

CHAPTER 1

# SPREADSHEETS

**INFocus**

WPL\_E880

Spreadsheets have become a very common and popular application on personal computers. One reason for this is the variety of tasks that they can be used for. Another reason is that they are relatively easy to use.

**In this session you will:**

- ✓ gain an understanding of spreadsheets and how they work
- ✓ gain an understanding of the size and capacity of a spreadsheet
- ✓ gain an understanding of three functions of a spreadsheet - calculations, graphs, and lists
- ✓ gain an understanding of what spreadsheets can be used for and what is inappropriate.

# UNDERSTANDING HOW SPREADSHEETS WORK

Word processing packages are designed to process words – they let you write letters, compose faxes, prepare reports, write books, and much more. **Spreadsheet** packages on the other

hand, are designed to process numbers. While word processing applications are perfect for creating documents, spreadsheets are ideal for budgets, statistics, sales analyses, and the like.

## What Is A Spreadsheet?

According to the *Oxford Dictionary of Computing* a spreadsheet is...

*“A program that manipulates tables consisting of rows and columns of cells, and displays them on a screen; the cells contain numerical information and formulas, or text... The value in a numerical cell is either typed in or is calculated from a formula in the cell; this formula can involve other cells. Each time the value of a cell is changed by typing in a new value from the keyboard, the value of all other cells whose values depend on this one are recalculated.”*

Employee	Hourly Rate	Hours	Gross Pay
Adams Margaret	15.50	24.0	\$372.00
Brown John	16.75	16.2	\$271.35
Francis Grace	12.50	12.0	\$150.00
Simpson Stephen	9.65	18.0	\$173.70
Total		70.2	\$967.05
Average		17.6	\$241.76
Maximum		24.0	\$372.00
Minimum		12.0	\$150.00

- 1 **Numerical Information:** Hourly Rate and Hours worked are typed into the cells so that they can be used to calculate Gross Pay.
- 2 **Formulas:** Use the information in Hourly Rate and Hours worked to calculate Gross Pay and other statistical information.
- 3 **Text:** Text is typed into the cells and is normally used as labels. Here text is typed to identify the employees, the column headings and also the types of statistical calculations.

The screen above shows a spreadsheet application being used to calculate weekly pay for four employees. Spreadsheet applications are laid out as tables comprising **rows** and **columns** – notice how the columns have alphabetical headings and the rows are numbered (down the side) numerically. The intersection of a column and a row is known as a **cell**. Your data, comprised of text (referred to as **labels**), numbers (referred to as **values**), or **formulas** is typed into these cells.

In the example above, the gross pays, total, average, maximum, and minimum figures are formulas which are dependent upon what is typed into *Hourly Rate* and *Hours*. Each time a value in *Hourly Rate* or *Hours* is changed all of the formulas that are dependent on that value are recalculated – instantly. In the screen below the Hours worked by Margaret Adams have changed from 24 to 33, and the Hourly Rate for Grace Francis has increased from \$12.50 to \$13.75 – notice how the relevant Gross Pay information and statistics have changed...

Employee	Hourly Rate	Hours	Gross Pay
Adams Margaret	15.50	33.0	\$511.50
Brown John	16.75	16.2	\$271.35
Francis Grace	13.75	12.0	\$165.00
Simpson Stephen	9.65	18.0	\$173.70
Total		79.2	\$1,121.55
Average		19.8	\$280.39
Maximum		33.0	\$511.50
Minimum		12.0	\$165.00

- 1 Changes in the Hourly Rate and Hours cells...
- 2 ...cause the formulas in these cells to instantly recalculate and reflect any changes.

# UNDERSTANDING SPREADSHEET CHARACTERISTICS

Spreadsheets actually became popular in the late 1970s and are ideally suited to personal computers. They have evolved steadily over the years and now include features and facilities that

allow them to be used for more tasks than they were originally designed for. Their theoretical capacity for data is simply mind blowing!

## History of Spreadsheets

Spreadsheets were developed with a specific use in mind. One of the earliest spreadsheet programs was developed in the mid-70s by Dan Bricklin, an MBA student at Harvard Business School.

Dan found that he had to create a number of complex business models that required tables of numbers that had to be constantly added and averaged. These numbers were written up on large sheets of paper with grand totals and averages at the bottom. He was required to enter new numbers and recalculate the bottom line to come up with a variety of business models. Dan got a bit tired of doing this on his calculator. So he developed an electronic version of a large sheet of paper that was ruled into columns and rows, and that could perform calculations. Spurred on by his friends he refined this product and marketed it as *VisiCalc*. Accountants and other people who had to prepare tables of numbers loved it.

