

Excel Math 1: Basic Math Formulas



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1.0 hour

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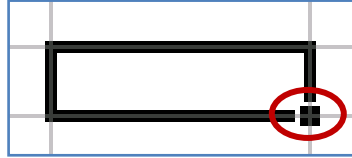
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Fill Handle



The **Fill Handle** is in the bottom right corner of the selected cell. When you place your mouse over this *handle*, it changes from a thick white cross, to a thin black cross. Once you see the thin cross (no arrows) you can click and drag the cell to fill its contents in a single direction (up, down, left or right). If you want to go in two directions, you must first complete one way, let go of the mouse and then drag the handle in the second direction.

When you use the **Fill Handle** to pull down a single number or plain text, it will copy the data.

Text	123
Text	123
Text	123

When you use the **Fill Handle** to pull down a text with numbers, a date, a month or a weekday it will fill in a series.

Exam 1	2/1/02	February	Friday
Exam 2	2/2/02	March	Saturday
Exam 3	2/3/02	April	Sunday

When you select two or more numbers (including dates) and then use the **Fill Handle**, Excel will fill in the series, following the original pattern of the selected cells. It can only follow simple addition and subtraction patterns.


123	5	100	2/01/02
124	4	110	2/08/02
125	3	120	2/15/02
126	2	130	2/22/02

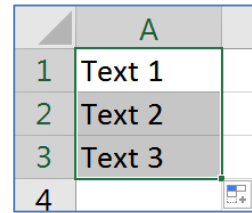
The **Fill Handle** will follow the format of the original cells. This includes number formats as well as capitalization,

Friday	FRIDAY	fri	\$123.00
Saturday	SATURDAY	sat	\$123.00
Sunday	SUNDAY	sun	\$123.00

If you double-click on the Fill Handle it will 'fill' as many cells as the previous column has in use.

Fill Handle Options

When you use the **Fill Handle**, you will notice a symbol appear in the right hand bottom corner of your newly filled cells. This icon () represents your AutoFill Options. If you put your mouse over the icon you will see a drop down arrow that will give you a list of your fill options.



	A
1	Text 1
2	Text 2
3	Text 3
4	

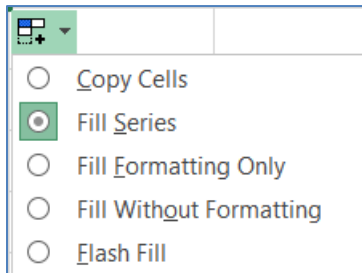
The four basic Fill Options are:

- Copy Cells – Repeat the cells along the selection
- Fill Series – Follow pattern along the selection
- Fill Format Only – Repeat the format of the cells along the selection
- Fill without Formatting – Follow the pattern along the selection, but not the format
- Flash Fill – Fills based on a pattern you establish in the same column

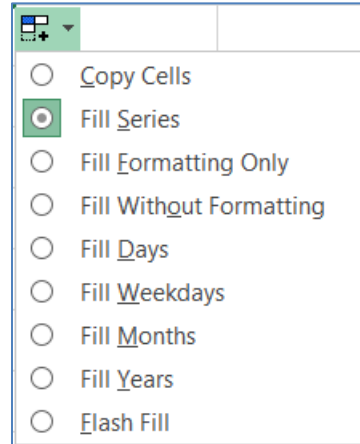
If you use the **Fill Handle** on cells with dates you will notice even more options:

- Fill Days
- Fill Weekdays
- Fill Months
- Fill Years

Number Fill Options



Date Fill Options



Mathematical Operations

To let Excel know you expect it to "do math" you need start your cell with an equal sign (=).

- | | | | |
|--------------------------------|-------|--------|-----|
| - Addition, plus sign (+) | = 5+2 | result | 7 |
| - Subtraction, hyphen (-) | = 5-2 | result | 3 |
| - (also used for negative) | = -5 | result | -5 |
| - Multiplication, asterisk (*) | = 5*2 | result | 10 |
| - Division, slash (/) | = 5/2 | result | 2.5 |
| - Exponent/Power, caret (^) | = 5^2 | result | 25 |

There are several operands to use for logic comparisons.

