

Acknowledgments and Thanks!!!

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All or part of any copies of this material must include this page.

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INFORMATION TECHNOLOGY LEVEL 2 - WHAT YOU NEED TO KNOW PART A

In searching for and selecting information, You need to know how to:

- Identify suitable sources of information (eg *hand-written documents, material to be scanned, files on disks, CD-ROMs, databases, the Internet*);
- Search for information using multiple criteria (eg *operators such as 'and', 'greater than' and tools such as search engines*);
- Interpret information and decide what is relevant to your purpose (eg *to respond to an enquiry, write a project report, help solve a problem, design or make something*).

In developing information, You need to know how to:

- Enter and bring together information (eg *'copy and paste' or import text, images, numbers*), using formats that help development (eg *using tabs rather than spaces to align text, using tables or frames to position information*);
- Explore information as needed for your purpose (eg *follow lines of enquiry, explore the effects of changing information in a spreadsheet model to make and test predictions*);
- Develop information in the form of text, images and numbers (eg *link information, organise information under headings, restructure tables, and graphs from data, select records or fields and prepare reports from a database*);
- Derive new information (eg *compare information from different sources to reach a conclusion, use formulae to calculate information such as a total or average*).

In presenting information You need to know how to:

- Select and use appropriate layouts for presenting combined information (eg *document structures such as margins, columns and headings, borders for images and text, record structures, tables, spreadsheets*);
- Present information in a consistent way, (eg *paragraph layouts, size and styles of images and text, alignments, fonts*);
- Develop the presentation to suit your purpose and types of information, including text, images and numbers, (eg *highlight information to improve its impact, refine layouts, make sure it suits the needs of your audience*);
- Ensure your work is accurate and clear (eg *proof-read, use a spell-checker, seek the views of others*) and is saved appropriately (eg *use suitable folders/directories and file names, avoid loss*).

You will also need to know: the benefits and disadvantages of using IT; when it is necessary to observe copyright or confidentiality; how to identify errors and their causes and minimise risks from viruses; and how to work safely and minimise health risks.

INFORMATION TECHNOLOGY - LEVEL 2 - PART B

ACHIEVEMENT RECORD

Course/ Programme	Student Name
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	You must:	Evidence must show you can:	Portfolio reference/ code	Evidence Type 1-9	Assessor Initials	Date
IT 2.1	Search for and select information for two different purposes.	<ul style="list-style-type: none"> Identify the information you need and suitable sources; 				
		<ul style="list-style-type: none"> Carry out effective searches; and 				
		<ul style="list-style-type: none"> Select information that is relevant to your purpose. 				
IT 2.2	Explore and develop information, and derive new information, for two different purposes.	<ul style="list-style-type: none"> Enter and bring together information using formats that help development; 				
		<ul style="list-style-type: none"> Explore information as needed for your purpose; and 				
		<ul style="list-style-type: none"> Develop information and derive new information as appropriate. 				
IT 2.3	Present combined information for two different purposes. Your work must include at least one example of text, one example of images and one example of numbers.	<ul style="list-style-type: none"> Select and use appropriate layouts for presenting combined information in a consistent way; 				
		<ul style="list-style-type: none"> Develop the presentation to suit your purpose and the types of information; and 				
		<ul style="list-style-type: none"> Ensure your work is accurate, clear and saved appropriately. 				
INTERNAL VERIFICATION		Name	Signature			Date

KEY: Type of Evidence Sampled –

1. Naturalistic observation of workplace activities	4. Candidates explanation of process/personal account	7. Projects/assignments/case studies
2. Observation of product	5. Simulation/roleplay	8. Oral questioning
3. Testimony of others	6. Assessment of prior achievement	9. Written questioning

INFORMATION TECHNOLOGY LEVEL 2 – GUIDANCE PART C

Examples of activities you might use

You will have opportunities to develop and apply your IT skills during your work, studies or other activities. For example when:

- Researching and reporting findings from a project or assignment;
- Researching and designing a product;
- Dealing with enquiries from customers or clients;
- Exchanging information and ideas with work colleagues or other students.

You will need time to practise your skills and prepare for assessment. So it is important to plan ahead.

The purpose for using IT can be decided by you or by other people, but you must make sure that the work you produce suits this purpose. Using IT can contribute evidence for other key skills, such as communication and application of number.

You will need to think about the quality of your IT skills and check your evidence covers all the requirements in Part B.

Examples of Evidence

2.1 Search for and select information

Print-outs of the relevant information with notes of sources and how you made searches, or a record from an assessor who observed you using IT when searching for information.

2.2 Develop information

Print-outs or a record from an assessor who observed you using IT, with notes to show how you explored and developed information and derived new information.

2.3 Present information

Working drafts, or a record from an assessor who observed your screen displays, with notes to show how you have developed content and presentation.

Print-outs, or prints of static or dynamic screen displays, of your final work, including examples of text, images and numbers.

Records of how you saved information.

If producing certain types of evidence creates difficulties, due to disability or other factors, you may be able to use other ways to show your achievement.

Ask your tutor or supervisor for further information.

Level 2 - Contents

Section 1

- P1 - P12 - Internet Searching
- P13 - P15 - Build-up Exercise: Scanner Use

Section 2

- P16 - P36 - Graphics
- P37 - P41 - Graphical 'Representation Of Data' Software
- P42 - P50 - Creating Graphs And Charts
- P51 - P55 - Modifying Graphs And Charts

Section 3

- P56 - P57 - What Is A Spreadsheet?
- P58 - P67 - Getting Help With Excel
- P68 - P95 - Excel '97
- P96 - P97 - English Law
- P98 - P101 - A Guide To Copyrights
- P102-P105 - Data Protection Acts
- P106-P109 - Computer Viruses
- P110 - P116 - Working With VDU's
- P117 - P121 - RSI

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 GETTING STARTED ON THE WEB

Whether you're brand new to browsing the World Wide Web or you have some experience under your belt, you'll want to check out the practical questions and answers and loads of useful browser tips in this section.

WHAT'S IN A WEB BROWSER?

A Web browser contains the basic software you need in order to find, retrieve, view, and send information over the Internet. This includes software that lets you:

- Send and receive electronic mail (or e-mail) messages worldwide nearly instantaneously.
- Read messages from newsgroups (or forums) about thousands of topics in which users share information and opinions.
- Browse the World Wide Web (or Web) where you can find a rich variety of text, graphics, and interactive information.

Browsers such as Internet Explorer 5.0 include additional Internet-related software.

For example, with Internet Explorer version 5.0, you also get:

- Windows™ Media Player version 6.0
- NetMeeting® conferencing software version 2.11
- ActiveX® controls
- Chat version 2.5
- DirectShow® application programming interface
- Subscriptions for automatic Web page update
- Dynamic hypertext mark-up language (HTML)

You also can download various Microsoft software programs—like Active Channel a Webcast or the 128-bit encryption program—that work with Internet Explorer 5.0 or use the install-on-demand feature that effortlessly downloads software called for on other Web sites.

- **Windows Media Player** – This allows you to see and hear live and recorded broadcasts—such as concerts or breaking news with synchronised audio, graphics, video, uniform resource locators (URLs), and script commands. And streaming technology allows you to see or hear the information as it arrives instead of having to wait for the entire file to download.
- **NetMeeting conferencing software** – With a sound card, speakers, and a microphone, you can talk to others worldwide from family to colleagues using NetMeeting. Add a Windows-compatible video capture card and/or camera to see them, too. Exchange pictures and draw diagrams on an electronic whiteboard, communicate with text-based chat, transfer files, and share applications.
- **ActiveX controls** – ActiveX technology (first developed for Internet Explorer 3.0) allows authors to develop innovative, highly interactive Web sites. ActiveX controls are the software components that run behind the scenes in Internet Explorer so that these sites come alive for you.
- **Chat** – This program lets you converse online in real time with one or more people. You decide how your message is displayed—text only or text with graphics. You can send and receive sounds, files, and links of e-mail addresses, Web pages, and newsgroups. You can even "whisper" to another person in a group chat. Use it for your next online family reunion.
- **DirectShow application programming interface** – DirectShow allows you to experience television-quality video and CD-quality audio, while minimising file size and download time compared with other

video and audio formats. By using "progressive downloading," DirectShow lets you start playing an audio or video clip while it's still downloading.

Subscriptions – This feature delivers preferred information straight to your desktop, when you want it, in the way you want it—for free (Internet connect charges may apply). To subscribe to a Web site, select the site and specify when you want the information updated and how you want to be notified, such as through an e-mail message. Internet Explorer does the rest. Then you can browse the content offline.

Dynamic HTML – Internet Explorer 5.0 supports this programming language, which makes enticing, unique, fun and fast-downloading Web pages possible. The pages download quickly because they are created using lightweight HTML instead of heavy-duty graphics. Round-trips to the server are minimised, which means faster browser performance on your desktop computer.

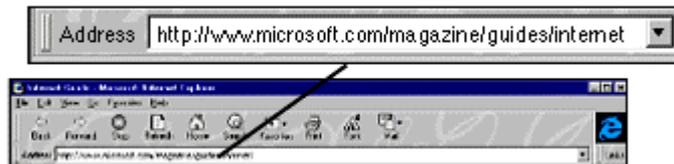
DOWNLOAD INTERNET EXPLORER 5.0

Simplicity, speed, and manageability all contributed to the unprecedented success of Internet Explorer 5.0 during testing, and now it's available for users everywhere. Internet Explorer 5.0 is fast and saves you time on the Web by automating complex tasks and making you more productive. It's never been easier to get online, find the information you need, and just move faster.

Check out the Internet Explorer 5 Web site to learn more about the exciting innovations of Internet Explorer 5.0. If you don't have version 5.0, you can download it from this site.

If you don't have a Web browser, contact your Internet service provider (ISP) to find out how to connect to the Internet in order to download a Web browser.

WHAT IS A URL?



A URL (or uniform resource locator) is the address of an Internet file. Usually it consists of four parts: protocol, server (or domain), path, and filename. Sometimes there's no path or filename. Here's an example:

- <http://www.microsoft.com/windows/default.asp>
 - http is the protocol
 - www.microsoft.com is the server
 - windows/ is the path
 - default.asp is the filename

BROWSER TIPS

Use the following tips to take advantage of all the great features of Internet Explorer 5.0.

Spot the links.

You can tell whether an item on a page is a link by moving the mouse pointer over the item. If the pointer changes to a hand, then the item is a link. A link can be a picture, a three-dimensional image, or coloured text. Click any link on a Web page to go to another page within that site or another site.

Display all Web pages faster

1. On the **Tools** menu in the browser, click **Internet Options**.
2. Click the **Advanced** tab.
3. In the Multimedia area, clear one or more of the **Show pictures**, **Play animations**, **Play videos**, or **Play sounds** check boxes.
4. If the **Show pictures** or **Play videos** check box is cleared, you can still display an individual picture or animation on a Web page by right-clicking its icon and then clicking **Show Picture**.
5. If the pictures on the current page are still visible after you clear the **Show pictures** check box, you can hide them by clicking the **View** menu and then clicking **Refresh**.

Display previously viewed pages faster

1. On the **Tools** menu in the browser, click **Internet Options**.
2. On the **General** tab, click **Settings**.
3. To create more space to store pages temporarily, move the slider to the right.
4. To prevent Internet Explorer from updating pages in the Temporary Internet Files folder, click **never**.

Change how page colours are displayed

1. On the **Tools** menu in the browser, click **Internet Options**.
2. Change the settings as needed.

Display text in a different font

1. On the **Tools** menu in the browser, click **Internet Options**.
2. On the **General** tab, click **Fonts**.
3. In the Proportional and Fixed-width font lists, click the fonts you want.

Specify which font and colour setting to always use

1. On the **Tools** menu in the browser, click **Internet Options**.
2. On the **General** tab, click **Accessibility**.
3. Change the settings as needed.

Display text larger or smaller

On the **View** menu, point to **Fonts**, and then click the size you want.

View Web pages in a different language

Some Web sites offer their content in several languages. You can add languages to your list of languages in Internet Explorer so that you can view these sites in your preferred language. To view Web pages written in a different language:

1. On the **Tools** menu in the browser, click **Internet Options**.
2. On the **General** tab, click **Languages**.
3. Click **Add**.
4. Select the language you want to add.
 - If you speak several languages, you can arrange them in order of priority. If a Web site offers multiple languages, it will supply content in the language with the highest priority.
 - Adding languages does not guarantee that you have a font that can display Web pages in your preferred languages. You may need to download a Multilanguage support pack to display pages in these languages. To download Multilanguage support packs, see the Internet Explorer download page.

Add a page to your Favourites

1. Go to the page that you want to add to your collection of favourite pages.
2. On the **Favourites** menu, click **Add to Favourites**.
3. Type a new name for the page if you want to.
 - To open one of your favourite pages, click the **Favourites** button on the toolbar and then click the page you want to open.
 - To keep track of your favourite pages, you can organise them into folders. Click the **Create In** button in the **Add to Favourites** dialog box.

Add Microsoft Product Insider to your Favourites

To make sure you always have access to the latest Internet news, software updates, and tips and tricks for using Internet Explorer and other Microsoft® products, why not add the Microsoft Product Insider site to your Favourites list now? To add Product Insider to your Favourites list, follow these steps:

1. On the **File** menu of your Internet Explorer toolbar, point to **New** and click **Window** so you don't lose your place in this guide.
2. On the **File** menu in the new window, click **Open**, and then type <http://www.microsoft.com/insider/> in the address box.
3. Click **OK**.
4. When the Microsoft® products Insider home page has finished loading, on the **Favourites** menu, click **Add to Favourites**, and click **OK**.
5. Close the new window.

Organise your Favourites into folders

1. On the **Favourites** menu, click **Organise Favourites**.
2. Click **Create New Folder**, type a name for the folder, and then press ENTER.
3. Drag the shortcuts in the list to the appropriate folders.
 - You might want to organise your pages by topic. For example, you could create a folder named Art for storing information about art exhibits and reviews.
 - If the number of shortcuts or folders makes dragging impractical, you can use the Move button instead.

Find Favourites more quickly in an overloaded Favourites menu

1. On the Windows **Start** menu, point to **Find** and click **Files or Folders**. Windows will display a **Find: All Files** dialog box.
2. In the **Look in** dropdown box, type **c:\windows\favorites**, or browse to this directory.
3. In the **Named** dropdown box, type the filename you are looking for and click the **Find Now** button. Windows will display all the Favourites that match your query and list information about each.

4. If there are multiple results, you can click the column information title and sort the results by name, date, and so on.

Edit Favourites.

You can do a lot more with your Favourites folder list in Internet Explorer 5.0 than you can with other browsers. Remember these tips:

- You can drag a Favourite or folder to different areas to reorganise.
- You can drag a Favourite or folder from the list box to your desktop.
- Right-click a Favourite or folder to display a pop-up menu that lets you perform functions like Edit (in the Microsoft FrontPage® Web site creation and management tool), Subscribe, Copy, and Delete.
- You can click the Send To option to send the Favourite to a floppy disk, create a shortcut on the desktop, or attach the shortcut to an e-mail message.

To Change your home page.

1. Go to the page that you want to appear when you first start Internet Explorer.
2. On the **Tools** menu, click **Internet Options**.
3. Click the **General** tab.
4. In the Home Page area, click **Use Current**.

To restore your original home page, click **Use Default**.

Save text and graphics from the Web.

When you see text or graphics on a Web page that you like or want to refer to later, you can save them on your computer's hard disk. Later, you can open the saved file and review it offline.

To save a text or source file:

1. On the toolbar, click **File**, and then click **Save As**.
2. Click **Save** to save the file.

To save a graphic:

1. Right-click the graphic.
2. On the shortcut menu that appears, click **Save Picture As**.
3. Browse to the folder where you would like to save the file.
4. Click **Save** to save the file.

To open a saved file, double-click it from the folder where you've saved it. Internet Explorer will start automatically, and your saved file will appear in the browser window.

To add a page to your Links bar

- Drag the icon for the page from your **Address** bar to your **Links** bar.
- Drag a link from a Web page to your **Links** bar.
- Drag a link to the **Links** folder in your **Favourites** list. You can drag it directly to the **Favourites** menu and then into the **Links** folder or you can drag it to the **Links** folder when displaying your Favourites in the Explorer bar.

You also can organise your links by dragging them to a different location on the Links bar.

Create a desktop shortcut to the current page.

Right-click the page, and then click **Create Shortcut**. If the Internet Explorer window is not maximised, you also can create a shortcut by dragging a link from the Internet Explorer window to the location you want, such as your desktop or a folder.

Return to a Web page you've already seen.

There are several ways to return to a previously viewed Web page:

- To return to the last page you viewed, you can click the Back button on the toolbar or press the BACKSPACE key.
- To see a list of the last few pages you visited, click the small down arrow beside the Back or Forward button. Then click the page you want.
- If you want to view one of the last five pages you visited in this session, click the File menu and click the page that you want to go to. This list is started fresh every time you start Internet Explorer.
- To view more pages, including pages you visited in previous sessions, click the History button on the toolbar and then click the appropriate folder.

Change the appearance of the toolbar

- You can move or resize the Address bar and Links bar by dragging them up, down, left, or right. You can even move them into the menu bar.
- To make more room on your screen, you can hide toolbar button labels. Just right-click the toolbar and clear the check mark next to Text Labels.
- You can hide the Address bar or Links section of the toolbar by right-clicking the toolbar and clearing the check mark for each item you want to hide.
- You can add items to the Links bar by dragging the icon from the Address bar or dragging a link from a page.
- You can rearrange items on the Links bar by dragging them to a new location on the bar.
- You can use smaller Microsoft Office–style toolbar buttons. On the Tools menu in a browser window, click Internet Options, and then click the Advanced tab. In the Toolbar area, select the Small Icons check box.

Use pop-up menus for quick access

Internet Explorer 5.0 features pop-up shortcuts to functions like Save As, Open, and Copy. To access a pop-up menu:

1. Place the mouse cursor on a hypertext link or graphic image, and right-click.
2. Internet Explorer will display one of three pop-up menus you can use to quickly perform the desired function.

Pop-up menu functions include:

- Add to favourites
- Back
- Copy background
- Copy shortcut
- Forward
- Open link
- Open link in new window
- Print target
- Refresh
- Save background
- Save picture as
- Save target as
- Select all
- Set as wallpaper
- Show picture
- View source

THE CACHE AND TOOLBAR

You've arrived at this page, so you already know something about how to use a Web browser. Just in case you haven't yet used some of the features of Microsoft Internet Explorer, here's a guide to them.

Cache

When you explore the World Wide Web, your browser keeps track of the pages you've visited and saves them on your hard disk so they'll load faster when you return to them. This saves you time and money because you can view the saved pages without being connected to the Internet. The saved files, your "temporary Internet files," are stored in your disk cache.

To empty your disk cache.

When you browse, your disk cache can fill up with files you no longer need. Here's how to empty your Internet Explorer disk cache.

For Internet Explorer 5.0:

1. On the **Tools** menu of your Internet Explorer toolbar, click **Internet Options**.
2. Click the **General** tab.
3. In the Temporary Internet Files area, click **Delete Files**, and then click **OK**.
4. Click **OK** to close **Internet Options**.

For Internet Explorer 4.01:

1. On the **View** menu of your Internet Explorer toolbar, click **Internet Options**.
2. Click the **General** tab.
3. In the Temporary Internet Files area, click **Delete Files**, and then click **OK**.
4. Click **OK** to close **Internet Options**.

To change the size of your Internet Explorer disk cache.

You can change the amount of hard-disk space reserved for your disk cache. A larger disk cache may display previously visited pages faster, but it will decrease the amount of hard-disk space available for other files. Here's how to set the size of your disk cache.

For Internet Explorer 5.0:

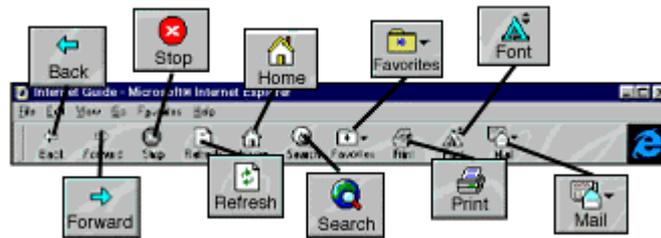
1. On the **Tools** menu of your Internet Explorer toolbar, click **Internet Options**.
2. Click the **General** tab.
3. In the Temporary Internet Files section, click **Settings**.
4. In the Temporary Internet Files Folder section, drag the arrow on the Amount of Disk Space to **Use** slider to the percentage of disk space you want designated for your disk cache, and click **OK**.
5. Click **OK** to close Internet Options.

For Internet Explorer 4.01:

1. On the **View** menu of your Internet Explorer toolbar, click **Internet Options**.
2. Click the **General** tab.
3. In the Temporary Internet Files section, click **Settings**.
4. In the Temporary Internet Files Folder section, drag the arrow on the **Amount of Disk Space to Use** slider to the percentage of disk space you want designated for your disk cache, and click **OK**.
5. Click **OK** to close Internet Options.

Toolbar

The Microsoft Internet Explorer toolbar consists of buttons that are shortcuts for menu commands. They make browsing faster and easier. Click any button on the toolbar below to find out its function.



- **Back** – Lets you return to pages you've viewed, beginning with the most recent. With Microsoft Internet Explorer 5.0, right-click the Back button and select from a list of recently visited sites.
- **Forward** – Lets you move forward through pages you've viewed using the Back button. With Internet Explorer 5.0, right-click the Forward button and select from a list of recently visited sites.
- **Stop** – Halts the process of downloading a Web page. Click this if you want to stop downloading a page for any reason— for example, if you're having trouble downloading it or if you don't want to wait for it to download. Then try downloading it again or browse elsewhere.
- **Refresh** – Updates any Web page stored in your disk cache with the latest content. When you return to a page that you've visited, your browser displays the file stored in your disk cache, rather than the current page on the World Wide Web. This saves download time.
- **Home** – Returns you to your home page. You can designate any Web page as your home page.
- **Search** – Displays a choice of popular Internet search engines in the left pane. Your search results appear in the left pane, too. When you click a link, the page appears in the right pane, so you don't lose sight of your search results.
- **Favourites** – Displays a list of the sites—and, with Internet Explorer 5.0, the folders, files, and servers—that you've saved as Favourites. Click any item in the list to jump to it.
- **Print** – Prints the page you're viewing. This is one way to save information from the Internet so that you don't have to reconnect to view it again. You can even print the URL associated with each hyperlink, making it easy to navigate to the site later.
- **Font** – Lets you display text in a larger or smaller font with Internet Explorer 5.0.
- **Mail** – Connects you to the Microsoft Outlook® Express messaging and collaboration client so you can read e-mail and newsgroup messages.
- **Edit** – Opens a file in the Microsoft Word, word processor that contains the HTML code for the page you're viewing so you can see and even edit it.

UNLEASH THE POWER OF THE INTERNET

What is HTML?

HTML (or hypertext mark-up language) is a programming language used to build Web sites. It contains standard codes (or tags) that determine how a Web page looks when your browser displays it. HTML tags also make possible the hyperlinks that connect information on the World Wide Web.

Why do some Web pages take so long to download?

Many factors affect how fast a Web page travels from its Web site to your computer. Web pages may load slowly for these reasons:

- Your modem transmits data slowly.
- Traffic on the Internet is heavy.
- The page's file is large. It contains graphic, sound, or video files, for example, in addition to text.
- The server and connecting lines used by your online service, your Internet service provider, or the Web site transmit data slowly.

To decrease download time, try these pointers:

- Get the latest version of your browser software.
- Buy a faster modem that transmits at a rate of at least 28,800 baud.
- Browse during off-peak hours.
- Turn off sound and images in your browser software. Text-only pages load faster.
- If a page is loading so slowly that you think it may be stuck, click the Stop button on your browser's toolbar, and try to load the page again in a few minutes.

What is Active Desktop?

The Active Desktop™ interface is a feature of Microsoft Internet Explorer version 5.0 that allows your desktop to function like a browser. Here are some of the things you can do using Active Desktop:

- Get easy, instant access to your most-used applications, including tools such as corporate directories and search engines.
- Display multiple HTML pages and pictures from the World Wide Web or your local network or hard disk.

Create windows on your desktop for the objects you're interested in so the information you need is delivered directly to you.

- Place ActiveX®-based and Java components alongside existing desktop icons, giving you customisable space for your favourite Web content and notifications of new e-mail.

What is FTP, and what does it have to do with downloading?

FTP is short for "file transfer protocol." It's a system of rules for communicating over the Internet, and it allows you to transfer files to and download files from other computers. A Browser software such as Microsoft Internet Explorer contains the tools you need to handle FTP. So with Internet Explorer, you can download any file available on the Internet.

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 INTERNET SEARCHES

This task will help you to find relevant information from an internet search, and show you how to save the text and images.

SEARCHING ON THE INTERNET

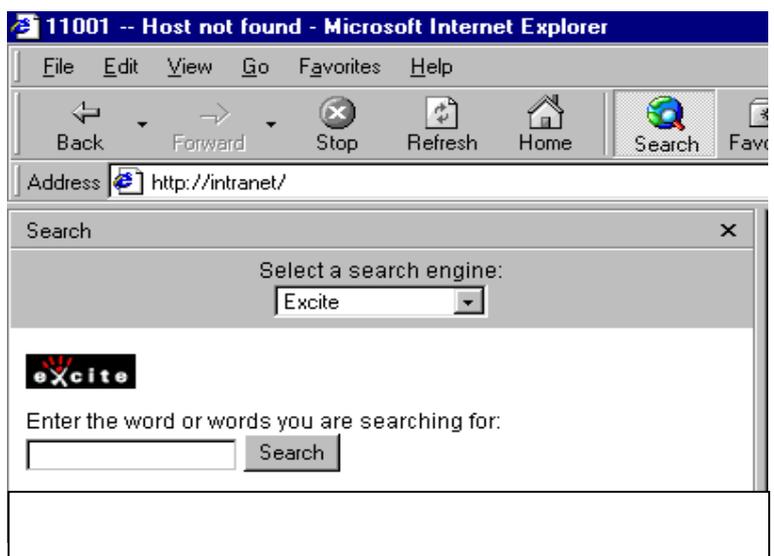
1. Open a web browser that allows you to download and view pages of the Web:



2. Click on the **Search** button.

3. There are many different search engines e.g. **Yahoo, Excite, Infoseek, Google, Alta Vista**. Choose **Excite** for this exercise.

4. Type the words '**key skills**' in the box. Please be sure to spell the words correctly. Click on the **Search** button to the right. (Notice that more than 100,000 web pages were found!).



5. The top ten sites are displayed. Choose one of the sites (highlighted in blue), a hand will appear when you move the pointer over it. Click on it and read the web page.

6. Click the **Back** speed button to return to the search list.

7. Move on to search results 11-20 by clicking on page 2 of the **Results**:

Results
Matches 11-20 out of 109465
[<<](#) [. 1](#) [. 2](#) [. 3](#) [. 4](#) [. 5](#) [. 6](#) [. 7](#) [. 8](#) [. 9](#) [. 10](#) [. >>](#)

8. This time go to a web page by using the right mouse button and clicking on **Open in a New Window**.

9. Try another search engine.

ADVANCED SEARCHING

1. If you enter several keywords, type them in descending order of importance. Try **Bradman Cricket Australia**.
2. Quotation marks can be used to group words together – useful when looking for a name. Try looking up **“Gordon Brown”**.
3. The word **AND**, or one of the symbols **+**, **&** is used to combine words for searching – all terms must be found in a document for a result. Try the following internet query: **Royal AND Family**.
4. **NOT** or the minus sign (-) are used to eliminate a word from a search. Try: **Royal + Family - Diana**.
5. **OR** is used to give a choice of terms in searching. This is best used when either one of two similar terms could be found in a document. Try: **Rainforest AND (deforestation or logging)**.
6. Another useful way of being specific is to look only at titles. In Yahoo place **‘t:’** in front of the keywords you are searching for.
7. Most search engines will have a **Search Help** or **Advanced Search Button**, click on it to get specific advice.

BOOKMARKS

Keep a note of the web pages to which you may wish to return by using the bookmark feature.

1. Go to the BBC web page:
[Http://www.bbc.uk/home/today](http://www.bbc.uk/home/today)
2. Click on Bookmark; Add Bookmark, (in Internet Explorer - Favorites).
3. Exit from your web browser and then reopen it. Click on the Bookmark (Favorites) speed button and click on the appropriate name to return to the BBC Homepage.



SAVING PICTURE FRAMES

Choose an image from the web page and save it to disk. Right click the picture, choose **Save Picture As**, give it a name, and specify the location to save it in.

COPYING PICTURE FRAMES

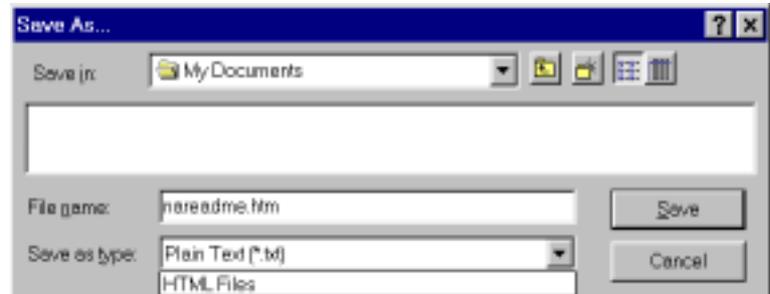
Choose an image from the web page and place it onto the clipboard, by using **Edit; Copy** (or **Ctrl+C**). Open a wordprocessing application and use **Edit; Paste** (or **Ctrl+V**) to paste the picture.

COPYING TEXT FROM A WEB PAGE

Open a news story by clicking on a link from the BBC homepage. Highlight three paragraphs of text and use **Copy & Paste** as above.

SAVING A WEB PAGE

Go to **File; Save As (Ctrl+S)** and choose **Plain Text** if available.



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Copyright applies to electronic information as well as paper-based materials so make sure that you are not infringing any copyright. Do not republish or sell images / text found on the web. Look up The World Wide Web Consortium's web page on intellectual property rights at: <http://www.w3.org/IPR/>

REFERENCES

If you have any quotations or references to online material in your work these should be cited correctly and with as much information as necessary to allow the user to access the web page.

For example, the above URL cited within a document would be:

<URL:<http://www.w3.org/IPR/>

although it is becoming more common to shorten

KEY SKILLS
INFORMATION TECHNOLOGY – LEVEL 1
BUILD-UP EXERCISE: USING A SCANNER

These tasks will help you to scan pictures and text from the documents, books, magazines or newspapers you have selected. Once on your computer the pictures or text can be imported into a variety of applications or saved as files for future use. Scanned images and text can enhance multimedia presentations, reports, newsletters, brochures and other types of communications.

N.b. All scanners come with the software you need to get images and text onto your computer and all work slightly differently, but the principles are the same. For extra assistance consult the Help drop-down menu or the manual.

SCANNING AND SAVING A PICTURE

1. Select a picture to scan. Bear in mind that image quality affects scanning results. Pictures with blurred or missing detail do not scan well. Scanning images printed on glossy paper produces brighter, more contrasted results.
2. Check your scanner is switched on. (It will need to be switched on **before** the computer).

3.a For a flatbed scanner - lift the lid, place the picture face down on the scanner glass, and close the lid.



3.b. For a sheet-feed scanner - insert the picture face up (or place the scanner on the page if the scanner head lifts from the base).



4. **Open** the Scanner Software. You will see a Control Centre (this may have different names according to the software being used).



5. Click on the button for scanning pictures.

(More expensive software may give you the option of clicking a **Preview** button first. This then gives you the option of altering the area to be saved before the final scan).



6. Choose the option from Colour, Greyscale and Line Art.

(When scanning outlines, or any other black and white images, it is advisable to use **Greyscale** rather than **Line Art**). Click on **Scan**.

7. If available, use the **Image Editing Window** to adjust your scan. Try to straighten, rotate, enhance, or crop your scanned image at this stage.

8. Choose the **Save** or **Save As** command from the File menu. In the **Save As** box select a drive, directory, and format for the file. It may be advisable to save as a **.tif** file for best quality. Enter a suitable file name and click **O.K.** to save the image.

9. The picture is now saved as a file and can be opened into the program that you wish to use it in.



10. Saving large colour images uses a lot of disk space. If you were to scan an 8 1/2 by 11 inch colour picture at only 200 dpi (dots per inch), the file size would be 10.7 MB (megabytes). An empty high-density floppy disk will hold 1.44 MB!

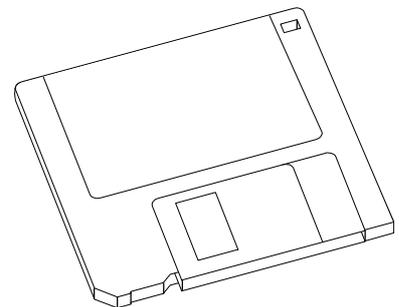
If drive space is a problem try one or more of the following:

a) Scan in colour at a lower **resolution** (in the example above at 100 dpi the file size would be 2.75 MB).

b) Scan the image in **Greyscale** (in the example above it would cut the file size to 3.5 MB, or 913 KB at 100 dpi).

c) Save in JPEG format (**.jpg**) to compress the file.

d) Resize or crop the picture in an image editor such as PhotoShop.



SCANNING A PICTURE DIRECTLY INTO AN APPLICATION

It is possible to scan a picture directly into an application (most applications are **TWAIN** compliant which makes this possible).

1. Always open the other application first. Try **Microsoft Publisher**, and select **Blank Page, Full Page**.

2. Go to **Insert; Scanner Image. Select Scanner**. Check the scanner is installed.

3. Go to **Insert; Scanner Image. Acquire Scanned Image. The Control Centre** will appear. Follow the steps taken in the section above.

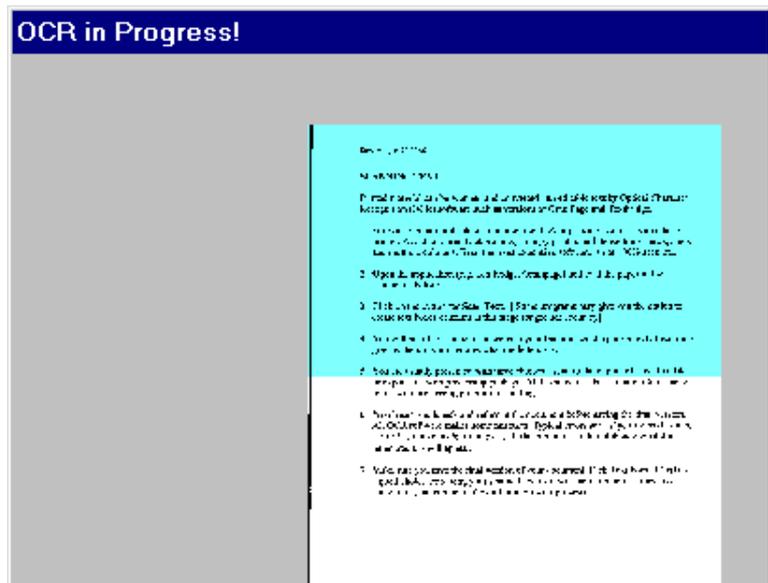
4. It is not unusual to scan an image a couple of times before getting it right. Discard the image and try again changing one or two settings until you are happy with the result.

SCANNING TEXT

Printed material can be scanned and converted into editable text by Optical Character Recognition (OCR) software such as versions of OmniPage and Textbridge. However, do not put too much faith into these packages - after a couple of trial runs you should be able to decide whether it would be quicker to type in text from future documents.

1. For your first attempt select a document with clear printing, such as from a laser printer. Avoid coloured backgrounds, smudgy print, small dense fonts, tables and multiple columns. Even the most expensive software is not 100% accurate.
2. **Open** the application (e.g. Textbridge, Omnipage) and load the paper in the scanner as before.

3. Click on the button for **Scan Text**. (Some programs may give you the option to create text boxes or zones at this stage for greater accuracy).



