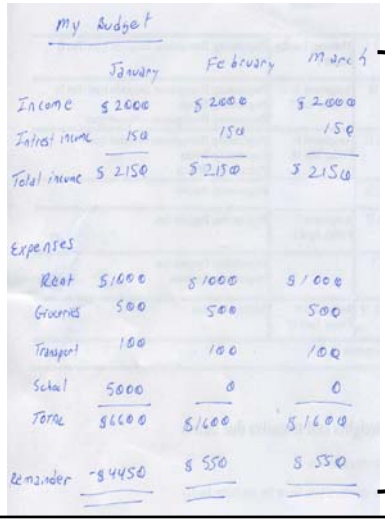
Spreadsheets

You will learn about some important spreadsheet features as well as good design principles.

Paper Spreadsheets

- The original purpose was to show the data to be used in calculations.

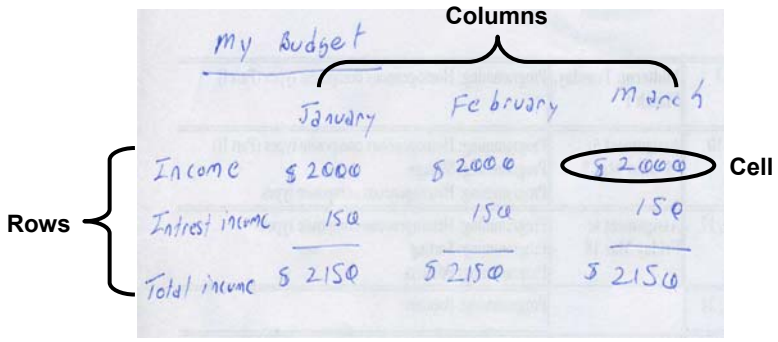


my budget

	January	February	March
Income	$2000	$2000	$2000
Interest income	150	150	150
Total income	$2150	$2150	$2150
Expenses			
Rent	$1000	$1000	$1000
Groceries	500	500	500
Transport	100	100	100
School	5000	0	0
Total	$6600	$1600	$1600
Remainder	-$4450	$550	$550

This information was represented in tabular form. These tables became known as spreadsheets

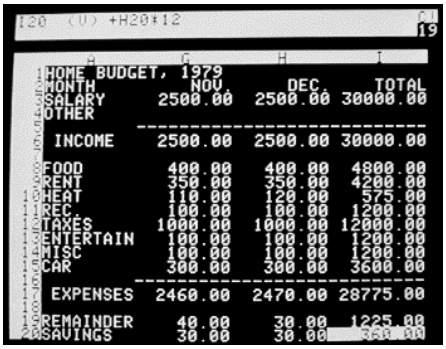
Spreadsheet Terminology



Drawbacks Of Paper Spreadsheets

- However making changes could be awkward:
  - Modifying the data e.g., correcting errors
  - Attempting variations e.g., for a personal budget what would be the effect of:
    - living in a 1 bedroom vs. 2 bedroom apartment,
    - taking a full time vs. part time job,
    - going on a vacation to Paris France vs. going to Vulcan Alberta.

Electronic Spreadsheets



	G	H	I
1	HOME BUDGET, 1979		
2	MONTH	NOV.	DEC.	TOTAL
3	SALARY	2500.00	2500.00	30000.00
4	OTHER			
5	INCOME	2500.00	2500.00	30000.00
6	FOOD	400.00	400.00	4800.00
7	RENT	350.00	350.00	4200.00
8	HEAT	110.00	120.00	575.00
9	REC	100.00	100.00	1200.00
10	TAXES	1000.00	1000.00	12000.00
11	ENTERTAIN	100.00	100.00	1200.00
12	MISC	100.00	100.00	1200.00
13	CAR	300.00	300.00	3600.00
14	EXPENSES	2460.00	2470.00	28775.00
15	REMAINDER	40.00	30.00	1225.00
16	SAVINGS	30.00	30.00	1260.00

VISICALC Dan Bricklin & Bob Frankston

- Early versions of electronic spreadsheets were primitive but they did what paper spreadsheets did and more.

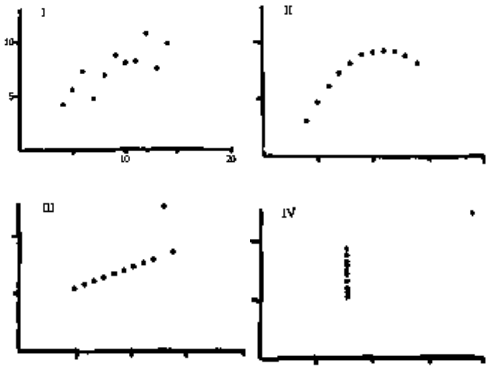
Electronic Spreadsheets (2)

- Are used to perform calculations.
- They may also be used to quickly try out different scenarios (this is called "what if analysis"):
  - E.g., : If I received a B+ on all the assignments what would my term grade be if I got an "A" on the final exam? What if I got a "D" on the final?
- Also spreadsheets are frequently used to help people visualize and interpret information.

Example Visualization : Anscombe's Quartet

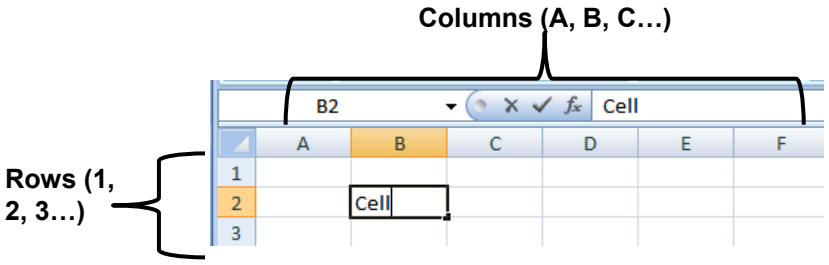
- A famous example showing the benefits of having an effective visualization.
- Shown one way (a set of numbered pairs) it's hard to analyze the information e.g., is there any trends or patterns?

I		II		III		IV	
x	y	x	y	x	y	x	y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89



James Tam

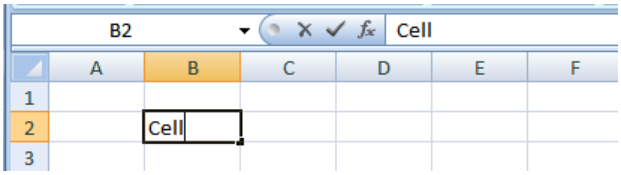
Electronic Spreadsheets Are Also Grid-Based



James Tam

Spreadsheet Cells

•It's the intersection of a row and column.

