National 5 Graphics

Course notes

Name: _____

DESIGN + TECHNOLOGY

BSI Dimensions and protocols

The British Standards Institution (BSI) is a body which is responsible for a range of standards controlling quality over many different areas of industry and elsewhere. Within graphics, there are several you must be aware of and understand. They are mostly concerned with **Production Drawings,** such as building plans and engineering layouts. Their purpose is to ensure **uniformity and consistency** across all material, and allow everyone concerned to understand the drawings and their intentions.
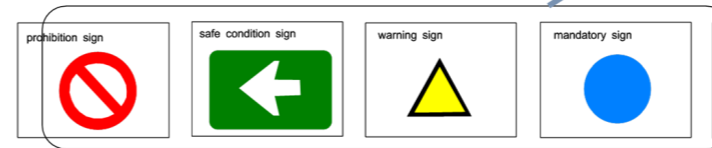
BSI symbols for construction

These are symbols used within the construction industry to represent a range of features which are relevant within this field. They are adopted so all architects, planners, engineers and tradesmen involved understand how the plans are laid out and what is required from them.

Mandatory Signs
Blue circular background with white symbol e.g eye protection must be worn.

Safe Condition Signs
Green rectangular / square background with white text or symbol. E.g first aid, indication of direction.

Warning Signs
Yellow triangular background with black band e.g risk of electric shock.

Prohibition Signs
white circular background with red band and cross bar e.g no smoking.

Firefighting Signs
Red square background with white symbol or text e.g fire alarm

Danger Identification
Used to identify the perimeter of a hazard. The stripes are black and luminous orange or yellow.

prohibition sign	safe condition sign	warning sign	mandatory sign

Lamp	Switch	Socket	Radiator

Shower tray	Bath	Wash basin	Sink	WC

Sinktop	Heated towel rail	Concrete	Brickwork

Door	Sawn timber	Insulation board	Blockwork

Fixed window	Window–hinged at side	Window–hinged at top	Window–hinged at bottom
F			

Window–pivoted, horizontal axis	Window–sliding horizontally	Drainage	North sign

| Existing tree	Existing tree–to be removed	Proposed tree	Contours

BSI line types

It is important you are aware of the various BSI line types used within graphics; both to accurately produce your own drawings and to interpret others.

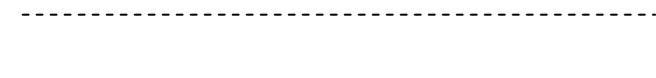You will need to understand these line types for your final exam.
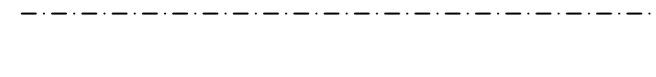

Line types and dimensions in practice
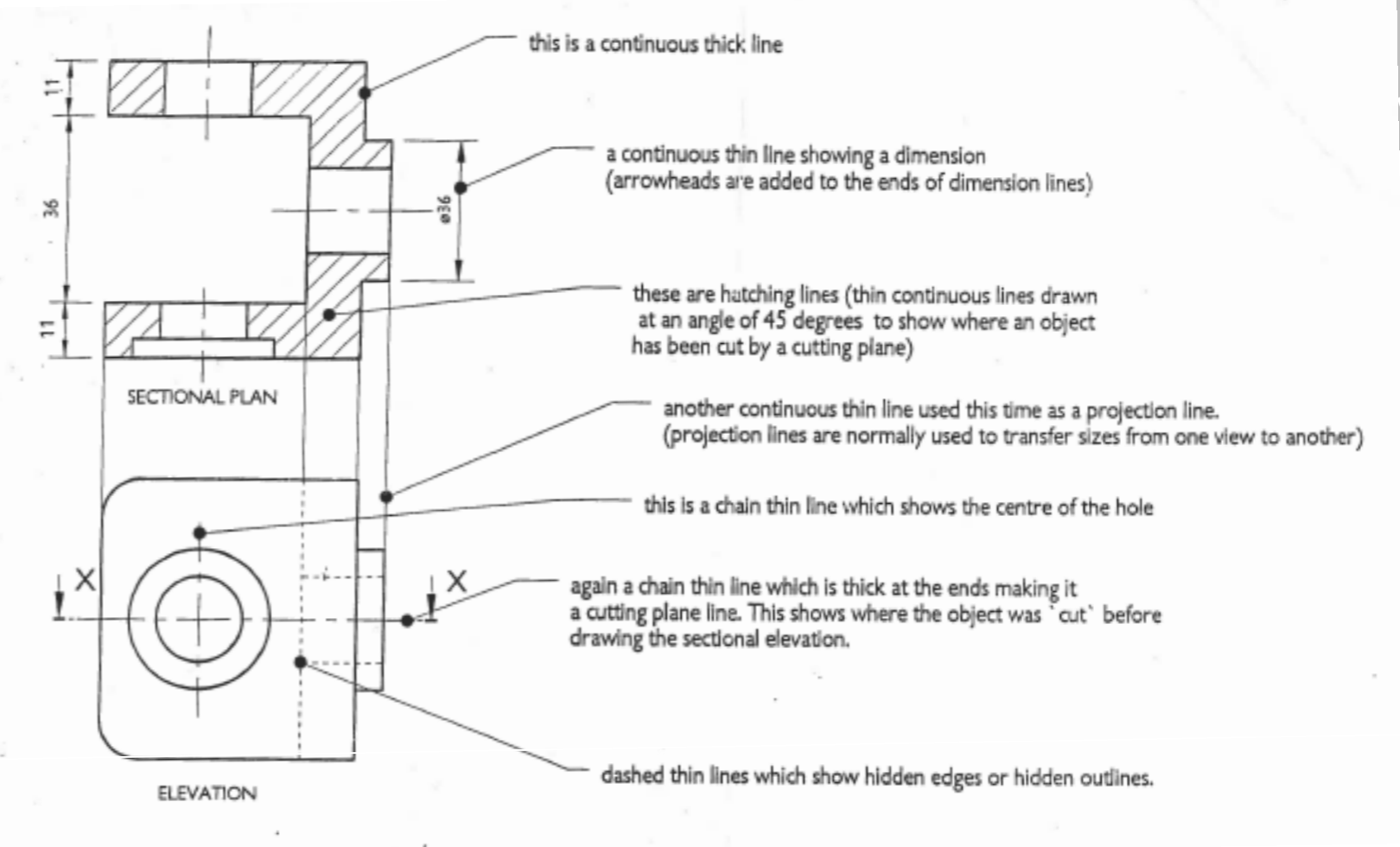
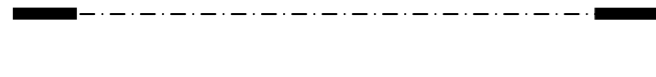A thick continuous line shows **visible outlines** and **visible edges.**
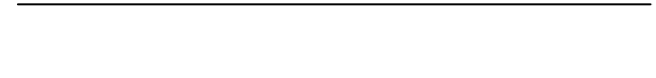
A thin continuous line is used for **projection lines** and **construction lines.**
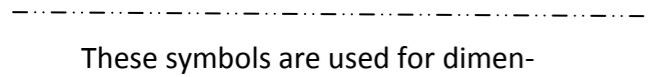
A thin, broken line shows **hidden outlines** and **hidden edges**.

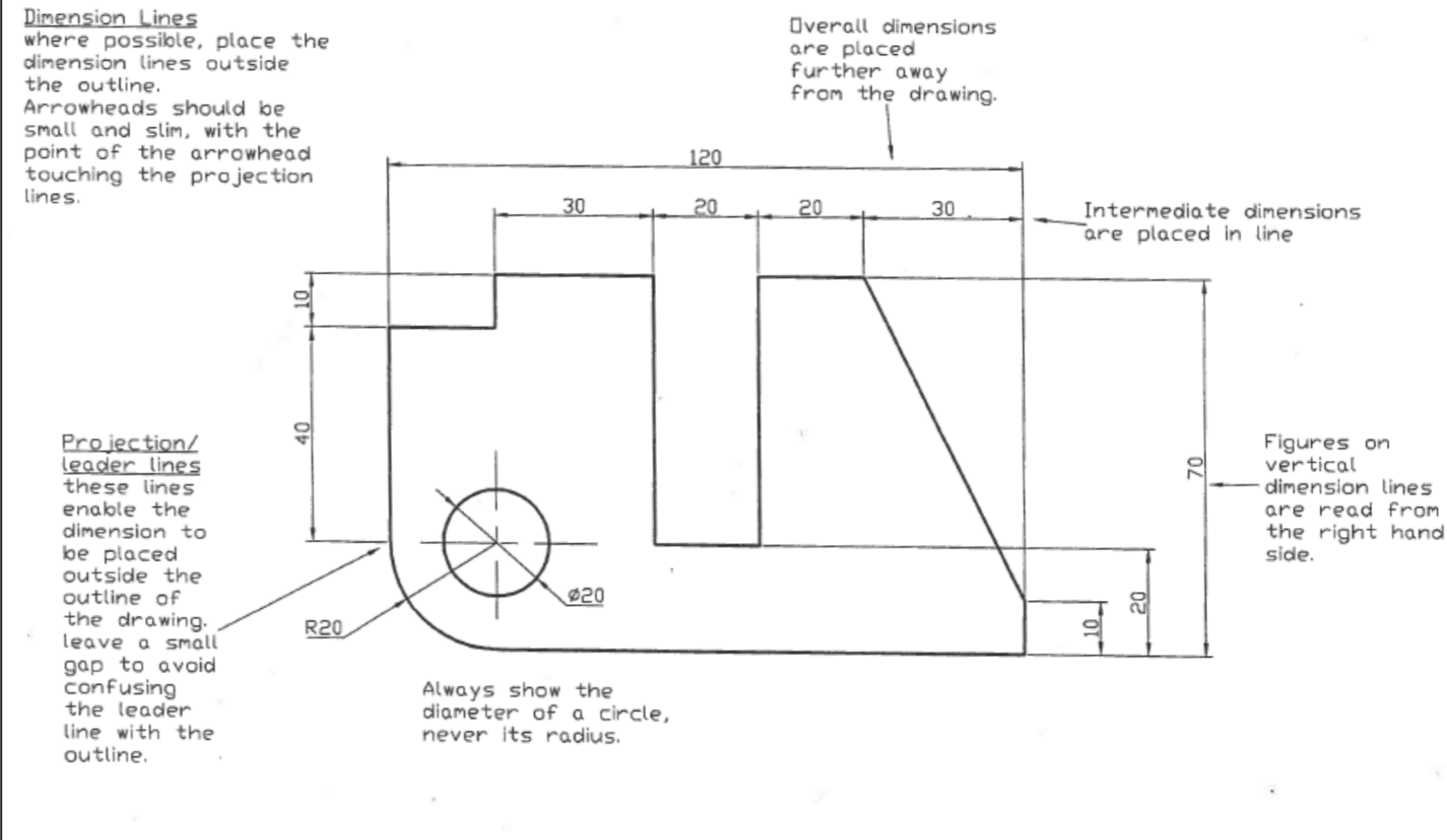A thin chain line shows a **centre line**, e.g. the centres of circles, cylinders and cones.

A thin chain line with thick ends shows where an object is cut through or sec-

A thin double dash chain line is used as a **fold line** to indicate where a surface development should be folded.

These symbols are used for dimensioning:

Ø diameter

R radius

☐ square

CL centre line

AF across flats (Hexagons)

AC across corners (Hexagons)

---

this is a continuous thick line

a continuous thin line showing a dimension (arrowheads are added to the ends of dimension lines)

these are hatching lines (thin continuous lines drawn at an angle of 45 degrees to show where an object has been cut by a cutting plane)

another continuous thin line used this time as a projection line. (projection lines are normally used to transfer sizes from one view to another)

this is a chain thin line which shows the centre of the hole

again a chain thin line which is thick at the ends making it a cutting plane line. This shows where the object was `cut` before drawing the sectional elevation.

dashed thin lines which show hidden edges or hidden outlines.

SECTIONAL PLAN

ELEVATION

X

X

36

11

11

ø36

Dimension Lines
where possible, place the dimension lines outside the outline. Arrowheads should be small and slim, with the point of the arrowhead touching the projection lines.

Projection/ leader lines
these lines enable the dimension to be placed outside the outline of the drawing. leave a small gap to avoid confusing the leader line with the outline.

Overall dimensions are placed further away from the drawing.

Intermediate dimensions are placed in line

Figures on vertical dimension lines are read from the right hand side.

Always show the diameter of a circle, never its radius.

120

30 20 20 30

10

40

70

20

10

ø20

R20

DESIGN + TECHNOLOGY

BSI dimensions

Dimensioning terms

These are the conventions for technical graphic dimensioning that you should use in your work.

Leader line	Across corners	Across flats	Square
Dimension Line / Extension Line / Gap / Ø30 Leader Line	75AC	60AF	□30

Linear	Radial	Projection symbol
40 / 30	R10 / R5 / R5 / R10	3rd angle projection

Diameter	Running	Chain
Ø50 / Ø50 / Ø40 / Ø40 / Ø20 / Ø20	20 40 55 70	20 20 30 / 20 / 20

Parallel	Major and minor axis
70 / 40 / 20	Major Axis / Minor Axis

Pitch circle diameter	Angular dimension
Pitch Circle / PCD 50	67°

Building construction drawings

The construction industry is one of the most important in the country; millions of people are employed as architects, tradesmen, suppliers service staff and in many other disciplines. To ensure all people involved can work together effectively, it is essential projects are effectively planned and developed. A set of building drawings are called **project sets** and take several forms, depending on the requirements of those involved.

These are sets of drawings used by **architects, property developers, building control departments, designers and tradesmen** in the various areas of construction and property development. They are important to maintain standards across different areas of interest; these are the most important ones used:

Location plans

This drawing is the first drawing of the building set. It helps the builder plan the layout of the new building scheme, and is required by the local government planning department to help them decide whether to approve a new project or not.

Location plan - Plot 6 Wodlands Road, Raith Park Estate   Scale 1:1250
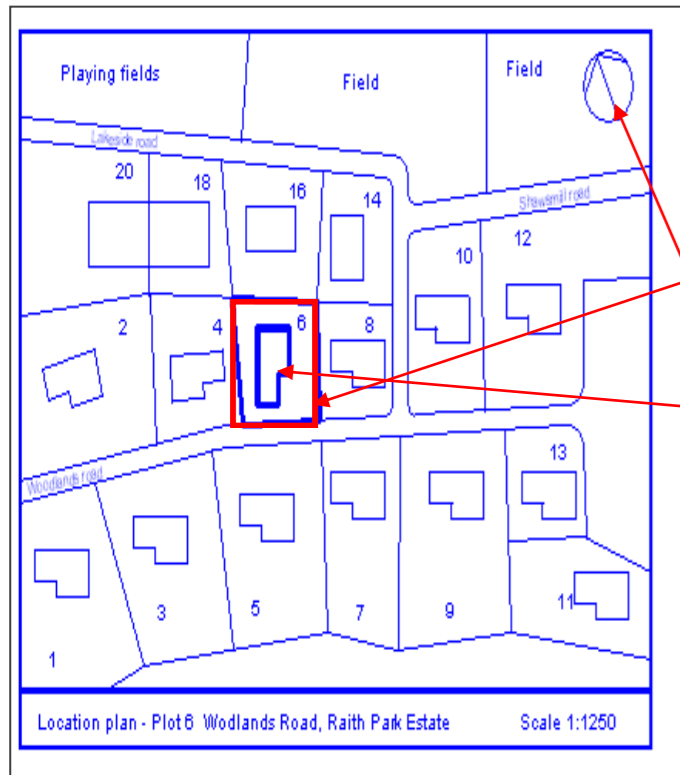
Neighbouring buildings and their boundaries are shown, along with roads, street names and fields.

- In the example shown, the new building is on **PLOT 6** which is highlighted.

- The new building and plot are outlined with a thick black line and may also be hatched as well.

- The direction arrow at the top right hand side always indicates the direction **NORTH.**

Typical scales used

1:1250
1:2500

Site Plans 1

A **site plan (also known as a block plan)** shows the site boundary and the outline of the new building which are highlighted in the location plan. Paths, roads and neighbouring plots are also shown. Site plans allow builders to mark out the site, lay drainage pipes and build manholes. Two site plans for **PLOT 6** are shown below:
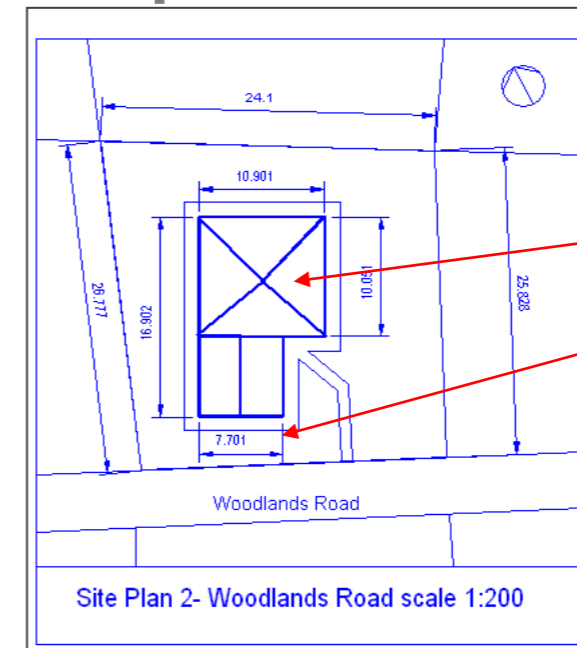

Site Plan 1- Woodlands Road scale 1:200
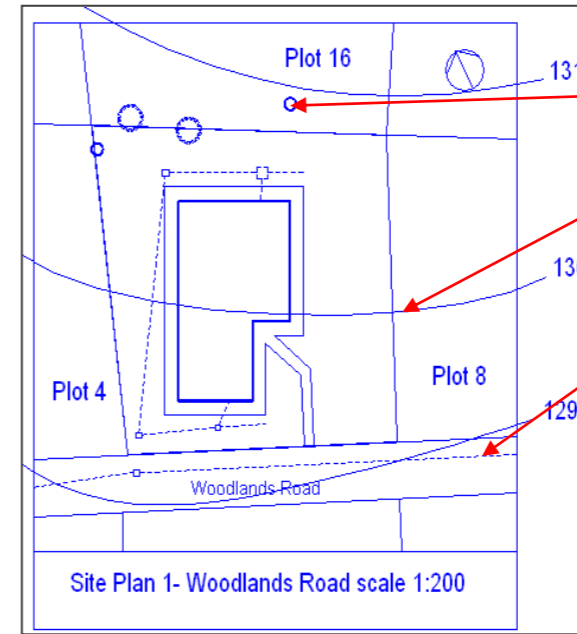
Site Plan 1 shows:

- Existing trees

- Contour lines which show the ground sloping towards the road

- Drainage pipes and manholes which run from the bathroom and kitchen.

Typical scales used

1:200
1:500

Site plans 2

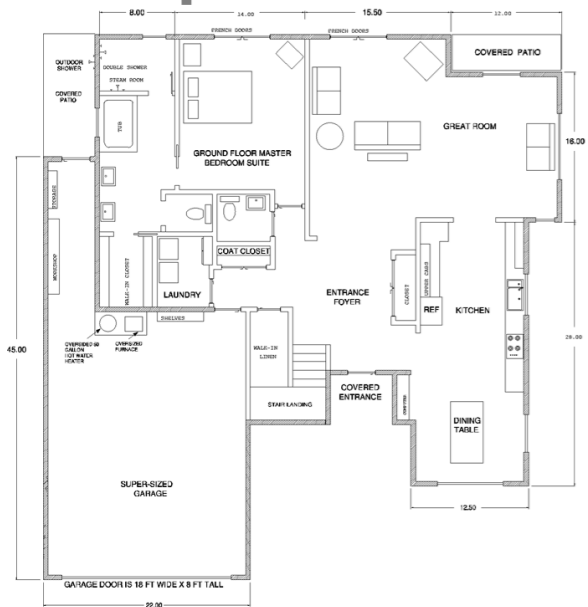Site Plan 2- Woodlands Road scale 1:200

Site Plan 2 shows:

- The building outline, including the roof

- The main dimensions of the house and site in metres

- The position of the house on the site

Building construction drawings (2)

Floor plans

This is a type of sectional view. It represents a plan view of the building with the roof and a few layers of bricks removed. This shows detail of the building which otherwise could not be seen, such as:
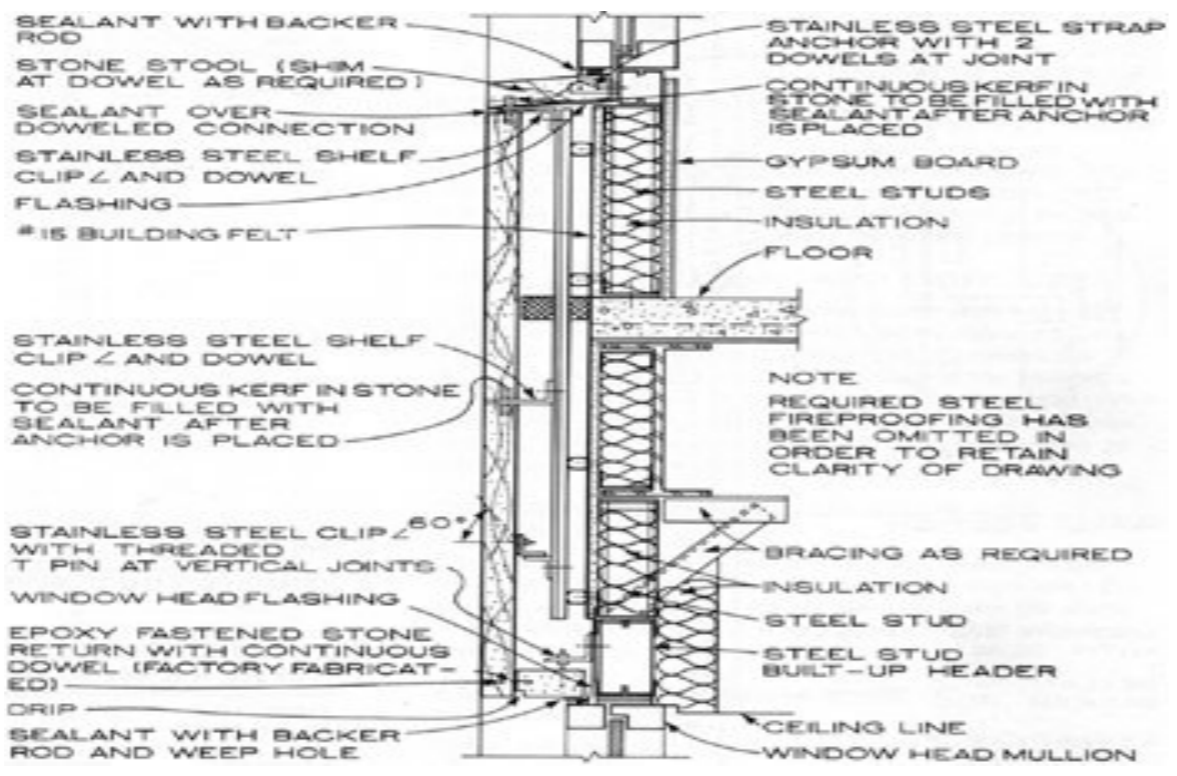
- The arrangements of rooms
- The positions of windows and doors
- The types of internal and external walls.

