

COMP1022Q
Introduction to Computing with Excel VBA

Starting to Use Excel

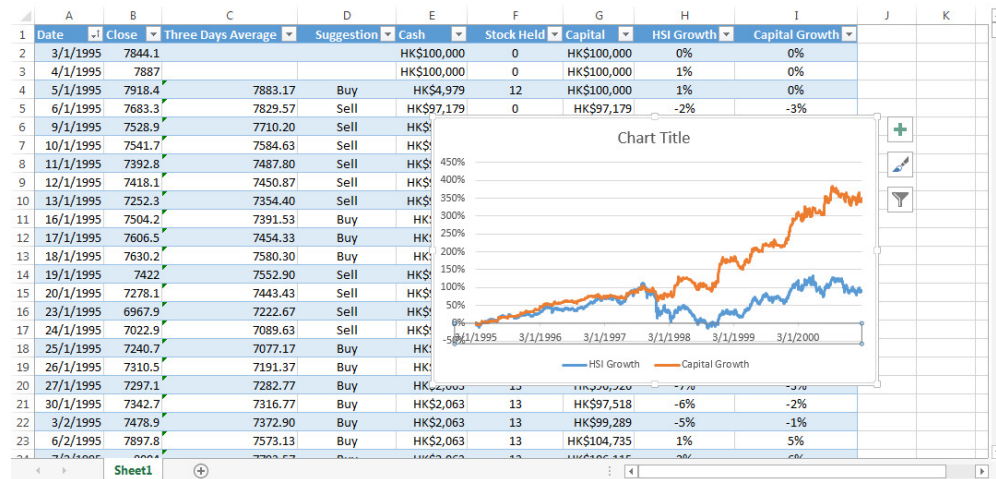
David Rossiter

Outcomes

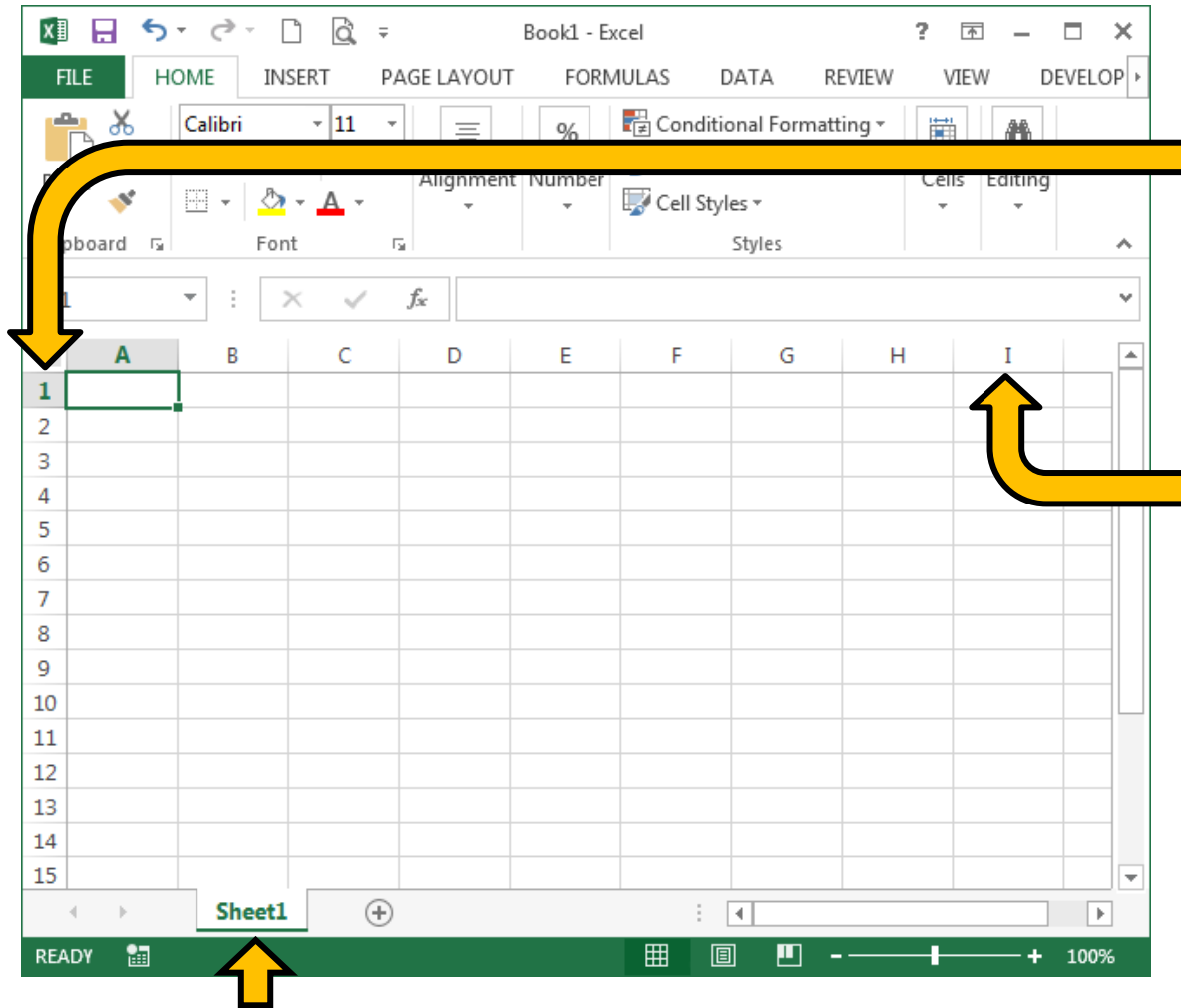
- After completing this presentation, you are expected to be able to:
 1. Understand the basics of Excel, i.e. worksheets, cells and formulas
 2. Apply different ways of referring to cells in formulas, i.e. relative and absolute cell references, and cell labels
 3. Understand the basics of Excel charts

Excel Basics

- You have probably used Excel before
- Even so, we will start from the basics
- Excel is all about numbers and formulas, and displaying the numbers and the results of the formulas in charts (usually)
- All numbers and formulas go into cells in a worksheet