In the 1980s VisiCalc was overtaken by another product, *Lotus 1-2-3*. This product added more functionality to the spreadsheet concept, allowing the user to draw graphs based on the numbers and to perform some elementary sorting and querying of the data just like a database package.

Since the advent of Windows 3.0 in June 1990, *Microsoft Excel* has become the predominant spreadsheet product – although IBM, who owns Lotus 1-2-3, might argue the toss on this one!

## The Anatomy of a Spreadsheet

Spreadsheets, such as Microsoft Excel, are just like electronic sheets of paper that have been ruled up into tables comprising of columns and rows. In Microsoft Excel the screen is referred to as a **worksheet** and it is actually made up of 16,384 **columns** across the screen, and 1,048,576 **rows** down the screen. If you hold a ruler up to the screen each column measures about 2.1 cm in width and about 0.5 cm deep. Performing some basic maths, 16,384 columns and 1,048,576 rows would give you a piece of paper about 344 metres wide and 524 metres long – this is one very big piece of paper!

In Microsoft Excel when you save your work it is saved in a file known as a **workbook**. A workbook is made up of one or more **worksheets** – you can have thousands of worksheets in each workbook, although you usually start with three. Each worksheet is given a **label** such as *Sheet1*, *Sheet2*, etc. These **sheet labels** appear at the bottom of the screen. In reality, what you see on the screen at any point in time is just a very, very, very tiny part of your huge electronic piece of paper!

When a row and a column intersect you have a **cell**. Each cell can hold up to 32,767 characters (each character roughly equivalent to a letter or number – for example, the name *John* occupies 4 characters of space, one for each letter). Given that there are 16,384 columns and 1,048,576 rows there are actually 17,179,869,184 cells in a worksheet. If each of these holds 32,767 characters you'll have a theoretical capacity in each worksheet of 562,932,773,552,128 characters... But all of this is theoretical and is limited to the actual memory (RAM) capacity of your computer.

**Columns:** There are 16,384 of these

**Rows:** There are 1,048,576 of these

**Worksheets:** The number of these is limited only by your computer's memory

	A	B	C	D	E	F
1						
2						
3	Employee		Hourly Rate	Hours	Gross Pay	
4						
5	Adams	Margaret	15.50	24.0	\$372.00	
6	Brown	John	16.75	16.2	\$271.35	
7	Francis	Grace	12.50	12.0	\$150.00	
8	Simpson	Stephen	9.65	18.0	\$173.70	
9						
10			Total	70.2	\$967.05	
11			Average	17.6	\$241.76	
12			Maximum	24.0	\$372.00	
13			Minimum	12.0	\$150.00	
14						

# UNDERSTANDING SPREADSHEET FUNCTIONALITY

Over the years the functionality of spreadsheets has increased. Today spreadsheets provide three main functions. Primarily they allow you to type numbers to perform calculations. They also allow

you to display those numbers pictorially as graphs. Finally, spreadsheets allow you to enter data into lists and to perform rudimentary operations such as sorting, filtering, and summarising of those lists.

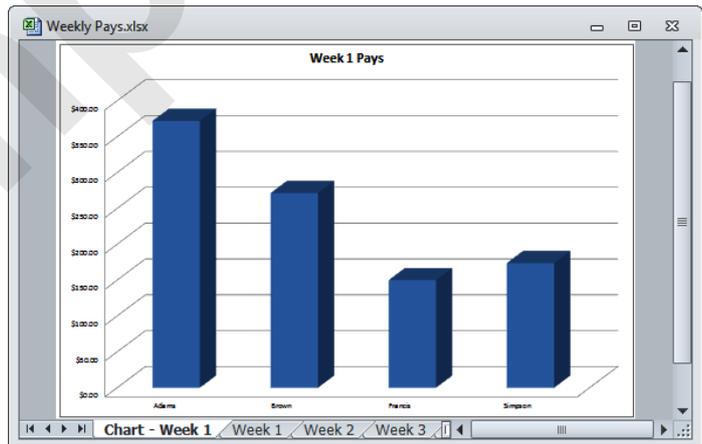
## Performing Calculations

Spreadsheets are most commonly identified as applications that help you process numbers. Numbers are entered into cells and formulas that use these numbers are automatically and instantly recalculated. This is sometimes referred to as **numeric modelling**.