The BSI symbols you are familiar with are usually included in these views.

Typical scales used

1:50   1:100

Sectional views

These are sectional views showing the cross-section of a building on the elevation. They show the tradesmen concerned how the house should be built and the material to be used. This example shows:

- The construction of the cavity wall
- The window, and how it is fitted and sealed
- The insulation required for the cavity
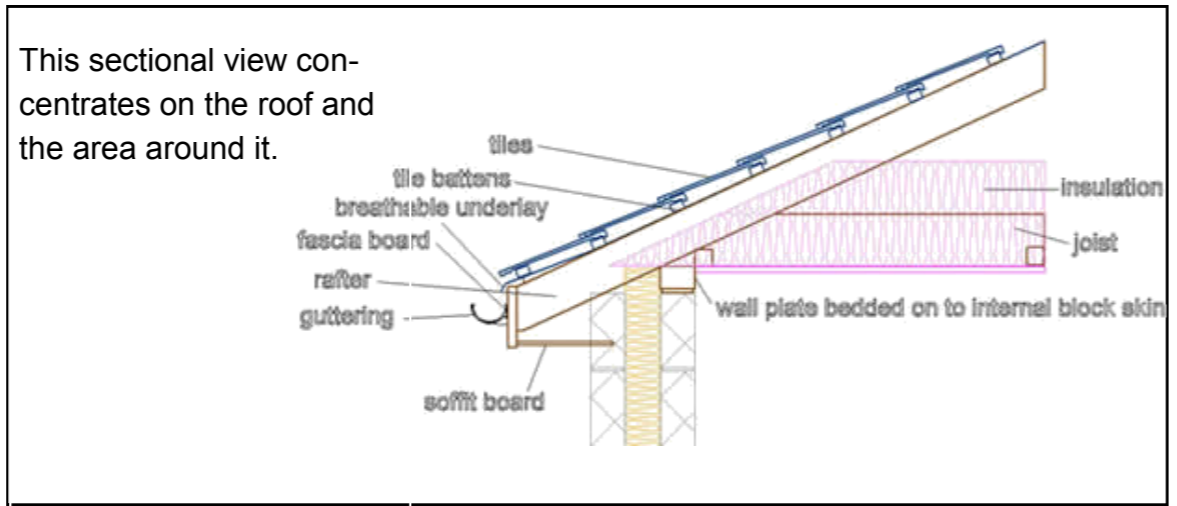
This sectional view concentrates on the roof and the area around it.

Typical scales used   1:20

Elevations

Elevations are orthographic projections of a building produced by its architect or designer. They show:

- The style of the building, e.g. bungalow or villa
- The external appearance of the building
- The style of roof
- The position of doors, chimneys and windows.

Elevations are required by the local planning department to decide whether the style and proportions of the proposed building are appropriate for the location. Builders also need a picture of what the house will look like from the outside.

Drawing views
Pictorial views

These views allow all three dimensions of an object, etc. to be seen. They are not known as **3D views**, however as they cannot be turned around or manipulated as they are still 'flat' views. Instead, they can be described as **2½ D.** They are used in many different situations to give a more realistic and easy to understand view of the item, in a way which orthographic views may not. This is also beneficial to communicate information to individuals who are not technically-minded or experienced in reading orthographic views.
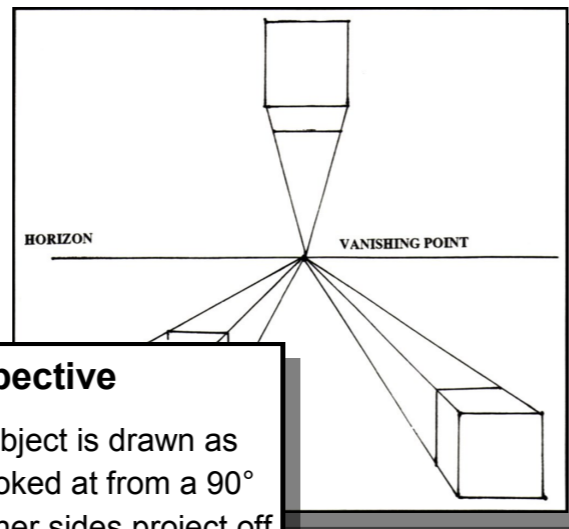
1 Point Perspective

The front of the object is drawn as its true shape (looked at from a 90° angle), and its other sides project off to a 'vanishing point' on a horizon line. These sides are subject to **foreshortening**—the effect that things become smaller as they are further away. This gives the description of **perspective**.
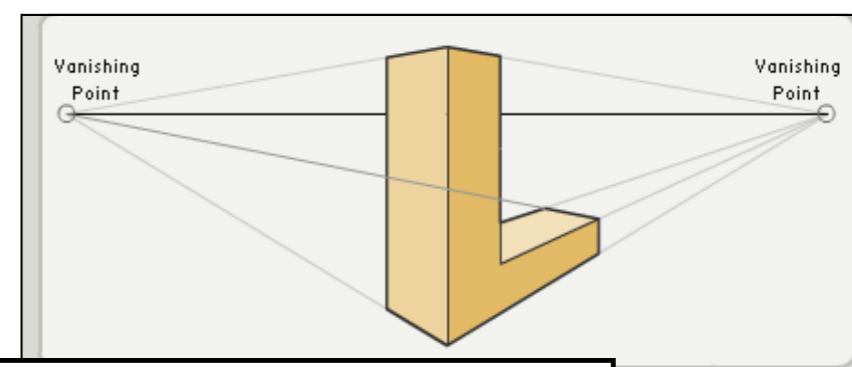
2 Point Perspective

A more realistic perspective view, this time with two vanishing points. The drawing is usually started with a vertical **leading edge** at the centre, and the 'horizontal' lines of the object going to either of the vanishing points. This form of pictorial view is often used in promotional graphics for houses, etc.
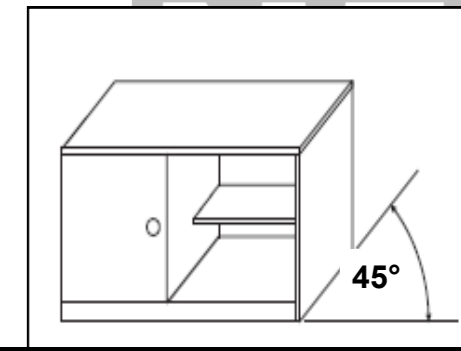
Oblique views

These views show the true shape of the elevation, with the breadths being projected back at 45° and divided by 2. They are often used to show circular based objects as the circle remains true, unlike isometrics where it becomes an ellipse.
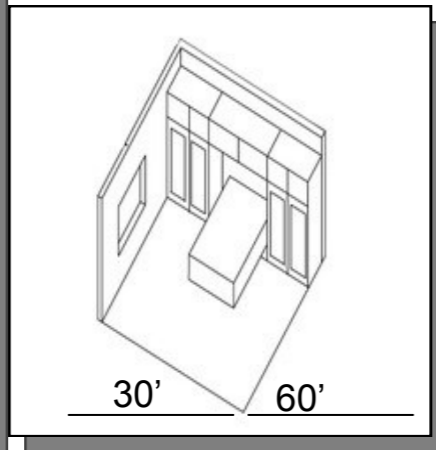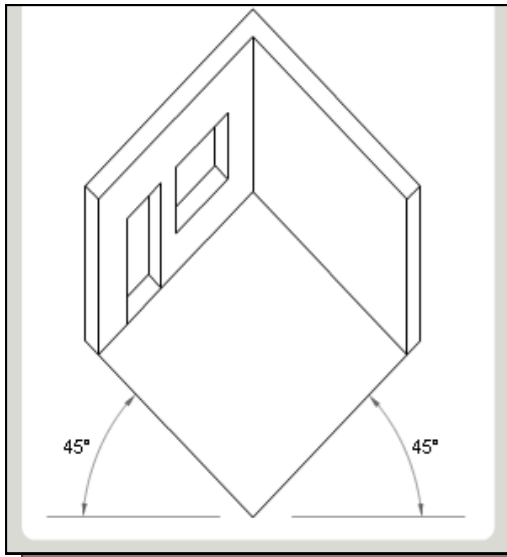
Planometric views

These views always have a 90° corner at their centre, and the other two angles add up to 90° also. They can either be 45°/45° or 30°/60°. They are frequently used to show the inside of rooms, but often outside features too such as gardens, etc.
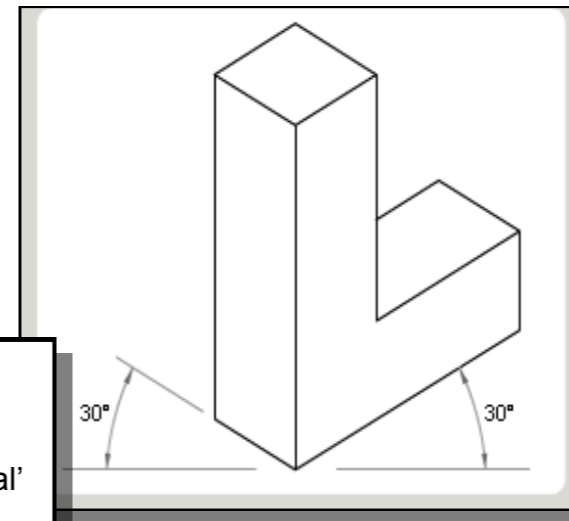
Isometric views

These views have vertical heights and the two 'horizontal' dimensions are angled at 30°. All the sizes of the object being drawn remain the same from the orthographic view it is based on—ie the height is still the same as are the length and breadth. Isometric views are frequently used to represent everyday objects and engineering/technical parts to make them easier to visualise.
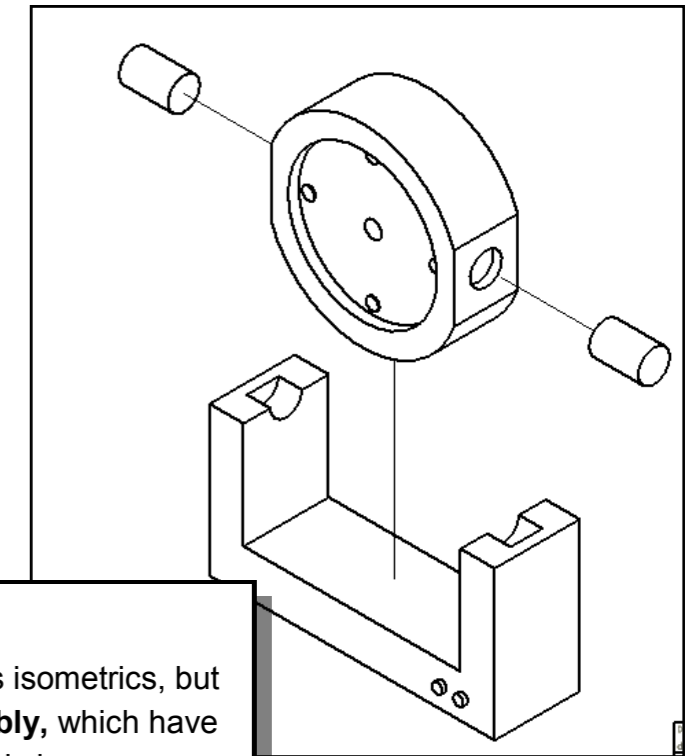
Exploded Isometric

These views follow the same rules as isometrics, but involve 2 or more parts of an **Assembly,** which have been separated in a **linear** way. This is known as an **exploded view** and can be considered to be the opposite of an assembly. They are used to illustrate the relationship between separate parts within an assembly, and are often used in instruction manuals for furniture, toys, etc.

Drawing views

Assemblies and sections

Sectional views

These are used to show **hidden features** within the view—often an assembly. They allow various parts and edges to be seen as if the object has been 'cut open'. They can either be **sectional elevations** or **sectional plans** depending on the view required and are labelled with the letters used by the **cutting plane.**

PLAN (1 : 1)

VIEW5 (1 : 2)

END ELEVATION (1 : 1)

ELEVATION

A-A (1 : 1)
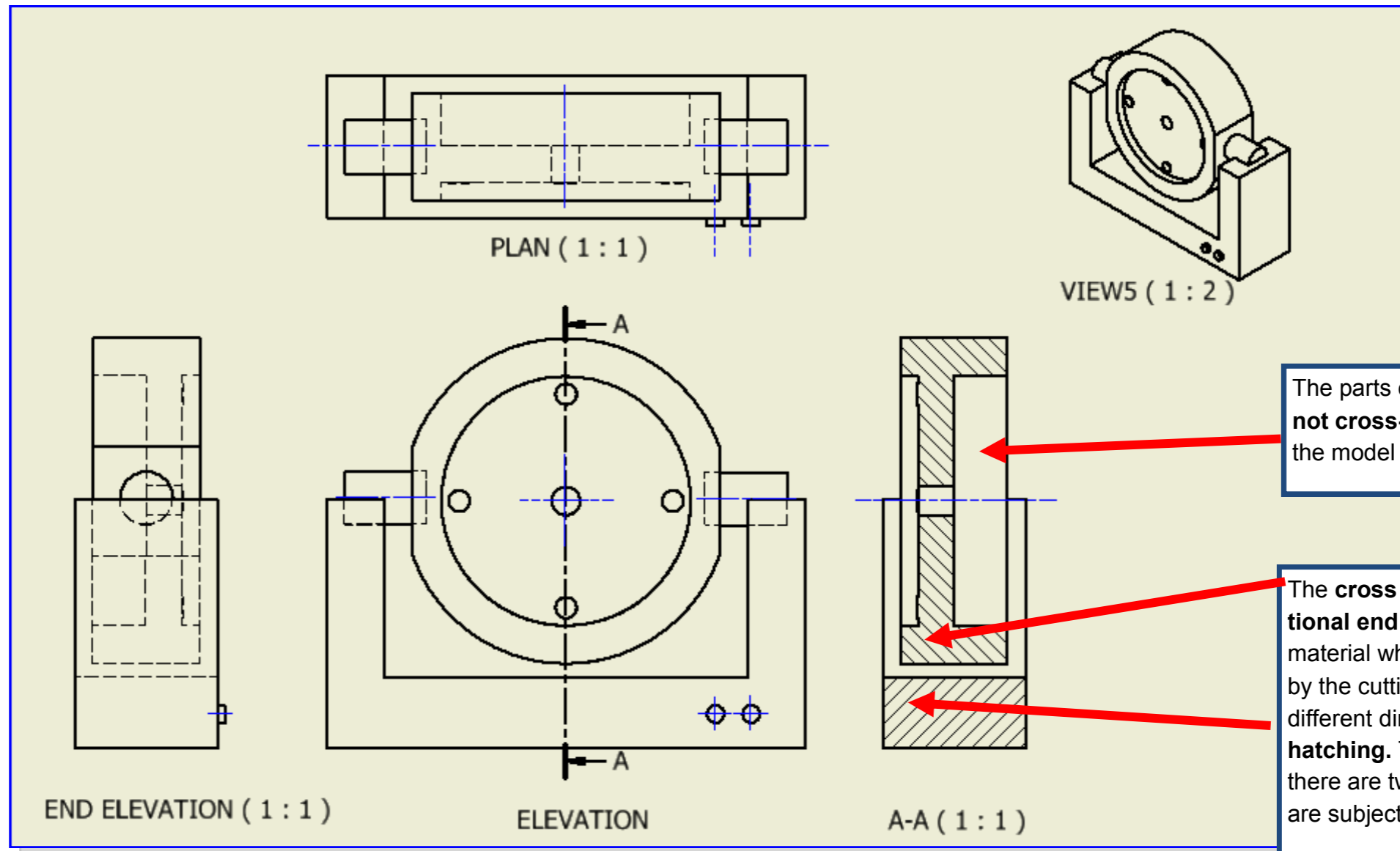
The parts of the view which are **not cross-hatched** are parts of the model which are 'fresh air'.

The **cross hatching** in this **sectional end elevation** shows the material which has been affected by the cutting plane **A-A.** Note the different directions of the **cross-hatching.** This illustrates that there are two different parts which are subject to the section.

Assembly drawings

These drawings represent more than one part which have been joined or connected to each other. They are widely used for many purposes—basically whenever different parts are assembled!

Often, an **exploded view** is provided to make the assembled view easier to understand. An **assembled view** can be thought of as being the opposite to an **exploded view**—and vice versa!
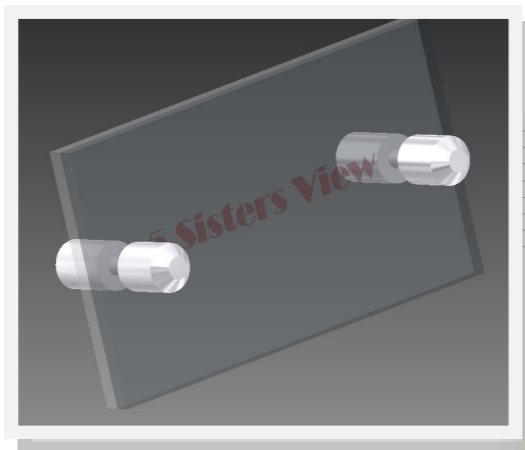
Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Back screen	
2	2	Fixing caps	
3	1	Front screen	
4	2	Spacer	
5	2	Stud	
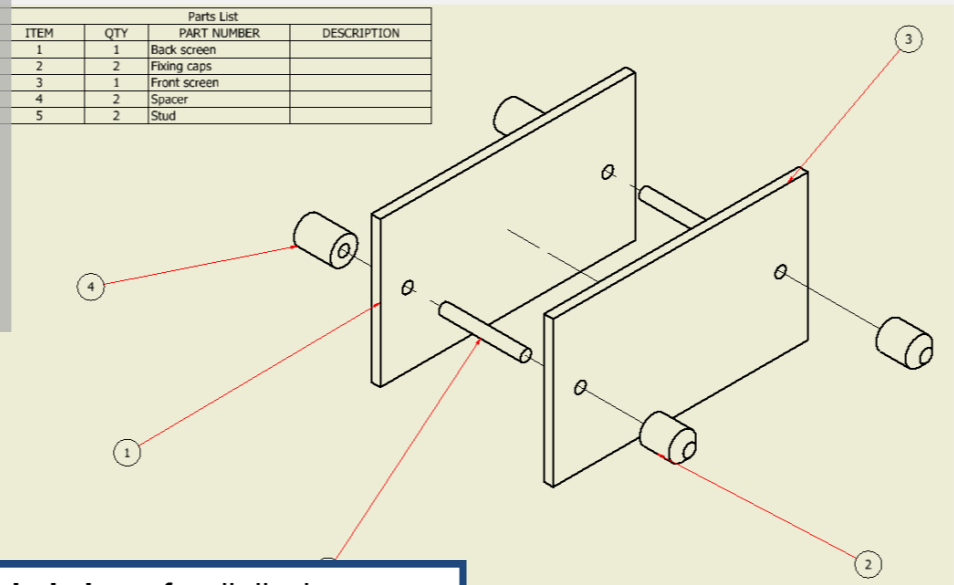
Exploded view of wall display

A-A (1 : 1)

B-B (1 : 1)
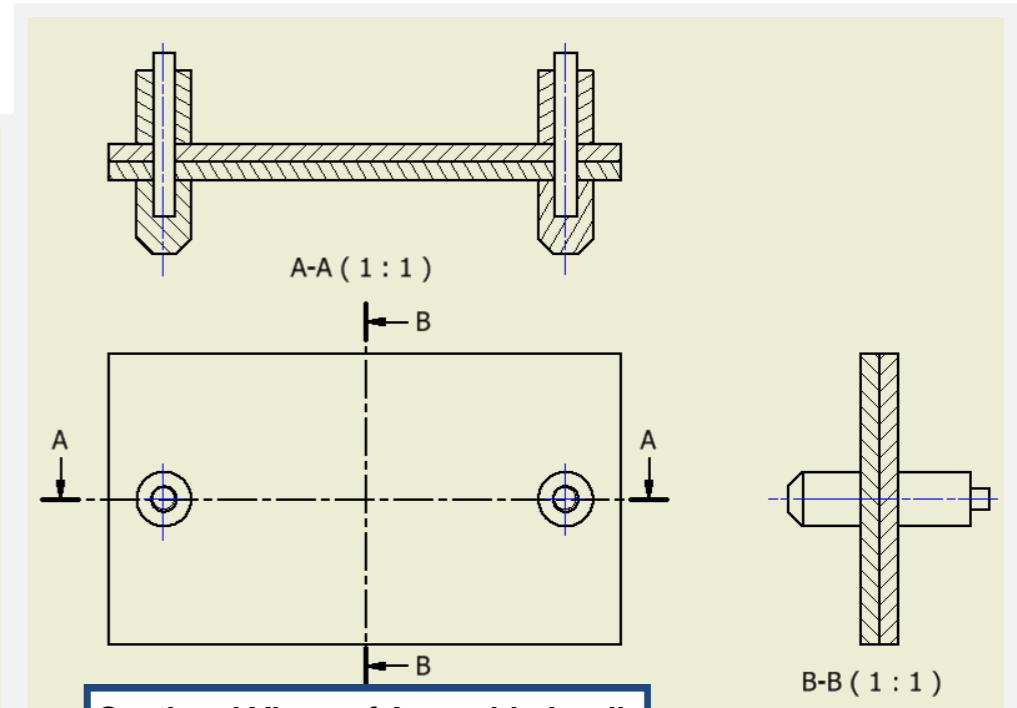
Sectional Views of **Assembled wall display**

Preliminary, Production and Promotional graphics

N5

The 3 Ps

All graphic forms can be classified by the following terms: *Preliminary, Production* and **Promotional** graphics. It is important you are familiar with each term and how they are applied across all features of the graphics industry. You shall have used many within several aspects of your school work to date, including within other subjects.

