

EXCEL TIPS AND INTEGRATION IDEAS

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Excel can be a useful power tool for everyone! Join us as we explore functions such as sorting data, finding subtotals, filtering data, concatenating fields, and writing simple and not so simple formulas.

Data-Driven Decision-Making: Interpreting Survey Data.....	2
Sorting data.....	2
Finding subtotals.....	2
Collapsing Data.....	3
Concatenation.....	3
Creating Name Cards for the Workshop.....	3
Set up the Place Card in MS Word.....	3
Use Mail Merge to Insert the Names.....	4
Save and Print the Place Cards.....	4
Comparing the Cost Per/MB of Various Media/Drives.....	5
Entering Data.....	5
Filtering data.....	6
Discount Chart.....	7
Discount Chart.....	7
Sale Price Chart.....	9
CIA World Fact Book Ranking.....	10
Formulas.....	10
Graphing the Data to Paint a Picture.....	11
Using the Chart Wizard.....	11
Modify the Chart – Follow these steps or use the Chart Formatting Palette.....	12
Absolute Value.....	13
Setting up x and f(x).....	13
Inserting the Formula.....	13
X-Values.....	13
Graph the function.....	13
Other Absolute Value Formulas.....	13
Area, Perimeter, Volume.....	14
Creating a Background Image.....	15
Inserting the Background Image.....	15
Inserting Descriptions.....	15
Adding the Finishing Touches.....	15
Creating a Timeline.....	16
Enter the Field Names.....	16
Enter the Data.....	16
Sorting the Data.....	16
Making a Copy of the Worksheet.....	16
Editing the Content and Format.....	17
Saving and Printing the Timeline.....	17

Data-Driven Decision-Making: Interpreting Survey Data

We often distribute surveys to get the opinion of others, but often have difficulty interpreting the results. Here is one way to gather information and manipulating the results so we can rank, sort, or filter the data.

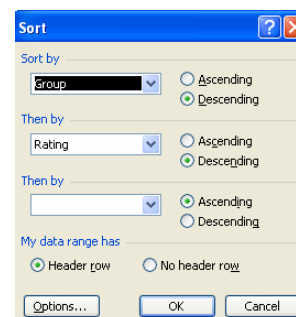
If you are collecting data manually from a relatively small group, you would probably create the survey in Word (to make it inviting and interesting) and then input the data into an Excel file. A sample survey sheet to determine interest in future technology professional development workshops is located at <http://mentortogo.com/classes/form.doc>

Fields were created for each question or item. Since the form asked people to rank their top 5 choices (#1 being their #1 choice), each ranking was then recoded so that each #1 ranking became a 5, each #2 received 4, etc. The results of this particular survey can be found at <http://mentortogo.com/classes> (follow the directions to download the survey results).

Sorting data

Sorting the data allows us to view like data and list them in ascending (lowest to the highest) or descending order (highest to the lowest). Using the previous example of the survey results, it would be helpful to sort the findings by group.

Start by single-clicking in the field name “Group” (this is not necessary, but makes the sort process easier) > go to the Menu > Data > Sort > use the dialog box to sort data by group and then by rating, if you would like to see which subtopics within the group were ranked highest.



Finding subtotals

Now that the groups have been sorted, it's possible to find subtotals for each group. Start by single-clicking in the field name “Group” (this is not necessary, but makes the sort process easier) > go to the Menu > Data > Subtotal > use the dialog box to select your options.

For this example, I wanted to find the total rating points for each group, so I made the selections that are shown in the screenshot to the right.

- “At each change in group” means that the subtotals will be displayed after each group.
- I chose “sum” instead of “count” because I wanted to compare rating points.
- I wanted to display the subtotals below the ratings for the group, so I chose “Add subtotal to rating”
- Note: On subsequent subtotals, I will choose to replace current subtotals.

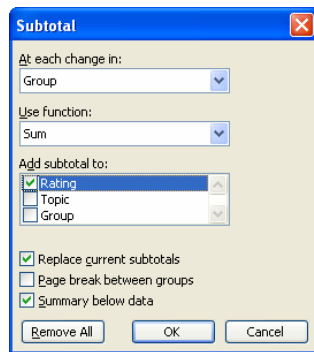
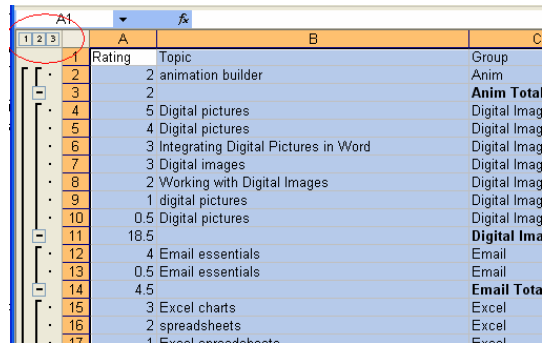
	A	B	C
1	Rating	Topic	Group
8	27.5		Inspir Total
17	24		Gen Compu Total
25	18.5		Digital Images Total

To remove the subtotals from the spreadsheet, go back to the Subtotal (Menu > Data > Subtotal) and use the “Remove All” button.

Collapsing Data

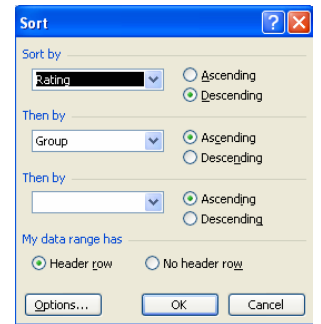
After the subtotal have been found, you can collapse the data so only the subtotals are displayed. This will enable you to sort the groups in order of popularity. The levels of data displayed is indicated in the top left of the spreadsheet, and by clicking on levels 1, or 2, or 3 you can collapse the data as you wish.

- Level 1: summary data only
- Level 2: subtotals only
- Level 3: all data



Notice, that you can collapse individual subtotal groups by clicking on the minus-sign to the left of the subtotal group.

For this example, select level 2 to display only the subtotals by group. Then sort the subtotals for rating in descending order (they are currently in ascending alphabetical order) by going to the Menu > Data > Sort > choose Rating for the first sort, as well as descending order.



