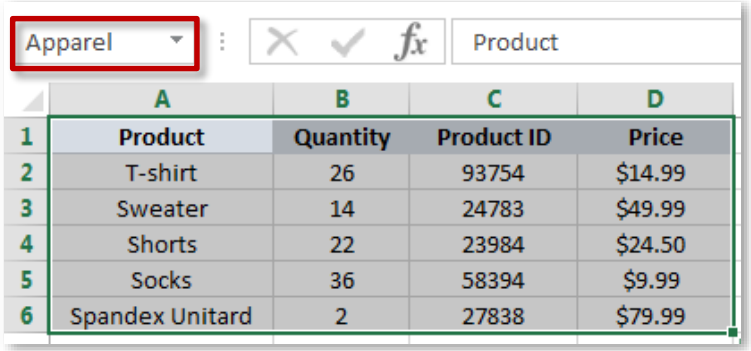
Using Named Arrays can simplify a lookup function if you use the same data array in multiple formulas

For example, if you name the array from A1:D6 "Apparel"…



	A	B	C	D
1	Product	Quantity	Product ID	Price
2	T-shirt	26	93754	$14.99
3	Sweater	14	24783	$49.99
4	Shorts	22	23984	$24.50
5	Socks	36	58394	$9.99
6	Spandex Unitard	2	27838	$79.99

…you can write your vlookup formula in either of the following ways:

=VLOOKUP(A1,$A$1:$D$6,2)
=VLOOKUP(A1,Apparel,2)

Let's take a look at one of Excel's most common reference functions – VLOOKUP:

=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

- **lookup_value**: This is the **value** that you are trying to match in the table array
- **table_array**: This is **where** you are looking for the lookup value
- **col_index_num**: **Which column** contains the data you're looking for?
- **[range_lookup]**: Are you trying to match the **exact** lookup value (0), or something similar (1)?

	A	B	C	D
1	Product	Quantity	Product ID	Price
2	T-shirt	26	93754	$14.99
3	Sweater	14	24783	$49.99
4	Shorts	22	23984	$24.50
5	Socks	36	58394	$9.99
6	Spandex Unitard	2	27838	$79.99

D2=VLOOKUP(A2, $G$1:$H$5, 2, 0)

G	H
Product	Price
Shorts	$24.50
Sweater	$49.99
Spandex Unitard	$79.99
T-shirt	$14.99
Socks	$9.99

To populate the Price in column D, we look up the name of the product in the data array from G1:H5 and return the value from the 2nd column over

Use HLOOKUP if your table array is transposed (variables headers listed in rows)

=HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])

This is the **value** that you are trying to match in the table array

This is **where** you are looking for the lookup value

Which column contains the data you're looking for?

Are you trying to match the **exact** lookup value (0), or something similar (1)?

	A	B	C	D
1	Product	Quantity	Product ID	Price
2	T-shirt	26	93754	$14.99
3	Sweater	14	24783	$49.99
4	Shorts	22	23984	$24.50
5	Socks	36	58394	$9.99
6	Spandex Unitard	2	27838	$79.99

D2=HLOOKUP(A2, $H$1:$L$2, 2, 0)

With an HLOOKUP, we search for the product name in F1:J2 and return the value from the 2nd row down

	G	H	I	J	K	L
	Product	Shorts	T-shirt	Sweater	Spandex Unitard	Socks
	Price	$24.50	$14.99	$49.99	$79.99	$9.99

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There are two key rules that constrain VLOOKUP and HLOOKUP formulas:

1. **The lookup value must be in the first column of a VLOOKUP table array or the first row of a HLOOKUP table array**

2. **Excel will always return the value from the top most row or left most column of a table array when multiple instances of the lookup value are present**

PRO TIP:

Avoid breaking Law #2 by identifying a "Key" that is common to both datasets and is unique for every row (NOTE: Keys often take the form of a concatenation of multiple fields)

The ROW function returns the row number of a given *reference*, while the ROWS function returns the number of rows in a given *array* or *array formula*

=ROW([reference])

=ROWS(array)

This example uses an array, which is why it includes the fancy { } signs – more on that in the ARRAY functions section

