

Appendix A: Big Ideas

Topic 1: Tools of Communication – Past Present and Future

Communications Tools

These are tools used to aid communication and may be used to perform one or more parts of the communication process.

Communications tools are physical and virtual (existing in an electronic domain) devices and systems employed to communicate information. Traditionally, tools belonged to very specific media that did not share content very easily. For example,

- the print medium included books, magazines and newspapers and required typesetting tools, printing presses, still cameras and copy cameras. Processes and skills related to these industries were unique to the tools.
- the TV broadcast medium involved electronic signals and transmission towers, video cameras and recorders, amplifiers, signal mixers and sound stages. It required a broad range of processes, skills, and tasks.

In both examples, the systems use information encoded in analog formats - content developed for one medium is incompatible with other media requirements, and had to be completely redone to be used in the other media.

The revolution in computer and networking technology has transformed the entire range of communications systems and industries. All production systems are now built around computers. This means that all content is in digital format. Digital information can be shared across all digital systems. Content developed for print can now be used directly in video, and vice versa. Students can develop information in response to a question or problem and simultaneously publish it in print, video, and any other format. In fact, web documents typically can contain information in all traditional formats plus novel formats.

It is helpful to start thinking of documents in terms other than text and static images. A document is analogous to a container; it can hold text, pictures, voice, video, animations, technical drawings and other media types.

Digital Convergence

Computers were first popularized for business use when a spreadsheet program was invented. Most people considered computers as being counting tools for business accounting purposes and for a substantial period of time that was the primary function of computers. When database tools were invented the focus shifted toward non-numerical data and the relationships among pieces of information and many people considered computers as being business data tools. Wordprocessors appeared and computers were adopted as writing tools by business professionals and individual users. Graphics and drawing tools appeared, and again people's ideas about computers changed.

As each new software tool is added, the perception of what a computer is changes. Computers have, in fact, become ubiquitous. They are everywhere - even in appliances. They can still only count and add. But they can do it so quickly that a wide range of information can be represented, stored and manipulated. At the present time, any information that can be represented in traditional methods can also be represented in digital format. Furthermore, when the information is in digital format, it may be presented alongside other digital information in ways that are not possible with traditional methods.

As an example, consider a multimedia presentation that would have been developed a few years ago. It could include audio, slides, movie clips and video clips. Each required a separate piece of equipment. Coordinating the events was a formidable task. By contrast, a computer-based multimedia event is much easier to produce, coordinate and present. In addition, only one machine is required for the presentation. It is also easy to make the presentation interactive so that the experience is different for each individual. A click here and a click there and different things happen. In fact, the Internet is the largest, most complex multimedia event imaginable.

Digital convergence simply means that all forms of communications are becoming digital. Each stage of the process employs digital tools and uses information that is encoded in digital format. This is all possible because computers are fast enough to present the information to people in a manner that appears to be analog. The images and text on a computer screen are digitally encoded but are painted by the electron beam of the CRT (Cathode Ray Tube) to appear as analog information.

Digital convergence is possible because of scanners, digital cameras, video capture cards, a wide variety of software, interfaces and software to control machines and equipment, and small computers that may be embedded in cars, stereos, and kitchen stoves.

*Topic 2: Communications Tools
in Everyday Use*

Purpose and Function of Tools

Communications tools are designed to perform specific tasks or functions. Often, they may be used for a wide variety of communications functions. For example, a fax machine encodes information in a fashion that allows it to be sent to and received by any other fax machine. The purpose of the communication can vary widely and is largely irrelevant to the functioning of the tool. Students need to understand the functioning of the tools and get a sense of the range of tasks they can perform with them.

Common Elements of Tools

Many of the sample tools listed in *Unit 1 - Big Ideas* are computer based. An examination of the software related to these tools will reveal a series of common components or elements. For example, all software have menus. Many menu items are common (open, save, print) and are located in the same place. The only different menu items are those related to the unique functions of the tool.