- | | | | |
|---|-------|--------|-------|
| - Greater than, greater than sign (>) | =5>2 | result | TRUE |
| - Less than, less than sign (<) | =5<2 | result | FALSE |
| - Equal to, equal sign (=) | =5=2 | result | FALSE |
| - Not equal to, both greater and less than signs (<>) | =5<>2 | result | TRUE |

Building an Equation

You can directly type in values, but that data stays constant. If you want to have the answers to your equations update as you change your data, you should use the cell addresses. You will see the cell addresses change colors so you can tell which ones are used in your equation.

Type in the exact cell address

Cells are labeled by their row and column headings. Rows are numbered and go horizontally across (rows of chairs) and columns are lettered and go vertically top to bottom (columns of a building). When we refer to the address of a cell, we use the column letter then the row number such as A1.

- Click in the cell where the answer will appear
- Press the Equal sign (=)
- Type in the cell address you want to use in your equation
- Accept the answer or press the next math operator (+, -, *, /, ^)

	A	B	C
1	1	2	=a1+b1
2			

Use the keyboard to point to the cell address

When you first enter a character into a cell, you will be in "ENTER" mode. This includes when you type an equal sign. But if you press an arrow key on the keyboard after the equal sign, Excel does not move out of the cell. Instead you will be put into a "POINT" mode, and Excel will color coordinate the cell you are selecting.

- Click in the cell where the answer will appear
- Press the Equal sign (=)
- Press the arrow keys until you are on the cell you want to use in your equation
- Accept the answer or press the next math operator (+, -, *, /, ^)

	A	B	C
1	1	2	=A1
2			

Use the mouse to point to the cell address

The mouse and arrow keys are both "pointers". If you press the equal sign and then use the mouse to click on another cell, Excel will put you into a "POINT" mode, and place the address of the cell you clicked on in your equation.

- Click in the cell where the answer will appear
- Press the Equal sign (=)
- Use the mouse to click on the cell you want to use in your equation
- Accept the answer or press the next math operator (+, -, *, /, ^)

Order of Operations

Microsoft Excel respects the Order of Operations.

- (1) Parenthesis
- (2) Exponents (raised to a power)
- (3) Multiplication and Division
- (4) Addition and Subtraction

Parentheses Please Exponents Excuse Multiply My Divide Dear Add Aunt Subtract Sally

This means with an equation such as

$$= 5 + 3 * 2$$

Excel will do the multiplication before it does the addition. The result would be 11.

If you wanted the addition to happen first, you have to use parentheses:

$$= (5 + 3) * 2$$

giving us a result of 16.

In math, we use the brackets, such as

$$\{[(5+3)*(4-2)] / 2\}$$

In Excel we ONLY use parentheses

$$=(((5+3)*(4-2))/2)$$

result 8.

Remember to let Excel know you want it to calculate something; you have to start with an equal sign (=).

*If you get stuck inside an equation, or confused by a mistake, press **Esc** to cancel and try again.*

Formatting Dates

Dates and Times are technically numbers because they can be used in equations. Excel is able to do this because it has a "serial" number equivalent. Both columns of this table at the right of this page show the same value, but the dates in the second column have lost the date format. For a date, 0 = 1/1/1900. The numeric values in the second column represent how many days there are between 1/1/1900 and the date listed.