Preliminary graphics

This is the first category of graphic, and as the name suggests these are used to **plan** how graphic design briefs shall be answered. Their form varies depending on the area of graphics concerned, but always takes the form of **quick, freehand sketches.** Here are three examples from 3D modelling, 2D CAD and DTP:

Benefits of using *preliminary graphics*—thumbnails, rough sketches and illustrations:

- They can be easily and quickly annotated to convey ideas
- They are a good way of recording ideas
- They are quick to produce
- Sketches are excellent ways to communicate ideas to a client.
- They are produced cheaply—no expense is required for materials.

DTP

These **thumbnails** allow the designer to quickly jot down ideas for layouts.

3D Modelling

Preliminary sketches are ideally suited to helping plan out complex 3D modelling operations.

Engineering/ development

The sketches here show **technical features** such as dimensions and how the products fit together.

Preliminary, Production and Promotional graphics

Production Graphics

These graphics—as the name suggests—are used to produce the article in question. They must therefore be accurately **dimensioned** and in proportion.

Benefits of using *production drawings;* dimensioned orthographic views, exploded drawings, surface developments and sectional views

- They are accurate and drawn to scale

- They can be easily dimensioned

- Technical details can be shown using a variety of drawing types

- Commonly required parts can be added to a library to be easily accessed and re-used.

- Because of the international standards applied, they can be understood and used by anyone in the world.

- They can be used in promotional material to illustrate how products are assembled.
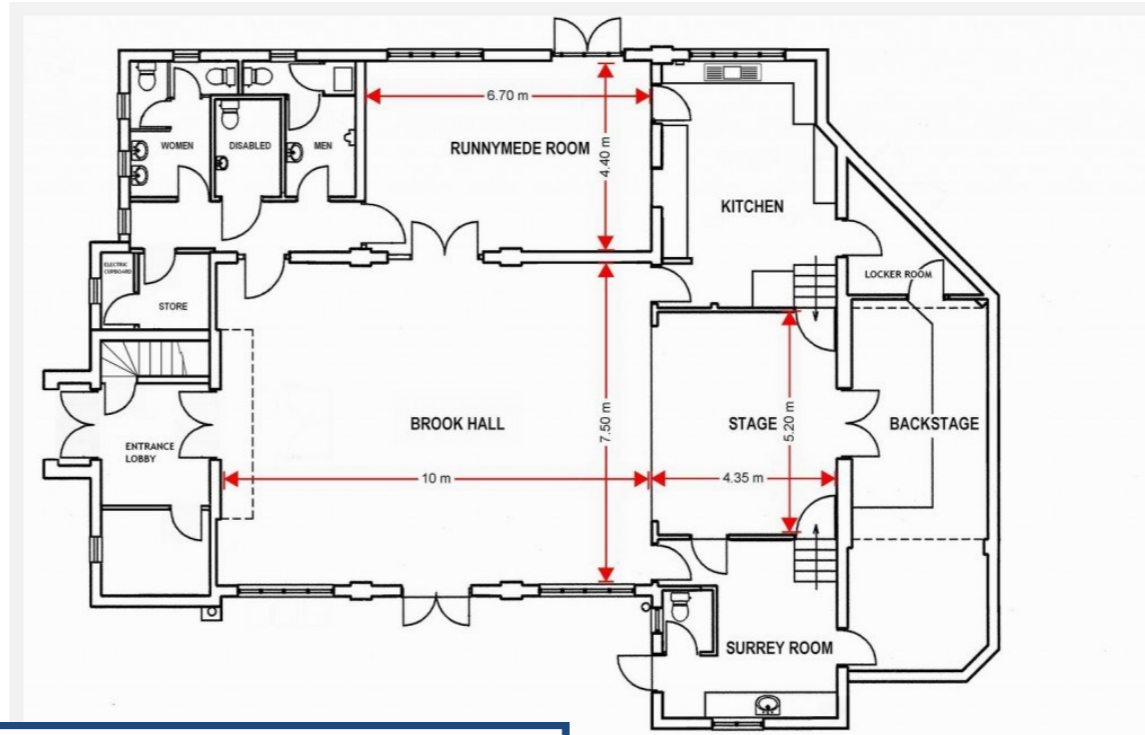
This **floor plan** is a production drawing; it has specific dimensions and various items of detail and information are included.
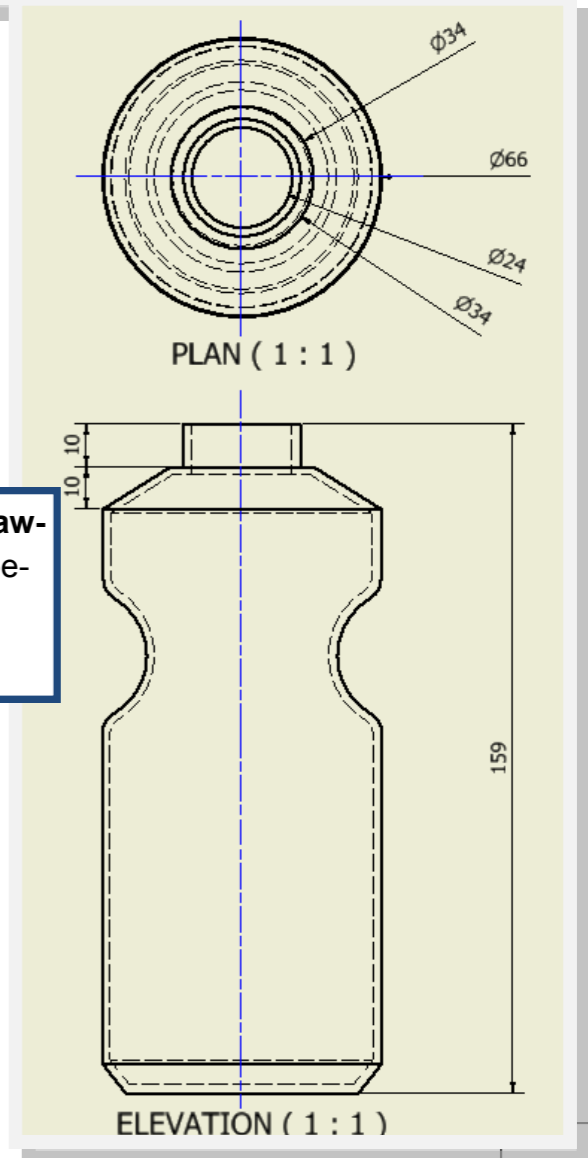
This **dimensioned orthographic drawing** is a production drawing; it has specific dimensions of the bottle which would allow it to be produced.

This **exploded isometric** is a production drawing; the parts list corresponds with the **balloon numbers** on the exploded views. This provides details of the model's assembly.

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	PUSHERHANDLETOP	
2	1	INVTOP	
3	2	HANDLE	
4	2	INVBASEENDS	
5	1	INVPUSHER	
6	1	TOPEND	
7	1	INVMESH	
8	1	RIVET	
9	2	INVHOOK	

Preliminary, Production and Promotional graphics

Promotional graphics

The purpose of these graphics is to make the product attractive to the consumer—in short, **to sell** the product. Various graphic techniques—both manual and computer based—are applied to achieve this.

Construction and property businesses

Benefits of using **promotional graphics**—posters, leaflets, web pages, graphs, animations, billboards, etc.

- They can be easily understood by people with no technical training

- They can show a customer what the finished product would look like

- Images can be enhanced to make them more attractive to the customer

- They can be made to look more realistic than production drawings

- The same product can be styled to appear to a particular market.

Consumer industry

Selling or renting the property is an important part of any building project. This often begins before the building work starts. In fact, it is now common to buy a new house before a brick has been laid – think of all the new build houses in Livingston which are sold before they are finished.

The process of selling a new building is known as **marketing the property.** This requires a special type of graphic known as an illustration.

Illustrations are usually pictorial graphics and they are vital to the marketing plan because:

- They can be drawn in perspective and rendered in colour to make them realistic and attractive to cus-

tomers

- They promote the property on the market

- They are easily understood by the public because they are not technical graphics

- They can be included in sales brochures for customers

- They can represent the property in pleasant, mature surroundings – like trees, plants etc. which are unlikely to be there at the building site when the property is being built.

Manufacturing/ engineering industry
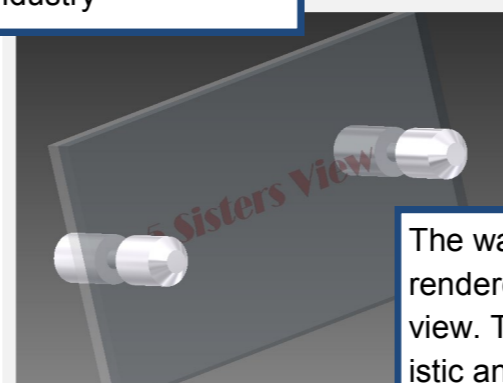
The wall display has been rendered from a pictorial view. This allows a more realistic and easy to understand image of it to be produced for a consumer.

Colour theory

Tone—this term describes lighter or darker versions of the same colour:
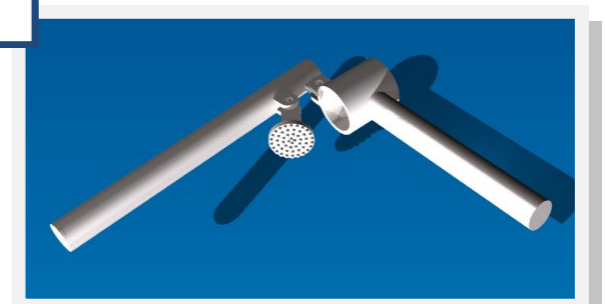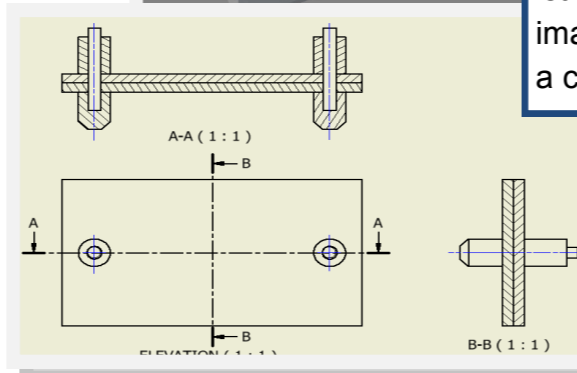
Colour is used extensively within all areas of graphics. Different effects within the same layout can be achieved easily with the appropriate application of colour.

It is important you are familiar with the **colour wheel**, the different effects colours have and how they work together.

Warm Colours such as **reds, yellows and oranges** are also known as **ADVANCING COLOURS** because they appear to be closer to the viewer than other colours. **A room painted in these colours would seem warm, but also feel smaller because warm colours make the walls look closer.**

Tint: a lighter tone is a *tint -*(a colour mixed with white)

Shade: a darker tone is called a *shade -* (a colour mixed with black)

The Colour Wheel

All colours are derived from the **primary colours—yellow, red and blue—** and are a result of mixing two of these together. This in turn produces **secondary colours—green, orange and violet.** When a secondary colour is mixed with a primary colour, a **tertiary colour** is produced.

Harmony

Colours which are close to or next to each other on the colour wheel are said to be in *harmony.* They *harmonise* with each other. They are *harmonious.*

Contrast

Colours which are opposite to each other on the colour wheel are said to be *complimentary.* They are *contrasting colours.*

Red/ orange

primary

tertiary

Red/

tertiary

secondary

secondary

Cool Colours such as blues, greens and violets have exactly the opposite effect. They appear to be further away, and are also known as **RECEDING COLOURS. A room painted in these colours would appear cold, but also feel bigger as these colours make the walls look more distant.**

secondary

secondary

primary

secondary

Yellow/ orange

tertiary

primary

primary

tertiary

Blue/ violet

primary

secondary

primary

Yellow/ green

tertiary

secondary

tertiary

Blue/ green

Colours and Moods

Red: warm, exciting, dangerous, passionate

Orange: warm, happy, sunny

Yellow: warm, happy, cheerful, bright, sparkling

Green: cool, restful, fresh, calm, natural, quiet

Blue: cool, elegant, sophisticated

Purple: rich, pompous, regal

Neutrals: **Greys**—natural, restful, elegant; **Browns** - natural, earthy, safe

**Black and white**: dramatic, elegant, stylish, sophisticated

Line Design Element

The use of **line** can be an important and effective technique to enhance a page. They can be used to **connect** parts of the layout, create **emphasis** on certain items and **separate** parts of the design from others.

HEATWAVE

In top salons now

This layout is quite **disconnected**—the text and the product are unrelated to each other and the different colours of the background appear separate from the hairdryer.

HEATWAVE

In top salons now

The use of the two sets of lines brings repetition to the display, and links the product on the right hand side with the text on the left. The lines also link both coloured parts of the layout together.

HEATWAVE

In top salons now
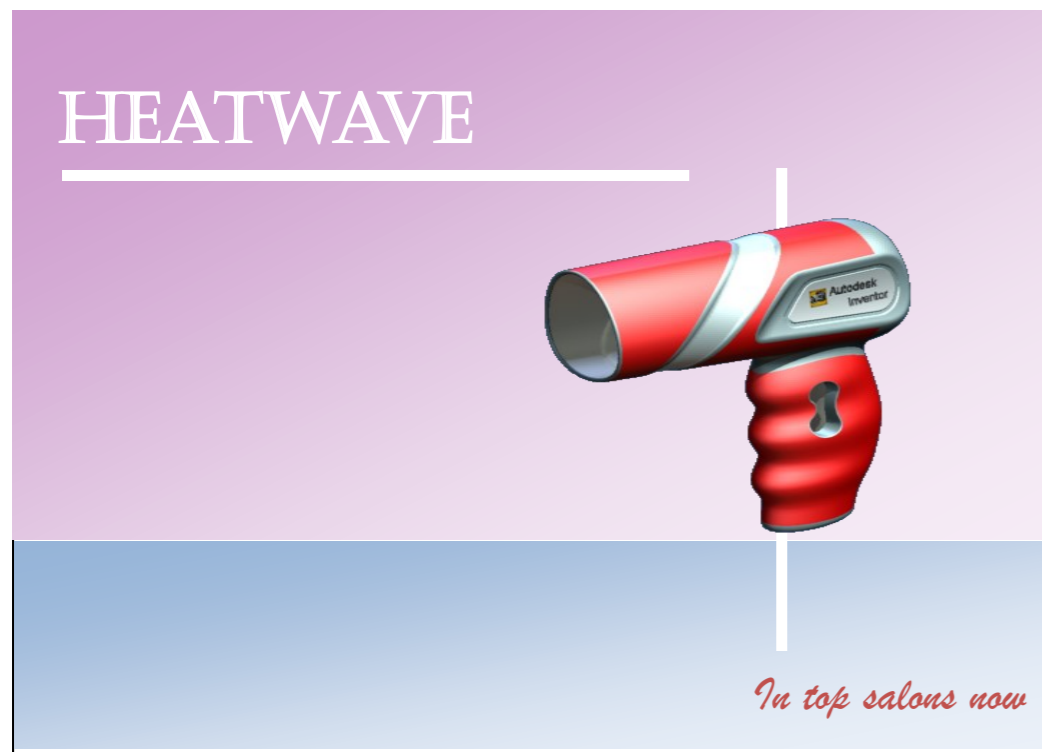
By simply applying two thin lines, the viewer's eye is led along the page from the product name to the slogan at the bottom right. The vertical line passes behind the product, so linking it to the slogan and the light blue element of the layout. This also brings depth to the display.

HEATWAVE

In top salons now

The wavy lines in this layout make it feel less formal and more vibrant than the other two layouts. An impression of movement is created here and again the reader's eye is taken to the slogan at the bottom.

Shape Design Element

As most layouts take the form of squares and rectangles, it is effective to uses different shapes within the design. The use of circles for example, are useful for bringing contrast to a layout and creating visual interest. This is especially true if he product being advertised has straight edges, in this case a mobile phone.

ZombiePhone

The latest model in store Now! Order to ensure you get yours!

This layout is very straight and rectangular in structure. All the graphic items are in boxes, and the shapes of the product are also rectangular.

The red lines further add to this feel, and the display is not very eye-catching or exciting.

It lacks visual impact.

ZombiePhone
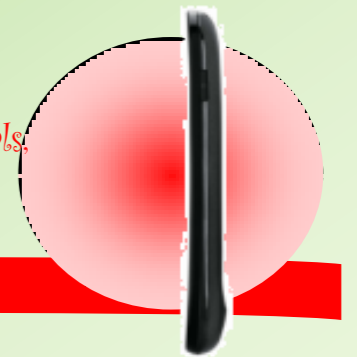
The best hairdryer on the market. Used by professionals and now available to YOU!

This layout has is more vibrant and eye-catching as circles have been applied to it. The circles contrast well with the rectangular outlines of the phones and make them stand out more.

The straight red lines have been replaced with wavy lines and this gives a feeling of movement and contrast to it.

A change of font for the slogan further adds to the contrast in shape—it is less 'straight' than before and harmonises well with the circular shapes now adopted.

Colour Design Element

The use of colour can have a dramatic effect on the impact of graphic layouts. Colour **combinations** should be considered, and not just colours in isolation. Colours working together are what makes a difference. If colour combinations are effectively applied, they can:

- Give visual impact to the layout
- Suggest a mood
- Unify a layout
- Make a product stand out
- Connect the product with a target market

You should be familiar with colour theory, which is covered elsewhere in your notes.

HeatWave!

....Introducing the latest in styling technology: gives you the look you DESERVE

The application of colour combinations does not work effectively here—too many colours are used. The colours are in conflict with each other, and make the layout confusing to read. It is also difficult to read the slogan at the bottom.

White space

White space does not need to be white; it refers to a blank area or empty space on a page.

There are three main reasons for including white space in a layout:

- It calms a layout and makes a busy layout less busy.
- It can make an item in or near the white space stand out more—it gives that item **emphasis.**

It can allow the reader's eyes to rest. This is advantageous if the layout is busy.

HeatWave!

....Introducing the latest in styling technology: gives you the look you DESERVE

This colour scheme predominately uses **tones** of the same colour—blue.

This unifies the display and contrasts well with the red of the product—so creating visual impact.

The red of the product is used in the two items of text—this now becomes the **accent colour**. This unifies the display and also creates brand awareness as it is the same as that of the hairdryer.

HeatWave!

....Introducing the latest in styling technology: gives you the look you DESERVE

This colour scheme only uses the colours of the hairdryer product. This means no 'extra' colours are used and they work well together to create a harmonious feel.

The light grey of the flashbars is effective in giving depth to the layout and makes the product stand out.

It is easier to see the slogan at the bottom now a single colour gradient has been applied to it.

Balance Design Principle

It is quite straightforward to understand and apply the principle of balance in a layout.

Most layouts are based on a rectangular shape. If the advertised product is placed in the centre, there are two areas to fill—each either side of the graphic.

Layout [1] has been balanced **symmetrically**—if you divided it in half vertically, each side would be essentially the same.

1.

HeatWave!

....Introducing the latest in styling technology: gives you the look you DESERVE

STYLE .

In all good salons….

This **symmetrical** layout is quite difficult to follow, and text items are spread over the page. This can make it difficult to read the text and there is little 'flow' to reading the layout.

2.

HeatWave!

STYLE .

....Introducing the latest in styling technology: gives you the look you DESERVE

In all good salons….

This **asymmetrical** layout is more eye-catching. As the text is positioned to the left and the graphic to the right, the layout 'flows' better.

The Rule of Thirds

If a space is divided into 9 equal rectangles, the four lines dividing the space provide **focal points.** If objects are and text are placed here or close to these lines, a more visually effective layout can be produced.

The points where the lines cross are called **impact points,** and these are key areas to place important features.

3.

HeatWave!

STYLE .

....Introducing the latest in styling technology: gives you the look you DESERVE

In all good salons….
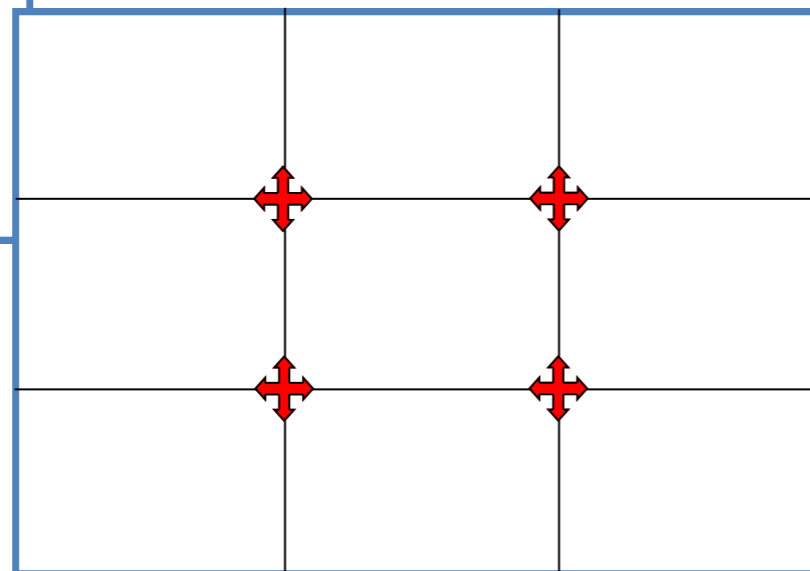
Some small alterations have been made here to further improve the layout. The text is grouped more together than before, the product has been enlarged and a shadow effect has been applied. The 'HeatWave' text has been reduced slightly in size and also moved to the left.

Unity, repetition and harmony   Design Principle

As layouts usually consist of different graphic items and text, it is important to connect these different elements together within the layout so that they appear linked and together.

Unity is achieved here by overlapping the image onto the text. This makes a physical connection between the image and the text.
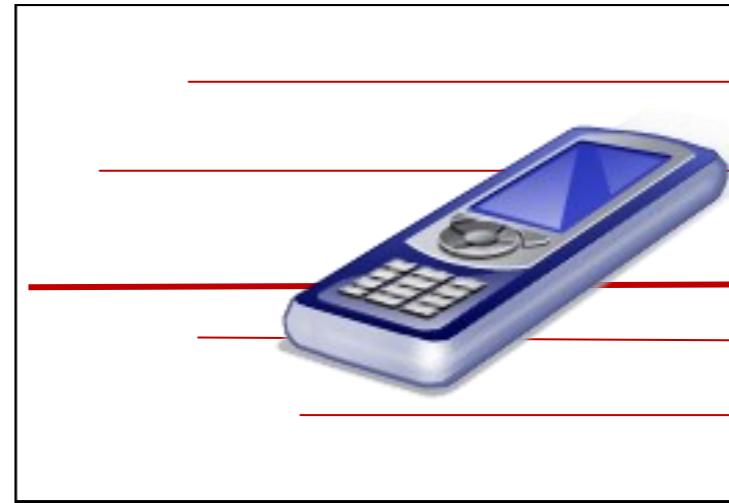
The same effect is achieved here by positioning the image over the lines

The repetition of the thicker blue lines with black outlines creates unity here. The use of a similar colour to the graphic is also a unifying feature.

