

Spreadsheets were a killer app for personal computers (perhaps *the* killer business app).

It's a mind-set, not a skill-set. Brilliance helps, but is not required. Instead, adopt these mantras: be stubborn, bossy, **lazy**, obsessive, cynical, plodding, and importunate. Why? So you can use IT as a tool to do cool stuff...

This week, resist the urge to build a technological solution before you understand what its for. There's no sense attending to details until you know what you're talking about (cf. the old von Neumann quote).



Accountant's Paper Ledger

2-Dimensional representation of accounting data

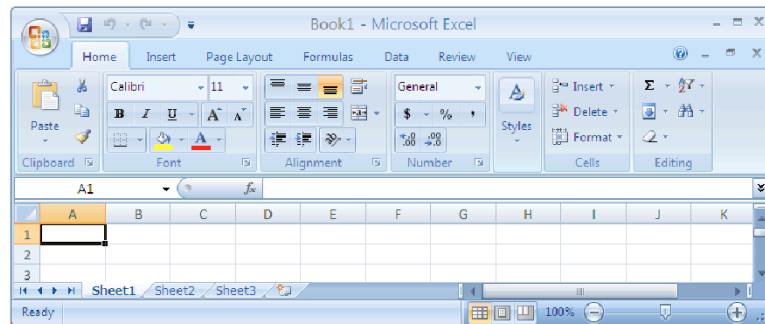
		Prepared by:				Initials	Date
		Approved by:					
		1	2	3	4	5	6
1	UNIT PRICE			2	0		1
2	UNIT SALES	1	2	0	0		2
3	GROSS PROFIT	24	0	0	0		3
4							4
5	EXPENSES						5
6	PRODUCTION	10	0	0	0		6
7	DISTRIBUTION	1	2	0	0		7
8	MARKETING	5	0	0	0		8
9	OVERHEAD	3	0	0	0		9
10	TOTAL EXPENSES	19	2	0	0		10
11							11
12	NET PROFIT	4	8	0	0		12

image from Grauer&Barber, *Excel 2003*, Prentice Hall, Oct., 2004
© Keith Vander Linden, 2005

The accountant's ledger is pure paper and hard work! If you found a mistake anywhere in the ledger, you'd have to painstakingly go back through changing all the sums, etc.

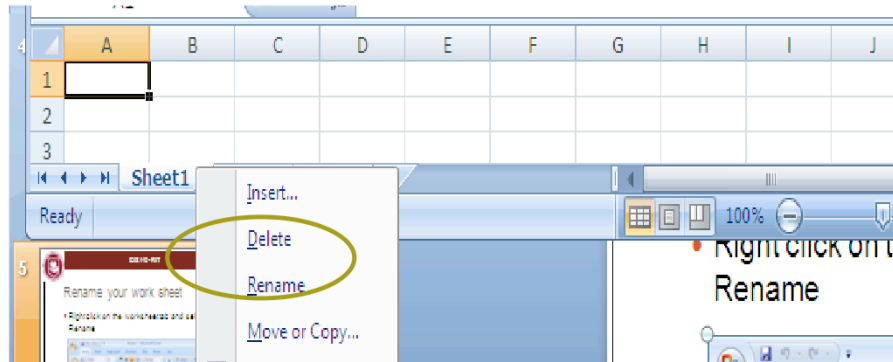
Let's Make a Simple Budget

- Worksheets are saved together in a single file called a workbook.



Rename your worksheet

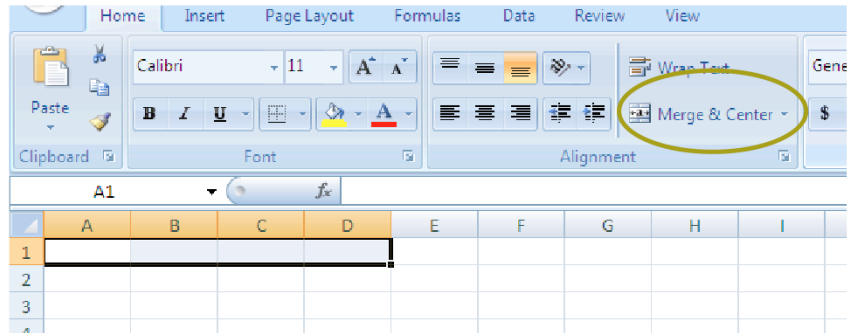
- Right click on the worksheet tab and select Rename. Then key in the new name "Budget"