Concatenation

Let's say you wanted to use the data to create worksheets or checklists. It's often useful to be able to combine information in two fields and display them in one field. Concatenation means to combine data. One good example is combining the first and last names so you have "Last, First".

Start by clicking the cell of the first name you want to concatenate. Every formula begins with "=", so start with that. Click in the cell for the corresponding Lastname. To concatenate a comma and space after the last name, enter "&", ". (The quotation marks allow the insertion of a space into the formula.) You'll concatenate another element, so type another ampersand (&), followed by the cell that houses the first name. If you refer to the screenshot above, you'll see that the formula in its entirety is: =A2&"", "&B2

	A	B	C
1	Last	First	Combined
2	Miller	Mark	Miller, Mark

Creating Name Cards for the Workshop

Take the data one step further by using the names from the spreadsheet/database to create place cards for the workshop participants. To create place cards made from a single 8 1/2 X 11 sheet:

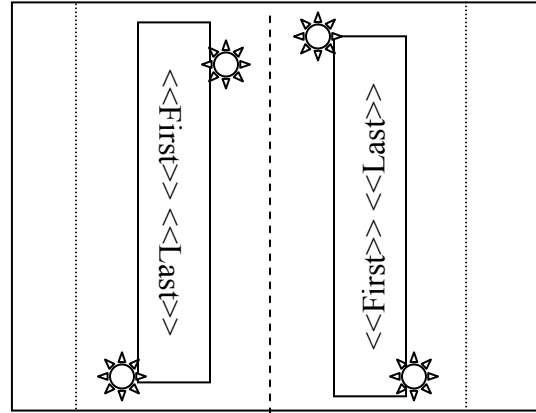
- Set up the place card in Word
- Use Mail Merge to insert the names
- Save and print the place cards

Set up the Place Card in MS Word

Text cannot be placed upside down in Word, so you will need to turn the sheet sideways and use text boxes. You can also add clipart to warm up the place card.

Set the page orientation of the document (go to the Menu > File > Page Setup > Margins > Page Orientation > Landscape).

It will help to display the grid when you place the textboxes. Make sure the Drawing Toolbar is displayed. Click on the Draw icon > Grid > use the dialog box to set the options to display the grid (please see Project 2 for detailed instructions).



Select the Textbox icon from the Drawing Toolbar. Click on the Textbox icon and drag out a textbox for the name. Use the Formatting Toolbar to change the alignment of the text to centered, change the font and font size, and font color (optional). When the textbox is selected, the Textbox Toolbar should also be displayed (if not, go to the Menu > View > Toolbars > Textbox). Use the Text direction icon to turn the text in the desired direction. (Notice that there are three text directions to choose from—the direction displayed on the icon shows the direction the text will turn if the icon is clicked.)

Once the first textbox is formatted, duplicate the textbox and place it on the other half. To duplicate the textbox, hover the cursor over the border of the textbox and hold down the Control (PC) or Alt/Option (Mac) key until the plus sign appears next to the cursor. Press and drag out a duplicate textbox and move it into place, using the grid as a guide.

Turn the text direction in the second textbox.

Use Mail Merge to Insert the Names

Use the Mail Merge wizard (go to the Menu > Tools > Mail Merge) and select “Letter” as the document type. Locate the database list file. Insert the merge fields for the first and last names into the textbox. Format the merge field by changing the font, font size, alignment, etc. Merge the documents.

Save and Print the Place Cards

Comparing the Cost Per/MB of Various Media/Drives

Sometimes it is more helpful to filter data instead of sorting and viewing all of it at once. You might think you need to use a relational database such as Access or Filemaker Pro to do that, but you can filter data using Excel as well.

For this project, I wanted to compare the cost per megabyte of memory of different media and drives that were advertised on the Fourth of July for a descriptive stats class I was taking. I started by launching Excel and setting up the fields: Entry Number, Capacity (in MB), Format, Brand, Name, Vendor, Model No., Price, Tax Rate Rebate, Rebate 2, Cost/MB, Net Price/MB, and Store Type (Retail, Online).

B	C	D	E	F
Capac	Form	Brand	Name	Vendor
512		(All)	Cruzer Mico	Fry's
512		(Top 10...)	Secure Digital Memory	Fry's
40960		(Custom...)	Flashpac Portable Data Storage	Fry's
256000		AcomData	Dual Option Backup Ext. HD	Fry's
256		Dane-Elec	USB Drive	Target
256000		FujiFilm	External HD	CompUS2
512		IO Gear	Compact Flash	CompUS2
512		Iomega	Secure Digital Memory	CompUS2
512		Kingston	Secure Digital Memory	Circuit Cit
512		Lacie	Cruzer Micro	Circuit Cit
512		Lexar Media	Ultra Compact Flash Drive	Circuit Cit
512		Maxtor	xD Picture Card	Circuit Cit
1024		Memorex	Memory Stick Pro	Circuit Cit
1024		PNV	Ultra II SD Card	Circuit Cit
256		PQT		
256		SanDisk		
256		Viking		
256		Western Digital		
512		Wolverine		

Entering Data

Entry Number

I entered 1 and 2, respectively for the first two entries > highlighted those two cells as my target > and filled the numbers down (place the cursor over the bottom right corner of the highlighted target area until the cursor looks like the Fill Tool > drag through the cells you want to enter numbers).

Capacity in MB:

This was pretty straight forward, but I needed to convert gigabytes to MB by multiplying each GB by 1024.

Format:

1=USB drive, 2=External HD, 3= media card

Brand:

Keep the brand name uniform by using the same designation. For example, SanDisk Mini Cruiser would always be SanDisk or Cruiser, etc.

Name:

Since there is no uniform name for USB drives, I wanted to list all the advertised names for the drives so I could compare and compile them.

Price, Vendor, Model No., Store Type:

These were recorded straight from the source.

Tax Rate:

If the local tax rate applied to the purchase, I included it here.

Rebate, Rebate 2

Some stores offered one or two rebates, so I entered them here.