By overlapping the image onto all three areas of the layout, unity is achieved. Again, a harmonious colour is effective in contributing to this effect and the flashbar connects the text to the image.

The three circles are filled with a similar colour to the graphic. The repetition of these circles creates a unifying effect to the layout.

By wrapping the text around the image, the layout is unified and connected.

Colour, repetition and positioning of graphic are used here to effect to create a unified layout.

Alignment

Design Principle

Alignment is an effective method to improve the structure of a layout. Good alignment makes a page easy to follow and organised and helps make it neat and sharp.

1.

Boost

Fresh

For the winner in you. In all good sports shops, fitness clubs and selected stores now.

www.boost.co.uk

2.

Boost

Fresh

For the winner in you. In all good sports shops, fitness clubs and selected stores now.

www.boost.co.uk

This layout [1] is poorly aligned. The impression given is one of disorganisation, and it appears messy and ill-structured. The image and various items of text are almost scattered around the layout, and it becomes difficult to take in the information.

Once guidelines are added to the display [2], one can see how poorly aligned the graphic items and text are. The guidelines illustrate where alignment can be achieved with edges of items.
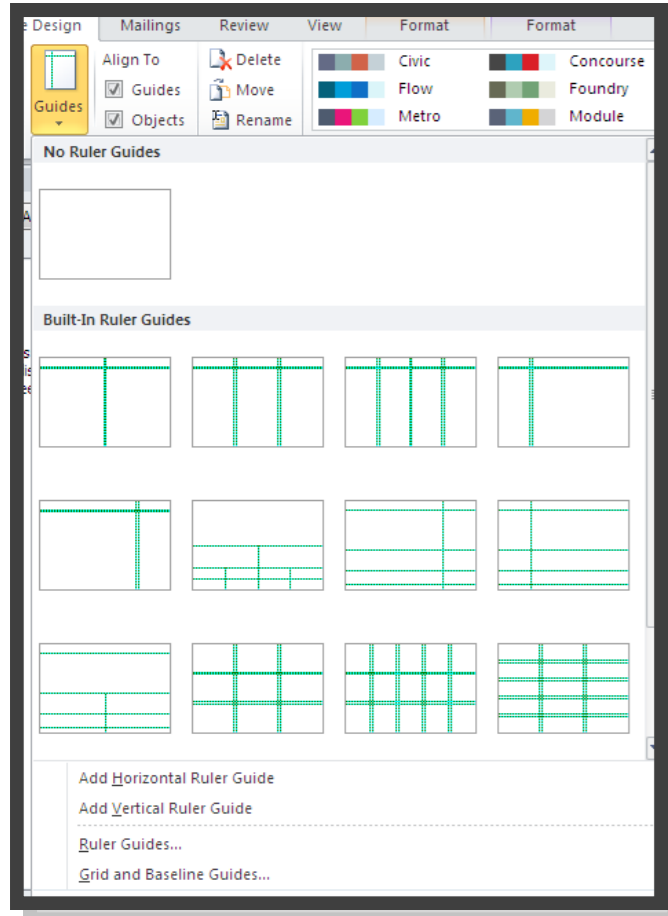
This screenshot from Publisher shows how using a layout guide and the 'Snap' tool can effectively and easily enable alignment to be achieved in the display. Such a guide has been applied to the layout in [3]. One can see how the edge of each item and text is aligned with another.

3.

Boost

Fresh

For the winner in you. In all good sports shops, fitness clubs and selected stores now.

www.boost.co.uk

4.

Boost

Fresh

For the winner in you. In all good sports shops, fitness clubs and selected stores now.

www.boost.co.uk

This layout [4] has the guidelines removed and demonstrates how effective good alignment is to a display. Compare it with the original layout [1] and note how it is more structured and organised.

Depth Design Principle

As layouts are produced in a 2D format—usually a page—it is important to create an illusion of **Depth.** This illusion stimulates the layout and makes it more eye-catching. There are several methods to achieve an impression of depth.
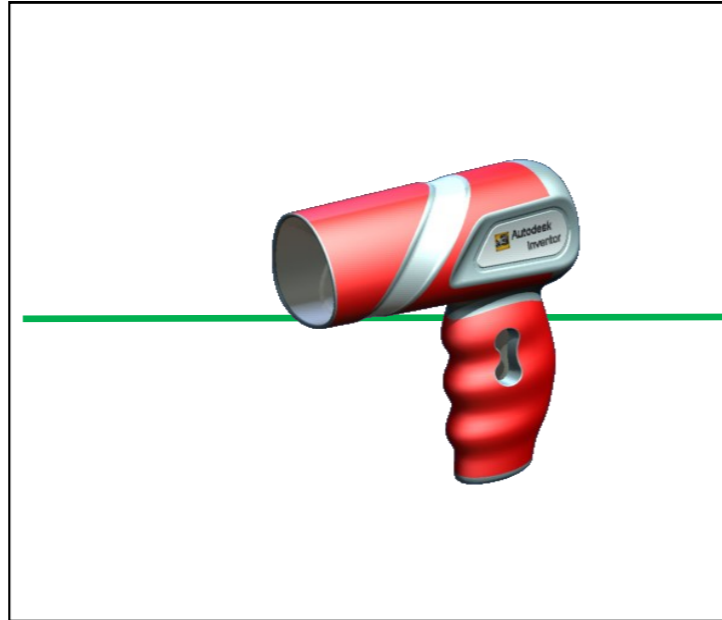
If a **pictorial** view of the product is chosen, it appears to have more depth than a simple 2D view. Another simple method of creating depth in this layout is the application of a single thin line behind the hairdryer, making it look as if it is closer than the line.
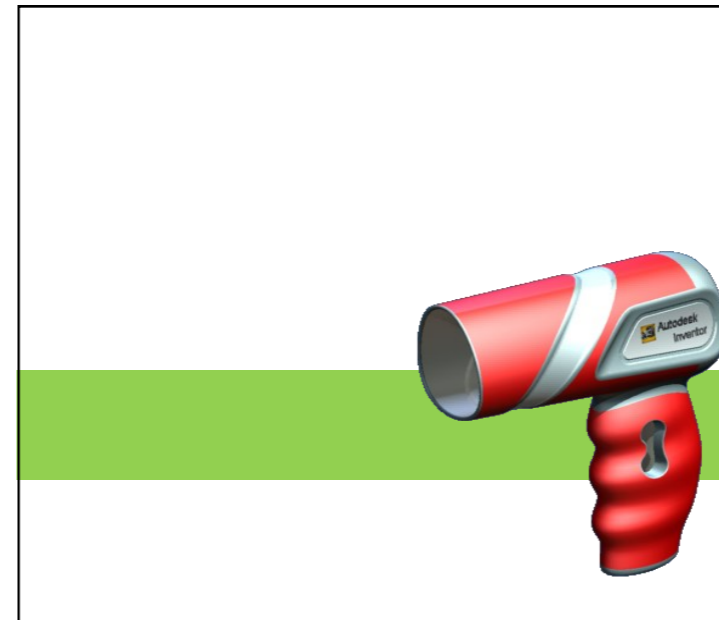
The same effect is achieved here by placing the product onto a coloured shape. As green is a **receding** colour, the effect is to push the hairdryer into the forefront of the layout—which makes it eye-catching.

Using the **Drop Shadow** tool in this instance creates depth in the layout by making it appear that the product is standing out from a background.

By applying an image as a background, depth is brought to this display. It is important to consider the style of the background to successfully achieve this, and in this one a blue washed out colour doesn't take away the emphasis on the hairdryer.
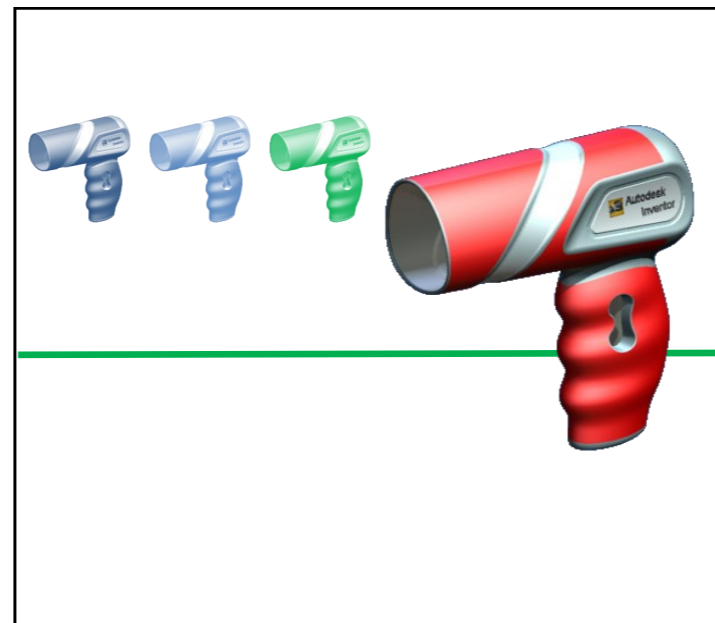
By placing the hairdryer in the forefront of the layout with smaller images of the same product next to it, an impression of depth is created.

By placing the product in front of the text, an impression of depth is created and the hairdryer is brought to the forefront of the layout.

HeatWave!

DESIGN + TECHNOLOGY

Emphasis and dominance   Design Principle

As graphic layouts are often looked at hurriedly by a reader, it is important to attract their attention quickly. If a page has no focal point or is generally bland, the reader shall ignore it and move on.

As a layout may contain several items of text and graphics, a strong **focal point** must be provided to centre the display around. This is normally the graphic or photograph on the page.

Dominance is when one item of the layout stands out more than the others.

Emphasis occurs when one item is made more eye-caching.

These are the three rules of order to dominance in a layout:

1. The main graphic or image should dominate the layout.
2. The title, heading or product should be next.
3. Less important items should be grouped and positioned effectively to support this order.

This layout has no item achieving overall dominance; as it is advertising the 'Boost' drink then the bottle should be the main item the viewer notices.

In this case, the bottle is 'swamped' by the other features in the display—the slogan and the athlete are perhaps the most noticeable features. The font size of the 'Boost' is almost the same as that of the slogan.

BOOST

For the winner in you

Some simple changes have been applied here to make the product become the dominant feature and emphasise the product name:

- The bottle has been enlarged and put off—centre. This immediately attracts the reader's attention.

- The athlete has been reduced in size, and relocated to the top left corner. She still contributes to the layout, but does not take over.

- The crowd silhouette has been faded slightly and put more behind the bottle—this is acting as a flashbar so giving the layout more depth and pushing the product forward.

- 'Boost' has been underlined to emphasis the product name more effectively

- The line at the bottom gives further dominance to the bottle and leads the eye to the slogan—which has been reduced in size.

- A gradient fill has been applied to the background. This has the effect of making the items in the layout stand out more and not be overcome by the starkness of the original solid

BOOST

Boost

Contrast
Design Principle

The purpose of a designed page is to grab the reader's attention—this is especially true in promotional graphics where the layout is competing against other adverts and products.

An effective way to achieve this is through the use of **contrast**— especially by comparing opposites.

Opposites can be between colours, horizontal and vertical lines and between shapes—such as circles and squares.

PhonesYouNeed

The widest selection of phones on the high street. Now in stock: The new Zombie phone!
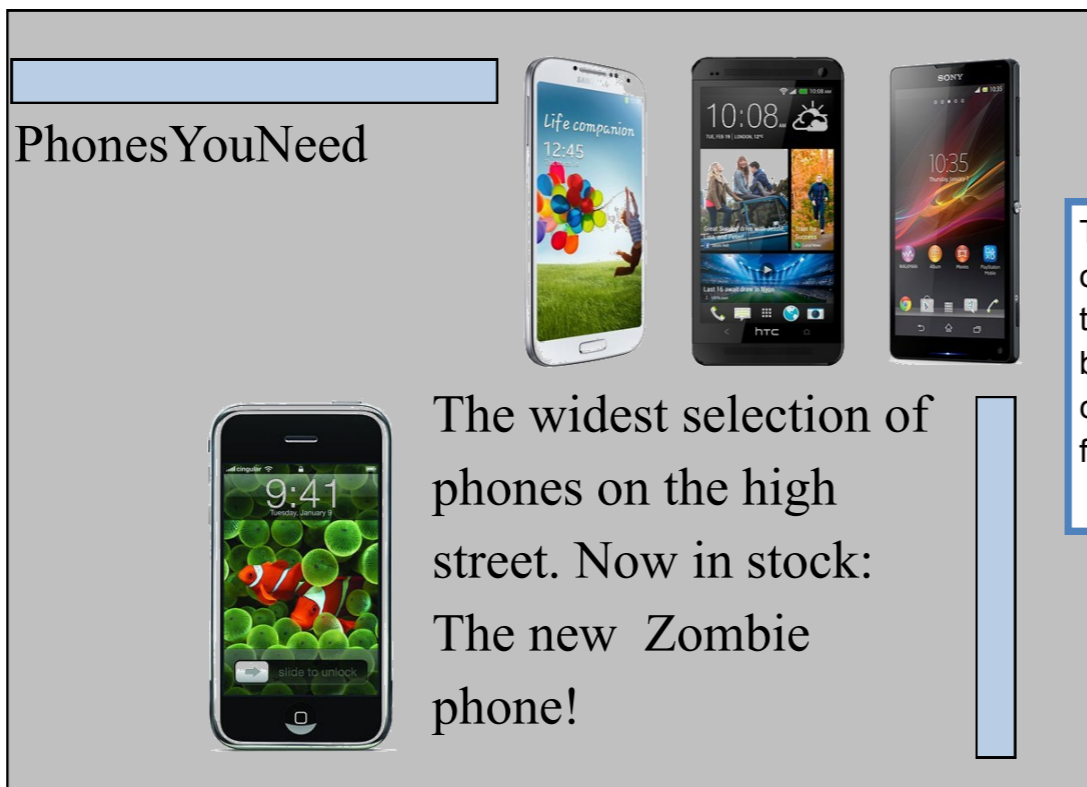
This promotional layout provides no occasions of contrast. The black text is almost lost against the grey background. The page is aligned well, but the straight shapes of the phones and the coloured shapes give the page a very grid-like feel and nothing in particular stands out.

This layout is different however. The display has a much more vibrant feel to it; the red wavy lines contrast strongly with the rectangular shapes of the phones, and by increasing the size of he main image and tilting it the phone grabs the reader's attention. By applying a gradient fill to the flashbar the red text of the company's name stands out more. The use of a circular background for the product information contrasts with the straight lines of he product and flashbar and grabs the reader's attention.

PhonesYouNeed

The widest selection of phones on the high street.

Now in stock:

The new Zombie phone!

DESIGN + TECHNOLOGY

Desktop Publishing (DTP)

Benefits of modern printing methods to society

Desktop Publishing (DTP) enables the production of magazines, newspapers, books, promotional literature etc. to be created on a desktop computer or laptop. The **publishing industry** creates these documents and the physical paper documents are produced by the **printing industry.** The design is the result of the work of the **graphic designer**.

Benefits of DTP to the Graphic Designer

Graphic designers nowadays operate on a very flexible basis— work can be produced anywhere and any time using modern technology and sent to the office via the internet.

Modern DTP packages allow exciting and imaginative displays to be very quickly and easily created. The main benefits DTP software brings to the graphic designer are:

- It is simple to make modifications to images such as colour, shape and formatting.

- Further modifications to the design can easily be implemented on behalf of the editor or client.

- The grid structure templates within DTP software enables designs to be created accurately and quickly.

- Design proposals can be sent to the editor or client electronically to save time. Their responses can be returned this way.

- The graphic designer can work from home. This saves travel costs and environmental impact of their journey.

Benefits of DTP to the graphics industries

As there is great competition among newspapers and magazines in the market and the circulation of most printed newspapers is declining, DTP provides many advantages to the industry:

- Proposals and final editions with full designs and images can be sent quickly electronically. These can then be forwarded onto the printer in this way.

- News reports can be sent from anywhere in the world email.

- The time it takes to design and publish a document is greatly reduced. Modifications can easily be made by the editor and sent to printer.

- Common features within a publication can be quickly produced via templates such as footers, running headers etc.

The advent of modern methods has had a major impact on the printing industry. Traditional methods were very labour intensive and large numbers of people were employed in various roles such as print-setters, labourers and engineers. The amount of semi-skilled workers has been reduced, although there is now great demand for highly skilled operators as more reliance is placed on computer controlled design and production. The new technology has also had an effect on the industry's environmental impact:

- Modern printing methods are more energy efficient than previous means.

- Many publications provide an electronic or online edition. This reduces the amount of paper and ink required

- Most publications use paper which can be 100% recycled as a result of modern printing technology.

- Modern inks are more environmentally friendly and less quantity is required. Inks are now based on vegetable oil rather than on petro-chemicals.

- The quantity of paper and inks required is digitally controlled. This reduces waste.
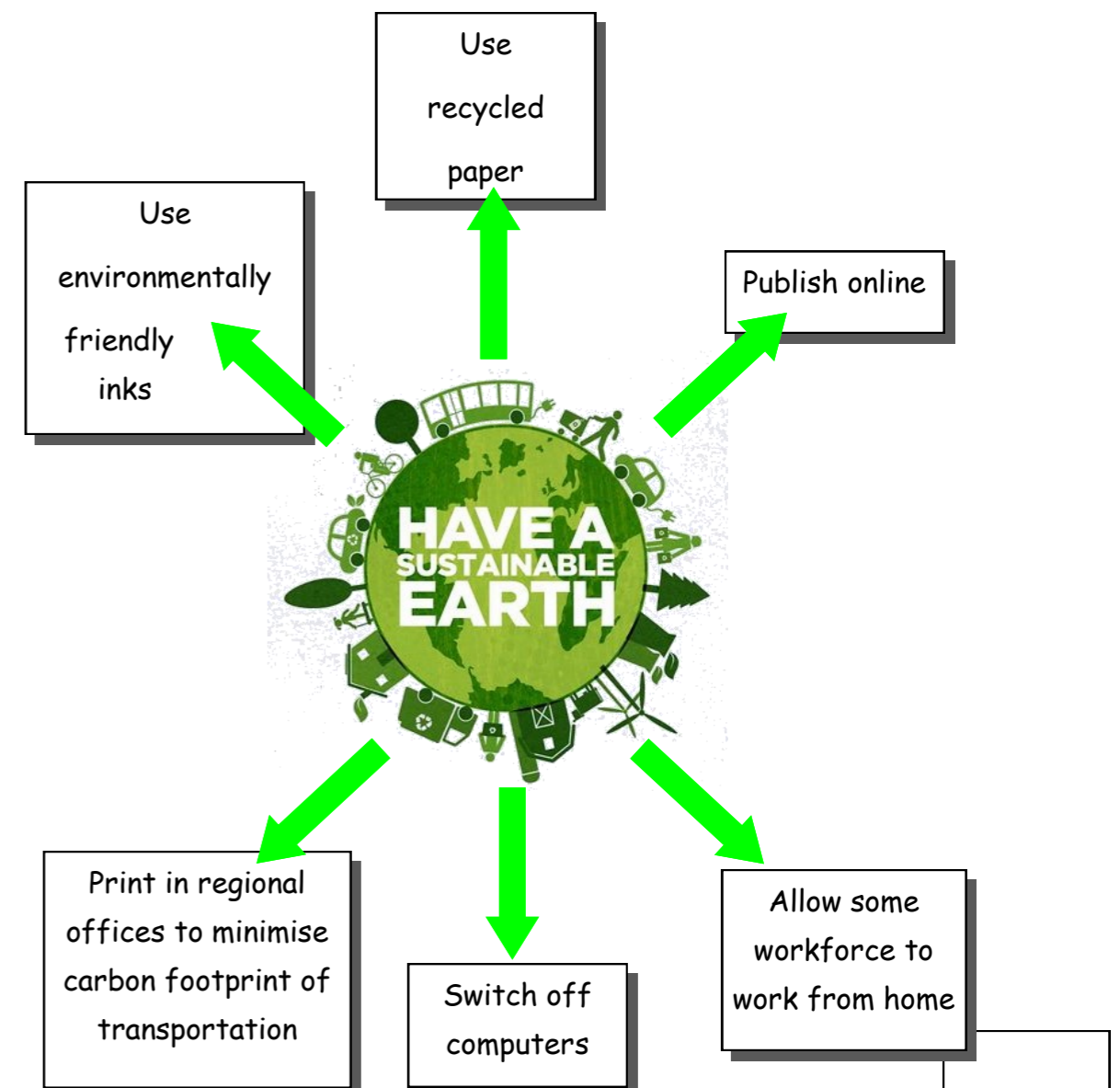
DTP (2)
DTP techniques

DO IT YOURSELF

N5

Bleed

This main image bleeds off the printing area and through the margin. This creates an informal feel to the page.

Colour fill

Contrast and harmony can be achieved by formatting the text box appropriately. These two text boxes use a blue/ grey fill which harmonises with the main picture, but contrasts with reds used in the headers.

Column rule

This column rule gives this page a more formal look, and separates these two sections.

Reverse

The body text colour is black. The text of the subheading has been reversed, and the box filled with a darker colour. This creates contrast and gives the page interest.

Header

This is called a **running header**, and appears on every section of the magazine.

Headline

The headline introduces the article. In this case, the bold fonts create emphasis, and the reverse text on the blue/ grey fill gives it visual impact.

Drop capital

This larger first letter signifies the start of the article. The use of reverse also attracts interest.

Margin

Margin—the space at the side and bottom of the page where there is no text or graphic.

Heading

This introduces a separate section of the article.

Tilt

This image is tilted, which catches the reader's attention. It creates a modern feel, which will appeal to the youthful target market.

Caption

Gives information about the image.

Sub-headings

These break up the large section of body text. The use of the accent colour produces a visual rhythm.

SPECIAL FEATURE

SPECIAL FEATURE

Excitement...what it is all about

Declaring war on the 'dull' music scene….