© Keith Vander Linden, 2005

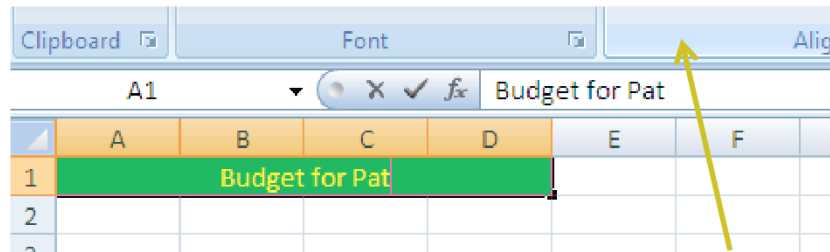
Add a header

- Go to cell A1, hold down your left mouse button and “drag” it four cells across. Then, click on the merge and center tool.



Some more formatting....

- With the new “single” cell, key in the header. Type in “Budget for Pat” (use your name instead of Pat) Use the standard MS Office tools for background colors.



*Note: as you type, the “value” for the cell shows in the edit bar, too.



Stretch out the width

- Move your mouse to the position between column A and B until it turns into a double arrow. Press your left mouse button and drag it to the right to widen column A. Do this for the remaining three columns.

	A	B	C	D
1	Budget for Pat			
2				
3				
4				
5				



More setup

You know enough to add more. Modify the spreadsheet to look similar to the following (don't forget to use the merge and center tool when needed)

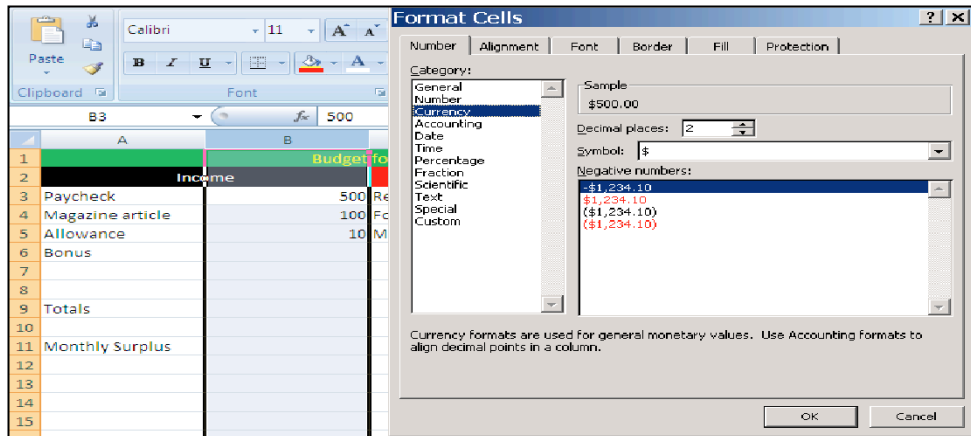
	A	B	C	D	E
1	Budget for Pat				
2	Income		Expenses		
3	Paycheck	500	Rent	300	BONUS RATE
4	Magazine article	100	Food	150	0.05
5	Allowance	10	Movies	20	
6	Bonus				
7					
8					
9	Totals				
10					
11	Monthly Surplus				

© Keith Vander Linden, 2005



Formatting

- We want to make sure that the numbers look appropriate. We want dollar signs and percent signs. So, click on column B. After it highlights, right click and choose **Format Cells**
- You will see a dialog box show up. Click on the **Number** tab. Then click on the option to format the numbers as currency. Then click on Okay.



Formatting, gives you this result.

	A	B	C	D	E
1	Budget for Pat				
2	Income		Expenses		
3	Paycheck	\$500.00	Rent	300	BONUS RATE
4	Magazine article	\$100.00	Food	150	0.05
5	Allowance	\$10.00	Movies	20	
6	Bonus				
7					
8					
9	Totals				
10					
11	Monthly Surplus				

© Keith Vander Linden, 2005



More formatting

- Do the same thing for column D.
- Then right click on cell with the Bonus rate (it has .05 in it), and choose Format cells. This time, select Percent in the number tab.

