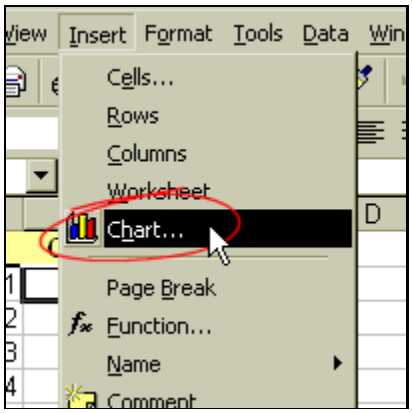
EXCEL DIRECTIONS

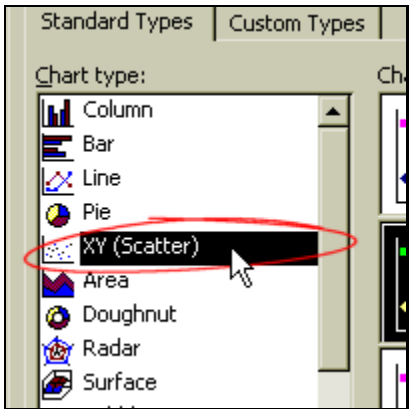
CREATE A CHART

STEP 1



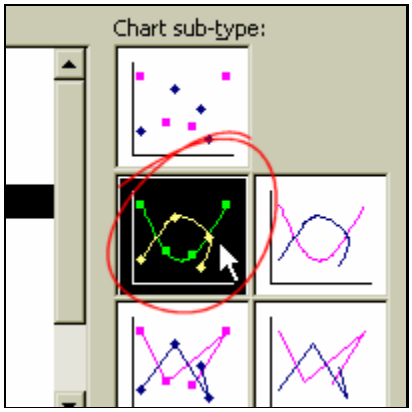
To see how pH CaCO3 are related, we need to make a Chart. To insert a chart, move your cursor to the Insert Menu, and then select Chart from the list.

STEP 2



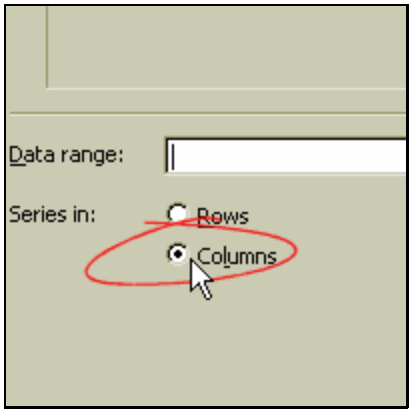
Because you have two continuous variables, An X-Y Scatter chart will best represent your data. Select it in the Chart type list.

STEP 3



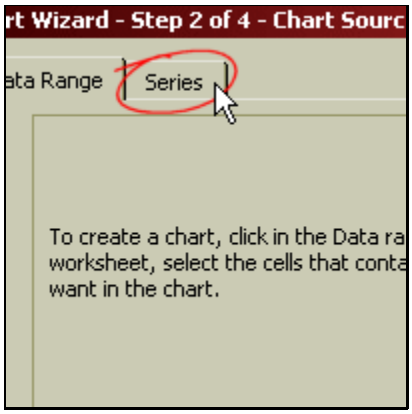
For a chart sub-type, select the box shown. This will connect your data points with a smooth curve. When you have selected this, click the Next button at the bottom of the dialog box.

STEP 4



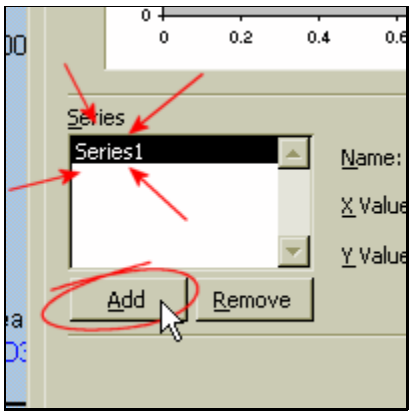
If there is any text in the "Data range" field, remove it now. Also, be sure to set the "Series in" to Columns.