Employee	Hourly Rate	Hours	Gross Pay
Adams Margaret	15.50	24.0	\$372.00
Brown John	16.75	16.2	\$271.35
Francis Grace	12.50	12.0	\$150.00
Simpson Stephen	9.65	18.0	\$173.70
<b>Total</b>		70.2	\$967.05
<b>Average</b>		17.6	\$241.76
<b>Maximum</b>		24.0	\$372.00
<b>Minimum</b>		12.0	\$150.00

## Creating Graphs

Graphs, or **charts** as they are known in Excel, allow you to pictorially view the data in a worksheet. Charts are created based on one or more series of numbers that are in the worksheet. These numbers may be ones that have been typed or ones that appear as the result of a calculation. Like formulas, charts are automatically updated when the data in the worksheet changes.



## Working With Lists

A list is simply a collection of items organised into columns and rows – and since that is how a worksheet is organised it is only logical that list-type operations can be performed. These operations include the ability to filter (search and display) specific data, the ability to sort the data either numerically or alphabetically, and the ability to summarise the data such as displaying the total of a particular column.

Last Name	First Name	Week	Rate	Hours	Gross Pay
Adams	Margaret	Week 1	15.50	24.00	\$372.00
Brown	John	Week 1	16.75	16.20	\$271.35
Francis	Grace	Week 1	12.50	12.00	\$150.00
Simpson	Stephen	Week 1	9.65	18.00	\$173.70
Adams	Margaret	Week 2	15.50	22.00	\$341.00
Brown	John	Week 2	16.75	17.40	\$291.45
Francis	Grace	Week 2	12.50	13.50	\$168.75
Simpson	Stephen	Week 2	9.65	16.00	\$154.40
Adams	Margaret	Week 3	15.50	16.00	\$248.00
Brown	John	Week 3	16.75	9.30	\$155.78
Francis	Grace	Week 3	12.50	22.00	\$275.00
Simpson	Stephen	Week 3	9.65	15.60	\$150.54
Adams	Margaret	Week 4	15.50	21.00	\$325.50
Brown	John	Week 4	16.75	34.20	\$572.85
Francis	Grace	Week 4	12.50	19.70	\$246.25
Simpson	Stephen	Week 4	9.65	16.30	\$157.30

# THE APPROPRIATENESS OF SPREADSHEETS

Basically spreadsheets can be used for virtually any task that uses numbers and needs to be calculated. While they initially gained momentum in the accounting professions, spreadsheets are

now used throughout the business community, in Government, manufacturing, science, and many other areas of industry.

## Where Spreadsheets Are Well Suited

Spreadsheets are basically just like large electronic pieces of paper ruled up into columns and rows that allow you to crunch numbers. The piece of electronic paper that you work with, known as a *worksheet*, is huge. However, spreadsheets have one Achilles heel – all of the worksheet must be loaded (or at least pass through) the computer's memory, known as RAM. There isn't a computer on the market today that can handle an entire worksheet filled with data. So while big is theoretically probable, it is technically impossible, and worksheets need to be kept relatively small to perform efficiently. Given this limitation, there are still a gazillion uses in the modern world for spreadsheet applications such as Microsoft Excel.

### In Business and Government...

Spreadsheets are used for a diverse range of purposes, including budgeting, analyses of sales and costs, monthly reporting of sales and costs, financial modelling, loan recalculation and amortisation, petty cash, bank and credit card reconciliations, producing simple lists, producing charts and graphs for business presentations, and more.

### In Industry...

Spreadsheets are used in manufacturing for estimating things such as materials, costs, and the like, and for analyses of data captured by manufacturing or scientific equipment. Other uses of spreadsheets include price lists and statistical analyses for quality control.

### At Home...

Yes, even at home spreadsheets can be quite useful for things such as tracking personal finances, credit card and bank reconciliations, hobby and small business bookkeeping, asset registers, and the like. The lists functionality is perfect for keeping small lists (of about several hundred lines) of things such as names and addresses, CD collections and wine collections. Spreadsheets can also be used for sporting clubs, hobby associations, and other groups or clubs where basic accounting and member records need to be kept.

## Where Spreadsheets Are Unsuitable

Most people fall in love with spreadsheets once they learn the basics – spreadsheets are probably the simplest of all of the personal computer applications to use. As a consequence some people tend to use spreadsheets for everything, including things that they are inappropriate for such as writing lengthy documents.

As mentioned above the single greatest drawback with spreadsheets is that they promise so much in that they give the illusion that they can handle vast amounts of data. However, given that everything processed in a spreadsheet must pass through the computer's memory, the true size of a worksheet is really much smaller than the 16,384 columns and 1,048,576 rows. In fact, the larger your worksheet grows, the less efficient it becomes.

So there are definitely things that you should NOT do with a spreadsheet.

First and foremost, you shouldn't attempt to produce text-based documents such as a letter or a memo with a spreadsheet. It's not designed for this – use a word processing package such as Microsoft Word for this type of task.