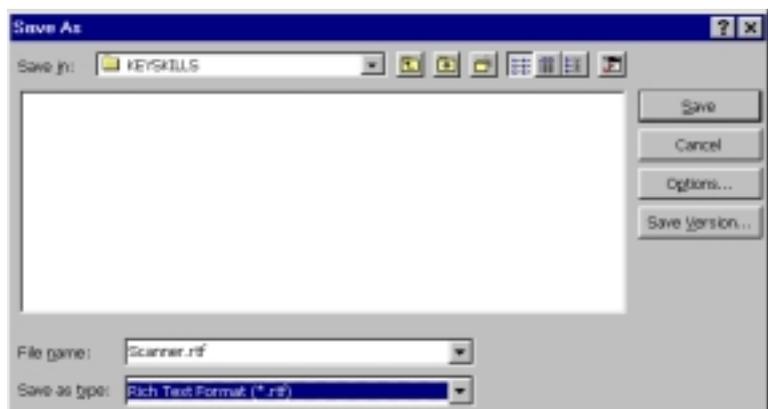
4. You will hear the scanner as it scans in your text and see the page slowly becoming grey or blue as the program decides what the letters are.

5. You are presented with two or three choices - send to the clipboard, save to a file, or export to a word-processing package (e.g. Word, WordPerfect).

Either **Send** to the clipboard,
Or **Open** a word-processing program and then **Edit; Paste** into a document
Or **Export** into the word-processing program.

6. It is important to edit the scanned text in a word-processing package as all OCR software makes some mistakes. Typical errors are a *d* getting read as a *cl*, a *1* or *!* as *l*, an *m* as *in*, or an *e* as *c*. If the computer could not decide what the letter was a ~ will appear. Proof read, spellcheck and reformat the document until you are satisfied with it.

7. Make sure you save the final version of your document. Rich Text Format (.rtf) is a good choice for saving your scanned text as it will maintain bold, italics and some fonts, but can be read by all modern wordprocessors.



**KEY SKILLS
INFORMATION TECHNOLOGY – LEVEL 2
GRAPHICS**



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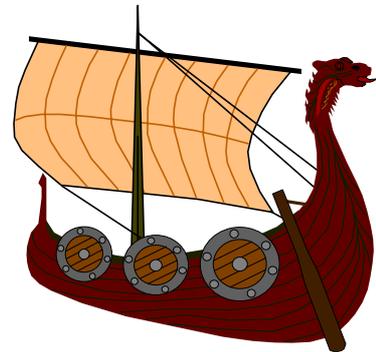
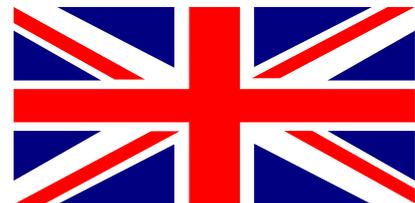
INTRODUCTION

This work book will introduce you to ideas about how drawing is used. You will be using the drawing toolbar with in Microsoft Word, a word-processing package that you have already used.

Drawing packages are used in a wide range of situations and in many different types of organisations, e.g. in engineering and construction, maps, illustrations, scientific experiments, family trees designing posters and cards.

This work booklet will help prepare you for the Key Skills Information Technology test. It will show you how to produce two-dimensional drawings. Some more complex packages can produce three-dimensional drawings.

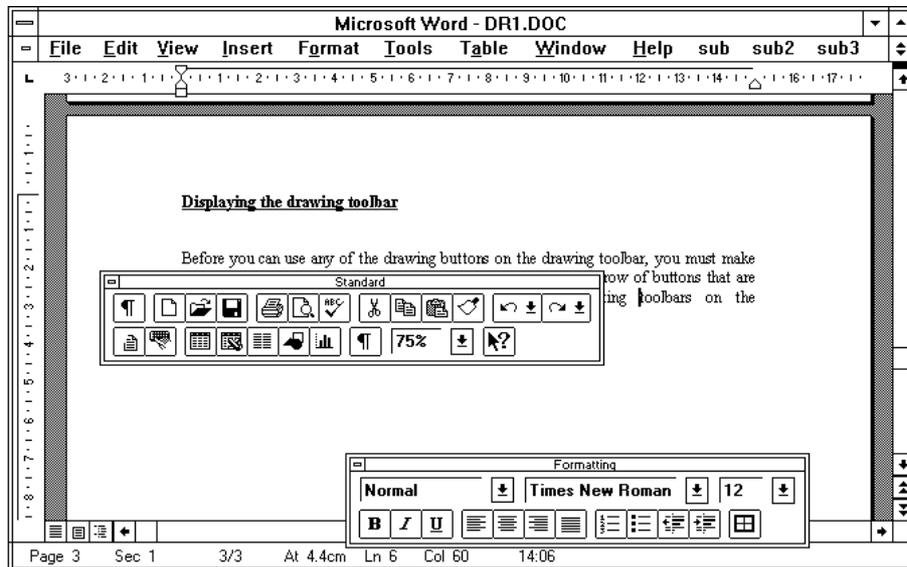
Before starting the exercises in this booklet, ask your tutor to reset the drawing package. This will ensure that the lines & objects that you draw will appear as 'normal' lines.



If in doubt - Ask your assessor.

DISPLAYING THE DRAWING TOOLBAR

Before you can use any of the drawing buttons on the drawing toolbar, you must make sure that the toolbar is visible. Remember a toolbar is simply a row of buttons that are grouped together. For instance the standard and formatting toolbars on the word-processing screen



Note : As shown in the diagram above, toolbars can be placed anywhere on the screen. If you are unsure how to do this ask your tutor to show you.

To display the Drawing Toolbar

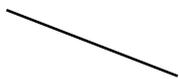
Click the drawing button.



This is located towards the right hand side of the standard toolbar.

USING THE TOOLBAR TO DRAW SHAPES

For most drawings that can be drawn using this package can be made up by using the following primitive shapes. This is true no matter how complex the drawing looks.



Line



Rectangle



Ellipse



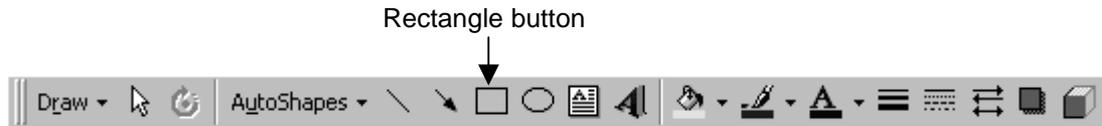
Arc



Freeform

To draw a shape

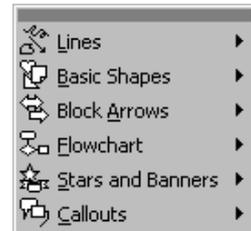
1. Click the mouse pointer over the rectangle button.



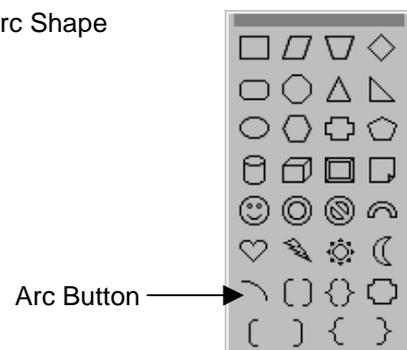
2. Move the pointer over a clear part of the screen
3. Hold down the mouse button, with the button still held, move roughly 1 inch down and 1 inch across.
4. Release the mouse button.
5. Click the mouse pointer over the AutoShapes button.



6. Click the mouse pointer over the Type of AutoShape (try Basic Shapes).



7. Click the mouse pointer over the Shape you require (try the Arc Shape button).



8. Move the pointer over a clear part of the screen.
9. Hold down the mouse button, with the button still held, move roughly 1 inch down and 1 inch across.
10. Release the mouse button.

NB: This is the general procedure that you would use to draw a Line, rectangle, Ellipse or an Arc.

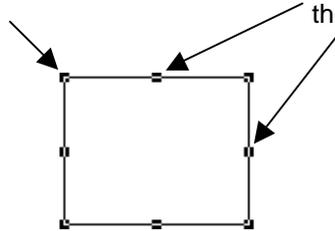
Handles

When the shape is first drawn, you will notice a number of small rectangles attached to the shapes corners and sides. These are known as **Handles**.

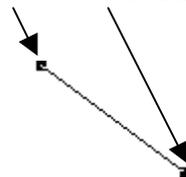
Different handles have different functions and are described below.

Corner handles adjust the size & shape of the rectangle.

Handles at the side of a rectangle adjust the width or height.

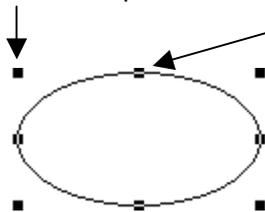


Handles at the start or end of a line allow you to relocate the start or end of a line.

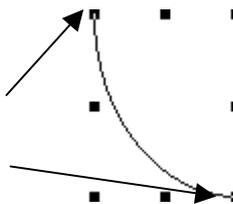


Corner handles adjust the size & shape of the ellipse.

Handles at the side of an ellipse adjust the width or height.



Handles at the start or end of an arc allow you to relocate the start or end of the arc.



Handles at the corner allow you to adjust the size of the freeform shape.

Handles at the side of a freeform shape adjust the width or height.

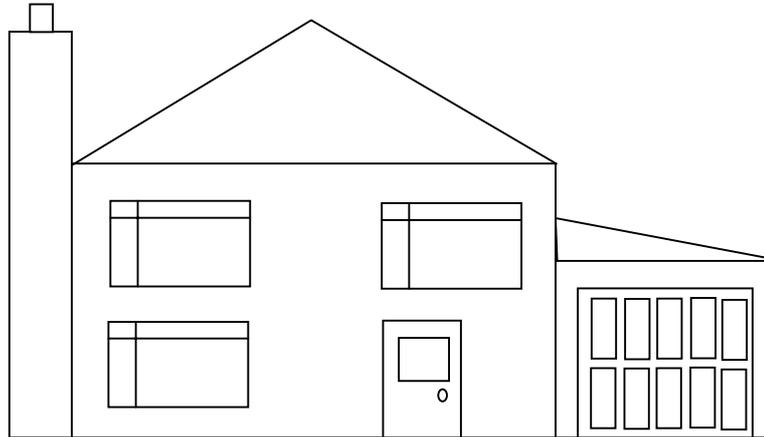


Practice Exercise

This practice exercise gives you chance to practice drawing the shapes that you have been reading about. If you draw a shape that is in the wrong place, try using the handles to adjust the shape so that it is correct.

EXERCISE 1 - STEP 1

1. Copy the drawing of a house shown below.

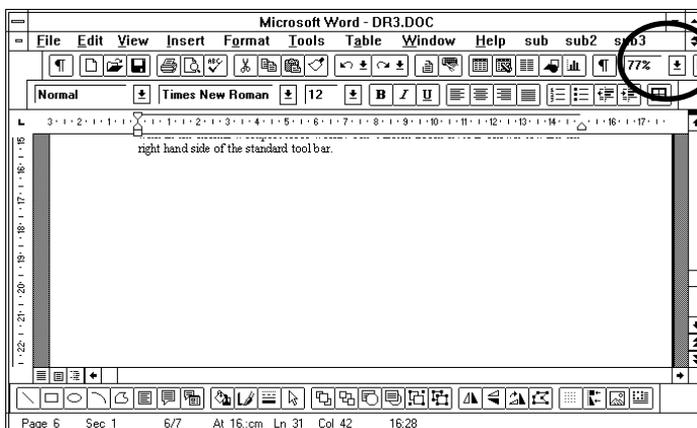


EXERCISE 1 - STEP 2

1. Place your name at the top of your drawing.
2. Print out one copy.
3. Save your work to your floppy drive under the name "draw 1".
4. File your work in your portfolio.

ZOOM

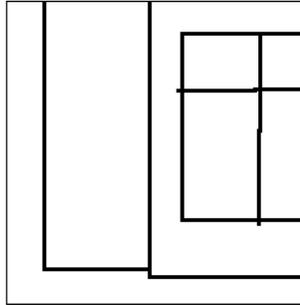
The zoom feature of this drawing package works in exactly the same way that the zoom with in the normal word-processor works. The current zoom level is shown toward the right hand side of the standard tool bar.



Using the zoom feature will allow you to look more closely or more distantly at your drawing.

To adjust the Zoom Level

1. Click the downward arrow that is next to the box that shows the zoom level.
2. From this list of sizes, click on a different percentage value.
3. Use the zoom feature to zoom into the drawing of a house. Zoom to a size of 200 % and use the scroll bars to look at the bottom window.

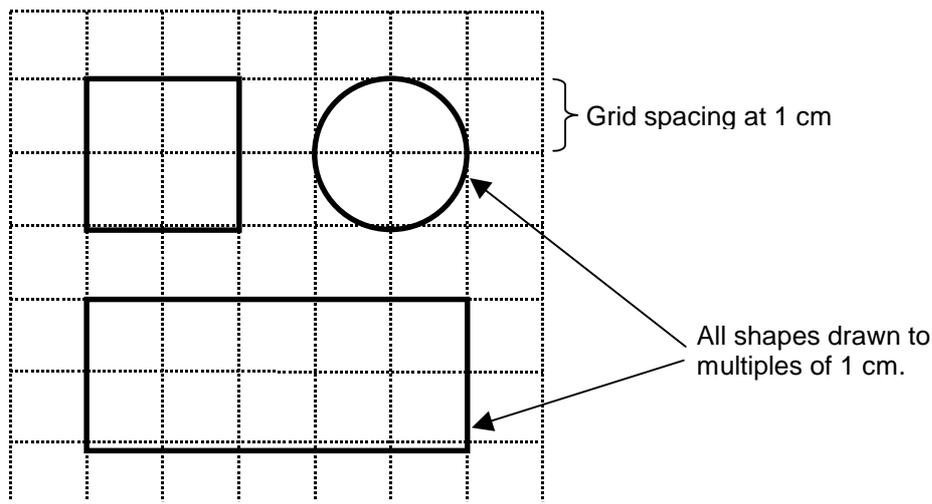


You will see an enlarged view and you will notice that the lines that previously looked straight are in fact not very well drawn.

One way to draw shapes more accurately is to zoom in as far as possible (200%) when constructing the shapes. However, a better way is to use a **Grid**.

USING A GRID

Using a grid allows you to draw shapes to a multiple of the grid size. For instance if the grid size is set to 1 cm, then it would be simple to draw the following shapes.



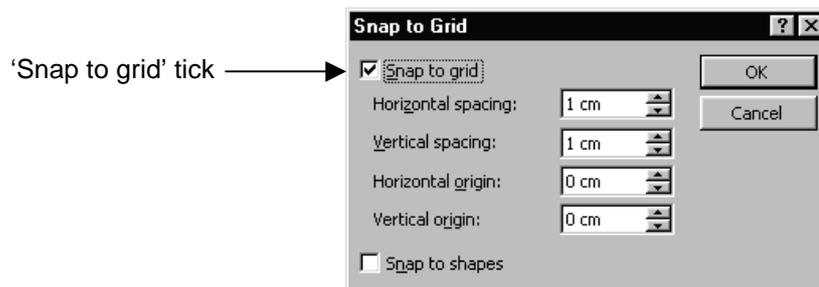
Note : In MsWord the grid is not actually visible on the screen.

To switch the Grid on or adjust the Grid spacing

1. Click on the "Draw" button



2. Click on the "snap to grid" menu  button. This is toward the left hand side on the menu bar.
3. To activate the grid, make sure that the "snap to grid" check box has a tick in it. If it does not, then click the box until a tick appears as shown below.



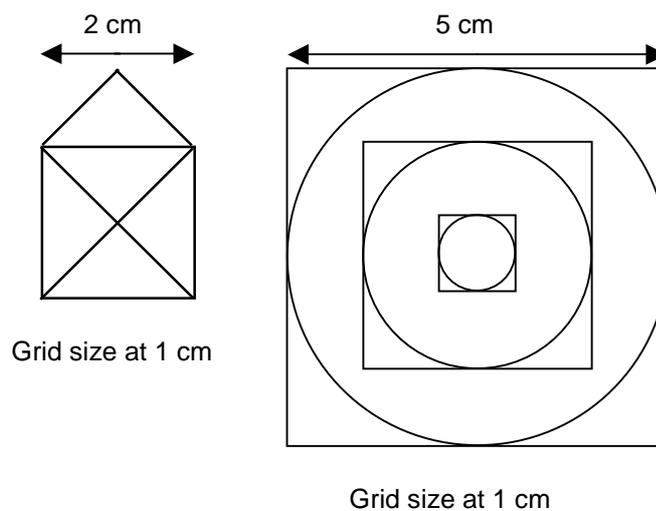
4. To set the grid size click the up or down arrows that appear next to the Horizontal & Vertical spacing boxes.

Normally the horizontal and vertical sizes are kept to the same size.

Practice Exercise

For practice, adjust the grid spacing to the following sizes and copy the shapes below. You should be able to make exact copies.

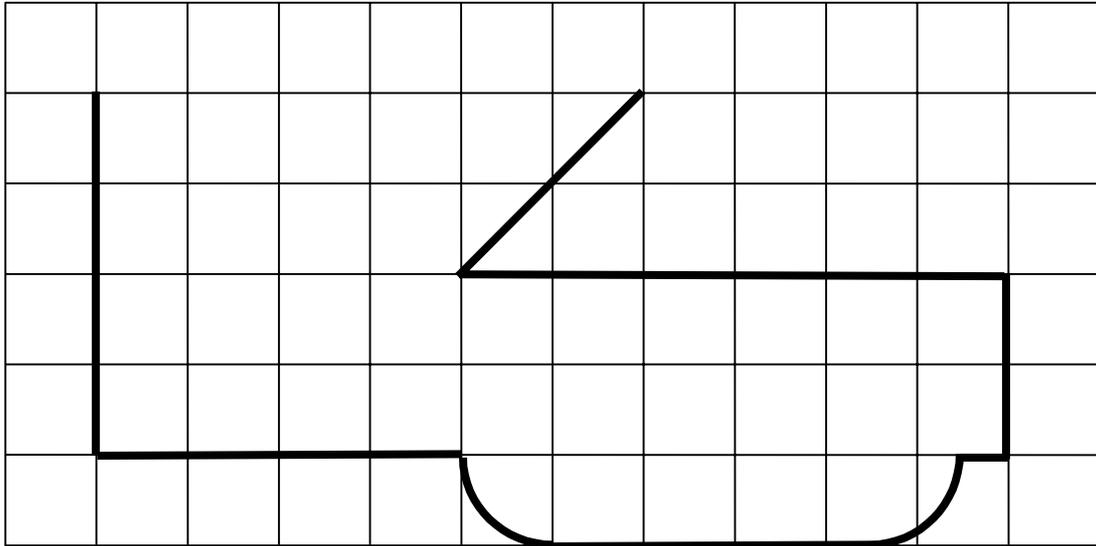
If you feel that you do not need much practice, then just draw the glasses.



EXERCISE 2 - STEP 1

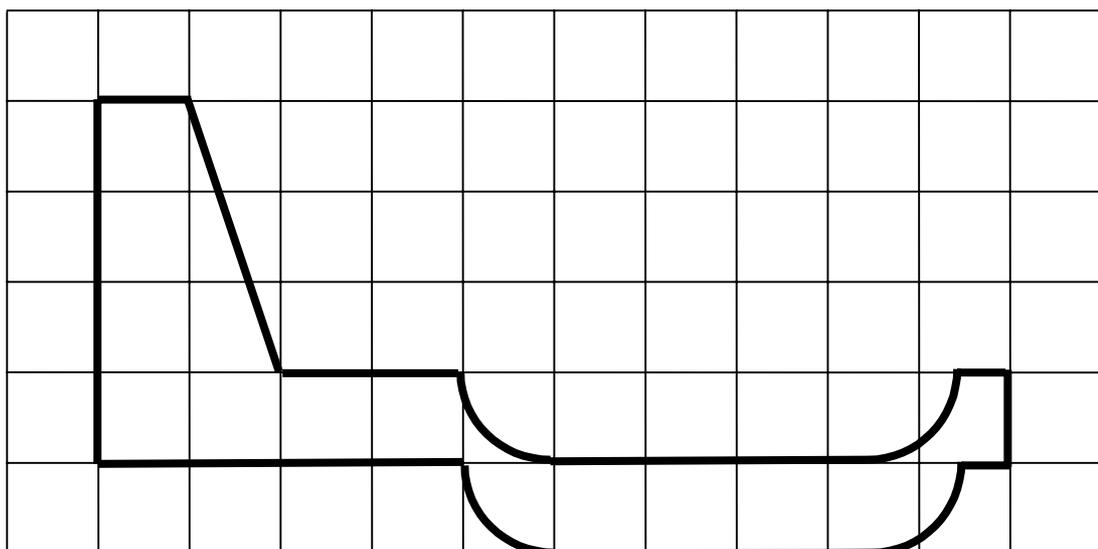
1. Copy the drawing shown below.

The grid has been drawn for you at size 1.2 cm, some lines require the size to be altered to 0.6cm.



EXERCISE 2 - STEP 2

1. Type in your name on the top of your page.
2. Print out one copy.
3. Save your work under the name "draw 2".
4. Make any necessary changes to make your diagram the same as the one below.



EXERCISE 2 - STEP 3

1. Print out one copy.
2. Save your work under the name "draw 2a".
3. File the work in your portfolio.

GROUPING & COPYING

Objects are normally grouped together so that they can all be moved or copied together at the same time.

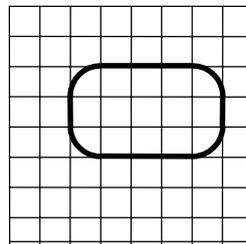
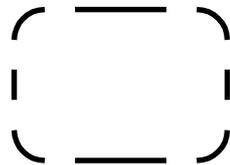
For instance supposing you were trying to draw a calculator. The quickest way to draw the keypad would be to draw a single key and then copy this for all the other keys.

Although the key is just a single key, it may be made up of several lines or different shapes. For this reason, before the key can be copied, the different lines must be grouped together. Once different lines are grouped together, they act as though they are all a single object and can be moved, copied or re-sized together.

Practice/training exercise

Follow this worked example to see how to group & copy individual lines.

1. Set the grid size to 0.4 cm and draw a single key. The individual lines & arcs that make up the key are shown below on the left, the key & grid size are shown on the right.



2. To group the individual lines together, hold down the shift key, keep this held until you are told to let go.
3. One-By-One, click on each line or arc. When you are doing this, it tells the computer which lines or arcs you wish to group together.
4. When all 8 lines are selected, release the shift key.
5. Click on the "Draw" button.

Draw Button



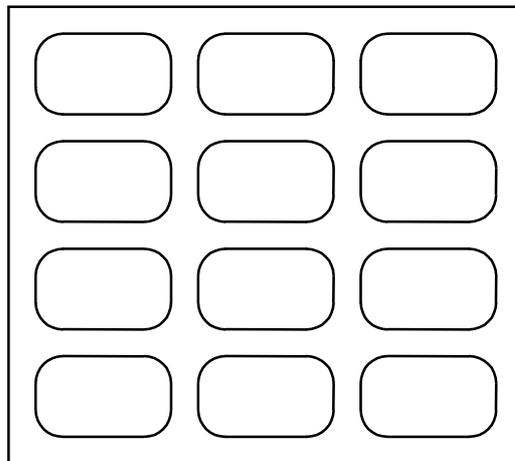
6. Click on the 'group' menu button.  This is toward the top of the menu bar.
7. The individual lines are now grouped together, to test this, try moving or re-sizing the object.

Note: At any time it is possible to ungroup an object. See the help sheets later on for help concerning this.

8. To copy this key, click on the key.
9. Go into the **Edit** menu & select **Copy**.
10. Go into the **Edit** menu & select **Paste**.

A copy of the first key will appear on the screen. Perform the above copy until you have a total of 12 keys.

11. Arrange the keys in a pattern, as shown below.



SUMMARY

So far you have looked at the basic features of the drawing package, these include.

- Displaying the drawing toolbar
- Drawing primitive shapes - Lines, Rectangles, Ellipses, Arcs and Freeform.
- Using Handles
- Zoom Levels
- Use of the Grid
- Copying
- Grouping

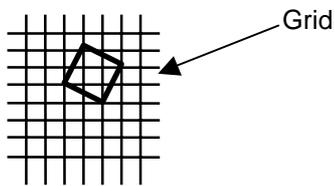
If you are unsure or would like to discuss any of the above, ask your assessor now, before continuing through this booklet.

The second part of this booklet consists of drawing exercises, along with help sheets. You will need to refer to these help sheets because you will be asked to use features that have not been covered before.

Winning Flag Exercise

Set the grid size to 0.25cm, make sure that the grid is switched on.

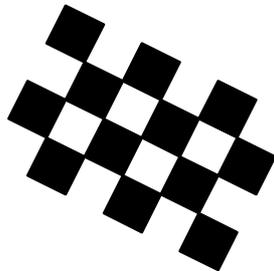
Create the following shape using the FreeForm tool.



Change the Fill of the shape so that it is solid black. When you have done this it should look like this (**see help on Fill**):



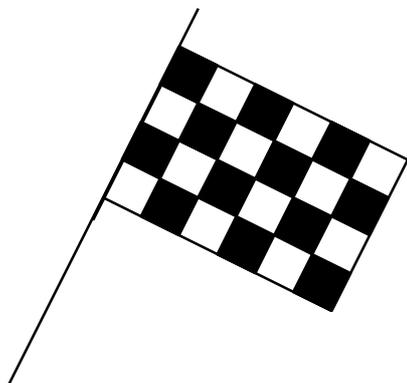
Copy this shape 11 times and arrange them as shown below:



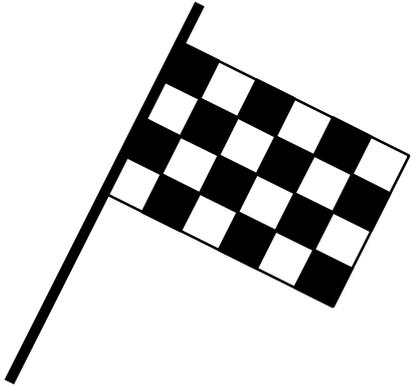
Using the Line tool, create a box around the flag as shown below:



Create a handle for the flag, as shown below:

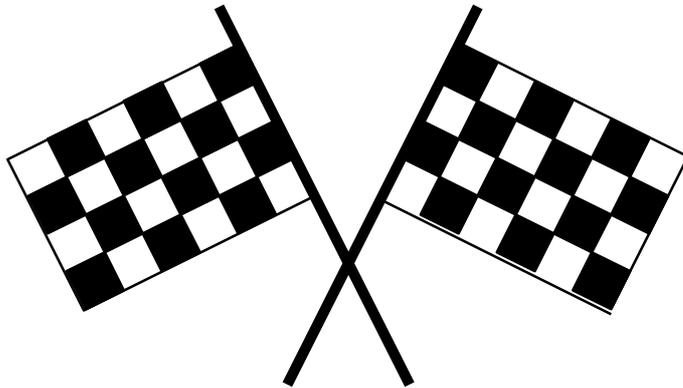


Adjust the thickness of this line so that it is 4 times as thick as a normal line. It should now appear like this (see help on line Style):



Group all the objects together. If you want to check that you have grouped **all** the objects, try moving them together. If you have made an error, use **Undo** and try again.

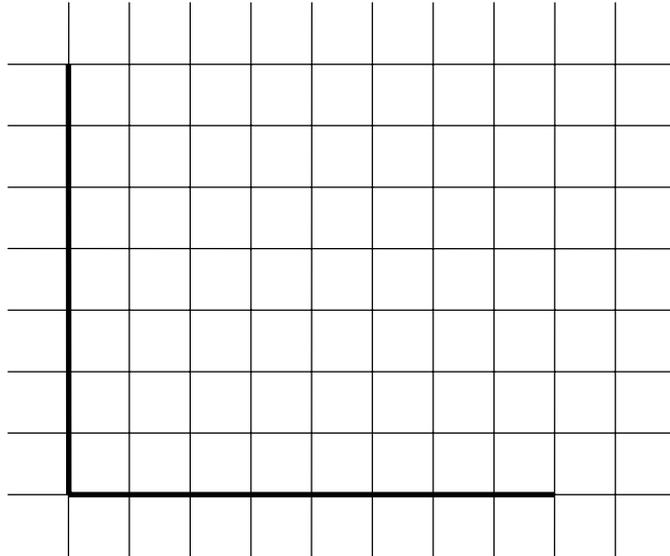
Copy the flag, and flip the flag horizontally. Position it as shown below. The completed flag should look like this (see help on Horizontal & Vertical Flip):



Motor Speed (bar chart) Exercise

EXERCISE 3 - STEP 1

1. Set the grid size to 1 cm, make sure that snap to grid is switched ON.
2. Copy the thick lines below. The thinner ones are just to show the grid size.

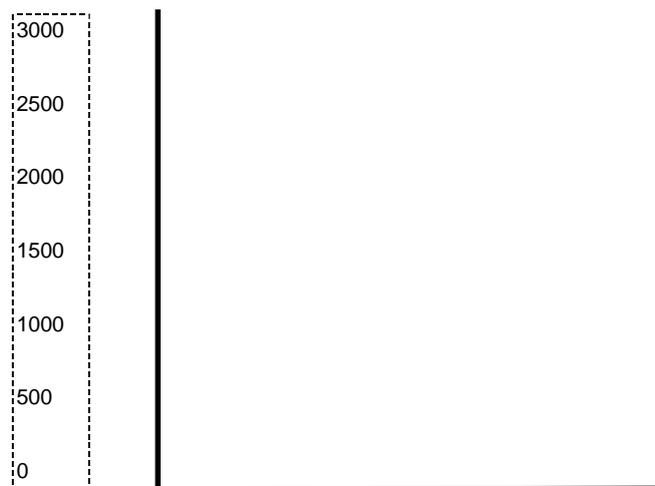


EXERCISE 3 - STEP 2

1. Insert a text box in the position shown below. Label the graph as shown below.

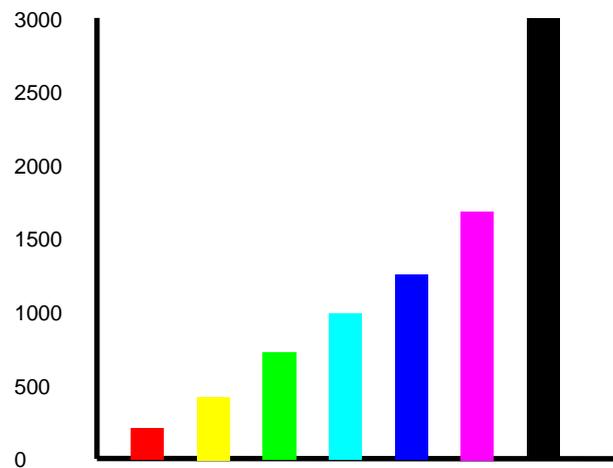
You will need to adjust the size of the text inside the text box to size 8 (**see help on Text Box**).

You should not actually be able to see the border of the text box, I have shown this with a dotted line.



EXERCISE 3 - STEP 3

1. Adjust the grid size to 0.5 cm and construct the graph values using filled rectangles. Make sure that each rectangle is filled with a different colour.

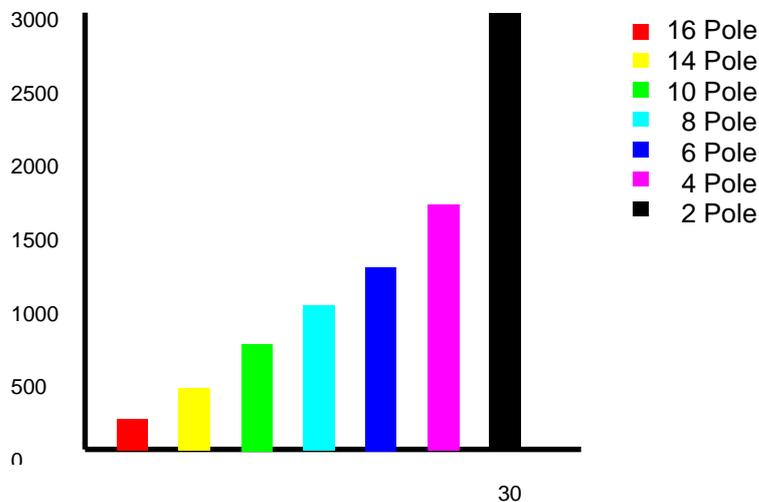


EXERCISE 3 - STEP 4

1. Type your name on the top of the page.
2. Print out one copy.
3. Save your work to your floppy under the name "draw 3".

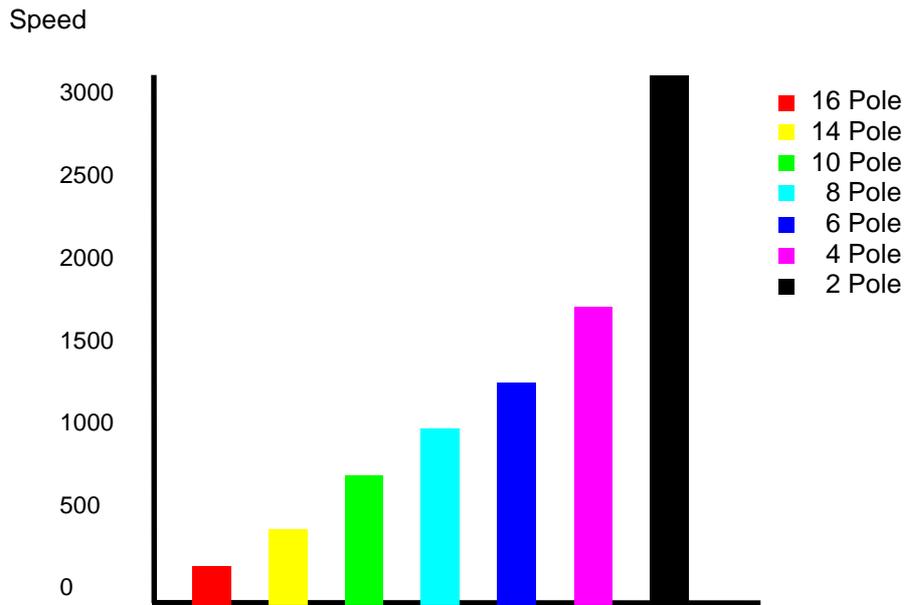
EXERCISE 3 - STEP 5

1. Insert another text box in the position shown below.
2. Type the legend text in, this text will need to be size 12.
3. Create filled rectangles that correspond with the graph values. To draw these boxes the grid must be set to 0.1 cm.



EXERCISE 3 - STEP 6

1. Add the title & label the vertical axis to complete the graph.
2. Save the file to your floppy drive under the name "draw 3a".
3. Print out your work.
4. File your work in your portfolio.



A/C Motor Speed

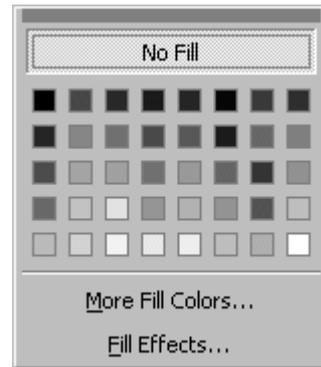
Population Pie Chart Exercise

1. Set the grid size to 1 cm, make sure that snap to grid is switched ON.
2. Draw a 2cm Arc using the **AutoShapes** menu on the draw toolbar.
3. Colour the Arc in using downward arrow next to the 'Fill colour' tool on the draw toolbar

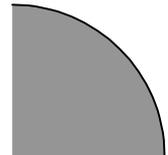
Downward arrow next to
the 'Fill colour' button



This will reveal the 'Fill colour' box

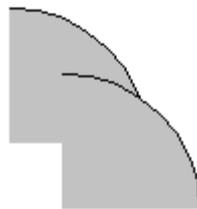


4. You may now select an appropriate fill colour for the Arc by clicking on a colour using the left hand button of your mouse - this will be the first segment of your pie chart.



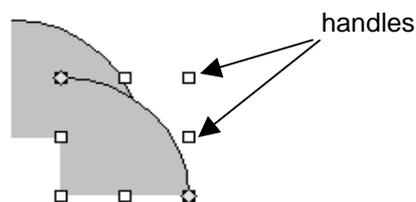
5. Select the segment by clicking it one then copy it using the '**copy**' tool  on the Standard toolbar.
6. Now past the object using the '**paste**' tool  on the Standard toolbar.