STEP 5



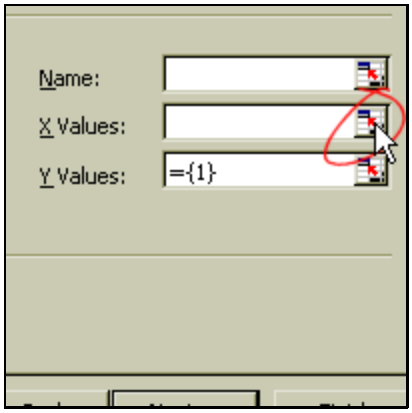
Now, click on the Series tab at the top of the dialog. This will allow you to choose what data goes into your chart.

STEP 6



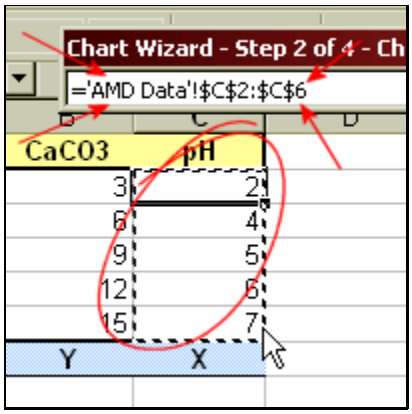
There should be no items in the Series list, if there are, remove them. Now click on Add. An item, Series1, should have been created in the list.

STEP 7



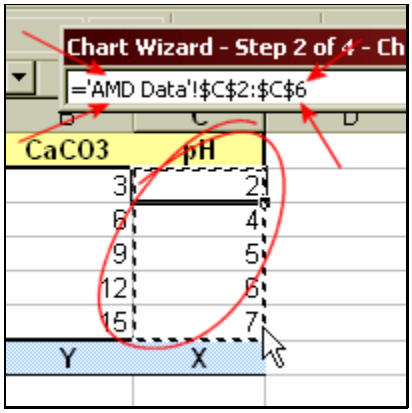
Click on the Collapse Dialog button at the right end of the X Values field. The dialog should now have collapsed into a small text field.

STEP 8



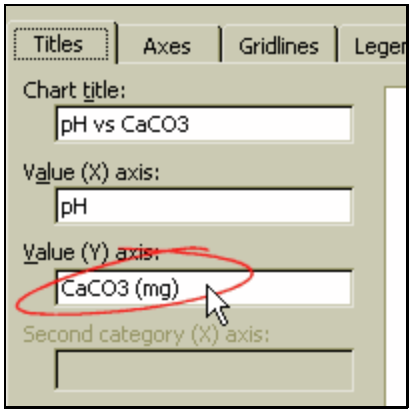
Make sure the new field is empty. Now select all of your measured pH data, cells C2 to C6. Check your text field against the field shown in the Wetlab Guide Box. If the chart wizard is still collapsed, click on the button at the right end to enlarge it again.

STEP 9



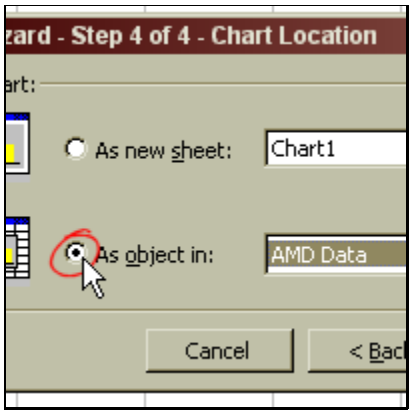
Now repeat Steps 7 and 8 for the Y Values field. Select the CaCO3 data for this field, cells B2 through B6. Again, enlarge the Chart Wizard if needed. Click Next when you are finished.

STEP 10



We're almost done now! Click on the Titles tab and give the chart meaningful labels. You may want to customize your chart by changing some of the values in the other tabs. When you are done, click Finish.