Topic 3: Processes of Communication

Communications Processes

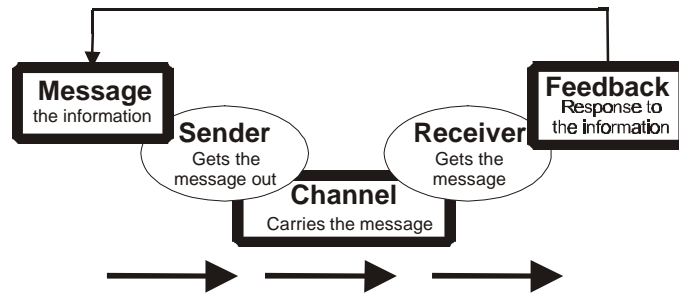
Communications processes include the:

- encoding of information as in print, pictures, technical drawings, electronic files
- decoding of information as in reading the print, interpreting the pictures, reading the technical drawings, or turning electronic files back into a human readable form
- sending information as in mailing a letter or sending email, or speaking
- receiving information as in getting a letter or listening to a speech
- storing information as in a library, on a CD-ROM or hard drive, or instructions stored in a robotic device
- retrieving information as in deliberately getting information from storage

In any communications action, the processes occur many times, and at different levels of sophistication.

The Communications Model

The communications model connects the various components and parts that interact when communications occurs. Typically, it is illustrated as the following:



The model can represent any communications system.

In a telephone system with person to person communications, the message would be sent from person one in the form of audio (voice), the sender is the telephone, the channel is the phone network of wires, switchers, amplifiers and computers, the receiver is the other telephone, and feedback is the voice of the second person.

In order for communications to occur, certain actions have to be taken at each stage of the process.

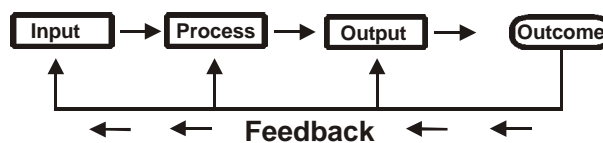
- The message has to be encoded. It has to be converted into a form that the sender can use. In this case, the voice sound waves are converted by the telephone into electrical impulses. They can no longer be interpreted directly by people.
- The message has to be sent. The electrical signal is sent along the channel of telephone lines and circuits.
- The message may or may not get stored. We tend to not think of telephone conversations as getting stored, but for the time it takes to move the signal from one location to another, it is stored on the circuits - even if that is only a fraction of a second.
- The message has to be retrieved. The telephone at the other end retrieves the signal from the circuits.
- The message has to be received. In this case receiving and retrieving are pretty much the same action.
- The message has to be decoded. The receiving telephone converts the electrical signal back into sound waves that replicate the original spoken message in audio format.

Topic 4: Communications Systems

Technological Systems

A system is comprised of sub-systems and components which, taken together, perform a function that the components could not perform individually.

Systems are designed to achieve specific outcomes. They have three major components: input, process and output. Feedback is used to modify the system components to ensure that the desired outcome is achieved.



When systems operate they consume resources. Resources are often considered as the inputs to the system. They are materials, time, capital, information, people, tools and machines, and energy. System processes are the actions taken on the inputs (usually on materials, energy, and/or information) to achieve the desired outcome or output. System outputs may have expected or unexpected effects. They may also be desirable or undesirable. System design and management always involves assessing the trade-offs in output.

Communications systems are designed to transmit information from a sender to a receiver. For example, the telephone system includes the phone, the networks of wires and satellites, and the switching stations and computers that manage it all. The telephone is a subsystem with additional subsystems—the receiver, amplifier, ringer, and transmitter. The entire system uses energy, and requires different resources to maintain it as a functioning system. Fax machines, local area networks, the Internet, radio, television, newspapers, and magazines are all communications systems.

Communications systems are constantly being modified and updated. Consider the phone system. Wired phones are being replaced by cellular phones which employ radio waves. Analog cell phones are being replaced by digital cell phones. Satellite based digital cell phones are also available. A wide array of phone services are available that includes caller-id, call forwarding, messaging and so on. An examination of other existing and new communications systems will reveal a similar pattern.