- Cells in an Excel worksheet are arranged in rows and columns



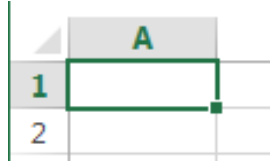
Rows are referred to using numbers, from 1 onwards

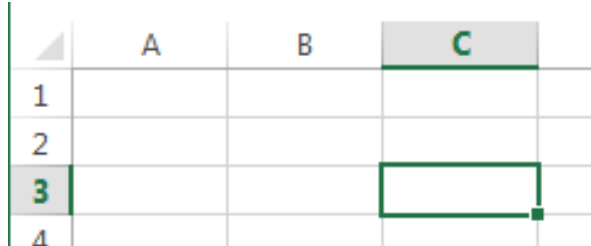
Columns are referred to using letters A ... Z, then AA ... ZZ and so on

At the start, Excel gives you 1 empty worksheet to play with

Getting Cells in a Worksheet

- So each cell is on a particular row and a particular column
- The combination of the column letter and the row number is called *cell address*, or *cell reference*
- For example,

– this cell  is cell A1, and

– this cell  is cell C3

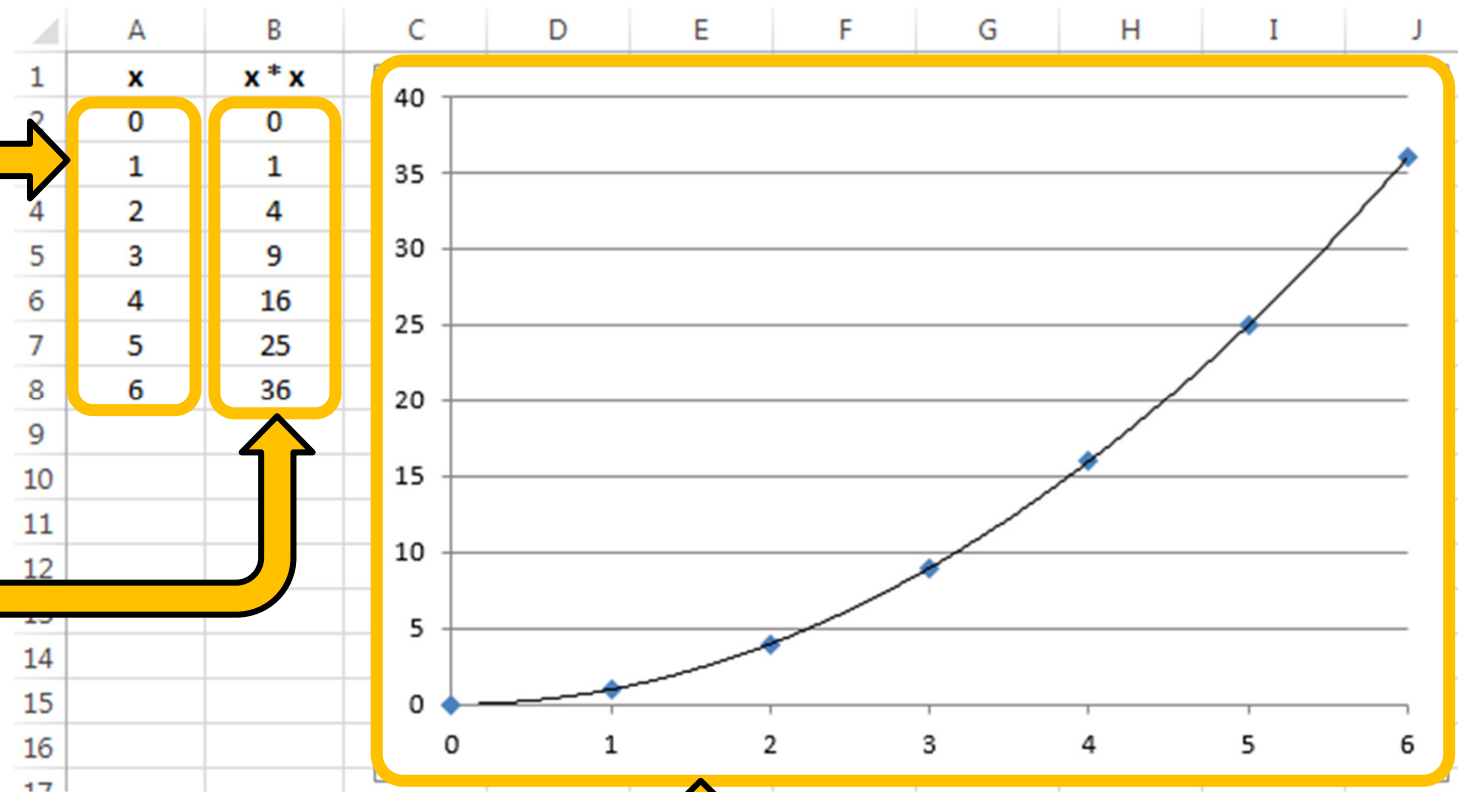
Most Common Steps

- This particular example produces a simple quadratic graph

First, enter some data

Second, add formulas:

`=A2*A2`
`=A3*A3`
`=A4*A4`
`=A5*A5`
`=A6*A6`
`=A7*A7`
`=A8*A8`



- *A formula must start with '='*
- *'*' means multiplication*

Third, add graph(s)

Copying and Pasting Formulas

- In the previous example, you need to type every one of those formulas:

`=A2*A2`
`=A3*A3`
`=A4*A4`
`=A5*A5`
`=A6*A6`
`=A7*A7`
`=A8*A8`



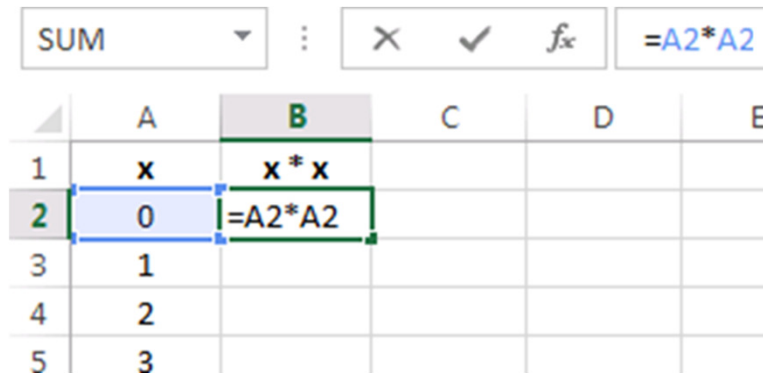
*Type the formulas
'x * x' for each cell
in column B*

	A	B	C	D
1	x	x * x		
2	0	0	40	
3	1	1	35	
4	2	4		
5	3	9	30	
6	4	16	25	
7	5	25		
8	6	36	20	
9				

- Instead of typing, Excel allows you to use copy and paste to quickly add similar formulas to your cells, which is shown on the next slide

Copying and Pasting Formulas

- First, you simply enter the formula in the first cell, and press Enter:



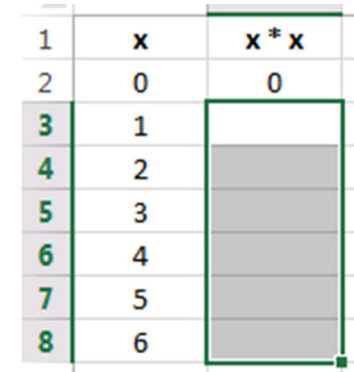
The image shows the Excel formula bar with the formula `=A2*A2` entered. Below it, a spreadsheet shows column A with values 1, 2, 3, 4, 5 and column B with the formula `x * x` in row 1 and `=A2*A2` in row 2. Cell B2 is highlighted with a green border.

	A	B	C	D	E
1	x	x * x			
2	0	=A2*A2			
3	1				
4	2				
5	3				

- Then select the cell and copy it

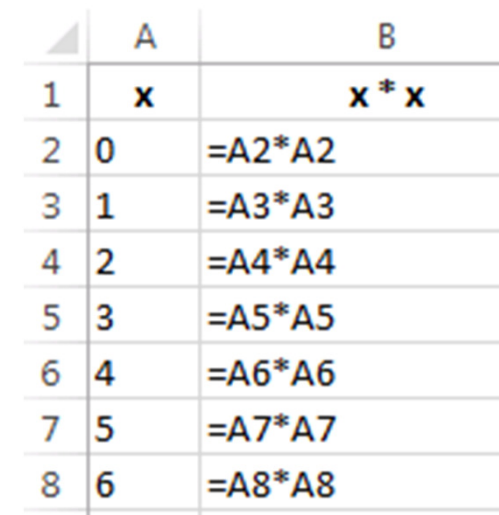


- Select the other cells where you want the formula to go
- Then select paste
- The formulas are copied to the cells, and automatically altered by Excel



The image shows a spreadsheet with column A containing values 1 through 8 and column B containing the formula `x * x` in row 1 and `0` in row 2. Rows 3 through 8 are highlighted with a green border, indicating they are selected for pasting.

1	x	x * x
2	0	0
3	1	
4	2	
5	3	
6	4	
7	5	
8	6	

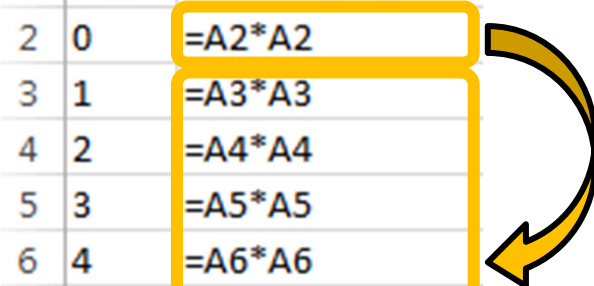


The image shows the final result of the paste operation. The formula `=A2*A2` has been copied to all selected cells in column B, and the values are automatically adjusted to match the corresponding values in column A.

	A	B
1	x	x * x
2	0	=A2*A2
3	1	=A3*A3
4	2	=A4*A4
5	3	=A5*A5
6	4	=A6*A6
7	5	=A7*A7
8	6	=A8*A8

Referencing Cells

- The type of cell reference we have seen so far is called 'relative referencing' i.e. A8
- When you use relative referencing you get an 'automatic change when pasting' behaviour
- However, sometimes you don't want the formulas to be automatically changed



	A	B
1	x	x * x
2	0	=A2*A2
3	1	=A3*A3
4	2	=A4*A4
5	3	=A5*A5
6	4	=A6*A6
7	5	=A7*A7
8	6	=A8*A8

The cell A2 is automatically changed to A3, A4,... when the formula in B2 is copied and pasted

Referencing Cells Example

- In our next example, we will look at problems with automatic change of formulas when copying and pasting
- This is our intended result:

	A	B	C	D	E	F	G	H	I
1									
2		IQ	Difference to Average HK IQ	Average HK IQ	107				
3	Julia	110	3	(From http://en.wikipedia.org/wiki/IQ_and_the_Wealth_of_Nations)					
4	Chan	57	-50						
5	Li	90	-17						
6	Kwong	120	13						
7	Richard	133	26						
8	Angel	108	1						
9	Fong	88	-19						

Problems with Automatic Change

- In the example we want to know how different the intelligence (IQ) is of some people compared to the average HK people
- In the third column, for the first person, we could enter the formula: $=B3-F2$

AVERAGE		×	✓	f_x	$=B3-F2$				
	A	B	C	D	E	F	G	H	I
1									
2		IQ	Difference to Average HK IQ		Average HK IQ	107			
3	Julia	110	$=B3-F2$		(From http://en.wikipedia.org/wiki/IQ_and_the_Wealth_of_Nations)				
4	Chan	57							
5	Li	90							
6	Kwong	120							
7	Richard	133							
8	Angel	108							
9	Fong	88							

- The result for the first person is correctly shown:

		IQ	Difference to Average HK IQ
2			
3	Julia	110	3
4	Chan	57	
5	Li	90	
6	Kwong	120	

Problems with Automatic Change

- But if we copy and paste that formula into the cells underneath it, we get nonsense results!