STEP 11



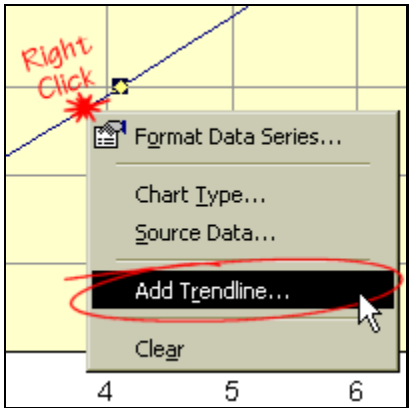
Put the chart "As an object in AMD Data. Position and resize the chart so that you can see all of the chart without covering up your data.

STEP 12

If you want to change anything about the chart, then right-click on an empty area and select chart properties. You can remove the legend by selecting it and hitting delete. Labels can be changed by selecting the text, and from there you can also change the font and color. Feel free to experiment and explore. When you are ready, hit the Finish button on Wetlab Guide Box to return to its main menu.

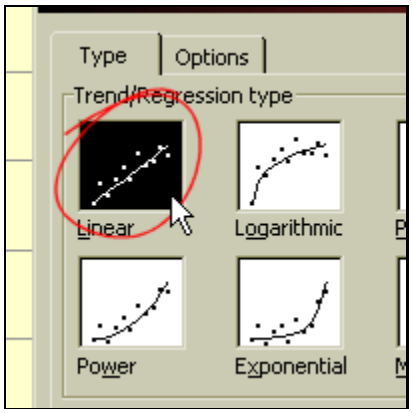
ADD A TRENDLINE

STEP 1



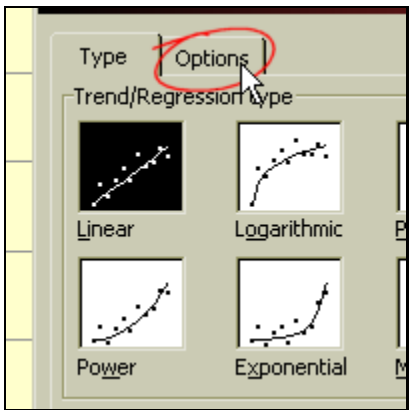
To make a trendline, or regression, that fits your data, first right click on the line connecting your data points and select "Add Trendline."

STEP 2



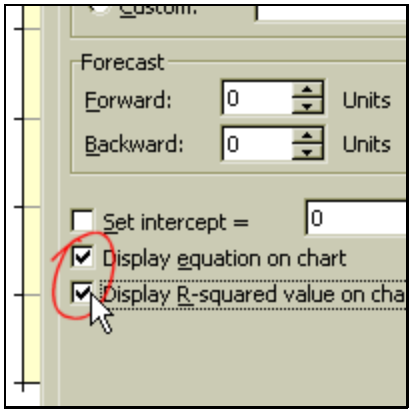
In the dialog box, under "Trend/ Regression type" select Linear, because we want an equation that represents our data as a straight line.

STEP 3



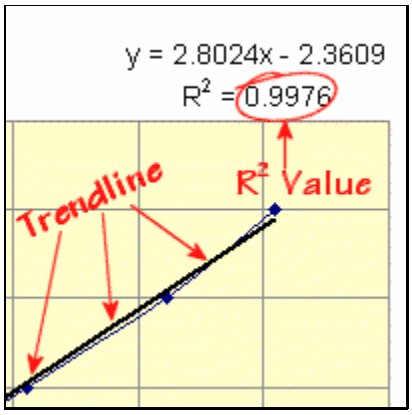
Then, select the Options tab to set some trendline options.

STEP 4



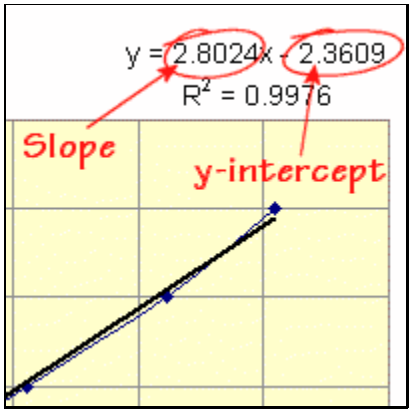
Mark the bottom two checkboxes labeled "Display equation on chart" and "Display R-squared value on chart". Leave all of the other options as is. Click OK to finish.