Convergence

All these systems are subject to convergence. Because they are digital, each mode is incorporating elements of the other. For example, TV, especially news services, is also becoming web based, where it incorporates mail and messaging services along with direct sales and order processing.

*Topic 5: Introduction to
Communications Graphics*

Communications Graphics

Communications graphics refer to the use of a particular set of technical drawing techniques. These techniques are employed for a variety of purposes and involve the communication of technical information in a clear, concise manner. These techniques are used by all industries and businesses where products are created. Most people are familiar with a particular type of these drawings—the house plan. Communications graphics include sets of lines and symbols which may be considered in the same fashion as the alphabet. In addition, the location of these lines and symbols on a drawing has meanings, just like we place particular parts of a letter in specific places. Learning to read these drawings is a critical step in developing technological literacy. Learning to develop the drawings is very important when we engage in technological problem solving activities.

This section provides introductions to the important concepts.

Lines used in Technical Drawings


Technical drawings use lines as an alphabet in the same way that text uses letters as an alphabet. These lines are created in a specific fashion, regardless of the tools used to create them, and always have the same meaning - much like letters do. The most common lines are:

Construction line —————

Construction lines are used when creating freehand sketches or drawings done with drafting instruments. They are usually not required in CAD drawings. They are lightweight lines used to quickly block out the major parts of a drawing. Created with a sharp pencil, they can be erased without leaving any marks on the paper.

Visible Object line —————

Visible Object lines show the visible edges of objects. They are sharp, clear, and clean lines that will be part of the final drawing.

Hidden Object Lines 

Hidden Object lines show where the edges of objects would be if you could see them (e.g., if they were not obscured by another part of the object). They are sharp, clear, and clean lines that will be part of the final drawing. The spaces are usually 1/3 of the dashes. When 2 hidden object lines meet, they always meet with 2 dashes. If 2 hidden lines cross, the intersection is centered on the dashes.

Centerline 

Centerlines are used to indicate the center of an object that is symmetrical. They are sharp, clear, and clean lines that will be part of the final drawing. They are usually used to show where the center of a feature is located e.g., the center of a circle. They are often used in conjunction with measurements. When centerlines meet, they cross on the short dashes.