These values are all wrong

2		IQ	Difference to Average HK IQ
3	Julia	110	3
4	Chan	57	57
5	Li	90	90
6	Kwong	120	120
7	Richard	133	133
8	Angel	108	108
9	Fong	88	88



- Press Ctrl and ` when you want to see/ hide all the formulas (next slide)

2		IQ	Difference to Average HK IQ
3	Julia	110	=B3-F2
4	Chan	57	=B4-F3
5	Li	90	=B5-F4
6	Kwong	120	=B6-F5
7	Richard	133	=B7-F6
8	Angel	108	=B8-F7
9	Fong	88	=B9-F8



- You can see that the reference to cell F2 was automatically changed by Excel – but in this situation we don't want it to be changed...!

How to do Ctrl `

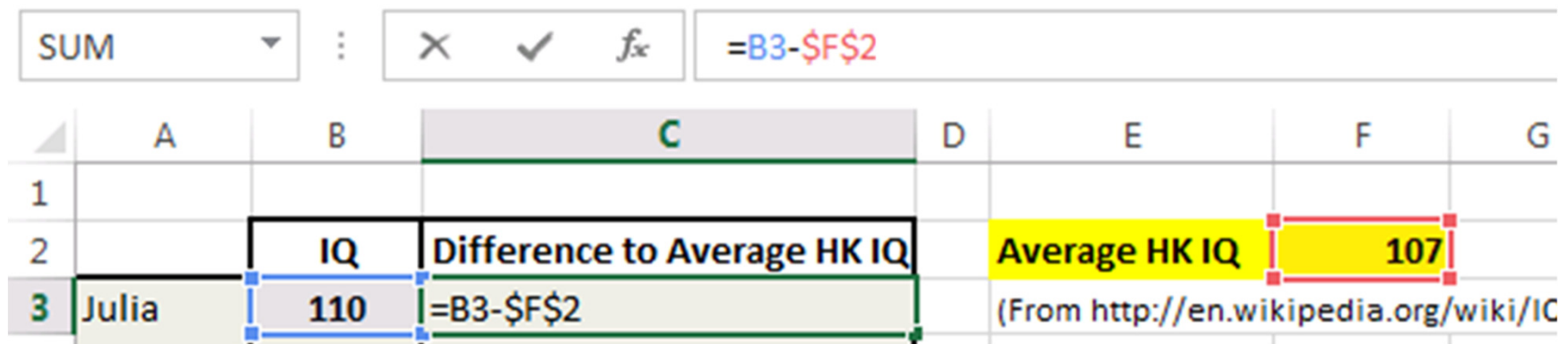
- To show/hide all the formulas in a worksheet:
 - Hold down the Ctrl key
 - While the Ctrl button is being held down, press the ` key



Absolute Referencing of Cells

- Whenever you want the reference to a cell to be fixed, you use '\$'
- Here is an example:

Using \$F\$2 instead of F2



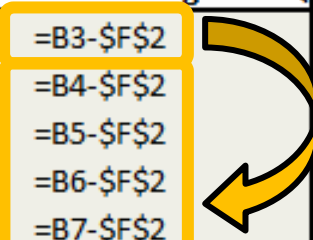
	A	B	C	D	E	F	G
1							
2		IQ	Difference to Average HK IQ		Average HK IQ	107	
3	Julia	110	=B3-\$F\$2		(From http://en.wikipedia.org/wiki/IC		

- Now when the cell is copied and pasted, the reference to cell F2 does not get changed by Excel, as shown on the next slide

Absolute Referencing of Cells

- The formula in row 3 is copied and pasted to row 4 and row 9 in the same column
- You can see the second part of the formula hasn't been changed
- Referring to cells in this way is called 'absolute referencing'

2		IQ	Difference to Average HK IQ
3	Julia	110	=B3-\$F\$2
4	Chan	57	=B4-\$F\$2
5	Li	90	=B5-\$F\$2
6	Kwong	120	=B6-\$F\$2
7	Richard	133	=B7-\$F\$2
8	Angel	108	=B8-\$F\$2
9	Fong	88	=B9-\$F\$2



2		IQ	Difference to Average HK IQ
3	Julia	110	3
4	Chan	57	-50
5	Li	90	-17
6	Kwong	120	13
7	Richard	133	26
8	Angel	108	1
9	Fong	88	-19

Writing References to Cells

- When you write an Excel formula which contains a reference to a cell, you should choose the appropriate way to write it. You can choose from:
 - Fixing both column and row i.e. \$D\$6
 - Fixing only the column i.e. \$D6
 - Fixing only the row i.e. D\$6
 - Not fixing anything i.e. D6
- Remember - the differences are important when you copy and paste the cell

Ways to Enter Formulas – Method 1

- Previously you learnt you can copy formulas into lots of cells quickly by copying and pasting of a formula from one cell to the others

The diagram illustrates the process of copying a formula from one cell to multiple cells in a spreadsheet. It consists of three sequential tables connected by yellow arrows.

Step 1: Writing a formula in one cell

	IQ	Difference to Average HK IQ
Julia	110	=B3-\$F\$2
Chan	57	
Li	90	
Kwong	120	
Richard	133	
Angel	108	
Fong	88	

Step 2: Copying the formula from that cell

	IQ	Difference to Average HK IQ
Julia	110	3
Chan	57	
Li	90	
Kwong	120	
Richard	133	
Angel	108	
Fong	88	

Step 3: Selecting all other cells, pasting the formula

	IQ	Difference to Average HK IQ
Julia	110	3
Chan	57	-50
Li	90	-17
Kwong	120	13
Richard	133	26
Angel	108	1
Fong	88	-19

*Writing a formula
in one cell*


*Copying the formula
from that cell
i.e. right click > Copy*

*Selecting all other cells,
pasting the formula
i.e. right click > Paste*

- This method works fine but we will show two alternative methods which are even quicker

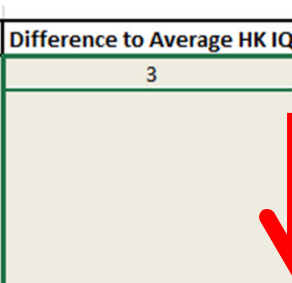
Method 2 – Quicker Way

1. Select the cell you want to copy
2. Click on the small square in the bottom right corner of the cell without letting go of the mouse button
3. Drag downwards to select all the cells you want to copy the formula to
4. Let go of the mouse button




	IQ	Difference to Average HK IQ
Julia	110	3
Chan	57	
Li	90	
Kwong	120	
Richard	133	
Angel	108	
Fong	88	

A small square handle is visible in the bottom-right corner of the first cell in the 'Difference to Average HK IQ' column.