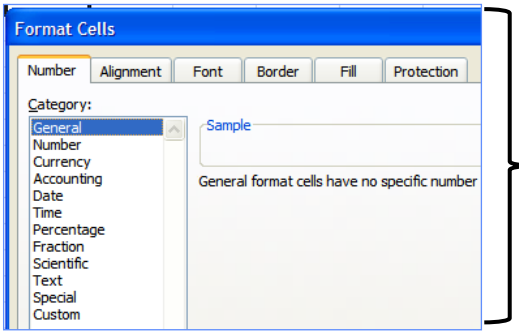


•Cells can contain:

- Text (alphabetic, numeric or most anything that can be entered using a keyboard).
- Numerical information.
- Calculations in formulas.

Number Formatting

•Are useful formatting effects that are unique only to numeric information.



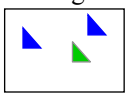
Example: currency format automatically displays a currency symbol and rounds to two decimal places.

Graphic Design And Spreadsheets

- How to use and not to use color
- Contrast and consistency
- Rules of thumb for formatting text

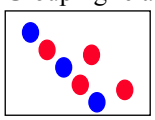
Using Color To Help Visualize Information

- Color is one of the most widely used (and misused) ways of communicating information.
- Color works well for:
  - Making things stand out



This is **important**!

  - Grouping related items

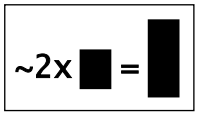


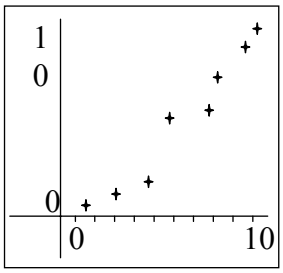
Using Color To Help Visualize Information (2)

•Color should not be used for:

- Communicating numerical information

- (In these cases): Consider using something else like size or position.

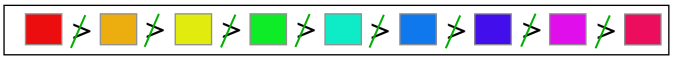




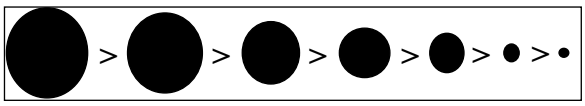
Using Color To Help Visualize Information (3)

•Color should not be used for:

- Showing a ranking between items



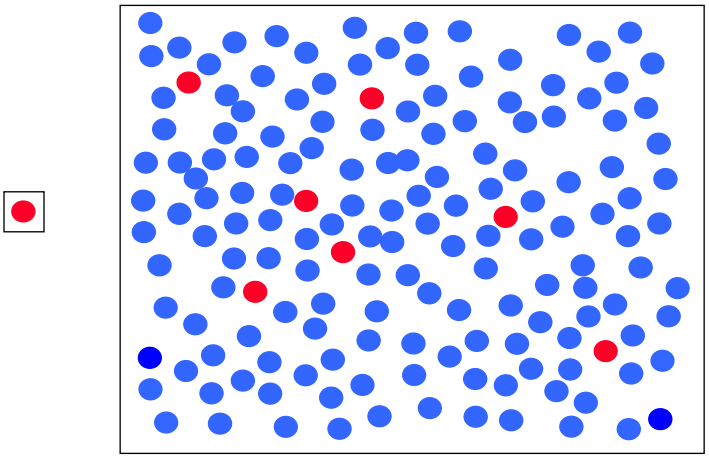
- (In these cases): Consider using something else like size, position or brightness/value.



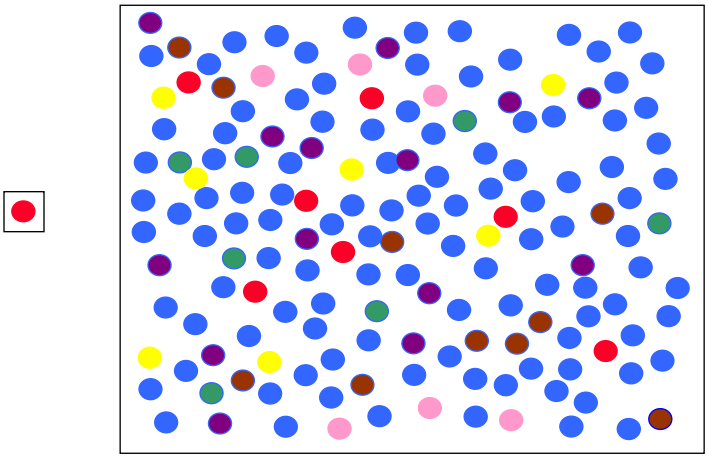
Use Color Sparingly

•Don't use color like you did when you were a kid.