KASABIAN

Kasabian burst on to the British music scene in 2004 with the release of their eponymous debut album. Disgusted with the clean living 'non' antics of the current groups of the time—Coldplay, Keane, etc.—they vowed to bring back some of the excitement and glamour that had been sorely missing. They have since gone from strength to strength, becoming the major attraction at festivals over the years.As guitarist Serge says: "Oasis have gone. We are the biggest band inBritain now. Kasabian are to headline the Isle of Wight and Rockness festivals.

The song "Vlad the Impaler" was released as a free download for a period of 4 days, as a preview for the album. The promo video for "Vlad the Impaler" stars Noel Fielding of *The Mighty Boosh*.The album's first official single was the track "Fire", which was released on 1 June 2009, and the song "Where Did All the Love Go?" was released as the second official single. The third single "Underdog" was used in the movie *Takers* (2010).

On 14 June 2009, *West Ryder Pauper Lunatic Asylum* reached number one in the UK top 40 charts, spending two weeks there. *West Ryder Pauper Lunatic Asylum* was shortlisted for the 2009 Mercury Prize, and was named 'Best Album' at the 2009 Q Awards. The band won "Best Group" at the 2010 Brit Awards. At the 2010 Q Awards the band won the "Best Act In The World Today".

The song "Fire" was used as the Barclays Premier League theme song for

Lead singer Tom explains the Kasabian philosophy

Where do you prefer to perform?

Scotland—the crowds are always up for it and go mental.

Lead singer Tom

Why do you hate some other bands' boring attitudes?

All rock bands have a responsibility to live the life of a rock star—who wants to hear about Chris Martin's vegan diet or the Fratellis going to bed early? People want an escape from the grinding routine of life, and we'll give th

Favourite festival?

T in ... ark.

KASABIAN

Page number (folio)

Column

Columns are used to restrict the length of the lines of text, making them easier to read. They also produce a visual structure to the page.

Gutter

This separates columns, and helps to de-clutter the page.

Text wrap

As it suggests, the text wraps around the image.

Cropped image

This is an image with the background removed. It creates a more interesting shape.

DESIGN + TECHNOLOGY

DTP (3)

Text/Typeface/Font

There are different ways of organizing text which are used globally. This is referred to **justification** or **alignment.**

Aligned Left

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Aligned Right

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Justified

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Centered

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

Copy/cut/paste

When you take an image/piece of text etc. and copy it from one place to another. Cut is when you delete something from its original location and paste it somewhere else.

Shortcuts: Ctrl C / Ctrl X / Ctrl C

Text Box

A text box is what you would insert into a page in order to in out text into your document. It should look something like the image shown

Handles

Handles are the parts which appear when you select an image. By moving these you can manipulate the image in many ways i.e. changing the size or rotating an image.

Colour Fill

This is when you take a shape with an outline and fill it in with a colour this is shown in the images below.

Before col-

After colour

Guidelines

Guidelines are guides which you access via your rulers on you page. They act as a guideline for aligning images/text etc.

You can select **Snap to Guidelines** which will allow your image to automatically jump to meet with guidelines you have positioned on the page

Draw Text Box

DTP (4)
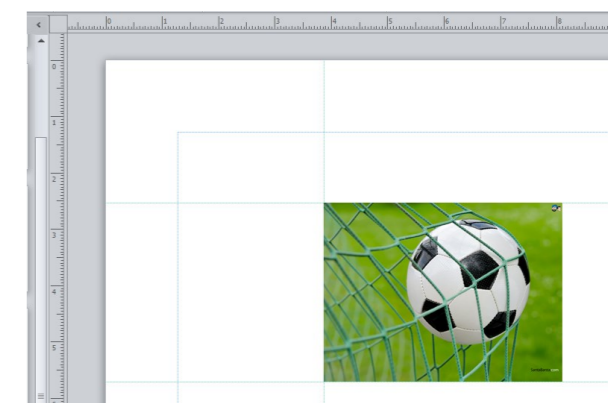
Cropping

Cropping is a tool which allows you to delete unwanted parts of an image. You can crop an image by pulling in the sides or by cropping around the outline of the shape as shown in the second cropped image

Cropped Image

Cropped Image

Original image

Rotate

Rotate is when an image is rotated like the beach ball shown in the second image. You can rotate an image/text to any specific angle you wish

Original image

Rotated image

Transparency

When you make an image/text/ block of colour etc. 'see-through' so that you can see anything positioned behind

Desktop Publishing techniques
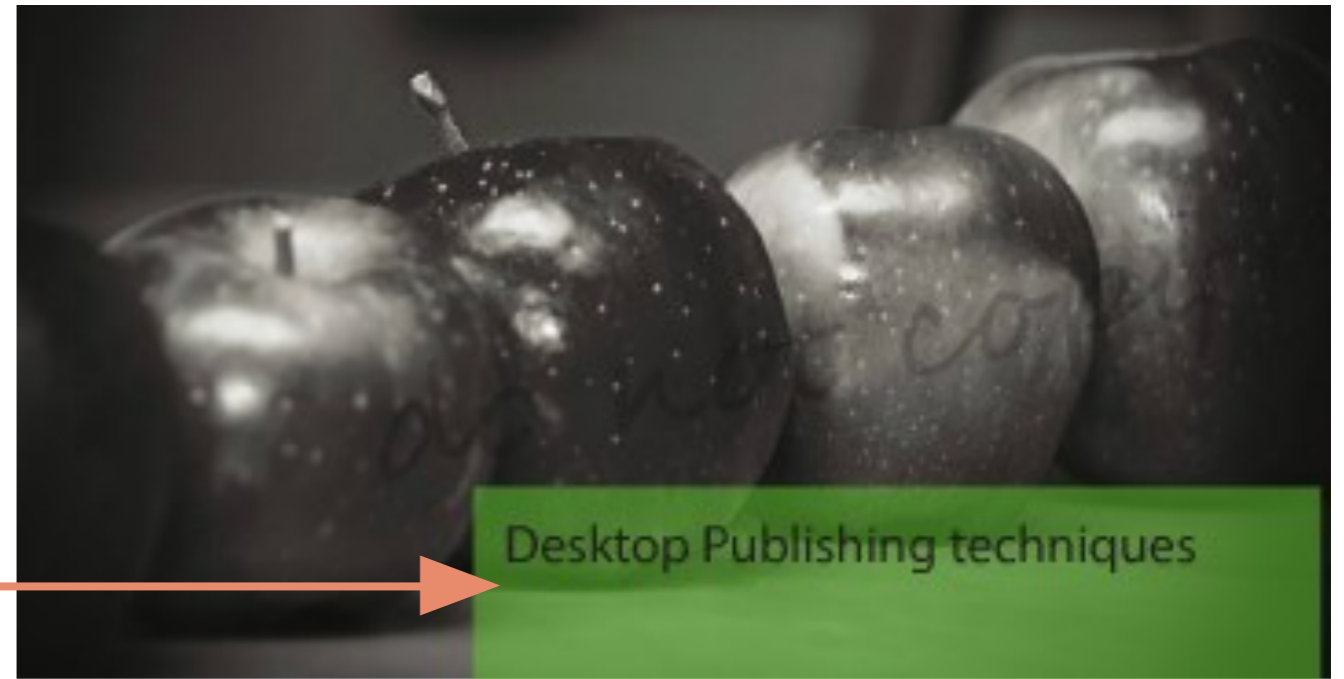
Desktop Publishing

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Text Wrap

When you alter text to wrap around an image or shape

Text Wrap

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Drop Shadow

When you make an image/text/ block of colour etc. 'see-through' so that you can see anything positioned behind

Drop Shaddow

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea

Computers in the Graphics industries
2D CAD, 3D CAD and DTP

The development of computers in recent years has dramatically changed the ways in which graphics are produced – for example **Desktop Publishing (DTP)** has transformed the way in which books and magazines are produced and published. **Computer Aided Draughting/ Design (CAD)** has greatly increased the power of the engineer, architect and graphic designer in developing and producing a range of work associated with their disciplines.

While there are many areas covered within this series of notes, you should remember the main advantages and disadvantages using computers within graphics brings to the user. *More specific advantages and disadvantages are discussed in each area, however.*

These **core points** are generally the same across all areas, and it is very likely you shall be asked them in your final exam:

General advantages of using computer-based graphics:

- Items of work can be easily edited and modified.
- Work can be sent quickly anywhere in the world via the internet.
- Work can be easily and quickly stored.
- Money can be saved on labour and production costs.

General disadvantages of using computer-based graphics

- Computers can fall victim to viruses or system failure.
- It can be easier to steal electronic files than hard copies.
- The initial cost of buying, installing and training staff to use the software can be high.

Because Graphic Communication is essentially a **practical subject**—as a student you are usually **doing** something—the best way to learn is in this manner. You have had experience in using most of the features in this section.

The parts of the course within these notes in which you can learn by doing are labelled with this icon:

This is the best way to learn, and there is more chance of you understanding and remembering the material for your final exam.

However, there are some areas in which this is impossible in a school—usually due to financial constraints and similar reasons. For example, quality 3D printers are very expensive (£40000 and upwards) and obviously out of the reach of a school budget.

YouTube videos are a very effective way of seeing a process, technology or equipment in action, and give a more realistic account than written descriptions ever can. If you go to YouTube and type the search term you can see a wide and comprehensive range of these technologies in action. Within these notes such items are labelled with this icon:

If you are interested in reading further articles about some sections, a search of Wikipedia is also useful. These parts have been labelled with this icon:

The role of the computer in graphics

Information is **INPUT** into the computer via various forms of **HARDWARE,** the computer **PROCESSES** this information using **SOFTWARE** and the results are **OUTPUT** using **HARDWARE.**

Hardware and software

Computers use a combination of **hardware** and **software** to perform tasks. Hardware is the name given to the physical parts of the system such as keyboard, monitor and printer. Software is the name given to programs which interact with the hardware, enabling the computer to perform its tasks.

Input to the system → Processing by the system → Output from the system

Processing by the system ⇄ Storage within the system

Hardware

Input

- Mouse
- Keyboard
- Trackerball

Inputting Hard Copies

- Graphics Tablet
- Digital stills
- Flatbed scanner

Computer

Output

Electronic/

- Monitor
- Digital projector

Physical

- 3D Printer
- Laser cutter

Hard Copies

A **HARD COPY** is a **paper copy** of the information

- Laser Printer
- Drum plotter
- Flatbed plotter
- Inkjet printer
- Large format printer

Software

Software—the programs which allow the computer to do what you want it to—cover a huge range of functions. Most are dedicated to a particular role, but some programs have more than one feature—for example Inventor has a computer illustration feature: **Inventor** Studio. A comprehensive list is given on this page:
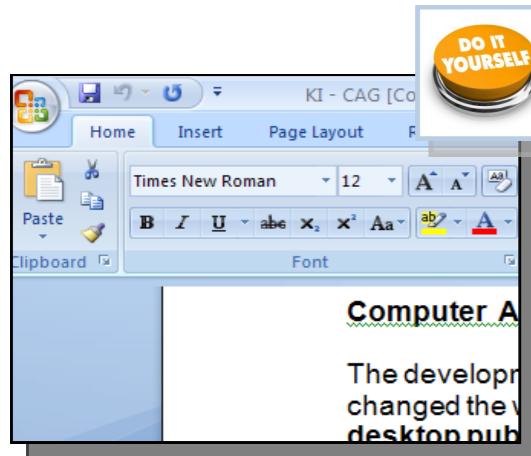
Word processing package e.g. Microsoft Word. This would be used to produce letters which only contain text.
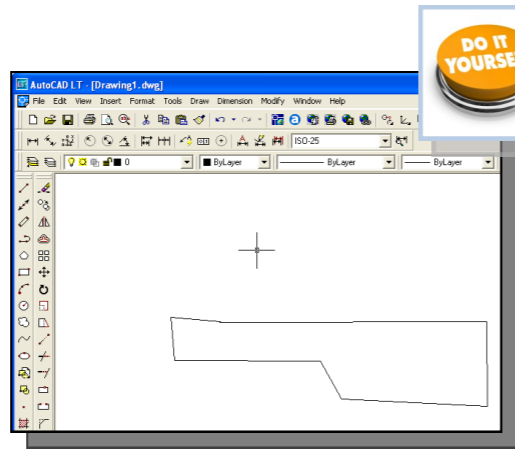
Computer Aided Drawing (CAD) package e.g. Auto-Cad. This would be used to produce detailed technical drawings of some component.
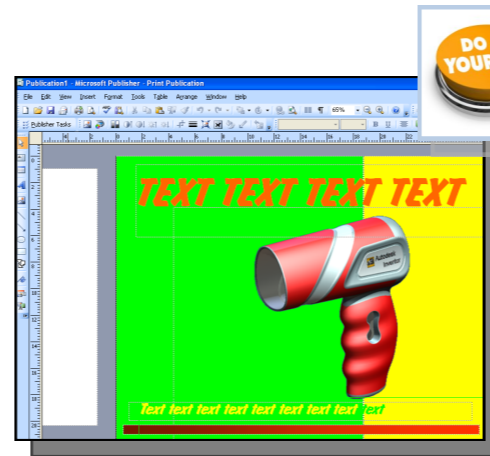
Desk Top Publishing (DTP) package e.g. Microsoft Publisher. This is used to produce a mixture of text and graphics, for example a magazine.
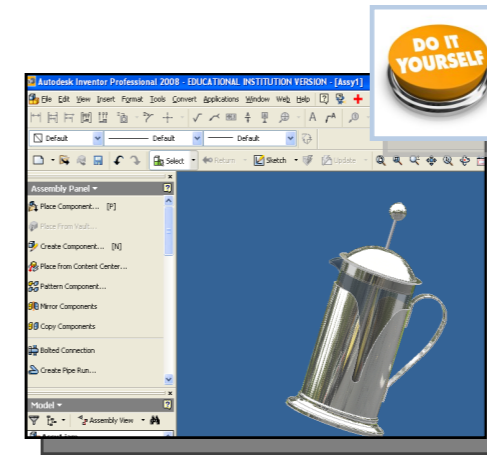
3D Modelling package e.g. Inventor. This is used to produce realistic 3D models of components, allowing changes to be made easily.

Illustration and Presentation package e.g. Inventor Studio. This would be used to colour and render an object or environment.

Website building software

These allow the rapid creation of websites, and packages range in sophistication.

Video editing software

This software enables the user to professionally edit pre-recorded videos.

Vector drawing

High quality vector drawings can be quickly produced. There are many free programs available.
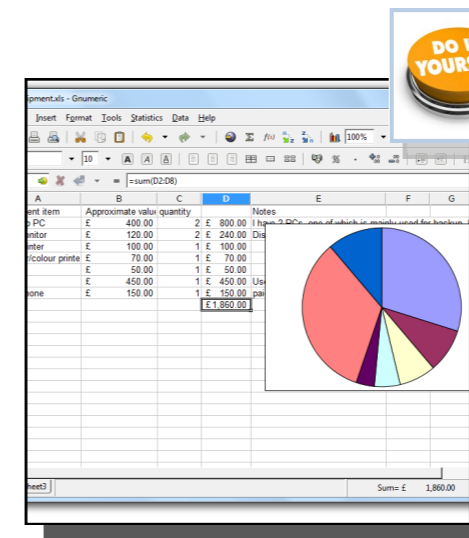
Spread sheets

Spread sheet programs usually have a feature which lets the user represent the data graphically.

Photo editing software

These packages allows the manipulation of previously taken images.

2D CAD

2D CAD can basically be considered as being a computer version of a manual drawing board and is used extensively in the architectural, engineering and construction industries. It also forms the basis for producing 3D models. By applying on-screen commands the user can quickly, easily and accurately produce high-quality 2D drawings of the required format.

2D CAD packages bring several advantages to the process. In addition to increased **SPEED** and **ACCURACY** of production, the drawings can be easily **EDITED, STORED** and **TRANSFERRED** immediately around the world via the internet. 2D CAD also provides the user with several features which are unique to this medium:

Grid

By applying a grid template to the drawing, the user can 'Snap to grid' - this means that each point and line on the drawing is joined to a pre-determined format. The size and style of the grid can be set before drawing and this allows greater accuracy and speed of production. It can be compared with the drawing instruments used with the manual drawing board such as the rule, set squares and T-squares.

Isometric
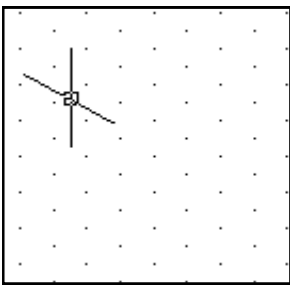
Displays a 30' grid on screen which makes isometric drawing easier and more accurate.

Ortho grid
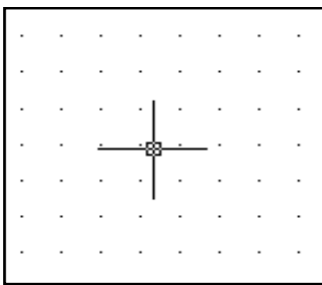
Displays a grid on the screen to any desired spacing. This makes orthographic drawing easier and more accurate.
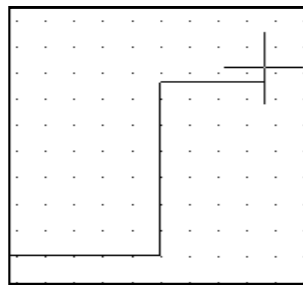
Ortho

Restricts the movement of the cursor to horizontal and vertical movement only. This makes orthographic projection

Library of parts

This allows the user to insert previously drawn and saved parts into a new drawing. The advantage of this feature is that each part is **UNIFORM** (BSI symbols, etc.) and does not have to be redrawn each time it is required. The library feature allows newly drawn parts to be saved for future use and multiple users can add to and access the library.
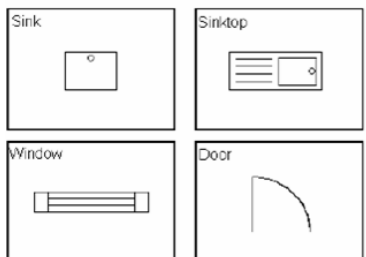
Some disadvantages with CAD...

Using CAD as a software package involves some of the risks associated with any computer systems, such as:

- The initial cost of a computer system is high, as is the cost of retraining staff that are used to producing drawings by traditional methods.

- It takes time to convert existing paper drawings over to an electronic format, although **scanners** can help with this.

- Loss of material can occur due to computer viruses and power failures.

- Possible theft of materials is more common with a CAD system.

Layers

A CAD drawing is made up of individual 'layers', with each layer providing a different line type or 'element' of the drawing. This allows that layer to be isolated and edited/applied to the drawing. For example, within a large floor plan the electrical, plumbing or heating systems can be displayed individually so allowing that information to be easily available to the individual required without the drawing becoming 'cluttered' with excess detail.

All the layers in the CAD drawing have now been turned off, apart the centre lines. This can be done with any layer in the drawing.

2D CAD (2)

The main CAD comands

These CAD commands are taken from 2D Auto-CAD, but all can be used within the **sketching** mode of 3D Modelling packages, including Inventor. They are all designed to make the drawing of material as easy and efficient as possible for the user.

Trim, extend and break

trim — Trims the end off a line

extend — Makes a line longer

break — Removes a section from the middle of a line

Fillet and chamfer
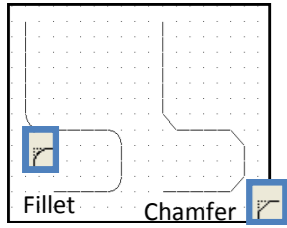
Fillet   Chamfer

Rounds (fillets) corners;

Angles (chamfers) corners

Rectangle/box
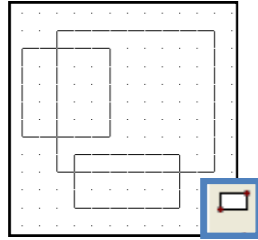
Draws squares and rectangles accurately and quickly

Circle and arc
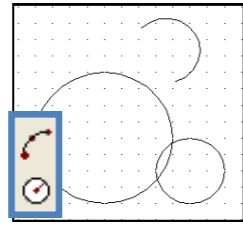
Draws circles and arcs accurately and quickly

Ellipse
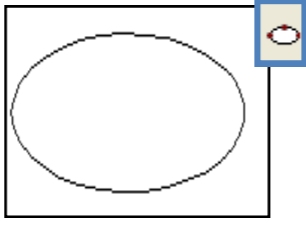
Draws circles and arcs accurately and quickly

Dimension

100
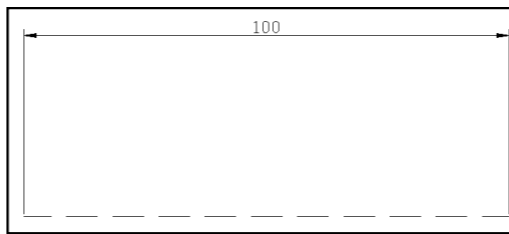
Automatically measures then dimensions chosen parts of a drawing.

Ring Array
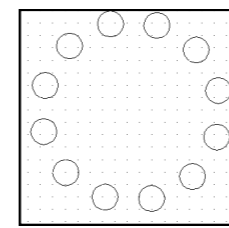
Creates a circular arrangement from copied objects.

Box Array
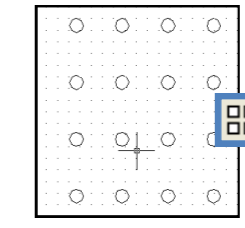
Creates a rectangular arrangement from copied objects.

Text

TEXT

Allows text to be entered in a variety of fonts and sizes

Mirror
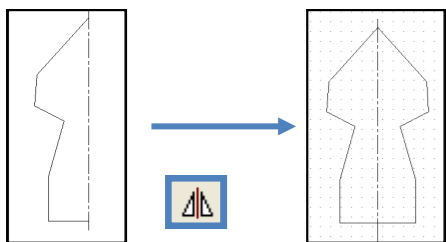
Creates a mirror image copy of an object

Copy
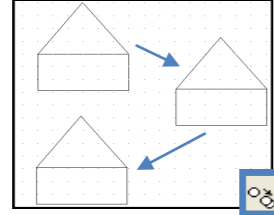
Copies and positions without having

Rotate
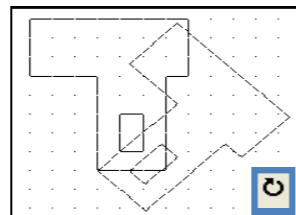
Turns an object to any angle required.