The objects will look something like this



7. Select one of the Arc's by single clicking over it with the left hand button of your mouse.

The handles should now appear



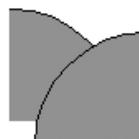
8. Select the Draw menu on the on the draw toolbar

Draw menu button

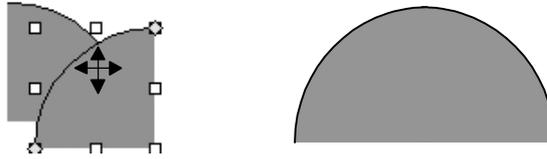


9. Select **Rotate** or **Flip** then **Flip Horizontal**

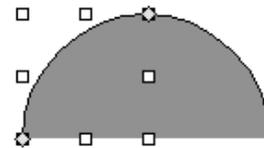
The objects will look something like this



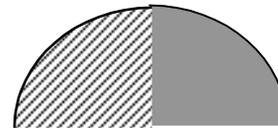
10. Select one of the Arc's by single clicking over it with the left hand button of your mouse.
11. Rearrange the Arc's to for a semicircle -by dragging the object
12. Position the cursor over the object until the cross appears similar to the one below. Press on the left hand mouse button without letting go drag the object to its new position then let go.



13. Select the Segments thus



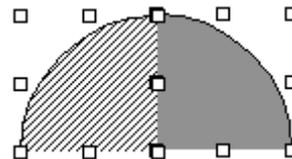
14. Recolor it using the 'Fill colour' tool on the draw toolbar



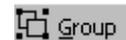
15. Click on the **Select Objects** tool  on the draw toolbar

16. Draw a box around both objects that form the semicircle

The object should now appear like this

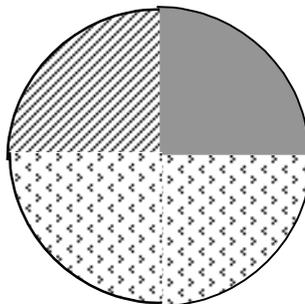


17. Now group the objects by selecting the Draw menu on the draw toolbar and then group from the top of the revealed menu.



18. Now Copy, Paste and Rotate Vertical using the same procedure as before then rearrange the new semicircle and recolor for your pie chart.

You should now have a pie chart similar to the one below.



HELP SHEET - FILL

This refers to how the inside of a bounded object is filled. You have a choice of many different colours and different hatch styles. A number of examples are shown below.

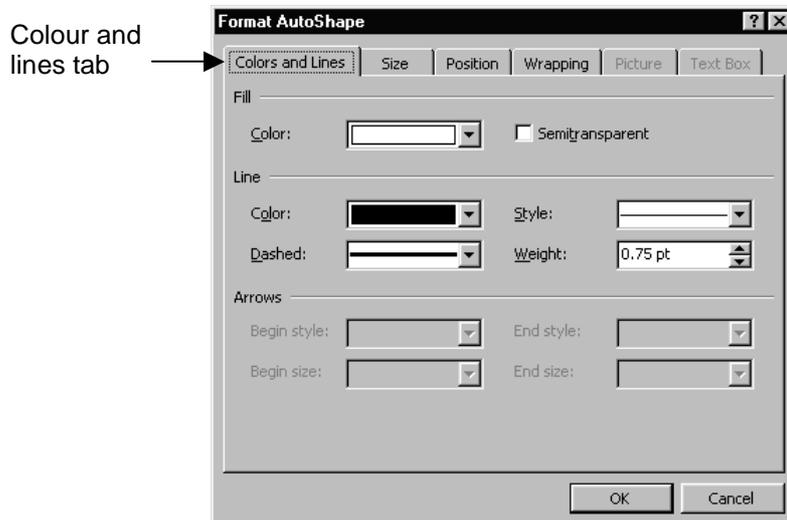


To change the Fill style of an existing shape do the following,

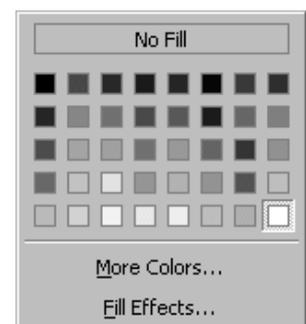
1. Make sure that no objects are selected. If necessary, click in free space to do this.
2. Move the mouse pointer over the object until the pointer changes to show four arrows, looking like this.
3. Double click on the object.



You will be presented with the Drawing Object dialogue box, like this.



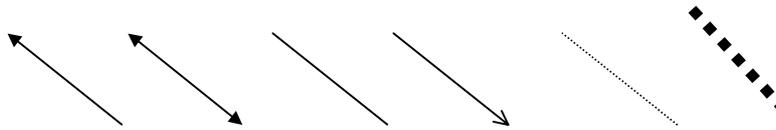
4. Make sure that the Colour and Line Tab is selected
5. Select the desired Fill colour.
6. Or Select Fill Effects and select a pattern then Click OK when done .
7. Click OK when done.



Note: This new Fill pattern will be used for all future bounded objects, until the fill style is changed.

HELP SHEET - LINE STYLE

A line can be drawn in any colour and with many different settings of line style. A number of examples are shown below.

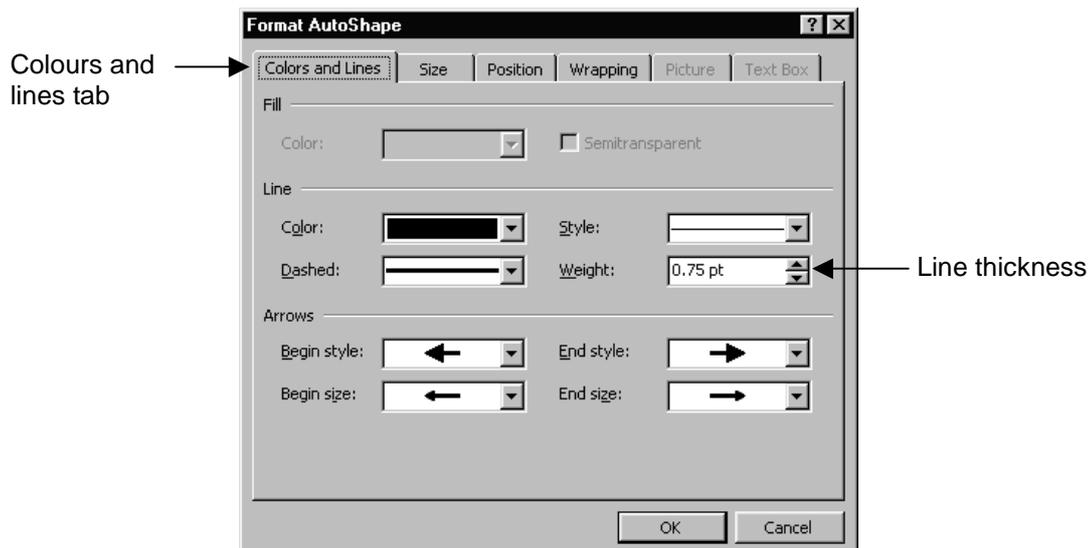


To change the Line Style of an existing line do the following,

1. Make sure that no objects are selected, if necessary, click in free space to do this.
2. Move the mouse pointer over the line until the pointer changes to show four arrows, looking like this.
3. Double click on the Line.



You will be presented with the Format AutoShape dialogue box, like this.



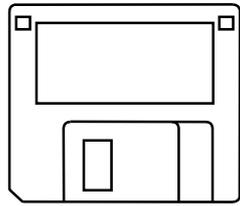
4. Make sure that the Line tab is selected
5. Select the desired colour.
6. Select the desired weighting to change the line thickness
7. Click OK when done.

Note: This new line style will be used for all future lines, until the line style is changed.

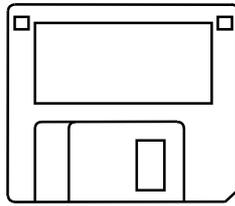
HELP SHEET - FLIP HORIZONTAL & VERTICAL

The **Flip horizontal** & **Flip vertical** buttons allow you to flip an object about a horizontal or vertical axis. For instance imagine the picture of a computer disk, this can be flipped, as shown below:

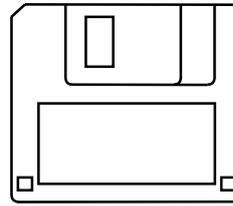
To flip an object



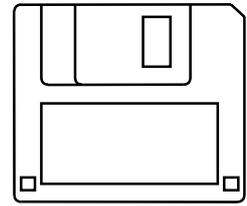
Disk as it was drawn



Horizontal Flip



Vertical Flip



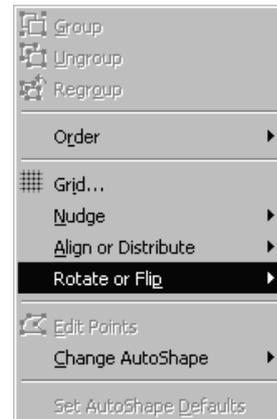
Horizontal & vertical Flip

1. Select the object to be flipped

Draw Button



2. Click on **Rotate** or **Flip** on the Draw Menu



3. Click either the flip horizontal  or the flip vertical  button on the menu bar.

HELP SHEET - TEXT BOXES

Using the word-processor it is possible to place text anywhere on the screen. However using a text box offers two advantages,

- It is easier to move a block of text
- You don't need to use tabs or spaces to put the text in the correct position.

To insert a text box, use exactly the same procedure as you would to draw a rectangle. The only difference is that you would use the text box button  instead of the rectangle button.

Once you have a text box on the screen, it can be moved or re-sized just as any other shape.

You will not be allowed to write more text than will fit into the text box.

KEY SKILLS
INFORMATION TECHNOLOGY – LEVEL 2
GRAPHICAL REPRESENTATION OF DATA SOFTWARE

INTRODUCTION

Graphical Representation of Data software allows you to output numerical information as a graph, chart or diagram. The graphing function of a spreadsheet package such as Microsoft Excel, Claris Works or Lotus 1-2-3 can be used, or software especially designed for graphic displays, such as Delta Graph or CricketGraph. Converting numerical data into pictorial form makes it easier to read, understand and analyse.

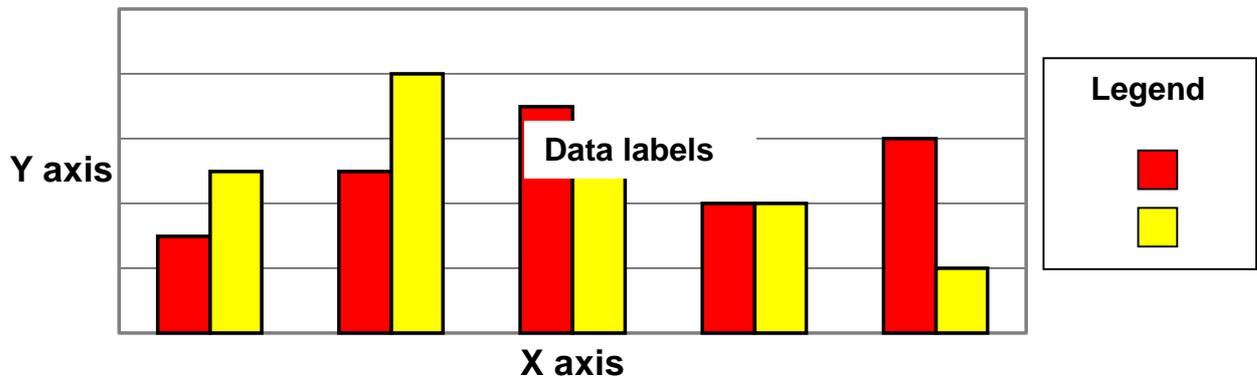
MAIN FEATURES

The software can:

- Quickly produce professional looking charts.
- Allow you to select the graph or chart that is best suited for your readers or audience.
- Write headings or labels in a variety of fonts and sizes.
- Easily adjust the size and scale of your display, add legends, and alter the colours on the chart.
- Save graphs to disk and print graphs.
- Edit data without having to create a new graph
- Link charts to the worksheet data they are created from so they are updated when you change the worksheet data.
- Paste or insert charts into word processing, presentation and desktop publishing packages.

THE PARTS OF A CHART

THE TITLE



The **Title** summarises what the graph or chart is showing. It should be descriptive and clear. It is usually placed above or below your graph.

The Axes are the lines of reference against which the information is plotted. The axes have to be clearly named but try to avoid cluttering the graph with too much text. Where appropriate the units of measurement should be included e.g. '£', 'cm', 'per week'.

The x-axis is the horizontal axis. This is normally used to show categories of the data.

The y-axis is the vertical axis. This is normally used to show the range of values for the categories in the graph.

The Scale is how the units of measurement are represented on the axis. The choice of scale can greatly affect the visual impact of the graph.

The Data labels explain the segments of a pie chart or the bars of a graph.

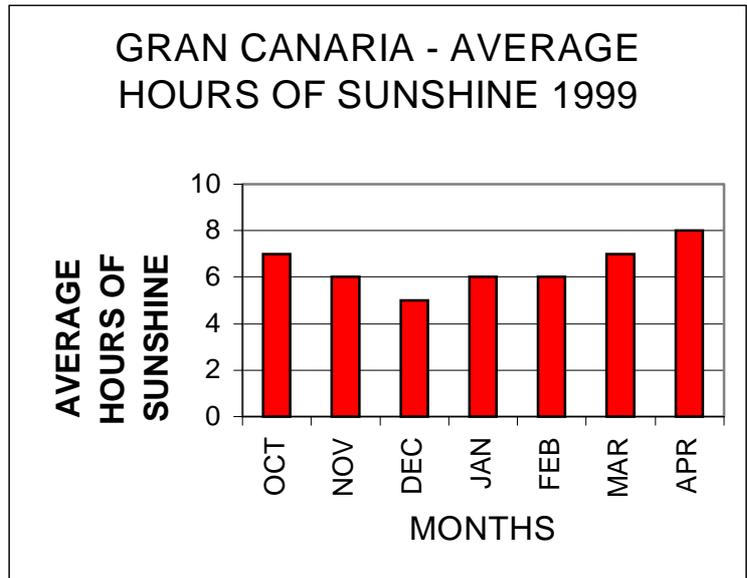
The Legend explains the patterns or colours used. A legend is helpful with pie charts and comparative graphs but may be unnecessary with other charts.

TYPES OF CHARTS

There are three broad categories of charts:

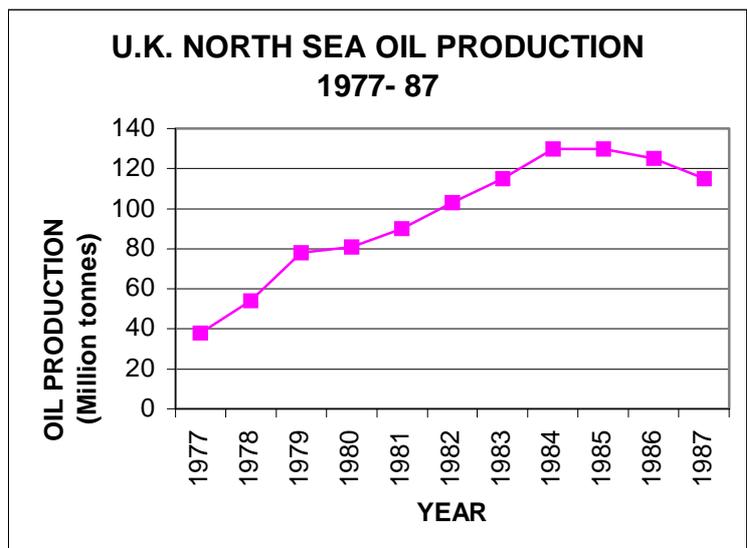
A Bar chart uses columns for each item of data. The bars should go vertically. (Note Excel rather confusingly calls these 'column' charts).

Bar charts best represent data over time and allow one-to-one comparisons of the data series. In the example, the shortest bar is December, which shows that it was the winter month in Gran Canaria with the least sunshine.



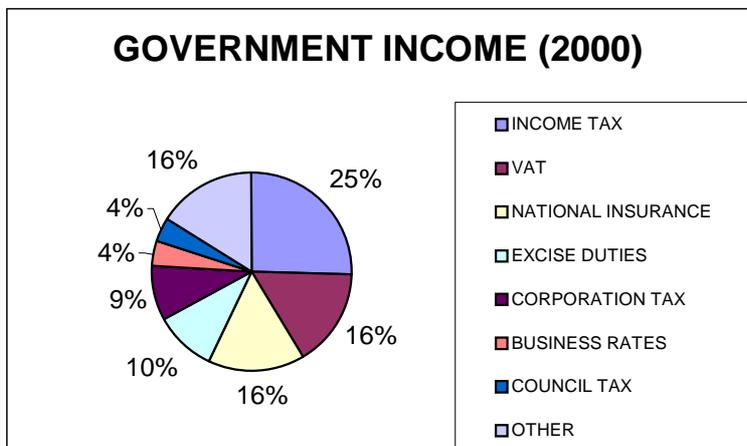
A Graph plots a series of points, with each point being determined by a pair of co-ordinates. Usually, the points are joined together by a line.

Line graphs are used to show trends in data. The data series is plotted at equal time intervals. The example shows how U.K. North Sea oil production was on an upward trend until 1984 when a decline began.



A Pie chart consists of a circle divided into a number of segments. The values in the data series are totalled, so that each value can be calculated as a percentage of the total.

The pie chart to the right shows at a glance that income tax is the largest single source of Government Income in the year 2000.



CREATING A GRAPH IN EXCEL

Excel 97 provides a quick way to produce a professional-looking chart:

Load Excel and enter the data and headings in the cells.

Highlight the data you want to graph. Select both the numeric data and the adjacent row and column labels. (The labels are used for axis and legend information).

Use the **Chart Wizard** (or press **F11** for a quick bar chart).

Using the Chart Wizard

It is advisable to use the **Chart Wizard**. The **Chart Wizard** provides a wide range of options so you can create a chart that meets your needs. There are 4 easy steps and at each step there is a dialogue box. At any stage you can press **Cancel** to return to the worksheet or **Finish** to complete the creation of a chart.

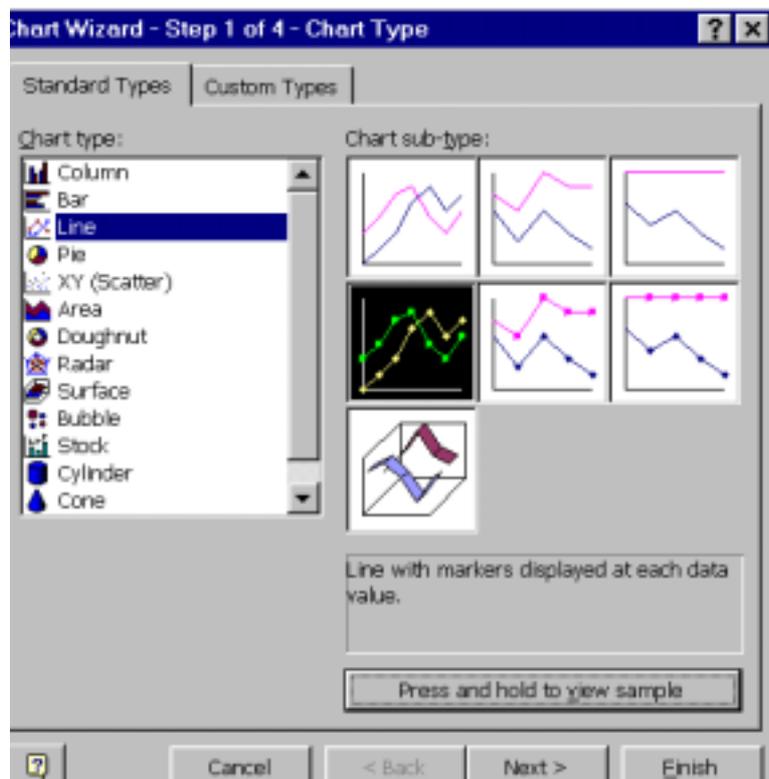
To select the **Chart Wizard** click the graph icon and click on **Chart**.



on the toolbar (or go to the **Insert** menu

Step 1

1. Choose the type of graph you want.
2. (Think twice before using 3-D effects as they can obscure what you are trying to show).
3. Press and hold the **Preview** option to see how it will display.
4. Click **Next** to move to Step 2.



Step 2

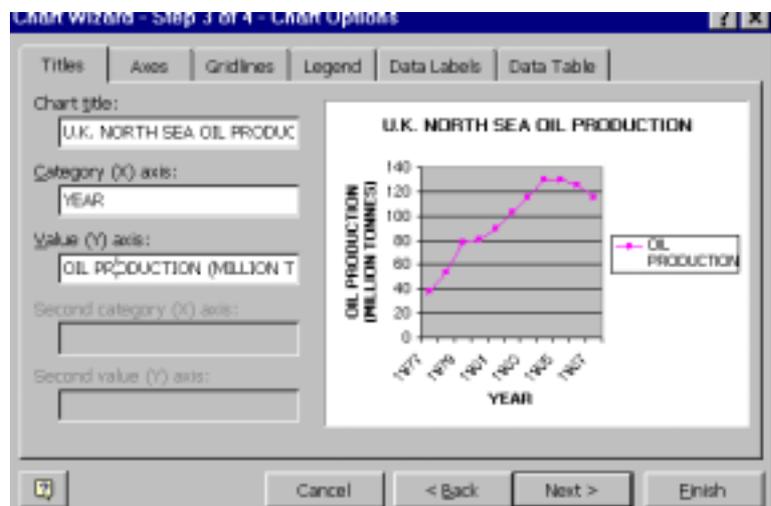
Usually you will not need to make changes at Step 2. However, if the chart looked wrong at the preview stage (as in the case of this line graph):

1. The **Data Range** tab allows you to change the data range you selected or to use rows instead of columns as the basis for the data series.
2. The **Series** tab allows you to change the ranges that identify the series names, values and X-axis labels.
3. Click **Next**.



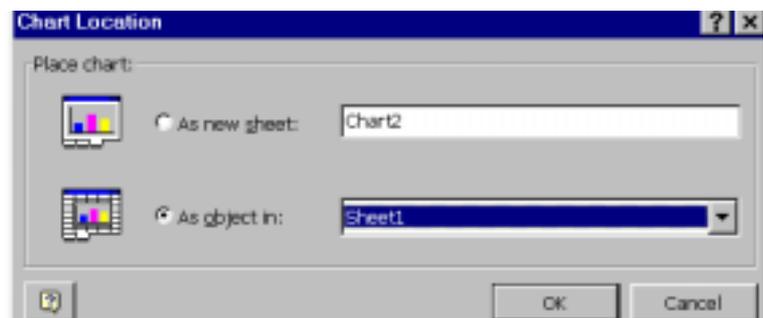
Step 3

1. Click on each tab at the top of the dialogue box.
2. Make your choices relating to **Titles, Axes, Gridlines, Legend, Data Labels** and **Data Table**.
3. Click **Next**.



Step 4

1. Select the **Location** for your chart. Create a separate worksheet (which you can name) or embed the chart in the same worksheet as the data.
2. Click **Finish**.



KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 CREATING GRAPHS AND CHARTS

This exercise covers Excel 97 chart features. It will show you how to:

- Enter and select data.
- Create a pie chart.
- Create a bar chart and a comparative bar chart.
- Create a line graph.
- Save and print your chart.

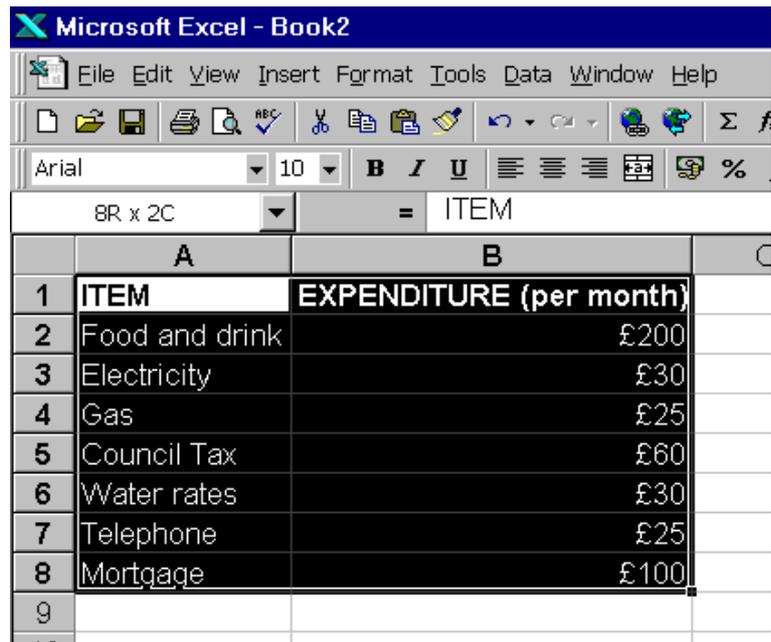
TO ENTER DATA

1. Start Excel. Excel labels each column with a letter and each row with a number. Each box in the grid is called a cell and each cell is identified by a cell address - **A1** for example.
2. Type '**ITEM**' in **cell A1** (the active cell). Press Enter.
3. Write '**Food And Drink**' in cell **A2**, press **Enter**.
4. Continue to enter all the data in the table below. To change the active cell from **A8** (Mortgage) to **B1** (**EXPENDITURE** per month) use the mouse to click on cell **B1**:

ITEM	EXPENDITURE (per month)
Food & Drink	£200
Electricity	£30
Gas	£25
Council Tax	£60
Water Rates	£30
Telephone	£25
Mortgage	£100

TO SELECT THE DATA AND HEADINGS

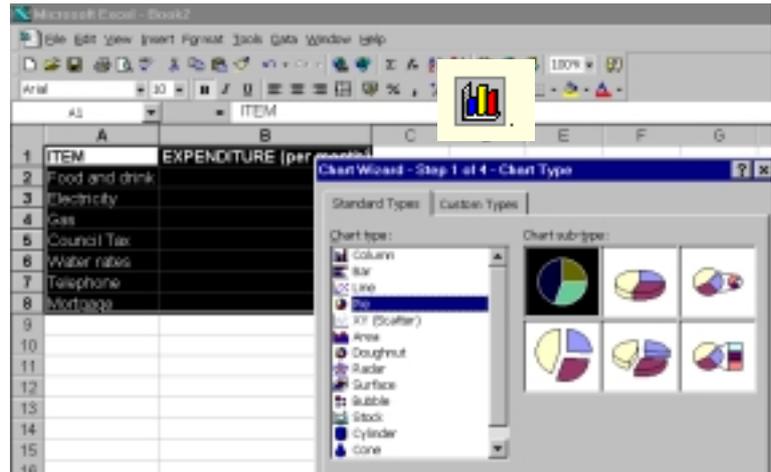
Click on cell **A1**, press and hold down the left mouse button, drag diagonally down to cell **B8**, and release the mouse button. (The active cell, **A1**, is still part of the selection, even though it is white).



TO CREATE A PIE CHART METHOD 1

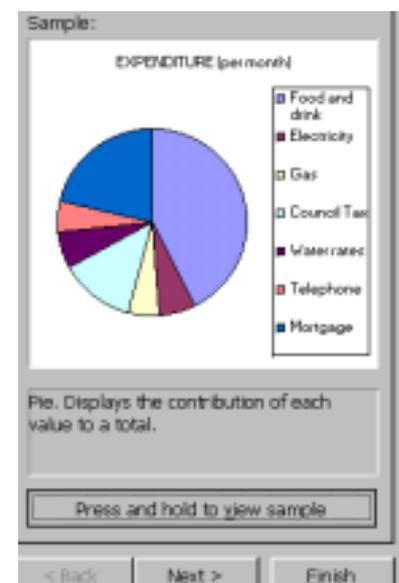
Create a pie chart showing household expenditure per month.

1. Click on the **ChartWizard** icon on the Toolbar.
2. In **Step 1** of the Chart Wizard click on **Pie** from the **Standard Types** list.
3. Select the top left **Chart sub-type**.
4. Hold down the **Press and hold to view sample** button.

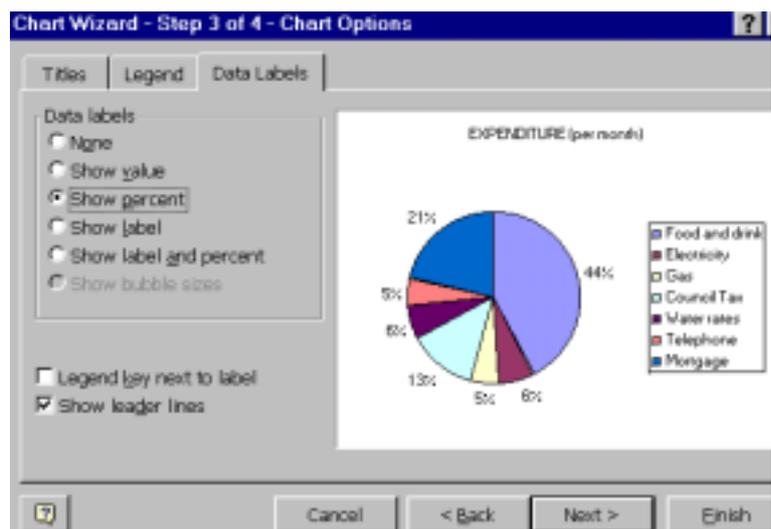


The pie chart should be displayed. Notice that percentages (or values) for each item are not yet displayed.

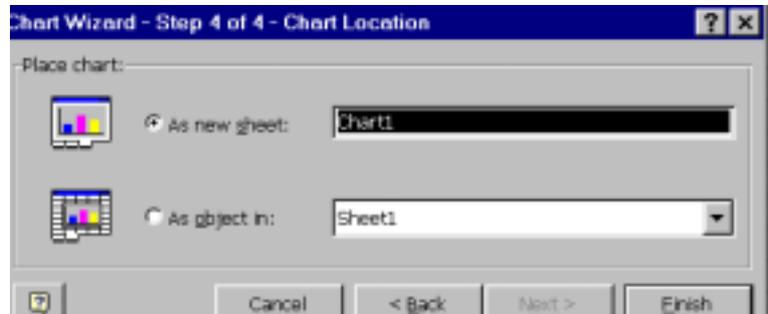
5. Click on **Next >** to move to **Step 2**.



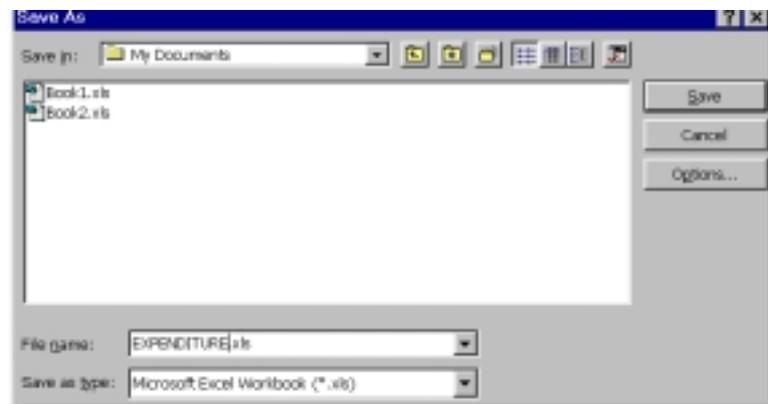
6. As the data selected looks O.K. click on **Next >** to move to **Step 3**.



7. Click on the **Titles** tab. Type: '**HOUSEHOLD EXPENDITURE**' (per month)'
8. The Legend is O.K. so click on the **Data Labels** tab next. Click on **Show Percentage**.
9. Click on **Next >** to move to **Step 4**.
10. At **Step 4** you have a choice between overlaying the new chart on the worksheet or placing it in a new sheet. Choose **As new sheet**.
11. Click on **Finish**. The new chart will appear.



12. Go to the **File** menu and click on **Save As**.
13. Type '**Expenditure.xls**' as the **File name**. Click on **Save**.



TO CREATE A PIE CHART METHOD 2

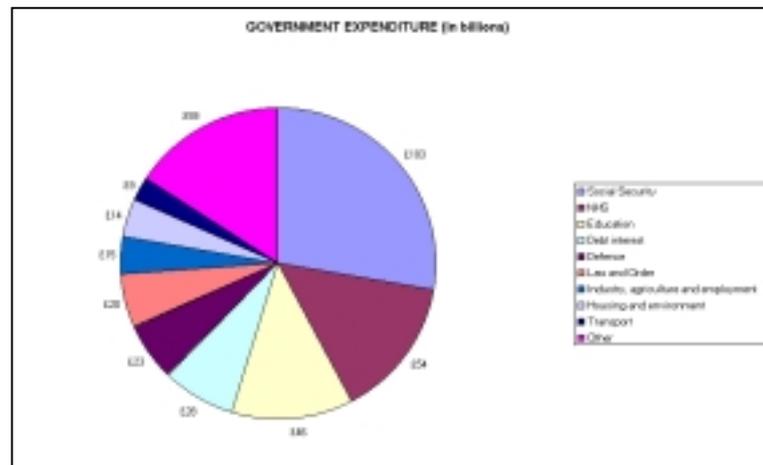
Create a pie chart showing Government Spending 2000-1.

1. Start Excel and enter the data below:

AREA	EXPENDITURE (in billions)
Social Security	£103
N.H.S.	£54
Education	£46
Debt Interest	£28
Defence	£23
Law and Order	£20
Industry, Agriculture and Employment	£15
Housing and Environment	£14
Transport	£9
Other	£59

2. Select the data and headings.
3. Click on the **Chart Wizard** icon and work through the 4 steps as before except:
4. At **Step 3**:
Click the **Titles** tab. Type 'Government Expenditure 2000-1 (in billions)'.
Click the **Data labels** and select **Show value**.

- When you click **Finish**, go to **File** and click **Save As**. Type '**Government Expenditure.xls**' as the filename.



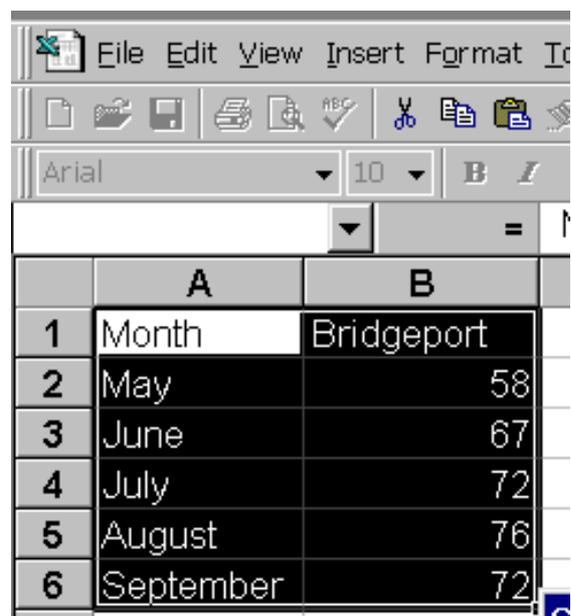
TO CREATE A BAR CHART

Create a bar chart showing the average water temperatures at Bridgeport, U.S.A.

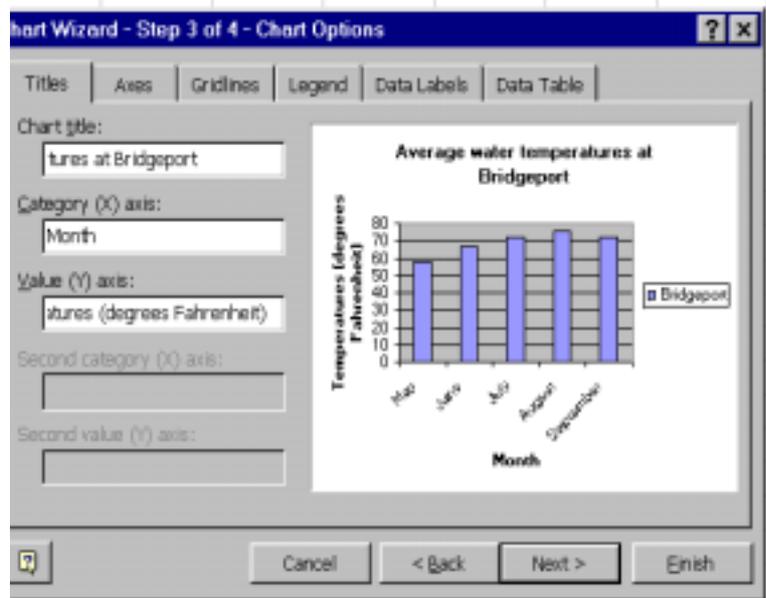
- Go to **File** and click on **New**. Double click on the workbook icon.
- Enter the following data and headings:

MONTH	BRIDGEPORT
May	58
June	67
July	72
August	76
September	72

- Select all the data and headings.
- Click on the **Chart wizard icon**.
- At **Step 1** select **Column** (It is best to have vertical bars).
- Choose the top-left **Chart sub-type** (this will probably be selected already).
- Click and hold down the Preview button. Click **Next >**.
- Step 2** click **Next >**.