Color Is Used Sparingly: Effective

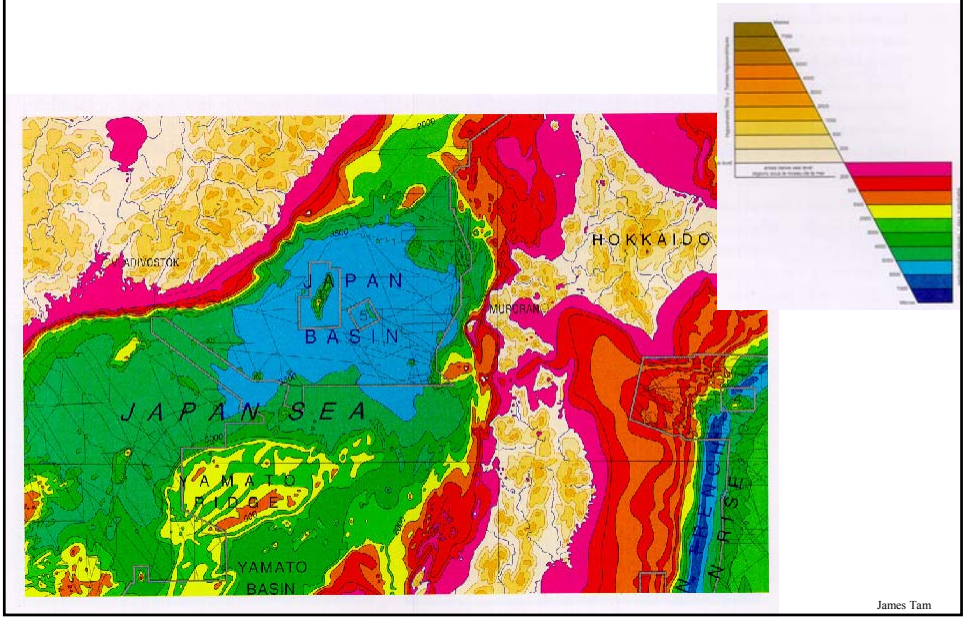


The Increased Use Of Color: Mutes The Message



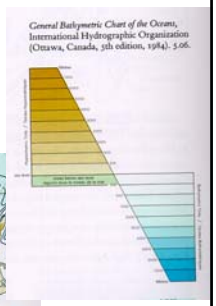
James Tam

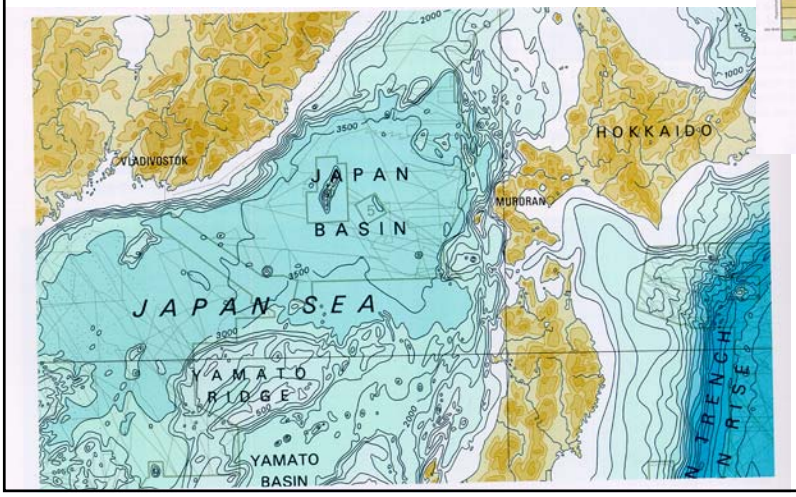
Over Use Of Color: Mutes The Message



James Tam

Color Is Used Sparingly: Effective





James Tam

Additional Issues Associated With Color

- Color blindness:
  - The majority of people who are color blind are red-green color blind so using only these colors to represent information should be avoided.
- Field size
  - The larger the area to be color coded, the more easily that colors can be distinguished.

	A	B	C	D	E	F	G	H
1	**ID**	**A1**	**A2**	**A3**	**A4**	**A5**	**Midterm**	**Final**
2	111	A	A	A-	B	A+	A-	A
3	112	A	B	C	B+	B-	C+	B-
4	113	A	A	B	C	B+	B	C-
5	114	A	A	A	C+	B-	C+	D
6	115	A	A-	C-	F	F	F	W
7	116	A	A	A	A	A-	C-	F
8	117	A	B+	B	B+	C+	D	F-
9	118	A	A	C+	C	C	C	D
10	119	A	A	C	B	B+	C-	B-
11	120	A	A-	C-	F	F	F	W
12	121	A	B	D	D-	F	C	W
13	122	A	B+	F	F	F	D	W
14	123	A	A-	B	B-	C	C+	D
15	124	A	A	C+	C	C	C	D
16	125	A	B	D	B+	B-	C+	B-

  - This means that if you use color for a large surface area you can use more muted/subtle colors (preferable).

James Tam

Additional Issues Associated With Color (2)

- When objects are small (text or small graphics) and color is used to distinguish information use highly saturated colors.

This is
important
information!

This is
important
information!

	A	B	C	D	E	F	G	H
1	**ID**	**A1**	**A2**	**A3**	**A4**	**A5**	**Midterm**	**Final**
2	111	A	A	A-	B	A+	A-	A
3	112	A	B	C	B+	B-	C+	B-
4	113	A	A	B	C	B+	B	C-
5	114	A	A	A	C+	B-	C+	D
6	115	A	A-	C-	F	F	F	W
7	116	A	A	A	A	A-	C-	F
8	117	A	B+	B	B+	C+	D	F-
9	118	A	A	C+	C	C	C	D
10	119	A	A	C	B	B+	C-	B-
11	120	A	A-	C-	F	F	F	W
12	121	A	B	D	D-	F	C	W
13	122	A	B+	F	F	F	D	W
14	123	A	A-	B	B-	C	C+	D
15	124	A	A	C+	C	C	C	D
16	125	A	B	D	B+	B-	C+	B-

Color Conventions

- "Commonly accepted" conventions can vary widely by culture and their use should be carefully considered e.g., white is associated with purity in some Western cultures and death in some Eastern cultures.

Color And Cultural Associations

	Egypt	China	Japan	India	France
Red	• **Death**	•**Happiness**	• **Anger, Danger**	• **Life, creativity**	• **Aristocracy, Freedom, Peace**
Blue	• **Virtue, Faith, Truth**	• **Heavens, Clouds**	•**Villainy**		• **Freedom, peace**
Green	• **Fertility, Strength**	• **Ming Dynasty, Heavens, Clouds**	• **Future, Youth, Energy**	• **Prosperity, Fertility**	•**Criminality**
Yellow	• **Happiness, Prosperity**	• **Birth, Wealth, Power**	• **Grace, Nobility**	•**Success**	•**Temporary**
White	•**Joy**	•**Death, Purity**	•**Death**	• **Death, Purity**	•**Neutrality**

From "How Fluent is Your Interface? Designing for International Users" Proceedings of the INTERCHI'93. Russo P. and Boor S.

James Tam

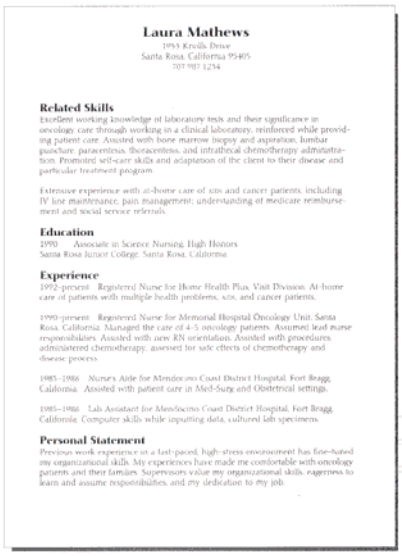
Contrast, Consistency

- Information that belongs in the same category should visually appear similar:
  - Font type
  - Font size and effects (bold, italics, underline)
- Information in different categories should not only look different but the difference should be significant.

From "The Non-Designers Design book by Robin Williams

James Tam

Contrasting Contrast



Laura Mathews

1953 Knolls Drive
Santa Rosa, California 95405
707 987 1234

Related Skills

Excellent working knowledge of laboratory tests and their significance in oncology care through working in a clinical laboratory, reinforced while providing patient care. Assisted with bone marrow biopsy and aspiration, lumbar puncture, paracentesis, thoracentesis, and intrathecal chemotherapy administration. Promoted self-care skills and adaptation of the client to their disease and particular treatment program.

Extensive experience with at-home care of AIDS and cancer patients, including IV line maintenance, pain management; understanding of medicare reimbursement and social service referrals.

