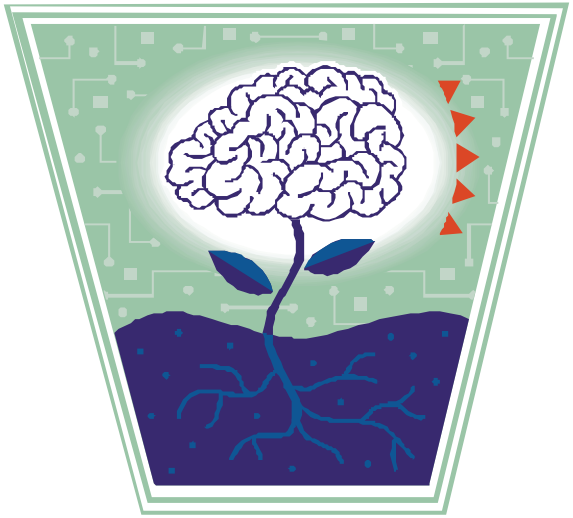
Knox Academy

Design Technology Department



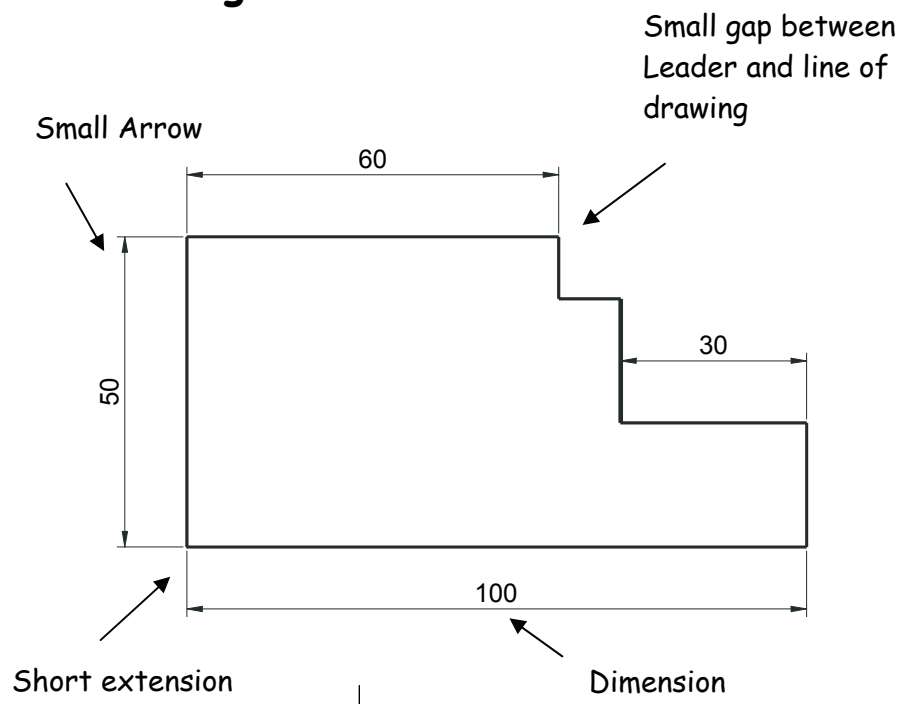
Curriculum for Excellence
National 4 - 5
Graphic Communication

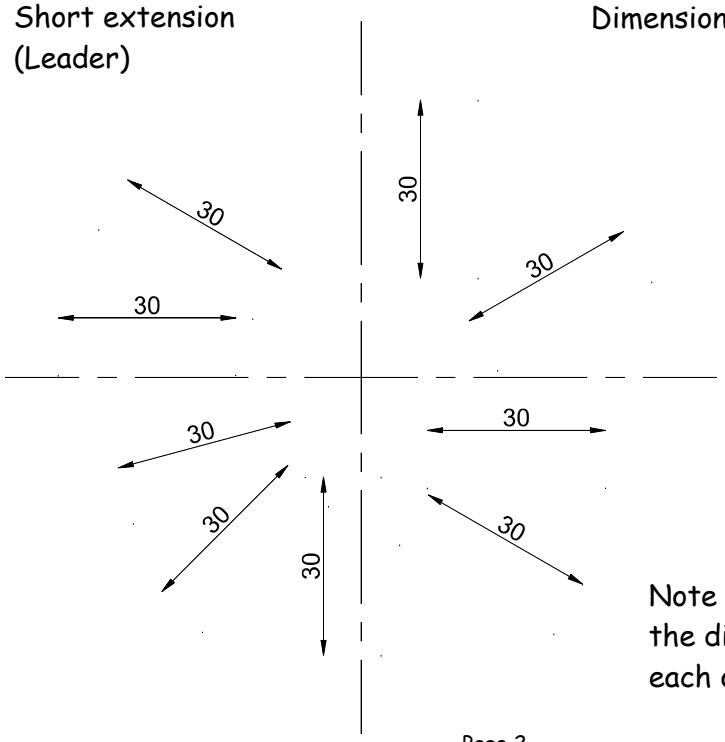
Knowledge & Interpretation

Types of line used

Continuous thick	Continuous thick	Used for visible outlines and edges.
Continuous thin	Continuous thin	Used for projection, dimensioning, leader lines, hatching and short centre lines.
Continuous thin straight with zigzags	Continuous thin straight with zigzags	Used for limits of partial or interrupted views and sections if the limit is not an axis.
Dashed thin line.	Dashed thin line.	Used for hidden outlines and edges.
Chain thin.	Chain thin.	Used for centre lines, lines of symmetry.
Chain thin double dash	Chain thin double dash	Used for ghost outlines and bend
Continuous thin irregular	Continuous thin irregular	Used as the limit to an interrupted view when an axis is not present.
Chain thin thick at both ends and changes in direction	Chain thin thick at both ends and changes in direction	Used on Cutting planes.

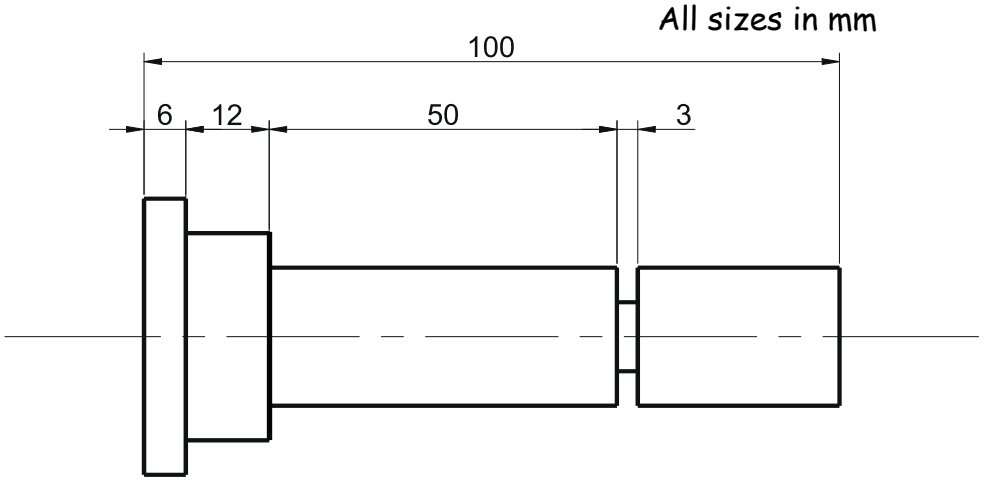
Dimensioning





Note the position of the dimensions on each of the lines

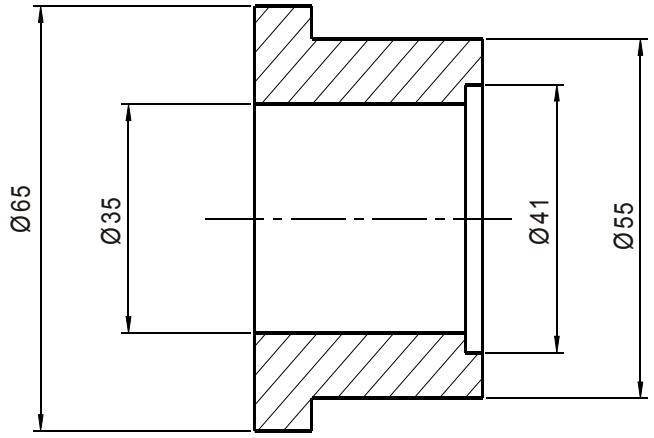
Dimensioning — Continued



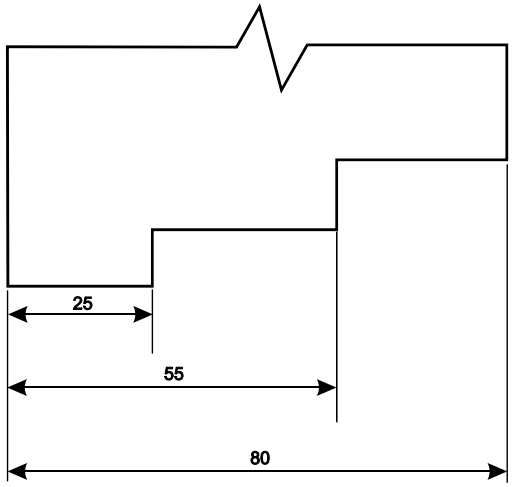
Notice on the above drawing that the largest dimension is placed on the outside of the smaller dimensions. Where there is a limited space for dimensioning, the dimension can be placed above, or in line with, the extension of one of the dimension lines. E.g. the 3mm dimension uses the 50mm dimension leader. It is also important when dimensioning not to include the units of measurement. As can be seen from the drawing above, state on the drawing the unit of measurement. i.e. (**All sizes in mm**).

The sectioned drawing opposite shows some possibilities for putting a diameter on a drawing. This is by no means the only method.

If the section shown was **Square**, then the following symbol would be used. □ **45**

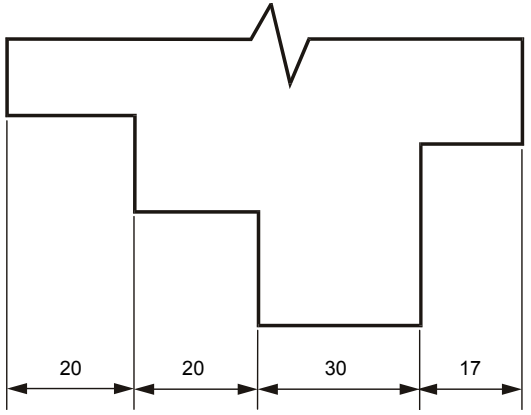


Dimensioning methods



Parallel dimensioning

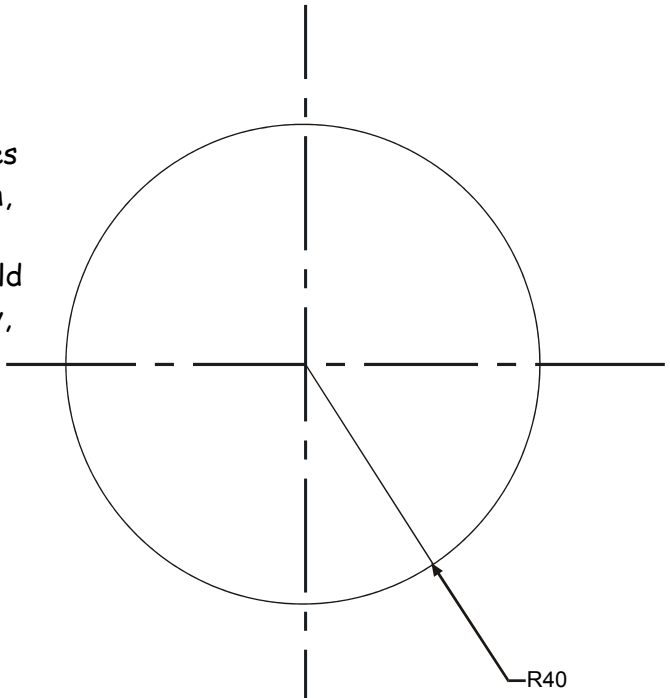
Parallel dimensioning shows dimensions taken from a common datum.



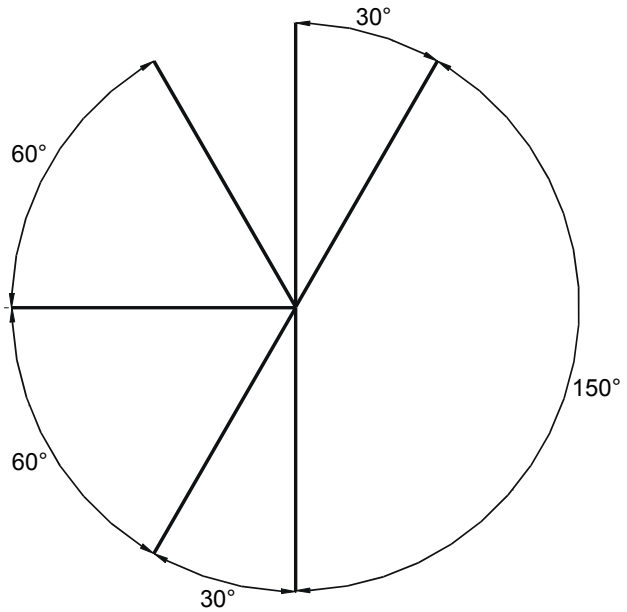
Chain Dimensioning

Chain dimensioning should only be used when the accumulation of tolerances will not affect the part.

Radii should be dimensioned by a dimension line that passes through, or is in line with, the centre of the arc. The dimension lines should have one arrow head only, that which touches the arc. The symbol R is placed in front of the dimension.

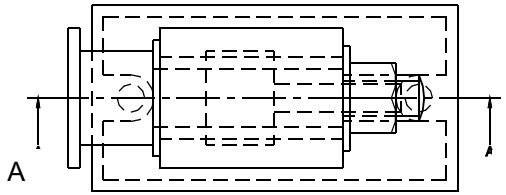


Angular Dimensions

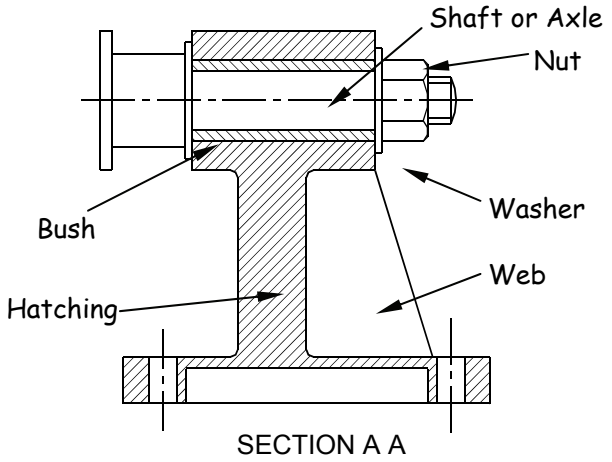


Sectioned Drawings

Sectional views are drawn to show more clearly what hidden parts would look like.



The cutting plane is shown as a chain dotted line thickened at the ends and labelled with a letter.

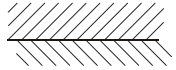


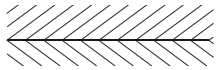
SECTION A A

Where parts are cut by the cutting plane they are hatched using a thin line drawn at 45°. These lines should be equally spaced at 4mm. **Adjacent parts are hatched in the opposite direction.**

Offset hatching lines between parts.

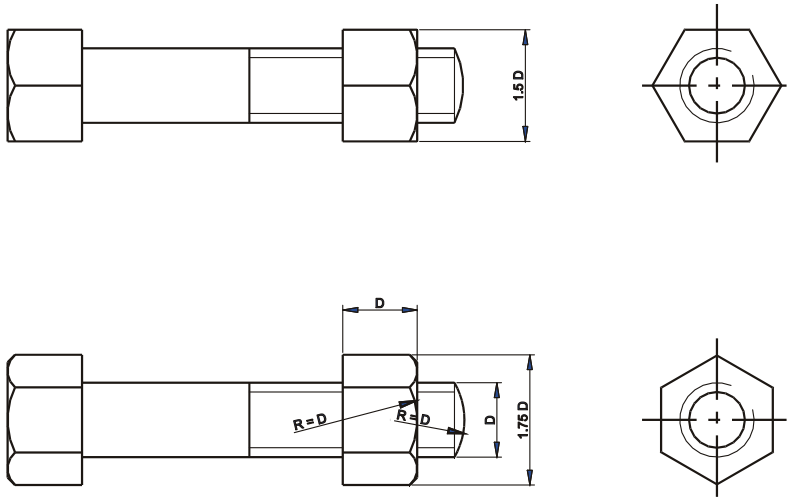
Do not produce herring bone pattern.


offset


Herring bone

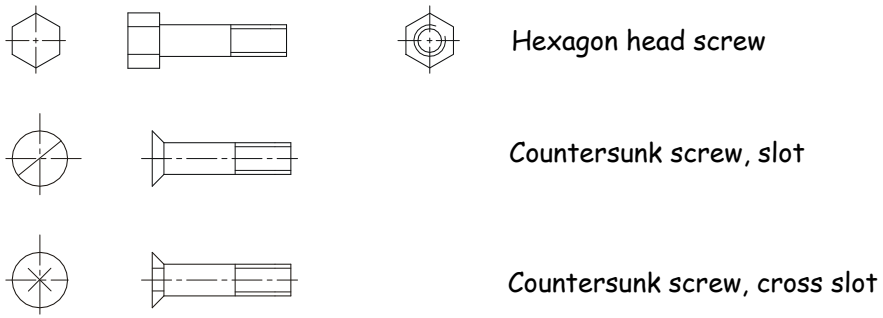
The following parts are **not** normally sectioned:- Shafts, ribs, webs, spokes of wheels, nuts and bolts, washers and keys.

Nuts and Bolts



Conventional sizes to draw a nut and bolt are shown. Use these sizes if you have to draw the nut or bolt accurately otherwise use the simplified convention shown below.

Simplified Fasteners etc



Hexagon head screw

Countersunk screw, slot

Countersunk screw, cross slot

Correct Use of Lettering

Accuracy of dimensioning is very important in technical drawings so as to communicate the correct information to the person reading the drawing. This can also be said for the lettering of drawings.

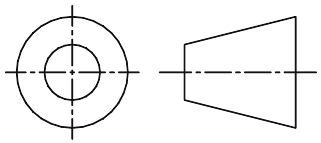
It is recommended that good practice is followed with regards to how a drawing is lettered, i.e. the information written down on the drawing. All lettering should be upper case, have a consistency in use, i.e. they are all the same type of font.

It is also recommended that lettering is not underlined. If special attention is required to a particular part of the drawing then **LARGER LETTERING** can be used.

To ensure lettering is of a uniform height of 4mm, it is recommended that two lines parallel to one another are drawn 10mm below the view.

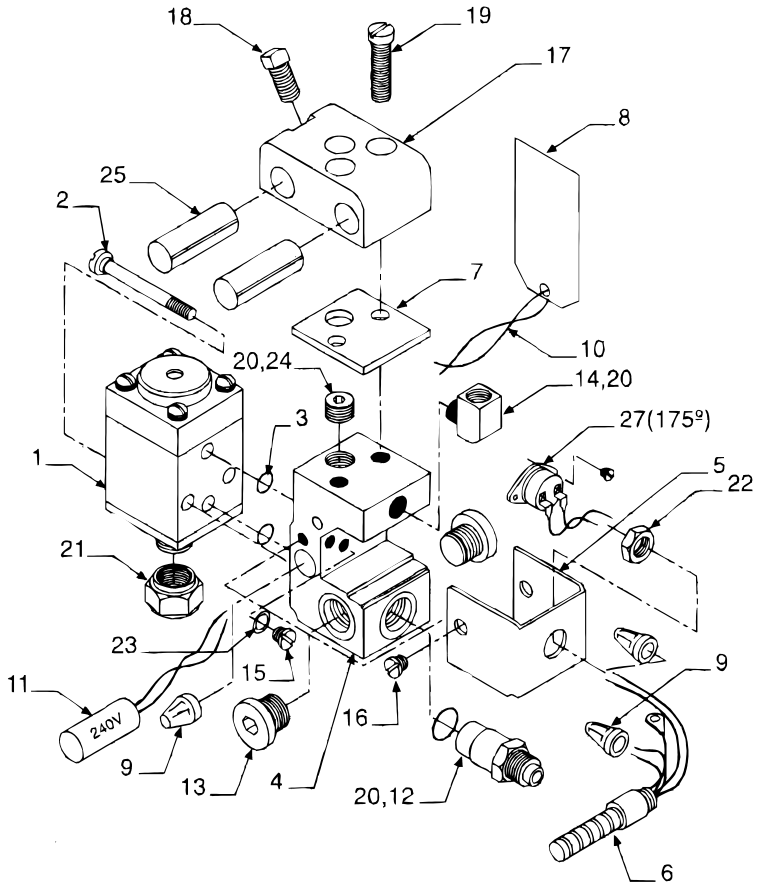
Third Angle Projection Symbol

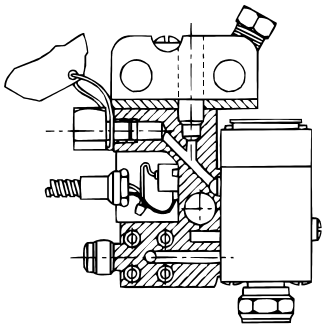
The use of the third angle projection symbol informs the reader of the drawing it has been carried out in this projection.



Assembly Drawing

A - Exploded Isometric





Above is an exploded view of a **Hot Melt Glue Gun.**
On the page opposite, the table shows a list of all the component parts and their respective identification numbers which are used in the manufacture of the gun.

B - Section

Item Number	Part Number	Part Description	Amount Required
1	153 011	Module Assembly	1
2	153030	Screw, Special	2
3	940 101	O-ring, Viton	
4	276 167	Body, Service Module	1
5	153 035	Cover, Service Module	1
6	242 077	Cordset, Standard Hose	1
6a	273 906	Cordset, Quick Disconnect	1
7	153 037	Insulator	1
8	-	Tag Set	3
9	933 056	Connector, Porcelain	1
10	939 110	Cable Tie	1
11	938 053	Cartridge, Heater 147 Watts	1
12	972 628	Connector, Assembly, Hose	1
-	945 032	O-ring, Viton	1
-	972 627	Connector	1
13	973 574	Plug	2
-	945 032	O-ring, Viton	1
14	973 125	Elbow, Street, Pipe	1
15	981 000	Screw, Fillister Head	3
16	981 141	Screw, Pan Head	2
17	153 041	Block, Mounting	1
18	981 405	Screw Square Head	1
19	981 244	Screw, Fillister Head	2
20	900 236	Paste, Teflon	
21	152 290	Nut, Nozzle Retaining	1
22	984 155	Nut, Panel Mounting	1
23	983 103	Lock washer, No. 5 (Ground Wire)	1
24	973 402	Plug, Pipe	1
25	152 683	Sleeve, Teflon	2
26	983 161	Lock washer	1
27	271 929	Thermostat	1

Signs - General

Pupils should be aware of and recognise the following symbols and also how such symbols are combined with the appropriate safety sign category.

Hazard Warning

Male

Female

This Way Up

Fragile

Keep Dry

Kite Mark

Safety Mark

Symbols - Electrical

Pupils should be familiar with and be able to reproduce the following selected symbols. Pupils should also be aware of the need for standardising symbols within various industrial sectors and should be aware of the existence of the British Standards Institution and its work. The WEB address is WWW.BSI.org.uk

Power Socket Outlet

Primary or Secondary cell

Signal lamp (general)

Switch

Switch
(General Symbol)

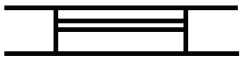
Electric Clock

Symbols - Architectural

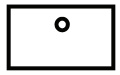
In-line valve (any type)

Wood, any type, sawn

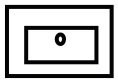
Brickwork



Window



Sink, any type

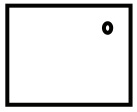


Wash basin

Sink top

Bath

Door



Shower tray

Radiator

Softwood, machined

Insulation

Concrete

Glossary of Common CAG Terms

This is a brief guide to CAG terms likely to be encountered in the course.

CAD Computer-aided drawing.

DTP Desk-top publishing.

CAG Computer Aided Graphics. A term used which encompasses CAD, DTP and modeling.

2D Two-dimensional drawing in which an item is depicted as a flat object. Example: first and third angle orthographic drawings.

2½D Two-and-a-half-dimensional drawing in which three surfaces of the drawn item can be viewed. For example, isometric, oblique.

3D Three-dimensional drawing or model in which the complete object can be displayed, normally in colour, and manipulated to show views from any chosen direction.

Animation "Bring to life". The manipulation of electronic images by means of a computer to create moving images, similar to creating a film, the computer is giving the illusion of moving parts.

Application software Software that has been specially written to carry out a certain task to solve a specific problem.

Automatic Dimensioning Any system of generating dimension lines in specific locations.

Back-up A term used to describe the processes of making a second copy of drawing files, CAG programs, etc. in case the working copies are damaged.

Central Processing Unit (CPU) At the heart of the computer, it controls all other units.

Database A store of organised information. Any data which have been stored in a readily retrievable form can be regarded as forming a database.

Desk-Top Publishing (DTP) is the creation of a whole publication on computer, preparing it for printing without the normal processes of typing, typesetting, cutting & pasting and laying out. This booklet is produced using DTP.

Digitiser A means of transferring information into the computer by a hand-held device which makes an electronic 'tracing'. A mesh of wires under the digitiser surface detects the position of the hand-held device. (See Graphics Tablet.)

Disc A random-access magnetic storage device. Binary code data are held on both surfaces of what, in the case of floppy discs, is a flat circular plastic disc coated with magnetic material. Hard discs are generally similar but are metal rather than plastic, have higher 'bit-density', rotate much faster than floppies, and are held in airtight cases.

Dot matrix printer A contact printer that prints text characters and graphics images by using a series of dots to make up the text, lines and fills.

DPI Dots per inch. A measurement of resolution of output devices. The more dots per inch the greater the clarity of the graphic.

Drum Plotter A pen-type plotter in which the paper is rotated on a drum under the pen while the pen also moves across the drum.

Dump A colloquialism for transferring what is in the computer's memory to disc or printer or some other output device.

Extrusion A command whereby an existing 2D (x,y) shape is translated into a 3D shape by addition of the Z depth or length.

File A file is the collection of data of which a drawing is comprised and which has been given a name (filename) by which it can be recognised when stored on disc.

Flat-bed plotter A flat table over which a pen moves in both the X and Y planes.

Font This is the American version of the English 'fount' meaning, in printing terms, a set of type in one size and style. CAG systems use it rather loosely to describe 'typestyles', the size of which can be changed by the operator.

Format In terms of DTP, the arrangement of text on a page defined by the alignment and text style. Formatting means applying a style or alignment to a document or paragraph.

Frame grab (Screen Dump) The screen image is captured and stored separately and may then be manipulated by software.

Graphics processor A special CPU that deals only with the handling of the graphics and screen display.

Graphics Tablet A flat-bed input device with a grid of fine wire below the surface. A puck, stylus or light pen will chase the cursor around the screen as it moves over the surface. Useful for 'tracing over' existing drawings to convert them into computer-stored versions, and for making free-hand sketches dimensionally accurate. With overlaid menus they can be used to input symbols from icons. Graphic tables are also, and more frequently, called digitisers.

Grid All CAG systems provide 'transparent' grids; patterns which appear on the screen as construction aids but do not form part of a drawing.

Handles The small rectangles that surround a selected shape. Text blocks in DTP software commonly have four handles.

Hard Copy Simply means any copy of drawings produced as a plot, printout, or photograph, for example.

Hardware The physical parts of the computer. Example: the case, disc drives, motherboard, floppy discs, etc.

Hidden-line removal A CAD command that removes background lines from 3D wire-frame images. Wire-frame perspective views show every line used to assemble a model. To be able to display and plot views as seen in real life means editing out all the lines and planes which would be concealed by other lines and planes. This is known as hidden-line removal and poses massive calculation problems for the computer.

Import To bring in a copy of a text file or graphics, for example from an external application to the page layout application.

Input A term used to describe information that is being sent to the computer.

Joystick An input device which normally moves in two axes. The output from the joystick can be used to control the screen cursor movement.

Kerning The removal of excess space between letters to improve the visual impact of text. For example, in the large type used for headlines.

Landscape Description of the shape of a document page that is wider than it is high. (See Portrait.)

Laser Printer A non-contact printing device predominantly used in DTP.

Laser printers use a laser beam focused on an electrically charged drum which forces the ink to follow the light pattern and form the characters. It is a fast method of printing which also provides very clear images.

Layers CAG software allows drawings to be built up as a series of layers, each layer dedicated to one aspect of the drawing, e.g. construction lines, text, dimensions, hatching, or electrical layout. Layers can be switched in and out and act like clear film overlays which are always in perfect alignment with each other.

Light pen A light sensitive device which can be used as an input device. The light pen is used by pointing it at a raster-type display. Not commonly used in desk-top CAG applications.

Linetype There are a variety of linetypes: continuous, dotted, dashed and dot-dash.

Modeling/Model A CAG model is more than just a three-dimensional screen representation of an object: it is something which the computer can recognise as having three-dimensional 'shape' and which it can interrogate as such. Any screen display or plot is restricted to two-dimensional limitations, however, the shape exists in computer memory as if it were a solid model.

Mouse A mobile hand-held interaction device for controlling the cursor position.

Optical Scanning A process in which documents are scanned and the incident light from their contents generates signals which are received by the scanning device and transmitted to the computer. This is an **INPUT** device.

Pen plotter A drawing device that uses a pen. Any plotter using detachable pens is a pen plotter. There are two main types, flat-bed and drum.

Pixel Picture element. Video and screen displays are made up of tiny dots called pixels. These dots are arranged in a grid and can be set to give typical grid densities of 320 h x 200 v, 640 h x 200 v and 640 h x 400 v dots per grid.

Portrait Description of the shape of a document page which is higher than it is wide. (See Landscape.)

Printer An output device for obtaining bard copy of drawings and text. Types in common use are impact (dot-matrix), laser and ink-jet.

Real time The term used to describe an event that is executed immediately, rather than an event that will be carried out after a time delay.

Resolution The sharpness of definition of a digitised image depending on the number of pixels displayed on screen. Normally defined by the number of pixels shown on screen horizontally and vertically, e.g. 320 h x 200 v.

ROM Read-Only Memory. Its contents are fixed during manufacture and cannot be changed. It is used to store the permanent programs which form the basic intelligence of the computer.

Screen Dump When a screen image is sent to a printer to obtain a hard copy, the resulting copy is a screen dump.
Scrolling The vertical movement of the screen image.

Simulation This is very similar to animation but with simulation the graphics react to a persons input. i.e. A flight simulator, or a games consol.

Snap A CAG command that locks or 'Snaps' the cursor to the nearest 'snapable' point. This might be points on a screen-displayed grid, or any point naturally arising as a 'lockable' point (a line-end or vertex). Such 'lockable' points can often be forced into a drawing by special

commands. The 'snap' facility is a powerful tool for precision work.

Software The programs which the computer executes. In addition all data files can be classed as software.

Solid modeling The creation of a three-dimensional image on screen, thereafter capable of manipulation to show other views and surfaces.

Surface modeling A three-dimensional model in which the surface is defined by connecting elements.

Table Talker A three sided advertisement usually found on a table.

Template A dummy publication that acts as a model, providing the structure and general layout for another similar publication.

Text Flow along a path Text which follow a predetermined path

Text Wrap Text which has been wrapped around and object on the page.

Thumbnails Simple sketched ideas jotted down to capture different designs

Type Sizes The standard 'point' system used to describe type sizes is based on 72 points to an inch. (12 points is, therefore, 1/6" high.)

VDU Visual Display Unit: an alternative way of describing the monitor.

Working Rough A detailed sketch of a captured idea originally jotted down as a thumbnail sketch.

VGA Video graphics array (adaptor). A colour adaptor allowing high resolution and a range of colours. (320 h **x** 200 v at 256 colours to 640 h **x** 480 **V** at 16 colours.)

Window A window is a rectangular box that can be used to define a space around an object or set of lines. At its simplest, a window can be a frame drawn around a selected area of the screen, to isolate the area within the 'window'.

Wire-frame model A three-dimensional image made up as a series of connected lines between all edges and line end-points.

Plotters/Printers

A brief description of the above heading has been given in the CAG Glossary of Terms. It is recognised that pen plotters are now regarded as antiquated (no longer used) but pupils do have to know of their existence for examination purposes.

There are two types of plotter, **Flat Bed** and **Drum**.

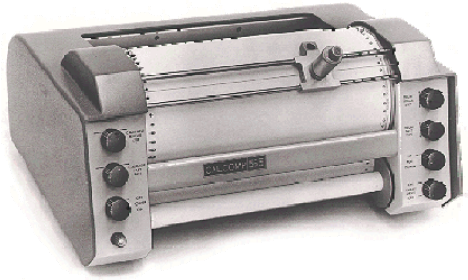
The **drum** plotter works by having interchangeable moving pens which move horizontally on an X axis, while the paper moves vertically on the Y axis. This type of plotter takes up far less space and is faster than the flat bed plotter.

The **flat** bed plotter also has interchangeable pens but move in both the horizontal and vertical directions. It is generally much bigger than the drum plotter because of the way in which it draws.

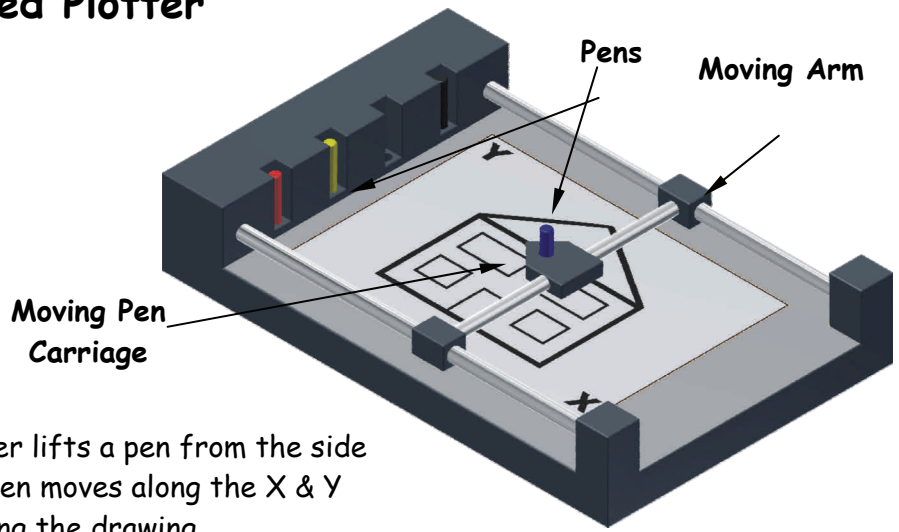
Plotters can still be used for printing circuit diagrams in three colours and for printing lines but modern day printers far exceed the capability of plotters and therefore make plotters redundant.

Drum Plotter

A type of pen plotter that wraps the paper around a drum with a pin feed attachment. The drum turns to produce one direction of the plot, and the pens move to provide the other. The plotter was the first output device to print graphics and large engineering drawings. Using different coloured pens, it could draw in colour long before colour inkjet printers became viable.

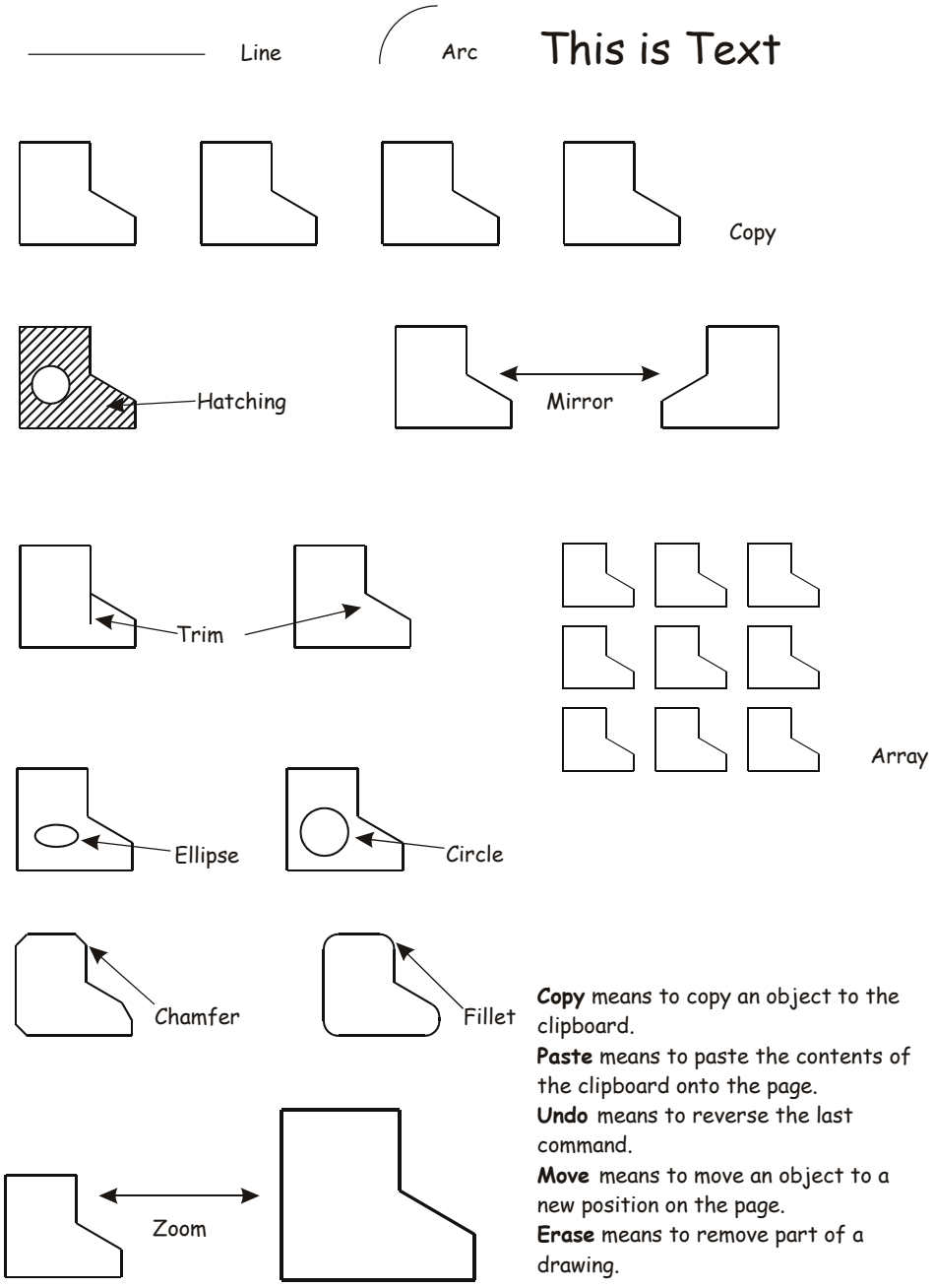


Flat bed Plotter



This printer lifts a pen from the side bar and then moves along the X & Y axis drawing the drawing.

Common CAD Commands



Copy means to copy an object to the clipboard.
Paste means to paste the contents of the clipboard onto the page.
Undo means to reverse the last command.
Move means to move an object to a new position on the page.
Erase means to remove part of a drawing.

Advantages of CAG over manual drawing techniques.

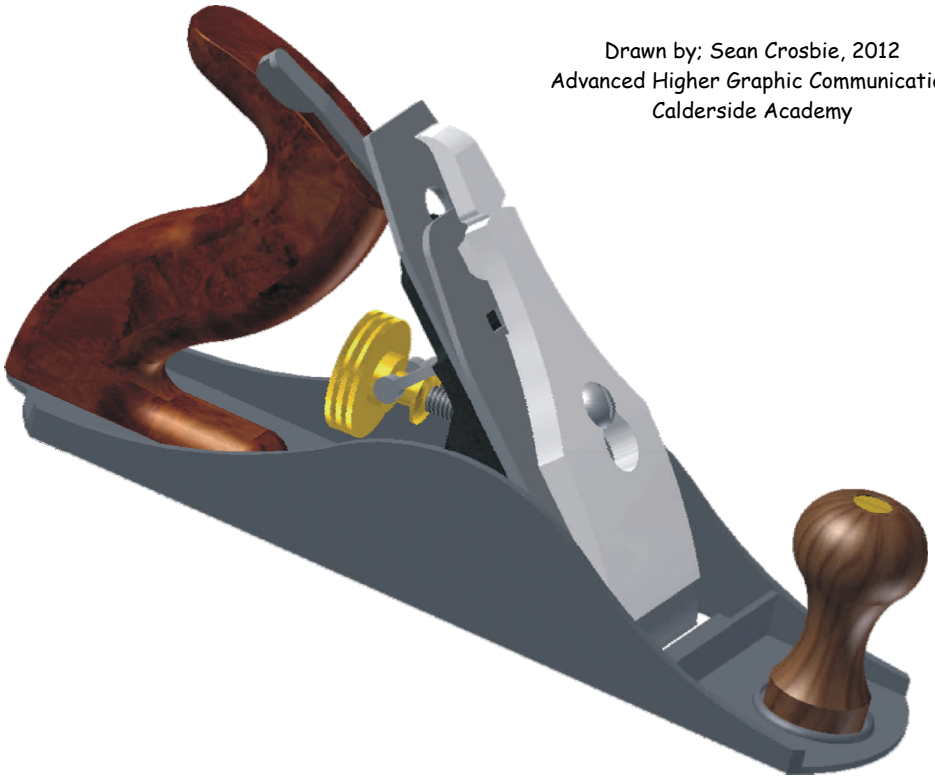
- Drawings are produced quicker and very accurately.
- Drawings are easier to edit/change.
- Libraries of various parts can be created.
- Lead time can be reduced.
- Quality of drawings are improved.
- Convenience of use (Lap top).
- Standardisation.
- Drawings can be easily scaled up or down.
- Use of layers allows different parts to be drawn separately.
- Easier to store drawings.
- Easier to send drawings to another location quickly.
- True 3D modelling made easy.
- New designs from existing designs.

Disadvantages of CAG over manual drawing techniques.

- Overall cost of hardware.
- Overall cost of software.
- Continual need to upgrade systems to stay competitive.
- Risk of catching computer viruses.
- Staff training costs.
- System faults/crashes.
- Data loss security.

Solid Model

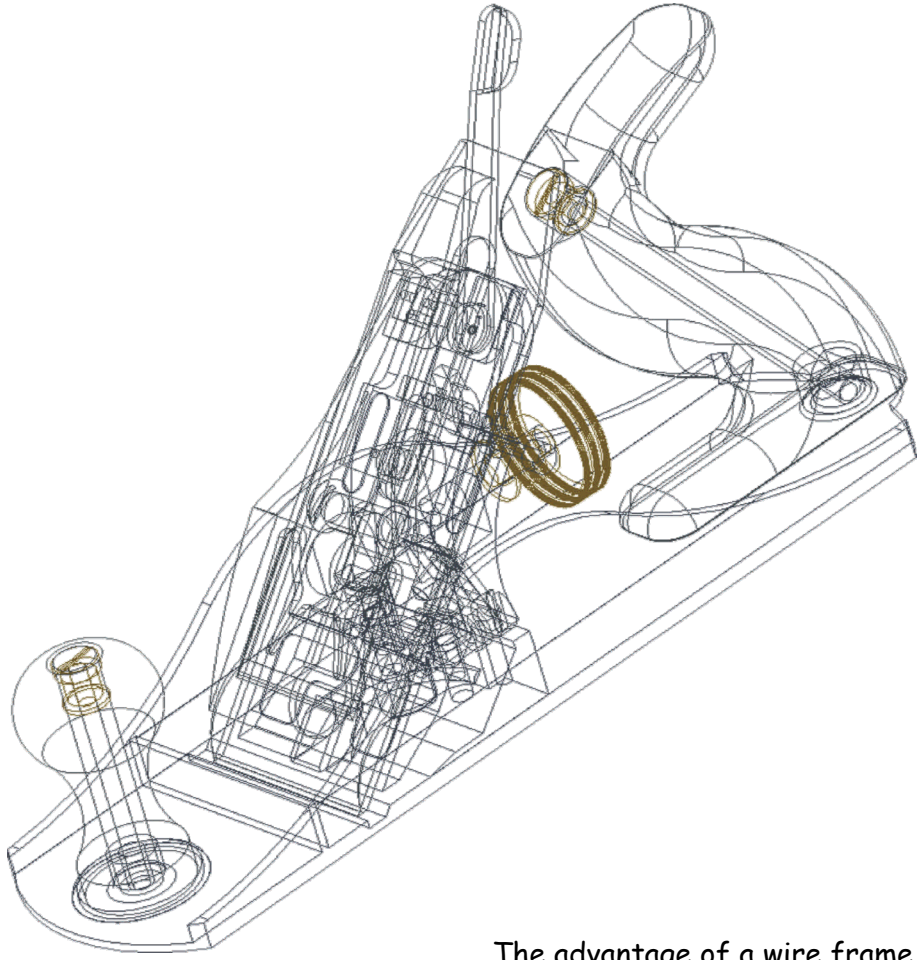
As can be seen from the solid model shown below, a solid model is the creation of a three dimensional image on screen, thereafter capable of being turned through 360 degrees, allowing viewing of all surfaces drawn. The advantage to designers is that a designed model can be seen without ever having to make the actual model thus making great savings on time and costs.



Drawn by; Sean Crosbie, 2012
Advanced Higher Graphic Communication
Calderside Academy

Wire - Frame

As can be seen from the wire frame model shown below, a wire frame model is a three dimensional image made up of a series of connected lines between all edges and line end-points.



The advantage of a wire frame model is that is uses far less memory within the computer than the solid model.

Layers

All Technical/Engineering Drawings should be set out with :-

- Internal lines
- Outlines
- Hidden lines
- Dimension lines
- Text
- Centre Lines
- Construction Lines

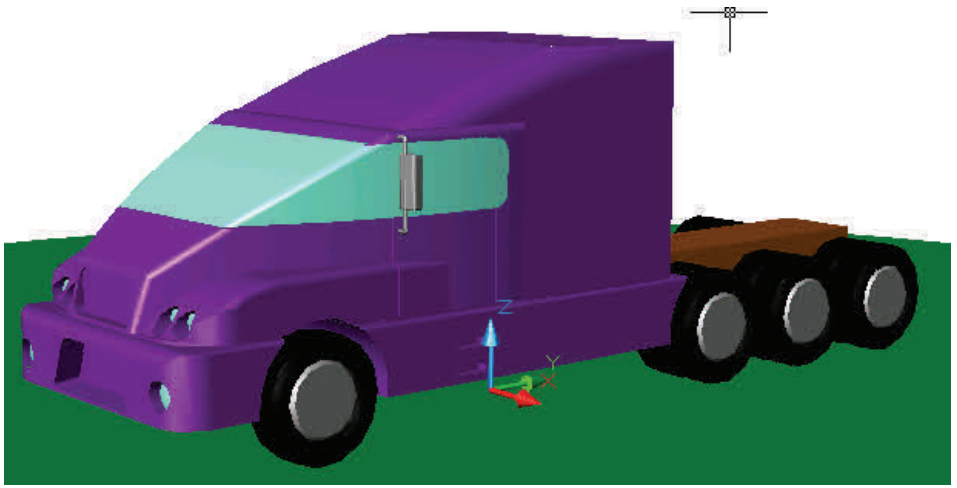
The 7 layers indicated above are like having 7 pieces of clear paper sitting on top of each other which can be switched on or off as required. The example on the opposite page shows a truck with its body on in the first drawing and off in the second. This is achieved by simply turning the layer which the body is drawn on, off.

Depending on what you are drawing determines how many layers are required. A drawing could have 50 layers or more.

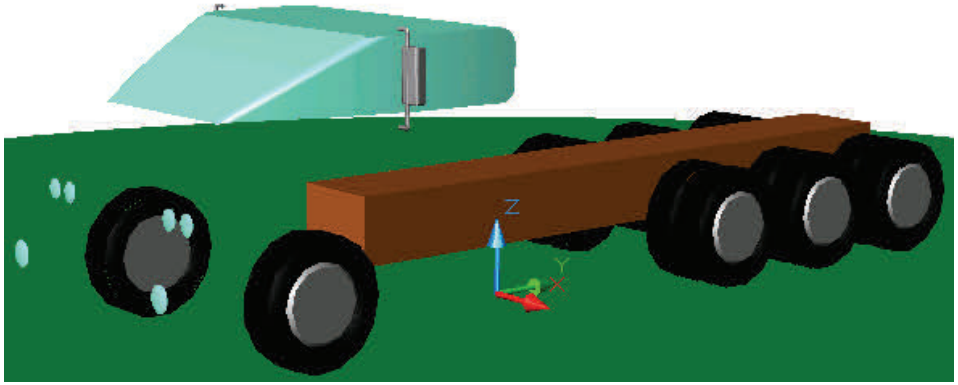
Example of a typical layer setup

Name	On	Freez...	L...	Color	Linetype	Lineweight	Plot St...	P...	Curre...	New...
0				White	Continuous	Default	Color_7			
Body				24	Continuous	Default	Color_24			
INTERLINE				250	Continuous	Default	Color_250			
Lights				Cyan	Continuous	Default	Color_4			
Mirrors				Cyan	Continuous	Default	Color_4			
Nuts				250	Continuous	Default	Color_250			
Plan				White	Continuous	Default	Color_7			
text				Blue	Continuous	Default	Color_5			
Truck Canopy				202	Continuous	Default	Color_202			
Tyres				250	Continuous	Default	Color_250			
vp1				White	Continuous	Default	Color_7			
vp2				White	Continuous	Default	Color_7			
vp3				White	Continuous	Default	Color_7			
Wheels				9	CENTER2	Default	Color_9			
Windscreen				130	Continuous	Default	Color_130			

All layers turned on



One layer with truck canopy turned off



Graphs & Charts

Statistics are used in everyday life. Many people collect information and reproduce it in newspapers, magazines, etc. Information readily accessible, includes :- Football league tables, record sales, car sales figures, public spending, etc. These figures can be complex and difficult to understand.

Graphs and charts make these figures easier to understand without the need for long paragraphs of text.

There are three main types of charts :-

1. Pie Chart
2. Line Graphs
3. Bar Charts/Pictograms.

All graphs & charts should be CLEARLY labelled and easy to read. Having said this you can make the presentation more interesting in many ways e.g. adding a graphic that relates to the topic.

Line graphs usually contain horizontal & vertical axis.
Bar charts can contain both or 1 only depending on your graph

Pie Chart

A pie chart is usually shown as a circle divided into a number of segments/slices that represent some part of a whole number. The total amount of segments should add up to a full circle.
See example on next page

When to use

- To display parts of a whole number

When not to use

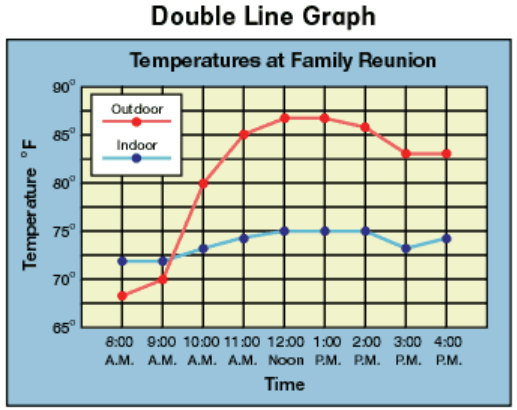
- To compare items.
- To show large numbers of component parts.
- When it contains some components that are small.

Possible Enhancement

The pie chart could be made in the image of a pie, CD, etc. Parts could be exploded emphasising certain parts of the chart.

Line Graphs

A **line graph** connects a series of plotted points which show trends or movements over a period of time. The shorter the time period the smoother and more accurate the graph.



When to Use

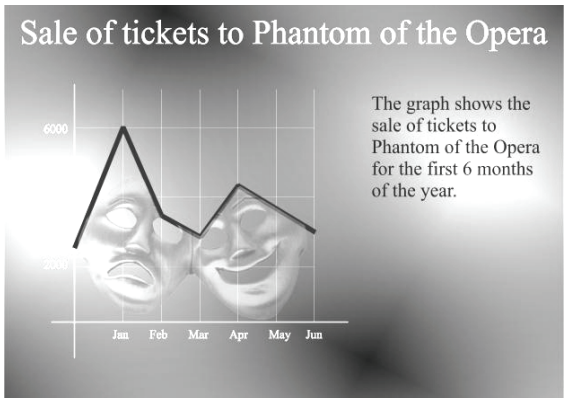
- When showing Trends.

When not to Use

- When the emphasis is on amounts. i.e. The amount of ticket sales sold over a period of time.

Enhancement

The addition of a graphic could enhance the graph, i.e. make it look more presentable.

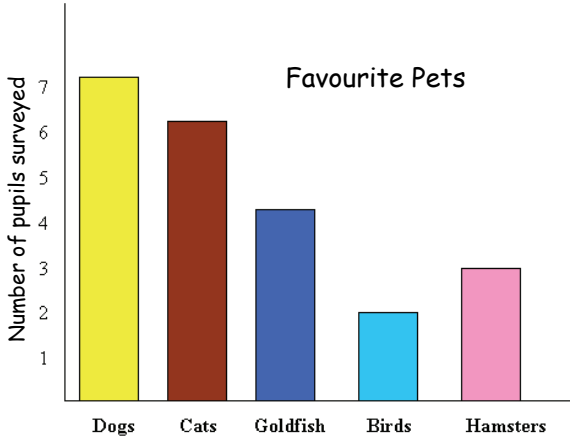


Bar Charts

A **bar chart** shows how values vary over a period of time or how different values compare with one another.

When to Use

- When individual figures have to be highlighted.
- When comparison of

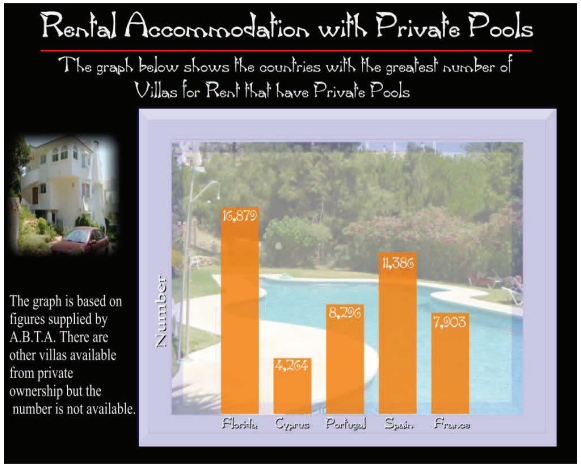


When not to Use

- When too many bars are required ~ difficult to follow.
- When the flow of figures is more important than individual values.

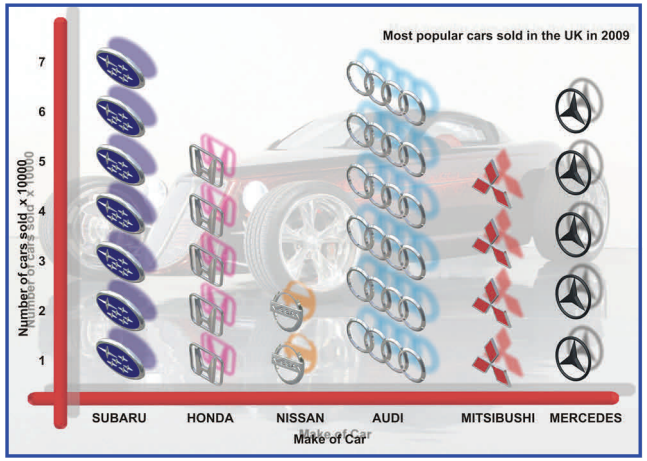
Enhancement

Enhancement could be in many different forms. Forms such as an added backdrop/picture. However, the main purpose of the graph is to highlight the information on the subject and not the background.



Pictograms

Similar to bar charts but using pictures or symbols instead.



Scales

Scaling drawings allow us to draw exceptionally large objects such as houses on any size of paper available to us. To enable this to happen we have to scale every size (dimension) by the same factor. i.e. taking the example of the house, every dimension would have to be divided by say 100. By doing this we are scaling **DOWN** the size of the house. We can also draw exceptionally small objects larger, examples of which are, the minute electronic chips which are now part of our every day life. They are so small we could not draw them as they are we have to **SCALE UP** the drawing to be able to draw them.

1:1

When we carryout a drawing using the actual dimensions, this is called '**full size**', or the drawing has been drawn to a scale of **1:1**. For every 1mm drawn, 1mm is represented.

1:2

When we carryout a drawing and reduce all the sizes by a factor of 2, i.e. all dimensions are divided by 2, this is scaling down the drawing. This makes the drawing half its original size. What the 1 & 2 represent are, for every 1mm drawn on paper the actual size of the real object is 2mm.

2:1

We can also increase the size of an object by any factor. In the example shown opposite the sizes have been increased by a factor of 2. This will make the drawing twice its original size. The 2 is stating that for every 1mm actual size of the object, 2mm have been drawn. If we increased the object by **10** the scale would be **10:1**. If we reduced the objects dimensions by twenty the scale would be **1:20**.

With respect to Engineering drawings, there are recommended scales for reduction and enlargement. These are as follows:-

Reduction:- 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:500, and 1:1000

Enlargement:- 2:1, 5:1, 10:1, 20:1, and 50:1.

The size of scale used is mainly dependant on two factors. These factors are the;

Size of paper available

And the size of the object being drawn.

The amount of detail required

E.g. If house was being drawn on a piece of A4 paper opposed to a sheet of A2 paper, the scale used will obviously have to be different or it won't fit onto the page.

Scales are used a great deal in building drawings. They are used in three main areas, Floor plans, Site plans and Location plans. Each of the three types of drawings have preferred scales. These are as follows:-

Type of Drawing	Floor Plans	Site Plans	Location Plans
Preferred Scales	1:50 or 1:100	1:200 or 1:500	1:1250 or 1:2500

Floor Plans

This type of drawing shows the layout of the rooms inside the building and the position of the doors, windows and important fittings like a bath, sink and toilet.

Site Plans

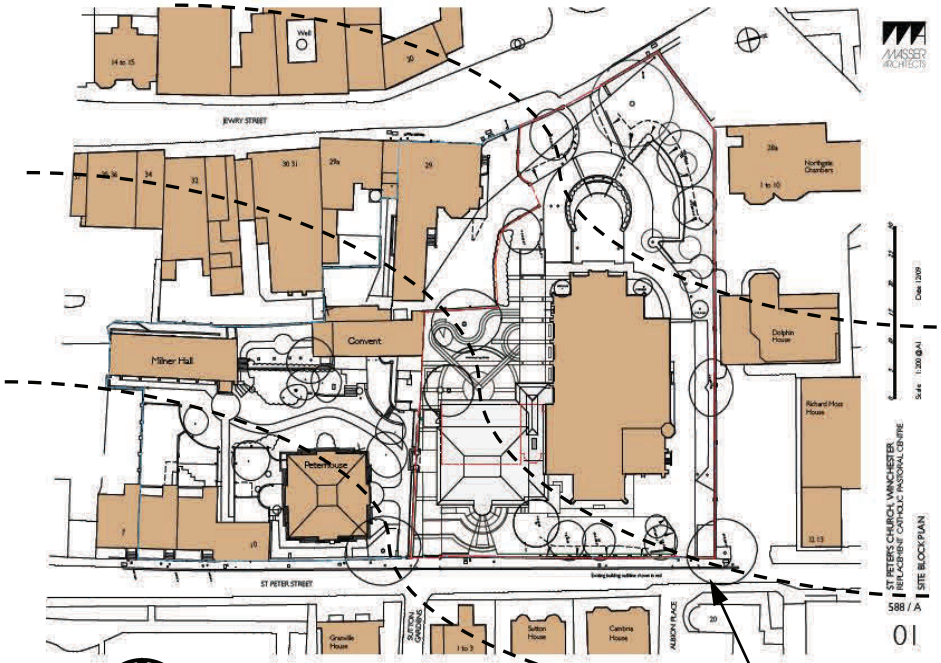
This type of drawing is concerned with one or more buildings which are within the same area and shows these buildings within their own site (or plot) boundary.

The buildings are shown as outlines and boundaries are marked slightly darker. The scale and the north point are both indicated on the drawing. The site is numbered (usually as plots). Waste pipe runs, manholes and trees are also indicated. Important dimensions are shown.

Block Plans

A **Block Plan** or **Location Drawing** shows where the site is located within the local area. It shows roads, outlines of buildings and site boundaries (Garden boundaries).

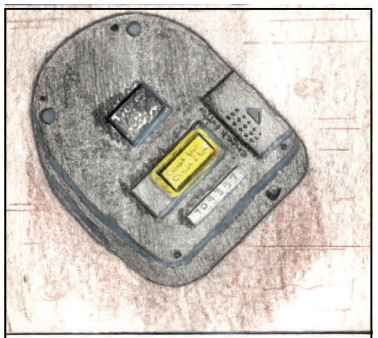
The block plan below shows where a bungalow is situated within the surrounding area. It is normally drawn to a scale of 1:1250.



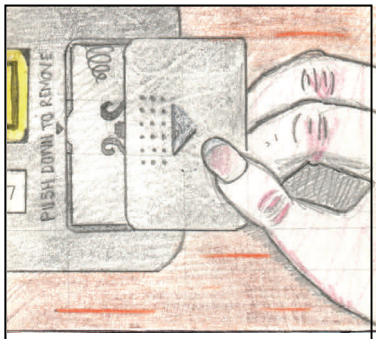
Sequence Diagram/Storyboard

A sequence diagram is used to show stages of an operation graphically and often without words. They are commonly used to give instructions when companies produce products in different languages.

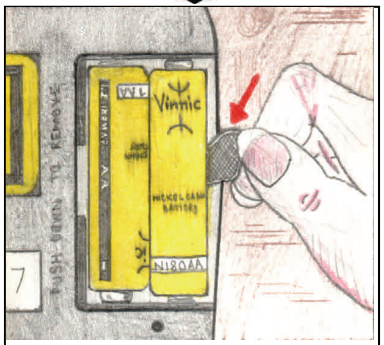
Changing Batteries in a CD player



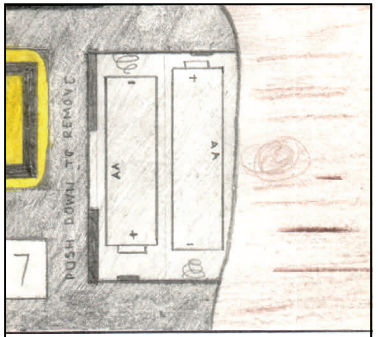
1. Carefully turn CD player on it's reverse side



2. Remove battery cover



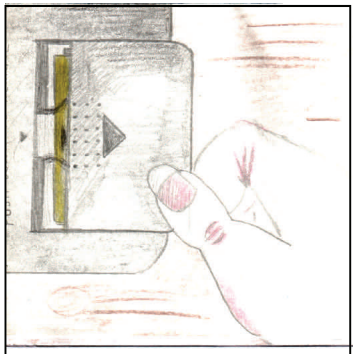
3. Remove old batteries using ribbon as shown



4. Replace with new AA batteries using internal diagram

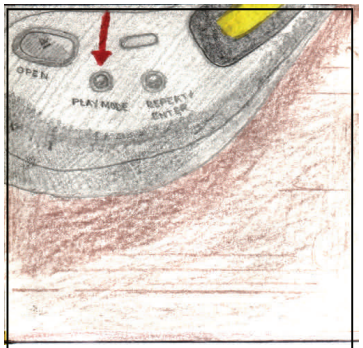
PTO

Sequence Diagram/Storyboard - continued



5. Replace battery cover

6. Return CD player to an upright position



7. Check CD player is working by pressing "Play" button

8. You can now enjoy the true quality of a Tyke CD player.

Many storyboards can be found in user guides for household products such as televisions, video recorders and even mobile phones. You may be asked to produce one for your portfolio and may even be asked to sketch one in your exam.

Flow Charts

Sometimes it's more effective to visualise something graphically than it is to describe it with words. That is the essence of what flowcharts do for you. Flowcharts explain a process clearly through symbols and text. Moreover, flowcharts give you the gist of the process flow in a single glance.

The process starts. All flow charts Start/Stop with this symbol and is the Start/Stop of the particular process being undertaken

This symbol represents a decision i.e. Is it broken? Yes or No?

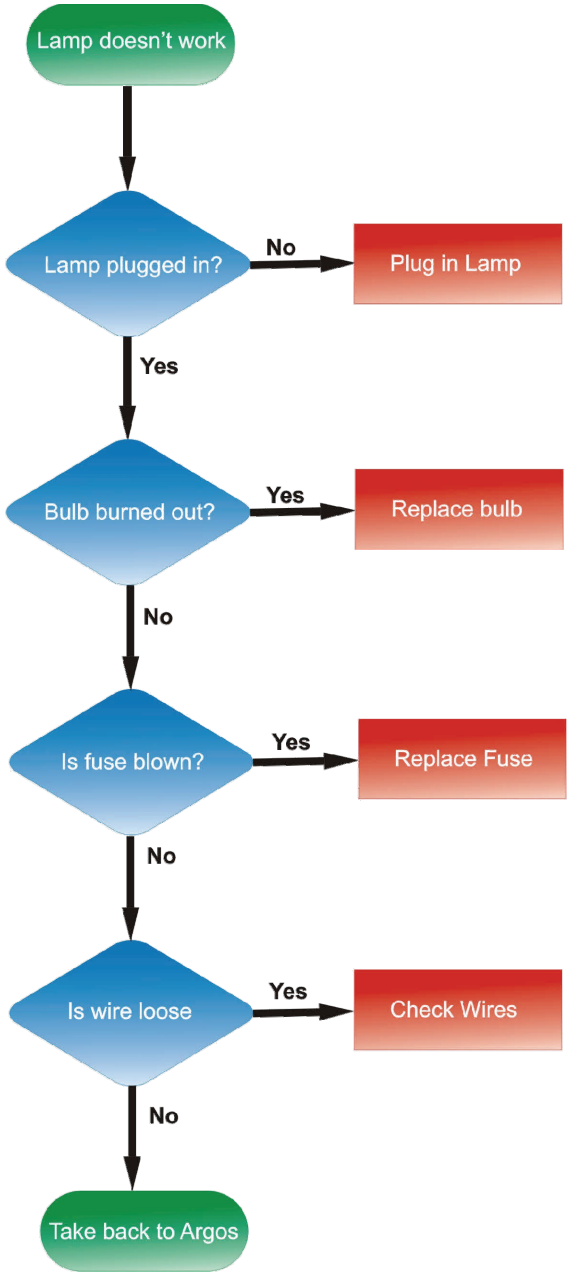
This symbol is the doing task, i.e. Fix the problem, do something.

Input/Output e.g. Insert a USB, CD, DVD, etc.

Flow Charts - continued

The example shown opposite shows the basic flow chart working through a typical everyday fault that could occur in any household or business.

What the chart is basically doing is systematically working through what the possible faults could be before returning to the store where it was purchased.



Graphic Communication and the effects of its use in every day living.

As much as graphic communication has excelled in recent years making all of our lives better, it does however leave a carbon footprint. A carbon footprint is determined by the human effect on the environment through green house gasses, paper waste, and pollution of volatile organic compounds found in inks. The footprint is measured in units of how much carbon dioxide has been released into the atmosphere.

Virtually every product you will see on a shop shelf has a package which has been graphically designed and subsequently printed. The print industry through the use of ink and paper has a lot to answer for.

Water

In 1995, 92 percent of the global population had a sufficient supply of water. If the world continues to consume water at its current rate, it is projected that water sufficiency in 2050 will be only 58 percent. It is further predicted that nations will go to war over water supplies within the next two decades.

The print industry makes a negative contribution to this situation. Large quantities of water are used in most printing processes (even digital), the exception being waterless printing.
Printers can reduce water usage by recycling the water used on the printing presses.

At the other end of the process is the issue of water contamination. All printers are legally required to clean waste water before disposing it. Some company's don't do this as well as they should.

Energy & Emissions

In addition to the waste printers use up, they also use a significant amount of energy – from electricity to run the presses, to fuel for delivering the finished product.

The industry can adopt measures to reduce energy consumption, such as using voltage optimisers (*making the most of the voltage available*) on the presses, driving fuel-efficient delivery vehicles, and switching to green electricity suppliers.

But until measures like these are widespread, energy consumption will keep on creating carbon emissions.

Waste

As has been discussed the print industry generates relatively high levels of waste. As shown below, a lot this waste can be recycled or reused, but currently much of it ends up in landfill.

Examples of how waste ink can be reused.

Waste inks and varnishes can be used as low grade fuel or mixed with concrete and buried in 'special (or hazardous) waste landfill'. A large printer could be chucking out around 9000 tins worth of waste ink per year.

Ink tins are usually crushed and recycled.

Ink cartridges are often favoured over tins, but although these plastic cartridges waste less ink than tins, they're classed as hazardous waste and usually sent to 'special waste landfill'.

More environmentally aware printers will pay for them to be collected and recycled into drainpipes etc. A large litho printer could be generating around 800,000 of these cartridges per year.

Waste chemicals (solvents, developer, fixer). In a year a large printer could chuck out around 65,000 litres of waste solvent and 85,000 litres of waste developer. Responsible printers will make sure they're either used as 3rd grade fuel or that they undergo 'bio-digestion' to make the chemicals safe before flushing them into the water course.

Wooden pallets are usually sent to landfill, but are occasionally recycled into chipboard.

Plastic wrapping will usually be sent to landfill. However, if recyclable, it can be washed, shredded and recycled into more plastic wrapping.

CDs and cases are usually sent to landfill, although they can also be ground up, washed in caustic solution to remove the ink and foil, and then re-used.

Digital

There are some huge environmental advantages to printing digitally:
You can run a print job as and when needed.
Re-printing costs no extra, so there is no need to print 5000 extra copies in case you run out.

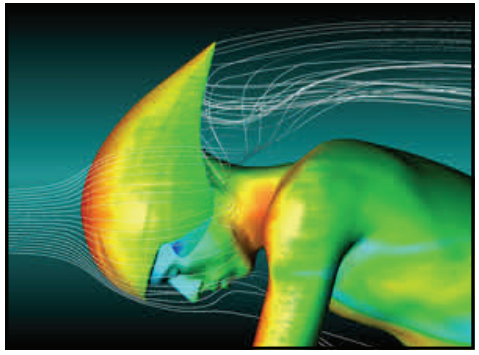
Downsides:

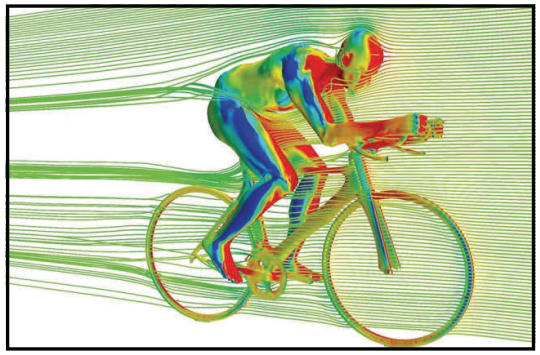
Digital inks are currently difficult to remove in the recycling process .
The choice of paper can be limited to approved papers, which are rarely recycled or FSC certified. (Forest Stewardship Council)
Large amounts of energy are used in the manufacturing of the machines themselves.

CAD/CAM

This an **Acronym** for Computer-Aided Design/Computer-Aided Manufacturing, computer systems used to design and manufacture products. The term CAD/CAM implies that a person can use the system both for designing a product and for controlling manufacturing processes.

In simple terms it basically means we design artefacts on the computer such as the I-pod Nano, the Camera & Clock, etc, in Auto desk Inventor or we could design a fully functioning computer generated car. This is what happens in industry nowadays. These computer files can then be read by machines which can actually use the files as if it was the actual fully manufactured model. This allows the Engineers to see if it actually works before the making of it.



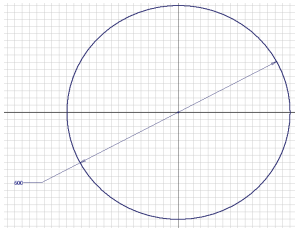


Other uses of this technology allows designers to see how efficient the aerodynamics of any given design is by placing the file in an electronic **Wind Tunnel**. The example above shows how such computer simulation has been used to check the aerodynamics of a cyclist. This information will then be used to try to design the optimum flow efficiency around the cyclist.

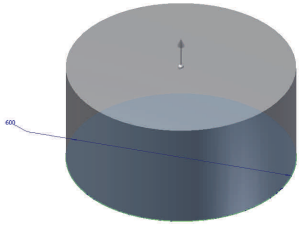
3D Modelling Techniques

School Bin Lid

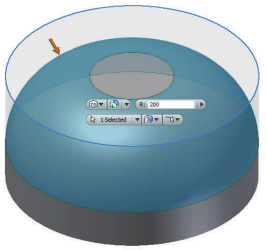
School Bin



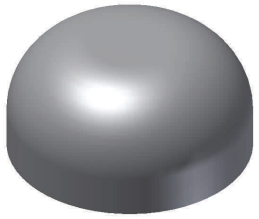
Sketch



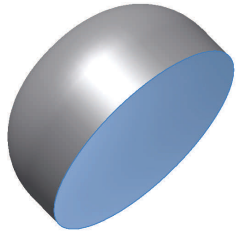
Extrusion



Fillet

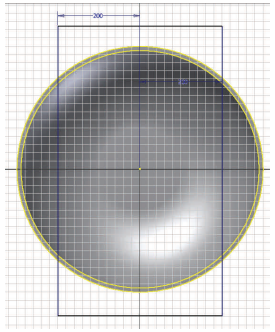


Completed Fillet

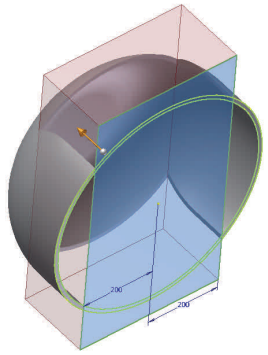


Shell

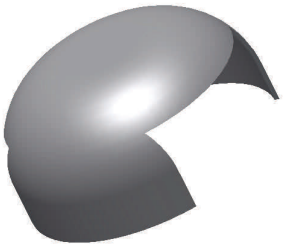
Completed Shell



Sketch



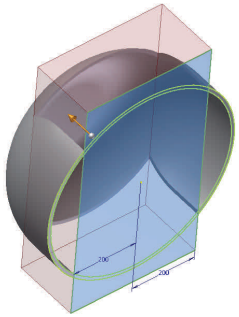
Subtraction - *Extrusion Cut*



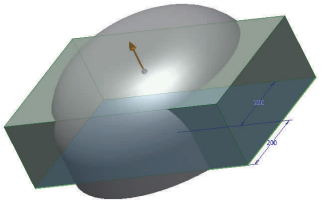
Completed **Subtraction**

3D Modelling Techniques

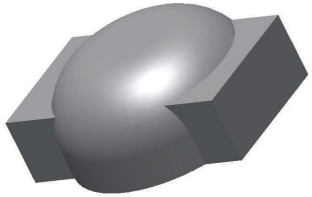
School Bin



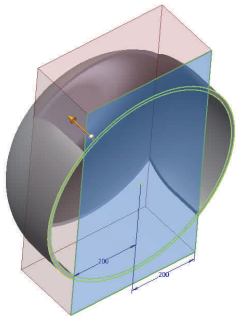
Sketch



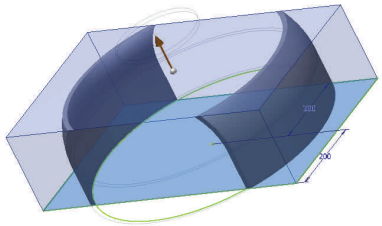
Union



Completed Union

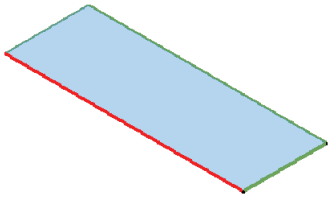


Sketch

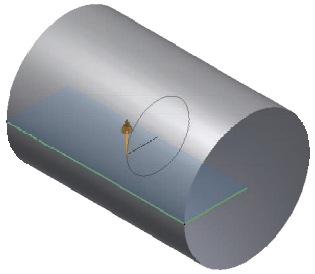


Intersection

Completed Intersection



Sketch



Revolve

Chamfer