Cost/MB

Each entry was calculated using a formula. Placing the cursor in this cell for entry 1, I entered the formula:

= H2/B2 (=to indicate a formula; H2 for price, / to divide by, and B2 for capacity in MB)

Fill down to repeat this relative formula for the rest of the entries.

Net Price/MB

Each entry was calculated using a formula. Placing the cursor in this cell for entry 1, I entered the formula:

=(H2*(1+I2)-J2-K2)/B2 (= to indicate a formula. I enclosed the net price in a pair of parenthesis and entered H2 for price, * to multiply by, (1+I2) to enter the price plus the tax, -J2 to subtract the first rebate, -K2 to subtract the second rebate. This was divided the capacity, as in the last formula.

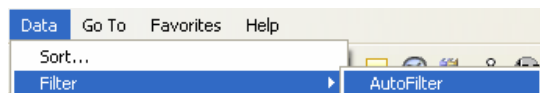
Fill down to repeat this relative formula for the rest of the entries.

Filtering data

Filtering data is helpful when you want to temporarily view segments of the data with one common characteristic. The process starts out in a similar fashion to the subtotal function. Start by clicking in one of the field names > go to the Menu > Data > Filter > AutoFilter. You will notice that a drop-down menu appears next to each field name. Use the drop down menu to select the value you want to view.

You can continue to use the previous sample spreadsheet, or work with a database of different drives (external, USB, or memory card) located at <http://www.mentortogo.com/classes/drives.xls> Go to the Menu > Data > Filter > AutoFilter.

Once you've turned on the AutoFilter function, you will notice the drop down menus. For example, choosing "Brand" will allow you to display drives produced by a given manufacturer (I chose SanDisk in the screenshot).




- To view all data again, reselect the drop down menu > choose (All).
- Selecting another field to filter before displaying all will further filter the data. In this example, I could choose to view only the SanDisk drives with 512 MB of memory.

To turn off the filtering function, return to the Menu > Data > Filter > AutoFilter and it will toggle off.

Discount Chart

Most people love to shop the sales! Most of them, though, don't like to calculate the percent of discount or the sale price. This spreadsheet project helps students understand percentages and spreadsheets better as they create (1) a discount chart to tell them how much they'll save and (2) a sale price chart that tells them how much they'll have to pay before tax. A great extension project is to have students create another spreadsheet that shows them the sale price, plus sales tax.

Discount Chart

1. Launch Excel, if it is not already running. Start on a new worksheet by clicking on a new worksheet tab at the bottom of the window, OR insert a new worksheet (go to the Menu > Insert > Worksheet). Rename the worksheet "Discounts" (double-click on the tab > type to replace the previous name).
2. Starting in A1, enter the fields "Discount", ".1", and ".15" to display the discount rates in 5% increments, starting with 10% off. Highlight B1 and C1 (press and drag), and change the cell format to display percent (look at the Formatting Toolbar > click  on the "%" button).

While the two cells are highlighted, fill in the rest of the percentages by using the Fill Tool (place the cursor in the lower right corner of cell C1 until the cursor looks like the fill tool > drag through the cells to the right until all the discount rates you want are displayed in the yellow preview box).

To create a heavy border below the discount rates, select the cells you want to "underline" (press and drag through) > use the drop down arrow next to the border tool in the Formatting Toolbar to select the double bottom underline.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Discount	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%
2	Reg. Price											

3. Click in cell A2. Enter the description "Reg. Price"
4. Click in cell A3 to start listing the regular price of items. In the screenshot below, I started by typing in "9.95" and "14.95" so I would have items starting near \$10 at \$5 intervals. Highlight both cells A3 and A4 and click on the "\$" icon in the Formatting Toolbar.

While they are still highlighted, fill in the rest of the prices by using the Fill Tool (place the cursor in the lower right corner of cell A4 until the cursor looks like the fill tool > drag through the cells below until all the prices you want are displayed in the yellow preview box).

To highlight the regular prices, select the cells you want to color > use the drop down arrow next to the Paint Bucket tool in the Formatting Toolbar to select the color you want to use.



	A
1	Discount
2	Reg. Price
3	\$ 9.95
4	\$ 14.95
5	\$ 19.95
6	\$ 24.95
7	\$ 29.95
8	\$ 34.95
9	\$ 39.95
10	\$ 44.95
11	\$ 49.95
12	\$ 54.95
13	\$ 59.95
14	\$ 64.95
15	\$ 69.95
16	\$ 74.95
17	\$ 79.95
18	\$ 84.95
19	\$ 89.95
20	\$ 94.95
21	\$ 99.95

- Click in cell B3. This is where we will start entering the discounts by using a formula. Up until this point, we've been entering relative formulas where the cell and row references were relative to each entry. Here we want to refer to the same cell for the entire column. Excel uses the "\$" sign to create absolute references.

Refer to the screenshot and take refer to the formula in the formula bar.

$$fx = \$A3 * B\$1$$

Every formula starts with "=".

The regular price will always be in column A, so we put a "\$" in front of A so the formula will always refer to column A.

The row will change to reflect the price, so there is no "\$" in front of the 3 (the row in this example).

"*" means multiply

As we fill in discounts for other columns, the columns will change, so no "\$" in front of B (the column in this example).

The discount will always be in row 1, so we enter "\$1"

Hit Enter/Return to accept the formula.