Education

1990 Associate in Science Nursing, High Honors
Santa Rosa Junior College, Santa Rosa, California

Experience

1992-present Registered Nurse for Home Health Plus, Visit Division. At-home care of patients with multiple health problems, AIDS, and cancer patients.

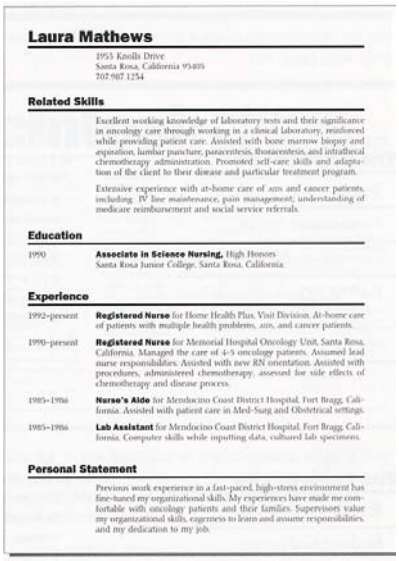
1990-present Registered Nurse for Memorial Hospital Oncology Unit, Santa Rosa, California. Managed the care of 4-5 oncology patients. Assumed lead nurse responsibilities. Assisted with new RN orientation. Assisted with procedures, administered chemotherapy, assessed for side effects of chemotherapy and disease process.

1985-1986 Nurse's Aide for Mendocino Coast District Hospital, Fort Bragg, California. Assisted with patient care in Med-Surg and Obstetrical settings.

1985-1986 Lab Assistant for Mendocino Coast District Hospital, Fort Bragg, California. Computer skills while inputting data, cultured lab specimens.

Personal Statement

Previous work experience in a fast-paced, high-stress environment has fine-tuned my organizational skills. My experiences have made me comfortable with oncology patients and their families. Supervisors value my organizational skills, eagerness to learn and assume responsibilities, and my dedication to my job.



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1953 Knolls Drive
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707.987.1234

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From "The Non-Designers Design book by Robin Williams

James Tam

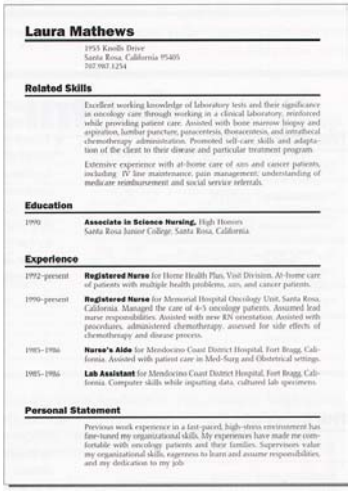
Consistency And Contrast In A Spreadsheet

Assign1	Assign2	Assign3	Midterm	Final	Term grade
A	A	A-	B		
B	C	C	D		
C-	B+	D	C		
A	A	A-	B		
C-	B+	B	C		
C	C	C+	D+		
A	A	A-	B		
A-	B+	B+	B		
C	B+	B-	C+		
A	A	B+	B		

James Tam

Formatting Text

•If used sparingly fonts and font effects can be an effective way of highlighting and drawing attention to important information.



Laura Mathews

1955 Knolls Drive
Santa Rosa, California 95405
707.987.1254

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From "The Non-Designers Design book by Robin Williams

Formatting Text (2)

•Just because you *can* use a lot of different formatting effects doesn't mean that you *should* do it.

•Rule of thumb:

- Maximum 3 variations of the following: font types, font style and color.
- Maximum 3 different sizes of fonts.

•Don't overdo it!

•Format painter (highlighter)
•Cut, copy and paste text
•Clipboard
·DRAGGING and *dropping (text)*
•Finding and replacing words in a document
•Headers ***and*** *footers*
•Working with images (clipart, other images stored on your computer)

•If you're not sure if a font is a good one to use then it probably isn't (stick with the commonly used ones).

- (This is a real font called "Wing dings"): ♦✈■♍ ♎✈■♍♦

Some Benefits Of Electronic Spreadsheets

•Calculations can be automated

- Many formulas are built into Excel e.g., sum a range of numbers along a column **sum(B4:B10).**
- In addition to this almost any arbitrary formula can be specified by an Excel user.

  E.g., term GPA = (assignment GPA) * (percentage worth for assignment)
  + (midterm GPA) * (percentage worth for exam)
  + (final exam GPA) * (percentage worth for exam)
- Changes can be quickly made.

	A	B	C
1	Net income	$2,000.00	
2			
3		**Feb expenses**	**March expenses**
4	Rent	$907.00	$907.00
5	Parking	$25.00	$25.00
6	Groceries	$300.00	$300.00
7	Car	$500.00	$500.00
8	Fun	$0.00	$100.00
9	Misc	$100.00	$200.00
10	Total expenses	$1,832.00	$2,032.00
11			
12	Income after bills	$168.00	-$32.00

Row 10 sums all the expenses

The difference between B1 and Row 10

Some Benefits Of Electronic Spreadsheets (2)

- Changes can be quickly made.

	A	B	C
1	Net income	$2,200.00	
2			
3		**Feb expenses**	**March expenses**
4	Rent	$907.00	$907.00
5	Parking	$25.00	$25.00
6	Groceries	$300.00	$300.00
7	Car	$500.00	$500.00
8	Fun	$0.00	$100.00
9	Misc	$100.00	$200.00
10	Total expenses	$1,832.00	$2,032.00
11			
12	Income after bills	$368.00	$168.00

A change is made here.

Automatically reflected here (where the data is referenced).

Methods Of Referring To Cells

- Absolute
- Relative

Absolute Reference

- When a reference to an cell or range of cells doesn't change when the contents of a cell or cells is copied or the sheet changes in size.

	A	B	C
1	Net income	$2,000.00	
2			
3		**Feb expenses**	**March expenses**
4	Rent	$907.00	$907.00
5	Parking	$25.00	$25.00
6	Groceries	$300.00	$300.00
7	Car	$500.00	$500.00
8	Fun	$0.00	$100.00
9	Misc	$100.00	$200.00
10	Total expenses	$1,832.00	$2,032.00
11			
12	Income after bills	$168.00	-$32.00

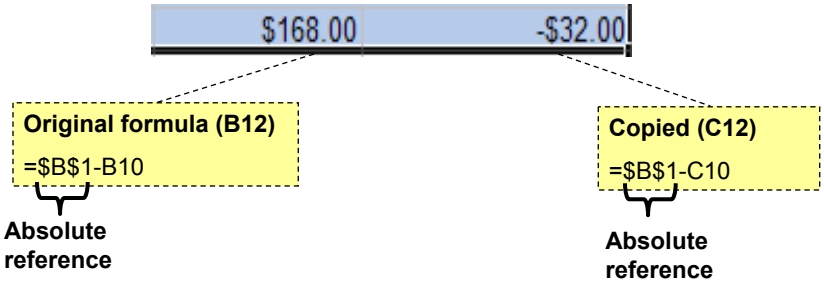
Original formula (B12)

=$B$1-B10

Copied (C12)

=$B$1-C10

Absolute Reference (2)



Absolute reference because the same (absolute) reference to cell B1 is made when the formula is copied.