9. At **Step 3** click the **Titles** tab. As the **Chart title** type 'Average water temperature at Bridgeport'.
10. As the **Category (X) axis** type 'Month'.
11. As the **Value (Y) axis** type 'Temperature (degrees Fahrenheit)'.
12. Click on the **Gridlines** tab. Check that **Major gridlines** are ticked on the **Value (Y) axis**.
13. Click on the **Legend** tab. Click on the **Show legend** box to remove the tick (and to remove the legend from the chart).
14. Click **Next >**.
15. At **Step 4** select **As new sheet**. Click **Finish**.
16. **Save As 'Water temperature.xls'**.

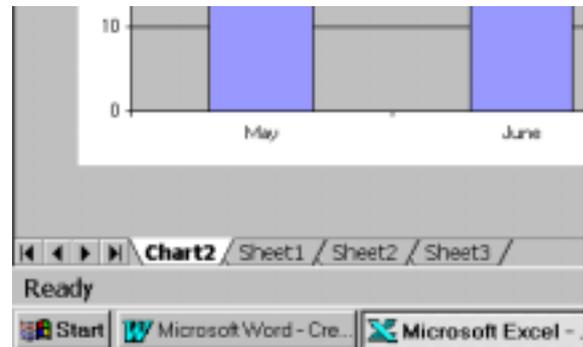


CREATING A COMPARATIVE BAR CHART

Create a bar chart comparing the average water temperatures in Bermuda and Bridgeport.

1. Go back to the worksheet by clicking on **Sheet 1** at the bottom of the screen.
2. Add this column, starting in cell C1:

Bermuda
80
81
82
83
83
3. Select all the data and headings and click on the **ChartWizard** icon.



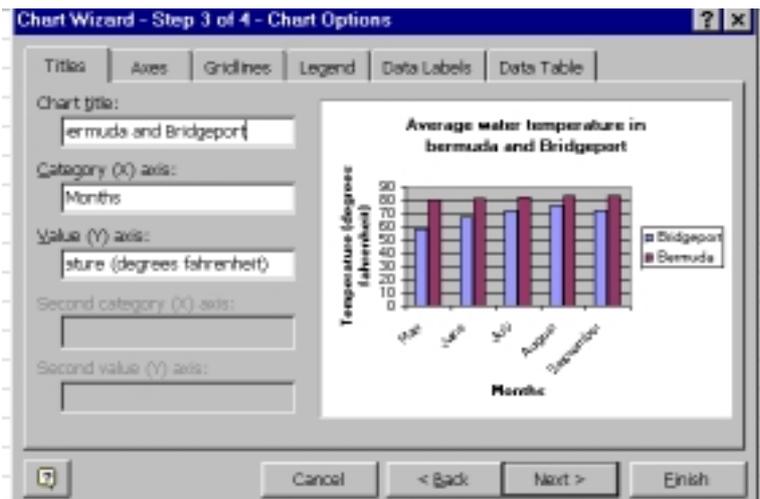
Microsoft Excel - Book1

	A	B	C
1	Month	Bridgeport	Bermuda
2	May	58	80
3	June	67	81
4	July	72	82
5	August	76	83
6	September	72	83
7			
8			

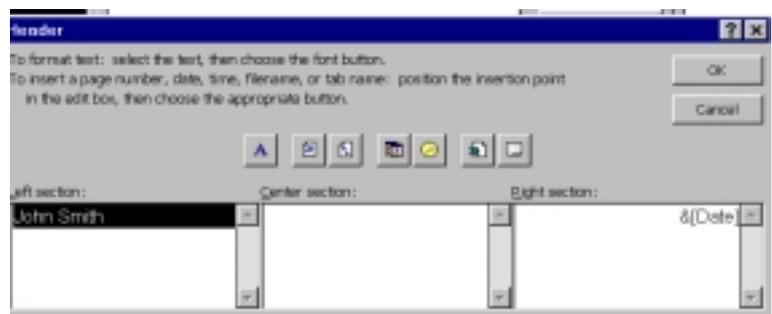
- Go through 5-14 of 'To Create a Bar Chart' with these changes:

At Step 3 the **Chart Title** should read 'Average water temperatures in Bridgeport and Bermuda'.

The **Legend** should be displayed.



- Go to the **File** menu and click on **Page Setup**.
- Click on the **Header** tab and on **Custom Header**.
- Type your name and the date.
- Click **O.K.** to leave the **Header** dialogue box and again to leave **Page Setup**.
- Save As '**Comparative graph.xls**' and Print a copy.



CREATING A LINE GRAPH METHOD 1

Produce a line graph for the number of cars sold in the period August 1999 to March 2000.

MONTH	CAR SALES (Thousands)
Aug-99	120
Sep-99	81
Oct-99	63
Nov-99	50
Dec-99	43
Jan-00	35
Feb-00	43
Mar-00	49

1. Open a new worksheet and enter the data above.

2. Select the data and use the **ChartWizard** to create the line graph.

3. At **Step 1** try the different sub-types of Line graph and check with the Preview button until you are satisfied with your choice.

4. At **Step 3** include:

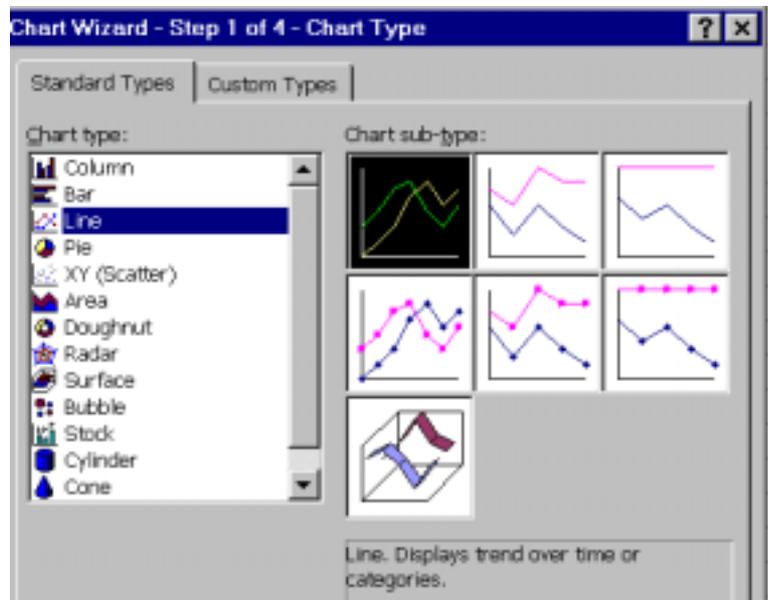
Chart Title - NUMBER OF CAR SALES,
X Axis Title – MONTH,
Y Axis Title – CARS SOLD (in thousands)

At **Step 3** do not display the **Legend**.

5. At **Step 4** select **As new sheet**.

6. Add your name and the date. (Go to **File; Page Setup; Header; Custom Header**).

7. From the **File** menu, **Save As 'Car Sales.xls'**, check it with **Print Preview**, and **Print** a copy.



TO CREATE A LINE GRAPH METHOD 2

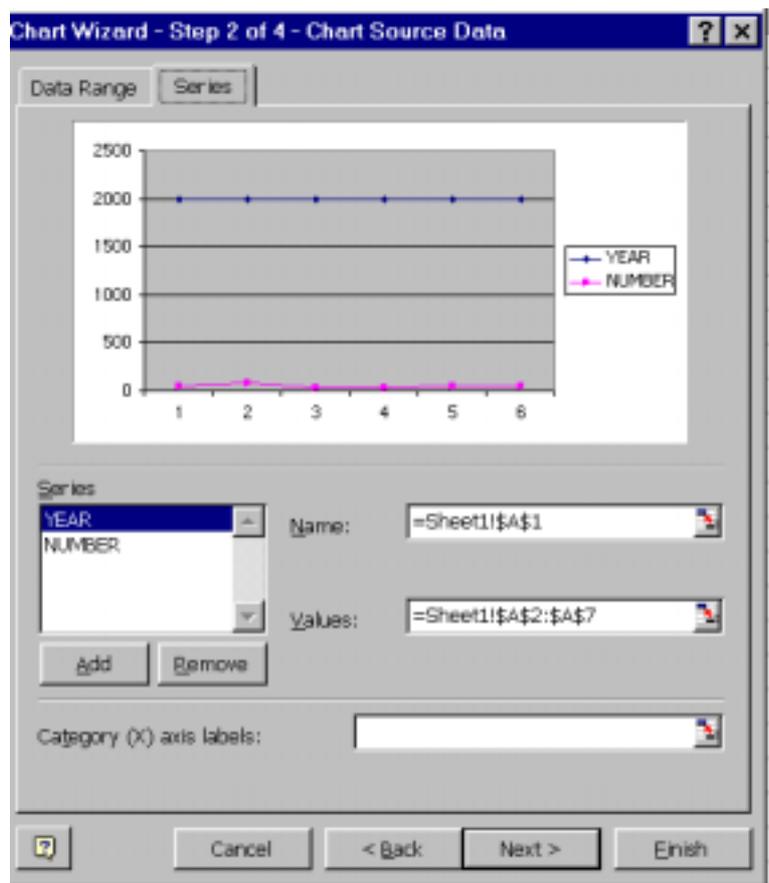
Produce a line graph for the number of cars sold by a garage between 1990 and 1995.

(This line graph shows you how to use Step 2 of the ChartWizard when the graph looks wrong at the preview stage).

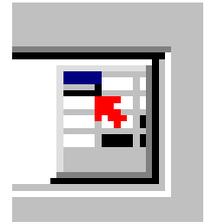
1. Enter the following data onto a new worksheet:

YEAR	NUMBER
1990	50
1991	75
1992	37
1993	38
1994	49

2. Select the data and click on the **ChartWizard**.
3. At **Step 1** select **Line** Graph.
4. Look at the Preview. (Notice the graph has 2 lines plotted instead of one, and the X and Y axis scales look wrong). Click **Next>**.
5. At **Step 2** click on the **Series** tab. Click on **YEAR** and press **Remove**.



6. For **Category (X) axis labels**, click on the collapse dialogue button just above the word **'Finish'**.



7. Highlight the range of years on the worksheet and click on the collapse dialogue button again.

8. Click **Next>**.

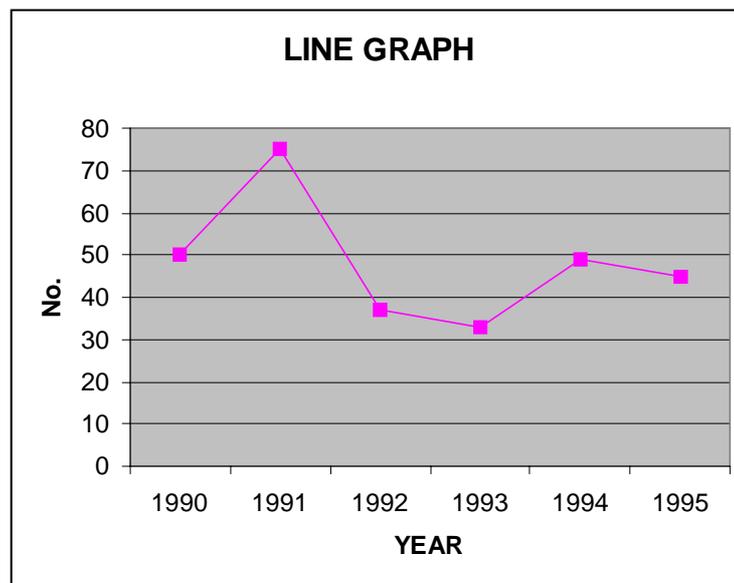
9. At **Step 3** enter the Chart Title 'LINE GRAPH' and the Axis headings 'YEAR' & 'NO.'

1	YEAR	NUMBER
2	1990	50
3	1991	75
4	1992	37
5	1993	33
6	1994	49
7	1995	45

10. Make sure the **Legend** is **not** displayed. Click **Next>**.

11. At **Step 4** select **As new sheet** (Chart 1). Click **Finish**.

12. **Save As 'Line graph.xls'**.



KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 MODIFYING GRAPHS AND CHARTS

This exercise show you how to:

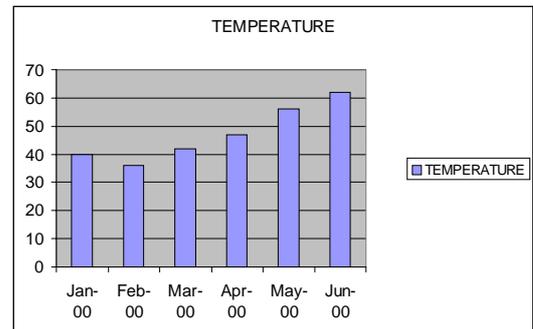
- Change the type of chart
- Format and modify your chart
- Move a chart or graph to another worksheet or application

TO CHANGE THE LOCATION OF A CHART

1. Enter the following data about water temperature at Boston harbour into a worksheet:

MONTH	TEMPERATURE
Jan-00	40
Feb-00	36
Mar-00	42
Apr-00	47
May-00	56
June-00	62

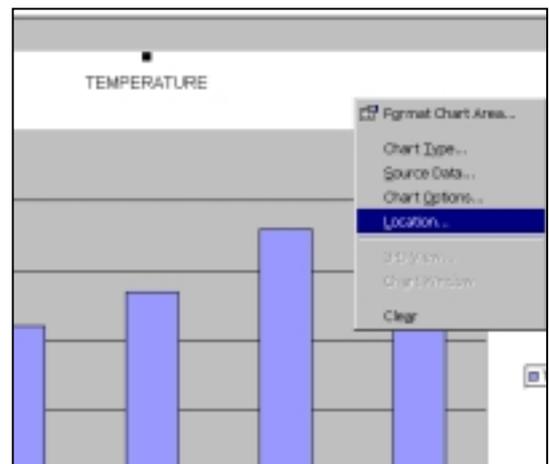
2. Select the data and press the **F11** key. A bar chart should appear on a new sheet.
3. To change the location of the bar chart, right mouse click on the white area around the chart. The menu will give you several options.



4. Check out some of the options. Click on **Chart type** and then **Cancel**. Repeat for **Source Data** and **Chart Options**. (Note the dialogue boxes from the Chart Wizard are available).

5. Select **Location**. Click on **As object in sheet 1**.

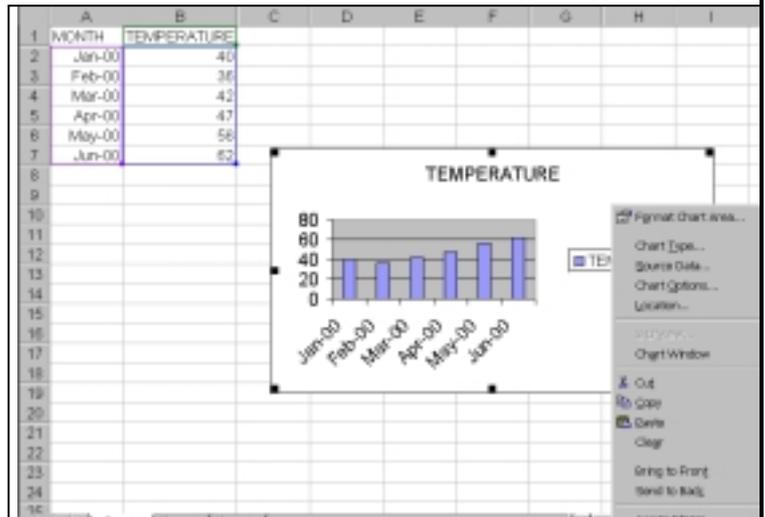
(This right mouse button method can be used for any of the commands in the Chart Wizard).



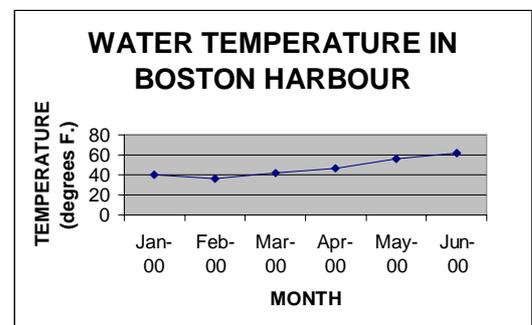
TO EDIT A CHART

The chart is now laid over the top of the original worksheet.

6. To edit the chart make sure you can see the handles around the chart. (If not click on the chart).
7. Right mouse click on the white area and select **Chart Type**. Click on **Line graph** and **O.K.**
8. Right mouse click and select **Chart Options**:

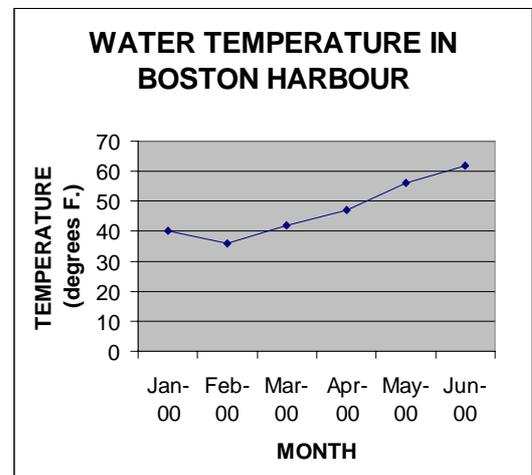


As the **Chart Title** type 'WATER TEMPERATURE IN BOSTON HARBOUR'
 As the **X axis label** type 'MONTH'
 As the **Y axis label** type 'TEMPERATURE (degrees F.)'.
 Remove the tick in the **Show legend** box.



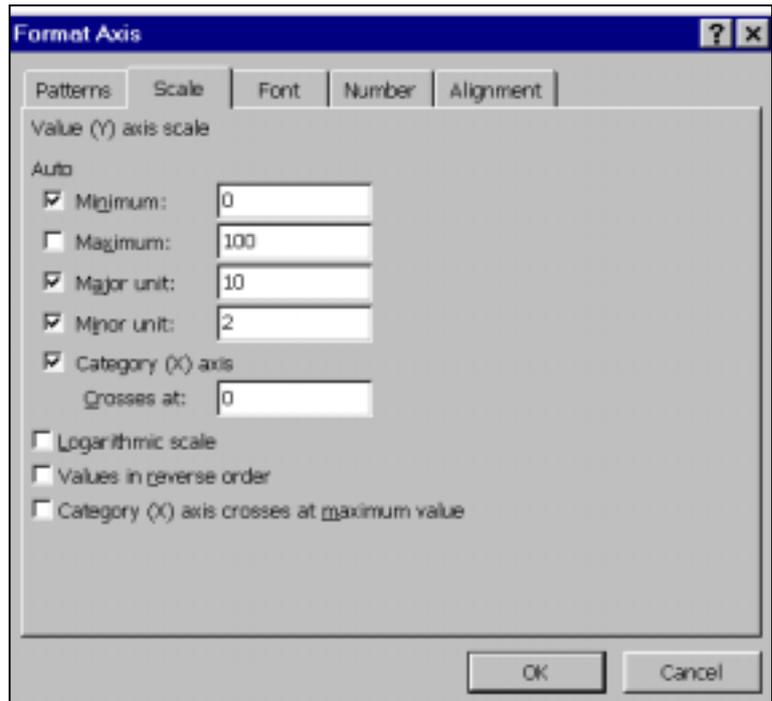
9. The chart now needs resizing. Drag the sizing handle on one corner to make it larger. Experiment until you are happy with the balance of chart and text.

(Double clicking on any item on the chart allows you to modify it.



10. Double click on the vertical (Y) axis.
(The **Format Axis** Dialogue box opens).

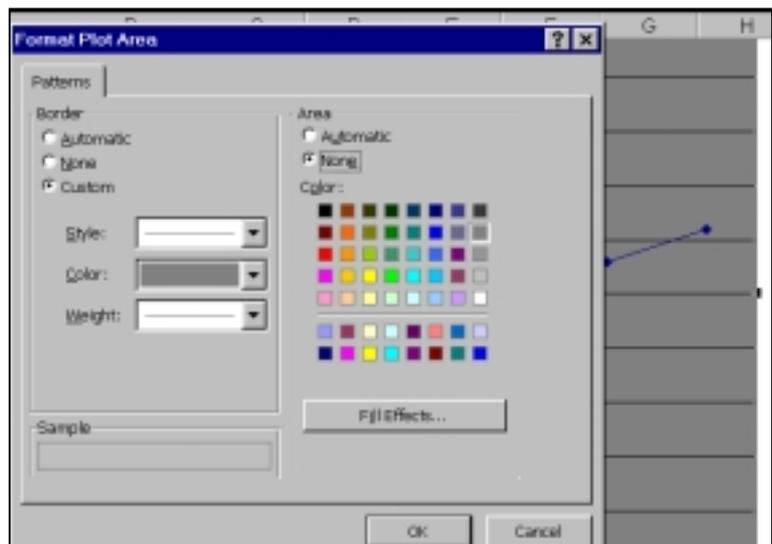
11. Click on the **Scale** tab of the dialogue box. Write **100** as the **Maximum**. Click **O.K.**



12. To remove the grey background move your mouse pointer over it until a **Plot area** label appears.

13. Double click.

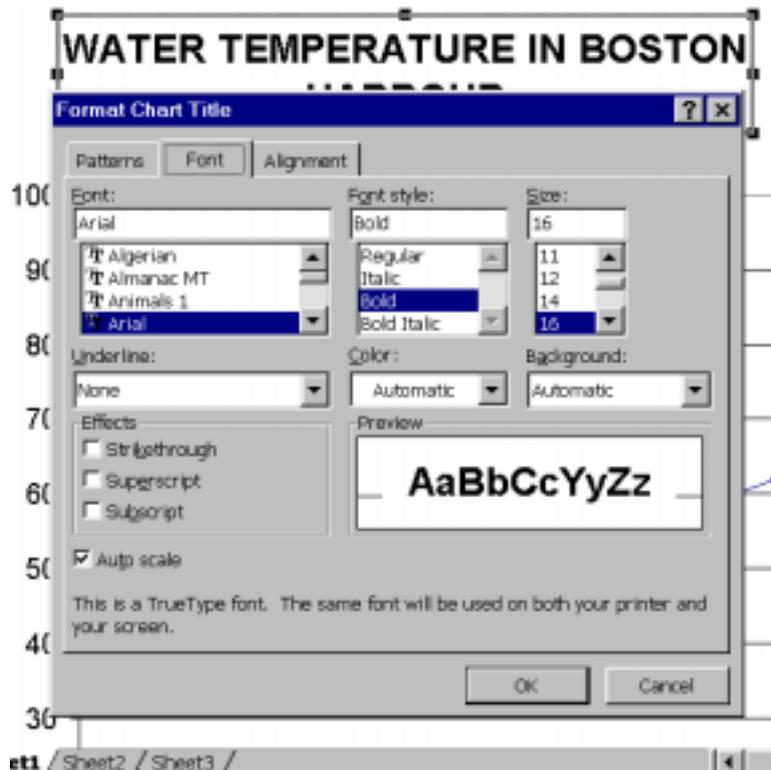
14. On the **Format Plot Area** dialogue box click on **None** under **Area**, and **O.K.**



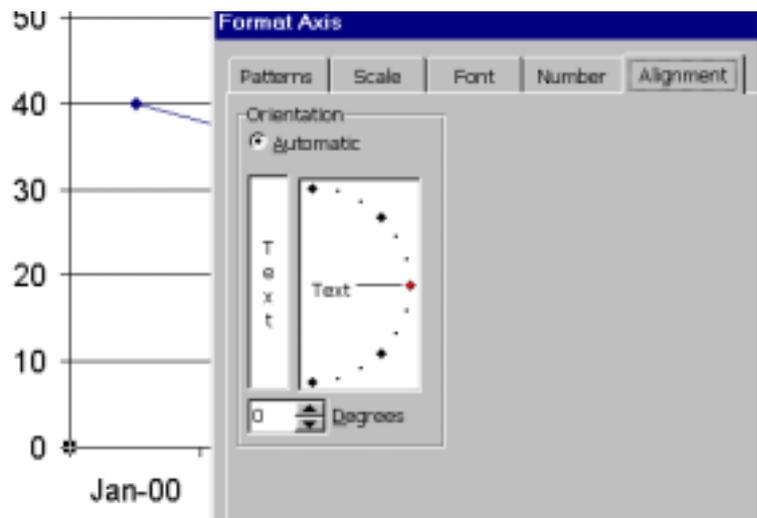
(Keep checking that the chart is selected with handles around it. If not, single click inside the chart box. If you place your mouse pointer over any area of the chart, a label pops up. Hence you can be sure you are on the correct part before double clicking)

15. Using the above method, change the font sizes and styles as follows:

- Chart Title** - 16
- and **Bold**
- Value Axis Title** - 14
- and **Regular**
- Category Axis Title** - 14
- and **Regular**
- Value Axis** - 12
- and **Regular**
- Category Axis** - 12
- and **Regular**

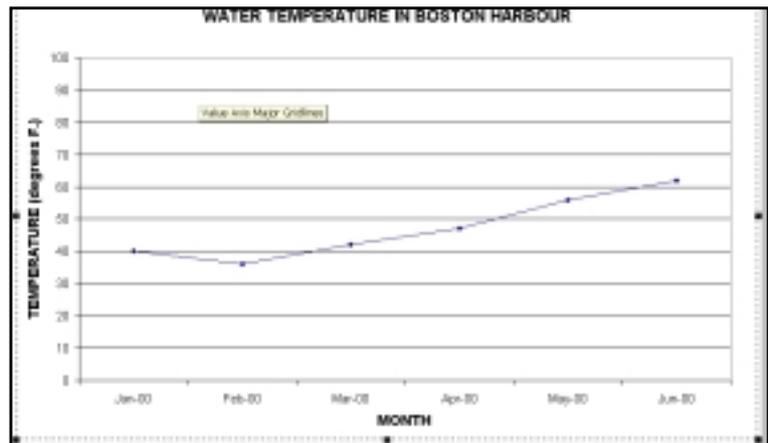


16. Double click on the horizontal **Category Axis** (X).
17. In the **Format Axis** dialogue box click on the **Alignment** tab.
18. Try **Automatic Orientation** and experiment with other angles. Select the one that best displays the months and years.



TO COPY AND PASTE A CHART INTO ANOTHER APPLICATION

19. Make sure the chart is selected. Click in the white chart area (if handles are not displayed).



20. Click the **Copy** toolbar button (or **CTRL + C**). A dotted line will appear around the chart.

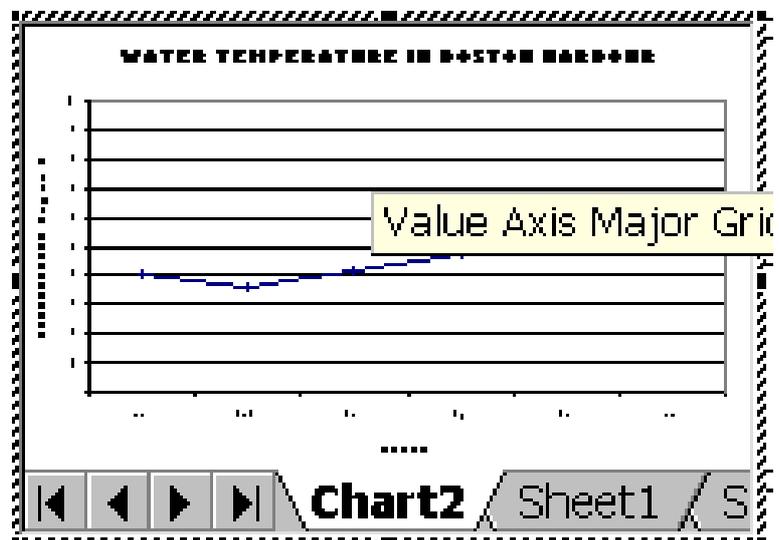
21. Minimise Excel by clicking on the minimise icon in the top corner of the screen.

22. Open a Word document. Move the insertion point to where you want to place the chart.

23. Click the Paste toolbar button (or **CTRL + V**). The chart will appear.

24. If the chart is too large, resize it by dragging the handles inwards.

25. If the text on the chart is too small, double-click on the chart to select it. Increase the font sizes as you do in Excel. Then click outside the chart.



26. Now you no longer need Excel. Use your right mouse button to click on the Microsoft Excel button on the **Taskbar** (at the bottom of the screen).



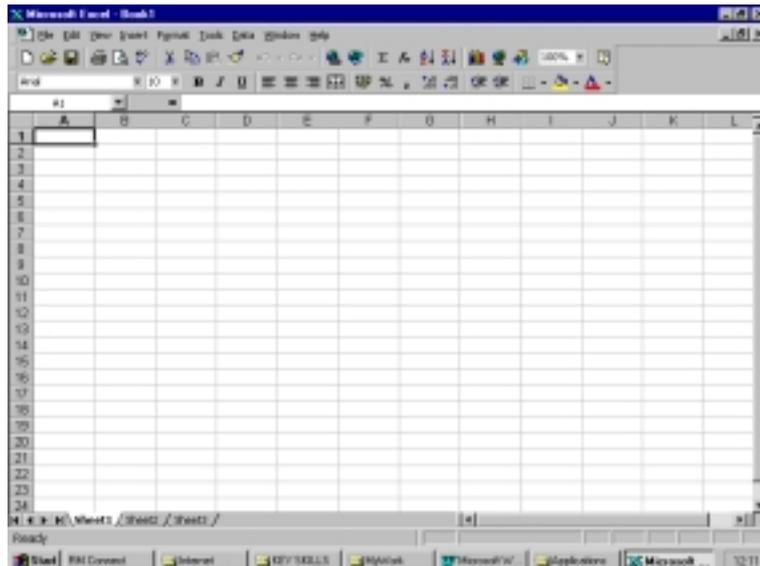
27. Click **Close**.



(This method can be used to copy any type of chart, and can be used paste charts into a wide range of applications e.g. PowerPoint slides, or Publisher documents)

KEY SKILLS FACTSHEET INFORMATION TECHNOLOGY WHAT IS A SPREADSHEET?

A spreadsheet is a software application that allows the user to perform calculations by creating number-structured information. A spreadsheet is a grid containing numerous rows (9999) and columns (A-AV). Each row number and column letter is called a cell. A cell can contain text or numbers. When calculating formulas it is important to use the cell reference (ie B3) rather than the value within the cell. If the value is used the total will not automatically re-calculate if any values are changed at a later date.



DATA ALIGNMENT

Numerical data within a spreadsheet is automatically right aligned within each cell and text entries are automatically left aligned. Alignment facilities are available to align column headings appropriately above numerical data.

SHOW GRID

It is possible to show the whole spreadsheet grid when printing your work. The grid will show the column letters along the top and row numbers down the side.

EXAMPLE OF BASIC FORMULAS

A basic formula can consist of adding, multiplying, dividing or subtracting 2 numerical values together. In the majority of spreadsheet software applications, the formula must begin with the '=' symbol:

1) = $(c4*e4)$ or 2) =sum(c4:d6)

This formula is multiplying the value in cell c4 with the value in cell e4.

This formula is adding a range of values (more than 2 values) together, by locating the first value (cell c4), the last value (cell d6) and then adding every value between and inclusive of these cells.

EXAMPLES OF ADVANCED FORMULAS

Advanced formulas generally have 2 or more formulas:

1) = $(c4-e4)*17.5\%$ 2) = $(b3+d3)+(c3-e3)*f3$

SHOWING FORMULAS

It is possible to show formulas used on screen for the purpose of printing. The totals generated are switched to formula mode that shows the formula keyed in.

INSERTING/DELETING COLUMNS AND ROWS

Within spreadsheets it is possible to insert or delete columns and rows to enable the spreadsheet to be updated at a later stage. This facility is ideal when adding and removing unwanted items from a spreadsheet.

LINKING

A spreadsheet can be linked to other applications or other spreadsheets that are frequently updated. This linking facility saves time, as all linked documents are updated automatically.

PRODUCING GRAPHS/CHARTS

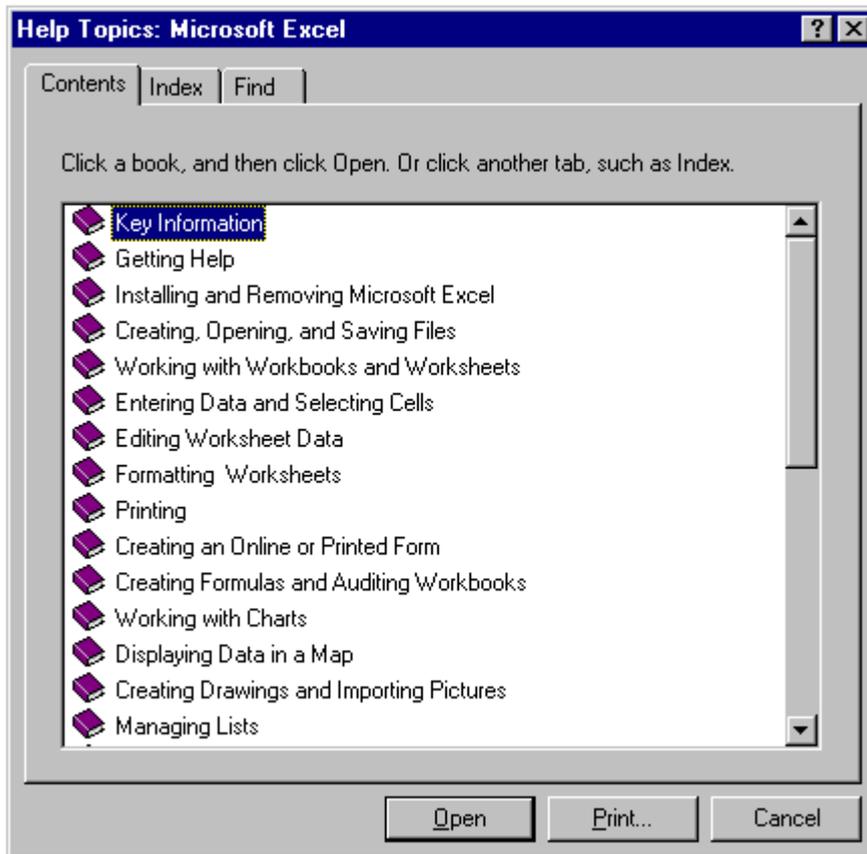
It is possible to create graphs and charts based on spreadsheet information by using the chart wizard available in any spreadsheet software application. This facility is ideal if you are wishing to present data in an illustrated manner.

KEY SKILLS INFORMATION TECHNOLOGY GETTING HELP WITH EXCEL

Microsoft Excel has an on-line Help system, which you can access in several ways. The Help Topics dialog box enables you to select specific Help information.

To display the Help Topics dialog box:

- Choose the Help Contents and Index command. The Help Topics dialog box is displayed:



- The Help Topics dialog box contains three different groups of options. These groups are located on different tabs:



Searching for Help Using the Contents Tab

Microsoft Excel Help information is split into several categories and topics in the Help Topics dialog box. The Contents tab displays these categories and topics and enables you to browse for the Help information you want.