	A	B	C	D
1	Discount	10%	15%	20%
2	Reg. Price			
3	\$ 9.95	\$ 1.00	\$ 1.49	\$ 1.99
4	\$ 14.95	\$ 1.50	\$ 2.24	\$ 2.99
5	\$ 19.95	\$ 2.00	\$ 2.99	\$ 3.99
6	\$ 24.95	\$ 2.50	\$ 3.74	\$ 4.99

- Complete the chart using the Fill Tool. Click in the target cell B3. Place the cursor over the bottom right corner of B3 until it looks like the Fill Tool > drag down to repeat the formula for the rest of the discounts at 10% discount. While the column is highlighted, drag across to fill in the discounts for the rest of the discount rates.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Discount	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%
2	Reg. Price											
3	\$ 9.95	\$ 1.00	\$ 1.49	\$ 1.99	\$ 2.49	\$ 2.99	\$ 3.48	\$ 3.98	\$ 4.48	\$ 4.98	\$ 5.47	\$ 5.97
4	\$ 14.95	\$ 1.50	\$ 2.24	\$ 2.99	\$ 3.74	\$ 4.49	\$ 5.23	\$ 5.98	\$ 6.73	\$ 7.48	\$ 8.22	\$ 8.97
5	\$ 19.95	\$ 2.00	\$ 2.99	\$ 3.99	\$ 4.99	\$ 5.99	\$ 6.98	\$ 7.98	\$ 8.98	\$ 9.98	\$ 10.97	\$ 11.97
6	\$ 24.95	\$ 2.50	\$ 3.74	\$ 4.99	\$ 6.24	\$ 7.49	\$ 8.73	\$ 9.98	\$ 11.23	\$ 12.48	\$ 13.72	\$ 14.97
7	\$ 29.95	\$ 3.00	\$ 4.49	\$ 5.99	\$ 7.49	\$ 8.99	\$ 10.48	\$ 11.98	\$ 13.48	\$ 14.98	\$ 16.47	\$ 17.97
8	\$ 34.95	\$ 3.50	\$ 5.24	\$ 6.99	\$ 8.74	\$ 10.49	\$ 12.23	\$ 13.98	\$ 15.73	\$ 17.48	\$ 19.22	\$ 20.97
9	\$ 39.95	\$ 4.00	\$ 5.99	\$ 7.99	\$ 9.99	\$ 11.99	\$ 13.98	\$ 15.98	\$ 17.98	\$ 19.98	\$ 21.97	\$ 23.97
10	\$ 44.95	\$ 4.50	\$ 6.74	\$ 8.99	\$ 11.24	\$ 13.49	\$ 15.73	\$ 17.98	\$ 20.23	\$ 22.48	\$ 24.72	\$ 26.97
11	\$ 49.95	\$ 5.00	\$ 7.49	\$ 9.99	\$ 12.49	\$ 14.99	\$ 17.48	\$ 19.98	\$ 22.48	\$ 24.98	\$ 27.47	\$ 29.97
12	\$ 54.95	\$ 5.50	\$ 8.24	\$ 10.99	\$ 13.74	\$ 16.49	\$ 19.23	\$ 21.98	\$ 24.73	\$ 27.48	\$ 30.22	\$ 32.97
13	\$ 59.95	\$ 6.00	\$ 8.99	\$ 11.99	\$ 14.99	\$ 17.99	\$ 20.98	\$ 23.98	\$ 26.98	\$ 29.98	\$ 32.97	\$ 35.97
14	\$ 64.95	\$ 6.50	\$ 9.74	\$ 12.99	\$ 16.24	\$ 19.49	\$ 22.73	\$ 25.98	\$ 29.23	\$ 32.48	\$ 35.72	\$ 38.97
15	\$ 69.95	\$ 7.00	\$ 10.49	\$ 13.99	\$ 17.49	\$ 20.99	\$ 24.48	\$ 27.98	\$ 31.48	\$ 34.98	\$ 38.47	\$ 41.97
16	\$ 74.95	\$ 7.50	\$ 11.24	\$ 14.99	\$ 18.74	\$ 22.49	\$ 26.23	\$ 29.98	\$ 33.73	\$ 37.48	\$ 41.22	\$ 44.97
17	\$ 79.95	\$ 8.00	\$ 11.99	\$ 15.99	\$ 19.99	\$ 23.99	\$ 27.98	\$ 31.98	\$ 35.98	\$ 39.98	\$ 43.97	\$ 47.97
18	\$ 84.95	\$ 8.50	\$ 12.74	\$ 16.99	\$ 21.24	\$ 25.49	\$ 29.73	\$ 33.98	\$ 38.23	\$ 42.48	\$ 46.72	\$ 50.97
19	\$ 89.95	\$ 9.00	\$ 13.49	\$ 17.99	\$ 22.49	\$ 26.99	\$ 31.48	\$ 35.98	\$ 40.48	\$ 44.98	\$ 49.47	\$ 53.97
20	\$ 94.95	\$ 9.50	\$ 14.24	\$ 18.99	\$ 23.74	\$ 28.49	\$ 33.23	\$ 37.98	\$ 42.73	\$ 47.48	\$ 52.22	\$ 56.97
21	\$ 99.95	\$ 10.00	\$ 14.99	\$ 19.99	\$ 24.99	\$ 29.99	\$ 34.98	\$ 39.98	\$ 44.98	\$ 49.98	\$ 54.97	\$ 59.97

Sale Price Chart

So now they know how much they're saving...how much will they have to pay? We're going to start the sale price chart by making a copy of the discount chart.

1. Make a copy of the "Discount" worksheet by going to the Menu > Edit > Move or copy sheet. (If that choice is grayed out, you need to click somewhere in the spreadsheet, not on the tab.) Use the dialog box to select the location of the copy (choose "Discount", so it will appear after the Discount Chart) and make to select "Make a copy".

Rename the new worksheet (double-click on "Discount (2)" and type in SalePrice).

2. Click in cell B3 to modify the formula to read "=\$A3*(1-B\$1)".

	B3	= \$A3*(1-B\$1)			
	A	B	C	D	
1	Discount	10%	15%	20%	
2	Reg. Price				
3	\$ 9.95	\$ 8.96	\$ 8.46	\$ 7.96	
4	\$ 14.95	\$ 13.46	\$ 12.71	\$ 11.96	
5	\$ 19.95	\$ 17.96	\$ 16.96	\$ 15.96	

Notes:

This time we want to multiply the regular price by 100% minus the discount of 10%. Keep the "\$" signs where they are because the absolute reference to column A for the regular price doesn't change; neither does the absolute reference to row 1 for the discounted rate.

Order of operations

100% minus 10% can be expressed as 1-B\$1, but without the parentheses the order of operations would be incorrect. (\$A3*1-B\$1 would necessitate multiplying \$A3 by 1, then subtract B\$1.)