STEP 5



The trendline you added is the black line on the chart. If the trendline is a good representation of your data, then the R-squared value will be close to -1 or 1, if it is a very bad representation, then it will be close to zero

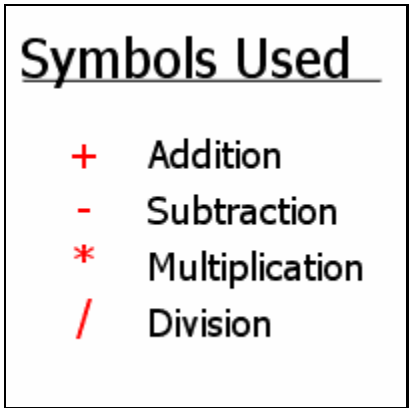
STEP 6



Remember, all lines can be expressed as y=mx+b, where 'm' is the slope and 'b' is the y-intercept. Find the number corresponding to the slope in your trendline equation. Put this number in the blue cell with the label "slope of trend line", cell D9. Now find the number corresponding to the y-intercept and put it in the blue cell labeled "y-intercept of trend line", cell D10.

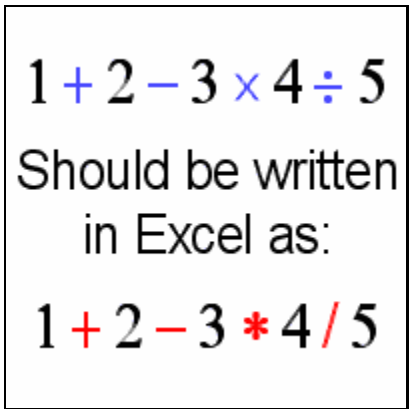
Writing Excel Calculations

Step 1



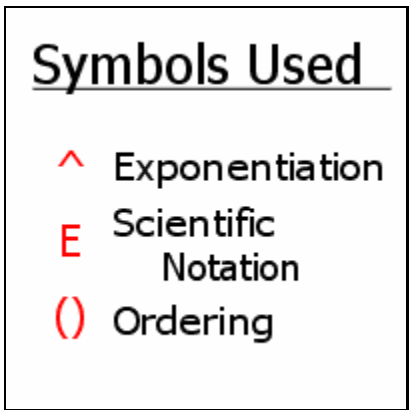
Excel uses special symbols for Multiplication and Division. If you have a graphing calculator then you will recognize these symbols from there, as they are common to all computer math. The '*' can be found above the '8' on the keyboard, and the '/' above the '?'. They can also be found on the number pad.

Step 2



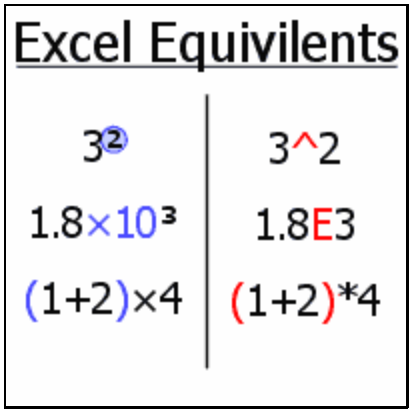
Besides changing a couple of symbols, Excel uses the same format for math as you are used to with paper and pencil. The normal blue symbols at the top are replaced with their Excel equivalents in red at the bottom.

Step 3



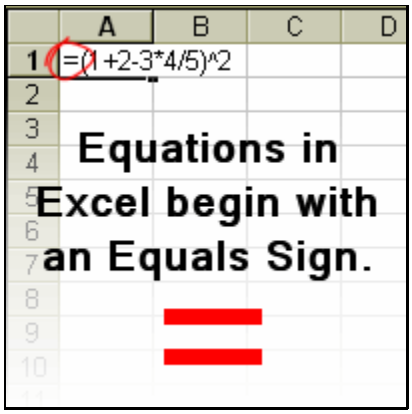
Use the '^' to raise a number to a power, and a capital 'E' to denote scientific notation. Excel uses the same order of operations common to all math, so use '()' around math that should be done first.