Spreadsheets are great for producing and manipulating lists – providing they are kept small. However, some users create a list in a spreadsheet and then keep adding and adding new data until one day the whole thing just chokes up. As a rough rule of thumb lists of more than several hundred lines (sometimes known as records) are better placed into a database application such as Microsoft Access.

# NOTES:

Sample

## CHAPTER 2

## GETTING TO KNOW MICROSOFT EXCEL

INFocus

WPL\_E801

**Microsoft Excel** is a *spreadsheet* application that is usually part of a suite of Microsoft applications, known as **Microsoft Office**.

You can use Excel for all sorts of tasks involving numbers such as budgeting, sales analysis, forecasting, charting and graphing and much more. Excel is a tool used to perform calculations with numbers so virtually any task that requires calculation and number crunching can be setup and performed in Excel.

Before you leap into creating anything, it is worth taking some time to become familiar with the Excel environment and its features.

**In this session you will:**

- ✓ learn how to start **Microsoft Excel 2010**
- ✓ gain an understanding of the **Microsoft Excel 2010** screen
- ✓ gain an understanding of how **Microsoft Excel 2010** works
- ✓ learn how to use the **Ribbon**
- ✓ learn how to use the keytip badges on the **Ribbon**
- ✓ learn how to minimise the **Ribbon**
- ✓ gain an understanding of **Backstage View** in **Microsoft Excel**
- ✓ learn how to access the **Backstage View**
- ✓ learn how to use shortcut menus
- ✓ gain an understanding of how dialog boxes work
- ✓ learn how to launch a dialog box
- ✓ gain an understanding of the **Quick Access Toolbar**
- ✓ learn how to add commands to the **Quick Access Toolbar**
- ✓ gain an understanding of the status bar
- ✓ learn how to exit correctly and safely from **Microsoft Excel 2010**.

# STARTING MICROSOFT EXCEL

To create a new spreadsheet, or edit an existing one, the first thing that you need to do is to start **Microsoft Excel**. As a standard software application, how **Microsoft Excel** is started is

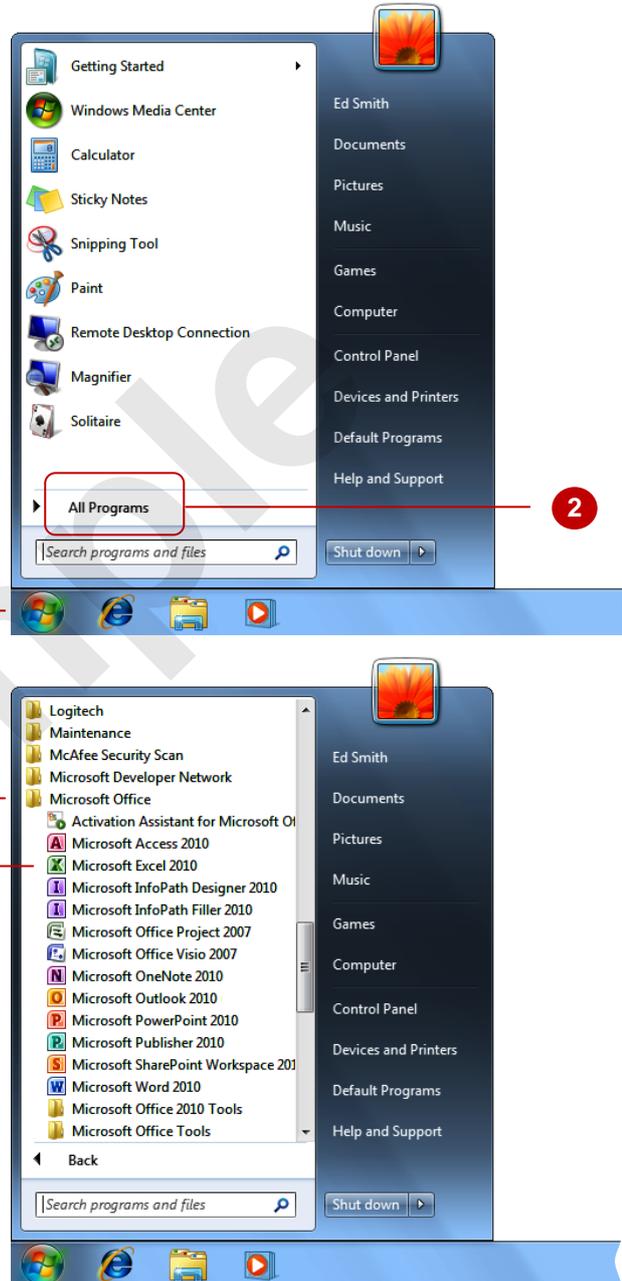
largely determined by Windows. For example, it can be started from the Windows **Start menu**, from a **shortcut**, or even by opening a workbook (project) that was created previously in Excel.