3. Now that the formula is correct, use the Fill Tool to fill down and across to complete the Sale Price chart.

	A	B	C	D	E	F	G	H	I	J
1	Discount	10%	15%	20%	25%	30%	35%	40%	45%	50%
2	Reg. Price									
3	\$ 9.95	\$ 8.96	\$ 8.46	\$ 7.96	\$ 7.46	\$ 6.97	\$ 6.47	\$ 5.97	\$ 5.47	\$ 4.98
4	\$ 14.95	\$ 13.46	\$ 12.71	\$ 11.96	\$ 11.21	\$ 10.47	\$ 9.72	\$ 8.97	\$ 8.22	\$ 7.48
5	\$ 19.95	\$ 17.96	\$ 16.96	\$ 15.96	\$ 14.96	\$ 13.97	\$ 12.97	\$ 11.97	\$ 10.97	\$ 9.98
6	\$ 24.95	\$ 22.46	\$ 21.21	\$ 19.96	\$ 18.71	\$ 17.47	\$ 16.22	\$ 14.97	\$ 13.72	\$ 12.48
7	\$ 29.95	\$ 26.96	\$ 25.46	\$ 23.96	\$ 22.46	\$ 20.97	\$ 19.47	\$ 17.97	\$ 16.47	\$ 14.98
8	\$ 34.95	\$ 31.46	\$ 29.71	\$ 27.96	\$ 26.21	\$ 24.47	\$ 22.72	\$ 20.97	\$ 19.22	\$ 17.48
9	\$ 39.95	\$ 35.96	\$ 33.96	\$ 31.96	\$ 29.96	\$ 27.97	\$ 25.97	\$ 23.97	\$ 21.97	\$ 19.98
10	\$ 44.95	\$ 40.46	\$ 38.21	\$ 35.96	\$ 33.71	\$ 31.47	\$ 29.22	\$ 26.97	\$ 24.72	\$ 22.48
11	\$ 49.95	\$ 44.96	\$ 42.46	\$ 39.96	\$ 37.46	\$ 34.97	\$ 32.47	\$ 29.97	\$ 27.47	\$ 24.98
12	\$ 54.95	\$ 49.46	\$ 46.71	\$ 43.96	\$ 41.21	\$ 38.47	\$ 35.72	\$ 32.97	\$ 30.22	\$ 27.48
13	\$ 59.95	\$ 53.96	\$ 50.96	\$ 47.96	\$ 44.96	\$ 41.97	\$ 38.97	\$ 35.97	\$ 32.97	\$ 29.98
14	\$ 64.95	\$ 58.46	\$ 55.21	\$ 51.96	\$ 48.71	\$ 45.47	\$ 42.22	\$ 38.97	\$ 35.72	\$ 32.48
15	\$ 69.95	\$ 62.96	\$ 59.46	\$ 55.96	\$ 52.46	\$ 48.97	\$ 45.47	\$ 41.97	\$ 38.47	\$ 34.98
16	\$ 74.95	\$ 67.46	\$ 63.71	\$ 59.96	\$ 56.21	\$ 52.47	\$ 48.72	\$ 44.97	\$ 41.22	\$ 37.48
17	\$ 79.95	\$ 71.96	\$ 67.96	\$ 63.96	\$ 59.96	\$ 55.97	\$ 51.97	\$ 47.97	\$ 43.97	\$ 39.98
18	\$ 84.95	\$ 76.46	\$ 72.21	\$ 67.96	\$ 63.71	\$ 59.47	\$ 55.22	\$ 50.97	\$ 46.72	\$ 42.48
19	\$ 89.95	\$ 80.96	\$ 76.46	\$ 71.96	\$ 67.46	\$ 62.97	\$ 58.47	\$ 53.97	\$ 49.47	\$ 44.98
20	\$ 94.95	\$ 85.46	\$ 80.71	\$ 75.96	\$ 71.21	\$ 66.47	\$ 61.72	\$ 56.97	\$ 52.22	\$ 47.48
21	\$ 99.95	\$ 89.96	\$ 84.96	\$ 79.96	\$ 74.96	\$ 69.97	\$ 64.97	\$ 59.97	\$ 54.97	\$ 49.98

CIA World Fact Book Ranking

Go to the website and copy the table for Land Area Ranking.

<http://www.odci.gov/cia/publications/factbook/rankorder/2147rank.html>

Other fascinating data can be found on the website:

<http://www.odci.gov/cia/publications/factbook/index.html>

Highlight all the cells in the table > Edit > Copy.

Open a new workbook in Excel > click in cell A1 if it is not already highlighted > Paste the data (Edit > Paste). Notice that all the data is entered in separate cells and that the links to each country's page is active.

Formulas

Area in Square Miles

Select Cell D1 and Type the field name "Area (sq mi)".

	A	B	C	D
1			Area (sq km)	
2	Rank	Country	Area (sq km)	Area (sq mi)
3	1	World	510,072,000	=C3*.3861022
4	2	Pacific Ocean	155,557,000	NA

To enter the formula for the area of the world in square miles, click in cell D3. The formula for converting square kilometers to square miles is show in the screenshot above. Notice that every formula begins with "=", C3 is where the corresponding square km is entered, "*" means multiply, and 1 km=.3861022. Hit Enter.

Once the formula is entered for the world, it can be selected and filled down for the rest of the entries. (Click in D3 > place the cursor in the bottom right corner of the cell until it looks like the fill tool > drag through the rest of the cells in which the formula is to be repeated.)

	A	B	C	D	E
1			Area (sq km)	Area (sq mi)	% of earth's surface
2	Rank	Country	Area (sq km)	Area (sq mi)	
3	1	World	510,072,000	196,939,921.358	
4	2	Pacific Ocean	155,557,000	60,060,899.925	

Inserting Rows

We want to take a look at oceans of the world and find the sum, average, and count. In order to insert those formulas and move the Arctic Ocean up, we will need to insert five rows above "Russia". To do this by selecting five rows, starting with row 8 (click on the row heading "8" > drag through row 12 > Insert > Rows).