Scale

0.5
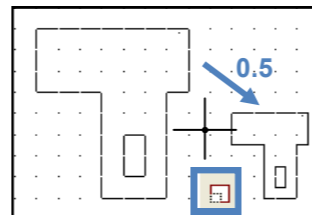
This changes the sizes of objects.

Line types

Linetype	Appearance	Description
ByLayer		
ByBlock		
CENTER2		Center (.5x)
Continuous		Continuous
HIDDEN2		Hidden (.5x)

Allows any BSI line types to be used in the drawing.

Erase

Erases selected lines or areas from a drawing

Zoom
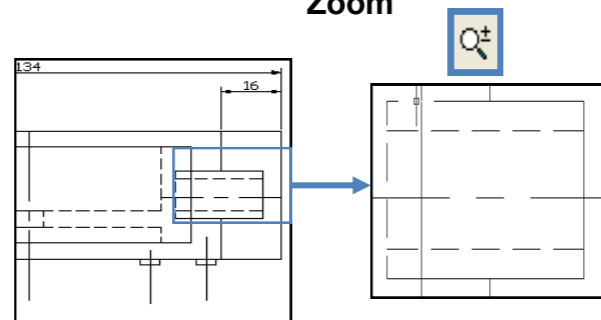
Enlarges view so that small details appear bigger and are easier to work on.

Layers

Name	On	Freeze...	L...	Color	Linetype	Lineweight
0				250	Continuous	Default
Centre Line				250	CENTER2	0.15 mm
Defpoints				250	Continuous	Default
Dimension				250	Continuous	0.15 mm
Hidden Line				250	HIDDEN2	0.15 mm
SMART-Redline				250	Continuous	0.15 mm

Allows a complex drawing to be built up in several layers to make it easier to work on.

3D CAD

3D CAD—also known as 3D modelling - allows the user to produce virtual models based on sketches produced within the package or imported 2D CAD drawings. 3D modelling has several uses within industry:

Manufacturing

Prototype 'models' of a design can be produced on the software and 'tested' via features in the program. This can be to simulate different areas of stress on the design or how it would react in various real-life situations. Computer Aided Manufacture (CAM) allows Computer Numerically Controlled (CNC) machines to produce physical parts. A result of this development over the years has been the replacement of many human workers with this automated system.
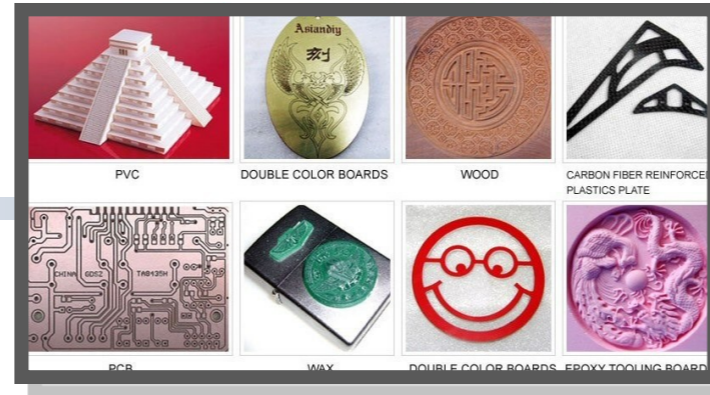
Production Drawings

2D CAD production drawings can be very quickly and accurately obtained from the 3D model. This can make it easier to produce these drawings than using manual methods or 2D CAD. Alterations to the model automatically update the 2D production drawing.
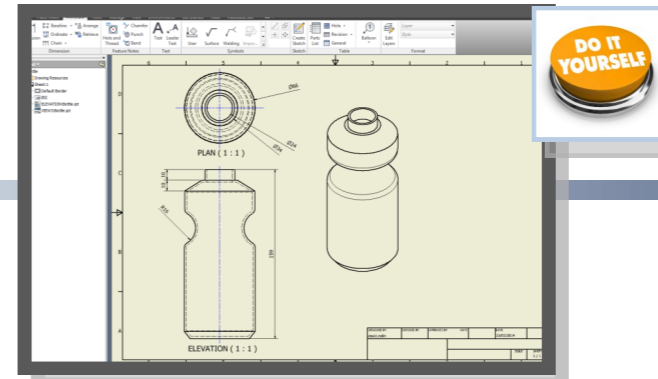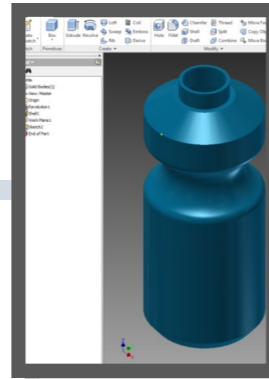
3D Printing

The 3D models can be exported as standard tessellation language (STL) files to 3D printers and produced as physical prototypes. This allows basic models to be produced to provide a hand-held, tangible version of the design from the computer. The advantages of this are that the designer or customer can get a 'feel' of how the design shall exist in real-life, in a way that the computer version cannot do, no matter how sophisticated the software is.

Simulation

This allows the creation of required situations for training, testing design/ materials and predicting future events. This is generally cheaper than 'real-life' and safer too.

3D Illustration

This improves the visual appearance of a 3D model, and some packages allow the user to interact and animate with the design. Most CAD packages have illustration features imbedded within them—ie Inventor Studio—but there are 'stand alone' products available which are solely devoted to the task.

3D CAD (2)

3D Modelling

3D modelling is a method of drawing objects on a computer and enables the user to manipulate them and view them from any angle. They are also easily sent to other users around the world via the internet. This development over the years has greatly benefitted design and manufacture as development time and costs have been reduced. This has had an impact on traditional manufacturing roles, although there has been a rapid demand for skilled CAD operators.

There are many 3D modelling packages available, but most adopt the same set of core tools or features:

Extrude
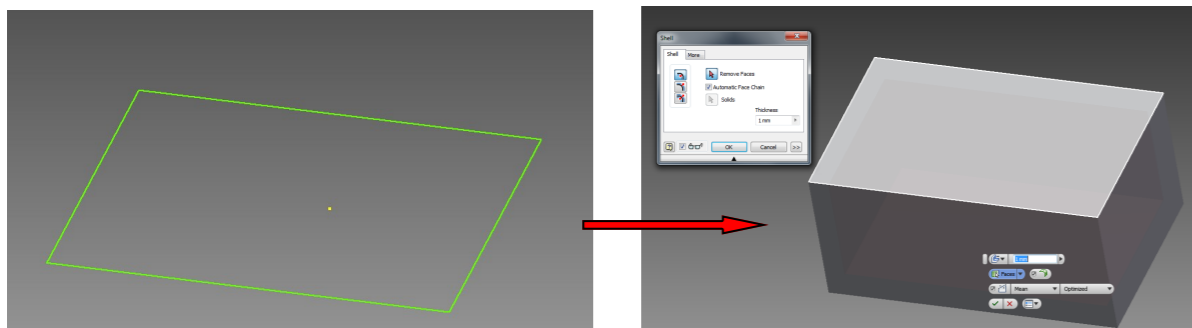
This is the most basic feature in 3D modelling. It allows the user to give another dimension to the initial 2D sketch by adding a specified amount of 'material' at 90° to the

Union and Subtraction
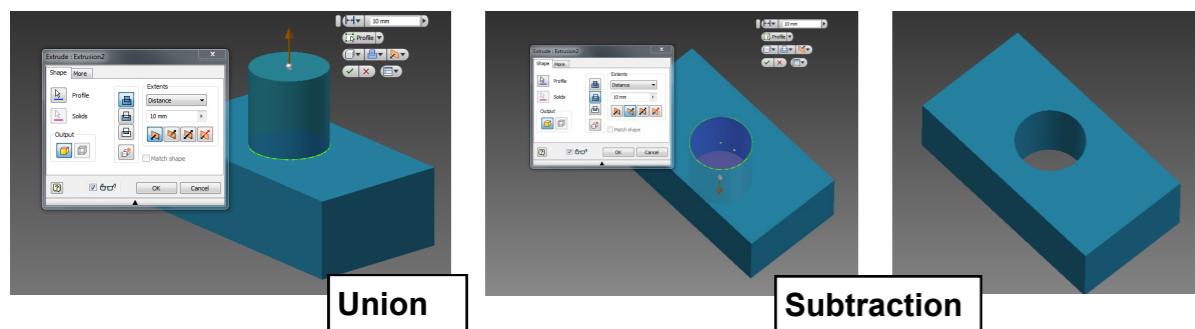
Union and **Subtraction** are effects the extrusion feature has on an existing solid. This is generated in the same way by a sketch, but a different option is chosen.

Union

Subtraction

Solid Revolve
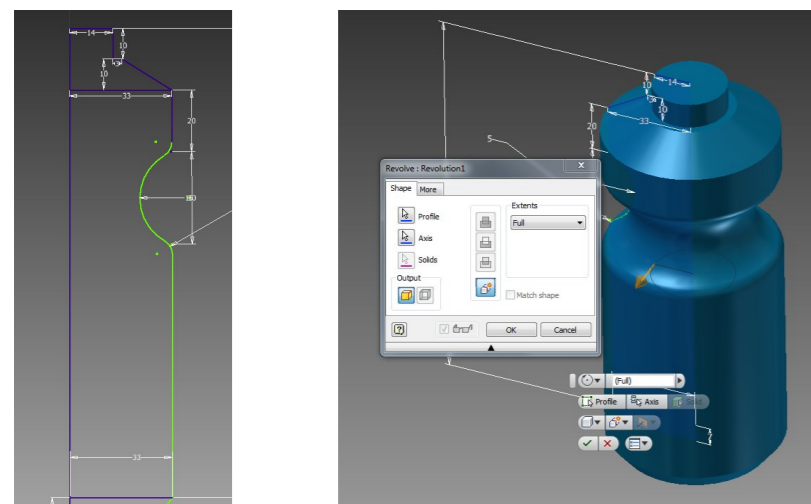
This feature allows the user to produce 3D models based on a profile sketch which is a symmetrical half of the final model. It is particularly useful for cylindrically-based objects such as bottles, glasses and other forms which would prove very time consuming, complicated and inaccurate to construct with the **extrude** feature.

Shell
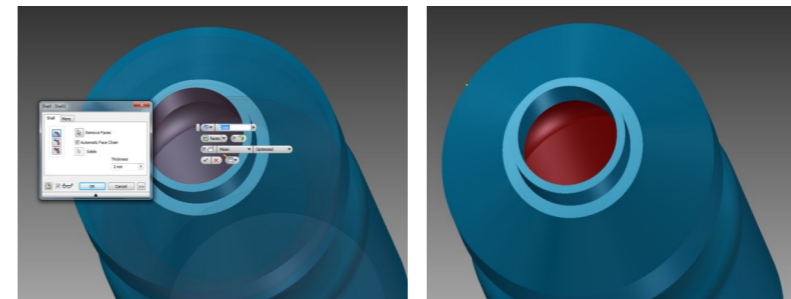
Shell provides the user with the ability to 'hollow out' the model. This is a quick and accurate method of changing a 'solid' model.

Fillet
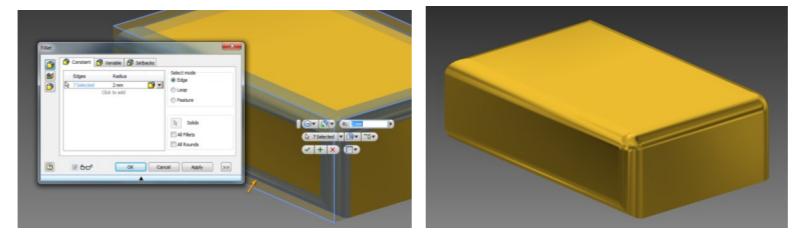
This edit allows the 'sharp' 90 °edges of a model to be rounded according to a designated radius.

Chamfer
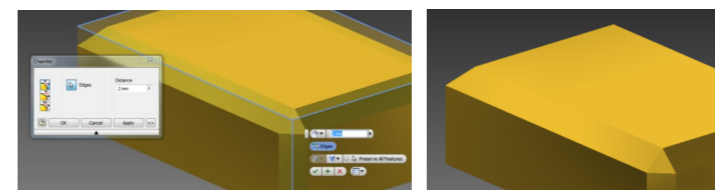
This edit creates an angled face to the 90° edges of the solid.
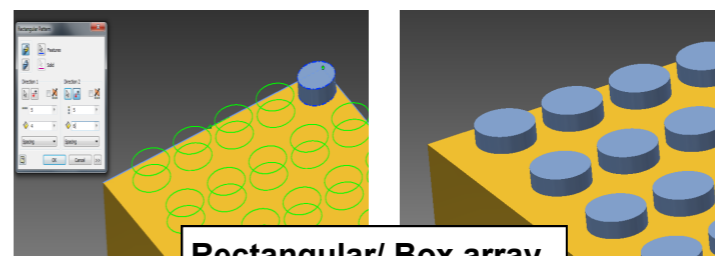
Array

The **array** feature allows the user to create a pattern based on a feature, or the initial sketch. This produces an accurate pattern very quickly. There are two kinds of array—**circular** and **rectangular/box.**

Circular array

Rectangular/ Box array

3333

3D CAD (3)

DO IT YOURSELF

3D Modelling continued

CAD Library

N5

Assemblies

- Individual components can be placed a number of times into a file called an **ASSEMBLY FILE.** They are then connected together to form the **ASSEMBLY** itself.

- This means the separate components can be worked on and altered in isolation of the other parts of the assembly. This is advantageous as they can be easily produced and edited without the model becoming too complicated if all the different parts were in the same model initially.

- The Assembly can be moved to mimic real-life actions such as a wheel turning or a lever moving.

- The components are fixed together in different ways using a set of conditions called **CONSTRAINTS.** The three ones you need for National 5 are shown here:

A CAD library is a vault of previously drawn parts which can be inserted into an assembly you are working on. The main advantages of using a library are:

- The same part doesn't have to be continually redrawn whenever required. **THIS SAVES TIME.**

- All the parts are **uniform**—namely the same size and form

- Multiple users can work on the same assembly, all accessing the same library of parts via a cloud based system.
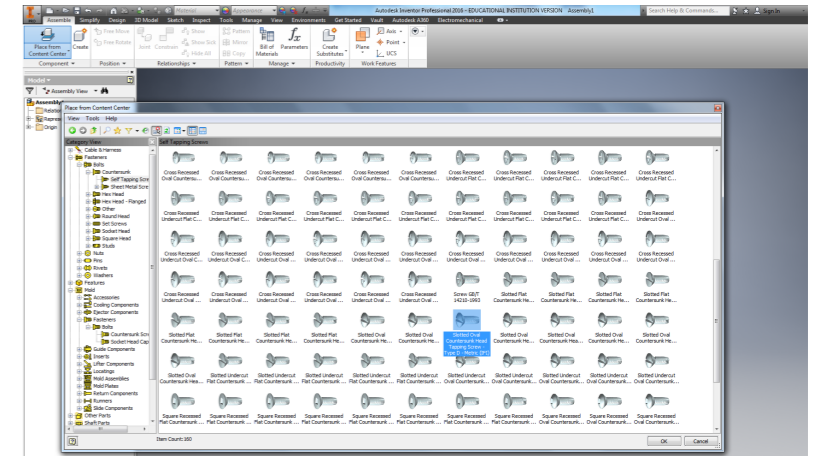
- CAD libraries allow a huge array of parts to be placed into an assembly. These parts may be re-sized as required.
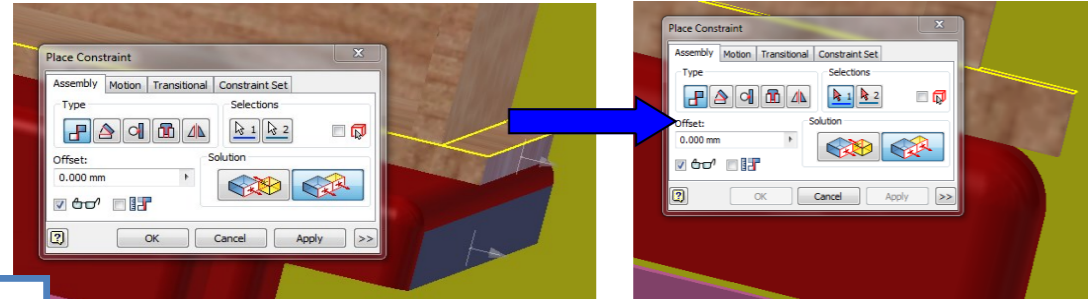
Align
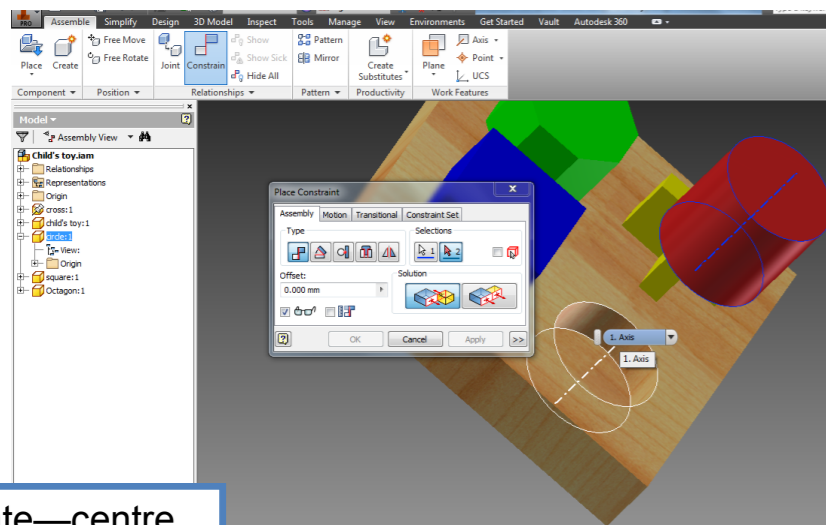
Mate—centre
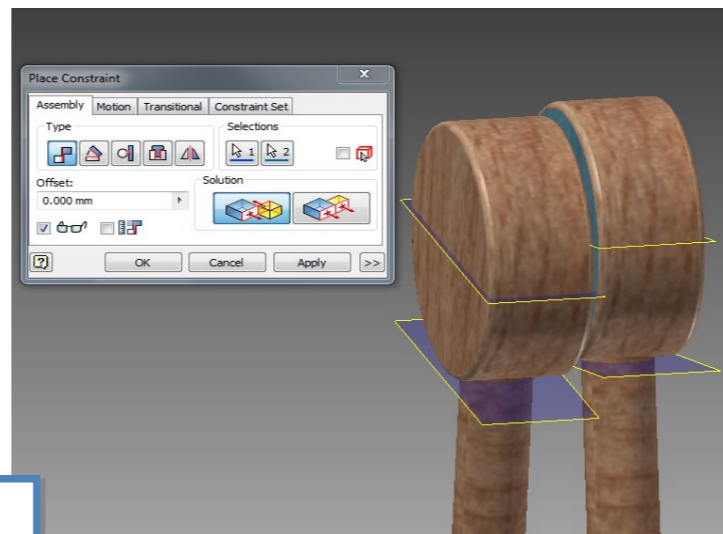
Mate
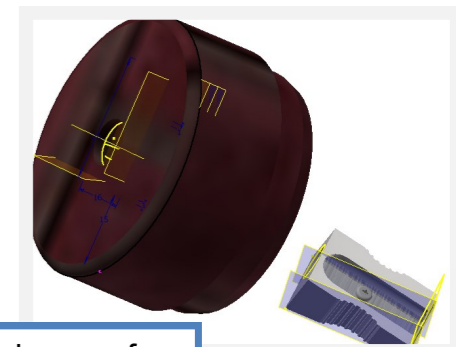
The Sharpener project you did in S4 made use of a CAD library - the sharpener itself and the top of the case were previously drawn components.

DESIGN + TECHNOLOGY

3D CAD (3)

Simulation

The rapid development and improvement in computer processing power and graphics over the years has enabled different scenarios to be realistically produced within the computer environment for a range of functions.

Training

Flight simulators are perhaps one of the most common uses for simulation. This allows the trainee to be subjected to a range of different scenarios and their performance monitored and recorded. This is obviously a lot safer than flying an actual plane, and saves a huge amount of money in training costs, fuel and parts. Many other training programmes can be simulated such as extreme driving, sailing and space flight.

Testing

Products can be tested for stress, momentum response and material properties before production using computer simulation. This saves greatly on production costs and products can easily be altered or 'tweaked' based on results before physical models are produced.
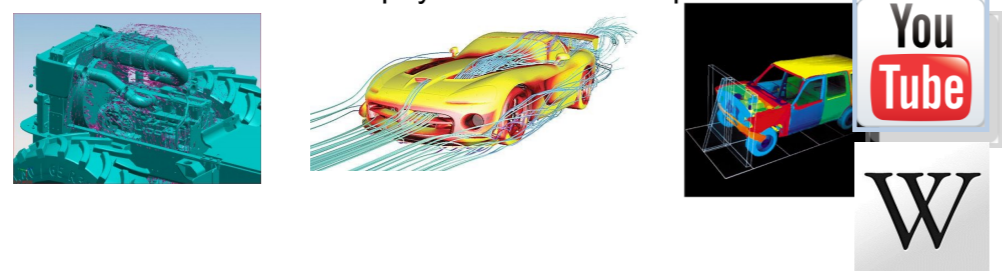
Predictive

The software converts complicated data into a visual form which anyone can easily understand. Weather patterns are the most common uses of this form of prediction, but other uses are animal migration, volcanic eruptions and volcanic activity.

Illustration

Films and Animation

Toystory (1995) was the first feature film made exclusively from computer-generated imagery (CGI). Since then, they have become ever more ambitious and advanced. This format brings several advantages to film production, as the producers have often unlimited scope for more scenes—often the imagination is the only limitation to what can be achieved.