## Try This Yourself:

*Before you begin, ensure that your computer is switched on and that the Windows desktop is displayed on your screen...*

- 1 Click on the Windows **Start** button (it's a round button with a Windows logo on it) at the bottom left-hand corner of the screen to display the menu
- 2 Click on **All Programs**
- 3 Click on **Microsoft Office**
- 4 Click on **Microsoft Excel 2010**

*After a few moments of huffing and puffing Excel will start with a blank "workbook" on the screen – the workbook appears like an electronic sheet of paper ruled into columns and rows.*



## For Your Reference...

To **start Microsoft Excel**:

1. Click on the Windows **Start** button
2. Click on **All Programs**
3. Click on **Microsoft Office**
4. Click on **Microsoft Excel 2010**

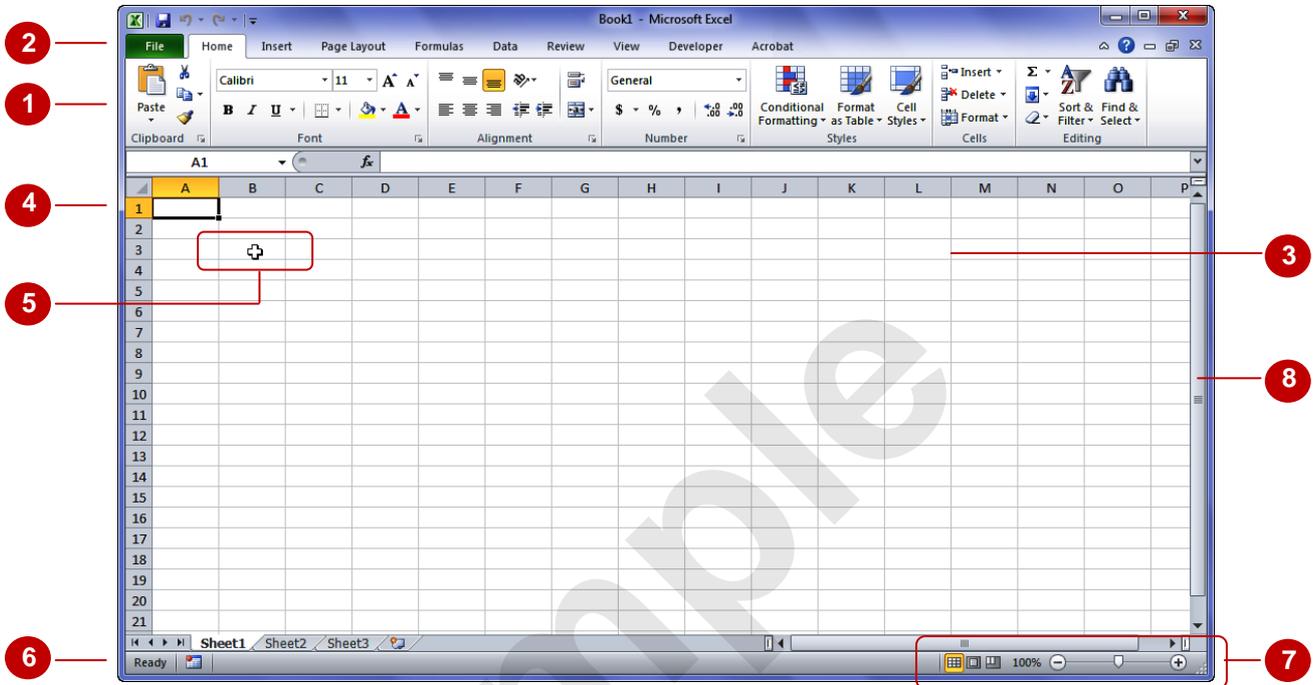
## Handy to Know...

- If you have accessed Microsoft Excel several times it should appear in the first part of the **Start** menu – this means you won't need to continue to the **All Programs** menu.

# THE EXCEL 2010 SCREEN

The Microsoft Excel 2010 screen is made up of several key elements. Some of these, such as the **Ribbon** and the **Backstage**, are common to other Office 2010 applications so once you know

how they work you won't have to relearn them when you use other applications. The unique aspect of Excel is the **worksheet** where you enter and work with your data.