Absolute Reference (3)

•Typically it's used in conjunction with constants (data that won't change).

	A	B	C
1	Net income	$2,000.00	
2			
3		**Feb expenses**	**March expenses**
4	Rent	$907.00	$907.00
5	Parking	$25.00	$25.00
6	Groceries	$300.00	$300.00
7	Car	$500.00	$500.00
8	Fun	$0.00	$100.00
9	Misc	$100.00	$200.00
10	Total expenses	$1,832.00	$2,032.00
11			
12	Income after bills	$168.00	-$32.00

References to B1 are absolute because income doesn't change

Original formula (B12)

=$B$1-B10

Copied (C12)

=$B$1-C10

Relative Reference

- A reference to a cell or group of cells change if the cell/cells are copied or the sheet changes in size.

	A	B	C
1	Net income	$2,000.00	
2			
3		**Feb expenses**	**March expenses**
4	Rent	$907.00	$907.00
5	Parking	$25.00	$25.00
6	Groceries	$300.00	$300.00
7	Car	$500.00	$500.00
8	Fun	$0.00	$100.00
9	Misc	$100.00	$200.00
10	Total expenses	$1,832.00	$2,032.00
11			
12	Income after bills	$168.00	-$32.00

Original formula (B12)

=$B$1-B10

Copied (C12)

=$B$1-C10

Relative Reference (2)

	A	B	C
1	Net income	$2,000.00	
2			
3		**Feb expenses**	**March expenses**
4	Rent	$907.00	$907.00
5	Parking	$25.00	$25.00
6	Groceries	$300.00	$300.00
7	Car	$500.00	$500.00
8	Fun	$0.00	$100.00
9	Misc	$100.00	$200.00
10	Total expenses	$1,832.00	$2,032.00
11			
12	Income after bills	$168.00	-$32.00

Recall:

- Total expenses (row 10) is a calculated value. It sums rows 4 – 9.

Original formula (B12)

=$B$1-B10

Relative reference

Copied (C12)

=$B$1-C10

Relative reference

Relative reference because the copied formula will change relative to how far it's copied.

Relative Reference (3)

- Typically it's used with variable data (that may change over time or in different parts of the sheet).

	A	B	C
1	Net income	$2,000.00	
2			
3		**Feb expenses**	**March expenses**
4	Rent	$907.00	$907.00
5	Parking	$25.00	$25.00
6	Groceries	$300.00	$300.00
7	Car	$500.00	$500.00
8	Fun	$0.00	$100.00
9	Misc	$100.00	$200.00
10	Total expenses	$1,832.00	$2,032.00
11			
12	Income after bills	$168.00	-$32.00

Total expenses may change from month-to-month so references will likely be relative.

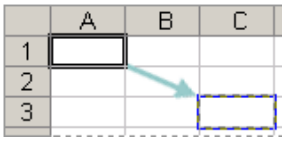
Original formula (B12)

=$B$1-B10

Copied (C12)

=$B$1-C10

Absolute, Relative And Mixed References: Examples[1]

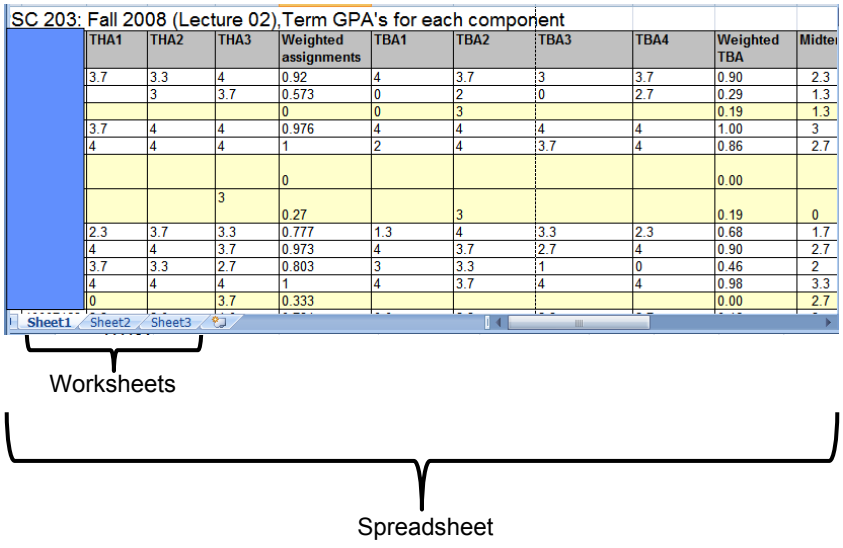


Example	Reference type	Copied result
$A$1	•Absolute column •Absolute row	$A$1
A$1	•Relative column •Absolute row	C$1
$A1	•Absolute column •Relative row	$A3
A1	•Relative column •Relative row	C3

1 Examples from the Excel 2003 Help System

Worksheets

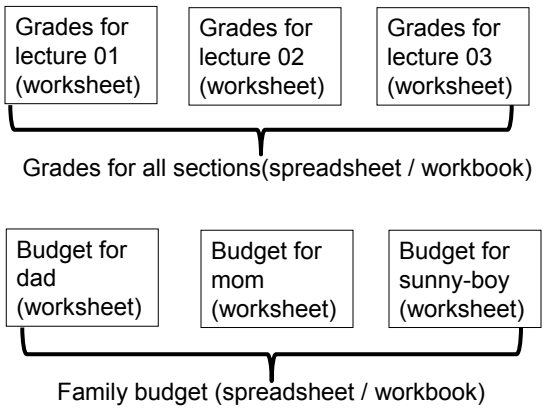
•Each *spreadsheet/workbook* can consist of multiple *worksheets.*



When To Use Multiple Worksheets

•Rules of thumb:

- When there are multiple sheets of related information, each group of information can be stored in it's own worksheet.



- Information from one worksheet may be used in another worksheet.

When Not To Use Multiple Worksheets

- If the information consists of groups of unrelated information then the information about each group should be stored in a separate spreadsheet/workbook rather than creating a single spreadsheet with multiple worksheets.