Absolute Reference

To find the percent of the earth's surface that is covered by each entity, we will divide each area by the area of the earth. Unlike previous formulas, we always divide by the same number, so we will need to make that an absolute reference, which is indicated by "\$". Take a look at the formula in the screenshot:

$$=D3/\$D\$3$$

	A	B	C	D	E
1			Area (sq km)	Area (sq mi)	% of earth's surface
2	Rank	Country	Area (sq km)	Area (sq mi)	
3	1	World	510,072,000	196,939,921.358	1
4	2	Pacific Ocean	155,557,000	60,060,899.925	0.304971
5	3	Atlantic Ocean	76,762,000	29,637,977.076	0.150492
6	4	Indian Ocean	68,556,000	26,469,622.423	0.134405
7	5	Southern Ocean	20,327,000	7,848,299.419	0.039851
8	7	Arctic Ocean	14,056,000	5,427,052.523	0.027557
9		Sum	335,258,000	129,443,851	
10		Count	5		5
11		Average	67,051,600	25,888,770	

- Start by clicking in E3, where the first percentage is going to be calculated.
- Type “=” start the formula
- Select the cell with the area in square miles (for the world) by typing in or clicking in cell D3
- Type “/” for division
- Type “\$D\$3” because we always need to divide by the total area of the world to find the percentage
- Hit Enter

Calculate the sum of the oceans:

Start by selecting the cell where you want the formula. Use the function keys.

Sum - AutoSum is a common function and has an icon of its own (Σ) in the Standard Toolbar. Click on it replace the cell range by dragging across the correct cells.

Count - How many figures are we working with? To find out, use the “Count” function. Start by selecting the cell (single click) where you want to place the count. Go to the Menu > select the drop down menu next to the summation key (Σ) > select Count, or use the fx (Paste function) key. The formula for finding the count will appear as well as the cell range. If the cell range is correct, hit Return (Mac) or Enter (PC). If it is not correct, either name the cells in the highlighted area or drag your mouse through the correct cell range.

Calculate the average area of the five oceans:

Average - Finding the average (mean average) of a column is a very similar to finding the count. Start by selecting the cell (single click) where you want to place the average. Go to the Menu > select the drop down menu next to the summation key (Σ) > select Average, or use the fx (Paste function) key. The formula for finding the mean average will appear as well as the cell range. If the cell range is correct, hit Return (Mac) or Enter (PC). If it is not correct, either name the cells in the highlighted area or drag your mouse through the correct cell range.

Graphing the Data to Paint a Picture

Make a pie chart to visually compare the area covered by each ocean and the remaining land.

Because the names of each ocean are hyperlinked, it may be easier to just type the names of the five oceans and a record for “Land”. Copy/Paste the area for each ocean into the next column. To calculate the area for Land, write a formula to subtract the area of the sum of the oceans from the world area.

Highlight the data > click on the chart wizard > use the dialog box to create your chart.

If the columns are non-contiguous you will have to hold the Control (PC) or Command (Mac) key while selecting the columns.

Pacific	155,557,000
Atlantic	76,762,000
Indian	68,556,000
Southern	20,327,000
Arctic	14,056,000
Land	188,870,000

Using the Chart Wizard



Click on the chart wizard icon or go to the Menu > Insert > Chart > and follow the wizard to select options.

Step 1 – Select the chart type. For this project, select any pie chart. If you press and hold the “Press Hold to View” bar, you will be able to preview the chart you have selected.

Troubleshooting tip: If half of the pie appears in one color, the student probably included the total in the data range.

Step 2 – Select the data range. The range you highlighted before clicking on the Chart Wizard icon should be listed in the dialog box. To change the range, click on the Range Selector Icon (this will collapse the dialog box), drag through the selected range, click on the Range Selector Icon again to enter the range.

Step 3 – Insert title for the chart, select the position of the legend, and decide on which Data Labels you want to display.

Step 4 – Select to insert chart on the worksheet or on a separate worksheet. For this project, please insert the chart within the worksheet.

Modify the Chart – Follow these steps or use the Chart Formatting Palette.

Modify the colors of the bars – Click on the chart legend, click on the color swatch for the slice you want to modify. Once the swatch has been selected, double-click it to access the appearance dialog box. Select the new color or fill. Click OK

Modify the chart area – To modify the chart background color, border or gridlines, start by selecting the plot area (single-click). Once the plot area is selected, double-click on it to access the appearance dialog box. Make your selections, and click OK.

Modify the legend – Single click to select the legend area. Use the mouse to move/place or resize the legend. To change the font of the legend labels, click to select the label, then double-click to access the font dialog box. Click OK.

Modify the axis – Single click to select the axis labels. Double-click on it to access the axis label dialog box. Select the appropriate tab to access the different characteristics of the label. To angle the label, select the alignment tab > type in the degree of angling or drag the diagram to place the label on a diagonal slant.

To return to the Chart Wizard, select the chart (single-click on the border or chart area) > click on the Chart Wizard icon in the toolbar.

Absolute Value

Setting up x and $f(x)$

Click in cell A1 and enter the field name “ x ”. Tab into cell B1 and enter the function. For this first problem, enter “ $f(x)=|x|$ ”

	A	B
1	x	$f(x)= x $

(The “vertical pipe” for absolute value is made by holding Shift+backward slash, which is found just under the backspace/delete key.)

Inserting the Formula

Hit the Enter/Return key to go to cell A2. Enter any number (this sample uses “3”). Tab into cell B2 and enter the formula. For this formula, enter “ $=ABS($ ” which inserts the absolute value function. Click into A2 or type “A2” into the formula. Finish the formula with “ $)$ ”. Enter/Return.