- 1 The **Ribbon** is the tabbed band that appears across the top of the window. It is the command control centre of Excel 2010. You use the **tabs** on the Ribbon to access **commands** which have been categorised into **groups**. Commands can be buttons or sometimes include **galleries** of formatting options that you can select from.
- 2 The **File** tab is used to access the **Backstage** view which contains file management functions such as saving, opening, closing, printing, sharing, etc. *Excel Options* are also available so that you can set your working preferences and options for Excel 2010.
- 3 The **Worksheet** is like an electronic piece of paper ruled into columns and rows. The worksheet is where you type numbers, letters, and formulas to perform calculations. Notice that columns are headed using letters of the alphabet (A, B, C, etc) while rows are designated using numbers down the left side.
- 4 The **Active Cell** is where text, numbers, and formulas will appear when you start typing.
- 5 The **Mouse Pointer** is used, amongst other things, to select a cell and make it active. It may appear as a large cross, as in this example, as an I-bar, or any number of other forms, depending upon its function at that position on the screen.
- 6 The **Status Bar** appears across the bottom of the window and displays useful information about what is happening in the worksheet. At present it shows **Ready** which means that Excel is ready to be used for your project.
- 7 The **View** buttons and the **Zoom Slider** are used to change the view or to increase/decrease the zoom ratio for your worksheet.
- 8 The **Scroll bar** indicates your current position in the worksheet and lets you move to other positions in the worksheet by clicking or dragging. The arrows can also be used to move through the worksheet.

# HOW MICROSOFT EXCEL 2010 WORKS

For a novice user the Microsoft Excel 2010 screen can seem intimidating. You'll soon see that it is made up of only three key areas. The data you type is placed on a **worksheet**. The

data within the worksheet can be manipulated and changed using commands on the **Ribbon**. The worksheet is part of a larger entity known as a workbook which is controlled on the **Backstage**.

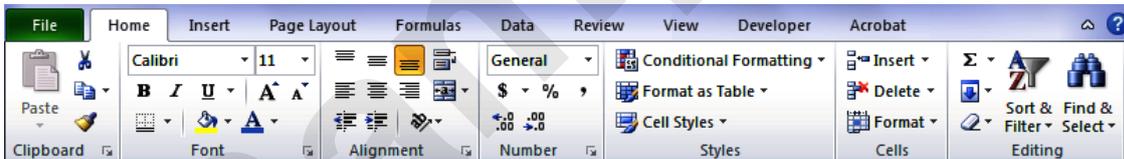
## 1 The Worksheet

A worksheet appears as a number of rows and columns which form squares known as **cells**. Everything you type in Excel is entered into these cells. In the simple business plan shown here there are *numbers* and *words* entered into a worksheet. *Formulas* are also entered that automatically perform calculations. The worksheet is part of a larger entity known as a *workbook* – workbooks can be filed away for future use or for sharing and can also be printed.

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Income</b>					
Sales	4,000	4,230	5,000	5,500	6,100
Royalties	1,200	1,200	1,200	1,200	1,200
Grants	5,500	6,000	3,000	4,000	4,500
<b>Total Income</b>	<b>10,700</b>	<b>11,430</b>	<b>9,200</b>	<b>10,700</b>	<b>11,800</b>
<b>Expenses</b>					
Office	250	280	300	320	360
Travel	6,200	5,800	6,100	7,000	5,200
Sundries	100	150	200	240	300
<b>Total Expenses</b>	<b>6,550</b>	<b>6,230</b>	<b>6,600</b>	<b>7,560</b>	<b>5,860</b>
<b>Profit</b>	<b>4,150</b>	<b>5,200</b>	<b>2,600</b>	<b>3,140</b>	<b>5,940</b>

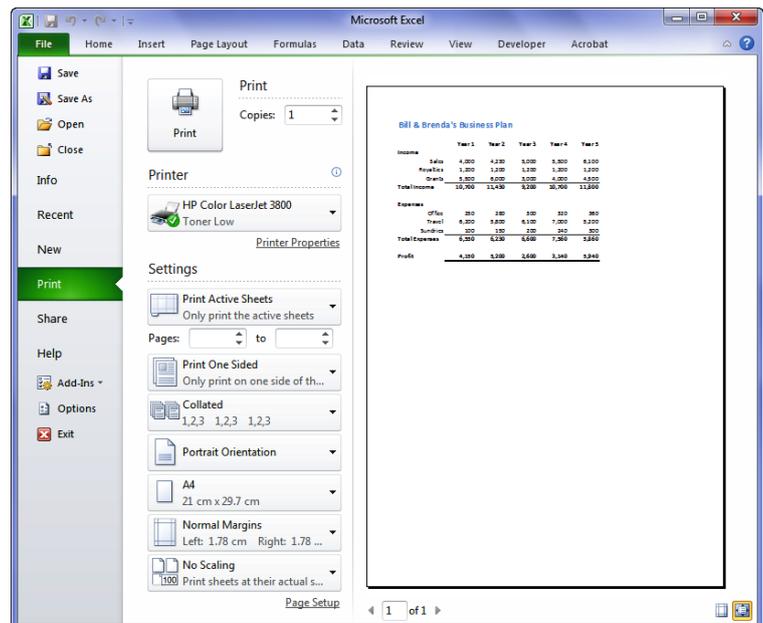
## 2 The Ribbon

When you need to do something with the data on a worksheet, such as format it, colour it, analyse it, move it, copy it, and much more, you'll find all of the relevant commands on the **Ribbon**. The **Ribbon** has commands organised thematically using a series of tabs across the top.