A	B	C	D	E
Budget for Pat				
Income		Expenses		
Paycheck	\$500.00	Rent	\$300.00	BONUS RATE
Magazine article	\$100.00	Food	\$150.00	5.00%
Allowance	\$10.00	Movies	\$20.00	
Bonus				
Totals				
0				
1	Monthly Surplus			

2005

Create totals

- Click on the cell next to “Totals”. In the far right hand corner, you will see an Sigma sign. Click on that, and you will see that cell filled in with a formula.

The screenshot shows the Microsoft Excel interface. The ribbon is visible, with the 'Formulas' tab selected. The 'AutoSum' group in the ribbon is highlighted with a yellow circle, and a yellow arrow points from the Sigma sign to the formula bar. The formula bar contains the text '=SUM(B3:B8)'. Below the formula bar, the spreadsheet grid is visible. The grid has columns A through L and rows 1 through 8. The data in the grid is as follows:

Budget for Pat												
Income	Expenses											
check	\$500.00	Rent	\$300.00	BONUS RATE								
magazine article	\$100.00	Food	\$150.00	5.00%								
advance	\$10.00	Movies	\$20.00									
us												
als	=SUM(B3:B8)											



Try it yourself

- Hit the enter key -- a total should appear.
- Now do the same thing for the Expenses column.

	A	B	C	D	E
1	Budget for Pat				
2	Income		Expenses		
3	Paycheck	\$500.00	Rent	\$300.00	BONUS RATE
4	Magazine article	\$100.00	Food	\$150.00	5.00%
5	Allowance	\$10.00	Movies	\$20.00	
6	Bonus				
7					
8					
9	Totals	\$610.00		=SUM(D3:D8)	
10					
11	Monthly Surplus				
12					

© Keith Vander Linden, 2005



Set the bonus

- Enter the following in the cell next to Bonus:
=B3 * \$E\$4
- You will see this is the Paycheck times the percentage bonus.
- The dollar signs ensure that we always refer to just cell E4.
- See the next slide for the example.

	A	B	C	D	E	F
1	Budget for Pat					
2	Income		Expenses			
3	Paycheck	\$500.00	Rent	\$300.00	BONUS RATE	
4	Magazine article	\$100.00	Food	\$150.00	5.00%	
5	Allowance	\$10.00	Movies	\$20.00		
6	Bonus	=B3*E4				
7						
8						
9	Totals	\$610.00		\$470.00		

After hitting enter, you should see....
and notice the Totals for Income!

	A	B	C	D	E
1	Budget for Pat				
2	Income		Expenses		
3	Paycheck	\$500.00	Rent	\$300.00	BONUS RATE
4	Magazine article	\$100.00	Food	\$150.00	5.00%
5	Allowance	\$10.00	Movies	\$20.00	
6	Bonus	\$25.00			
7					
8					
9	Totals	\$635.00		\$470.00	
10					



Now set up the bottom line

- Click on the cell next to Monthly Surplus and enter the following: =B9-D9 (or whatever is appropriate for the totals for income and expenses)

	A	B	C	D	E
1	Budget for Pat				
2	Income		Expenses		
3	Paycheck	\$500.00	Rent	\$300.00	BONUS RATE
4	Magazine article	\$100.00	Food	\$150.00	5.00%
5	Allowance	\$10.00	Movies	\$20.00	
6	Bonus	\$25.00			
7					
8					
9	Totals	\$635.00		\$470.00	
10					
11	Monthly Surplus	=B9-D9			
12					



After you hit enter....

	A	B	C	D	E
1	Budget for Pat				
2	Income		Expenses		
3	Paycheck	\$500.00	Rent	\$300.00	BONUS RATE
4	Magazine article	\$100.00	Food	\$150.00	5.00%
5	Allowance	\$10.00	Movies	\$20.00	
6	Bonus	\$25.00			
7					
8					
9	Totals	\$635.00		\$470.00	
10					
11	Monthly Surplus	\$165.00			
12					

© Keith Vander Linden, 2005

	A	B	C	D	E
	Income		Expenses		
3	Paycheck	\$500.00	Rent	\$300.00	BONUS RATE
4	Magazine article	\$100.00	Food	\$150.00	5.00%
5	Allowance	\$10.00	Movies	\$20.00	
6	Bonus	\$25.00			
7					
8					
9	Totals	\$635.00		\$470.00	
10					
11	Monthly Surplus	\$165.00			
12					
13	Sample	Return with Bonus			
14	\$1,000.00	=A14+(A14*E4)			
15					



Copying a formula...