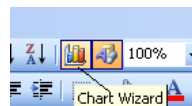
	A	B
1	x	$f(x)= x $
2	3	$=ABS(A2)$
3		

Once the formula has been entered in B2, we can repeat it in other cells. Click in B2. Place the cursor in the lower right hand corner of the cell until it looks like the Fill Tool (+-sign on PC, box with diagonal arrows on Mac). Drag through other cells in column B

X-Values

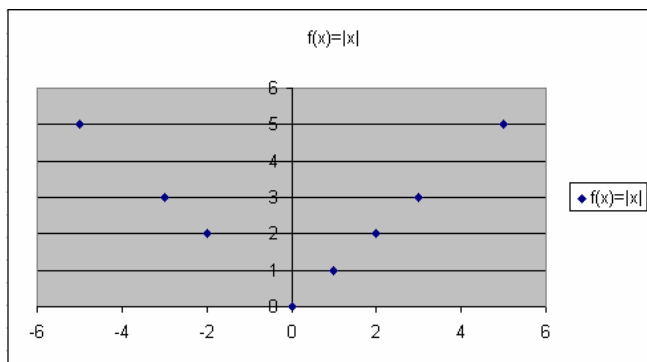
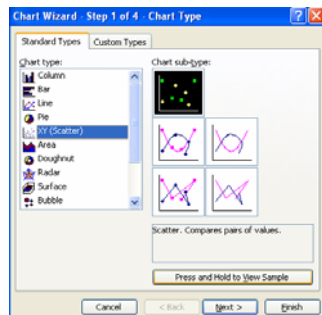
As you enter other values for X in column A, the $f(x)$ value will be calculated automatically in column B.

Graph the function



To plot the values that you just calculated, highlight the data (start from cell A1, and drag through the last entry in B). Use the Chart Wizard > choose the X, Y Scatter > and follow the steps to finish the chart.

	A	B
1	x	$f(x)= x $
2	3	3
3	-3	3
4	2	2
5	-2	2
6	1	1
7	0	0
8	5	5
9	-5	5



Other Absolute Value Formulas

You can also add functions within the Absolute Value calculation. To calculate $f(x)=|4-x|$, you would:

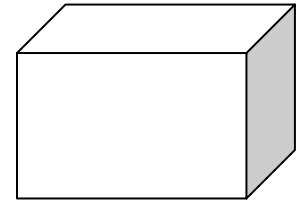
Click in the cell to start the formula > Type “ $=ABS($ ” > Enter the “4-”

Click in the cell containing the X value or type its cell location (eg. A2) > Type the closing parenthesis “ $)$ ” > Enter/Return

	A	B	C
1	x	$f(x)= x $	$f(x)= 4-x $
2	3	$=ABS(A2)$	$=ABS(4-A2)$

Area, Perimeter, Volume

Do you want to look like a math wizard to your students? I used to project my warm-ups on the screen and give students sample problems to find area and perimeter. They would use their calculators and solve the problems in their warm up books. When it came time to correct their problems, I simply entered the formulas for perimeter and area and accurately provided the answers in seconds. They were impressed! (Well, and some protested that I had cheated.)



The screenshot below displays the formulas for perimeter and area. Later in the unit, I added surface area and volume. Using the formulas also gave me an opportunity to show that order of operations applies to formulas.

Just for fun...

Check out the screenshot for the formulas for calculating circumference, area, surface area, and volume for a cylinder. Formula note: π is represented by "PI()", and exponents follow "^" (squared = "^2").

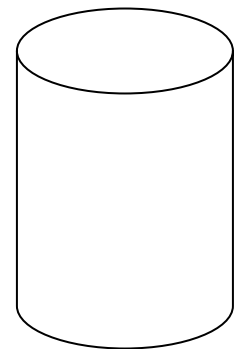
	A	B	C	D	E	F	G
1	width (x)	length (y)	height (z)	perimeter	area	surface area	volume
2	x	y	z	=2*A2+2*B2	=A2*B2	=2*A2*B2+2*B2*C2+2*A2*C2	=A2*B2*C2
3							
4							
5							
6							
7							
8	radius (r)	height(h)		circumference	area	surface area	volume
9	r	h		=2*PI()*A9	=PI()*A9^2	=2*PI()*A9^2+2*PI()*A9*B9	=PI()*A9^2*B9
10							

Word Problem Help:

Drawing the problem out is one strategy to help students solve word problems.

Using spreadsheets can be another tool to help them visualize the problem.

Suggestion: Have your students devise formulas for finding a missing dimension when perimeter or area are known.



Interactive Diagramming

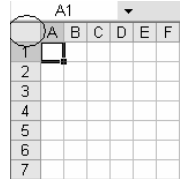
Turn plain maps, images, and diagrams into interactive, pop-up diagrams using Microsoft Excel.

Creating a Background Image

Save or create an image you want to diagram by using a drawing or painting application, scanning an image, or downloading an image from the Web. Make sure the image is fairly large (at least 800 pixels across), otherwise it will tile across and repeat several times on your page.

Inserting the Background Image

Go to the Menu > Format > Sheet > Background... > direct Excel to the location of the image. The image will tile to fit the window, so you will want to resize it before inserting it.



You will have better control over the “hot spots” that control the location of the descriptions if you reduce the cell size. Select the entire spreadsheet (click in the corner above row 1 and to the left of column A), place the cursor between two columns, and drag the column border to the appropriate size.

Inserting Descriptions

Click in a cell to locate the mouse over (the upper right corner of the cell will show the comment indicator). Go to the Menu > Insert > Comment. Click off of the text box when you are done. To edit the text, click in the cell, go to the Menu > Insert > Edit Comment > highlight the text to be changed and edit the text. Repeat the process as needed, and save often.



If you want the hot spot to extend over several cells, you will need to group them before inserting the description. To group cells, highlight the cells > click on the Merge and Center icon. Insert the description by going to the Menu > Insert > Comment.

Adding the Finishing Touches

To view the page without the gridlines or column or row headings,

Windows	Mac OS X	Mac OS 9 or Earlier
Go to the Menu > Tools > Options > View > uncheck gridlines and column and row headings.	Go to the Menu > Excel > Excel preferences > View > uncheck gridlines and column and row headings.	Go to the Menu > Edit > Preferences > View > uncheck gridlines and column and row headings.