11/16/1978	28,810.00
5/2/1982	30,073.00
11/4/1986	31,720.00
2/23/1993	34,023.00
11/13/1995	35,016.00
2/2/2002	37,289.00
7/24/2008	39,653.00
12/25/2010	40,537.00
6/8/2013	41,433.00
11/20/2018	43,424.00

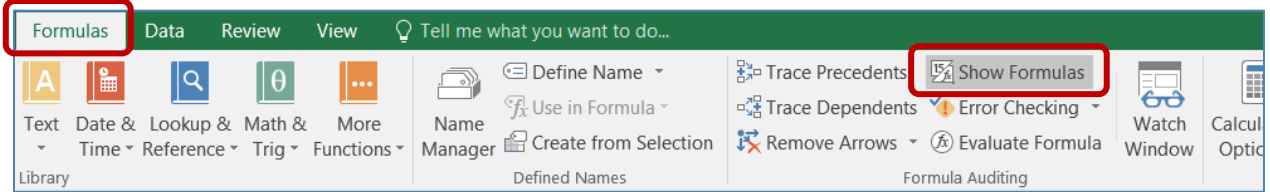
If your date loses its format you can modify it through the Number group or through the Format Cells Window. If you don't like the choices offered, you can custom build your date from the Custom section of the Number tab in the Format Cells Window. Use M for months, D for days and Y for years. Excel is not case sensitive, upper or lowercase letters will work for these formats.

Friday, February 1, 2002					
dddd, mmmm d, yyyy					
Day		Month		Year	
d	1	m	2	y	02
dd	01	mm	02	yy	02
ddd	Fri	mmm	Feb	yyy	2002
dddd	Friday	mmmm	February	yyyy	2002

You can also custom build times using H for hours, M for minutes and S for seconds.

Formula View

Our cells display the formula results. If we want to see the equation, we have to look at the formula bar or edit the cell. Sometimes it helps to see all the equations on a worksheet. The button for this option is on the Formula tab, in the Formula Auditing group. The keyboard shortcut is Control-Tilde, ctrl ~ (the wavy line above Tab, below Esc on your keyboard).



You can also turn this on through the Excel Options. From the File Menu, choose **Options**. On the **Advanced** tab, under the **Display Options for this Worksheet** group, check the box next to **Show formulas in cell instead of their calculated results**.

Calculated Results (normal view)

	A	B	C	D	E	F	G	H	I
1	Big City Store		Date:	10/8/2016					
2	Sales Report								
3									
4	Items	Price	Qty	SubTotal					
5	AAA	\$ 123.00	987	\$ 121,401.00					
6	BB	\$ 456.00	654	\$ 298,224.00					
7	C	\$ 789.00	321	\$ 253,269.00					
8				\$ 672,894.00					

Formula View

	A	B	C	D	
1	Big City Store		Date:	42651	
2	Sales Report				
3					
4	Items	Price	Qty	SubTotal	
5	AAA	123	987	=B5*C5	
6	BB	456	654	=B6*C6	
7	C	789	321	=B7*C7	
8				=SUM(D5:D7)	

The formula view will stretch out the columns and all the numbers appear to have lost their format, including the dates and some alignments. Be careful adjusting the column widths, if you shrink them in the formula view, it will proportionally shrink in the calculated results view.

You can continue working in this view and print out the sheet with all the formulas showing. If you're going to print this view, I recommend turning on the print headings from the Page Layout tab.

Absolute/Relative

When you create an equation in Excel using cell addresses, Excel sets up the equation to have a **relative** reference. When you are using the Fill Handle or the Copy and Paste features the equation result is relative to the location of the data. For example:

	A	B	C	D
1	5	6	=A1+B1	
2	12	4		
3				

If this equation is copied into cell C2, or the Fill Handle is used to drag the equation down to C2, Excel will give you this result:

	A	B	C	D
1	5	6	=A1+B1	
2	12	4	=A2+B2	
3				

Since the equation was moved down, between rows, only the row number changes. If instead we moved the equation across, the row numbers will remain the same, but the column numbers will change:

	A	B	C	D
1	5	6	=A1+B1	=B1+C1
2	12	4		
3				

The addresses in the equation are **relative** to where the answer is positioned. The equation in cell C1 of the table above states 'take the value of the cell that is two to the left from this cell and add it to the value of the cell that is one to the left from this cell'. When we fill or copy the cell over or down, the basic equation stays the same.