- Add three more lines under “Sample” for 2000, 3000 and 4000
- Copy the formula in the cells next those new entries under the “Return with Bonus”
- You will notice something doesn’t look right.



The formula here is $=A14+(A14*E4)$

12			
13	Sample	Return with Bonus	
14	\$1,000.00	\$1,050.00	
15	\$2,000.00	\$2,000.00	
16	\$3,000.00	\$3,000.00	
17	\$4,000.00	\$4,000.00	
18			

The formula here is : $=A17+(A17*E7)$



Go back and ...

- Change the original formula to
=A14+(A14 * \$E\$4)
- Then copy and watch the difference.

- Note: The \$ sign on the reference to the BONUS figure forces each copy not to change the cell address reference (this is an absolute reference)



So what have you learned?



Spreadsheet Cells

- Worksheets are 2-dimensional arrays of cells.
- Each cell is referred to by its **cell reference**.
 - Examples: A1, E10, AZ1024
- Cells can be grouped as a **range**.
 - Examples: A1:E10, C5:Q8



Spreadsheet Values

- Constants/literals
 - numbers, text labels, etc.
- Formulas (always begins with an =) and can contain: cells, numbers, arithmetic, functions.
=A7 + AVERAGE(E4:E10)
- Worksheet contents are updated in real time.
 - i.e., when you change a cell, all other cells that *depend* on it are updated.
- Select the cell where you want the results to be.

- Constants (aka “literals”, text of numeric) – e.g., “cell text label”, “3.14159”
- Formulas – e.g., =A5+A6
- Functions – e.g., =SUM(A5,A20)

Build the budget table as a class example (with them following along), and review the following spreadsheet features:

- Constants/formulas/functions
- Columns/rows and cell addresses
- relative/absolute addresses
- cell ranges
- copying cells using the “fill handle” with auto-updates of relative addresses
- sorting columns
- charting



Formula Gotchas

- The location of a formula is *not* in the formula.
 - select cell H17 and put a formula in it: you will not (and must not) have H17 in the formula.
- A formula starts with =
 - a space before it means it isn't a formula, just the characters “=”.
 - no other =s in the formula
 - after the =, you can have spaces, functions, cell references, parentheses, etc.



Formula Gotchas (continued)

- You should rarely have numbers in a formula
 - if you need to multiply by a number, put the value in a cell and reference it.
- A cell reference in a formula is relative and will change if you move/copy the formula.
 - Suppose you have a formula in C7 that references D4: D4 really means one column to the right and 3 rows up.
 - If you always want D4, write `D4`.



Relative/Absolute Addressing

- Syntax:
 - Relative address: **A1**
 - Absolute address: **\$A\$1**
- When a formula is copied:
 - **relative addresses** are modified automatically
 - **absolute addresses** are **not** modified: they ***always*** refer to the same cell
- Use the F4 key to convert an address



Spreadsheet Issues

- Powerful tools can create powerful problems.
- How to find bugs?
- “Garbage in, garbage out.”
- And, “Good stuff in, garbage processing, garbage out.”

Tell a failure story:

James A. Cummings Inc of Florida developed a bid on a multi-million dollar project using a spreadsheet. The spreadsheet programming had an error - they added \$254,000 overhead at the last minute, but the number was not added to total bid value. They underbid, got the contract, and lost a lot of money. To recover it, they sued the spreadsheet company and lost - the spreadsheet was not the cause of the “operator error”.

Moral - Know your tools; be careful; double-check your work; the organization should have checks and balances

Grab the 03Erroneous Financial Forecast.xls to illustrate this. Talk through it with them:

- The administration expenses are not subtracted out of the estimated earnings (because they didn't use SUM() to add the expenses and then added a new expense line)
- The production facility costs are not increasing because they didn't use an absolute reference for the facility cost increases)

Garbage-in-garbage out!!! Treasure in - garbage processing - garbage out!!!

How do you solve this sort of problem?

estimate results and see if they match

change some constants and see if results change

have others look over your work.



Technology and Humanity

- Working with technology can be dehumanizing.
 - Use it, but don't be used by it.
 - “Have dominion over it.”

Technology is a second-order part of creation. We can mold it, nurture it, be amazed by it, but it shouldn't control or dehumanize us. In fact, it should help us be more human!

This is pretty easy to forget when we're battling with Excel.