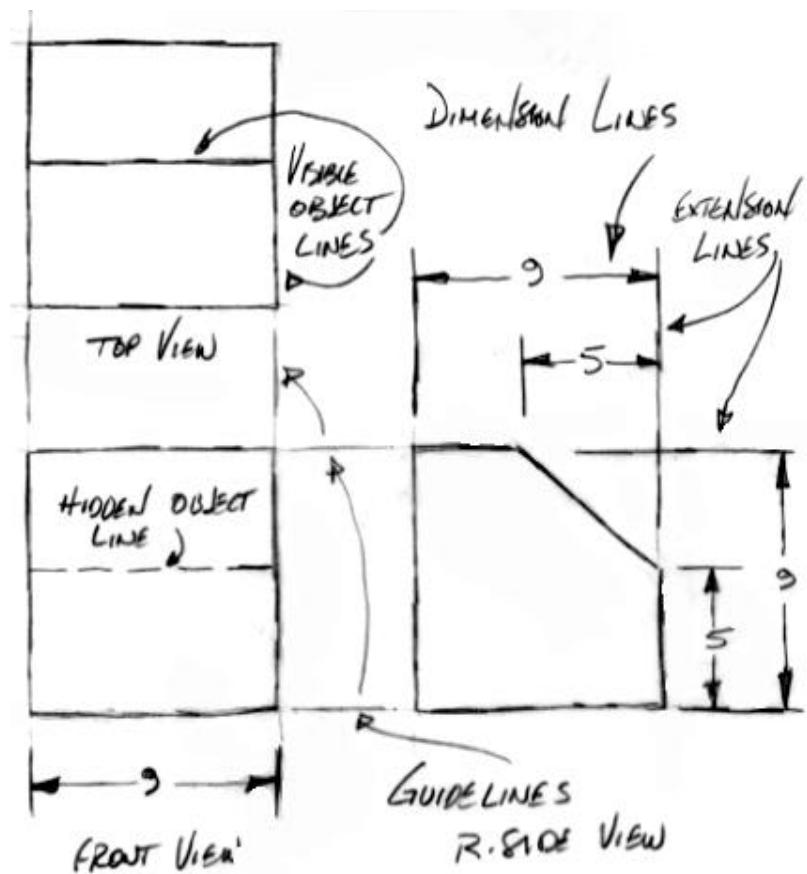
Extension line 

Extension lines are used to visually extend an edge or side so that measurements may be included on the drawing. They are sharp, clear, and clean lines that will be part of the final drawing. Extension lines do not physically touch the edges of the object, but are drawn close enough so that it is obvious which edge it is associated with.

Dimension line 

Dimension lines are used to indicate measurements on a drawing. They are sharp, clear, and clean lines that will be part of the final drawing. There are a number of standard ways to create dimension lines. Only one method would be used on a given drawing. Using multiple methods would be similar to writing a paper and randomly printing some letters, writing others, putting in capitals, and using different colors of ink.

Putting it together. Can you identify each line type in the drawing provided on the next page? Are they all there?

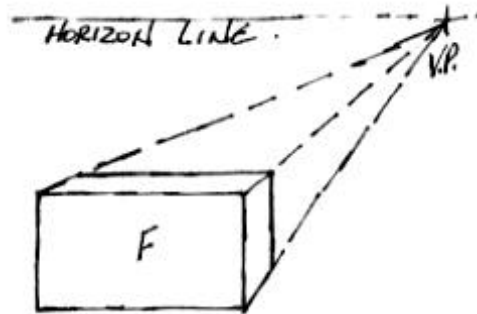


Pictorials

Pictorials are picture drawings that show more than one side of an object at the same time. There are many forms of pictorials. The most accurate form of pictorial drawing is perspective. It shows objects in the form that we see them, or that cameras photograph them. Perspective is a very complicated form of drawing to complete, so a number of other drawing types have been developed. The following sequence shows the basic types:

One Point Perspective

One point perspective is used to show simple objects.



One Point Perspective

Notice the horizon line and the single vanishing point. The object can also be on or above the horizon line.

Cabinet Projection

Cabinet projections are approximations of one-point perspective. To simplify drawing them, the perspective lines are replaced with lines at fixed angles so that they could be drawn with standard drafting instruments (T-Squares and triangles). The two common forms were:

30 Degree Projection

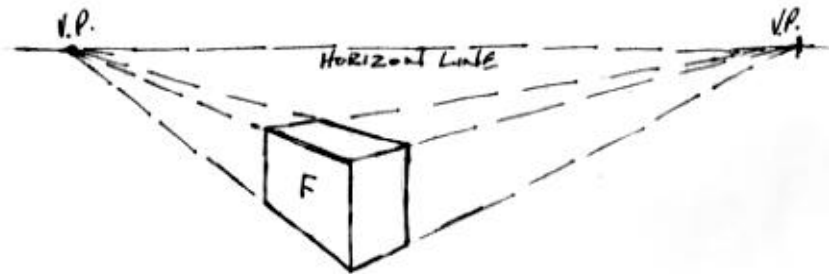
45 Degree Projection



According to the 1946 publication of *Audels Answers on Blueprint Reading*, distances on the 30 degree projection were 2/3 normal size, and on the 45 degree projection were 1/2 normal size. This is a very old style and is seldom used today.

Two Point Perspective

Two point perspective is a common form for pictures and artwork. Three or more points are also very common. They are not used as frequently for technical drawings, except for illustrations. Illustrations usually are done to look realistic and include shadows, shading, textures and color. Technical drawings are usually line drawings.

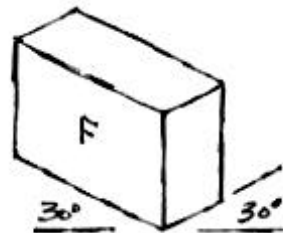


Two Point Perspective

Notice the horizon line and the 2 vanishing points. The object can be on or above the horizon line. Technical drawings would most often be below as shown in the diagram above.