If you do not want a number to move relatively you can make it **absolute** by using dollar signs (\$) in the equation. The **F4** button on the keyboard will place the dollar sign characters in for you while you are in Enter, Edit, or Point mode. (Think F4 -> FORCE)

= $\$A\1 - Locks the reference into Cell A1

= $\$A1$ - Locks the reference into Column A, but will allow the row number to change

= $A\$1$ - Locks the reference into Row 1, but will allow the row number to change

	A	B	C	D	E	F	G	H	I
1	5	6	= $\$A\1 +B1		SubTotals:	123	456	789	
2	12	4	= $\$A\1 +B2		TaxRate:	6.5%			
3					Taxes:	=F1* $\$F\2	=G1* $\$F\2	=H1* $\$F\2	

Class Exercise

Review

- Open Excel
- Click on Blank Workbook
- Zoom to 150%
- Remember Text on left, Numbers on the right
- Remember to "accept data"
 - o In Cell A1 type: 1
 - Press Ctrl Enter to accept (stays on cell)
 - o Clear A1
 - o In Cell A1 type: 1
 - Click on Check next to formula bar to accept
 - (The X is the same as cancel)

Fill Handle

- In Cell A1 type: 1 ("accept data" for each of these)
 - o Use the Fill Handle in the bottom right corner to drag down to row 8
 - 1,1,1,1...
- In Cell B1 type: text
 - o Fill to row 8
 - text, text, text, text...
- In Cell C1 type: text1
 - o Fill to row 8
 - text1, text2, text3, text4...
- In Cell D1 type: 1, In Cell D2 type: 2
 - o Select **both** and Fill to row 8
 - 1, 2, 3, 4...
- In Cell E1 type: 2, In Cell E2 type: 4
 - o Select **both** and Fill to row 8
 - 2, 4, 6, 8...
- In Cell F1 type: 5, In Cell F2 type: 4
 - o Select **both** and Fill to row 8
 - 5, 4, 3, 2...
- In Cell G1 type: text 1
 - o Double-click on fill handle
 - text1, text2, text3, text4...

	A	B	C	D	E	F	G
1	1 text	text1		1	2	5 Text 1	
2	2 text	text2		2	4	4 Text 2	
3	3 text	text3		3	6	3 Text 3	
4	4 text	text4		4	8	2 Text 4	
5	5 text	text5		5	10	1 Text 5	
6	6 text	text6		6	12	0 Text 6	
7	7 text	text7		7	14	-1 Text 7	
8	8 text	text8		8	16	-2 Text 8	

Special Reserved Words

Type the following into the cells listed and Fill using the double-click, or drag, down to row 8.

- In Cell H1 type: Quarter 1
- In Cell I1 type: 1st Qtr
- In Cell J1 type: 1st
- In Cell K1 type: 1 st
- In Cell L1 type: January
- In Cell M1 type: FEB
- In Cell N1 type: Monday
- In Cell O1 type: sat

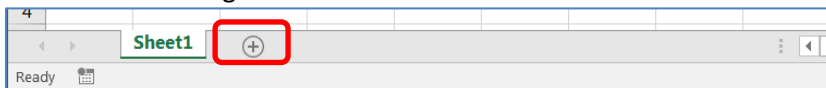
Working with Dates

Type the following into the cells listed and Fill using the double-click, or drag, down to row 8.

- In Cell P1 type: 10/20
- In Cell Q1 type: 12/28/2016
 - o Click on the Fill handle options, the box that pops up near the fill handle when you let go of the mouse. Try these settings:
 - Weekdays, Months, Years
- In Cell R1 type: Enter the two payday (example: 10/14, 10/28)
 - o *remember to select BOTH cells before you fill*

Sheet 2

- Click on the Plus sign next to Sheet 1 to create Sheet 2



- Zoom 150%
- Create data set
 - o A1: 1; B1: 2
 - o A2: 2, B2: 4
 - o Select all four cells and fill to Row 10