Scenes can be continually recreated until the producers are satisfied, and there is no need for a full film crew and actors to be kept on standby. This results in huge savings in production costs, although CGI films still involve great expense.
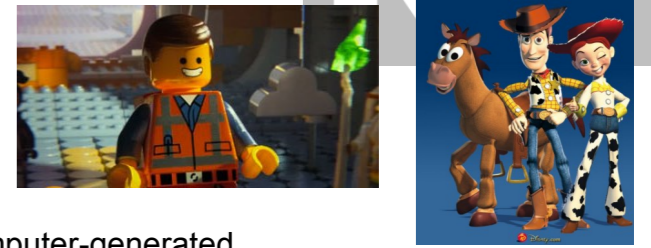
Product Visualisation

This involves rendering a 3D model to enhance its appearance and make it appear more realistic and attractive. Materials and lighting effects can be added and this rendered image can be used for promotional purposes within DTP documents.
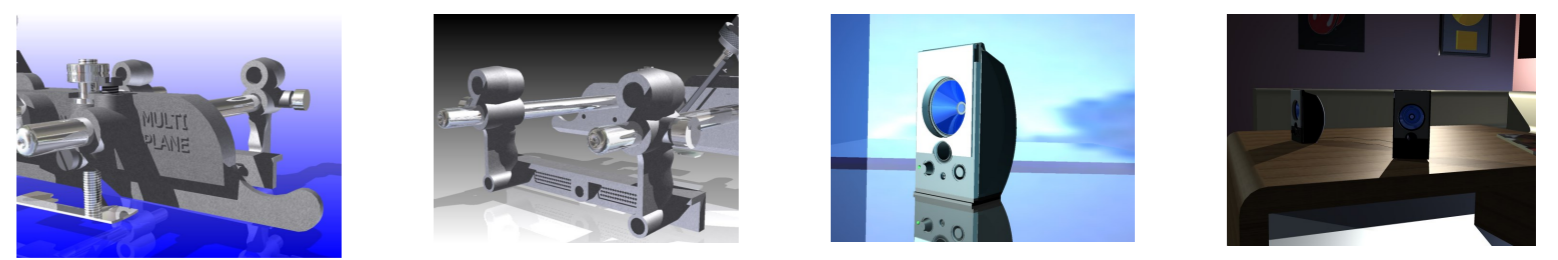
Video

Video games use 3D models which have been created, rendered and incorporated in a program to make them interact with each other and user input.

A more in-depth description of computer Illustration is provided on the following page

Computer Illustration

Computer illustration—or computer-generated imagery (CGI) - is the term given to producing or enhancing graphics with computers.

Rapid advances in technology have enabled this area of the graphics industry to generally dominate over manual methods. The internet, software and processing capabilities of computers have dramatically increased the possibilities within this area.

The fundamental purpose of promotional graphics is to capture the public's attention, and the computer illustrator is integral to this as they have the knowledge and skills to make the graphics eye catching and attractive.

Computer illustration involves 2D or 3D CAD, and often crosses over between both. A computer illustrator not only needs to have CAD skills, but must also understand design elements and principles, colour theory and DTP techniques.

Computer illustrators work in a range of industries, such as:

- Website building
- Sign writing
- Architecture
- Advertising
- Graphic design
- Video games
- Film and TV production

Resolution

Images on a screen or printout are made up of an array of dots; the greater the amount of dots in an area means the picture quality is better and sharper. A greater number of dots means the image has a higher **resolution** than one with less. This is either known as **pixels per inch (PPI) or dots per inch (DPI).** There are two form of computer graphics: **vector** and **raster**.

- Vector graphics are produced by a pre-determined mathematical equation, so resolution is constant regardless of the size of image.

- Raster graphics are constructed by allocating each pixel a colour. This can result in the image becoming 'pixelated' if it is enlarged greatly.

High Res Image 300dpi   Low Res Image 72dpi

Raster (PNG)   Vector (SVG)

3D illustration

With the rapid development of 3D modelling, great advantages have been provided to engineers, architects and designer. Basic models can be effectively 'brought to life' by a range of features within the software. Most 3D modelling programs have an in-built package to enable illustration—i.e. Inventor Studio—but there are many 'dedicated' packages which can provide even greater depth to illustration. Several core features are applied to a basic model or scene to make it attractive and realistic:

- **Materials:** metals, plastic and wood effects can be added to the model to give it different appearances.

- **Lights:** there are two basic types of light used to illuminate a model or scene. **Global illumination** lights up the whole scene, **Focused illumination** involves individual lights pointing at specific parts of the display—like spotlights.

- **Reflections:** these are used to add further realism to the illustration, and bounce light and surface details to other parts of the model or scene.

- **Shadows:** usually a 'follow on' effect from applying light to the display, it adds further realism to the illustration. The more focused illumination involved, the more shadows.

- **Texture:** added to material to give it further life-like qualities. It could involve characteristics such as a 'rough' look such as knurled metal.

2D illustration

2D illustration is used for a variety of purposes such as producing backgrounds for DTP displays, decals for 3D models and manipulating images. As with all aspects of computer graphics, they give the user the advantage of being able to easily edit them, send them via email and store easily. **Microsoft Paint** is a simple package for this form of illustration, but there are many more powerful free programs available.
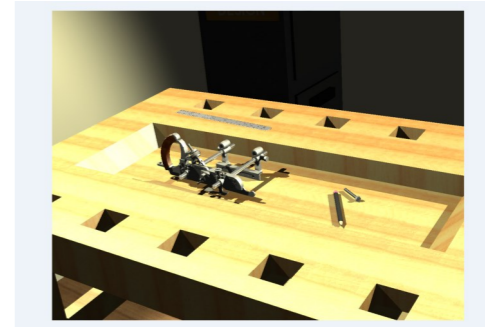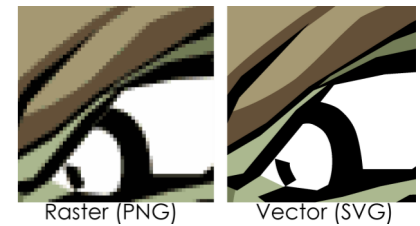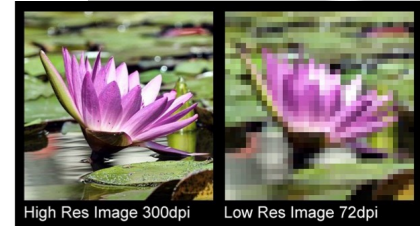
Gradient and radial fill

Geometric shapes and forms

Surface developments

Geometric forms are the basis for many different 'real-life' objects, and it is important you understand their properties. You need to know what they would look like after being manipulated—such as cuts or being 'unfolded' into **developments.**

Your **'AquaJ'** bottle consisted of three cylinders with extra features, and the label was the development of a cylinder.

Here are some examples of **prisms, cones, cylinders and prisms** with cuts to them, developments and 'real-life'

Surface developments are the **'2½D/ 3D'** form 'unfolded' to form what is known as a 'flat pattern' in 3D modelling. It is this form which has to be planned out and drawn accurately before the object can be produced for its intended purpose. If it has not been accurately draw, then it shall not fit together. Even a simple 'cube' as shown here will not be successful if poorly constructed—for example all the sides must be the same height.

Hexagonal-based prism

Probable development of spaghetti packet—note the **'long'** sides.

This development has been arranged around the base.
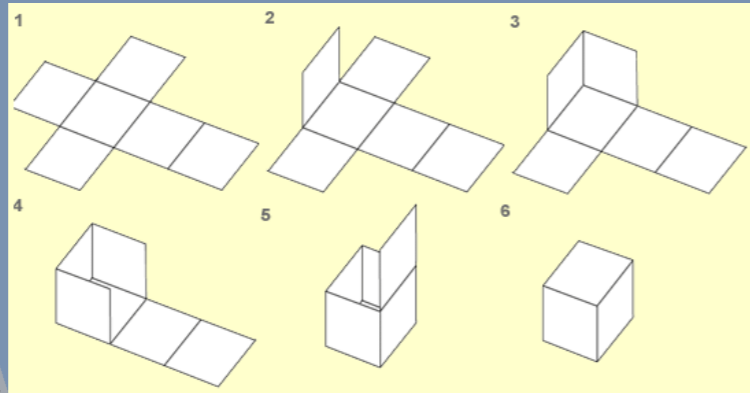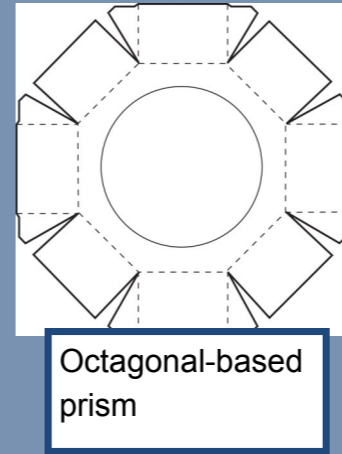
Square-based prism

Octagonal-based prism

Rectangular-based prism

Geometric shapes and forms

Using 3D modelling

N5
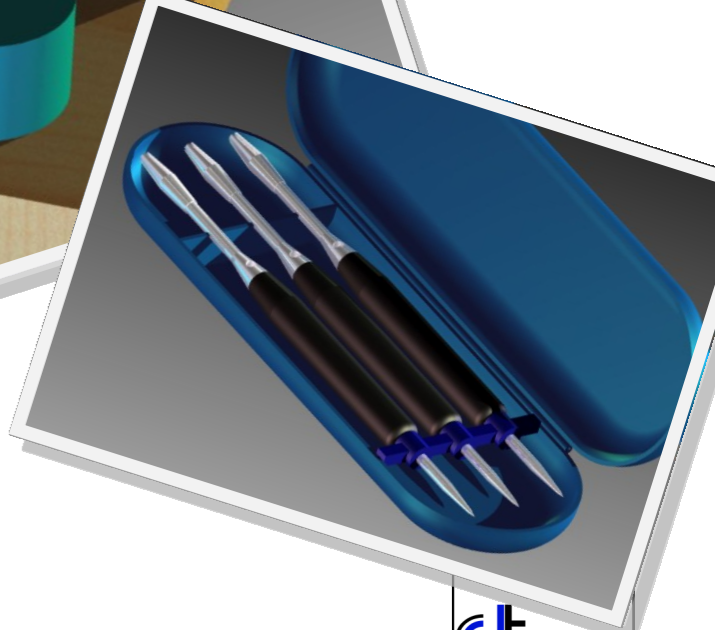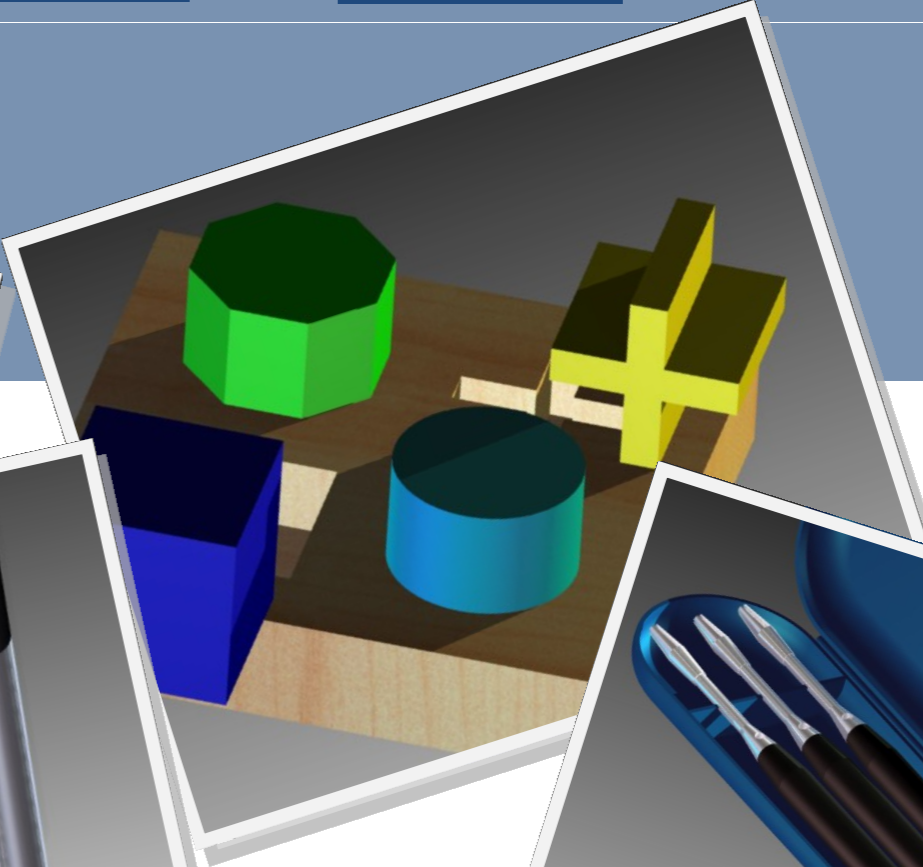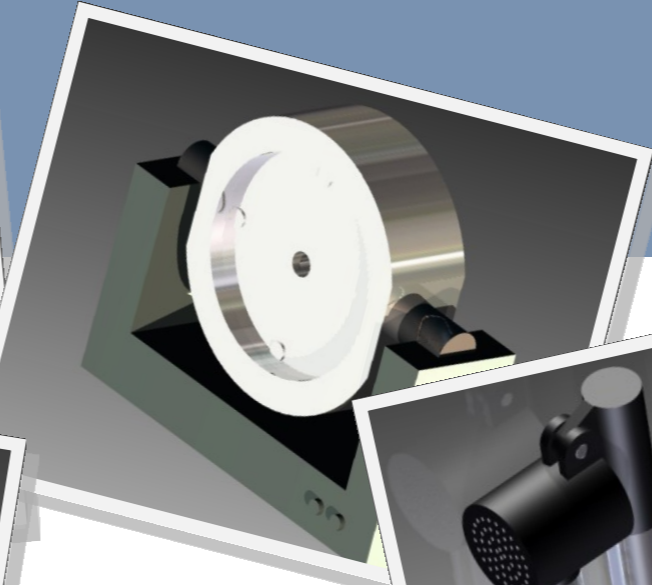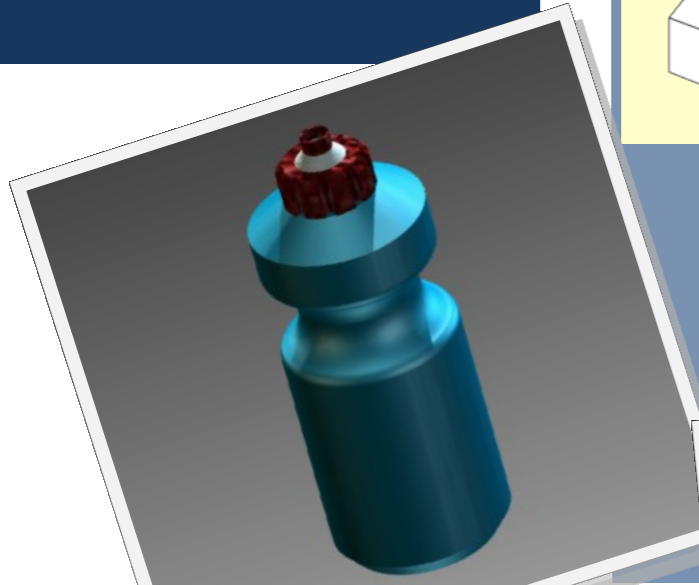
Prisms

These are the simplest of the geometric forms. They have a **straight sided base**—square, rectangle, hexagon, etc.— and **vertically straight** sides. Each prism's name is due to the shape of its base—hexagonal prism, etc. and provide the basis for many uses, especially product packaging.

Triangular-based prism

Hexagonal-based prism

Square-based prism

Octagonal-based prism

This hex based prism has been produced and cut using the **Extrude** tool.
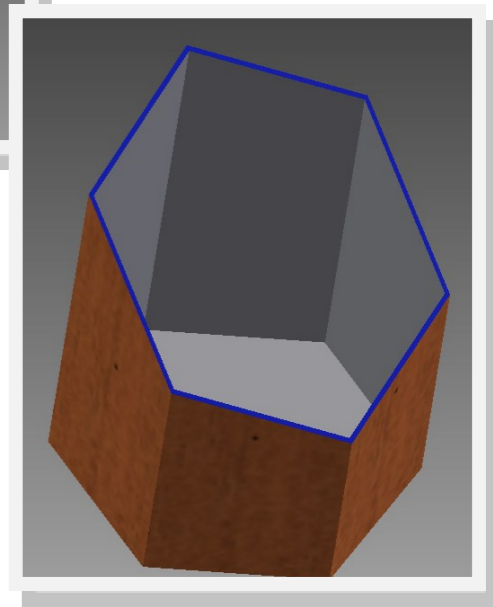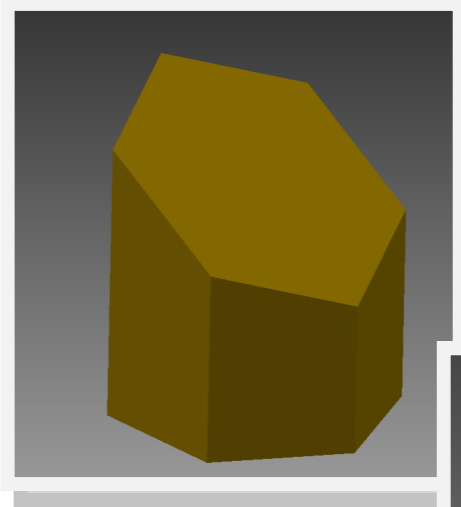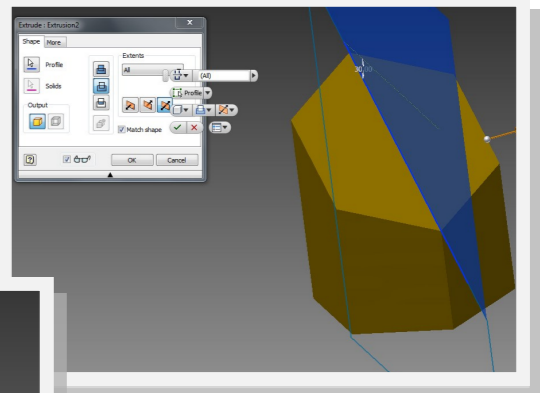
The solid prism has been **shelled** to give it a hollow characteristic to enable it to be used for packaging.

Using manual methods

PLAN

TORIAL VIEW

ELEVATION   END ELEVATION   DEVELOPMENT

Three views of a cut hexagonal prism and its development.

Geometric shapes and forms

Using 3D modelling

Cylinders

Cylinders are fundamentally circular-based prisms. Cylinders are widely used for many purposes and are frequently cut or **truncated** depending on their function.

This cylinder has been produced and cut using the **Extrude** feature.

Using manual methods

PLAN

ISOMETRIC VIEW (1 : 2)

This cylinder has been produced and cut using the **Revolve** feature. It enables more complex cylinders to be achieved.

ELEVATION   END ELEVATION   DEVELOPMENT
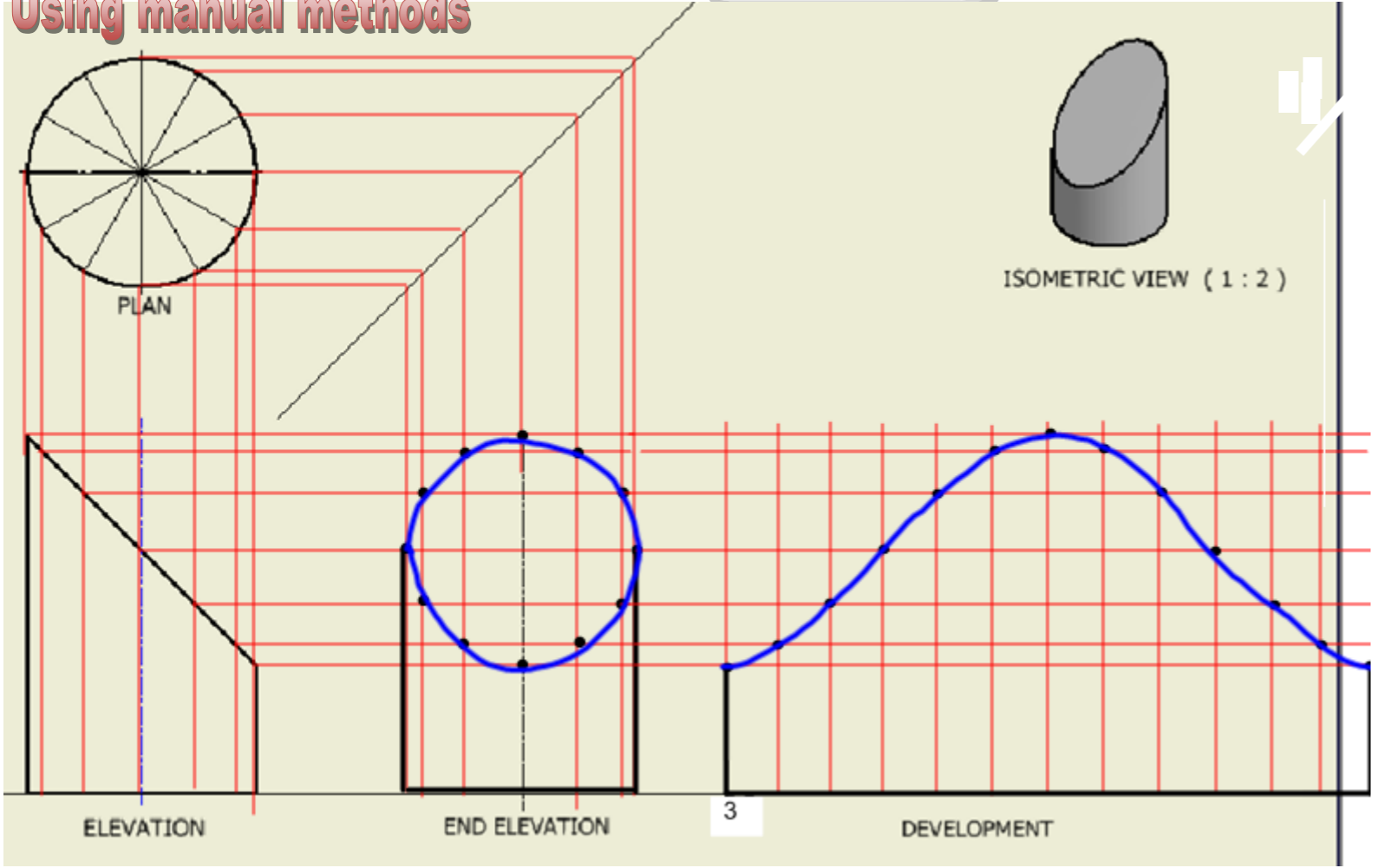
Three views of a cut cylinder and its development.

www.aquajnew.org

Aqua J is

aqua J
citrus flavour

500ml
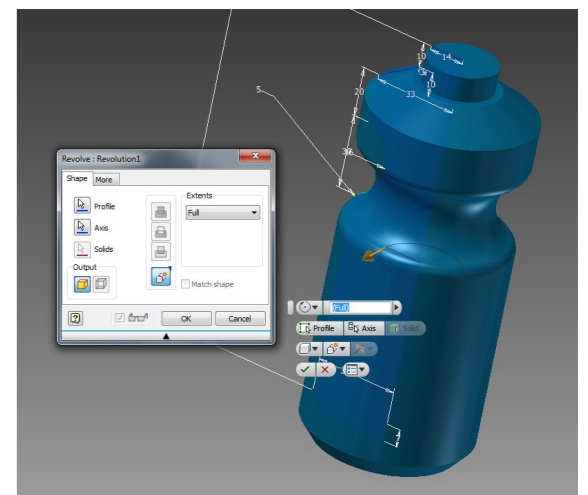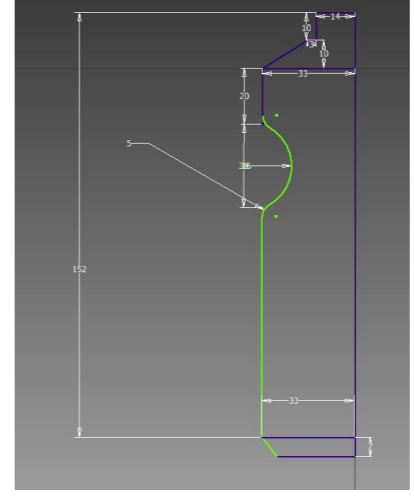
Geometric shapes and forms

Pyramids

Pyramids may be thought of as prisms with a straight-edged base with sides which rise to a single point. The base can be any number of sides just like a prism. They can form the basis for a range of functions from buildings to furniture to packaging.