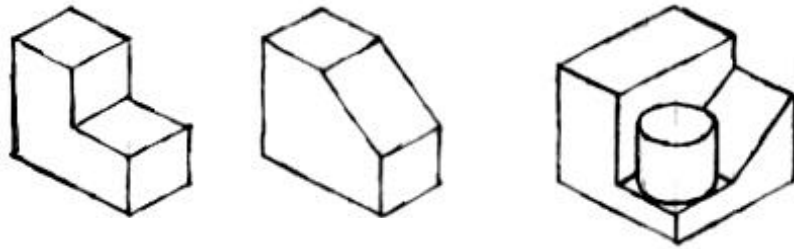
Isometric Drawings

Isometric is an approximation of two-point perspective. As with cabinet projections, this form was developed to be drawn using standard drafting instruments. This form is widely used for technical drawings and is supported in all CAD programs. Autosketch, for example, has an isometric grid mode which makes it easier to draw isometric drawings.



Isometric Example

Note that all lines are either vertical or sloped at 30 degrees. Isometric drawings use full dimensions on all sides. Very complex drawings may be done relatively easily with isometrics.



Isometric Examples

Orthographic Drawings

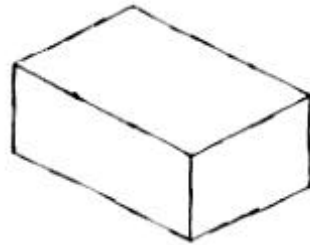
Orthographic Projection is a projection on a plane, using lines perpendicular to the plane.

Graphic communications has many forms. Orthographics is one such form. It was developed as a way of communicating information about physical objects and is part of a universal system of drawings. House plans, one well known drawing format, are a form of orthographic projection. In simple terms, orthographic drawings are views (front, side, top, etc.) of an object. An orthographic view is one that displays only one side of an object at a time. It takes several views to show all the object. Before dealing with the different views one should note the relationship between the pictorial and orthographic drawing. Pictorial drawings show several sides at the same time. Many people find pictorial drawings easier to understand; however, they do not provide as much information as orthographic views. The most commonly used pictorial drawing for technical information is called isometric drawings, as discussed earlier. Isometric drawings were developed to approximate perspective, but are much easier to draw. For a square box, all the sides are drawn as vertical lines, or at 30 degrees to the horizontal.

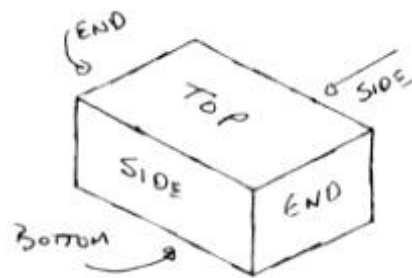
Box Figure 1 shows a typical isometric of a box. Note the way the sides are labelled. This is very important, because each side is normally used to create orthographic views.

Pictorial Drawing Example 1

A simple box has 6 sides - top, bottom, 2 ends and 2 sides. An isometric drawing of a box looks like this:



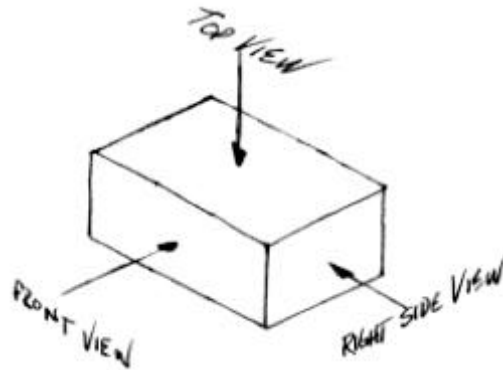
Add labels to the sides...