	A	B
1	1	2
2	2	4

Creating Equations with constant values

- In Cell C1 type: 1+2
 - o Accept. Notice the "1+2" is on the left side of the cell meaning Excel sees "text"
- Clear the contents of cell C1 (Delete)
- In Cell C1 type: =1+2
 - o Using the = sign as the first character tells Excel we are building an equation, we're doing math. We see a 3 in the cell, but the formula bar displays =1+2
 - o 1+2 **always** equal 3, but if we change data we want our answer to change

Creating Equations with Cell addresses

- Clear cell C1, type =a1+b1
 - o Not case sensitive
 - o Notice the color coding
 - o Accept data, should get a 3
 - o Change A1 to 5, accept to see answer in C1 change

- **USING KEYBOARD**
 - o Go to C2
 - o press = sign
 - o press ← arrow two times
 - o press + sign
 - o press ← arrow once
 - o enter to accept

- **USING MOUSE**
 - o Go to C3
 - o press = sign
 - o click on cell A3
 - o press the + sign
 - o click on cell B3
 - o click on check to accept

Basic math symbols

- Add +, Subtract -, Multiply *, Divide /
 - o All found on the NumPad
- Build these equations
 - o In Cell C4 add A4 and B4: =A4+B4
 - o In Cell C5 subtract A5 and B5: =A5-B5
 - o In Cell C6 multiply A6 and B6: =A6*B6
 - o In Cell C7 divide A7 and B7: =A7/B7

Remember the Order of Operations

- Parenthesis
- Exponents/Powers
- Multiplication/Division
- Addition/Subtractions

- Build these equations
 - o In Cell C8 type =2+3*5
 - o In Cell C9 type =(2+3)*5

	A	B	C
1	1	2	3
2	2	4	6
3	3	6	9
4	4	8	12
5	5	10	-5
6	6	12	72
7	7	14	0.5
8	8	16	17
9	9	18	25
10	10	20	

Date not Math?

- Put today's date in cell C10
 - o i.e. 10/5
 - o Note Excel sees it as a date not as an equation (10 divided by 5), Why? Because there is no Equal sign! 10/5 is October 5th, =10/5 is an equation with a result of 2

Totals Preview

- Select Column A
- Look in the status bar in the bottom right side of the window. When you select more than one cell, Excel will automatically calculate the Average, Count, and Sum of your selection.



Formatting

- Format column A with dollar signs
 - o Select Column A, from the right-click or Home tab, choose the \$ format
- Format column B to be centered
 - o Select Column B, from the right-click or Home tab, choose Align Center
- Edit Cell C1 (double-click in cell)
 - o When you accept, Excel recalculates answer and the format changes
- Format Column C with dollar signs
 - o Note format in cell C10, no longer a date

Reformat Date

- Click on Cell C10 (we don't want the whole column)
- Choose **Short date** from the list of number formats, in the Number group on the Home Tab
- Choose "More Numbers" to view different date formats
- Choose the 14-Mar format to return to the original date formatting
 - o To custom build a date format see page 6

Formula View

- Toggle cell data with ctrl-` (Ctrl-~... Wavy line above tab, below Esc)
- We can see all the formulas but NO formatting
- Toggle back to answer view

	A	B	C
1	1	2	=A1+B1
2	2	4	=A2+B2
3	3	6	=A3+B3
4	4	8	=A4+B4
5	5	10	=A5-B5
6	6	12	=A6*B6
7	7	14	=A7/B7
8	8	16	=2+3*5
9	9	18	=(2+3)*5
10	10	20	42651

Create Data Table

- Click on the Plus sign next to Sheet 2 to create Sheet 3
- Zoom to 150%
- Type in the table shown here

	A	B	C
1	Big City Store		
2	Sales Report		
3			
4	Items	Price	Qty
5	A	123	987
6	BB	456	654
7	CCC	789	321

Format Data Table

- Bold Row 4
- Center Column C
- AutoFit Column C
- Dollar Format the Prices, B5 through B7
- In Cell D4 type: SubTotal
 - o Should be bold already

	A	B	C	D
1	Big City Store			
2	Sales Report			
3				
4	Items	Price	Qty	SubTotal
5	A	\$ 123.00	987	
6	BB	\$ 456.00	654	
7	CCC	\$ 789.00	321	

Calculate SubTotals

- Enter First SubTotal
 - o In Cell D5 Type: = B5*C5
 - \$121,401.00
- Each total is going to be the price of the item, times the Qty sold of the item. If we had 3,000 records, we would not want to type the equation 3,000 times
 - o Our equation is a pattern, "the cell two away, times the cell next to me"
 - o Anywhere you copy or fill the equation, the pattern will follow
- Use Fill handle to pull down this "pattern"
- Switch to Formula view (Ctrl ~) to see results and switch back to normal view

	A	B	C	D
1	Big City Store			
2	Sales Report			
3				
4	Items	Price	Qty	SubTotal
5	A	123	987	=B5*C5
6	BB	456	654	=B6*C6
7	CCC	789	321	=B7*C7

Calculate Taxes

- In Cell D2 type: Tax Rate
- In Cell E2 type: 10%
- In Cell E4 type: Taxes
- In Cell E5 type: =D5*E2
 - o Our pattern is Subtotal times Tax Rate
- Use fill handle to pull down equation
 - o **Don't Panic**, these answers are supposed to look weird

Absolute vs Relative

- What Happened?
 - o Pattern "Cell next to me * Cell three above me"
 - o As we move DOWN the pattern continues but it's wrong for this equation
- Erase the answers
- In Cell E5 type the same equation: =D5*E2
 - o Before you accept, press the **F4** button on the keyboard to lock cell address E2
 - o =D5*\$E\$2
 - you can type in the \$ signs, but **F4** is often faster
 - Think **FORCE** for the F4 button
 - o D5 is relative (always cell next to me)
 - o \$E\$2 is absolute (always cell E2)
- Use fill handle to pull down the equation

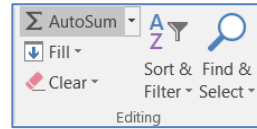
	A	B	C	D	E
1	Big City Store				
2	Grand Total			Tax Rate:	10%
3					
4	Items	Price	Qty	SubTotal	Taxes
5	AAA	\$123.00	987	\$ 121,401.00	=D5*\$E\$2
6	BB	\$456.00	654	\$ 298,224.00	
7	C	\$789.00	321	\$ 253,269.00	

Calculate Totals

- In Cell F4 type: Total
- In Cell F5 type: = D5+E5
- Use fill handle to pull down the equation

Calculate Grand Total

- In Cell E8 Type: Big City Store Grand Total
 - o From the Home tab, Align Right
 - If it won't let you, make sure you have accepted your entry (enter or ✓)
- Click in Cell F8
- Use AutoSum button Sigma - Σ in the **Editing** group on far right of the **Home** tab
 - o =SUM(F5:F7)
 - o In English, this reads "Calculate the Sum of F5 through F7"



	A	B	C	D	E	F
1	Big City Store					
2	Grand Total			Tax Rate:	10%	
3						
4	Items	Price	Qty	SubTotal	Taxes	Total
5	AAA	\$ 123.00	987	\$ 121,401.00	\$ 12,140.10	\$ 133,541.10
6	BB	\$ 456.00	654	\$ 298,224.00	\$ 29,822.40	\$ 328,046.40
7	C	\$ 789.00	321	\$ 253,269.00	\$ 25,326.90	\$ 278,595.90
8				Big City Store Grand Total		=SUM(F5:F7)

Note: When you click the AutoSum button Excel looks for numbers above the current cell. If it can't find a number, it will look to the left. The AutoSum button has a drop down menu to do quick calculations for Sum, Average, Max, Min, and Count.

Confirm your answer

- Select cells F5:F8
- Look at the status bar in the bottom right of the window to see the Average, Count, and Sum
 - o Sum should be \$740,183.40