Grades for mom (spreadsheet)	Expenses for the family business (spreadsheet)	Daily calorie intake for dad (spreadsheet)

Some Popular Spreadsheets

- MS-Excel:
  - Produced by Microsoft and it's part of the MS-Office suite of programs.
  - Why use it: The most popular spreadsheet (your sheets can be viewed and used by many people without additional work or modifications).
- Open Office:
  - A suite of programs produced by Sun Microsystems which includes a spreadsheet.
  - Documents produced with MS-Office may usually be viewed and edited with this program.
  - Why use it: It's free!

Some Popular Spreadsheets (2)

•Google spreadsheet:

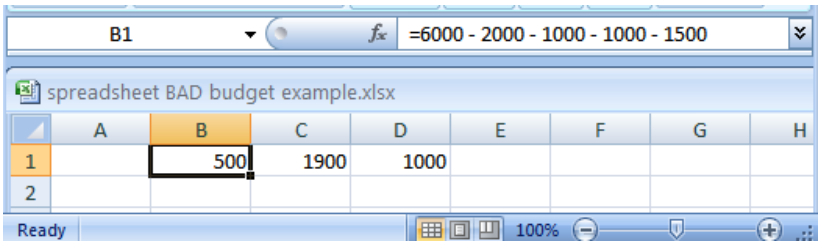
- Produced by the same company that made the Google web search engine.
- Part of the "Google docs" suite of programs.
- Documents can be saved in a variety of formats.
- Why use it: It's free!
- Normally documents are saved on the Google servers (it allows you to access documents from anywhere but there's limits on document sizes and the total amount that can be stored online).

Good Spreadsheet Design Principles

1. Make calculations explicit
2. Employ lookup tables when appropriate

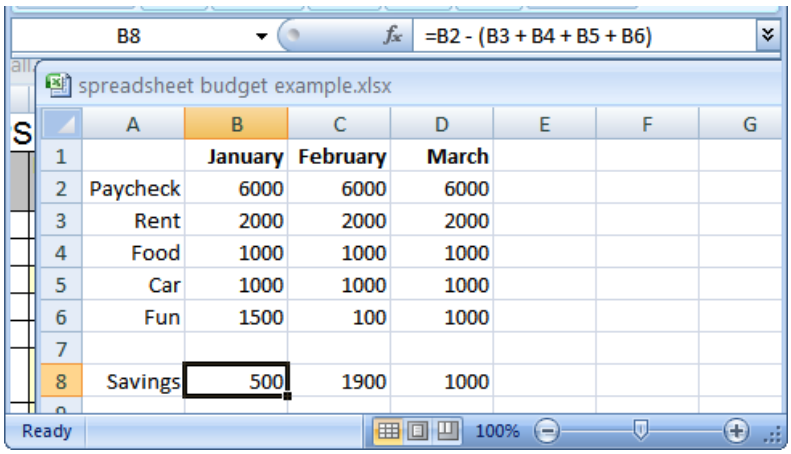
Example: Calculations Are Not Explicit

- Unless the formula is very obvious to the reader of the spreadsheet label all parts of a calculation.



Example: Calculations Are Shown In More Detail

- Whenever possible label the different parts of a calculation to make easier for the reader to interpret and understand how your calculations are derived.



Using Lookup Tables

- Contain information that is referred to/used in a spreadsheet
- Example, grades:

Letter	Percentage
A	80 – 100%
B	70 – 79%
C	60 – 69%
D	50 – 59%
F	0 – 49%

Using Lookup Tables (2)

- All the entries in the 'letter grade column' will refer to the table on the right.

Term percentage	Letter grade		Min. percentage	Letter
80			80	A
45			70	B
67			60	C
36			50	D
86			0	F
67				
69				
83				
77				
55				
65				
67				
91				
84				
67				
59				
80				
71				
59				

Example Of A Lookup Function

	A	B	C	D	E	F	G
1	Percentage	Letter			Range	Min percentage	Letter
2	91	A			0 - 59	0	F
3	81	B			60 - 69	60	D
4	71	C			70 - 79	70	C
5	61	D			80 - 89	80	B
6	60	D			90 - 100	90	A

=LOOKUP(A2, $F$2:F$6, $G$2:$G$6)

- A2: Cell whose value is to be looked up
- $F$2:$F$6 Look in this range of cells for a match. Search for a match and stop at the row whose cell value is less than or equal to the value searched for or if there is no matches then shown an error.
- $G$2:$G$6 When a value is found in a cell in column 'F' put the value from the same row of column 'G' into the cell in column 'B'.

James Tam

Why Use Lookup Tables

- The values are made explicit.
- It minimizes the number of changes needed, changing the values in the table changes all the parts in the sheet that refer to that table.

James Tam

What Representation Should Be Used In A Spreadsheet?

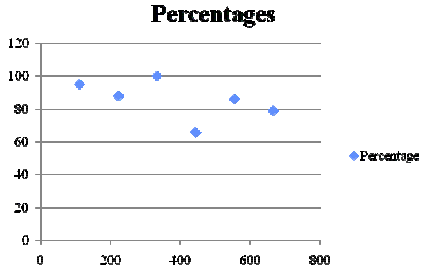
- Text?
- A graph or chart?
  - What type to use? (Pie, bar, line etc.)

The Benefits Of Using Text

- Text is the best representation to use when accuracy is paramount.
- Example term grades for individual students.

Student ID	Percentage
111	95
222	88
333	100
444	66
555	86
666	79

Vs.

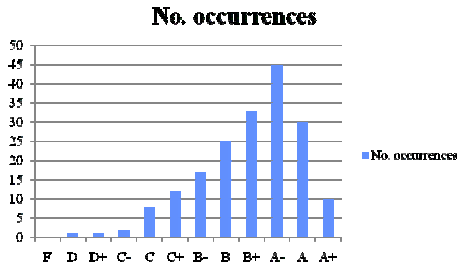


The Benefit Of Using A Graph

- Graphical representations can make a powerful impression!
- The focus is on overall rather than individual results.

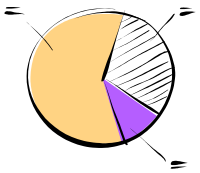
Letter	No. occurrences
F	0
D	1
D+	1
C-	2
C	8
C+	12
B-	17
B	25
B+	33
A-	45
A	30
A+	10

Vs.



Ways Of Graphically Representing Information

- Pie chart

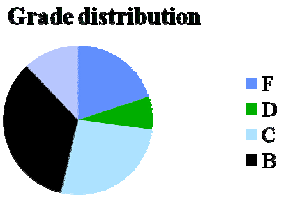


- Bar graph

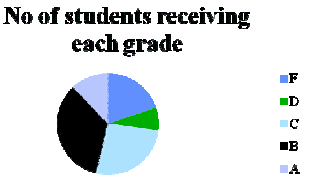
- Line graph

Pie Charts

•Good for showing proportions, how much of the whole does each item contribute.