	IQ	Difference to Average HK IQ
Julia	110	3
Chan	57	
Li	90	
Kwong	120	
Richard	133	
Angel	108	
Fong	88	


*Drag
down*



	IQ	Difference to Average HK IQ
Julia	110	3
Chan	57	-50
Li	90	-17
Kwong	120	13
Richard	133	26
Angel	108	1
Fong	88	-19

Method 3 – Super Quick Way


1. Select the cell you want to copy
2. Double-click on the small square in the bottom right corner of the cell



	IQ	Difference to Average HK IQ
Julia	110	3
Chan	57	
Li	90	
Kwong	120	
Richard	133	
Angel	108	
Fong	88	

Double-click the mouse button

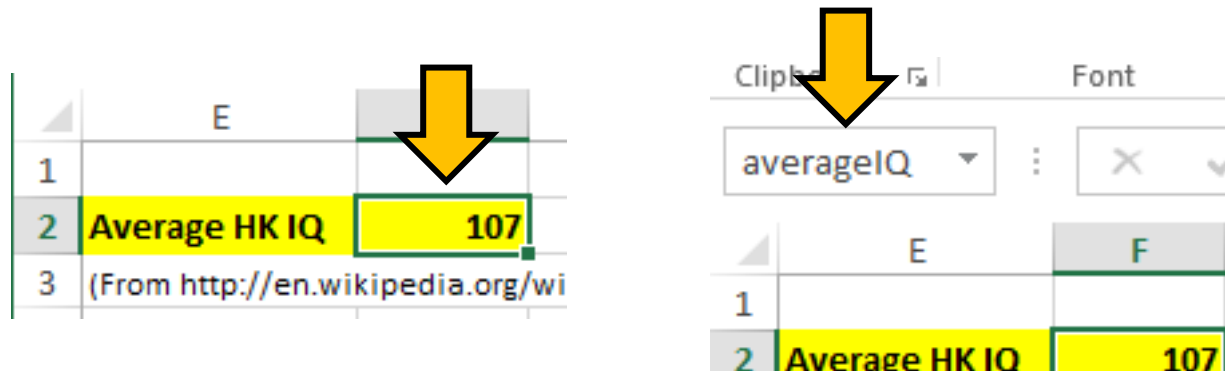
- This method copies the formula to the cells underneath which have a cell to the left which is not empty



	IQ	Difference to Average HK IQ
Julia	110	3
Chan	57	-50
Li	90	-17
Kwong	120	13
Richard	133	26
Angel	108	1
Fong	88	-19

Labeling Cells

- We can make any cell easier to reference by using a label
- To do that, you click on the cell and then enter a label for the cell in the *name box*



- From now onwards that cell can be referred to by using the label, without the need to type the location i.e. \$F\$2

Using a Cell Label

- For example, now you can enter this:

`=B3-averagelQ`

- Then copy and paste like before:

2		IQ	Difference to Average HK IQ
3	Julia	110	=B3-averagelQ
4	Chan	57	=B4-averagelQ
5	Li	90	=B5-averagelQ
6	Kwong	120	=B6-averagelQ
7	Richard	133	=B7-averagelQ
8	Angel	108	=B8-averagelQ
9	Fong	88	=B9-averagelQ