## 3 Backstage

When you want to do something with the data in your worksheet, such as save it so that you can access it again later, print it, share it with a colleague, send it to your boss, protect it from prying eyes, or whatever, you will need to access the **Microsoft Office Backstage** area of Microsoft Excel. The **Backstage** is accessed using the **File** tab on the **Ribbon**. Rather than offering you commands on a **Ribbon**, **Backstage** occupies the entire screen and has a series of options down the left side. Here the **Print** option is active, and that is why you can see a preview of the worksheet and a series of print-related options on the right side of the **Backstage**.



# USING THE RIBBON

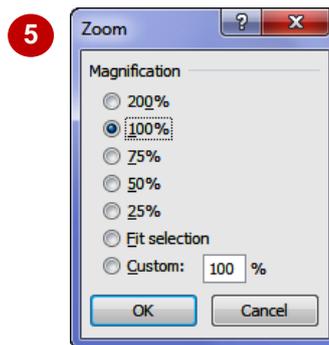
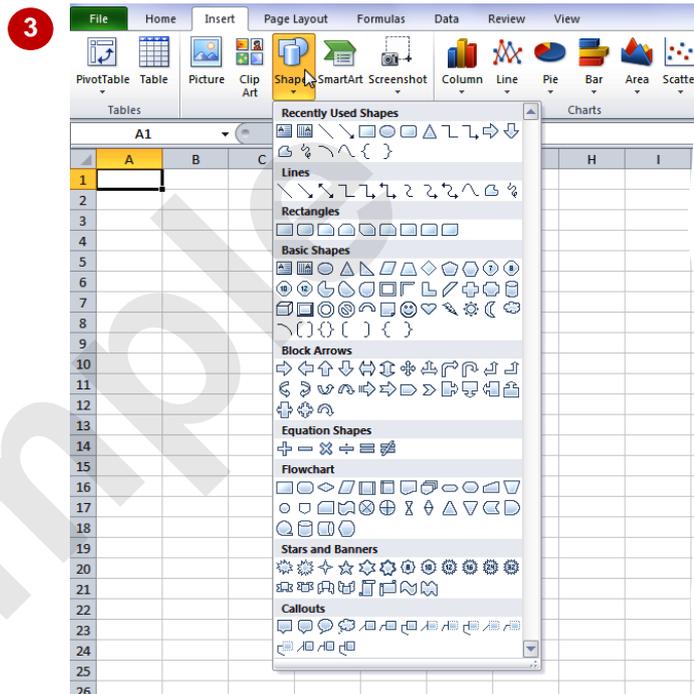
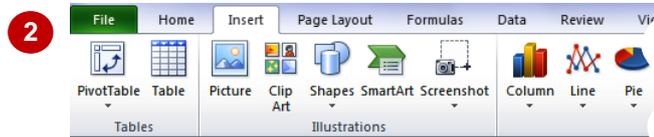
The **Ribbon** is the command centre for Microsoft Excel. It provides a series of **commands** organised into **groups** and placed on relevant **tabs**. Tabs are activated by clicking on their

name to display the command groups. **Commands** are activated by clicking on a button, tool or gallery option. Everything you could possibly want to do in Excel will be found somewhere on this **Ribbon**.

## Try This Yourself:

Before trying this ensure that Microsoft Excel 2010 has started...

- 1 Examine the **groups** on the **Home** tab  
*These are the most commonly used commands, including copy and paste, font and number formatting, styles and editing...*
- 2 Click on the **Insert** tab  
*The commands on this tab are used to create tables, illustrations, charts, headers and footers, text objects and symbols...*
- 3 Click on **Shapes** in the **Illustrations** group to display the **Shapes** gallery  
*A huge range of shapes will appear which can be inserted into the worksheet...*
- 4 Click on some of the other **tabs** across the top of the **Ribbon** (**Page Layout**, **Formulas**, etc) and examine the commands on them  
*Some of these open "dialog boxes"...*
- 5 On the **View** tab, click on **Zoom** in the **Zoom** group to display the **Zoom** dialog box
- 6 Click on [**Cancel**] then click on the **Home** tab



Dialog boxes like this one provide settings or options for you to choose from. For example in this one you can zoom the screen by varying percentages. We won't actually do anything at this point. You'll get plenty of opportunity for using dialog boxes at a later stage...