- Help categories are represented by book icons. You can open a category to display a list of topics or subcategories:

 Getting Help A Help category

- Help topics are represented by single page icons:

 Save a document A Help topic

Using Help Categories

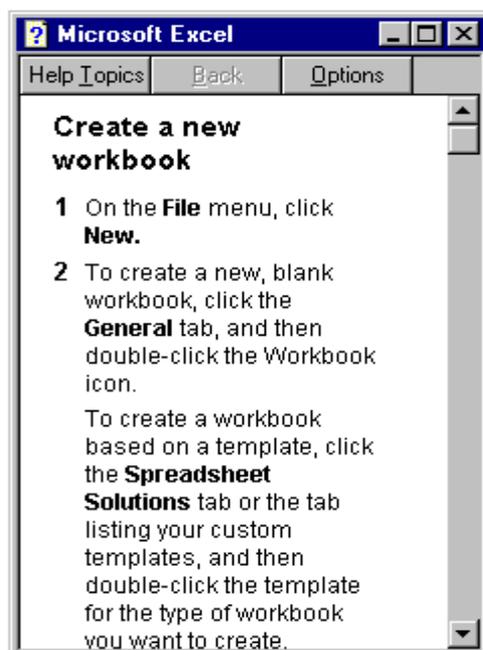
- Make sure the Help Topics dialog box is displayed and the Contents tab is selected.
- To open a Help category, double-click on the category or select the category and choose the Open button. A list of further items is displayed beneath that category.
- To close a Help category, double-click on the category again or select the category and choose the Close button.

To display a Help topic:

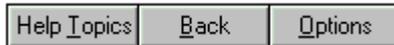
- Open each of the Help categories leading to the Help topic you want to display.
- Double-click on the Help topic or select the Help topic and choose the Display button. The Help Topics dialog box closes and the Help window is displayed. This contains information about the topic on which you clicked.

Using the Help Window

The Help window contains information on the Help topic that you selected. The Help window is an application window - it has maximize, minimize and close buttons in the title bar:



- The Help window has three command buttons below the title bar:



You can use the Help Topics button to display the Help Topics dialog box.

- The Back button enables you to return to the previously displayed Help topic. (This button is dimmed if no Help topic has previously been displayed.)
- The Options button displays a drop-down menu containing various commands, which enable you to add, copy and format the Help information. These commands are covered in more detail later in the Course Notes.

DISPLAYING FURTHER INFORMATION

As well as information on the topic you selected, the Help window also contains areas, which you can click on to display further information. When you point to one of these areas, the pointer changes to a hand:



The hand pointer

Areas Which Display Further Information

- Many Help windows contain buttons which enable you to start applications or display related topics:

Note If you don't see the template you want in the **New** dialog box, make sure the template is installed and located in the correct folder. For more information, click .

- In some Help windows, you can click on underlined words to jump to a related help topic.

You can click on words with a dotted underline to display a ScreenTip containing information on that word or picture - click anywhere to remove the ScreenTip:

default workbook template

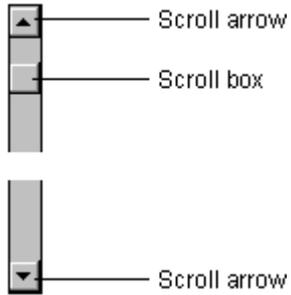
The Book.xlt template you create when you want to change the default format of new blank workbooks. Microsoft Excel uses the template to create the blank workbook that opens when you start Microsoft Excel, click the **New** button on the **Standard** toolbar, or select the Workbook template in the **New** dialog box (**File** menu). Unless you create the Book.xlt template, Microsoft Excel bases the new blank workbook on built-in program settings. You must store the Book.xlt template in the Xlstart folder or in the alternate startup folder. The Xlstart folder is in your Microsoft Excel folder or, if you are using Microsoft Office, in the Office folder.

Some Help windows contain pictures on which you can click to display a ScreenTip.

Scrolling Through the Help Window

A scroll bar appears in the Help window when there is more information than can be displayed in the space available. You can use a scroll bar to browse through this information.

The scroll bar has scroll arrows at the top and bottom and a scroll box between the two arrows:



To use a scroll bar:

- Click and hold on the scroll box. Drag the scroll box to the new position, then let go.

or:

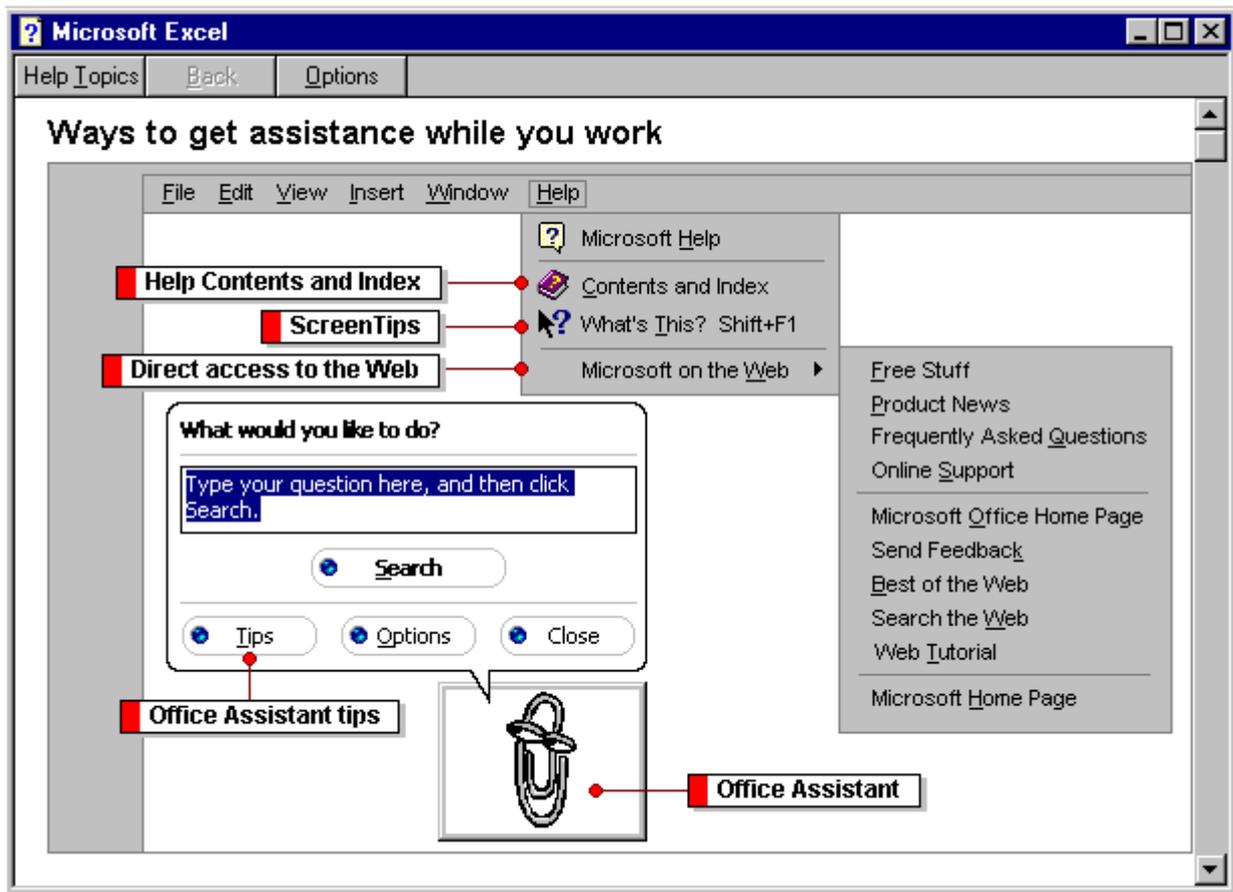
- Click in the shaded scroll bar.

or:

- Click on the scroll arrows at the top and bottom of the scroll bar.

USING GRAPHICAL HELP WINDOWS

Most Help topics are in text form, with information on how to perform particular actions. Some Help topics are in graphical form. These topics provide more general information on a particular feature:

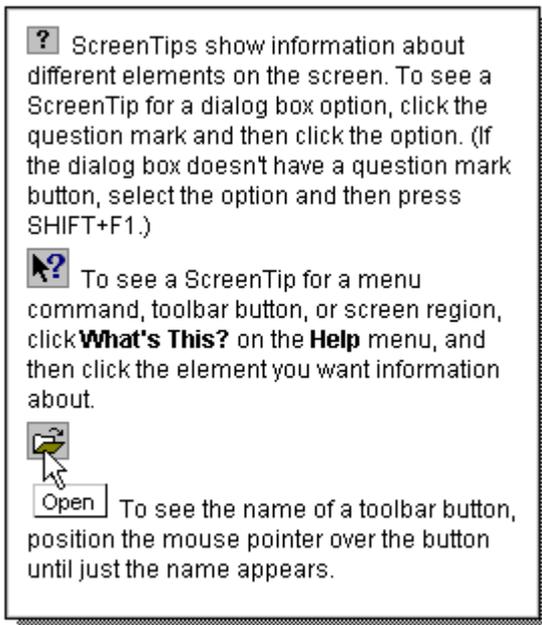


To use a graphical Help window:

- Move the pointer over the box containing the name of the topic for which you want to see more information. As you move the pointer over the box, the bar on the left of the box changes colour:



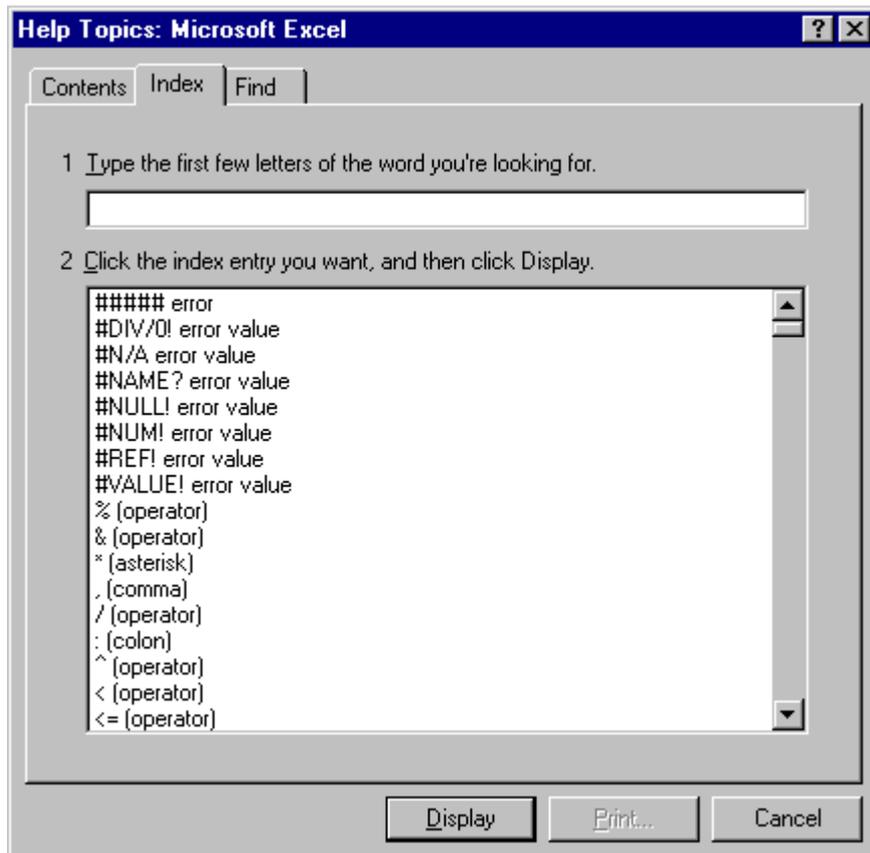
- Click on the box to display a ScreenTip:



ADDITIONAL HELP

Searching for a Specific Help Topic

The Index tab in the Help Topics dialog box enables you to find Help information on a specific topic by searching for the title of the topic:



To use the Index tab:

- Make sure the Help Topics dialog box is displayed and the Index tab is selected.
- If you know the name of the topic, type its name in the text box at the top of the dialog box. As you type, the list box below displays the topic name which best matches what you have typed. (You can also use the scroll bar on the right of the list box to browse topics - they are listed in alphabetical order.)
- Double-click on the appropriate topic in the list box. The Help window appears, with information about the topic on which you clicked.

CREATING A LIST OF KEYWORDS

The Find tab in the Help Topics dialog box enables you to search within the Help topics for occurrences of a specific piece of text. The first time you use the Find tab in the Help Topics dialog box, a list of keywords is created for you to search.

To create a list of keywords:

- Make sure the Help Topics dialog box is displayed, then select the Find tab. The first time you select the Find tab, the Find Setup Wizard dialog box appears containing information on finding keywords:



- In the Find Setup Wizard dialog box, select the appropriate option, then choose the Next > button.
- When the new information appears, choose the Finish button. A Creating Microsoft Excel List... button appears in the taskbar while the word list is created - this may take up to a minute.

Important Point

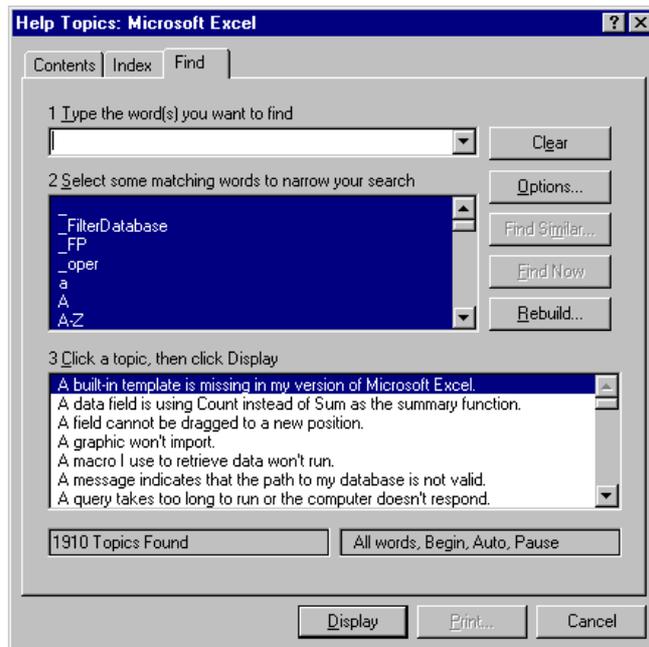
- Remember, you only need to create a word list the first time you display the Find tab.

Finding Keywords

When you have created a list of keywords, you can use the Find tab to search all the Help topics for occurrences of a specific piece of text. For example you could search for copying text to find Help topics containing information on this subject.

To find keywords:

Make sure the Help Topics dialog box is displayed and the Find tab is selected:



Type the piece of text you want to search for in the text box at the top of the dialog box - this can be a single word or a group of words.

- The list box below displays the matching pieces of text. Click on an item in this box to narrow the search and reduce the number of topics shown in the list box at the bottom of the dialog box.
- Double-click on a Help topic from the list box at the bottom of the dialog box to display the topic.

Important Points

- You can double-click on a Help topic in the list box at the bottom of the dialog box to display help information for that topic.
- The two boxes at the bottom of the dialog box display the number of topics which match the search text and a summary of the Find options:

1474 Topics Found All words, Begin, Auto, Pause

Changing the Find Options

The Options button on the Find tab displays the Find Options dialog box. This dialog box enables you to specify how the Help topics are found, based on the text you type:



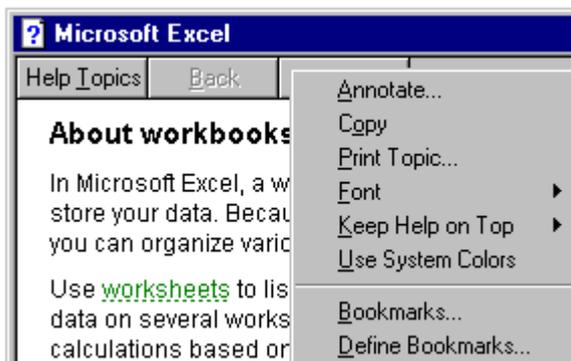
To specify whether Help searches for topics containing all the words together or topics containing at least one of the words, use the options in the Search for topics containing box.

- To specify how the words you type are matched to Help topics, select an item from the Show words that drop-down list.
- The options in the Begin searching box enable you to specify when to begin searching.
- When you have set the options you want, choose the OK button.

Setting Options for the Help Window

To set options for the Help window:

- Click on the Options button at the top of the Help window.
- When the Options menu appears, use the commands in the menu to manipulate the Help information:



**KEY SKILLS LEVEL 2
INFORMATION TECHNOLOGY
EXCEL 97**



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EXCEL OVERVIEW

Excel is what is commonly referred to as a spreadsheet application. Spreadsheets can be used to help you present and calculate rows and columns of data. Common uses for worksheets include: budget forecasts, employee timesheets, profit & loss accounts, calculation of depreciation, cash flow forecasts and monthly expense reports. Any report incorporating text, values and calculation formulae, can be created on a spreadsheet.

Some of the advantages of using a computer based spreadsheet are:

- You can format the information using a variety of different fonts, lines and shading, making the information easier to read.
- Changes can be made to values on a worksheet at any time, and all formulae making reference to those values will update automatically.
- Information can be presented graphically using charts of various types.
- You can incorporate spreadsheet data and charts into slide show presentations.

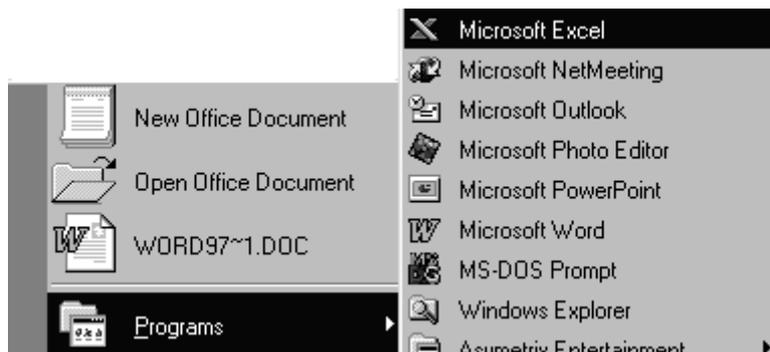
In this introductory course you will learn how to create spreadsheets incorporating the use of formatting and calculation formulae.

Loading Excel

To get started you need to load the Excel application. From the Windows95/98 Desktop, **double click** on the **Microsoft Excel** icon on the **desktop**.



An alternative method is to click on the  **Start** menu on the desktop then click on **programs** and search the menu system for **Microsoft Excel** searching the menus by clicking on items with the left hand button of the mouse.

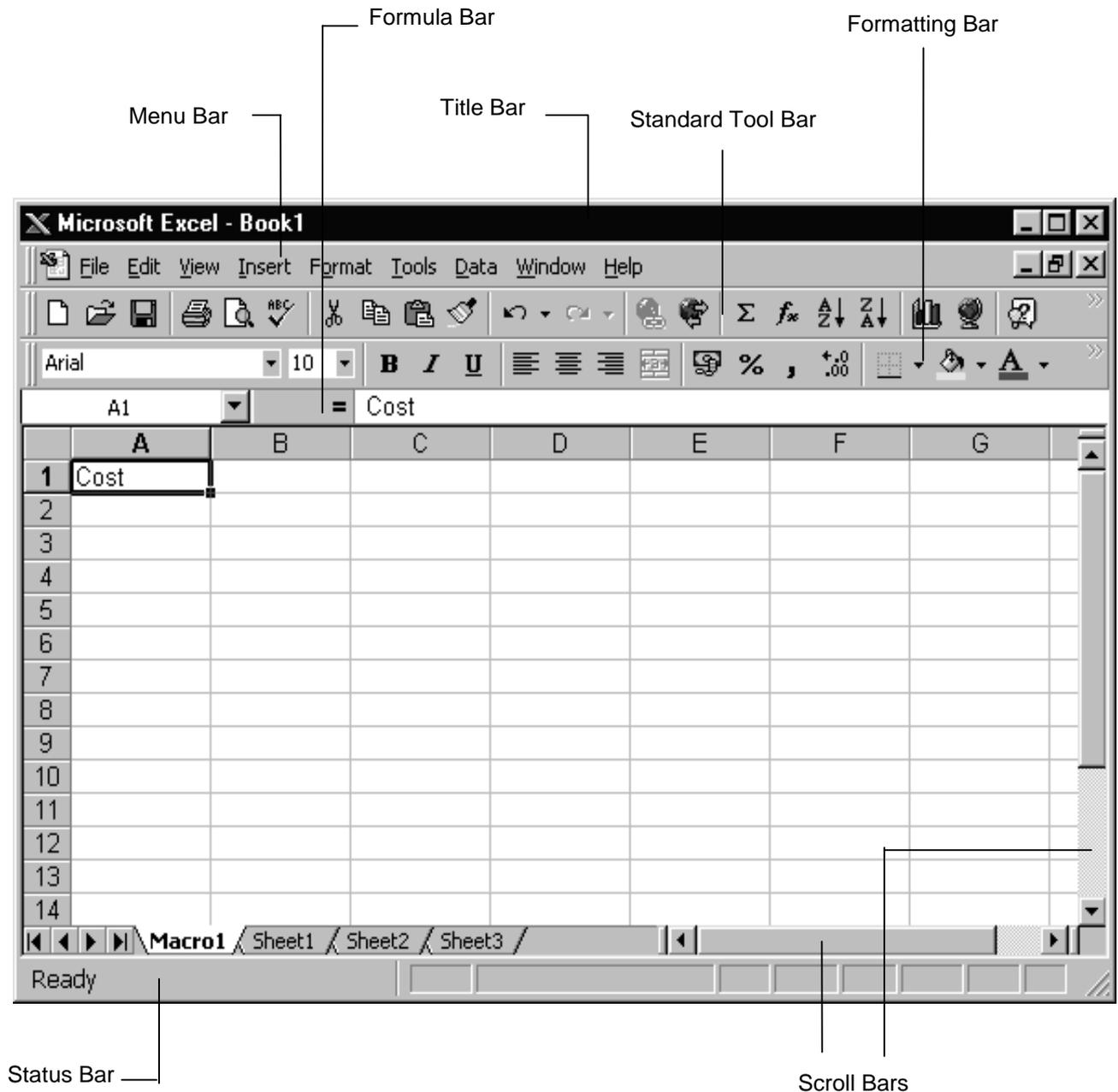


Note: Microsoft Excel will not be in the same position in the Start menu system on all computers.

The Excel Screen

When Excel is loaded you will see the application window.

Some of the screen elements can be 'toggled' on or off, therefore your screen may look slightly different from the illustration below.



Toolbars

A Toolbar has a number of buttons you can use with the mouse to carry out some of the more frequently used command options. Excel will display appropriate toolbars when you are using certain functions. For example, when you are creating a chart, Excel will display the Chart toolbar.

When you load Excel, the following toolbars will be displayed on the screen.

The Standard Toolbar



The Formatting Toolbar



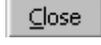
When you point and pause on a button using the mouse, Excel will display its name in a ToolTip box. If you then look at the bottom left corner of your screen you will see a short explanation of the button's function displayed on the Status Bar.

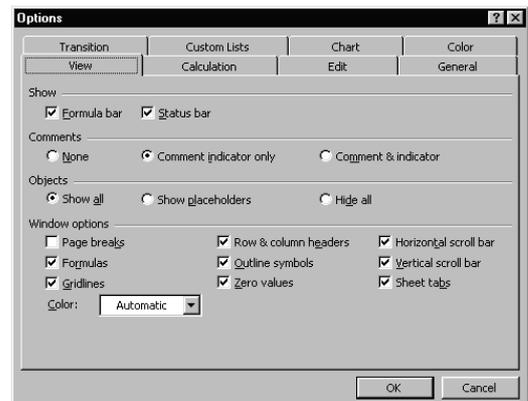
Spreadsheets

The spreadsheet is divided into columns and rows, creating a grid of squares referred to as cells. The cell that is highlighted by a darker border is referred to as the **Active Cell** and represents where data will appear when you start to type.

Each column is identified by a letter reference: A, B, C,.... AA, AB, AC... etc. and each row by a number: 1, 2, 3 etc, giving each cell a unique reference corresponding to its position on the worksheet. For example, the cell in the 4th column and 3rd row is cell D3.

Printing Spreadsheets

1. Click on the **print preview**  button. Check that the spreadsheet will fit onto the page.
2. When you are satisfied, go back into the spreadsheet by clicking on the  button.
3. Select **File** from the menu bar. Select **print** within the file menu. Select **OK** within the print dialogue box.
4. From the menu bar select Tools. Within the tools menu select Options. The Options dialogue box will be displayed.
5. Select the **View Tag** & click on the **Formula** check box.
6. Click on **OK** to return to the spreadsheet.
7. Use print preview to check that the spreadsheet still fits on the page, Adjust column width if necessary.
8. Select **File** from the **menu** bar. Select **print** within the **file** menu. Select **OK** within the **print dialogue** box.



EXERCISE 1 REGENT BEARINGS

During this exercise you will work towards creating a spreadsheet exactly the same as the one below. You may need to refer to this diagram if any of the later steps seem unclear. However **DO NOT** attempt to copy it.

Book1							
	A	B	C	D	E	F	G
1	Regent Bearings						
2							
3	ITEM	PRICE	COST	MADE	SOLD	INCOME	PROFIT
4							
5	Bearings	£1.12	£0.87	30	15	£16.80	-£9.30
6	Washers 5m x 100	£1.99	£1.35	20	17	£33.83	£6.83
7	Nails 30mm x 100	£2.50	£1.90	20	12	£30.00	-£8.00
8	Screws 30mm x 100	£1.10	£0.65	60	60	£66.00	£27.00
9	Nails 20mm x 100	£1.10	£0.66	50	44	£48.40	£15.40
10							
11	TOTALS			180	148	£195.03	£31.93

Entering information into a cell

1. Make the cell active cell by clicking the mouse pointer directly over the cell.
2. Type in the contents required and Press return.

Centring text across cells

1. To Select the Range hold down the mouse button in the first cell required and drag over to the last cell required.
2. e.g. To Select the Range of Cells from A1 to G1, Hold down the mouse button in cell A1 and drag over to cell G1.
3. Centre this by clicking on the merge cells  button.
4. Deselect the cell range by clicking anywhere on the worksheet with the left mouse button.

EXERCISE 1 - STEP 1

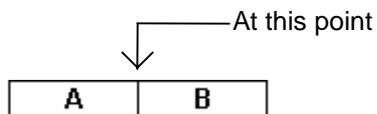
1. Use and centre across cells A1 to G1 the title Regent Bearings
Titles should appear in the centre of a spreadsheet and not affect column widths.
2. Starting in cell A3 enter the following headings.

ITEM	PRICE	COST	MADE	SOLD	INCOME
------	-------	------	------	------	--------
3. Starting in cell A5 enter the following titles, adjust the column width if necessary. This text should be left justified.

Bearings
Washers 5m x 100
Nails 30mm x 100
Screws 30mm x 100
Bolts 5m x 100
Nails 20mm x 100
 TOTALS
4. Print out one copy
5. Save your work as Exercise 1b

Modifying column widths

1. To modify the column width, move the mouse pointer on to the right edge of the column heading you want to modify.



The mouse pointer will change to a double arrow.

2. Hold and drag the mouse to the required position, or double click and Excel will increase the cell width to accommodate the widest cell entry.

Cell Justification

1. Select the range of cells required
2. Adjust the cell justification is by clicking on one of the alignment  Found on the formatting toolbar.
3. Enter the following data.

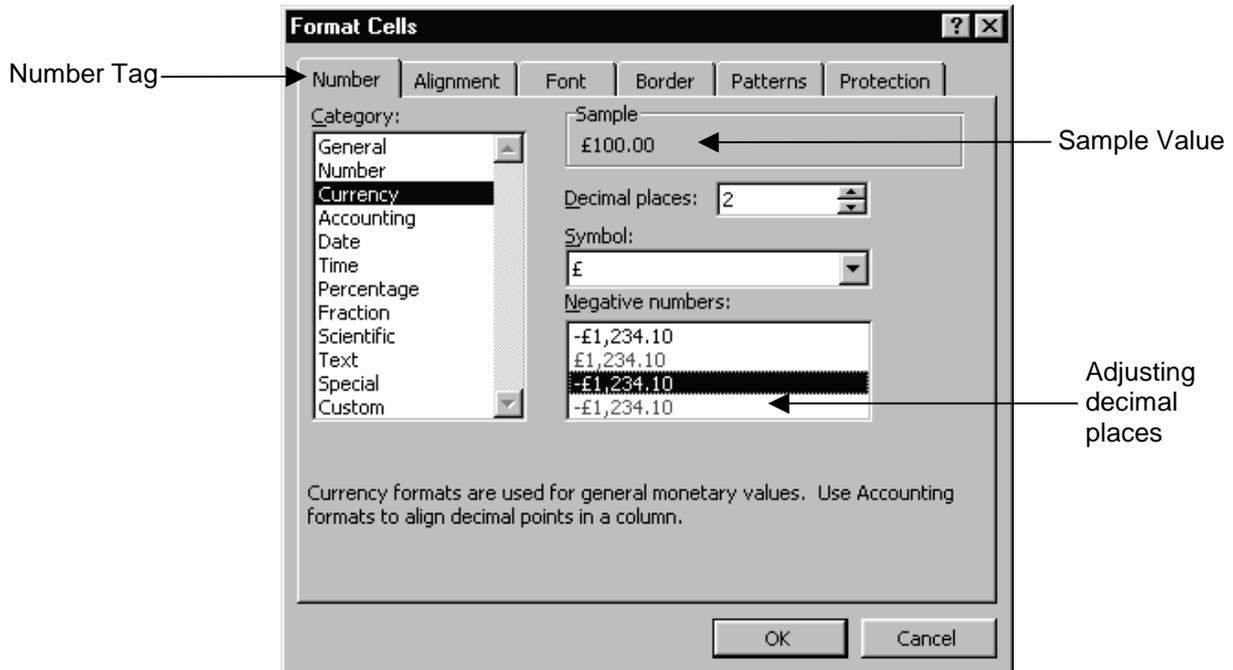
ITEM	PRICE	COST	MADE	SOLD
Bearings	1.12	0.87	30	15
Washers M5 x 100	1.99	1.35	20	17
Nails 30mm x 100	2.5	1.9	20	12
Screws 30mm x 100	1	0.65	10	3
Bolts M5 x 100	1	0.65	60	60
Nails 20mm x 100	1.1	0.66	50	44
TOTALS				

Changing the format of cells

1. Select the range of cells that you wish to change the format of.
2. Move the mouse pointer to the menu bar and click on FORMAT, now click on CELLS.

The Format Cells dialogue box will be displayed.

3. Click on the tag called NUMBER



4. Change the settings of this window to the same as the diagram shown. The sample value should be set to 2 decimal places.
5. Select OK to return to the spreadsheet.

Changing the contents of a cell

1. Click in the cell containing the information to be changed
2. This cells contents will appear in the formula bar.
3. Click in the formula bar and make any corrections.
4. Press return when done.

EXERCISE 1 - STEP 2

1. Change the format of the cells containing the values for 'PRICE' and 'COST' to CURRENCY so that the pound sign is displayed.
2. Increase the price of Bolts 5m*100 to 1.10

Entering simple formulas

1. Click in the cell where you want the answer to be, In this case cell F5

	A	B	C	D	E	F
1	Regent Bearings					
2						
3	ITEM	PRICE	COST	MADE	SOLD	INCOME
4						
5	Bearings	1.12	0.87	30	15	

The **INCOME** will be the **price** multiplied by the number **sold**. So the formula will be $B5 * E5$.

All formulas must start with an equals (=) symbol. To create this formula,

2. Click on the formula bar.
3. Press return.

The value 16.8 will appear as the income for Bearings.

4. Replicate this formula to calculate the income made for each dish.

AutoFill

One quick way to copy this formula is to use the **AutoFill** feature. The AutoFill handle is located at the bottom right corner of the active cell.



1. Click the mouse in the cell that you wish to copy, cell F5 in this case
2. Hold the mouse button on the AutoFill handle. Move the mouse pointer down to cover all the cells that you wish to copy the formula to, in this case F10.
3. Release the mouse button.

AutoSum

To quickly add a column or row of values, use Excel's **AutoSum** feature.

1. Move to the cell where the total will appear. (Cell D12 in this exercise)
2. Click on the AutoSum Σ button

Excel will indicate the range of cells to be included in the addition by surrounding them with a dotted line.

3. If the cell range shown is correct, click on the AutoSum Σ button a second time.
4. If the cell range selected is incorrect, click and drag over the correct range, then click on the AutoSum Σ button a second time.

Deleting rows or columns

1. Click on the row number or letter of the column you wish to delete with the mouse.
2. From the menu bar select Edit.
3. Within the Edit menu select Delete.

EXERCISE 1 - STEP 3

1. Generate the income obtained from Bearings by multiplying the **price** by the number **sold**, putting the answer in the **income** column.
2. Change the format of the cells containing the values for 'PRICE' and 'COST' to CURRENCY.
3. Use a formula to calculate the total items **made**, total dishes **sold** and the total **income**. The value for total made should be **190**.
4. Use the **AutoSum** feature to create the totals for items sold (should be 151) and income (should be 198.03) in the same way or use the **AutoFill** feature to copy this formula.
5. Bolts 5m*100 has been withdrawn from the menu so delete this row.
6. Add an extra column to the spreadsheet to show the profit made on each dish. Under the heading PROFIT generate the data for each item using the formula

PROFIT = INCOME - (COST * MADE). Total this column to calculate the overall profit for all the dishes, putting the answer in the totals row. See the notes below
7. Use the **AutoFill** feature to copy this formula for the other dishes.
8. Use the **AutoSum** feature to calculate the total profit. This should be 31.93
9. Change the format of the cells where the Income & Profit values are, showing the pound symbol to two decimal places.
10. Print out one copy
11. Save your work as Exercise 1a

First start by calculating the profit for Bearings. The profit for this dish should appear in cell G5 so click on this cell. If this is done correctly the answer should be -9.3

Check your printout showing formulas with the diagram below.

Book1							
	A	B	C	D	E	F	G
1	Regent Bearings						
2							
3	ITEM	PRICE	COST	MADE	SOLD	INCOME	PROFIT
4							
5	Bearings	1.12	0.87	30	15	=B5*E5	=F5-(C5*D5)
6	Washers 5m x 100	1.99	1.35	20	17	=B6*E6	=F6-(C6*D6)
7	Nails 30mm x 100	2.5	1.9	20	12	=B7*E7	=F7-(C7*D7)
8	Screws 30mm x 100	1.1	0.65	60	60	=B8*E8	=F8-(C8*D8)
9	Nails 20mm x 100	1.1	0.66	50	44	=B9*E9	=F9-(C9*D9)
10							
11	TOTALS			=SUM(D5:D9)	=SUM(E5:E9)	=SUM(F5:F9)	=SUM(G5:G9)

EXERCISE 1 - STEP 4

1. Check your answers and make any corrections required
2. Print out one copy
3. Save your work as Exercise 1b
4. File the work in your portfolio

Re-cap

During this first exercise you have covered the following features of Excel.

- Title centring
- Adjusting column width
- Formatting a range of cells
- Entering Formula
- AutoFill
- AutoSum
- Deleting Rows
- Printing
- Viewing Formula

Check that you are familiar with each of the above, experimenting if necessary. Ask your instructor to check you work and obtain the next exercise.

EXERCISE 2: SALES EXERCISE

During this exercise you will work towards creating this spreadsheet.

DO NOT START COPYING THIS DIAGRAM.