STEP 4



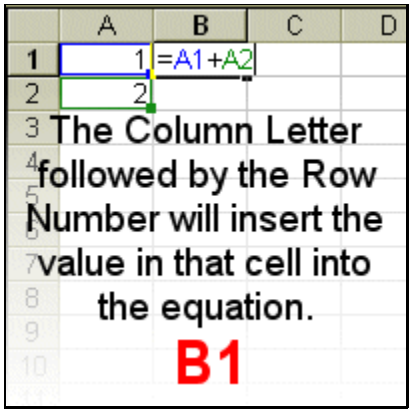
The blue symbols on the left are replaced with their Excel equivalents in red on the right.

STEP 5



To tell Excel that a cell has an equation in it, you must precede the equation with an '=', as shown.

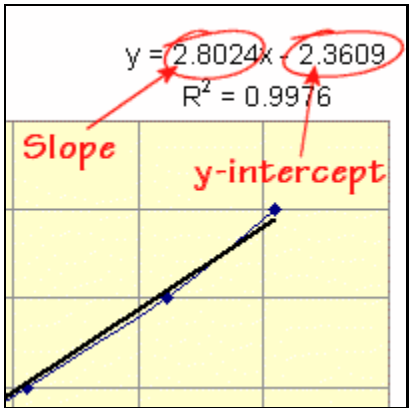
STEP 6



To put the value of a cell into another equation, use the Column Letter followed by the Row Number of the value you want to insert into the equation.

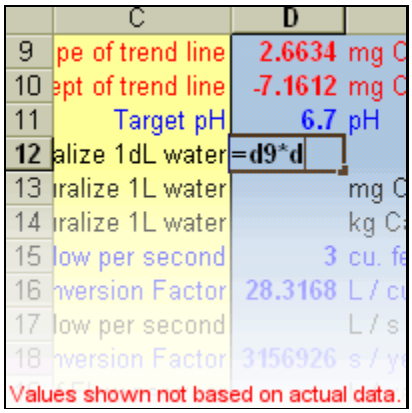
CALCULATE COST

STEP 1



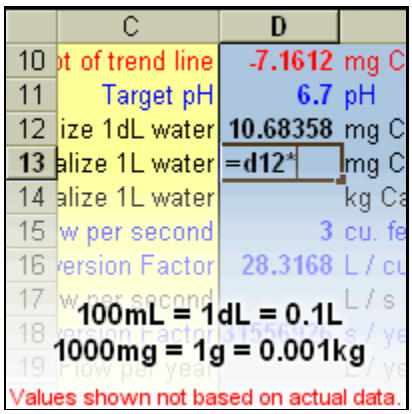
If you haven't already, put the slope and y-intercept of your trendline in the table. Don't forget to copy their sign!

STEP 2



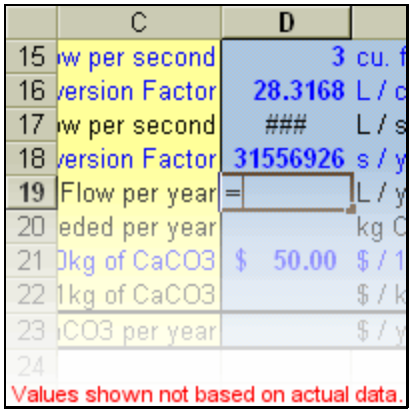
Remember, the trendline and its equation represent how many milligrams of CaCO3 is needed to reach the desired pH in 100mL of water. So write a formula in cell D12 that will use your equation to calculate how much CaCO3 you need to reach the pH given in cell D11.