ROW(C10) = 10

ROWS(A10:D15) = 6

ROWS({1,2,3;4,5,6}) = 2

The **COLUMN** function returns the column number of a given *reference*, while the **COLUMNS** function returns the number of columns in a given *array* or *array formula*

=COLUMN([reference])

=COLUMNS(array)

PRO TIP:

Leave the cell reference out and just write ROW() or COLUMN() to return the row or column number of the cell in which the formula is written

COLUMN(C10) = **3**

COLUMNS(A10:D15) = **4**

COLUMNS({1,2,3;4,5,6}) = **3**

The INDEX function returns the *value* of a specific cell within an array

=INDEX(array, row_num, column_num)

- array: What range of cells are you looking at?
- row_num: How many rows down is the value you want?
- column_num: How many columns over is the value you want?

	A	B	C
1	Tools	Price	Inventory
2	Hammer	$5.00	55
3	Screw Driver	$2.50	66
4	Pliers	$3.34	333
5	Wrench set	$10.00	234
6	Chain Saw	$55.48	23
7	Tool Box	$19.99	5
8	Level	$2.25	7

INDEX($A$1:$C$5, 5, 3) = 234

In this case we're telling Excel to find the value of a cell somewhere within the array of A1:C5. Starting from the upper left, we move down to the 5th row and right to the 3rd column, to return the value of 234

The MATCH function returns the *position* of a specific value within a column or row

=MATCH(lookup_value, lookup_array, [match_type])

What value are you trying to find the position of?

In which row or column are you looking? (**must be a 1-dimensional array**)

Are you looking for the exact value (0), or anything close?

1: *Find largest value* **<** *or* **=** *lookup_value*

0: *Find exact lookup_value*

-1: *Find smallest value* **>** *or* **=** *lookup_value*

	A	B
1	Tools	Price
2	Hammer	$5.00
3	Screw Driver	$2.50
4	Pliers	$3.34
5	Wrench set	$10.00

MATCH("Pliers",$A$1:$A$5, 0) = 4

	A	B	C
1	Tools	Price	Inventory
2	Hammer	$5.00	55
3	Screw Driver	$2.50	66
4	Pliers	$3.34	333

MATCH(66,$A$3:$C$3, 0) = 3

*Matching the word "**Pliers**" in column A, we find it in the **4th row**. Matching the number **66** in row 3, we find it in the **3rd column***

INDEX and MATCH are commonly used in tandem to act like a LOOKUP function; the only difference is that INDEX/MATCH can find values in any column or row in an array

Example: Price Checker

	A	B	C	D
1		Small	Medium	Large
2	Sweater	$10	$12	$15
3	Jacket	$30	$35	$40
4	Pants	$25	$30	$35
5				
6	*Product:*	Pants		
8	*Size:*	Medium		
10	**PRICE:**	?		

In this example, we want to populate the price of a given product and size in cell B10 by returning a particular value within the array B2:D4

B10=INDEX(B2:D4, MATCH(B6,A2:A4,0), MATCH(B8,B1:D1,0))

The number of rows down to index depends on what product I'm looking for, so we use a MATCH function and search for the value in cell B6 (in this case "Pants")

The number of columns over to index depends on what size I'm looking for, so we use a MATCH function and search for the value in cell B8 (in this case, "Medium")

Considering the output of each MATCH function, the formula is just a simple INDEX:

B10 = INDEX(B2:D4, 3, 2) = $30

The OFFSET function is similar to INDEX, but can return either the value of a cell within an array (like INDEX) or a specific *range* of cells

=OFFSET(reference, rows, columns, [height], [width])

- **reference** — What's your starting point?
- **rows** — How many rows down should you move?
- **columns** — How many columns over should you move?
- **[height], [width]** — If you want to return a multidimensional array, how tall and wide should it be?

An OFFSET formula where [height]=1 and [width]=1 will operate exactly like an INDEX. A more common use of OFFSET is to create dynamic arrays (like the Scroll Chart example in the appendix)

PRO TIP:

Don't use OFFSET or INDEX/MATCH when a simple VLOOKUP will do the trick