Book1								
	A	B	C	D	E	F	G	
1			SALES					
2		TRANSFORMERS	SWITCHES	SOCKETS	CABLE	TRUNKING	TOTAL	
3	MON	10	18	52	13	38	131	
4	TUE	34	23	55	40	33	185	
5	WED	48	36	29	29	54	196	
6	THU	50	22	40	32	51	195	
7	FRI	44	36	33	44	53	210	
8	SAT	31	45	32	21	12	141	
9	TOTAL	217	180	241	179	241		
10	COST	£0.15	£0.13	£0.11	£0.16	£0.17		
11	EXPENDITURE	£32.55	£23.40	£26.51	£28.64	£40.97	£152.07	

EXERCISE 2 - STEP 1

1. On the top row enter the title SALES, centre this across the spreadsheet.
2. Leaving a 1 row gap enter the following column headings. You may need to adjust column widths.
TRANSFORMERS SWITCHES SOCKETS CABLE TRUNKING DIODES TOTAL
3. Using the **AutoFill** feature, add weekdays to your spreadsheet.
4. Complete the first column by adding the rows TOTAL, COST and EXPENDITURE to the spreadsheet.
5. Fill in the spreadsheet with the figures as shown in the diagram below. At this point your spreadsheet should look like this :-
6. Print out one copy of your spreadsheet
7. Save the work to your floppy disk using the name Exersice2

Exercise2a.xls								
	A	B	C	D	E	F	G	H
1	SALES							
2		TRANSFORMERS	SWITCHES	SOCKETS	CABLE	TRUNKING	DIODES	TOTAL
3	MON	10	18	52	13	38	30	
4	TUE	34	23	55	40	33	40	
5	WED	48	36	29	29	54	29	
6	THU	50	22	40	32	51	35	
7	FRI	44	36	33	44	53	52	
8	TOTAL							
9	COST	£0.15	£0.12	£0.11	£0.16	£0.17		
10	EXPENDITURE							

EXERCISE 1 - STEP 4

- Use **AutoSum & AutoFill** to :-
 - Calculate the total sold on Monday. (This should be 161).
 - Replicate this formula to obtain the totals for the other days.
 - Calculate the total of TRANSFORMERS sold during the week. (This should be 186).
 - Replicate this formula to obtain the totals for the other items.
- Change the format of the cells containing figures for COST to CURRENCY.
- Use a formula to calculate the weekly expenditure on **each item**.

$$\text{EXPENDITURE} = \text{TOTAL SOLD} * \text{COST}$$
- Change the format of the expenditure row to CURRENCY.
- The data for DIODES should not have been entered, delete the whole column.
- The cost of SWITCHES should be 13 pence.
- Insert a new row after Friday, and insert the following sales data.

SAT	31	45	32	21	12
-----	----	----	----	----	----
- Adjust the spreadsheet to take into account the sales on Saturday and calculate the overall expenditure for all the items. (This should be £152.07).

 Check your spreadsheet with the one at the beginning of this exercise.
- Print out your spreadsheet showing both :-
 - Calculated Values
 - The Formulas
- Save the work to your floppy disk using the name Exersice2a.
- File your work in your portfolio.

Creating Charts

Excel provides a useful facility to allow you to create graphs from raw data on the spreadsheet. Excel refers to all types of graph (bar, line, pie etc.) as **charts**.

The following areas will be looked at :-

- Organising the Spreadsheet
- Using 'Chart Wizard'
- Printing a Chart

Organising the Spreadsheet

It is important to look at what characteristics a spreadsheet should have in order to produce good charts.

The secret of success in chart production is to ensure that the spreadsheet you use is correctly laid out, and that you select (highlight) the right parts of it.

To do this the spreadsheet must be laid-out in a tight 'block' like this.

	A	B	C	D	E	F	G
1		Class Exam Performance (%)					
2							
3							
4		Year 1	Year 2	Year 3			
5	Clare Norton	75	87	67			
6	David Mole	34	32	55			
7	John Felton	66	56	86			
8							
9							
10							
11							

Guidelines

- Keep the cell at the top left of the block empty.
- Do not leave blank rows or columns within the block.

Before creating a chart, you must select the area of your spreadsheet which contains the information you want to display. You should select **only** this block of cells (See diagram above). This avoids distorting the chart with other cells such as titles.

Entering Data

Before any charts can be created, input the following data into a spreadsheet. Use formulas to calculate the values in the **totals** row.

	A	B	C	D	E	F	G
1	<i>Humber Bridge Crossings</i>						
2							
3							
4	<i>All Values are Thousands</i>						
5							
6		1987-88	1987-89	1987-90	1987-91	1987-92	1987-93
7	Heavy Commercial	434	450	480	512	550	553
8	Light Commercial	198	278	300	278	256	249
9	Busses	10	13	16	18	22	27
10	Motor Cycles	72	63	51	55	59	61
11	Cars	2585	2964	3373	3742	3852	4043
12							
13	Total	3299	3768	4220	4605	4739	4933
14							
15							

Creating Charts using 'Chart Wizard'

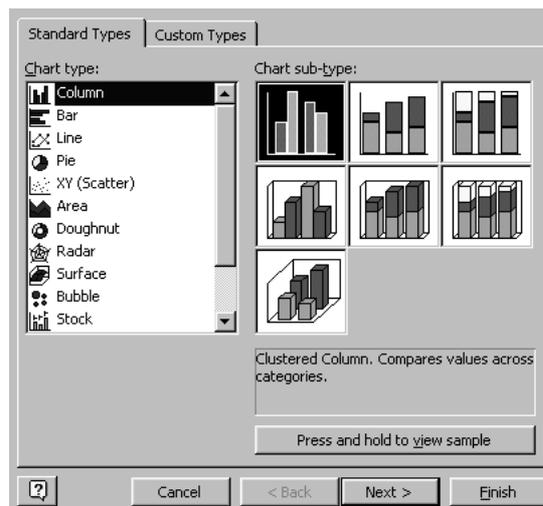
Excels Chart Wizard facility enables you to design and create charts quickly and easily, by taking you through four simple steps.

1. Specify which area of the spreadsheet you wish to use to create the chart.

To do this highlight (Select) the block of cells from **A6** to **G11** on your spreadsheet.

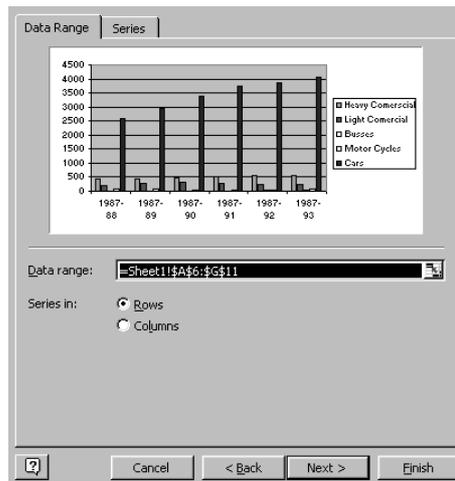
2. Click on the Chart Wizard  button on the Toolbar.

The first dialogue box appears, displaying the types of chart available.



3. To do this:

Select the **column** chart and the top left chart sub-type



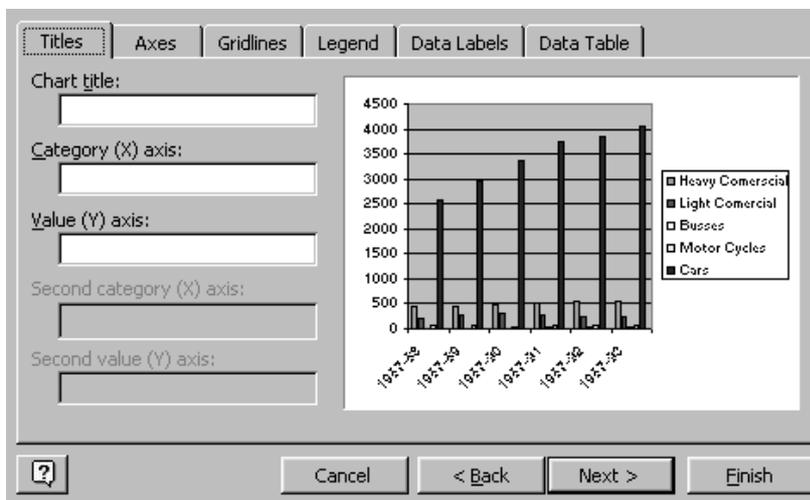
4. Click on **Next**.

The second dialogue box appears displaying different ways of presenting the graph.

5. Select to show the data series in columns. **Data Series in:**
 Rows
 Columns

6. Click on **Next**.

The last dialogue box appears, this allows you to modify the titles for the chart. Make the dialogue box like the one shown below.



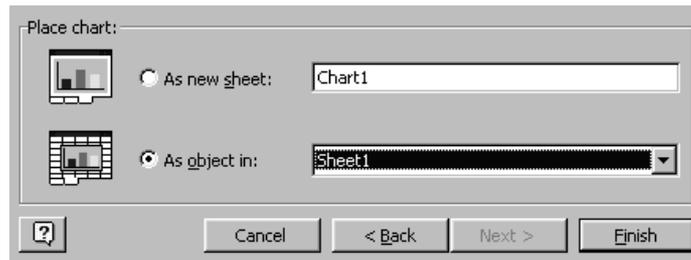
Type in the Chart title: box **Humber Bridge Crossing**

Type in the Category (x) axis: box **Category of Vehicle**

Type in the Value (y) axis: box **Thousands**

Select **Next** to see the Place chart dialogue box..

7. Select **Finish** to see the chart in your spreadsheet.



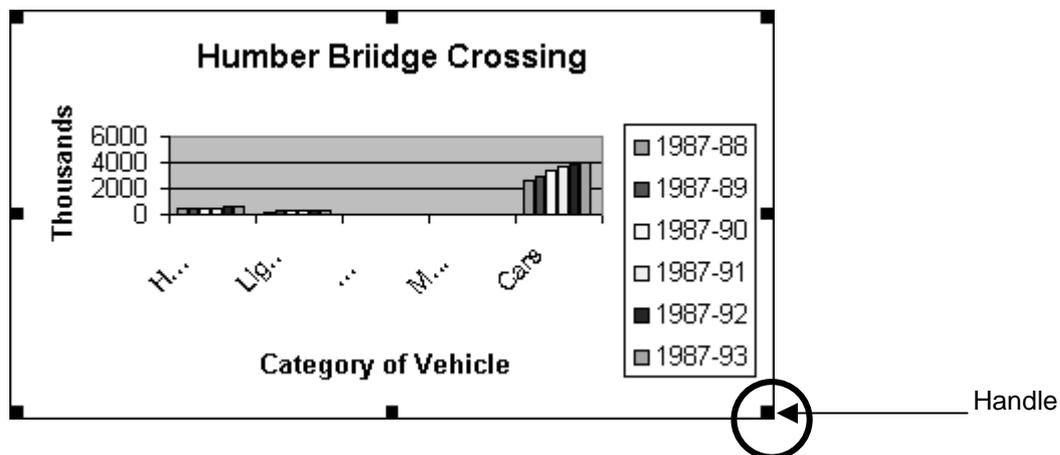
Re-sizing charts

To re-size the graph, do the following:

1. Highlight the graph by clicking in the centre.

When you do this you will see that the picture is surrounded by 8 small boxes, called handles.

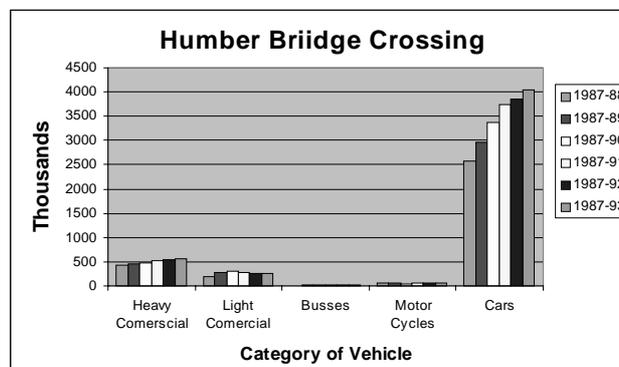
2. Move the pointer near to one of the corner handles until the pointer changes into a diagonal arrow like this . When this happens it means that the pointer is in the correct position to re-size that graph.



3. Hold down the mouse button and move nearer or further to the picture, thus altering the size.
4. Release the mouse button at the desired size.

NB by clicking or double clicking on an object in a graph, whether text or graphics you will be able to move or resize it. **Try this out to change the appearance of your graph.**

5. Use Excel to make the graph look line this,

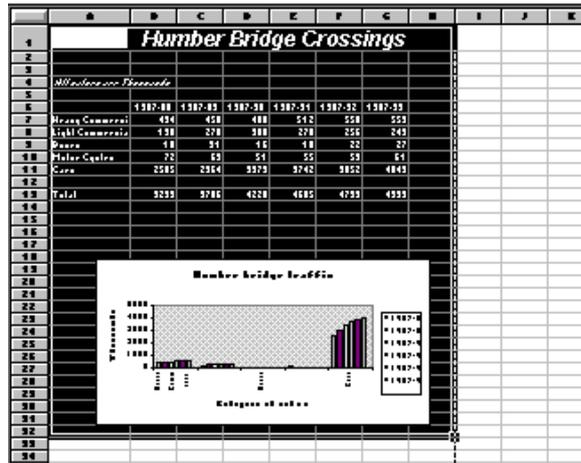


Printing a Chart

Before actually printing a chart (or anything) it is a good idea to use the Print Preview facility. This will allow you to see how the print-out would look, without having to print it out.

To use Print Preview

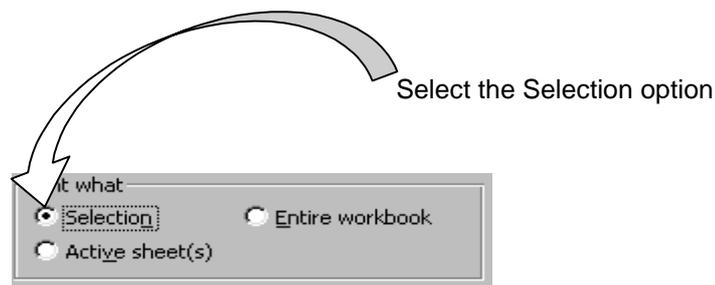
1. Highlight the area that you wish to print. In this case print all the text & the chart, like this.



2. Click the print preview  button.

You will see an example of how the printout will look.

3. Select the Print button on this screen.
4. So that the computer will only print out the highlighted area, make sure that the **Selection** option is chosen at the "print what" screen.



5. Click on the Preview button to return to the print preview screen

At the bottom right hand side of the screen, the computer will indicate how many pages the print-out is expected to take.

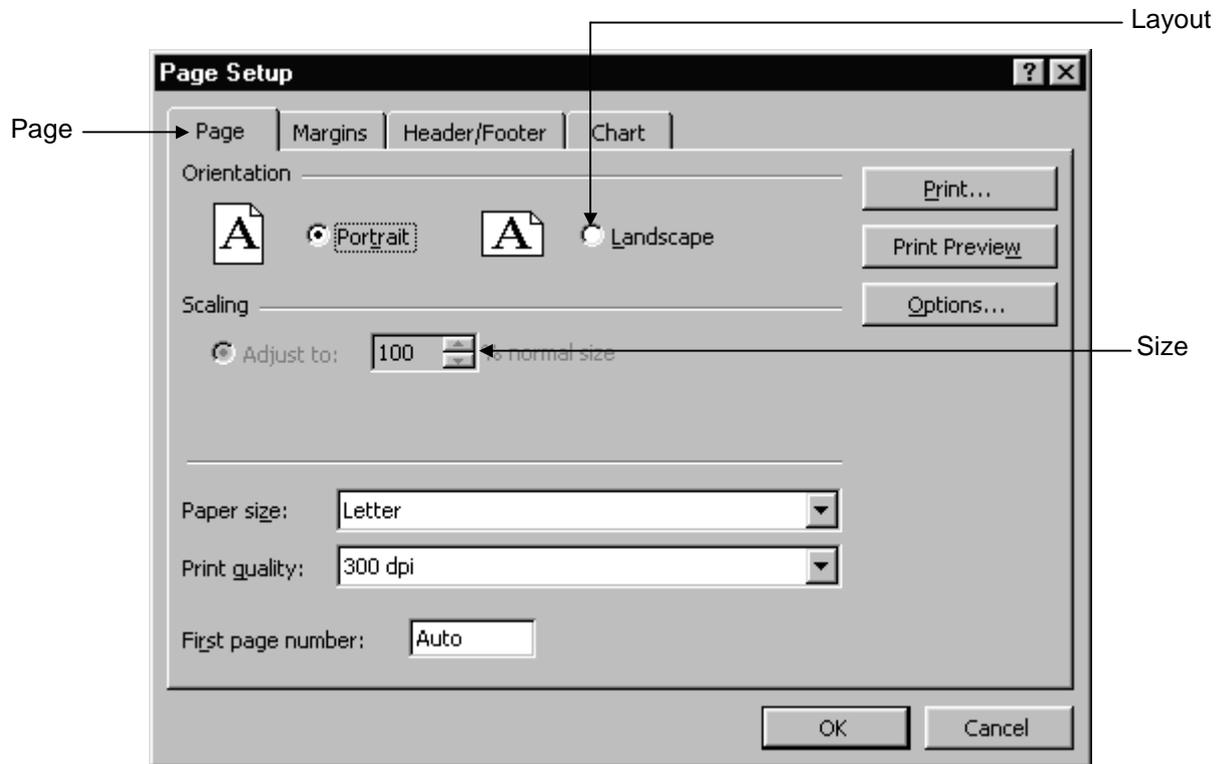
If this reads PAGE 1 OF 1 then select the print button again to print out your work onto 1 page.

If the print-out is expected to take more pages then it will be necessary to use the Set-up screen to make a few changes to the print settings.

To change the print settings

1. At the print preview screen, click on the set-up button.

The set-up screen will be displayed.



2. Try changing the Orientation to Landscape or adjust the scaling size.
3. Click OK to return to the print preview screen.

It may be necessary to adjust these settings and return to the print preview/set-up screens several times before you are able to fit the print-out onto 1 page.

EXERCISE 3: COIL ANALYSIS

During this exercise you will create a spreadsheet including a chart, illustrating the variations of resistance values over 1 week.

For this exercise you will be asked to use your judgement about how to organise the spreadsheet and what type of chart would be most suitable to show this data.

To get the most out of this learning exercise take your time and plan your work carefully. You **will** need to use extra functions as you see fit, these are not be mentioned in the steps below. However they have been mentioned in earlier exercises.

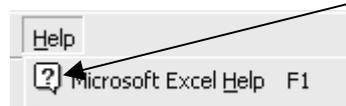
EXERCISE 3 - STEP 1

1. Start Excel
2. Create a Title for this exercise.
3. Create the following column headings
Date Time Coil type Resistance Value,
4. Fill in the **Dates** column at daily intervals over a 6 day period.
5. Fill the columns in with values that are **realistic** for the type of coil you are analysing
6. Print out one copy of your work
7. Save your work to your floppy disk under the name Exercise 3
8. Create three rows at the bottom of the spreadsheet headed,

MAX
MIN
AVERAGE

9. Enter formulae into these three rows to calculate their values from the data above.

You will need to use Excel's Help  to find out how to do this. You can access this by clicking on the help icon  or clicking on Help on the menus bar and then



Creating Charts

EXERCISE 3 - STEP 2

1. Create a chart of a **suitable type** to show **varying** resistance values of the various types of coils over the 1 week period.
2. Your chart should have a suitable heading, with the horizontal (x) and vertical (y) axis clearly labelled.
3. Save the spreadsheet & chart to your floppy disk as Exercise 3.
4. Print one copy of the spreadsheet & chart in colour if available.
5. Make sure this fits onto **one** page.
6. Print one copy of your spreadsheet showing the formulas used.
7. Make sure this is print out is in landscape and fits onto **one** page.
8. File the work in your portfolio.

**INFORMATION TECHNOLOGY
KEY SKILLS STAGE 3
SPREADSHEET BUILD UP TASK**

MIGHTY PACKERS PLC

You work for a company that packs crisps for wholesale markets and supermarkets.

You are responsible for the administration of the business which includes working out and making up the wages for the people who work in the packhouse sorting and packing the crisps.

You have decided that, in order to save time, you will build a spreadsheet on a computer to help work out the wages. You are going to work out the wages for two weeks.

Have a look at the hours worked each day for each person, for the week ending 14 January 2000.

NAME	TOTAL	ALLOWANCE
REG SMITH	46½	£82.22
SAM POOLE	46	£53.38
GEORGE DUNCAN	46½	£84.22
JESSIE ROSS	46	£53.38
BECKY SMITH	40	£53.38
JOHN SHERWIN	47¼	£91.15
JOHN SCOTT	44¾	£84.22
PETER JACOB	45	£63.13
GWEN ROBERTS	32	£44.98
KIERAN O'HARA	46	£84.22

WEEK ONE

Hours and Wage Rates

The company considers that 40 hours is a reasonable number of hours to work each week.

Basic hours = up to 40 hours worked per week. These hours are paid at the basic rate of £4.00 per hour.

Overtime hours = hours worked excluding the 40 hours. These are paid the overtime rate of £5.50 per hour.

Work out the number of basic and overtime hours worked by each person for the week ending 14 January 2000.

We will now start to build the spreadsheet to work out the following for each person:

- Number of Basic Hours
- Number of Overtime Hours
- Gross Wage (total amount of money due for all hours worked)

Key in the Heading **MIGHTY PACKERS PLC** in Cell A1

Underneath this heading key in the following Column Headings:

- Column A - NAME
- Column B - BASIC HRS
- Column C - NO OF OVERTIME HRS
- Column D - GROSS WAGE
- Column E - ALLOWANCE
- Column F - TAX DUE
- Column G - NI DUE
- Column H - NET PAY

Key in the Employee names underneath the NAME heading in Column A

Key in the Basic and Overtime Hrs above for each person. Remember to split the Basic Hrs (40 hrs) from the Overtime Hrs (anything over 40 hrs).

Key in the Tax Allowance from the list above in the ALLOWANCE Column

Include the two wage rates in a variable table at the top of the spreadsheet and refer to them from within.

	A	B	C
1	MIGHTY PACKERS PLC		
2			
3			
4		BASIC RATE	£4.00 N
5		OVERTIME RATE	£5.50 N
6			
7	NAME	NO OF BASIC HRS	NO OF OVERTIME HRS
8			
9	REG SMITH	40	6.5
10	SAM POOLE	40	6
11	GEORGE DUNCAN	40	6.5
12	JESSIE ROSS	40	6
13	BECKY SMITH	40	0
14	JOHN SHERWIN	40	7.25
15	JOHN SCOTT	40	4.75
16	PETER JACOB	40	5
17	GWEN ROBERTS	32	0
18	KIERAN O'HARA	40	6
19			
20			
21			
22			
23			
24			
25			

Tax

Everybody must pay tax to the government on the wages that they earn. This is called Income Tax. There are two aspects to income tax:

- A. You do not have to pay this tax on all of your wages – you have an allowance or free pay on which no tax is charged. Please see the Time Sheets for the amount of money on which the individual is charged no tax.
- B. Any wages earned over and above the allowance have 25% deducted in tax.

Extend the spreadsheet to include the allowance and also the tax to be deducted for each person. See the examples below to locate the formula to be used.

Include the tax rate of 25% in the variable table at the top of the spreadsheet.

The left screenshot shows a spreadsheet with a variable table at the top and a table of employee data. The variable table includes:

TAX	25%
BASIC RATE	£4.00
OVERTIME RATE	£5.50

The employee data table includes:

NAME	NO OF BASIC HRS	NO OF OVERTIME HRS	GROSS WAGE	ALLOWANCE	TAX DUE
REG SMITH	40	6.5	£195.75	£82.22	£28.38
SAM POOLE	40	6	£193.00	£53.38	£34.91
GEORGE DUNCAN	40	6.5	£195.75	£84.22	£27.88
JESSIE ROSS	40	6	£193.00	£53.38	£34.91
BECKY SMITH	40	0	£160.00	£53.38	£26.66
JOHN SHERWIN	40	7.25	£199.88	£91.15	£27.18
JOHN SCOTT	40	4.75	£186.13	£84.22	£25.48
PETER JACOB	40	5	£187.50	£63.13	£31.09
GWEN ROBERTS	32	0	£128.00	£44.98	£20.76
KIERAN O'HARA	40	6	£193.00	£84.22	£27.20

The right screenshot shows the same data with formulas for tax due:

NAME	NO OF BASIC HRS	NO OF OVERTIME HRS	GROSS WAGE	ALLOWANCE	TAX DUE
REG SMITH	40	6.5	= (B9*£4)+(C9*£5)	82.22	= (D9-E9)*£33
SAM POOLE	40	6	= (B10*£4)+(C10*£5)	53.38	= (D10-E10)*£33
GEORGE DUNCAN	40	6.5	= (B11*£4)+(C11*£5)	84.22	= (D11-E11)*£33
JESSIE ROSS	40	6	= (B12*£4)+(C12*£5)	53.38	= (D12-E12)*£33
BECKY SMITH	40	0	= (B13*£4)+(C13*£5)	53.38	= (D13-E13)*£33
JOHN SHERWIN	40	7.25	= (B14*£4)+(C14*£5)	91.15	= (D14-E14)*£33
JOHN SCOTT	40	4.75	= (B15*£4)+(C15*£5)	84.22	= (D15-E15)*£33
PETER JACOB	40	5	= (B16*£4)+(C16*£5)	63.13	= (D16-E16)*£33
GWEN ROBERTS	32	0	= (B17*£4)+(C17*£5)	44.98	= (D17-E17)*£33
KIERAN O'HARA	40	6	= (B18*£4)+(C18*£5)	84.22	= (D18-E18)*£33

National Insurance

This is another deduction made by the government. It is payable on all your gross earnings. We will assume for this task that the current rate of National Insurance is 2% on earnings up to £43 plus 9% on earnings over £43. Include these NI rates in the variable table at the top of the spreadsheet. Extend the spreadsheet to include the amount of NI due for each person. See the example below to locate the formula to be used

The left screenshot shows a variable table with NI rates and a table of employee data. The variable table includes:

TAX	25%
BASIC RATE	£4.00 N UP TO £43
OVERTIME RATE	£5.50 N OVER £43
	9%

The employee data table is the same as in the previous screenshots.

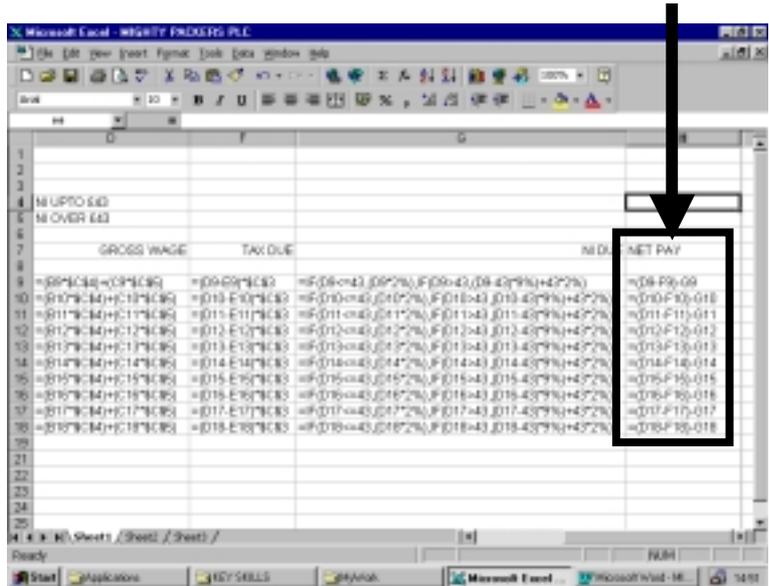
The right screenshot shows the same data with formulas for NI due:

NAME	NO OF BASIC HRS	NO OF OVERTIME HRS	GROSS WAGE	ALLOWANCE	TAX DUE	NI DUE
REG SMITH	40	6.5	£195.75	£82.22	£28.38	= (D9-E9)*£33
SAM POOLE	40	6	£193.00	£53.38	£34.91	= (D10-E10)*£33
GEORGE DUNCAN	40	6.5	£195.75	£84.22	£27.88	= (D11-E11)*£33
JESSIE ROSS	40	6	£193.00	£53.38	£34.91	= (D12-E12)*£33
BECKY SMITH	40	0	£160.00	£53.38	£26.66	= (D13-E13)*£33
JOHN SHERWIN	40	7.25	£199.88	£91.15	£27.18	= (D14-E14)*£33
JOHN SCOTT	40	4.75	£186.13	£84.22	£25.48	= (D15-E15)*£33
PETER JACOB	40	5	£187.50	£63.13	£31.09	= (D16-E16)*£33
GWEN ROBERTS	32	0	£128.00	£44.98	£20.76	= (D17-E17)*£33
KIERAN O'HARA	40	6	£193.00	£84.22	£27.20	= (D18-E18)*£33

NET PAY

To work out the Net Pay you will need to locate the Gross Pay and minus the Tax and minus the NI:

$$=(\text{Gross Pay}-\text{Tax})-\text{NI}$$



TOTALS FOR COLUMNS

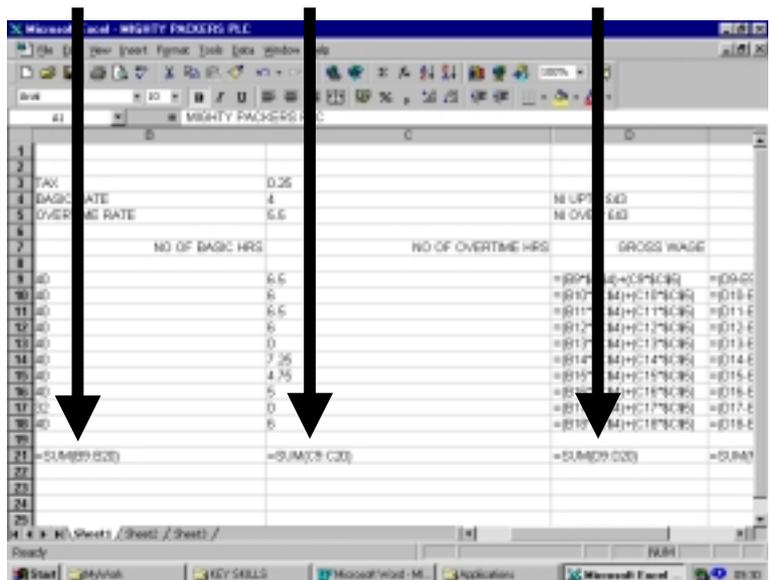
1. Click in the blank cell below the first column you require a total for, ie, basic hrs
2. Highlight all the figures in that column including the blank cell in which the answer will appear
3. Click on the **autosum** icon on the top Toolbar twice –



Once to show the formula you are creating
Twice to display the answer

Repeat step 3 until you have totals at the bottom of the following columns:

- Overtime Hrs
- Gross Pay**
- Allowance
- Tax
- NI
- Net Pay

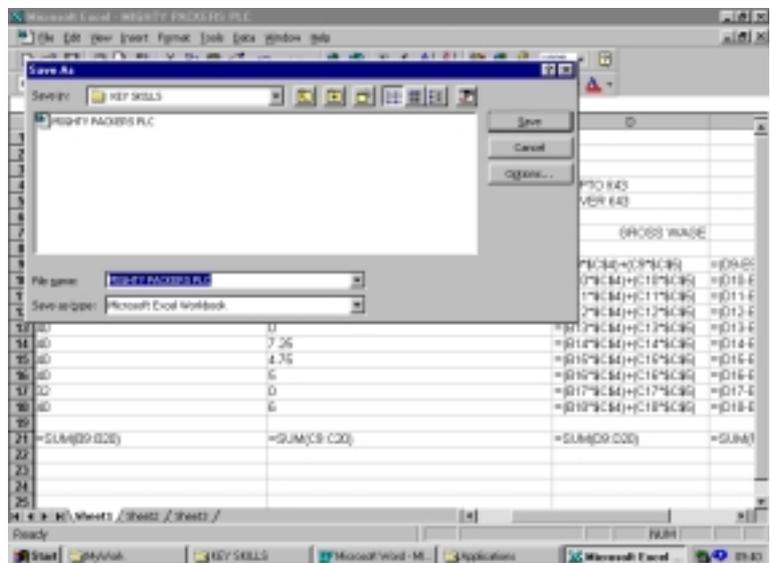
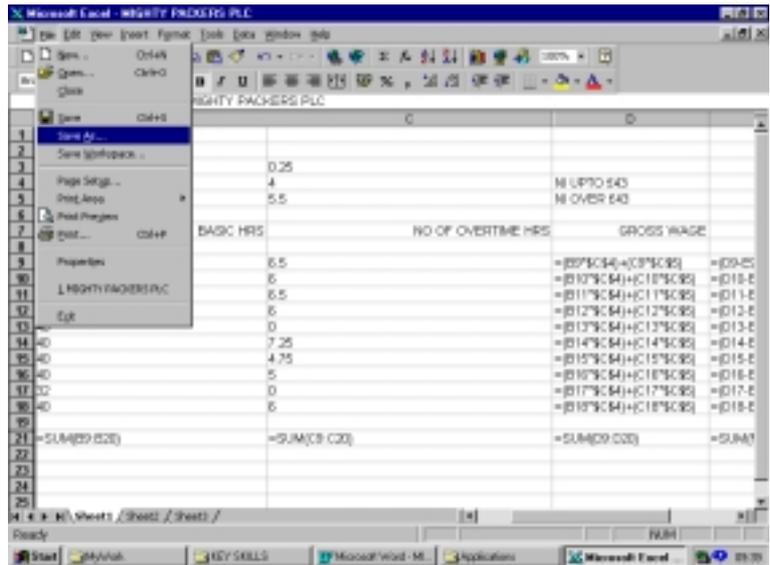


SAVING SPREADSHEETS

1. Click on the File Menu
2. Choose Save or Save As from the list
3. Key in an appropriate filename, ie Mighty Packers
4. Click on the Save Icon

Or

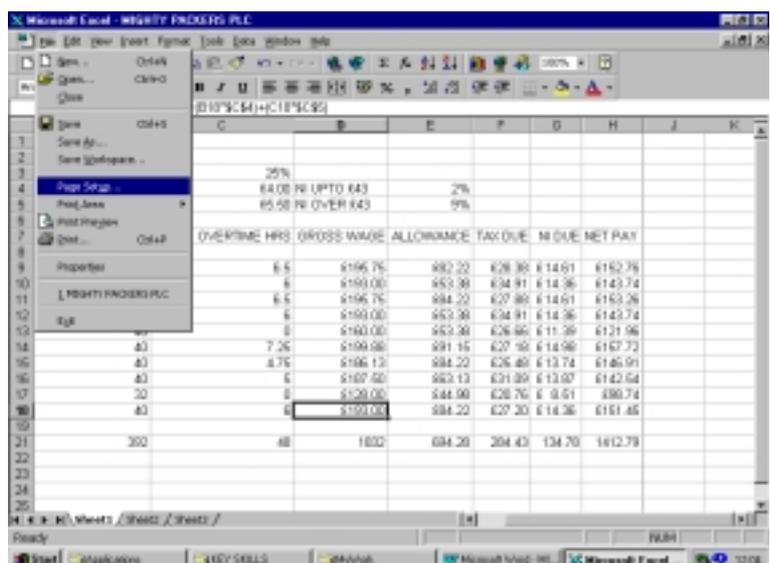
1. Click on the Save Icon on the top Toolbar (3rd Icon from left – black disk)
2. Follow steps 3 and 4 from above to save the work



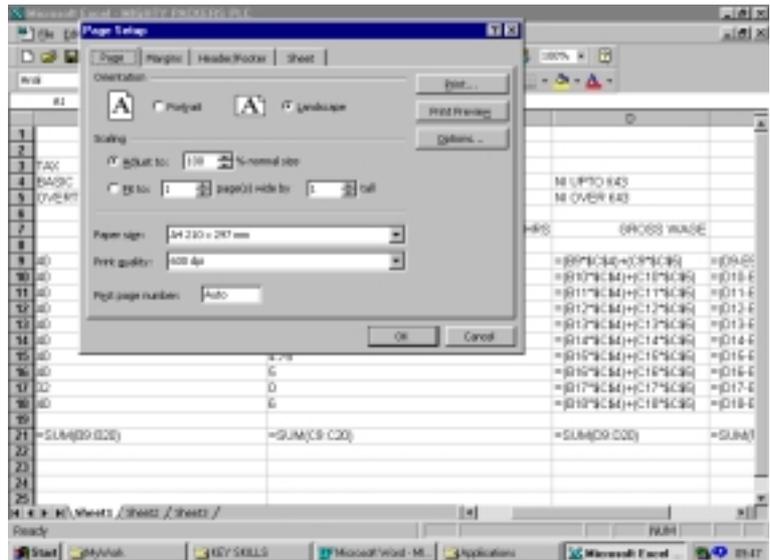
CHANGING PAGE ORIENTATION

Should your spreadsheet not fit on to one page on Portrait, it can be changed to print on Landscape:

1. Click on File
2. Choose Page Setup

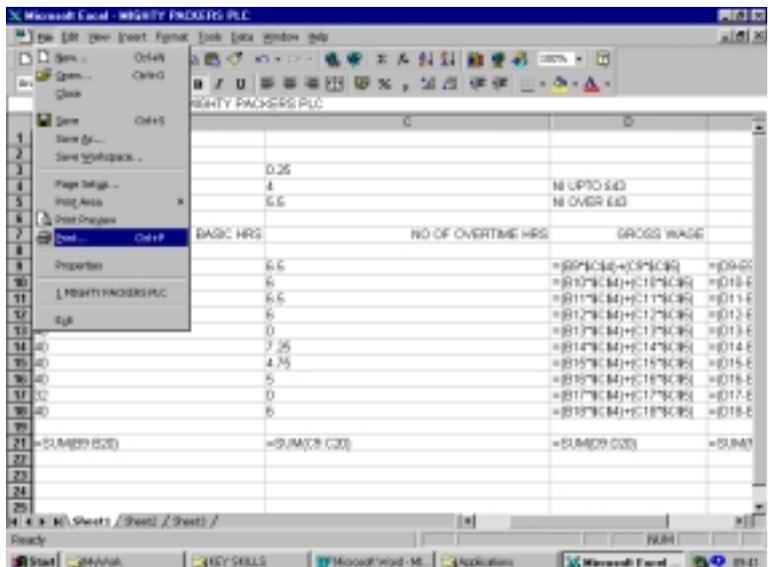


3. Click on the Page Tab at the top of the window
4. Click on Landscape
5. Click on OK or Print if you are wishing to print now

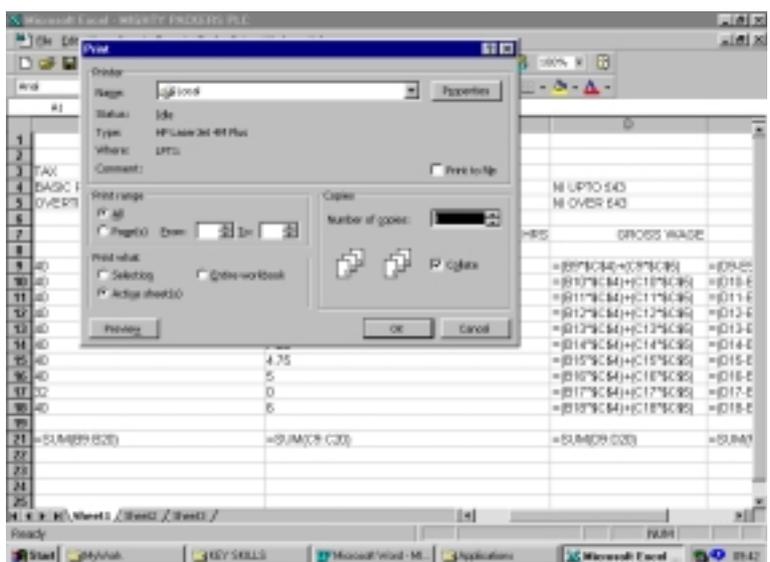


PRINTING SPREADSHEETS

1. Click on the File Menu
2. Choose Print from the list



3. Specify the number of pages you wish to print or choose All
4. Click on the Print button at the bottom of the window



PRINTING FORMULAS

Should you wish to keep a copy of the formulas used within a spreadsheet follow the steps below:

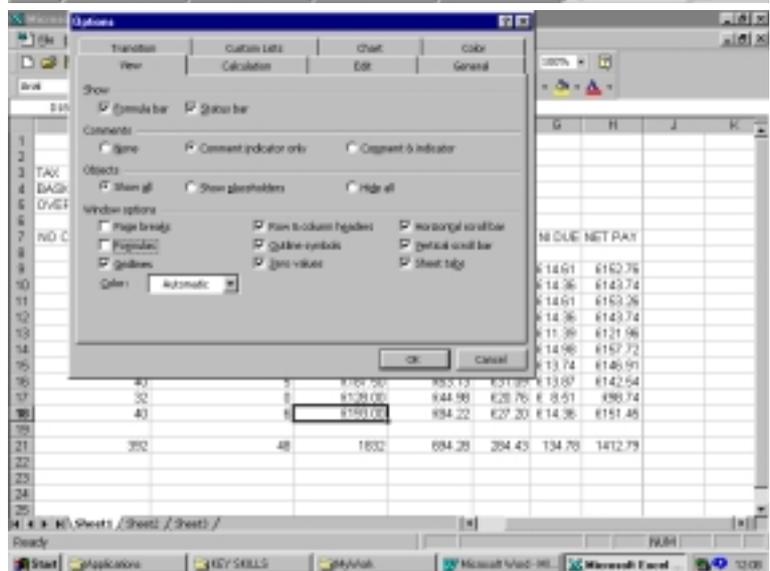
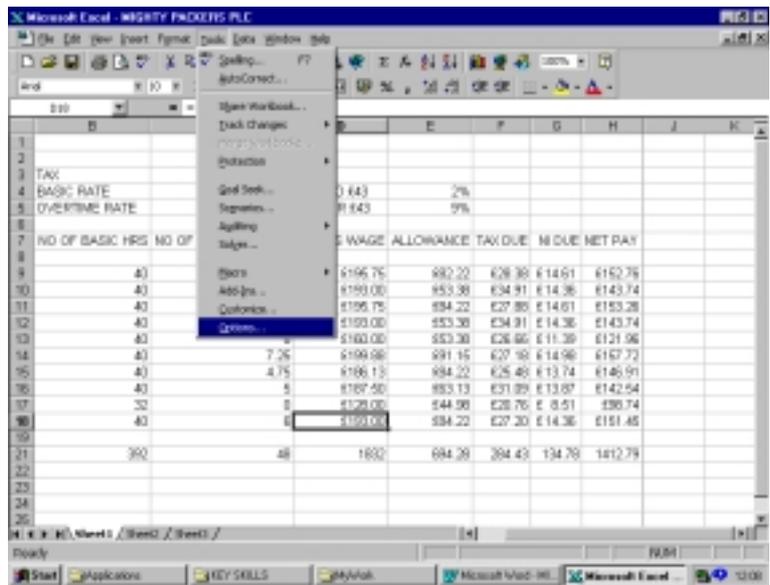
1. Click on the Tools Menu
2. Choose Options from the bottom of this list
3. Click on the Formulas option at the bottom left corner of this window to create a tick
4. Click on OK

Your spreadsheet will now display formulas rather than answers

5. You can print your work in the normal way if you require a hard copy of the formulas

Or

6. You can save your work again with a new filename by:
 - a. Clicking on the File Menu
 - b. Choose Save As from the list
 - c. **Key in a new filename**
 - d. Click on Save

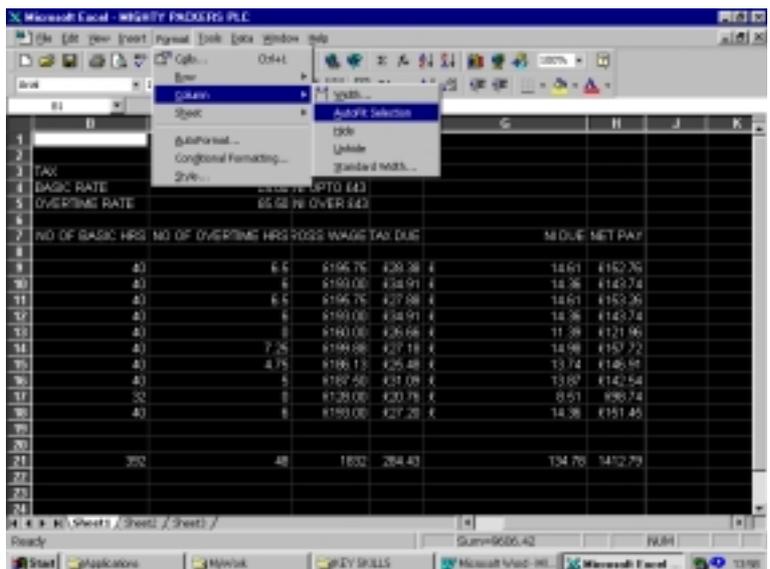


AUTOFIT COLUMNS

Sometimes you may have a fairly large spreadsheet and you need it to fit to one page.

1. Highlight the whole spreadsheet by clicking on the blank grey box at the left of the screen (above row 1 and next to Col A)
2. Click on the Format Menu
3. Choose Column from the list
4. Choose AutoFit Selection

Your spreadsheet will now fit the page ready to print

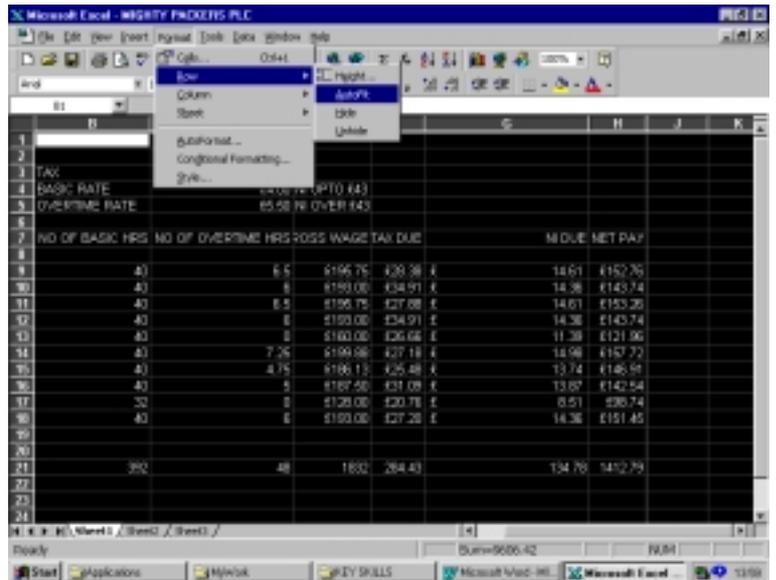


AUTOFIT ROWS

1. Repeat procedures 1 & 2 above
2. Choose Row from the list
3. Choose AutoFit

Or

1. Click on the File Menu
2. Choose Page Setup from the list
3. Click on the Page Tab at the top of this menu
4. Click on the option – Fit to 1 page
5. Click on OK

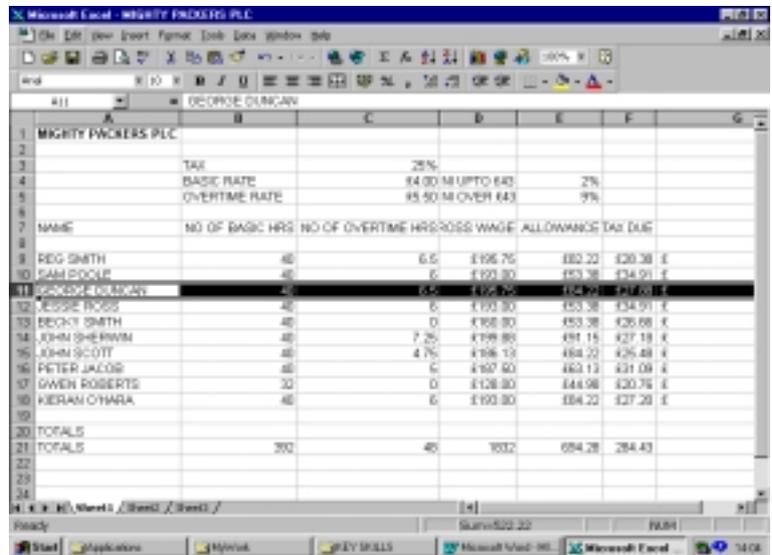


CHANGING AN EXISTING SPREADSHEET

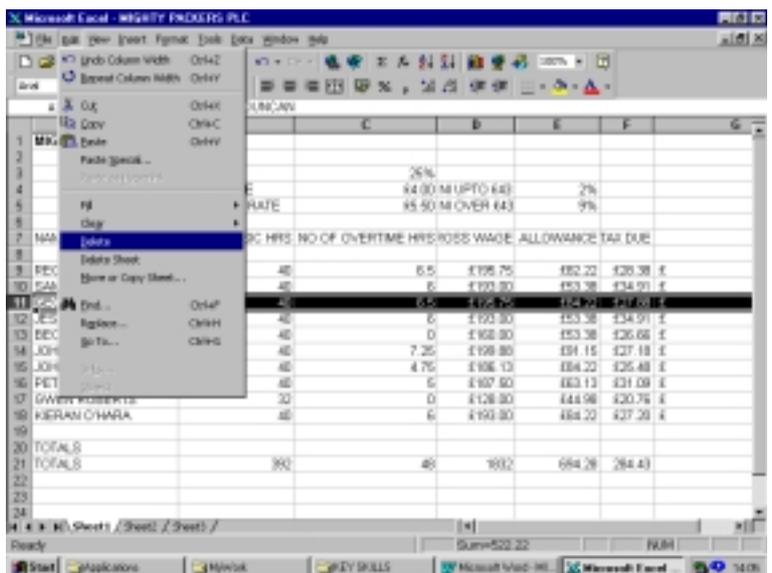
DELETING EMPLOYEES

George Duncan and John Sherwin have left the company and need to be removed from the spreadsheet for the next week:

1. Click and drag down on the row numbers alongside George's and John's name, this will highlight the rows



2. Click on the Edit Menu
3. Choose Delete from the list



George, John and the blank rows will have disappeared. Any data below this has now moved up in its place.

NAME	NO OF BASIC HRS	NO OF OVERTIME HRS	GROSS WAGE	ALLOWANCE	TAX DUE	NI DUE
REG SMITH	40	6.5	£196.75	£82.22	£32.38	£14.61
SAM POOLR	40	6	£193.00	£53.38	£40.48	£14.36
GEORGE BOOS	40	6	£193.00	£53.38	£40.48	£14.36
DELYN SMITH	40	0	£168.00	£53.38	£30.00	£11.39
JOHN SHERWIN	40	7.25	£199.88	£91.15	£31.53	£14.98
JOHN SCOTT	40	4.75	£186.13	£84.22	£29.55	£13.74
PETER JACOB	40	6	£197.50	£83.13	£36.07	£13.87
GWEN ROBERTS	30	6	£128.00	£44.98	£24.08	£8.51
KERAN O'HARA	40	6	£193.00	£84.22	£31.55	£14.36
TOTALS	362	41.5	£636.25	£180.6	£287.68	£120.17

A new Tax Rate has been introduced. 29% will replace the 25% tax rate last week:

Click in to the Tax Rate Cell (C3) and re-type the new rate of 29%

NAME	NO OF BASIC HRS	NO OF OVERTIME HRS	GROSS WAGE	ALLOWANCE	TAX DUE	NI DUE
REG SMITH	40	6.5	£196.75	£82.22	£32.92	£14.61
SAM POOLR	40	6	£193.00	£53.38	£40.48	£14.36
GEORGE BOOS	40	6	£193.00	£53.38	£40.48	£14.36
DELYN SMITH	40	0	£168.00	£53.38	£30.00	£11.39
JOHN SHERWIN	40	7.25	£199.88	£91.15	£31.53	£14.98
JOHN SCOTT	40	4.75	£186.13	£84.22	£29.55	£13.74
PETER JACOB	40	6	£197.50	£83.13	£36.07	£13.87
GWEN ROBERTS	30	6	£128.00	£44.98	£24.08	£8.51
KERAN O'HARA	40	6	£193.00	£84.22	£31.55	£14.36
TOTALS	362	41.5	£636.25	£180.6	£297.80	£120.17

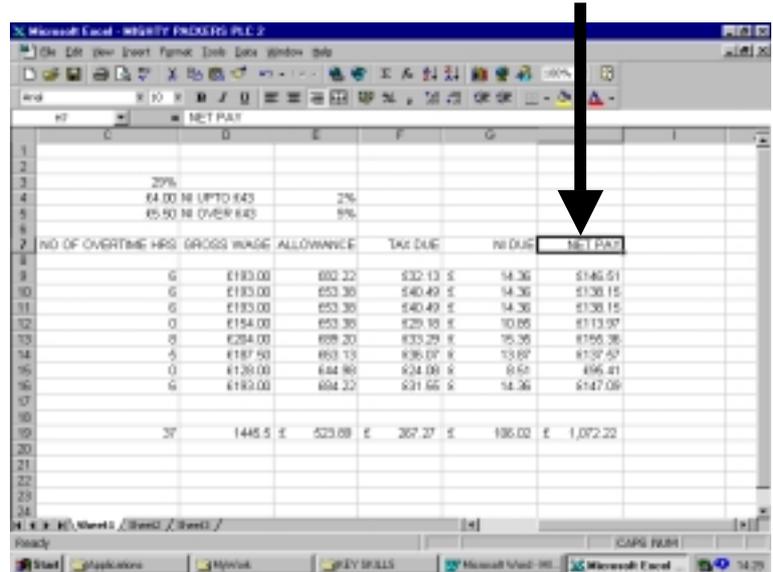
You will notice that because all employees' pay is connected to cell C3, the Tax and Net Pay columns change accordingly to accommodate the increase.

GROSS WAGE	ALLOWANCE	TAX DUE	NI DUE	NET PAY
£196.75	£82.22	£32.92	£14.61	£148.22
£193.00	£53.38	£40.48	£14.36	£138.15
£193.00	£53.38	£40.48	£14.36	£138.15
£168.00	£53.38	£30.00	£11.39	£117.68
£199.88	£91.15	£31.53	£14.98	£153.37
£186.13	£84.22	£29.55	£13.74	£142.03
£197.50	£83.13	£36.07	£13.87	£137.57
£128.00	£44.98	£24.08	£8.51	£95.41
£193.00	£84.22	£31.55	£14.36	£147.08
£636.25	£180.6	£297.68	£120.17	£1,218.48

All employees worked different hours this week as shown below:

NAME	TOTAL	ALLOWANCE
REG SMITH	46	£82.22
SAM POOLE	46	£53.38
JESSIE ROSS	46	£53.38
BECKY SMITH	38½	£53.38
JOHN SCOTT	48	£89.20
PETER JACOB	45	£63.13
GWEN ROBERTS	32	£44.98
KIERAN O'HARA	46	£84.22

1. Amend your spreadsheet to accommodate the changes and check your answers with the example shown:



2. Print a copy of both the main spreadsheet and the formulas

REMEMBER TO RE-SAVE YOUR WORK

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 ENGLISH LAW

STATUTORY AND OTHER PROVISIONS OF ENGLISH LAW

Whilst the use of the Internet is a broadly unregulated medium, there are a number of statutory and other legal provisions which may impact upon its use. The following are a selection of provisions for which users of the Internet will need to be cognisant; they are, however, by no means exhaustive.

COMPUTER MISUSE ACT 1990

The Computer Misuse Act 1990 makes it a criminal offence to access, or attempt to access computer material without proper authority or to make unauthorised modification of computer material. Persons convicted of an offence under the Computer Misuse Act are subject to a maximum of 5 years' imprisonment or a fine or both. In the context of Internet use, it is likely that the following examples would be considered illegal.

- Accessing restricted material without proper authority.
- Provision of any material, such as access codes or 'hacking' instructions which enables others to gain unauthorised access to a computer system.
- Knowingly receiving (or using) any material from an unauthorised user who has gained access to systems.
- Unauthorised modification of a computer system program or data stored on a system.
- Any material, which encourages or incites other persons to carry out unauthorised access or modification of a computer system, program or data.

THE COPYRIGHT DESIGNS AND PATENTS ACT 1988

It is an offence under this Act to copy software or other Internet materials without authority. It is immaterial whether such unauthorised copying is done with a view to personal convenience or for monetary gain. Unlimited fines and up to two years' imprisonment may be imposed on offenders.

All software, including commercial products and Shareware, is protected by copyright law and is licensed for legitimate use. Some software creators have designated their products as Freeware (for which use is authorised without a licence fee being payable) and have made this available on the Internet.

DATA PROTECTION ACT 1984

This Act prohibits the holding, processing or disclosure of personal information data about others on computer, unless the data user is properly registered and observes the data protection principles.

RACE RELATIONS AND SEXUAL DISCRIMINATION ACTS.

Discrimination on the grounds of race, colour, nationality, ethnic or national origin or gender is unlawful under the provisions of the above legislation. Any material published or received via the Internet (or by other means) which discriminates or encourages discrimination is in contravention of the legislation.

OFFICIAL SECRETS ACTS

The provisions of this legislation often apply in connection with contracts with the Government or government agencies. Any publication of material via the Internet (or by any other means) which is in contravention of obligations under the Official Secrets Acts is a criminal offence, which is punishable by imprisonment or a fine or both.

CRIMINAL JUSTICE AND PUBLIC ORDER ACT 1994

This miscellany of legislation includes a consolidation of provisions for the protection of minors by making it a criminal offence to possess pornographic or obscene material of or involving minors, or material considered being excessively violent. In the context of the Internet it would apply to the transmission, receipt and storage of text, audio and graphic images.

LAWS OF DEFAMATION

Any publication of a statement, comment or innuendo about another individual or organisation, which cannot be justified at law, may render the author liable to an action for defamation.

OBSCENE PUBLICATIONS ACT 1959

The publication (whether for gain or not) of material intended to be read, heard or looked at which is such as to tend to deprave and corrupt persons having access to the publication is a criminal offence which carries a maximum sentence of three years imprisonment.

TELECOMMUNICATIONS ACT 1984

A person who sends a message or other matter that is grossly offensive, indecent, obscene or menacing in character via the public telecommunication system or sends a false message for the purpose of causing annoyance, inconvenience or needless anxiety to another shall be guilty of a criminal offence. The Internet makes use of the "public telecommunication system". A breach of this Act will result in a substantial fine and/or imprisonment.

INTERNATIONAL LAW

Users of the Internet should be aware that any material, which they create and transmit, is accessible world-wide and that such material must not therefore contravene any international laws or treaties. Specific examples include the importation of specified material from countries for which an embargo is in force and the possibilities that material lawfully provided in the United Kingdom but accessed in another country may constitute an offence within that recipient country.

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 A GUIDE TO COPYRIGHTS

WHAT IS A COPYRIGHT

Copyright is a form of protection provided by the laws of the United States (title 17, U.S. Code) to the authors of "original works of authorship " including literary, dramatic, musical, artistic, and certain other intellectual works. This protection is available to both published and unpublished works. The Copyright Act generally gives the owner of copyright the following exclusive rights:

- To reproduce the copyrighted work in copies or recordings;
- To prepare derivative works based upon the copyrighted work;
- To distribute copies or recordings of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending;
- To perform the copyrighted work publicly, in the case of literary, musical, dramatic, and choreographic works, pantomimes, motion pictures and other audio-visual works; and
- To display the copyrighted work publicly, in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audio-visual work.

WHO CAN CLAIM COPYRIGHT?

In the case of works made for hire, the employer and not the employee is presumptively considered the author. The copyright statute defines a "work made for hire" as:

- A work prepared by an employee within the scope of his or her employment; or
- Certain works specially ordered or commissioned, if the parties expressly agree in a written instrument signed by them that the work shall be considered a work made for hire.

The authors of a joint work are co-owners of the copyright in the work, unless there is an agreement to the contrary.

Copyright in each separate contribution to a periodical or other collective work is distinct from copyright in the collective work as a whole and vests initially with the author of the contribution.

Mere ownership of a book, manuscript, painting, or any other copy or recording does not give the possessor the copyright. The law provides that transfer of ownership of any material object that embodies a protected work does not of itself convey any rights in the copyright.

WHAT WORKS ARE PROTECTED?

Copyright protection exists for "original works of authorship" when they become fixed in a tangible form of expression. Copyright able works include the following categories:

- written literary works;
- musical works, including any accompanying words;
- dramatic works, including any accompanying music;
- pantomimes and choreographic works;
- pictorial, graphic, and sculptural works;
- motion pictures, video recordings and other audio-visual works;
- sound recordings; and
- computer software.

This list is illustrative and is not meant to exhaust the categories of copyright able works. These categories are viewed quite broadly.

WHAT IS NOT PROTECTED BY COPYRIGHT?

Several categories of material are generally not eligible for statutory copyright protection. These include among others:

- Works that have not been fixed in a tangible form of expression. For example: choreographic works, which have not been noted or recorded or improvisational speeches or performances that have not been written or recorded.
- Titles, trademarks, names, short phrases, and slogans; familiar symbols or designs; mere variations of typographic ornamentation, lettering, or colouring; mere listings of ingredients or contents.
- Ideas, procedures, methods, systems, processes, concepts, principles, discoveries, or devices, as distinguished from a description, explanation or illustration.
- Works consisting entirely of information that is common property and containing no original authorship. For example: standard calendars, height and weight charts, tape measures and rules, and lists or tables taken from public documents or other common sources.

HOW TO SECURE A COPYRIGHT

Copyright is secured automatically upon creation.

The way in which copyright protection is secured under the present law is frequently misunderstood. No publication or registration or other action in the Copyright Office is required to secure copyright. Copyright is secured automatically when the work is created in tangible form for the first time.

There are, however, certain definite advantages to registration.

NOTICE OF COPYRIGHT

When a work is published under the authority of the copyright owner, a notice of copyright should be placed on all publicly distributed copies and on all publicly distributed sound recordings. This notice is required even on works published outside of the United States. Failure to comply with the notice requirement can result in the loss of certain additional rights otherwise available to the copyright owner.

The use of the copyright notice is the responsibility of the copyright owner and does not require advance permission from, or registration with, the Copyright Office.

Form of Notice for Visually Perceptible Copies

The notice for visually perceptible copies should contain all of the following three elements:

- The symbol comprising the letter C in a circle, the word "Copyright " or the abbreviation "Copr."
- The year of first publication of the work.
- The name of the owner of copyright in the work, or an abbreviation by which the name can be recognised, or a generally known alternative designation of the owner.
 - Example: © 1995 John Doe

Form Of Notice for Sound Recordings

The copyright notice for sound recordings has somewhat different requirements. The notice should contain the following three elements:

- The symbol comprising the letter P in a circle;
- The year of first publication of the sound recording; and
- The name of the owner of copyright in the sound recording, or an abbreviation by which the name can be recognised, or a generally known alternative designation of the owner. If the producer of the sound recording is named on its labels or containers, and if no other name appears in conjunction with the notice, the producer's name shall be considered a part of the notice.

Position Of Notice

The notice should be placed on all copies or recordings of the work in such a manner and location as to "give reasonable notice of the claim of copyright." The notice of recordings may appear on the surface of the recording or on its label or container, provided the manner of placement and location gives reasonable notice of the claim. The three elements of the notice should ordinarily appear together on the copies or recordings.

Unpublished Works

The copyright notice is not required on unpublished works. To avoid an inadvertent publication without notice, however, it may be advisable for the author or other owner of the copyright to place a copyright notice, or a statement such as "Unpublished Work, Copyright 1984 John Doe" on any copies or recordings which leave his or her control.

HOW LONG DOES COPYRIGHT PROTECTION ENDURE?

A work created (fixed in tangible form for the first time) on or after January 1, 1978 is automatically protected from the moment of its creation, and is ordinarily given a term enduring for the author's life, plus an additional 50 years after the author's death.

TRANSFER OF COPYRIGHT

Any or all of the exclusive rights of the copyright owner may be transferred, but the transfer of exclusive rights is not valid unless it is in writing and signed by the owner of the rights conveyed. Transfer of a right on a nonexclusive basis does not require a written agreement.

COPYRIGHT REGISTRATION

In general, copyright registration is a legal formality intended to make a public record of the basic facts of a particular copyright. However, except in two specific situations, registration is not a condition of copyright protection.

Even though registration is not generally a requirement for protection, the copyright law provides several inducements or advantages to encourage copyright owners to make registration. Among these advantages are the following:

- Registration establishes a public record of the copyright claim;
- Registration is ordinarily necessary before any infringement suits may be filed in court;
- If made before or within 5 years of publication, registration will establish evidence in court of the validity of the copyright; and
- If registration is made within 3 months after publication of the work or prior to an infringement of the work, statutory damages and attorney's fees will be available to the copyright owner in court actions. Otherwise, only an award of actual damages and profits is available.

Registration may be made at any time within the life of the copyright. To assure that you have full legal rights for enforcement of your copyright you should file for registration within 3 months after your work is first published and be certain that all published copies carry a copyright notice.

INTERNATIONAL COPYRIGHT PROTECTION

There is no such thing as an "international copyright" that will automatically protect an author's writings throughout the entire world. Protection against unauthorised use in a particular country depends, basically, on the national laws of that country. However, most countries do offer protection to foreign works under certain conditions, and these conditions have been greatly simplified by international copyright treaties and conventions.

Portions of "A Guide to Copyrights" were excerpted and edited from the following U.S. Government publication:

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 DATA PROTECTION ACT 1984

WHY HAVE DATA PROTECTION?

The Data Protection Act 1984 grew out of public concern about personal privacy in the face of rapidly developing computer technology. It provides new rights for individuals and demands good computer practice in handling information about people.

The Act also enabled the United Kingdom to ratify the Council of Europe Convention on Data Protection allowing data to flow freely between the United Kingdom and other European countries with similar laws, preventing damage to the economy and international trade which might otherwise have occurred.

WHAT DOES THE ACT COVER?

The Data Protection Act is administered by the Data Protection Registrar, an independent officer who reports directly to Parliament and in essence, the Act is concerned with 'personal data' which is 'automatically processed'. It works in two ways, giving individuals certain rights whilst requiring those who record and use personal information on computer to be open about that use and to follow sound and proper practices.

- **Personal Data** – is information about living, identifiable individuals. This need not be particularly sensitive information, and can be as little as a name and address.
- **Automatically processed** – means, broadly speaking, information which is processed by computer. It does not cover information which is held and processed manually, eg. in ordinary paper files.

To fully understand the Act, you will need to know two further Data Protection definitions:

- **Data users** – those who control the contents and use of a collection of personal data. This can be any type of company or organisation, large or small, within the public or private sector. A data user can also be a sole trader, partnership, or an individual. A data user need not necessarily own a computer.
- **Data subjects** – the individuals to whom the personal data relate.

WHAT DOES DATA PROTECTION MEAN TO ME?

- **Subject Access** – The Data Protection Act allows you to have access to information held about yourself on computer and where appropriate to have it corrected or deleted. This is known as the 'subject access right' and it means that you are entitled, on making a written request to a data user, to be supplied with a copy of any personal data held about you. The data user may charge a fee of up to £10 for each register entry for supplying this information but in some cases it is supplied free. Usually your request must be responded to within 40 days. If not, you are entitled to complain to the Registrar or to apply for a court order for access. If personal data are found to be inaccurate you may complain to the Registrar or apply to the Courts for correction or deletion of the data.
- **Access to the Register** – The Data Protection register is open to public inspection at the Registrar's office in Wilmslow. Copies of individual register entries are available free of charge (a small fee is payable for certified copies). A register entry only shows what a data user is registered to do, it does not reveal whether or not that data user holds personal information about you.
- **Complaints to the Registrar** – If you consider there has been a breach of one of the Principles (or any other provision of the Act), you are entitled to complain to the Data Protection Registrar. If the Registrar considers the complaint is justified and cannot be resolved informally then he may decide to prosecute or to serve an enforcement notice or notice of refusal of registration on the data user in question.

- **Compensation** – You are entitled to seek compensation through the Courts if damage (not just distress) has been caused by the loss, or unauthorised destruction or disclosure of your personal data. 'Unauthorised' means without the authority of the data user or computer bureau concerned. If damage is proved, then the Court may also order compensation for any associated distress. You may also seek compensation through the Courts for damage caused by inaccurate data.

Further information about your rights as an individual under the Data Protection Act is contained in the leaflet 'If there's a mistake on computer about you' available free from the Data Protection Registrar's Office.

**KEY SKILLS
INFORMATION TECHNOLOGY – LEVEL 2
THE DATA PROTECTION ACT 1998**



*Crown copyright 1998 with the
permission of the Controller of Her
Majesty's Stationery Office.*

The Data Protection Act 1998 came into force, 1 March 2000. It sets rules for processing personal information and applies to paper records as well as those held on computers.

The Data Protection Act is supervised by the Data Protection Commissioner, who is currently Elizabeth France.

HISTORY

What does the 1984 Act cover?

The Data Protection Act is concerned with "Personal Data" (this is information about living, identifiable individuals. This need not be particularly sensitive information, and can be as little as name and address) which is "automatically processed". It works in two ways, giving individuals certain rights whilst requiring those who record and use personal information on computer to be open about that use and to follow sound and proper practices.

The Data Protection Act 1984 was the first piece of legislation to regulate the use of automatically processed information – broadly speaking, information which is processed on computer. The Act grew out of public concern about personal privacy in the face of rapidly developing computer technology. It does not cover information which is held and processed manually in ordinary paper files, but does cover such developments as laptop and notepad computers, smart cards, and optical image processors. However, not all computerised information is covered, only that which relates to living individuals.

Investigate the Data Protection Act 1998 and write a report detailing your findings. Incorporate as many of your IT skills as possible.

Below are examples of some of the areas your report may cover:

- Data Protection Principles
- How to make a Subject Access request
- Complaints to the Commissioner
- Transfer of Data Overseas
- The current Commissioner's duties
- The differences between the 1984 Act and the 1998 Act

You could find the following contacts useful:

www.dataprotection.gov.uk

The Office of The Data Protection Commissioner
Wycliffe House
Water Lane
WILMSLOW
Cheshire
SK9 5AF

Enquiries 01625 545 745

e-mail: data@wycliffe.demon.co.uk

Proof read all work thoroughly. Save your work in an appropriate place so that it can be retrieved at a later date.

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 HOW COMPUTER VIRUSES WORK

Computer Viruses are mysterious and they also get your attention. Every time a new virus hits, it makes the news if it spreads quickly. On the one hand viruses show us how unknowingly vulnerable we are, but on the other hand they show how sophisticated and interconnected human beings have become. For example, the "Melissa" virus - which became a world-wide phenomenon in March of 1999 - was so powerful that it forced Microsoft and a number of other very large companies to completely turn off their email systems until the virus could be contained. That's pretty impressive when you consider how simple the Melissa virus was!

WHY IS IT CALLED A "VIRUS"?

Computer viruses are called "viruses" because they share some of the traits of biological viruses. A computer virus passes from computer to computer like a biological virus passes from person to person, for example.

At a deeper level there are similarities as well. A biological virus is not a living thing. A virus is a fragment of DNA inside a protective jacket. Unlike a cell, a virus has no way to do anything or to reproduce by itself - it is not alive. Instead, a biological virus must inject its DNA into a cell. The viral DNA then uses the cell's existing machinery to reproduce itself. In some cases the cell fills with new viral particles until it bursts, releasing the virus. In other cases the new virus particles bud off the cell one at a time and the cell remains alive.

A computer virus shares some of these traits. A computer virus must piggyback on top of some other program or document in order to get executed. Once it is running, it is then able to infect other programs or documents. Obviously the analogy between computer and biological viruses stretches things a bit, but there are enough similarities that the name sticks.

VIRUS HISTORY

Computer Viruses were first widely seen in the late 1980s, and they came about because of several factors. The first factor was the spread of personal computers. Prior to the 1980s, home computers were non-existent or they were toys. Real computers were rare and they were locked away for use by "experts". During the 1980s, real computers started to spread to businesses and homes because of the popularity of the IBM PC (released in 1982) and the Apple Macintosh (released in 1984). By the late 1980s PCs were widespread in businesses, homes and college campuses.

The second factor was the use of computer "bulletin boards". People could dial up a bulletin board with a modem and download programs of all types. Games were extremely popular, and so were simple word processors, spreadsheets, etc. Bulletin boards led to the precursor of the virus known as the **Trojan Horse**. A Trojan horse is a program that sounds really cool when you read about it. So you download it. When you run the program, however, it does something uncool like erasing your disk. So you think you are getting a neat game but it wipes out your system. Trojan horses only hit a small number of people because they are discovered quickly. Either the bulletin board owner would erase the file from the system or people would send out messages to warn one another.

The third factor that led to the creation of viruses was the floppy disk. In the 1980s programs were small and you could fit the operating system, a word processor (plus several other programs) and some documents onto a floppy disk or two. Many computers did not have hard disks, so you would turn on your machine and it would load the operating system and everything else off of the floppy disk. Viruses took advantage of these three facts to create the first self-replicating programs!