STEP 3



For the next two slots, use your knowledge of the metric system to write formulas that will convert the value you calculated in cell D11 into the units asked for.

STEP 4

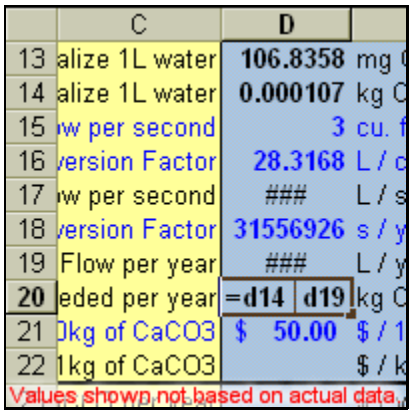


	C	D	
15	w per second	3	cu. f
16	ersion Factor	28.3168	L / c
17	w per second	###	L / s
18	ersion Factor	31556926	s / y
19	Flow per year	=	L / y
20	eded per year		kg C
21	0kg of CaCO3	$ 50.00	$ / 1
22	1kg of CaCO3		$ / k
23	CO3 per year		$ / y
24			

Values shown not based on actual data.

Use the value for "Cubic feet of flow per second" and the conversion factor given to write a formula that will find "Liters of flow per second". Then use the conversion factor to convert that value into "Liters of Flow per year".

STEP 5

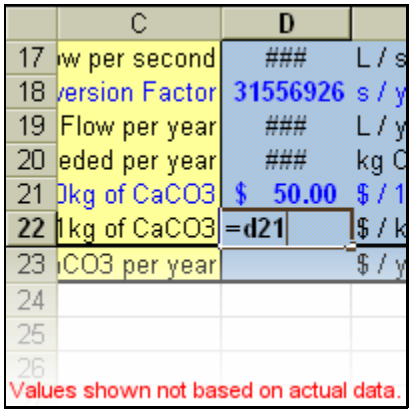


	C	D	
13	alize 1L water	106.8358	mg
14	alize 1L water	0.000107	kg C
15	w per second	3	cu. f
16	ersion Factor	28.3168	L / c
17	w per second	###	L / s
18	ersion Factor	31556926	s / y
19	Flow per year	###	L / y
20	eded per year	=d14 d19	kg C
21	0kg of CaCO3	$ 50.00	$ / 1
22	1kg of CaCO3		$ / k

Values shown not based on actual data.

Now, use the value you calculated in D14 and the value you just calculated in D19 to find how much CaCO3 you need per year.

STEP 6

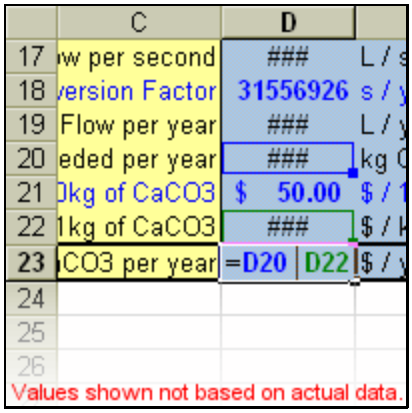


	C	D	
17	w per second	###	L / s
18	ersion Factor	31556926	s / y
19	Flow per year	###	L / y
20	eded per year	###	kg C
21	0kg of CaCO3	$ 50.00	$ / 1
22	1kg of CaCO3	=d21	$ / k
23	CO3 per year		$ / y
24			
25			
26			

Values shown not based on actual data.

Use your knowledge of the metric system to determine how much 1kg of CaCO3 costs based on the cost of 100kg.

STEP 7



	C	D	
17	w per second	###	L / s
18	version Factor	31556926	s / y
19	Flow per year	###	L / y
20	eded per year	###	kg C
21	0kg of CaCO3	$ 50.00	$ / t
22	1kg of CaCO3	###	$ / k
23	CO3 per year	=D20 | D22	$ / y
24			
25			
26			

Values shown not based on actual data.

Finally, use the value in D20 to write a formula that will calculate how much enough CaCO3 to naturalize the river will cost each year.