## For Your Reference...

To **use** the **Ribbon**:

1. Click on a **tab** to display the commands
2. Click on a **button** to activate a **command**, display a **gallery**, or display a **dialog box**

## Handy to Know...

- Additional tabs known as **Contextual tabs** appear in specific circumstances. For example, if you insert a picture, the **Picture Tools: Format** tab will appear. This provides quick access to all of the tools you may need to modify and work with the picture.

# USING RIBBON KEY TIPS

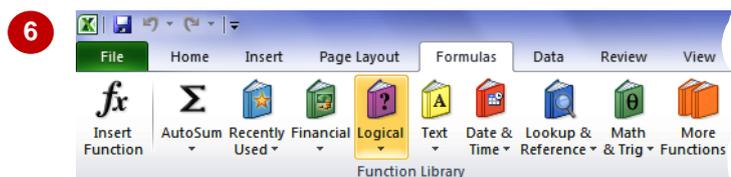
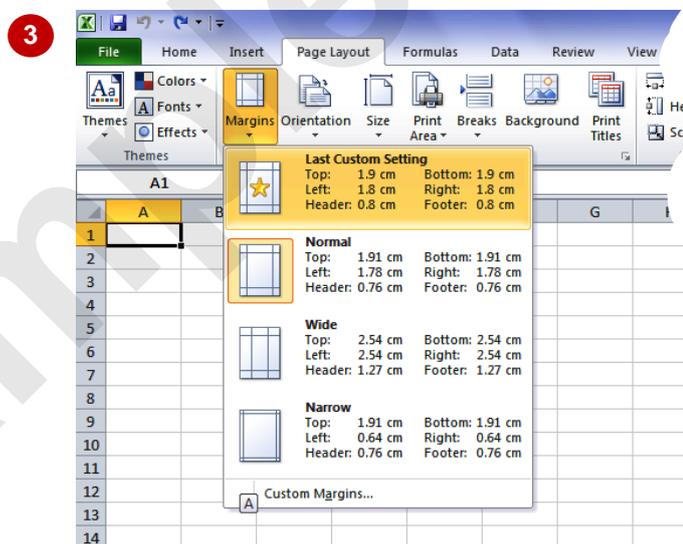
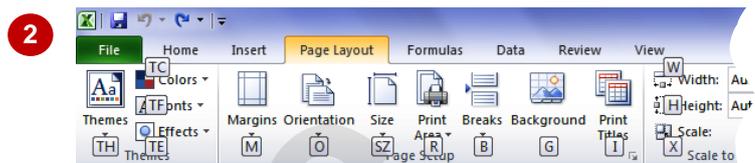
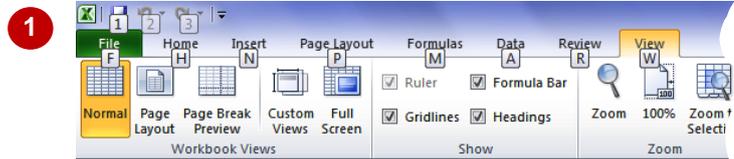
The **Ribbon** is normally accessed with a mouse. However you can also use the keyboard to access **Ribbon** commands. When you press the **Alt** key on the keyboard alphabetical labels,

known as **key tip badges**, appear on the **Ribbon**. Pressing a key on the keyboard will activate the corresponding command on the **Ribbon** just as if you'd clicked the command with the mouse.

## Try This Yourself:

Before trying this ensure that Microsoft Excel 2010 has started...

- 1 Press **Alt** to display the key tip badges for the tabs
- 2 Press **P** to display the **Page Layout** tab and to see the key tip badges for these commands
- 3 Press **M** to display the **Margins** options  
Here you could use the **↑** or **↓** keys to move through the options, or **A** to see Custom Margins...
- 4 Press **Esc** twice to return to the **Tab** level of key tips
- 5 Press **M** to access the **Formulas** tab
- 6 Press **Tab** five times and notice that **Logical** is selected
- 7 Press **Enter** to see a list of **Logical** functions, then press **↓** several times to move down the menu
- 8 Press **Esc** to abort the operation



## For Your Reference...

To **use KeyTip Badges** to access commands:

1. Press **Alt** to display the **KeyTip Badges**
2. Press the letter key of the command or tab that you want to select

## Handy to Know...

- You can still use the **shortcut keys** for menu commands that were available in previous versions of Office. For example, **Ctrl** + **B** applies bold to selected text.