How Viruses Work

Early viruses were pieces of code attached to a common program like a popular game or a popular word

processor. A person might download an infected game from a bulletin board and run it. A virus like this is a small piece of code embedded in a larger, legitimate program. Any virus is designed so it runs first when the legitimate program gets executed. The virus loads itself into memory and looks around to see if it can find any other programs on the disk if it can find one it modifies it to add the virus's code to the unsuspecting program. Then the virus launches the "real program". The user really has no way to know that the virus ever ran. Unfortunately, the virus has now reproduced itself, so two programs are infected. The next time either of those programs gets executed, they infect other programs, and the cycle continues. If one of the infected programs is given to another person on a floppy disk, or if it is uploaded to a bulletin board, then other programs get infected. This is how the virus spreads.

The spreading part is the "infection" phase of the virus. Viruses wouldn't be so violently despised if all they did was replicate themselves. Unfortunately most viruses also have some sort of destructive "attack" phase where they do some damage. Some sort of trigger will activate the attack phase, and the virus will then "do something" - anything from printing a silly message on the screen to erasing all of your data. The trigger might be a specific date, or the number of times the virus has been replicated, or something similar.

As viruses got more sophisticated, they learned new tricks. One important trick was the ability to load themselves into memory so they could keep running in the background as long as the computer remained on. This gave viruses a much more effective way to replicate themselves. Another trick was the ability to infect the **boot sector** on floppy disks and hard disks. The boot sector is a small program that is the first part of the operating system that the computer loads. The boot sector contains a tiny program that tells the computer how to load the rest of the operating system. By putting its code in the boot sector, a virus can guarantee it gets executed. It can load itself into memory immediately and it is able to run whenever the computer is on. Boot sector viruses can infect the boot sector of any floppy disk inserted in the machine, and on college campuses where lots of people share machines they spread like wildfire.

In general, both executable and boot sector viruses are not very threatening any more. The first reason for the decline has been the huge size of today's programs. Nearly every program you buy today comes on a compact disc. Compact discs cannot be modified, and that makes viral infection of a CD impossible. The programs are so big that the only easy way to move them around is to buy the CD. People certainly can't carry applications around on a floppy disk like they did in the 1980s, when floppies full of programs were traded like baseball cards. Boot sector viruses have also declined because operating systems now protect the boot sector.

Both boot sector viruses and executable viruses are still possible, but they are a lot harder now and they don't spread nearly as fast as they once could. Call it "shrinking habitat", if you want to use a biological analogy. The environment of floppy disks, small programs and weak operating systems made viruses possible in the 1980s, but that environmental niche has been largely eliminated by huge executables, unchangeable CDs and better operating system safeguards.

Macro Viruses

The latest thing is the **macro virus**, and the Melissa virus in March of 1999 was spectacular. Melissa spread in Microsoft Word documents sent via email, and it worked like this. Someone created the virus as a Word document uploaded to an Internet newsgroup. Anyone who downloaded the document and opened it would trigger the virus. The virus would then send the document (and therefore itself) in an email message to the first 50 people in the person's address book. The email message contained a friendly note that included the person's name, so the recipient would open the document thinking it was harmless. The virus would then create 50 new messages from the recipient's machine. As a result, the Melissa virus was the fastest-spreading virus ever seen! As mentioned earlier, it forced a number of large companies to shut down their email systems.

The Melissa virus took advantage of the programming language built into Microsoft Word called **VBA**, or Visual Basic for Applications. It is a complete programming language and it can be programmed to do things like modify files and send email messages. It also has a useful but dangerous auto-execute feature. A programmer can insert a program into a document that runs instantly whenever the document is opened. This is how the Melissa virus was programmed. Anyone who opened a document infected with Melissa would immediately activate the virus. It would send the 50 emails, and then infect a central file called NORMAL.DOT so that any file saved later would also contain the virus! It created a huge mess.

Microsoft applications have a feature called **Macro Virus Protection** built in to them to prevent this sort of thing. If you turn Macro Virus Protection on, then the auto-execute feature is disabled. By default the option is ON. So when a document tries to auto-execute viral code, a dialog pops up warning the user.

Unfortunately, many people don't know what macros or macro viruses are, and when they see the dialog they ignore it. So the virus runs anyway. Many other people turn off the protection mechanism. So the Melissa virus spread despite the safeguards in place to prevent it.

Why do people create viruses?

People create viruses. A person has to write the code, test it to make sure it spreads properly and then release the virus. A person also designs the virus's attack phase, whether its a silly message or destruction of a hard disk. So why do people do it?

There are probably at least three reasons. The first is the same psychology that drives vandals and arsonists. Why would someone want to bust the window on someone else's car, or spray paint signs on buildings or burn down a beautiful forest? For some people that seems to be a thrill. If that sort of person happens to know computer programming, then he or she may funnel energy into the creation of destructive viruses.

The second reason has to do with the thrill of watching things blow up. Many people have a fascination with things like explosions and car wrecks. When you were a kid there was probably a boy in your neighbourhood who learned how to make gunpowder and who then built bigger and bigger bombs until he either got bored or did some serious damage to himself. Creating a virus that spreads quickly is a little like that - it creates a bomb inside a computer, and the more computers that get infected, the more "fun" the explosion.

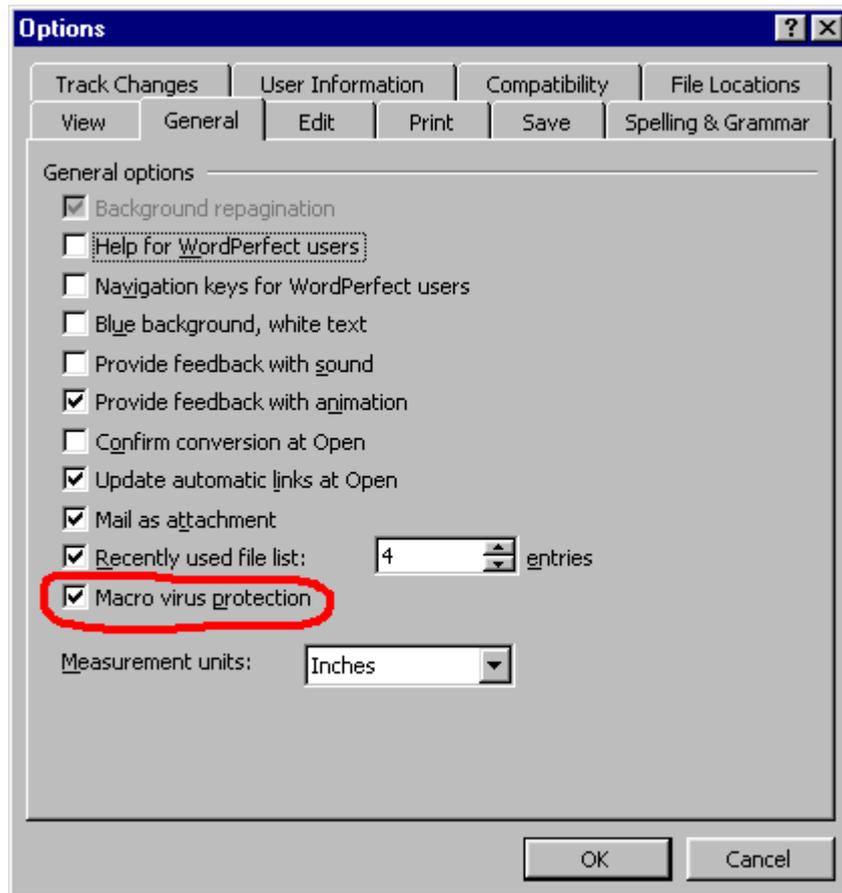
The third reason probably involves bragging rights, or the thrill of doing it. Sort of like Mt. Everest. The mountain is there and no one has climbed it, so someone is compelled to do it. If you are a certain type of programmer and you see a security hole that could be exploited, you might simply be compelled to exploit the hole yourself before someone else beats you to it. "Sure, I could TELL someone about the hole. But wouldn't it be better to SHOW them the hole?" That sort of logic leads to many viruses.

Of course, all of the virus creators miss the point that they cause real damage too real people with their creations. Destroying everything on a person's hard disk is real damage. Forcing the people inside a large company to waste thousands of hours cleaning up after a virus is real damage. Even a silly message is real damage because a person then has to waste the time getting rid of it. For this reason, the legal system is getting much harsher in punishing the people who create viruses.

Preventing Viruses

You can protect yourself against viruses with a few simple steps:

- If you are truly worried about viruses, you should be running a secure operating system like UNIX or Windows NT. You never hear about viruses on these operating systems because the security features keep viruses (and unwanted human visitors) away from your hard disk.
- If you are using an unsecured operating system, then buying virus protection software is a nice safeguard.
- If you simply avoid programs from unknown sources like the Internet, and instead stick with commercial software purchased on CDs, you eliminate almost all of the risk. In addition you should disable floppy disk booting - most computers now allow you to do this, and that will eliminate the risk of a boot sector virus coming in from a floppy disk accidentally left in the drive.
- You should make sure that Macro Virus Protection is enabled in all Microsoft applications, and you should NEVER run macros in a document unless you know what they do. No normal person adds macros to a document, so avoiding all macros is a great policy.



Open the **Options** dialog from the **Tools** menu in Microsoft Word and make sure that Macro Virus Protection is enabled, as shown

By following those simple steps, you can remain virus free!

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 WORKING WITH VDU'S



INTRODUCTION

This leaflet is a guide for people who work with visual display units (VDUs), and their employers. It: Answers questions that are most often asked about VDUs and health; Gives a summary of the law on VDU work (the Health and Safety (Display Screen Equipment) Regulations 1992). Outlines what employers and employees should do to comply; suggests some simple adjustments that users can make to workstations and screens to make them more comfortable and easy to use; and explains how employers and users can get further advice

What's the difference between a VDU, a VDT, a monitor and display screen equipment (DSE)?

There isn't one. All these terms mean the same thing - a display screen, usually forming part of a computer and showing text, numbers or graphics.

This booklet gives advice on health and safety in working with such screens. It covers both conventional (cathode ray tubes, TV-style) screens and the newer flat-panel displays such as those used in portable computers.

The advice in this booklet applies to the whole workstation, job and work environment, as well as to the VDU, keyboard and other equipment.

DOES MY VDU AFFECT MY HEALTH?

Answers to some common questions from VDU users

Am I at risk?

VDUs have been blamed - often wrongly - for a wide range of health problems. In fact, only a small proportion of VDU users actually suffers ill health as a result of their work. Where problems do occur, they are generally caused by the way in which VDUs are being used, rather than the VDUs themselves. So problems can be avoided by good workplace and job design, and by the way you use your VDU and workstation.

Are aches and pains caused by using a VDU? What about RSI?

Some users may get aches and pains in their hands, wrists, arms, neck, shoulders or back, especially after long periods of uninterrupted VDU work. Repetitive strain injury (RSI) has become a popular term for these aches, pains and disorders, but can be misleading - it means different things to different people. A better medical name for this whole group of conditions is upper limb disorders. Usually these disorders do not last, but in a few cases they may become persistent or even disabling.

How can I avoid these aches, pains and disorders?

Problems of this kind may have a physical cause, but may also be more likely if a VDU user feels stressed by the work (see next question). If you get aches or pains you should alert your supervisor or line manager. Problems can often be avoided by good workplace design, so that you can work comfortably, and by good working practices (like taking frequent short breaks from the VDU). Prevention is easiest if action is taken early, before the problem has become serious. For more about how to avoid trouble, see Making adjustments to suit your needs..

What can be done to reduce stress in my VDU work?

People who use a VDU sometimes complain of stress, but this usually arises from increased pace of work or pressure to meet deadlines, not the VDU itself. Some VDU workers find stress reduced because the VDU makes their job easier or more interesting, but for others stress becomes worse. This can happen when a system does not work well or when the user does not feel in control or competent to operate it. Employers can help overcome stress by providing the right training, and by designing systems and tasks to match the abilities of the people who work with them.

Can work with VDUs affect eyesight?

Extensive research has found **no evidence that VDUs can cause disease or permanent damage to eyes**. But long spells of VDU work can lead to tired eyes and discomfort. Also, by giving your eyes more demanding tasks, it might make you aware of an eyesight problem you had not noticed before. You and your employer can help your eyes by ensuring your VDU is well positioned and properly adjusted, and that the workplace lighting is suitable. Ask for an eye test if you still think there is a problem.

What about problems with my contact lenses or bifocals?

The heat generated by VDUs can make the air seem drier, and some **contact lens** wearers find this uncomfortable. If you have this problem but don't want to change to spectacles, you can try blinking more often or using tear-substitute drops. Where the air is dry, employers can help by taking steps to increase the humidity.

People with **bifocal spectacles** may find them less than ideal for VDU work. It is important to be able to see the screen easily without having to raise or lower your head. If you can't work comfortably with bifocals, you may need a different type of spectacles. Consult your optician or doctor if in doubt.

Can VDU work cause headaches?

Headaches may result from several things that occur with VDU work, such as:

- screen glare;
- poor image quality;
- a need for different spectacles;
- stress from the pace of work;
- anxiety about new technology;
- reading the screen for long periods without a break;
- poor posture; or
- a combination of these.

Many of these things can easily be put right once the cause of the problem has been found.

How long should I work with a VDU?

There is no legal limit, but you need to break up long spells of VDU work. How long you should work without a break depends on the type of work you are doing. See Plan work so there are breaks or changes of activity and Posture and breaks for further information.

Do VDUs give out harmful radiation?

No. VDUs give out both visible light, which enables us to see the screen, and other forms of electromagnetic radiation which can be harmful above certain levels. However, the levels of radiation emitted from VDUs are well below the safe levels set out in international recommendations. So your employer doesn't have to check radiation levels from your VDU, and you do not need any special devices such as spectacles, screens or aprons when using it.

What should I do if I'm pregnant?

You don't need to stop working with VDUs. Past concern, about reports of miscarriages and birth defects among some groups of VDU workers, has not been borne out by more recent research. Many scientific studies have now been carried out and, taken as a whole, these do **not** show any link between miscarriages or birth defects and working with VDUs.

If you are anxious about your VDU or about work generally during pregnancy, you should talk to your doctor. Or you could talk to someone who is well informed about current scientific information and advice on VDUs.

Can working with VDUs cause skin disorders?

This is rare. A few people have experienced irritation, rashes or other skin problems when working with a VDU. The exact cause is not known, but it seems possible that a combination of dry air, static electricity and individual susceptibility may be involved. If this is the case, increasing the humidity or allowing more fresh air into the room may help.

Can VDUs trigger epileptic fits?

Most people with epilepsy are completely unaffected by VDUs. A few who suffer from photo-sensitive epilepsy and are susceptible to flickering lights and striped patterns may be affected in some circumstances. But even they can often work successfully with VDUs without provoking an attack.

I use a portable computer - are there any precautions I should take?

Laptops and other portable computers have to be compact enough to be easy to carry. This result in design compromises, like smaller keyboards and screens, which make portables less comfortable in prolonged use than a normal VDU.

It is best to avoid using a portable for long periods when full-sized equipment is available. And like other VDU users, people who habitually use a portable should be trained how to minimise risks. This includes sitting comfortably, angling the screen so it can be seen clearly with minimal reflections, and taking frequent breaks if work is prolonged. Wherever possible, portables should be placed on a firm surface at the right height for keying.

Is it true that using a mouse can cause problems?

Intensive use of a mouse, trackball, or similar pointing device may give rise to aches and pains in the fingers, hands, wrists, arms or shoulders. This can also happen with a keyboard, but mouse work concentrates activity on one hand and arm (and one or two fingers), and this may make problems more likely.

Risks can be reduced by adopting a good posture and technique - see using a mouse.

Make the most of opportunities to take breaks from intensive mouse work - even short pauses can help, as can spells doing keyboard or non-computer work. If you use a mouse a lot, you can try changing from right to left-handed use (and vice-versa) from time to time. It can also help to take your hand off the mouse during short pauses and let your mouse arm hang straight down from your shoulder. If you find gripping your mouse awkward, you could try a different shaped or sized one.

THE REGULATIONS AND HOW THEY AFFECT YOU

The Health and Safety (Display Screen Equipment) Regulations 1992 came into effect from January 1993 to implement an EC Directive. They require employers to minimise the risks in VDU work by ensuring that workplaces and jobs are well designed.

Who is affected?

The Regulations apply where staff habitually uses VDUs as a significant part of their normal work. Other people, who use VDUs only occasionally, are not covered by these Regulations, but their employers still have general duties to protect them under other health and safety at work legislation.

I am self-employed - am I covered?

The Regulations do not place any duties on the self-employed. However, parts of them apply if you habitually use a VDU for a significant part of your normal work and are using a client employer's workstation. The client employer has to assess and reduce risks, ensure the workstation complies with the minimum requirements and provide information, as if you were an employee. But there is no requirement for employers to plan work breaks, or to provide eye tests or training for the self-employed.

I work at home - am I covered?

Yes, the Regulations apply if you are an employee working at home, and habitually using a VDU for a significant part of your normal work.

WHAT DO EMPLOYERS HAVE TO DO TO COMPLY?

The Regulations do not contain detailed technical specifications or lists of approved equipment. Instead, they set more general objectives.

Employers have to:

Analyse workstations, and assess and reduce risks

Employers need to look at:

- the whole workstation including equipment, furniture, and the work environment;
- the job being done; and
- any special needs of individual staff (whose views may be sought as part of the assessment).

Where risks are identified, the employer must take steps to reduce them.

Ensure workstations meet minimum requirements

These requirements are good features that should normally be found in a workstation, such as adjustable chairs and suitable lighting. They are set out in a schedule to the Regulations, covering screens, keyboards, desks, chairs, the work environment and software. All workstations covered by the Regulations now have to comply, to the extent necessary for the health and safety of workers (a transitional period for modification of older workstations expired at the end of 1996).

Plan work so there are breaks or changes of activity

As the need for breaks depends on the nature and intensity of the work, the Regulations require breaks or changes of activity but do not specify their timing or length. However the guidance on the Regulations explains general principles, for example short, frequent breaks are better than longer, less frequent ones. Ideally the individual should have some discretion over when to take breaks.

On request arrange eye tests, and provide spectacles if special ones are needed

Employees covered by the Regulations can ask their employer to provide and pay for an eye and eyesight test. This is a test by an optometrist or doctor. There is also entitlement to further tests at regular intervals; the optometrist doing the first test can recommend when the next should be. Employers only have to pay for spectacles if special ones (for example, prescribed for the distance at which the screen is viewed) are needed and normal ones cannot be used.

Provide health and safety training and information

Employers have to provide training, to make sure employees can use their VDU and workstation safely, and know how to make best use of it to avoid health problems, for example by adjusting the chair. Information should also be provided about VDU health and safety. This should include general background information - this could be done by giving out copies of this booklet. It should also cover more specific details of the steps taken by the employer to comply with the Regulations, such as the action taken to reduce risks and the arrangements for breaks.

Details of more comprehensive HSE guidance publications on the Regulations are given later.

MAKING ADJUSTMENTS TO SUIT YOUR NEEDS

What can I do to help myself?

Make full use of the equipment provided, and adjust it to get the best from it and to avoid potential health problems. If the Regulations apply to you, your employer should cover these things in training. If the Regulations don't apply, it is still worth setting up your workstation properly, to be as comfortable as possible. Here are some practical tips:

Getting comfortable



- Adjust your chair and VDU to find the most comfortable position for your work. As a broad guide, your forearms should be approximately horizontal and your eyes the same height as the top of the VDU.
- Make sure you have enough workspace to take whatever documents or other equipment you need.
- Try different arrangements of keyboard, screen, mouse and documents to find the best arrangement for you. A document holder may help you avoid awkward neck and eye movements.

- Arrange your desk and VDU to avoid glare, or bright reflections on the screen. This will be easiest if neither you nor the screen is directly facing windows or bright lights. Adjust curtains or blinds to prevent unwanted light.
- Make sure there is space under your desk to move your legs freely. Move any obstacles such as boxes or equipment. Avoid excess pressure from the edge of your seat on the backs of your legs and knees. A footrest may be helpful, particularly for smaller users.

Keying in

- Adjust your keyboard to get a good keying position. A space in front of the keyboard is sometimes helpful for resting the hands and wrists when not keying.
- Try to keep your wrists straight when keying. Keep a soft touch on the keys and don't overstretch your fingers. Good keyboard technique is important.

Using a mouse

- Position the mouse within easy reach, so it can be used with the wrist straight. Sit upright and close to the desk, so you don't have to work with your mouse arm stretched. Move the keyboard out of the way if it is not being used.
- Support your forearm on the desk, and don't grip the mouse too tightly.
- Rest your fingers lightly on the buttons and do not press them hard.

Reading the screen

- Adjust the brightness and contrast controls on the screen to suit lighting conditions in the room.
- Make sure the screen surface is clean.
- In setting up software, choose options giving text that is large enough to read easily on your screen, when you are sitting in a normal, comfortable working position. Select colours that are easy on the eye (avoid red text on a blue background, or vice-versa).
- Individual characters on the screen should be sharply focused and should not flicker or move. If they do, the VDU may need servicing or adjustment.

Posture and breaks

- Don't sit in the same position for long periods. Make sure you change your posture as often as practicable. Some movement is desirable, but avoid repeated stretching to reach things you need (if this happens a lot, rearrange your workstation).
- Most jobs provide opportunities to take a break from the screen, eg to do filing or photocopying. Make use of them. If there are no such natural breaks in your job, your employer should plan for you to have rest breaks. Frequent short breaks are better than fewer long ones.

MORE INFORMATION AND ADVICE

The Health and Safety Executive (HSE) has published two other guidance booklets giving detailed information on the Display Screen Equipment Regulations. Employers in particular may wish to consult one of them. The two booklets are:

- **VDUs: An easy guide to the Regulations**

HSG90 HSE Books 1994 ISBN 0 7176 0735 6

This is the booklet HSE recommends for most employers who have staff using standard VDUs in offices. It gives practical guidance, in plain language, on how to comply with the Regulations with a minimum of effort and expense. It is illustrated in colour and includes a checklist for workstation assessment.

Note: additional copies of the **checklist** are available in priced packs of 10, ISBN 0 7176 0804 2.

- **Display screen equipment work. Health and Safety (Display Screen Equipment) Regulations 1992. Guidance on Regulations**

L26 HSE Books ISBN 0 7176 0410 1

This booklet in HSE's Legal series gives comprehensive guidance on interpretation of each part of the Regulations. It includes the text of the Regulations themselves. It will be of most interest to employers who need to check the detail of particular requirements, or anyone who wants advice on application of the Regulations to display screen equipment other than ordinary VDUs in offices.

All these publications are available from HSE Books (see below) or booksellers.

What should I do if I have any problems?

If you are a VDU user and think you have health problems connected with your work, it's best to talk to your supervisor, manager or safety representative first. Employers have a duty to consult their employees or employee representatives on health and safety issues.

If this doesn't help, VDU users and employers can get advice from the relevant authority:

- For VDU work in an office, shop or hotel: contact the Environmental Health Department at your local council.
- For other premises (and government offices): contact your nearest local office of the Health and Safety Executive, as listed in the telephone directory.

This leaflet is available in priced packs of 10 from HSE Books, ISBN 0 7176 1504 9. Single free copies are also available from HSE Books.

HSE priced and free publications are available by mail order from:

HSE Books,
PO Box 1999,
Sudbury,
Suffolk CO10 6FS
Tel: 01787 881165 Fax: 01787 313995

HSE priced publications are also available from good booksellers.

For other enquiries ring HSE's InfoLine Tel: 0541 545500, or write to HSE's Information Centre, Broad Lane, Sheffield S3 7HQ

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you may need to do.

**THIS GUIDE HAS BEEN COPIED FROM THE HEALTH AND SAFETY EXECUTIVE WEB SITE
[HTTP://WWW.OPEN.GOV.UK/HSE/HSEHOME.HTM](http://www.open.gov.uk/hse/hsehome.htm)**

KEY SKILLS INFORMATION TECHNOLOGY – LEVEL 2 REPETITIVE STRAIN INJURIES (RSI)

CAUSES OF REPETITIVE STRAIN INJURIES

Repetitive strain injuries (RSI) are a category of injuries involving damage to muscles, tendons and nerves caused by overuse or misuse. Any combination of the following factors can lead to the overuse of some part of your body.

- **Repetitive tasks** – Small, rapid movements and/or tasks that are repeated over and over
- **Awkward or fixed postures** – Working in an awkward position or holding the same position for a long time
- **Forceful movements** – Using force or moving heavy loads to complete tasks
- **Insufficient rest time** – No time to relax during the above activities

Unlike strains and sprains, which usually result from a single incident (called acute trauma), repetitive strain injuries develop slowly over time; thus, they are also called Cumulative Trauma Disorders (CTDs). Other names for these injuries include Repetitive Stress Injury, Repetitive Motion Syndrome and Occupational Overuse Syndrome.

SYMPTOMS OF RSI

The most common body parts affected by RSI are the fingers, hands, wrists, elbows, arms, shoulders, back and neck. Other areas can be affected as well. Computer users suffer mostly from repetitive strain injuries to the hand, wrist, and arm.

The symptoms of RSI include: aching, tenderness, swelling, pains, crackling, tingling, numbness, loss of strength, loss of joint movement and decreased co-ordination in the injured area. If your hands are affected, you may find yourself dropping things or it may be difficult to do even simple tasks like buttoning a shirt.

These symptoms may appear in any order and at any stage in the development of an injury. Symptoms may not appear immediately after the activity that is causing the problem and are not necessarily experienced in the body part where the actual stress is occurring. For instance, if you wake up in the middle of the night with elbow or shoulder pain, that may be a sign of a repetitive strain injury resulting from keying or mousing at a computer.

In general, the more intense the symptoms, the more often you experience symptoms and the longer symptoms last, the more serious your injury is likely to be. A serious injury can develop only weeks after symptoms appear, or it may take years.

COMMON RSI

To understand the various repetitive strain injuries you need a basic understanding of how your body works. Contracting and relaxing muscles produce body movements. The muscles are attached to bones by tendons. Tendons are smooth and in some parts of your body glide back and forth inside tubes called synovial sheaths.

The sheath produces a lubricant called synovial fluid to help the tendons glide easily. (See Figures 1 and 2)

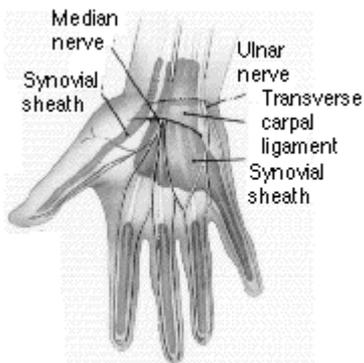


Figure 1

For example, the muscles in your forearm are used to move your fingers. They are attached to the finger bones by tendons in sheaths that travel through your wrist. The type of injury resulting from keying or mousing at a computer depends on whether the muscle, tendon, tendon sheath, or nerve tissue have been irritated or damaged.

- **Tendinitis** refers to the inflammation of tendons that occurs when muscles and tendons are repeatedly tensed. Symptoms may include pain and swelling. Eventually, the tendon becomes bumpy and fibres may fray. Or the tendon may thicken, making movement of the fingers, hands or arms difficult. Without sufficient time to heal, the tendon may be permanently weakened.
- **Tenosynovitis** refers to the inflammation of the synovial sheath caused by repetitive motion. It usually occurs in the hands and wrists (although it can also occur in the legs, elbows and shoulders). This injury can be quite painful and tendon movement may become restricted due to the swelling of the sheath. If the sheath or tendon becomes scarred, Tenosynovitis can cause permanent damage.
- **Ganglionic Cysts** are another tendon sheath condition. The sheath swells up with synovial fluid and causes a bump under the skin, often on the wrist. Ganglionic cysts may be a symptom of Tenosynovitis.
- **Carpal Tunnel Syndrome (CTS)** is one of the most potentially disabling RSI. Nine tendons for flexing your fingers, along with the median nerve, pass from the forearm to the hand through a passage in your wrist called the carpal tunnel. The tunnel is made up of bone and ligament (flexor retinaculum).

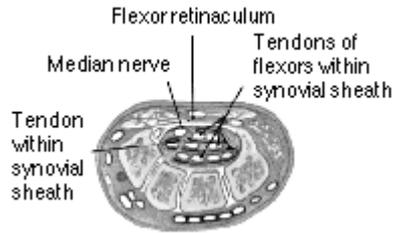


Figure 2

CTS result when the median nerve is compressed, either from the swelling of tendons and sheaths or from repeated bending of the wrist. Symptoms include numbness, tingling, and pain in the side of your hand that goes from the thumb to the inside of your ring finger. Often the pain is worse when sleeping. Advanced symptoms include weakness, especially in the thumb muscle, and clumsiness in your hands.

Other repetitive strain injuries to the upper body include De Quervian's Disease, Trigger Finger, Epicondylitis (tennis elbow), and Thoracic Outlet Syndrome.

RSI AND WORKING AT THE COMPUTER

These conditions, when present during computer use, can lead to RSI:

- **Repetition** – Long or concentrated hours of keying or mousing, especially if under pressure to key quickly
- **Posture** – Long hours of sitting in the same position while keying or mousing -- especially if in an uncomfortable or poorly supported position or if your wrists are bent
- **No Rest** – Intensive hours at the keyboard with few breaks, especially if the task has little variety or if you don't take a rest when you need one

Remember that a computer keyboard requires only light touches, letting you type very quickly, and that typing at a computer affords no natural variation in movement as working at a typewriter used to do.

RSI FROM NON-WORK ACTIVITY

RSI can be caused by activities, which are not work-related. These include hand-intensive sports and hobbies such as knitting or playing a musical instrument. The risk of developing an RSI can also be related to certain medical conditions such as bone fractures, rheumatoid arthritis, hypertension, diabetes, obesity, pregnancy and use of oral contraceptives. Older workers are more at risk because the body's ability to repair from constant wear and tear decreases with age.

RSI CAN BE PREVENTED

If symptoms are allowed to progress, a person with RSI can have protracted or chronic symptoms. However, RSI *can* be prevented. Don't wait until it's too late.

YOUR COMPUTER WORKSTATION: PERSONAL CHECKLIST OF ERGONOMIC FEATURES

Use the following checklist and the illustration to evaluate your posture, computer workstation design, and job design. If you answer "yes" to each question, then your workstation and job are probably well designed ergonomically. If you answer "no" or are unsure of your answers to any of the questions, then you should take steps to correct situations that may increase the risk of developing repetitive strain injuries.

Posture (when working at the computer)

- Are your feet resting fully and firmly on the floor or footrest?
- Are your knees bent at approximately right angles?
- Are your thighs parallel to the floor, so that the chair does not put pressure on the back of your thighs?
- Is your upper body straight, with your lower back firmly supported by the chair backrest?
- Are your upper arms hanging straight down at your sides?
- Are your elbows against your sides and bent at right angles?
- Are your forearms parallel to the floor?
- Are your wrists straight, neither bent up or down nor to the left or right?
- Is your head looking forward with only a slight downward tilt?

Chair

- Is your chair adjustable for seat height? If not adjustable, is the chair height right for you?
- If your chair is adjustable, do you know how to adjust it?
- Does the backrest give firm support on your lower back?
- Is the front edge of the seat rounded to avoid pressure on the back of your thighs?
- Does the chair have casters that roll easily on the floor?
- Do you have a footrest, if you need one, on which to rest your feet?

NOTE: Chair armrests are optional. If used, they should be padded, not hard.

The Keyboard and Mouse

- Is the keyboard detached from the monitor?
- Can the keyboard height be adjusted?
- Is the keyboard at the right height so that your elbows are at your sides, forearms parallel to the floor, and your wrists are straight?
- Is the keyboard thin and level with the floor?
- Is the keyboard on a foam pad to soften the impact of your fingers on the keys?
- Are the springs in the keys stiff enough to resist the weight of your fingers when relaxed?
- Do the keys give tactile (you can feel key pressure decrease when the character is registered) or audible (you hear a click when character is registered) feedback to stop you from pressing too hard?
- Can your fingers reach the shift and function keys without awkward straining?
- Are you able to keep your typing speed under 10,000 keystrokes per hour?
- Is the mouse located at the same height as the keyboard and as close to it as possible?

NOTE: Wrist rests are sometimes recommended but may do more harm than good. If used, they should be well padded and the proper thickness.

The Monitor

- Can the monitor height be adjusted?
- If the screen is small, is the top of the screen opposite eye level? If the screen is large, is the centre of the screen opposite eye level?
- Is the monitor at the proper viewing distance for you? (The distance is usually 1.5 to 2 feet from your eyes.)
- Is the monitor directly in front of you, rather than off to the side?
- Do you have a copy stand or document holder to hold the papers you work with?
- Are the copy stand and the computer screen at the same height, and at about the same distance from your eyes?
- Is the monitor positioned to avoid glare?

Work Area

- Does the desk have a lower surface for the keyboard and higher surface for the monitor (either built-in or attached)?
- Is there enough room for your legs under the desk?
- Is there enough space to put the equipment and other materials at the proper distance without crowding?

Are you able to use the phone without having to squeeze the receiver with your shoulder while you type?
Are standing counters available, if appropriate, so you can alternate sitting and standing while doing computer work?

Job/Project Design

Do you take short, frequent breaks from computer work? Short rests taken often provide better protection than longer breaks after longer periods of work.

Do you usually take a break before you feel any muscle fatigue in your upper body?

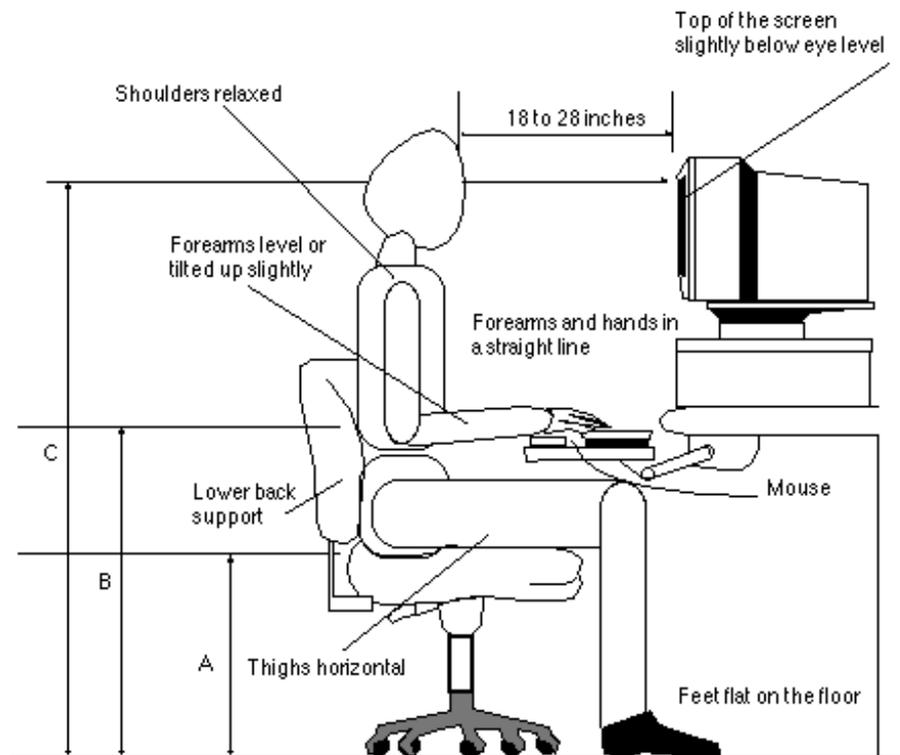
Do you get up and move around whenever you begin to feel any symptoms?

Do you pause periodically to do relaxation exercises?

Have you adjusted your workstation furniture?

Do you use the same workstation all day so that you only have to make adjustments once a day at most?

Do you have input when your department is purchasing computer equipment and furniture?



- A.** Measures the distance from the bottom of the heel, when it is flat on the floor, to the underside of the knee, when it is bent at right angles. Adjust the height of your chair so that your thighs are horizontal, your knees are at right angles, and your heels are flat on the floor.
- B.** Measures the distance from the floor to the bottom of the wrist when the arm is parallel to the floor. Adjust the keyboard height so that your forearms are parallel to the floor and your wrists are flat.
- C.** Measures the distance from the floor to the eye when you are sitting properly at a computer workstation. Adjust the monitor screen so that when your eyes are looking straight ahead they are opposite the top of the screen if it is small, or opposite the middle of the screen if it is large.