Printing the Diagram

To print the comments, go to the Menu > View > Comments > print the document. To print the diagram as well as the comments, take a screenshot while the comments are visible and print the screenshot.

Windows	Mac
Hit the PrtScr button on the keyboard to copy the image onto your clipboard. Launch Paint (go to the Start Menu > All Programs > Accessories > Paint) and paste the image (go to the Menu > Edit > Paste).	Hold the Command+Shift+4 on the keyboard, and use the cursor (it looks like a crosshair) to select the section of the screen you want to save. This will create a screenshot document (Picture 1, etc.) on your hard drive or desktop.

Creating a Timeline

You can create timelines using Excel or Word instead of purchasing additional software.

Enter the Field Names

	A	B	C	D	E	F	G
1	Start Date	End Date	Duration	Location	Commanding Officer	Casualties	Significance

In Row 1, start entering the field names (categories) for your data. It could be as simple as Date and Event, or you can enter as many field names as you want to compare or sort by. For instance, if the timeline is of important battles in the Civil War, the field names might include:

Enter the Data

Once the field names have been established, you can enter data for each event. Remember you can tab across a row, use the directional arrow keys, or hit the Enter key to move down the column.

If you want the text to wrap within a cell, select the cell or column and go to the Menu > Format > Cells > click on the Alignment tab > select Wrap text. Notice that you have the option to have the text vertically align at the top, center, or bottom of the cell. Click OK.

To change the column widths of your columns, place your cursor over the right border of the column until it looks like a plus sign with arrows going left and right. Drag the border in place. You can also double-click on the border, but with wrapped text, that option does not work very well.

Sorting the Data

To sort the data in chronological order, click on the field name (in the screenshot in the preceding section, click on cell B1 “End Date”), and go to the Menu > Data > Sort > use the dialog box to select the fields to sort by. Make sure to check off “My data has a header row”.

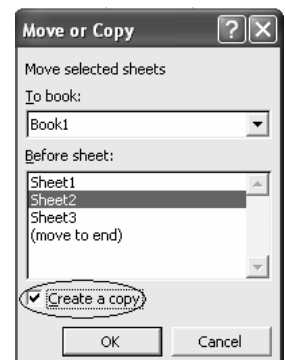
Notice that you have three sort fields. In the Civil War example, you could sort first by “Commanding Officer” and then by “End Date”, and you will have battles sorted by commanding officers in chronological order.

Making a Copy of the Worksheet

Before you start applying formatting changes, it’s best to make a copy of the data first. This way you can come back to the same spreadsheet and do a different sort.

To copy a worksheet, go to the Menu > Edit > Make or Copy Sheet. Use the dialog box to select “Make a Copy”, and move it in front of Sheet 2.

You should see a new worksheet listed at the bottom of the window labeled “Sheet 1 (2)”. Double-click on the worksheet label, and rename it. For this project, name it “Timeline”.



Editing the Content and Format

Since the worksheets work independently of each other, go ahead and select the columns and rows that are not needed for your timeline.

To select a column, place your cursor over the column heading until it looks like a heavy down arrow > click. To select contiguous columns, select one column and press and drag through the other columns. To select non-contiguous columns, select one column > hold down the Control (PC) or Command (Mac) key while selecting the other columns. The same principles apply to selecting rows. Go to the Menu > Edit > Delete to remove the selected rows or columns.

Transposing Cells

If you want to transpose the cells for the timeline, copy the cells in question and Paste Special > transpose. Start by highlighting the cells you want to transpose (press and drag through the cells or see previous paragraph for directions on selecting contiguous and non-contiguous cells). Copy the cells (go to the Menu > Edit > Copy, OR Control+C (PC) or Command+C (Mac)). Select the cell where you want to start pasting in your transposed data (select cells that are not currently in use, and delete others later). Go to the Menu > Edit > Paste Special > use the dialog box to choose “Transpose”. If you want to delete the original data, highlight the cells and go to the Menu > Edit > Delete.

Insert a Title

Type the title in cell A1. If you need to add a row, select row 1 > right-click (PC) or Control+click (Mac) > Insert. The title will appear to flow across several cells, but it actually only exists in cell A1.

Highlight all the cells (not the entire row) that you want to center the title across. the Merge and Center icon in the Formatting Toolbar to merge the cells and place the text in the center of the merged cell.



Use the

Border Selected Cells

If you want to place a border around specific cells, select the cells and click on the border tool. Notice that there are several border options if you click on the drop down menu next to the Border tool.

Select cells and use different border options to draw horizontal lines, OR use the Line Tool in the Drawing Toolbar.



Adding Graphics

You can apply many other graphic features, such as applying colors to cells, inserting clipart or pictures, adding textboxes, and drawing lines and shapes. Detailed directions for Drawing Tools and Digital Pictures can be found in Volume 2: Publish IT.

Saving and Printing the Timeline

Save your project by going to the Menu > File > Save As > select a file location and name the document. To save changes, go to the Menu > File > Save.

When you use the Print command, only the worksheet that is active will print. It is always a good idea, especially when using Excel to check the Print Preview (go to the Menu > File > Print Preview) to see what your printed document will look like.

Print Your Projects



The default setting is to print the entire spreadsheet. You can specify the way your spreadsheet will look by setting the options in Print Preview. Go to the Menu > File > Print Preview or use the print preview icon.

Once you are in print preview, you can access the options for margins and page set up. If you want to return to the document without printing, use the “Close” button and you’ll see dashed lines to indicate the edge of the page. Set up options include page, margins, header/footer, and sheet.

Page Orientation: Choose to print the page in landscape or portrait mode.

Printing Gridlines: Click on the “Sheet” tab. In the Print section, select Gridlines.

Printing Rows or Columns on every page: click on the “Sheet” tab. In the Printing Titles section, select the rows or columns to repeat.

Positioning the spreadsheet on the page: Use the “Margins” tab. You can choose to center the spreadsheet vertically or horizontally on the page.

Printing a Specific Area – select the range you want to print, and go to the Menu > File > Print Area > Set Print Area. The dotted area indicates the area you set. When you use the Menu to print, you will have the option to print the entire document or only the area.