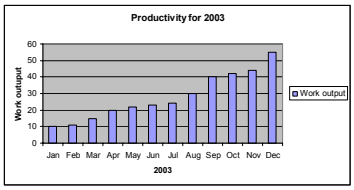


•It's poor for showing exact numeric values.

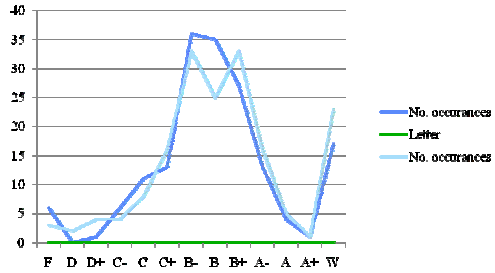


Bar And Line Graphs

•For showing trends

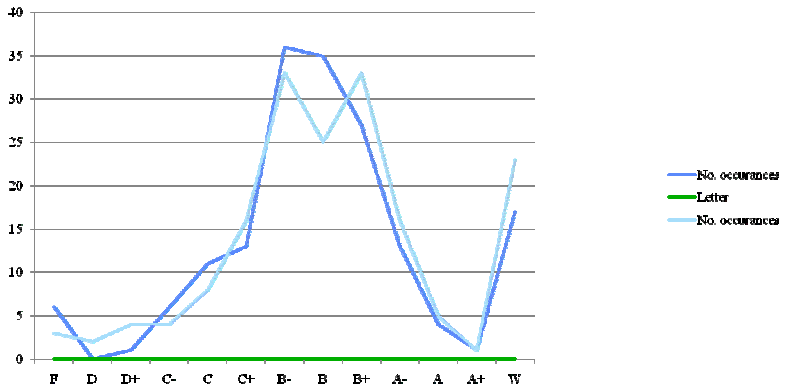


•Comparing functions



Rules Of Thumb For Graphs

1. The X axis is used to plot known data (e.g., letter grades), while the Y axis is used to plot the unknown data (e.g., the number of students who received particular letter grades).



Rules Of Thumb For Graphs (2)

2. Bar graphs are used to plot non-continuous data e.g., the number of patients that go to different hospitals.
3. Line graph are used to plot continuous data e.g., mortality trends over time.

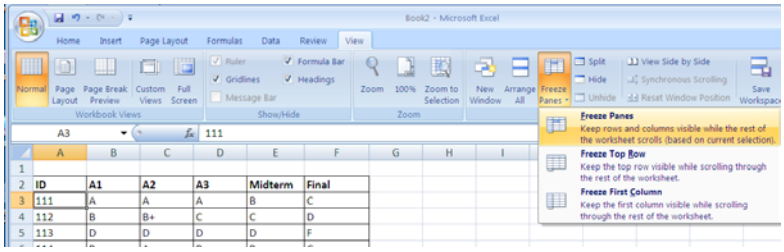
Viewing A Large Spreadsheet

- Quite often a spreadsheet will be larger than the visible area of the computer screen.
- This is problematic if there is information that must remain visible on screen at all times.

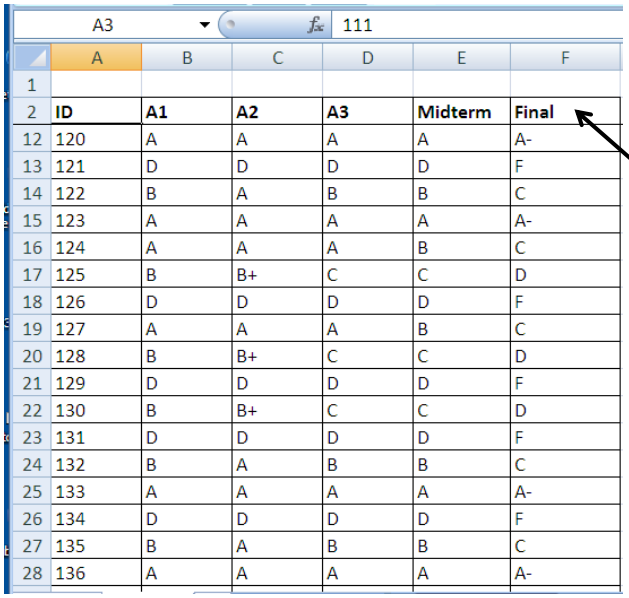
	A	B	C	D	E	F
1						
2	ID	A1	A2	A3	Midterm	Final
3	111	A	A	A	B	C
4	112	B	B+	C	C	D
5	113	D	D	D	D	F
6	114	B	A	B	B	C
7	115	A	A	A	A	A-
8	116	A	A	A	B	C
9	117	B	B+	C	C	D
10	118	D	D	D	D	F
11	119	B	A	B	B	C
12	120	A	A	A	A	A-
13	121	D	D	D	D	F
14	122	B	A	B	B	C
15	123	A	A	A	A	A-
16	124	A	A	A	B	C
17	125	B	B+	C	C	D
18	126	D	D	D	D	F
19	127	A	A	A	B	C
20	128	B	B+	C	C	D
21	129	D	D	D	D	F
22	130	B	B+	C	C	D

Viewing A Large Spreadsheet (2)

- Parts of the screen (top row, first column or any arbitrary row) can be 'frozen' so it remains visible as you scroll through the spreadsheet.



Viewing A Large Spreadsheet (3)



A3 | 111

	A	B	C	D	E	F
1						
2	**ID**	**A1**	**A2**	**A3**	**Midterm**	**Final**
12	120	A	A	A	A	A-
13	121	D	D	D	D	F
14	122	B	A	B	B	C
15	123	A	A	A	A	A-
16	124	A	A	A	B	C
17	125	B	B+	C	C	D
18	126	D	D	D	D	F
19	127	A	A	A	B	C
20	128	B	B+	C	C	D
21	129	D	D	D	D	F
22	130	B	B+	C	C	D
23	131	D	D	D	D	F
24	132	B	A	B	B	C
25	133	A	A	A	A	A-
26	134	D	D	D	D	F
27	135	B	A	B	B	C
28	136	A	A	A	A	A-

Column headings are always visible

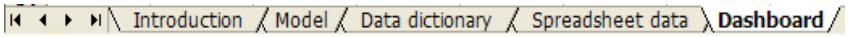
Laying Out Your Spreadsheet

- The all too common approach is to simply enter the data and calculations (perhaps with a few labels to act as titles).
- This may work if the spreadsheet is small and there is only one author.
- However in actual use this approach may be problematic e.g., new people accidentally introduces errors in the sheet because they're not fully aware of how the sheet was designed.

