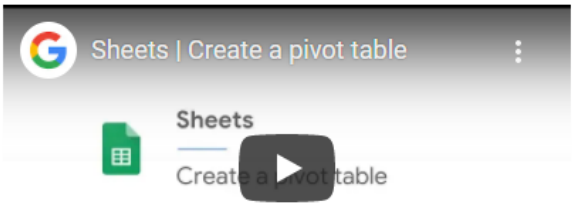
https://support.google.com/docs/answer/1272900?co=GENIE.Platform%3DDesktop&hl=en

Create & use pivot tables

Want to get more out of Google Docs for work or school? Sign up for a free Google Workspace trial .

You can use pivot tables to narrow down a large data set or see relationships between data points. For example, you could use a pivot table to analyze which salesperson brought the most revenue for a specific month.

Computer | Android | iPhone & iPad



Add or edit pivot tables

1. On your computer, open a spreadsheet in Google Sheets .
2. Select the cells with source data you want to use. **Important:** Each column needs a header.
3. In the menu at the top, click **Data** > **Pivot table**. Click the pivot table sheet, if it's not already open.
4. In the side panel, next to "Rows" or "Columns," click **Add**, then choose a value.
   - **Note:** Sometimes, you'll see recommended pivot tables based on the data you choose. To add a pivot table, under "Suggested," choose a pivot table.
5. In the side panel, next to "Values," click **Add**, then choose the value you want to see over your rows or columns.
6. You can change how your data is listed, sorted, summarized, or filtered. Next to what you want to change, click the Down Arrow .

Calculated fields with SUM or a custom formula

1. On your computer, open a spreadsheet in Google Sheets .
2. Click the pivot table.
3. In the side panel, next to "Values," click **Add** > click **Calculated field**.
   - **Calculate a value with SUM:** Next to "Summarize by," click **SUM**.
   - **Calculate a value with a custom formula:** In the field that appears, enter a formula. Then, next to "Summarize by," click **Custom**.
4. On the bottom right, click **Add** and the new column will appear.

Tip: To write custom formulas, you can use:

- Other columns, for example, `=sum(Price)/counta(Product)` where "Price" and "Product" are fields in the pivot table or an underlying table (available with Connected Sheets.)
- Google Sheets functions.

Important: If you use field values with spaces, make sure to use quotations around them in your custom formula.
For example: `="h sdf"`.

division	subdivision	product number	number of units	price per unit
east	1	$1	14	$10
east	2	$1	15	$11
west	1	$1	11	$10
west	2	$1	21	$9
east	3	$1	16	$8
west	3	$1	18	$12
east	4	$1	11	$9
east	1	$2	10	$9
east	2	$2	9	$13
west	1	$2	12	$10
west	2	$2	15	$10
east	3	$2	12	$9
west	3	2	16	$12
east	4	2	12	$9

division	*subdivision*	SUM of number of units	AVERAGE of price per unit
east	1	24	$10
	2	24	$12
	3	28	$9
	4	23	$9
east Total		99	$10
west	1	23	$10
	2	36	$10
	3	34	$12
west Total		93	$11
Grand Total		**192**	**$10**

Google Sheets and Excel

Google is your friend. All instructional references from this lesson came from googling "Google Sheets "...." Function"

Microsoft/Google have a lot of free introductory resources for learning excel

https://support.microsoft.com/en-us/office/excel-video-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb

https://support.google.com/a/users/answer/9282959?hl=en

Further Learning - Data Visualization

I highly recommend this book on data visualization. It will teach you how to make more effective and impactful charts with the data you collect

It's an easy read and relatively inexpensive (<$20)

Storytelling with Data - a data visulaization guide for business professionals

https://www.amazon.com/Storytelling-Data-Visualization-Business-Professionals/dp/1119002257