Using 3D modelling
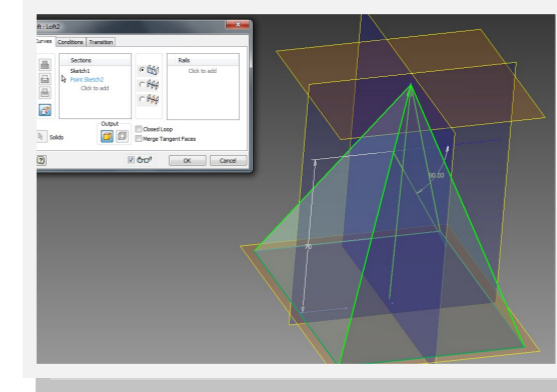
This pyramid has been produced using the **Loft** tool.

The pyramid has been cut using the **subtraction** tool within extrude.

Using manual methods

Complete the surface development

- On the elevation, project the labelled points **e - h** across to the true length
- Step these onto the surface development

4 1
3 2

O

g
c(d) b(a)
g(h) f(e)
3 (4) 2 (1)
ELEVATION

2
f
b
e
a
O
d h 4
c
b
g
f 3
2

Complete the surface development

- Draw in the visible outline over the construction lines

4 1
3 2

O

g
c(d) b(a)
g(h) f(e)
3 (4) 2 (1)
ELEVATION

TRUE LENGTH

2
f
b
e
O
e
b
g
f 3
2
h 4

Geometric shapes and forms

Using 3D modelling

Cones

Cones have **round** bases and this rises towards a singular point. They are frequently used for displays, packaging and other designs.
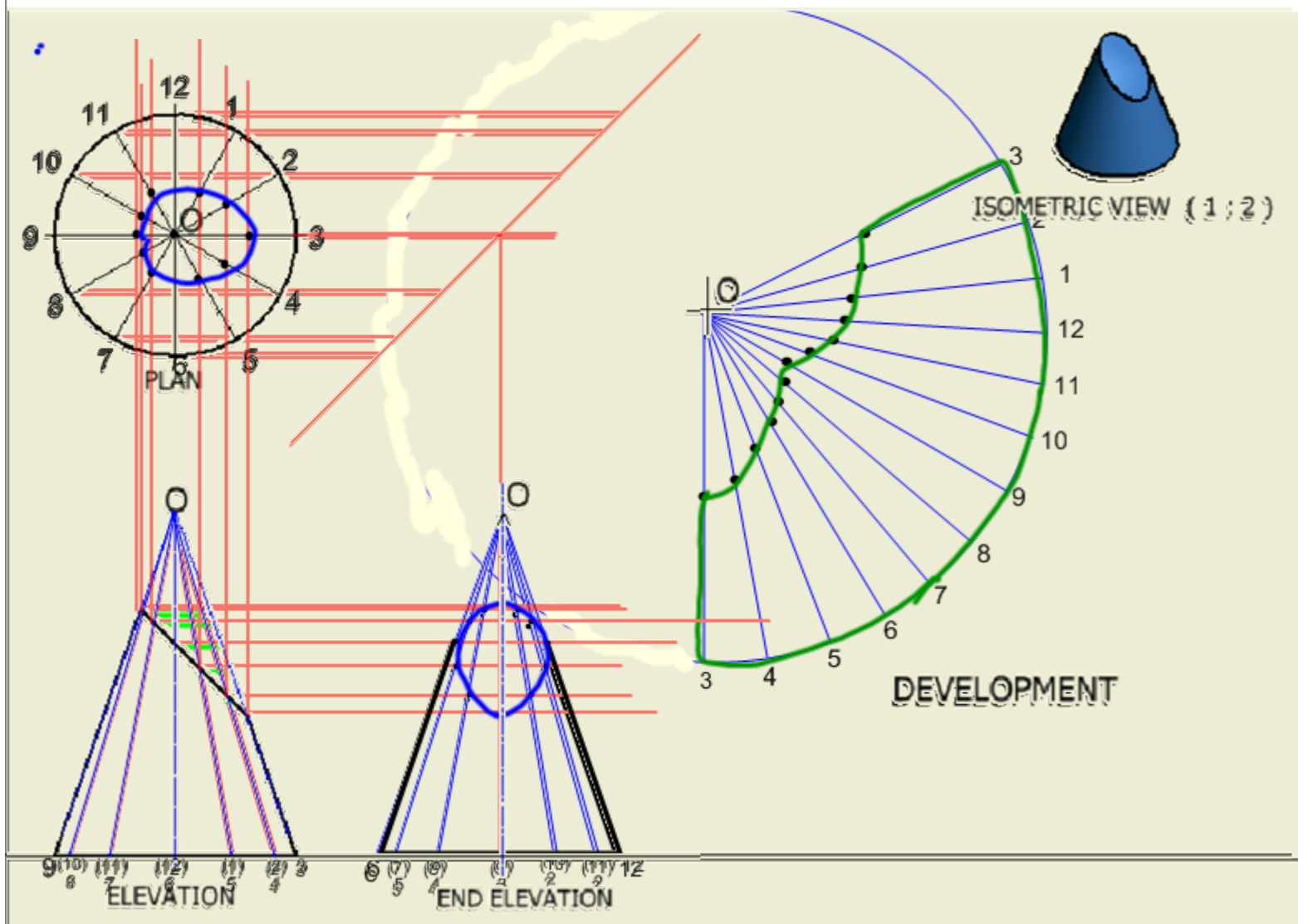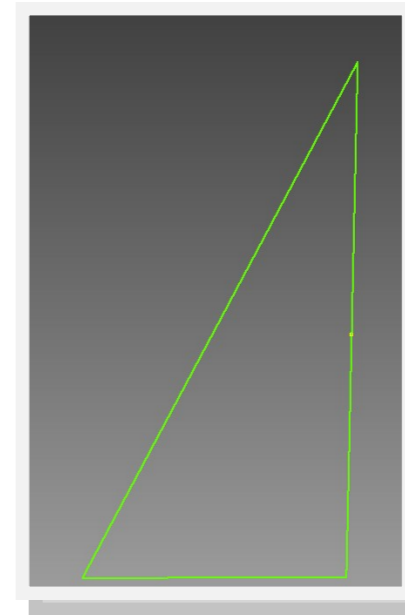
The cone has been produced using the **revolve** tool.

Using manual methods

ISOMETRIC VIEW (1:2)

DEVELOPMENT

PLAN

ELEVATION

END ELEVATION
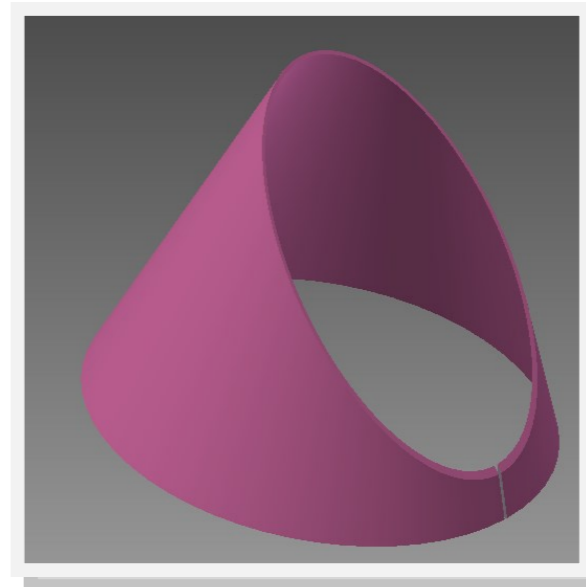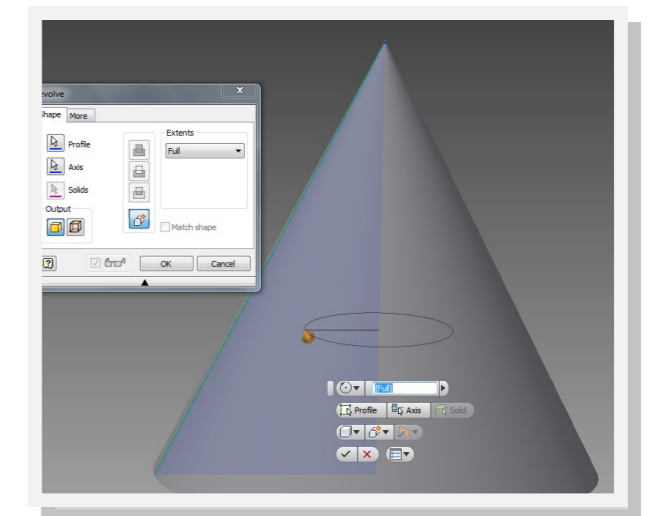
The cone has been cut and shelled here.

Geometric shapes and forms

True lengths and shapes

N5

The **true shape** and/ or **length** of an object can only be seen if one looks at the surface at an angle of 90°. In your exam you can be asked to identify different true shapes of sectioned objects

These well-known structures have sloping sides. Their **true length** can only be observed as shown by the graphic to the right.

True Lengths

X°
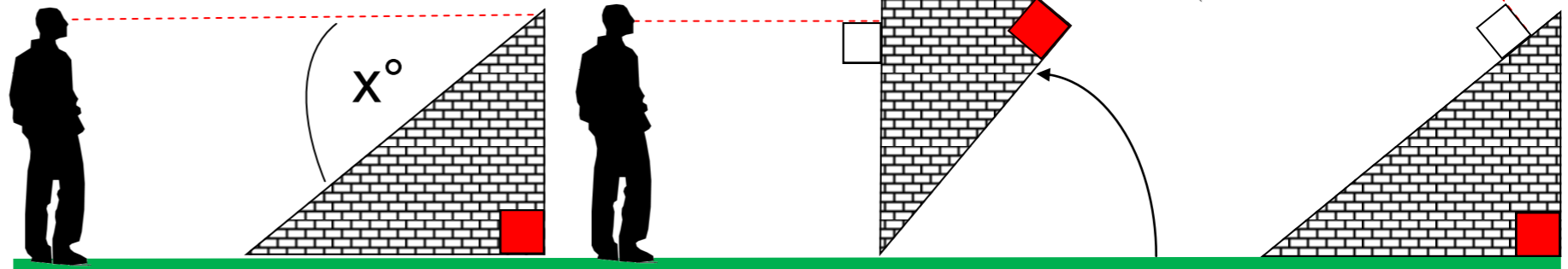
The line of the man's sight is at an acute angle to the slope of the wall. That means that he is not seeing the **True Length** of the slope. If you think of Pythagoras' Theorem you did in maths, you will remember that this side is the largest of the three in a right an-

If the wall has been rotated so the man is seeing the 'slope' at an angle of 90°. This means that he is seeing the **true length** of the sloping wall. Note that it is now a lot higher in relation to his vertical height.

This view shows what the man would see if it was **his** position which had changed in relation to the sloping wall. He is still looking at the slope at an angle of 90° so he is looking at its **True Length.** It is this concept—of looking at the object at 90° to the sloping surface— that you need to understand when identifying true

True Shapes

Drawing and identifying these views requires you to use the same principles adopted to achieve the **true length.** In this case, it is the entire **surface** of the sloping face which is created, rather than a single line.

So think of the third graphic above, with the man 'hovering' above the wall at an angle of 90° to the slope. Several
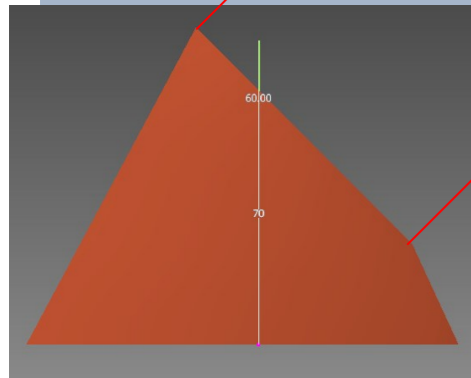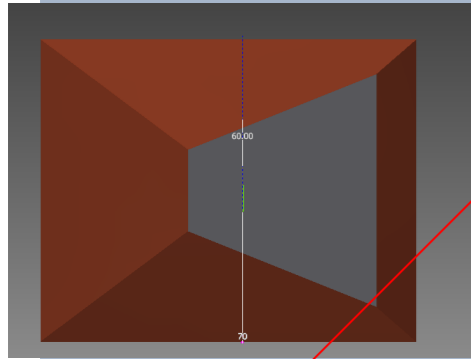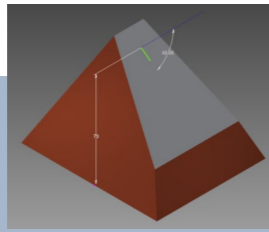
True shape of sloping surface

PLAN

A (1:2)

A

ELEVATION   END ELEVATION

Cones

True shape of sloping surface

PLAN E

ELEVATION   END ELEVATION

Prisms

True shape of sloping surface

PLAN

ELEVATION   END ELEVAT

Cylinders

True shape of sloping surface

PLAN

F (1:2)

ELEVATION   END ELEVATION
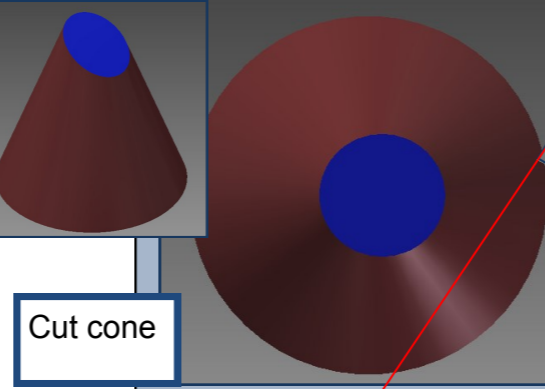
Pyramids

Geometric shapes and forms

True lengths and shapes using 3D modelling

3D modelling is an excellent way to visualise objects from different angles. It enables the user to quickly rotate it via the mouse and therefore is ideal for looking at the true shapes of many different angled surfaces. Here are several examples of various forms. Doing this yourself is a very effective way to reinforce the ideas previously covered in these notes.
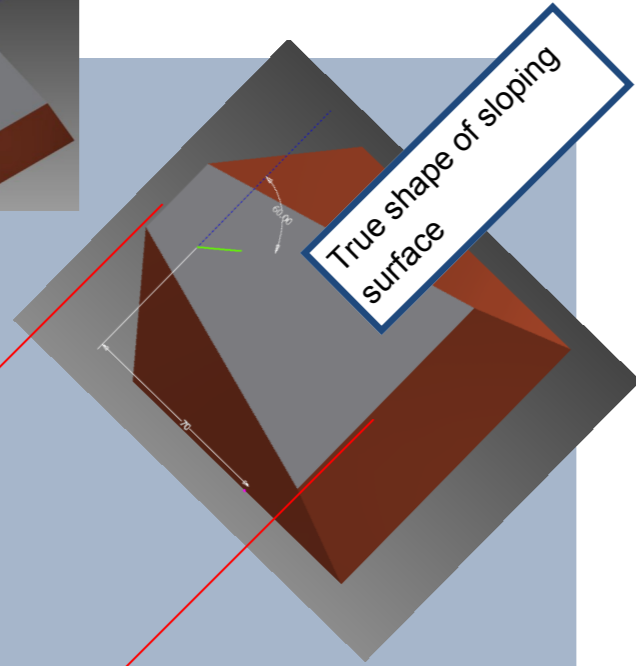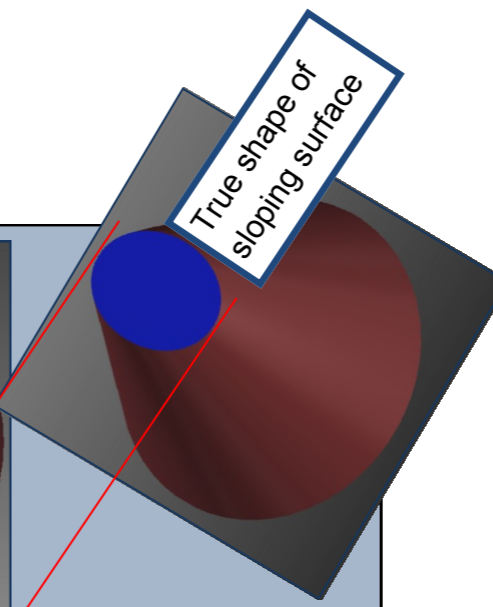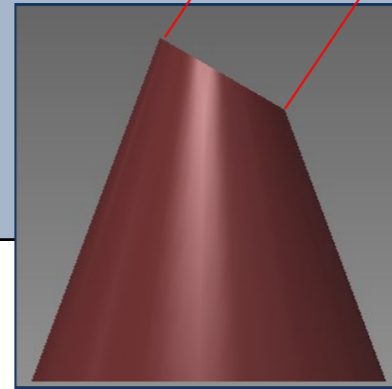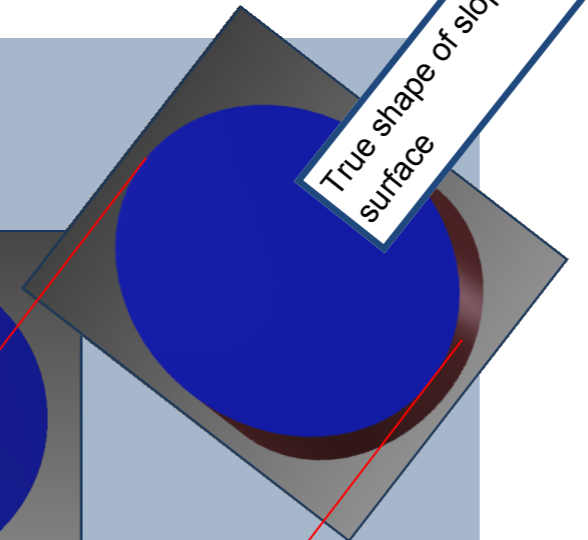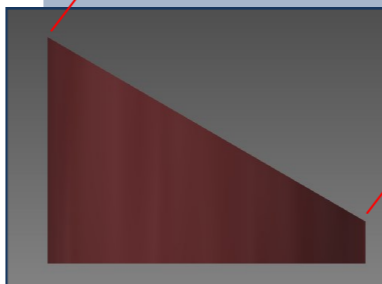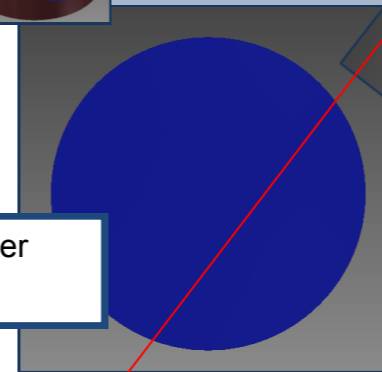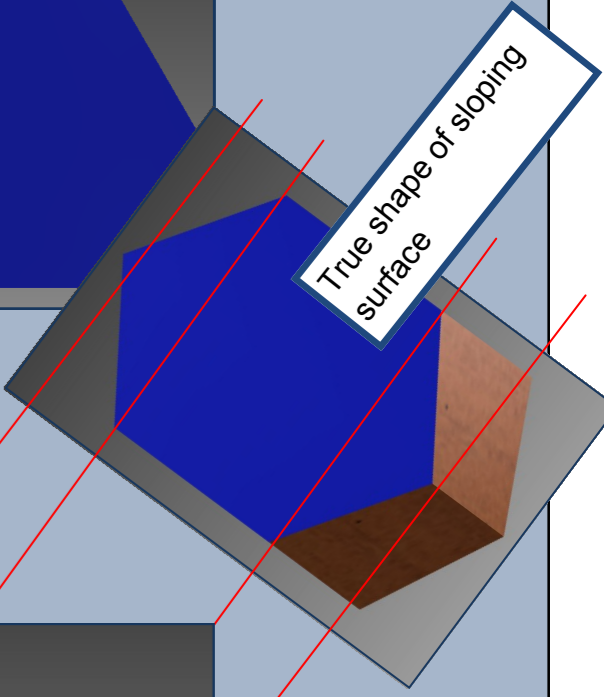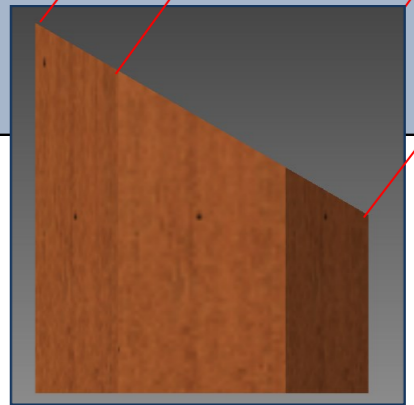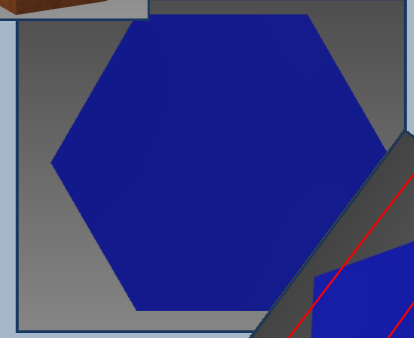
Cut cone

True shape of sloping surface

Cut hex prism

True shape of sloping surface

Rectangular pyramid

True shape of sloping surface

Cut cylinder

True shape of sloping surface

DESIGN + TECHNOLOGY