Sections Of A Well-Designed Spreadsheet[1]

1. Introduction: an overview of the spreadsheet
2. Model: describes the cells and parts of the sheets
3. Data dictionary: explains the calculations and provides the source of the data.
4. Spreadsheet data: the actual raw data and calculations that are based on the data.
5. Dashboard: a quick summary of the important data (often in visual form).

Each one of these sections will be a separate worksheet in Excel.



1 This is a modified version of the lecture notes produced by Jalal Kawash.

Section #1: Introduction

A. Title:
   - Make it informative
   - E.g., income statements for Company XYZ 2000 – 2010, analysis of the raw data from test participants in the study on the effects of aging on depth perception performed in 2008.

B. Description
   - What is the purpose of the sheet, how will the data be used.
   - If the sheet is used to make a decision then list the criteria being used.
   - E.g., buying a car then list the characteristics that are important.

C. Author
   - The name of the person who created or modified the spreadsheet.

D. Version/date
   - E.g., Version 1, 2, 3 or May 5, 2010

Section #1: Introduction (2)

E. Table of references

- List sources for formulas used, sources used to drive/justify the design.
- Example format of how to cite your sources: http://pages.cpsc.ucalgary.ca/~tamj/references.html

Section #2: Model

•Explain the rationale used in calculations

- E.g., buying a car state the weightings used for each criteria (color * 10 points, acceleration * 50 points, sound system quality * 5 points).
- E.g., calculating grades state the breakdown for course components.

Component	Weighting
First assignment	10%
Second assignment	10
Third assignment	10
Midterm I	20
Midterm II	20
Final exam	30
Total term grade	100%

•Explain the meaning of complex formulas

- e.g., $t = r / \sqrt{((1 - r^2) / (n - 2))}$
- This is the coefficient of correlation which is used to determine the amount of linear association within a sample of bivariate data.[1]

•(If applicable) list the sources of the formulas.

- E.g., $E = mc^2$ (Albert Einstein)

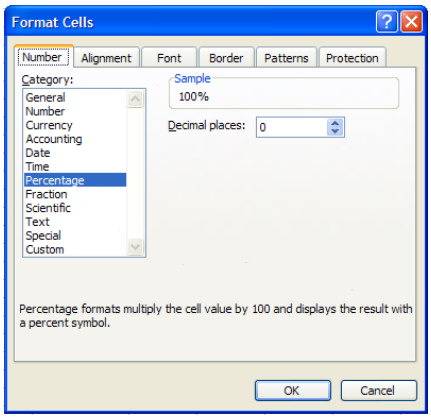
1 "*Introduction to Business Statistics*" by Kvanli, Guynes, Pavur

Section #3: Data Dictionary

- Source of the data
  - Raw data e.g., time in seconds for 0 – 60 mph acceleration rates, yearly crime rates of communities within a city.
  - Row calculation: formula generated by using data along a row.
  - Column calculation: formula generated by using data along a column.
  - Mixed calculation: includes data along rows and columns.
  - Label: text descriptions such as headings.
  - Location in the spreadsheet: the cell coordinates or cell ranges.

Section #3: Data Dictionary (2)

- Type of the data
  - The type of information stored e.g., number, currency, date, time etc.



An Example Data Dictionary

•Calculating scores of different US states around Ottawa.

Item	Data source	Data type	Cell/range reference
State	Label	Number	A2:A16
Average temperatures	Raw data	Number	B2:B16
Crime rate	Raw data	Number	C2:C16
Time to Ottawa	Raw data	Number	D2:D16
Score	Row calculation	Number	E2:E16
Weights	Raw data	Percentage	B20:B22

Section #4: Spreadsheet Data

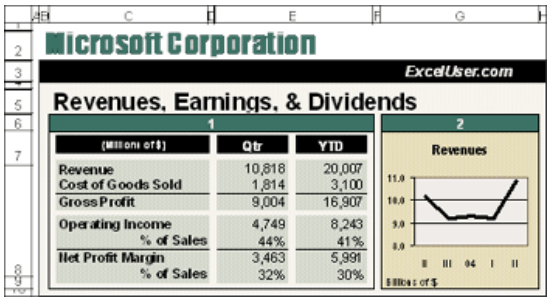
•This is the actual spreadsheet.

•It includes raw data and data that was generated from a calculation.

	A	B	C	D	E	F	G	H	I	J
1	ID	A1	A2	A3	A4	A5	A6	Midterm I	Midterm II	Final exam
2	111	4	3.3	3.7	1.7	2.7	3.3	3.3	0.7	2.7
3	112	3.7		4	2	4.3	4	3.3	3.3	4
4	113	4	4	4	4.3	4.3	3.7	3.7	4	3.3
5	114	4	4	3.7	4		4.3	0	1.3	2.7
6	115	3	3.3	3.7	2	1.7	3	1.7		1
7	116	2	0	2				1.7	0	
8	117	3	2	3.7	0.7	0.7	1.3	2.3	1	2
9	118	3.7	3.7	4				2		
10	119	4	4	3.7	2.7	2.3	3	2	1	2.7
11	120		2.3	3.3	3.7	3.7	3.7	2.7	3	3.7
12	121	3.7	2	2.7	4	2.7		3	0	

Section #5: Dashboard

- Presents summarizing data (often in visual form).
- Example: Comparison of one company's financial performance vs. the performance of it's key competitors.



Microsoft Corporation

ExcelUser.com

Revenues, Earnings, & Dividends

(Millions of $)	Qtr	YTD
Revenue	10,818	20,007
Cost of Goods Sold	1,814	3,100
Gross Profit	9,004	16,907
Operating Income	4,749	8,243
% of Sales	44%	41%
Net Profit Margin	3,463	5,991
% of Sales	32%	30%

From http://office.microsoft.com/en-ca/excel/HA012261271033.aspx

Section #5: Dashboard (2)

- Example: Comparing similar information about seven different companies.

From http://office.microsoft.com/en-ca/excel/HA012261271033.aspx

Section #5: Dashboard (3)

- Besides the charts and summaries you should also include some analysis and explanation of what the charts and graphs mean.
- Also as you build your dashboard keep in mind the design principles: color, contrast, consistency and the guidelines for representing information (e.g., text vs. graphics) covered earlier in this section.

You Should Now Know

- How electronic spreadsheets evolved out of a paper version
- Simple principles of graphic design applied to spreadsheets
- The difference between absolute and relative cell references
- The difference between a spreadsheet and a worksheet, when to employ multiple spreadsheets vs. multiple worksheets
- Good design principles for spreadsheets
- Guidelines for determining what representation to employ in a spreadsheet
- How and why to freeze different parts of a spreadsheet view
- What are the 5 sections of a well-designed spreadsheet and how to create these sections (and subsections) in an actual spreadsheet