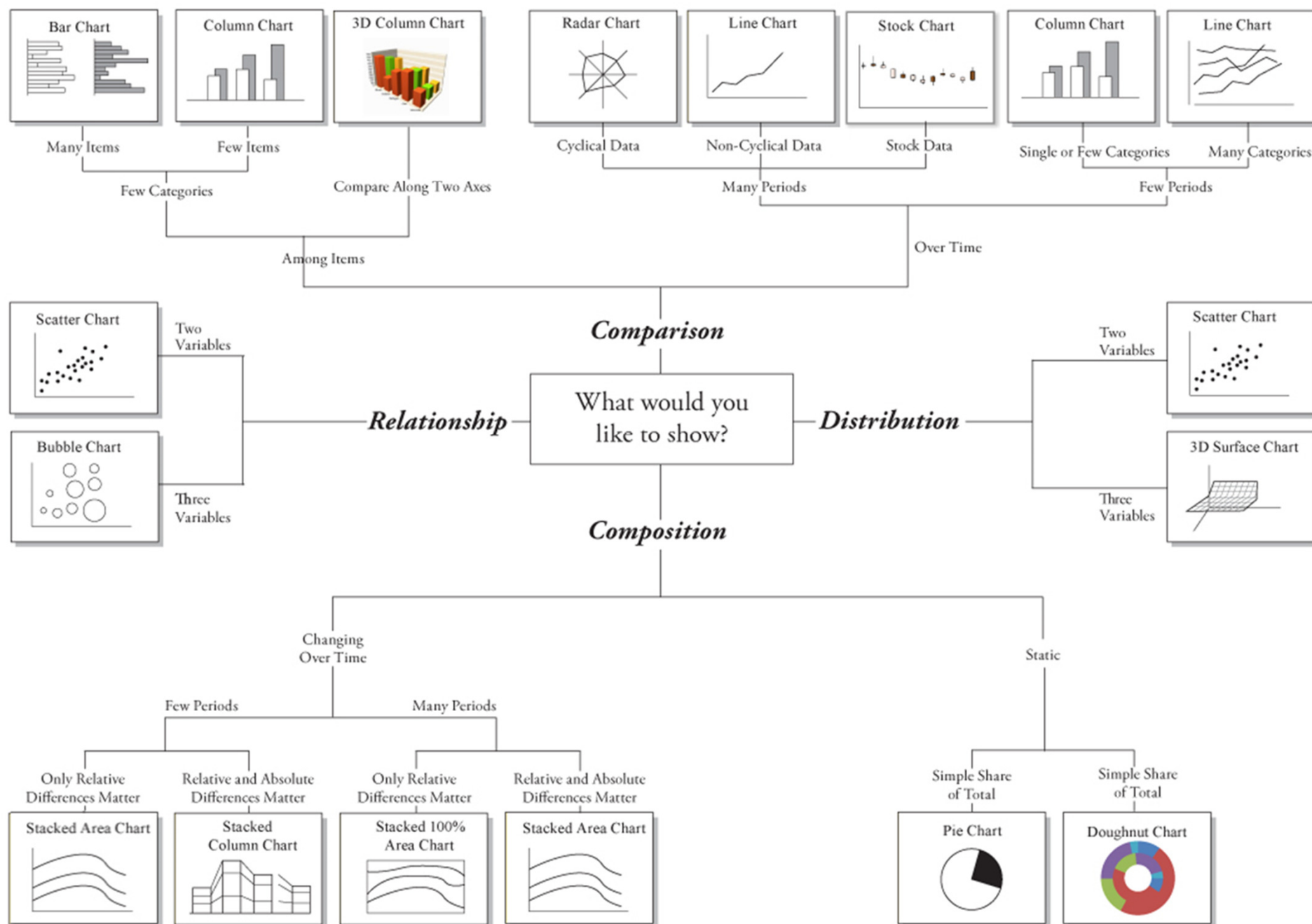
2		IQ	Difference to Average HK IQ
3	Julia	110	3
4	Chan	57	-50
5	Li	90	-17
6	Kwong	120	13
7	Richard	133	26
8	Angel	108	1
9	Fong	88	-19

- The formulas are now much easier to read

Making an Appropriate Chart

- Let's assume you have finished preparing the data
- Usually you want to display it in a chart
- Excel has lots of different types of charts
- The best chart to use depends on the type of data, how much there is, and what aspect you want to show
- For example, you might want to show relative differences or absolute values, or both at the same time
- A guide is shown on the next slide
- Lots of actual examples are given on the course web site

Examples of Excel Charts



Example 1 Three Sets of Data Across Time

- The data you need to display:

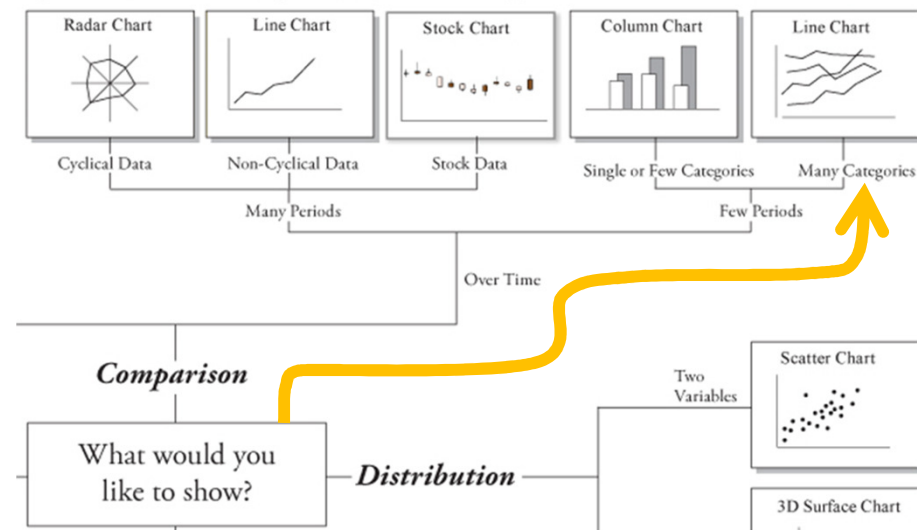
Month	Domestic	Commerical	Industrial
January	1,487	1,021	80
February	1,569	1,037	82
March	1,507	927	71
April	1,537	988	76
May	1,409	937	76
June	1,283	942	77
July	1,089	890	73
August	1,047	926	79
September	978	914	78
October	951	890	72
November	1,135	976	78
December	1,280	941	75

- This data is comprised of three sets of data across time
- We want to show the values of the three data across time

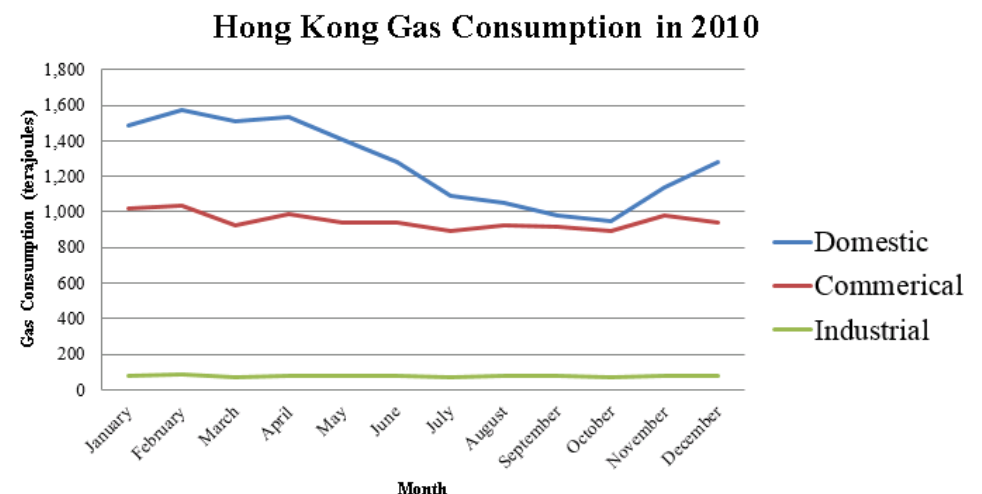
- You can use the guide to get an idea of an appropriate chart:

Examples of Excel Charts

Example box to see an example Excel file of that type



- A chart which displays the data effectively:

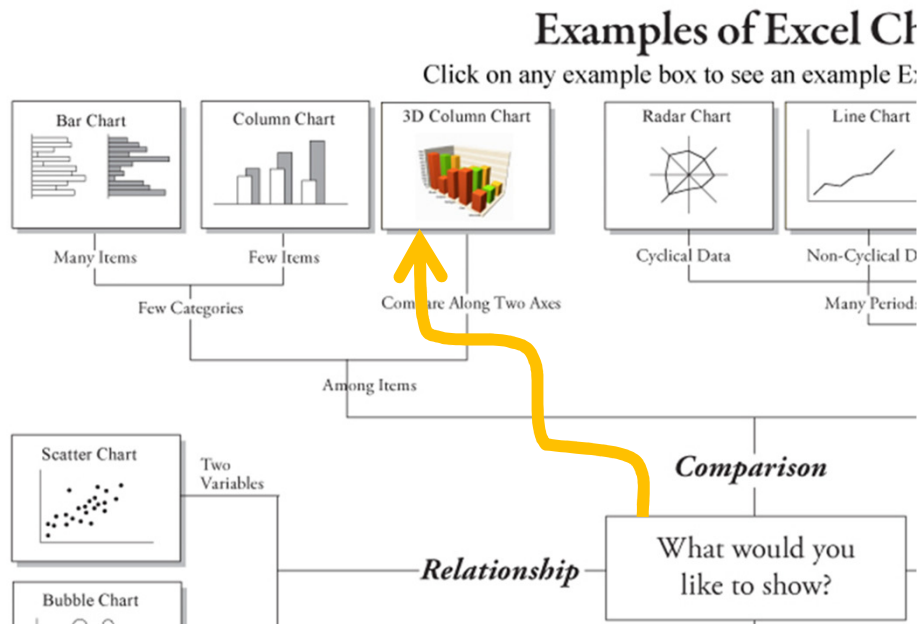


Example 2 Three Sets of Data across Values in a Category

- The data you need to display:

Age	No schooling	Secondary School	Post-Secondary
15 - 24	1,903	619,619	278,077
25 - 34	6,779	572,208	434,956
35 - 44	15,830	774,197	341,496
45 - 54	38,473	645,033	179,543
55 - 64	54,761	287,893	71,432
65+	305,564	156,826	55,969

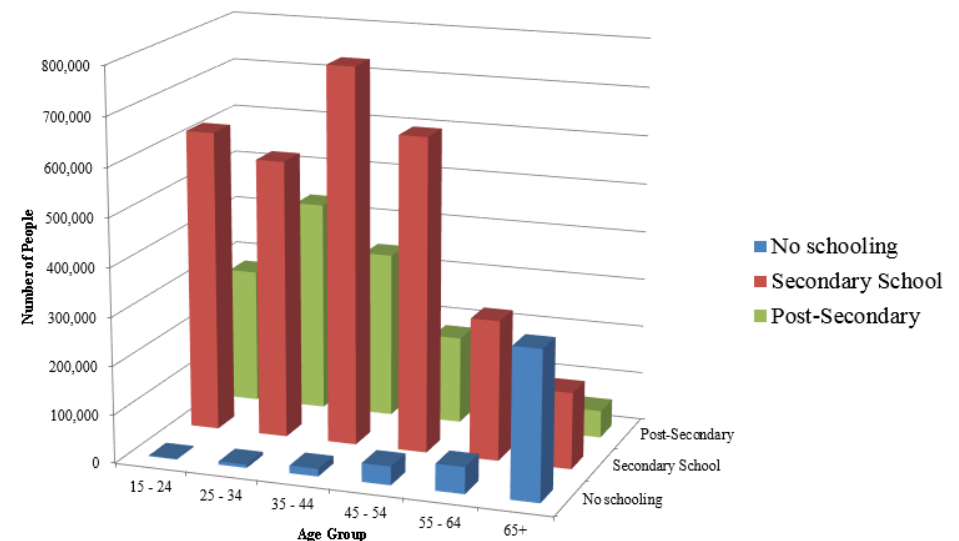
- You can use the guide to get an idea of an appropriate chart:



- This data is comprised of three sets of data across values in a category
- We want to show the values of the three data, but using a line may not be so good for this data (not much data)

- A chart which displays the data effectively:

Hong Kong Resident Educational Attainment in 2006

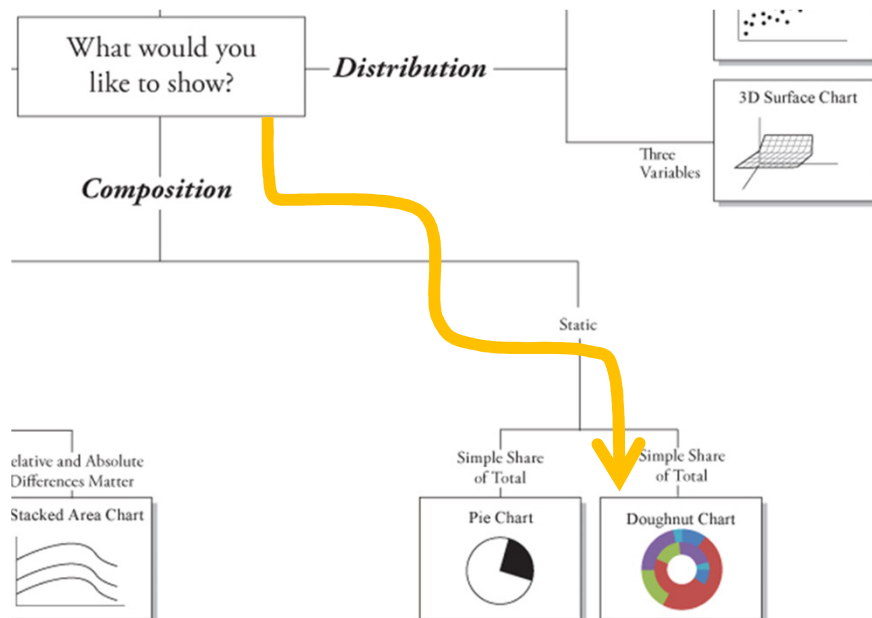


Example 3 Two Sets of Data Across Values in a Category

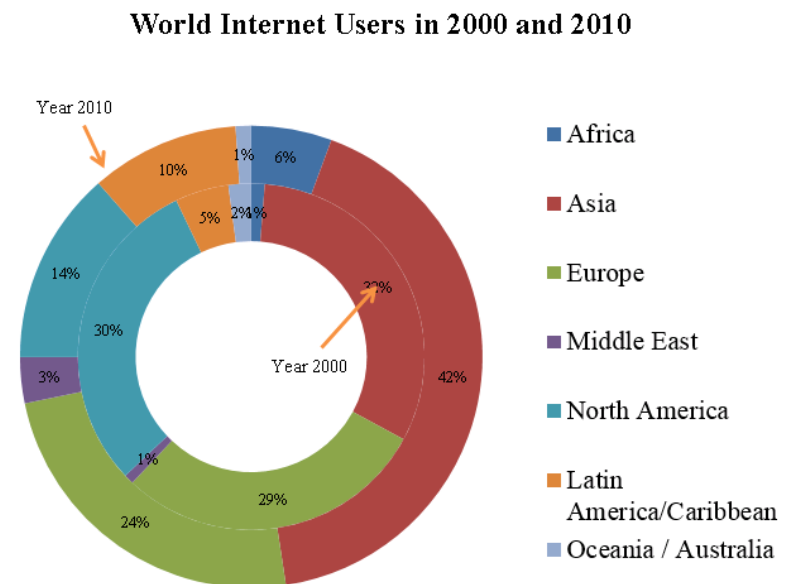
- The data you need to display:

World Regions	2000	2010
Africa	4,514,400	110,931,700
Asia	114,304,000	825,094,396
Europe	105,096,093	475,069,448
Middle East	3,284,800	63,240,946
North America	108,096,800	266,224,500
Latin America/Caribbean	18,068,919	204,689,836
Oceania / Australia	7,620,480	21,263,990

- You can use the guide to get an idea of an appropriate chart:



- This data is comprised of two sets of data across values in a category
- We want to show the *change in composition* between the two sets (not the absolute values)
 - A chart which displays the data effectively:

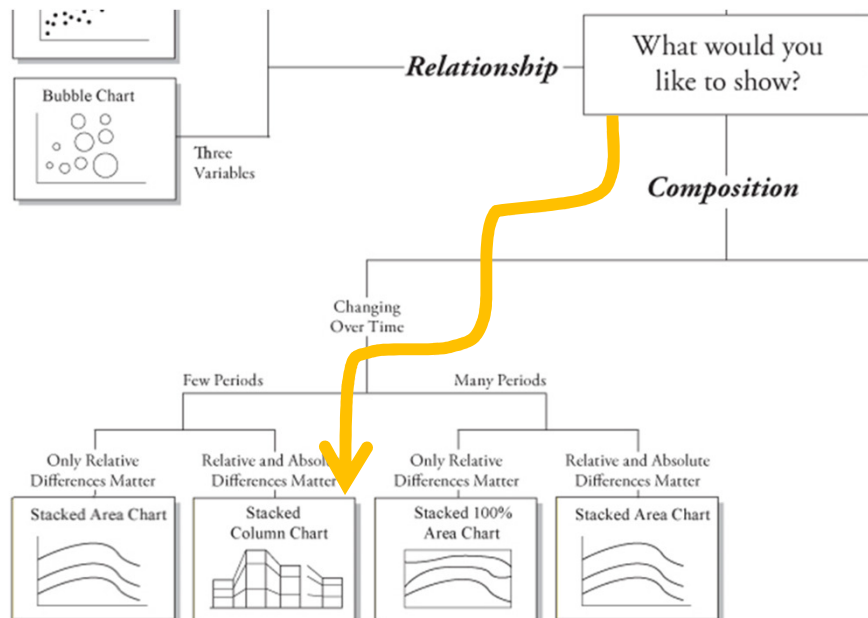


Example 4 Nine Sets of Data Across Values in a Category

- The data you need to display:

Cause of Death	2001	2002	2003	2004	2005	2006	2007	2008	2009
Malignant neoplasms	11,406	11,658	11,510	11,791	12,310	12,093	12,316	12,456	12,839
Diseases of heart	4,703	4,969	5,311	5,866	5,868	5,619	6,372	6,777	6,414
Pneumonia	3,026	3,194	3,877	3,676	4,291	4,201	4,978	5,486	5,312
Cerebrovascular diseases	3,130	3,218	3,462	3,416	3,434	3,302	3,513	3,691	3,443
External causes of morbidity and mortality	1,844	2,068	2,044	2,243	2,150	1,961	1,854	1,766	1,938
Chronic lower respiratory diseases	2,114	2,075	2,102	2,123	2,261	1,924	2,096	2,103	1,912
Nephritis, nephrotic syndrome and nephrosis	1,053	1,055	1,184	1,182	1,261	1,287	1,347	1,419	1,448
Septicaemia	424	467	572	615	701	676	737	797	736
Dementia	252	289	256	276	283	288	317	495	638
Diabetes mellitus	676	574	783	728	602	511	506	548	492
All other causes	4,677	4,749	5,322	5,405	5,522	5,553	5,927	5,992	5,875
All causes	33,305	34,316	36,423	37,321	38,683	37,415	39,963	41,530	41,047

- You can use the guide to get an idea of an appropriate chart:



- This data is comprised of nine sets of data across values in a category
- We want to show the relative values as well as the absolute values

- A chart which displays the data effectively:

