Notes to Remember

Remember that in the National 5 examination contributes to one half of the overall mark, therefore a lot of consideration should be given not only to the content of your folio, but to your overall knowledge of the information contained within this booklet.

The homework issues which are associated with this booklet should be completed and the information learned from doing so, retained, as this information will have a major influence on what grade is achieved at the final Standard Grade Examination with respect Knowledge & Interpretation.

If you are in any doubt about any aspect of the Knowledge and Interpretation ask your teacher - after all that is why they are there. (make them earn their wages).
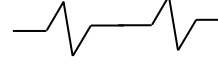
Greenfaulds High School

Technical Department

Nat 4 & 5
Graphic Communication

Knowledge & Interpretation

Types of line used

———————	Continuous thick	Used for visible outlines and edges.
———————	Continuous thin	Used for projection, dimensioning, leader lines, hatching and short centre lines.
/\/\/\	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.	Used for hidden outlines and edges.
— · — · — · ·	Chain thin.	Used for centre lines, lines of symmetry.
— · · — · · —	Chain thin double dash	Used for ghost outlines and bend
∿∿∿	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	Used on Cutting planes.

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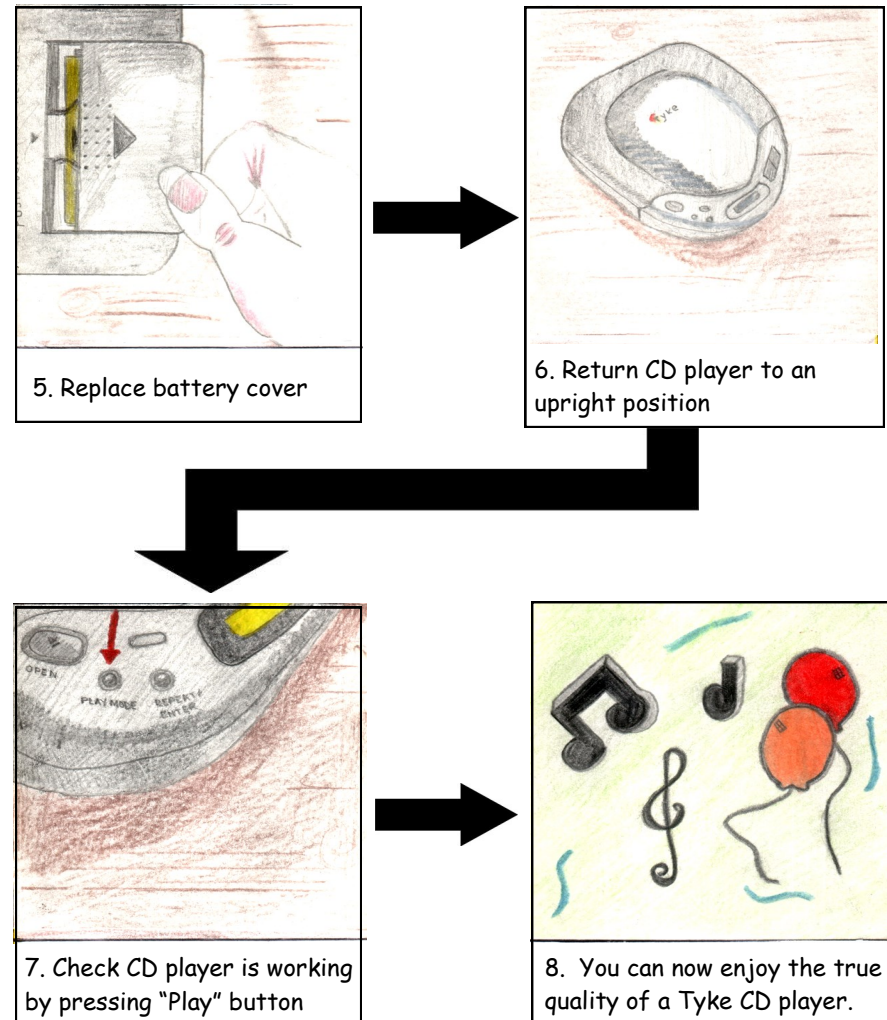
Many storyboards can be found in user guides for household products such as televisions, video recorders and even mobile phones. You may be asked to produce one for your portfolio and may even be asked to sketch one in your exam.

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
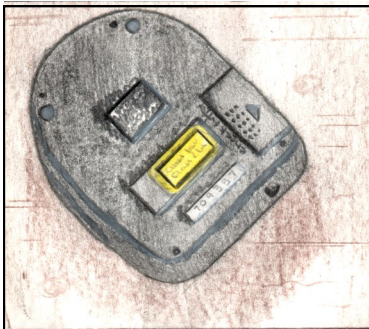
1. Carefully turn CD player on it's reverse side
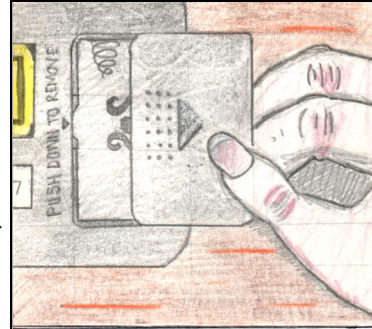
2. Remove battery cover

3. Remove old batteries using ribbon as shown

4. Replace with new AA batteries using internal diagram

Dimensioning

Small gap between Leader and line of drawing

Small Arrow

60

50

30

100

Short extension (Leader)

Dimension

30

30

30

30

30

30

30

30

Note the position of the dimensions on each of the lines

Dimensioning — Continued

All sizes in mm

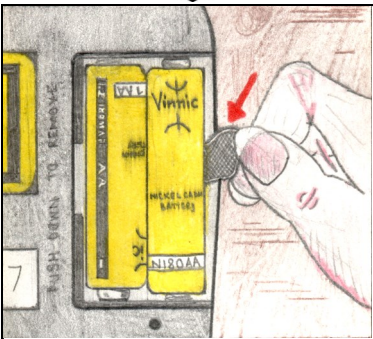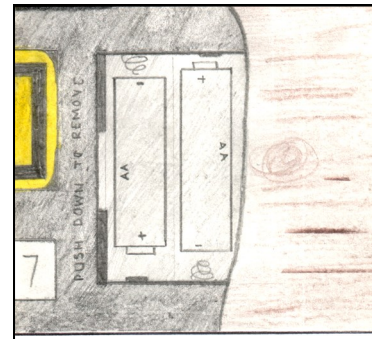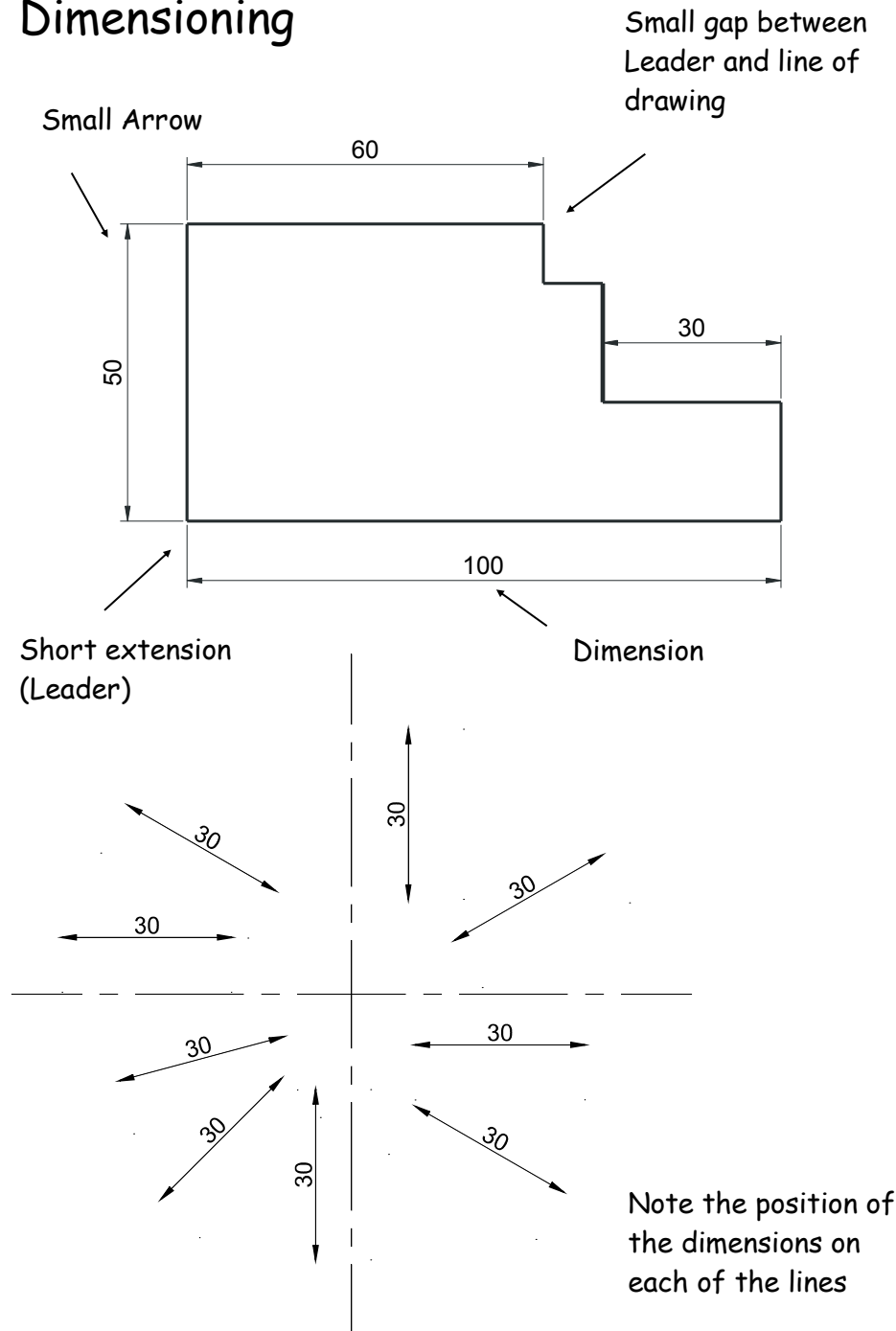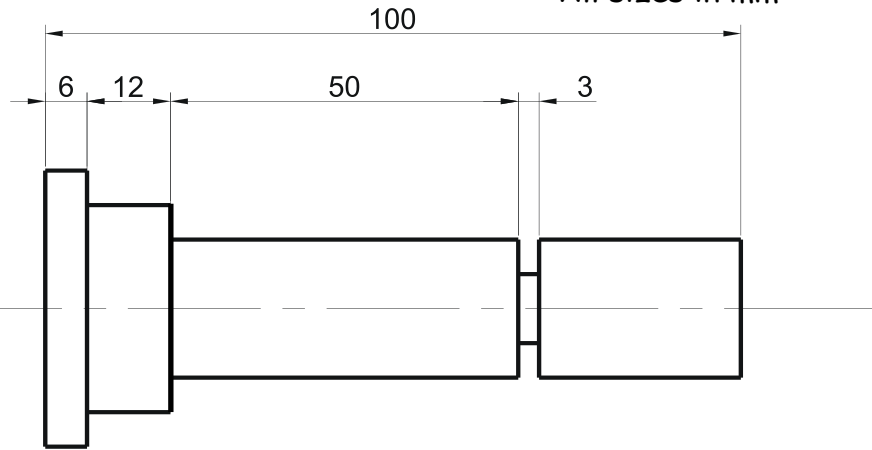Notice on the above drawing that the largest dimension is placed on the outside of the smaller dimensions. Where there is a limited space for dimensioning, the dimension can be placed above, or in line with, the extension of one of the dimension lines. E.g. the 3mm dimension uses the 50mm dimension leader. 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
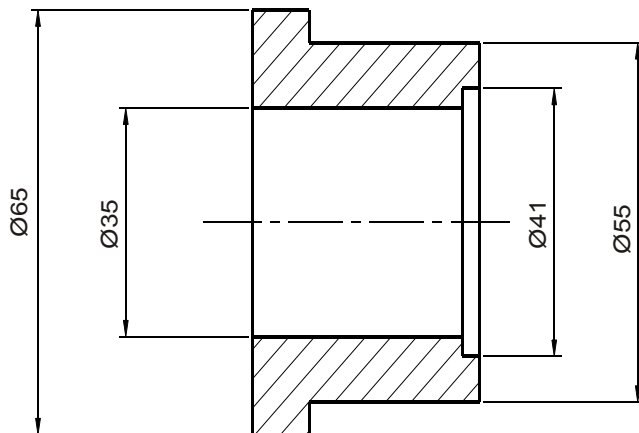
Block Plans

A **Block Plan** or **Site 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.
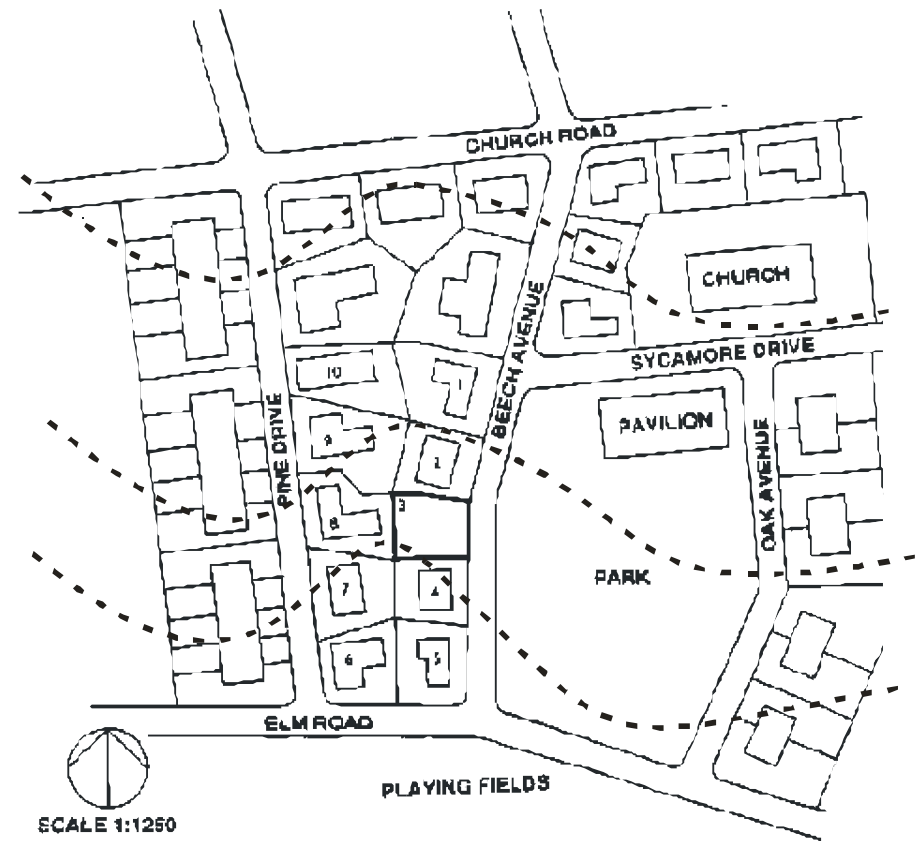
North Point indicator and scale.

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.
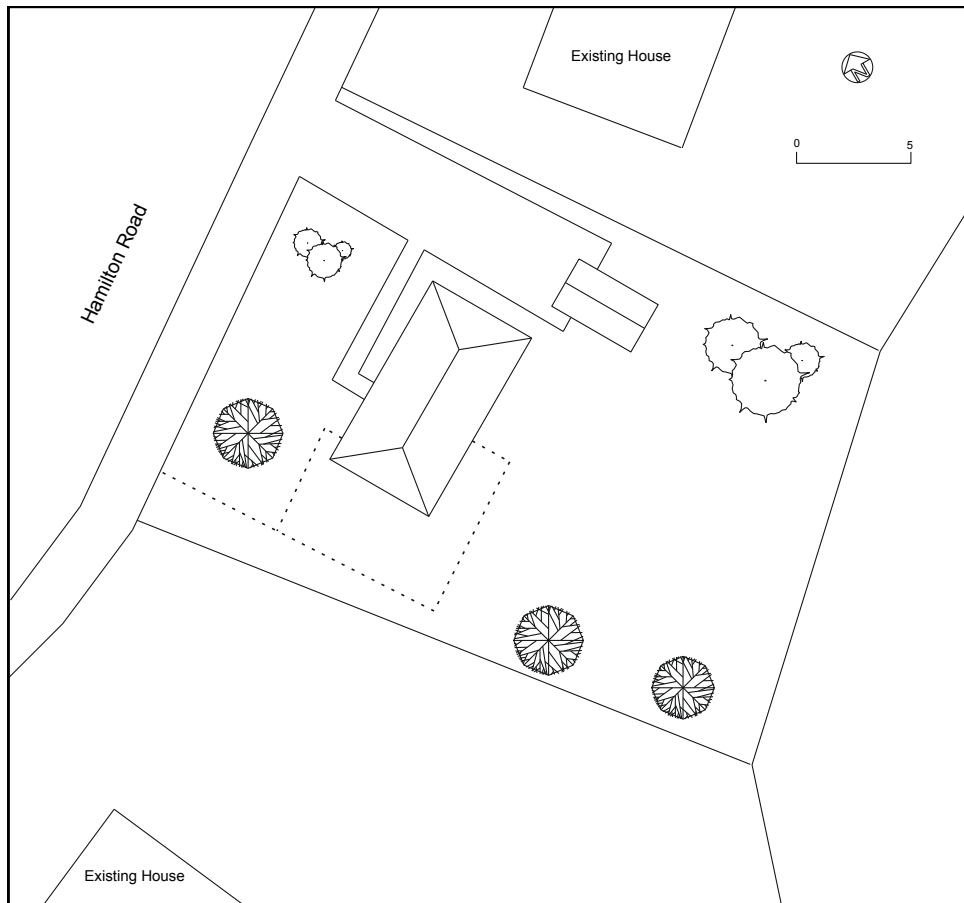
Dimensioning methods
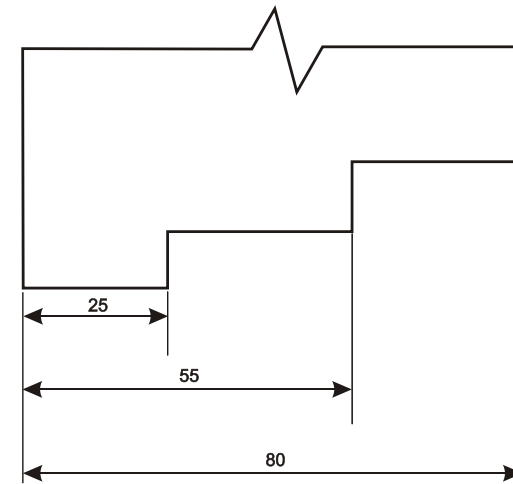
Parallel dimensioning

Parallel dimensioning shows dimensions taken from a common datum.
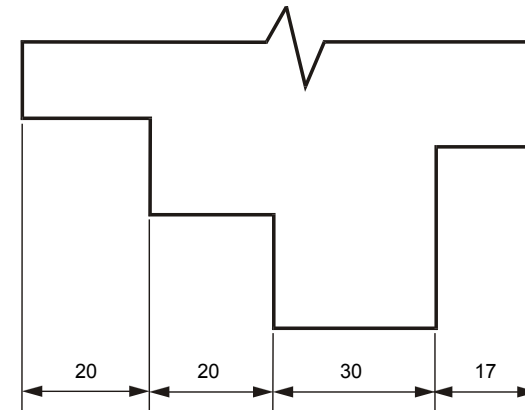
Chain Dimensioning

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.

R40
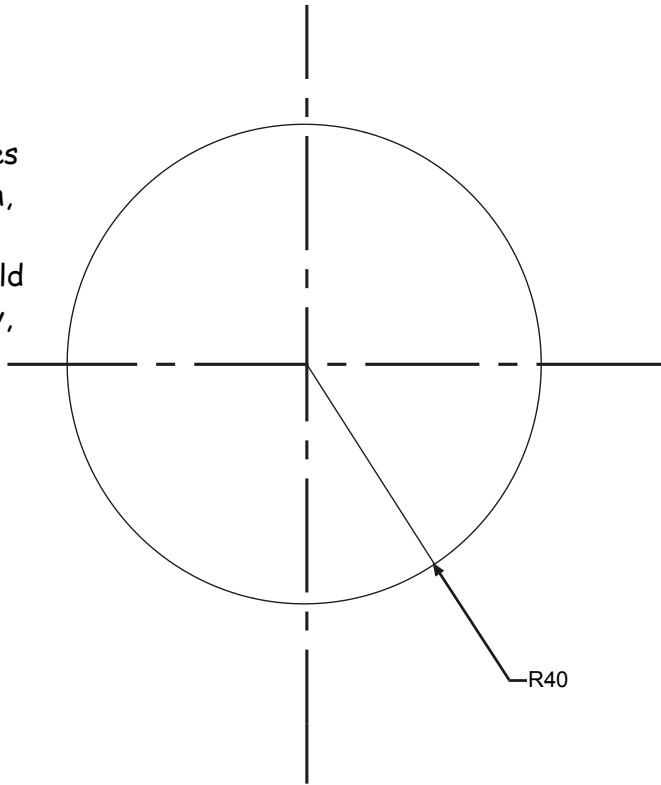
Angular Dimensions

30°

60°

150°

60°

30°
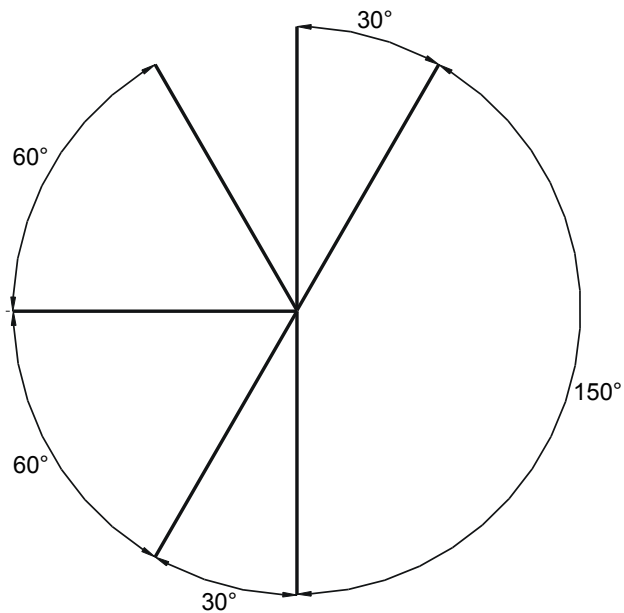
Scales are used a great deal in building drawings. They are used in three main areas, Floor plans, Site plans and Location plans. Each of the three types of drawings have preferred scales. These are as follows:-

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.

Drawn by; David Sommerville
Earnock High School
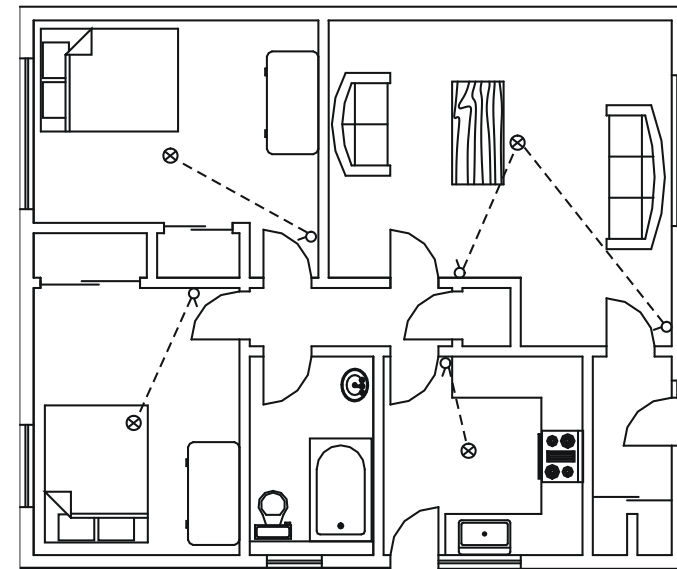
2:1

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.

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.

Sectioned Drawings
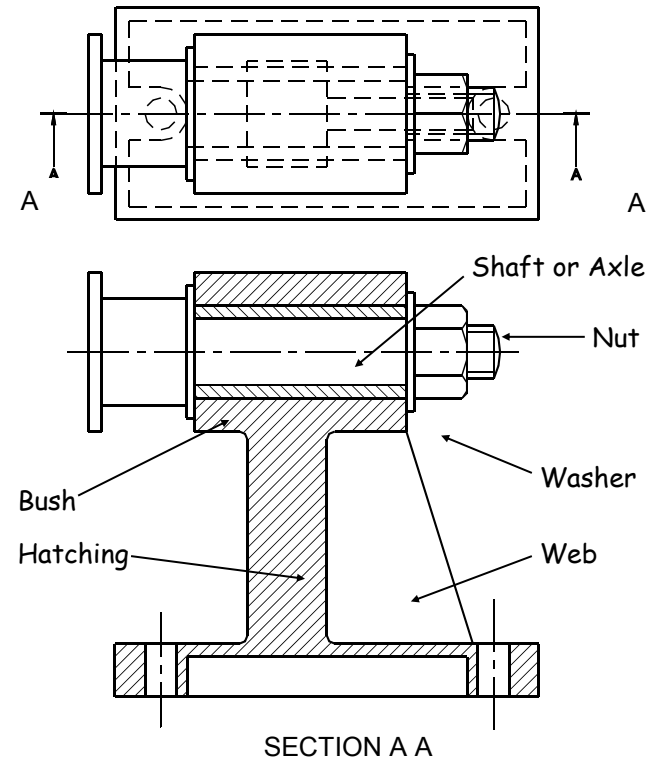
SECTION A A

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.
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.

Stepped Sections
(Sectional views in more than one plane)
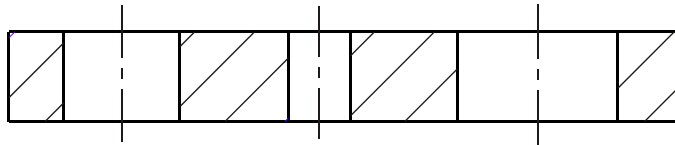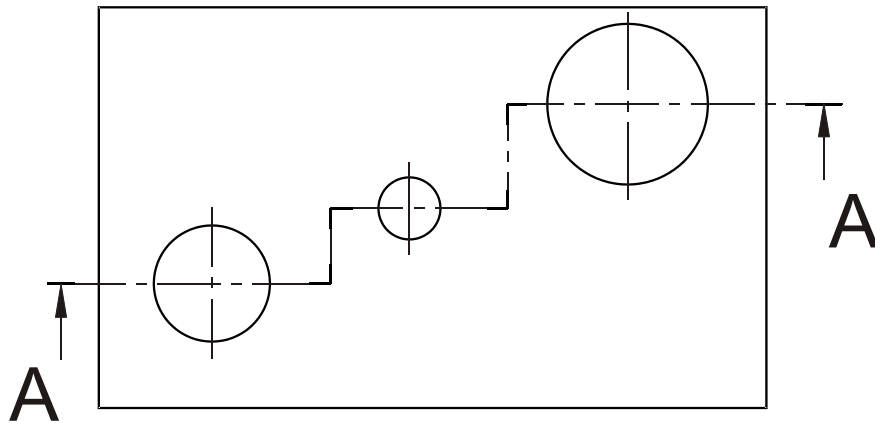
SECTION A A

It is convention to draw these views as if the cutting planes were one continuous plane.

Other types of sectional views include Revolved sections, Removed sections, Half sections and Part sections.

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.

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.

Rental Accommodation with Private Pools
The graph below shows the countries with the greatest number of Villas for Rent that have Private Pools

The graph is based on figures supplied by A.B.T.A. There are other villas available from private ownership but the number is not available.

16,879
11,386
8,296
4,264
7,903

Florida Cyprus Portugal Spain France
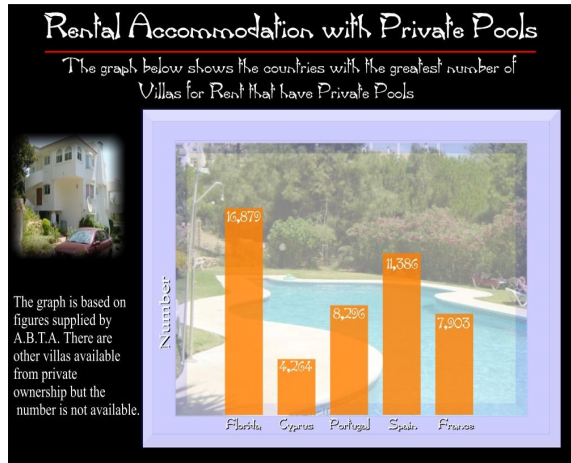
Pictograms

Similar to bar charts but using pictures or symbols instead.
In a pictogram you must have a key to tell you the amount each symbol stands for.

Average Attendance at Premier Football Clubs

Kilmarnock
Motherwell
Hearts
Aberdeen
Hibernian
Partick Thistle

= 1000
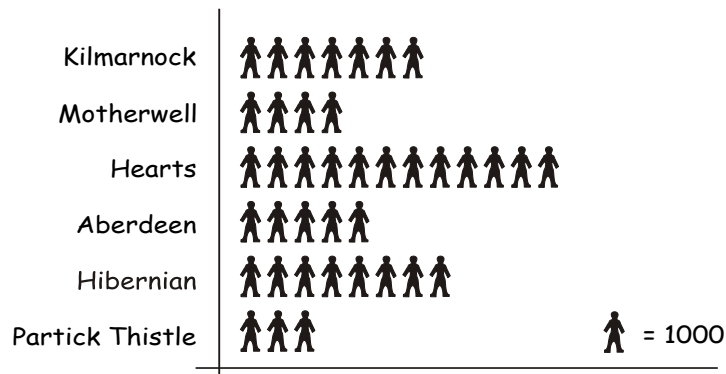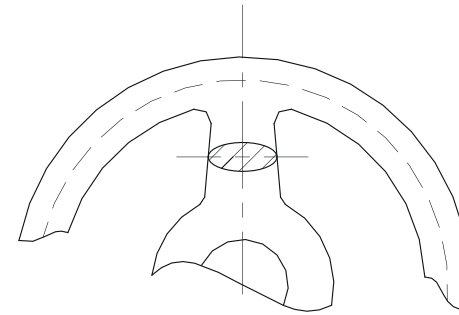
Revolved Section
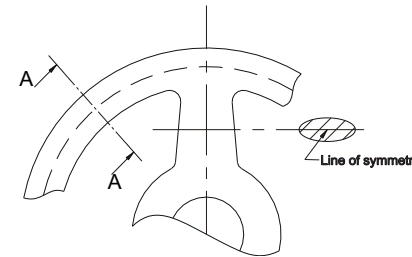
This type of section, as the name implies, has been turned through 90 degrees to show the reader what the section looks like.

A-A

Line of symmetry

A removed section shows the cut section out with the actual drawing as shown in section A-A. The groove shown on top of the cut section A-A is the top of a pulley wheel which would accommodate a belt.

Removed Sections

Part Section

This type of cut section only shows part of the component sectioned. It would most likely be carried out to show hidden detail such as this blind hole.

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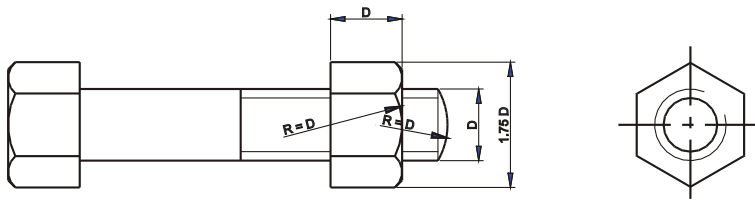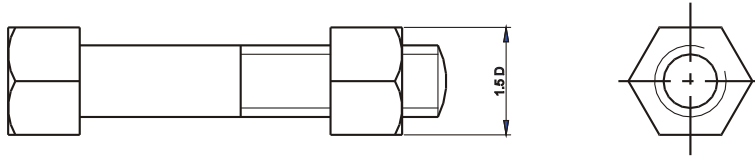
Conventional sizes to draw a nut and bolt are shown. Use these sizes if you have to draw the nut or bolt accurately otherwise use the simplified convention shown below.

Simplified Fasteners etc

Hexagon head screw

Countersunk screw, slot

Countersunk screw, cross slot
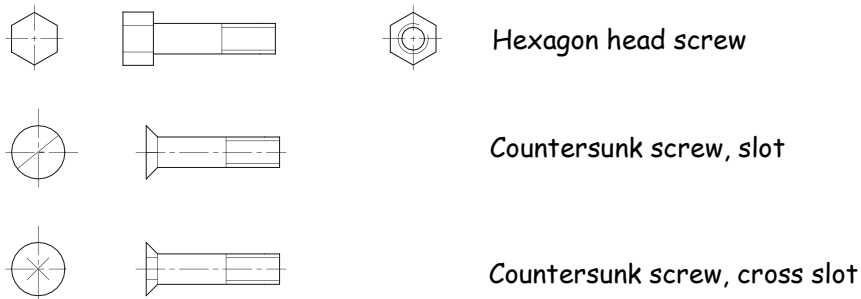
When to Use

- 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 figures is required.
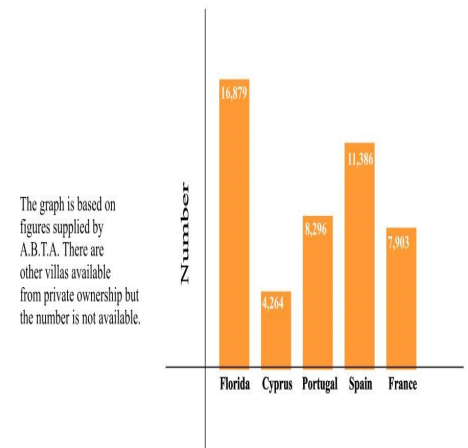
When not to use

- 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.
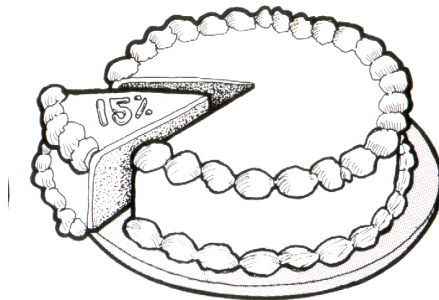
Line Graphs

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.

World's Leading Pie Eaters

U.S.A. 100%
U.K. 95%
Belgium 70%
France 80%
Spain 15%

15%
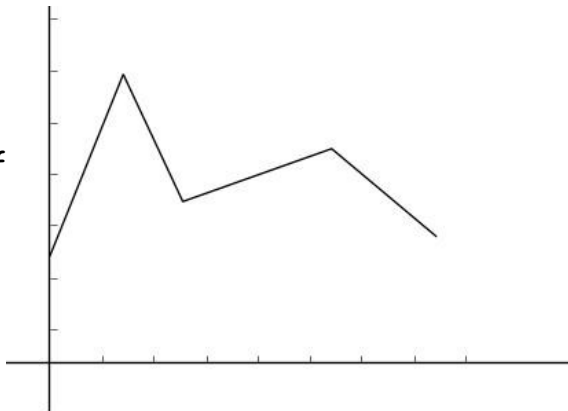
Correct Use of Lettering

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.

ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890   4mm

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.
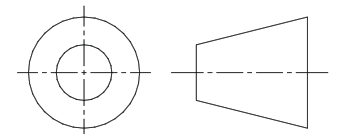
Assembly Drawing

A - Exploded Isometric

18 19 17 8
25 2 7
20,24 10
14,20
3 27(175º)
1 5 22
21
23 9 9
15
11 16
240V
9 13 4 20,12 6
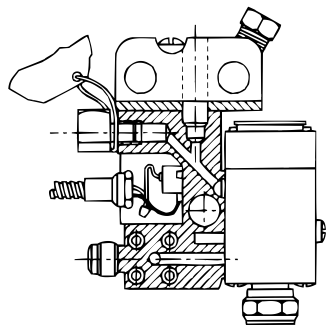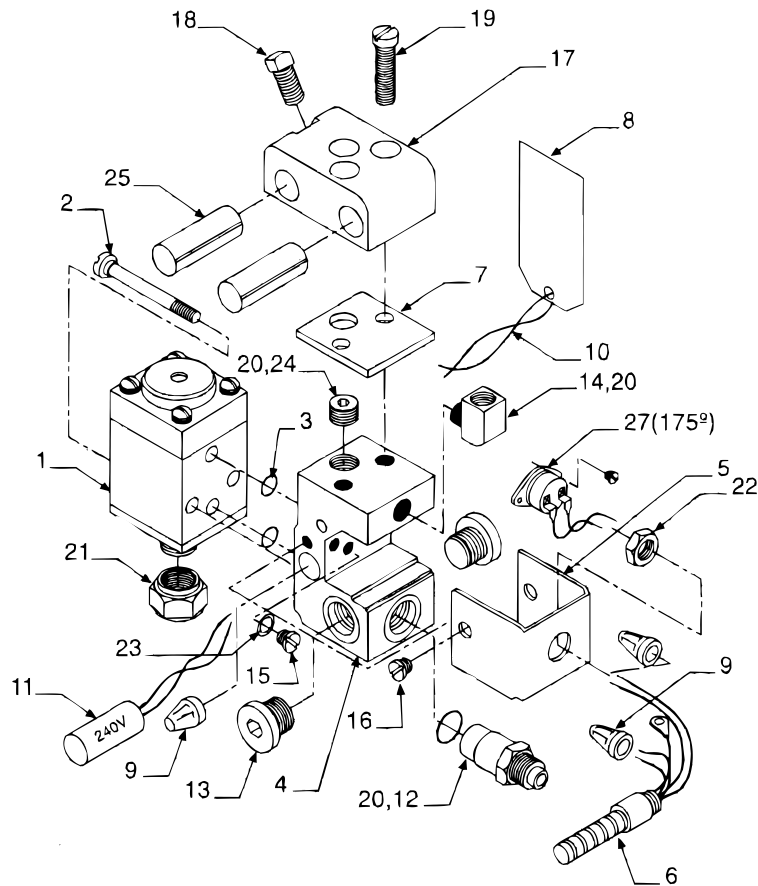
Above is an exploded view of a
Hot Melt Glue Gun.
On the page opposite, the table
shows a list of all the component
parts and their respective
identification numbers which are
used in the manufacture of the gun.

B - Section

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

Advantages of CAG over manual drawing

- 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

- 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.

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.
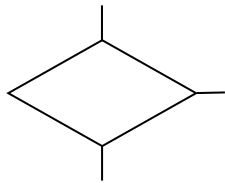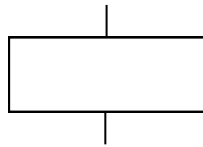
Hazard Warning

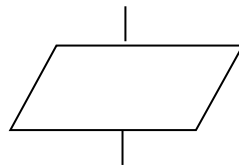Male

Female

Decision

Predefined Process

Terminator

Fragile
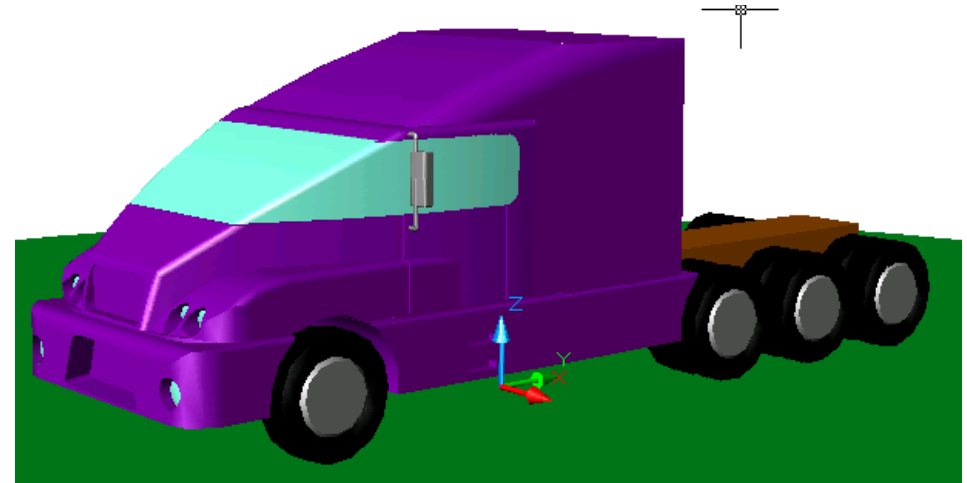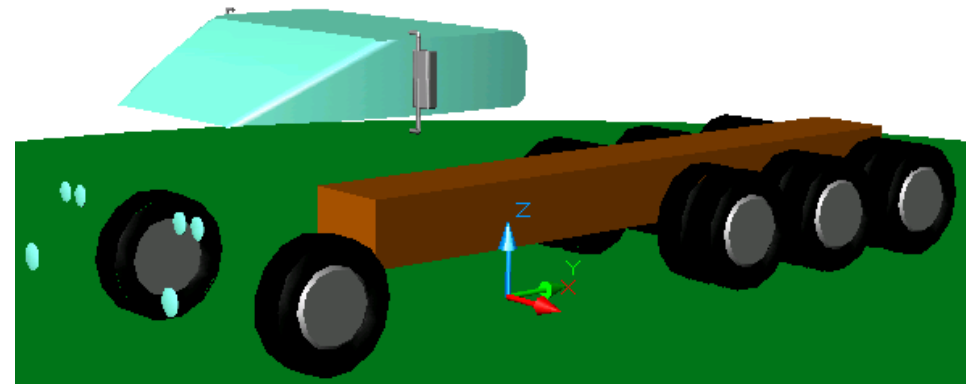
Keep Dry

Data

*

Kite Mark

Safety Mark

This Way Up

All layers turned on

One layer with truck canopy turned off

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	🖨	🔒	🔒

Symbols — Electrical

Symbols marked by * MUST be learned

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
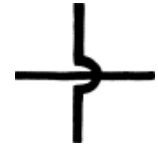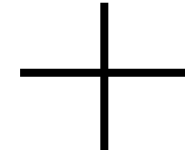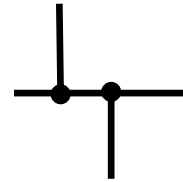
Junctions and cross-overs

* **Primary or Secondary cell**   **Battery**   **Electric bell**

* **Signal lamp (general)**   * **Power Socket Outlet**
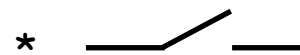
* **Switch (General Symbol)**   **Electric Clock**   * **Switch**
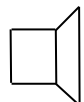
Microphone   **Earphone**   **Loudspeaker**

Symbols — Architectural

Symbols marked by * MUST be learned

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.

*

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
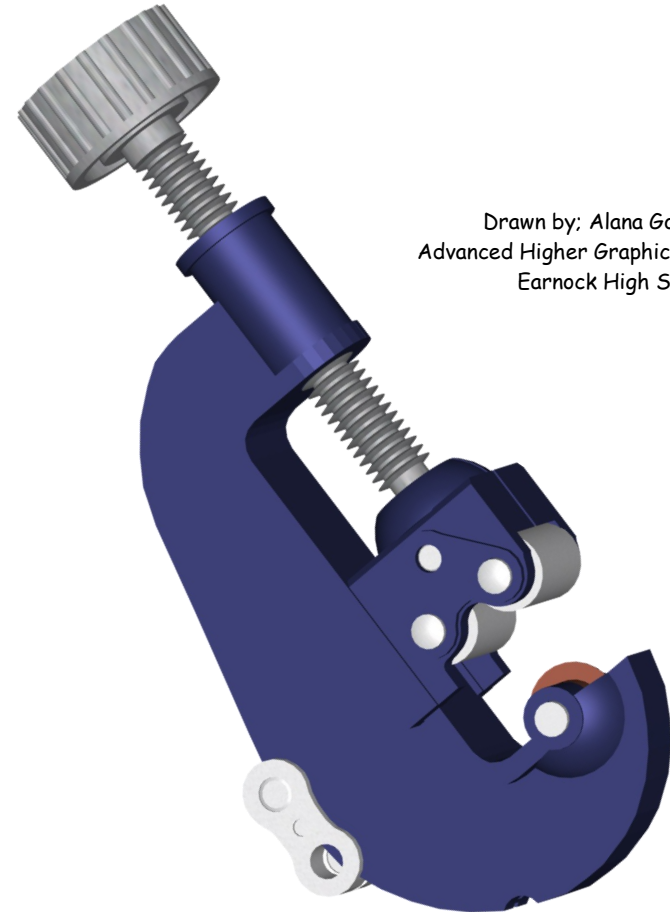
Drawn by; Alana Goodbrand
Advanced Higher Graphic Communication
Earnock High School

Wire-Frame Model

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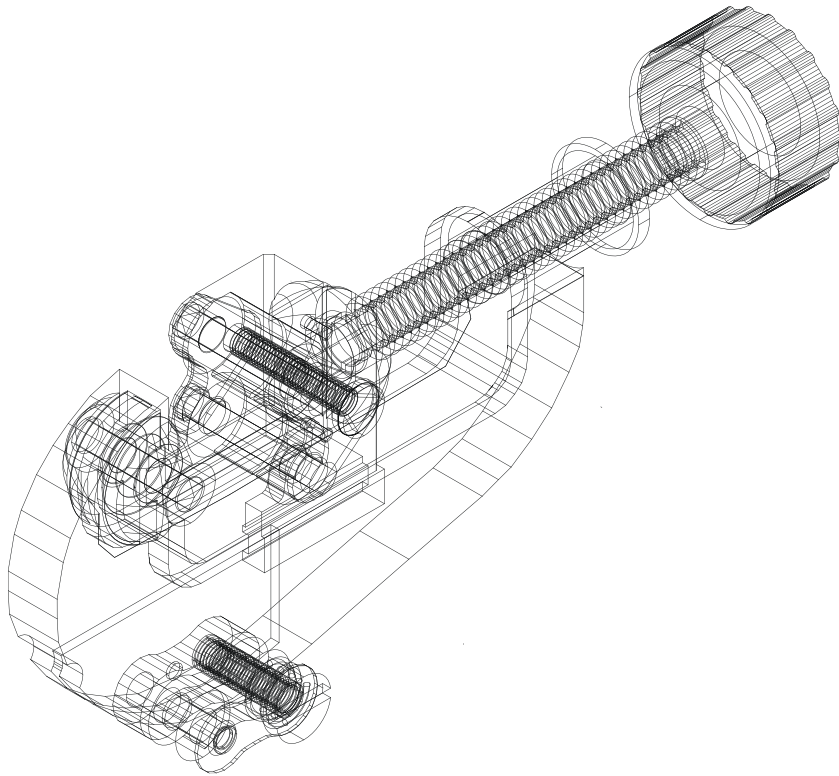
The advantage of a wire frame model is that is uses far less memory within the computer than the solid model.

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.

Adaptor An expansion card that connects to the monitor to generate the video/screen display. (See Hercules card, CGA, EGA, VGA and resolution.)

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.

CAE   Computer-aided engineering.

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

CGA Colour graphics adaptor.   A colour adaptor which provides low resolution up to four colours. (320 h x 200 v pixels at 4 colours)

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.

Common CAD Commands

Line

Arc

This is Text

Copy

Hatching

Mirror

Trim

Array

Ellipse

Circle

Chamfer

Fillet

Zoom

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.
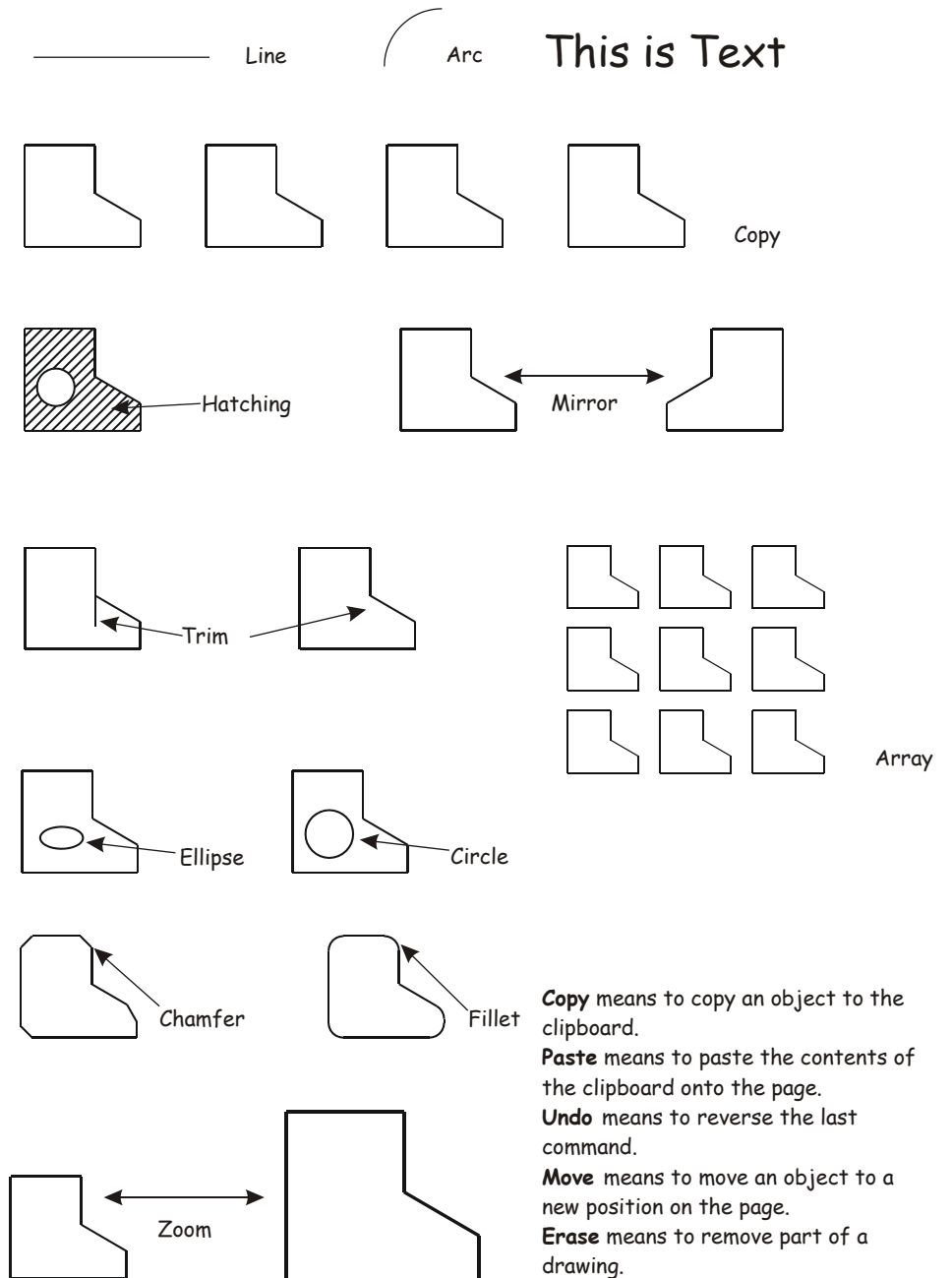
Drum Plotter

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

Moving Arm

Pen
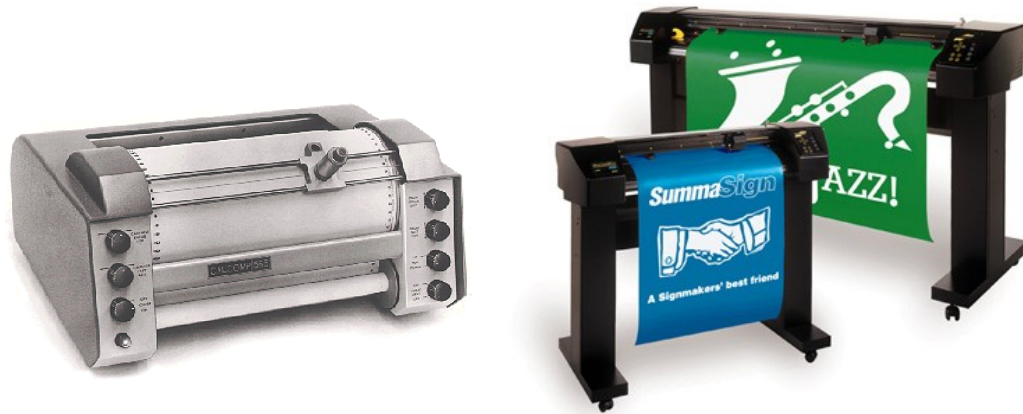
Moving Pen Carriage
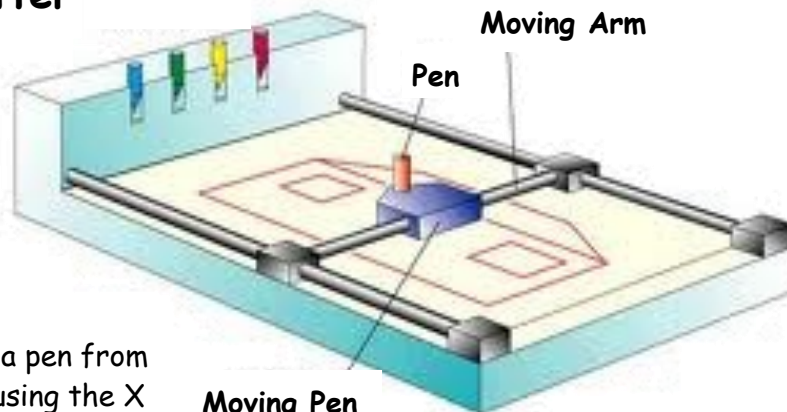
This printer lifts a pen from the side bar and using the X & Y axis draws the drawing.

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.

DXF   Drawing Exchange Format. A system controlling the format of data interchanged between CAG systems. Drawing files held in DXF format will have the suffix DXF.

EGA   Enhanced graphics adapter. A colour adaptor allowing a variety of high resolution modes (320 h x 200 v at 64 colours to 640 h x 350 v at 16 colours).

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   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.

Hercules Graphics Card   A proprietary adaptor card used to provide high screen resolution in monochrome monitors.

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.

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.

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

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.

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.

Housekeeping Embraces all the routines which, although essential to smooth running, do not assist problem solving.

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.

Maths Co-processor Known also as a maths chip, it processes numbers very rapidly using floating-point notation, 100 or more times faster than a standard CPU.

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.

NLQ Near letter quality. Printed output of high quality.

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.

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.

Peripherals External equipment that can be added or connected to the computer. Examples: printers, graphics tablet.

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.

Program Always spelt the American way, it describes a sequential set of instructions to the computer.

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.

Rubber Banding CAG systems provide for a visible flexible connection between the screen cursor and the position from which it last moved. As the cursor moves away from it, the connecting line seems to stretch.