These labels are OK, but in the world of technical drawings, special labels are used. The label refers to a position on the drawing. Proper labels for the sides on this box are:

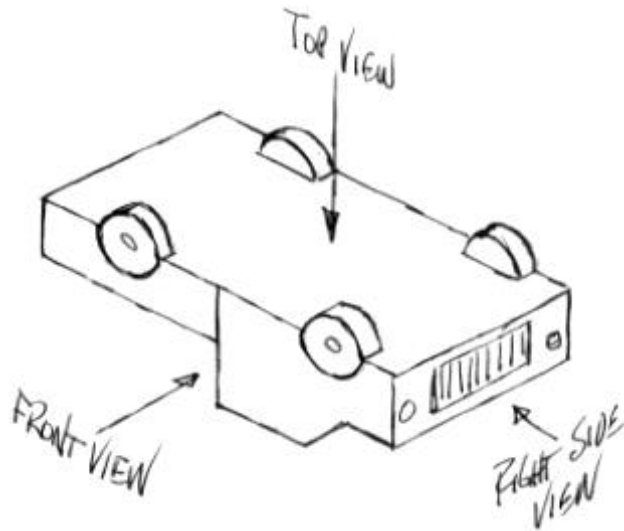
- Top View
- Front View
- Right Side View
- Left Side View
- Rear View
- Bottom View

The drawing on the next page has only 3 sides labelled (bottom is opposite the top, left side is opposite the right side, rear is opposite the front).



One important thing to note is that these labels are for the position. Front view is always in this location, regardless of the object that is drawn.

Note the drawing below:

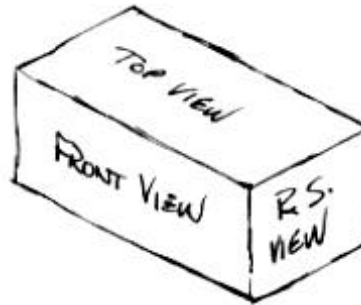


In this drawing immediately above the Front View is actually the view of the side of the truck and the Right Side View is of the front of the truck. Why not draw the truck so that the front of the truck corresponds with the Front View? The answer is related to how this kind of drawing is used to develop orthographic views. By placing the longest part of the object in the Front View, less space is needed to draw orthographic views (projections). The next section illustrates this idea.

The Makings of an Orthographic Projection

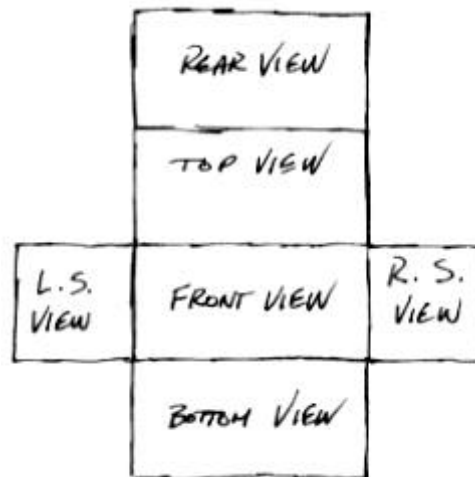
There are several ways to illustrate how isometric drawings relate to orthographic views. The method used here is the non-technical one.

Start with an isometric box::



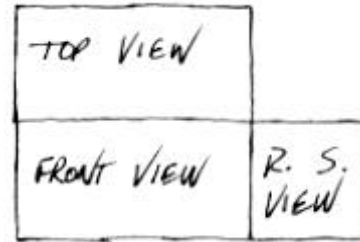
Think of it as a real box. Imagine cutting the box along the corners so that it lays flat.

If you make a particular set of cuts, the box will unfold to look like the following image:



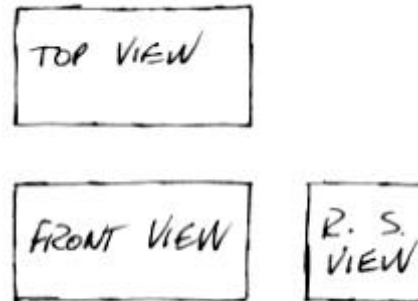
As you can see, the six sides unfold in a pattern. Three sides are normally used to make orthographic projections - Front View, Top View and Right Side View.

The next drawing has the rear, left side and bottom views removed:



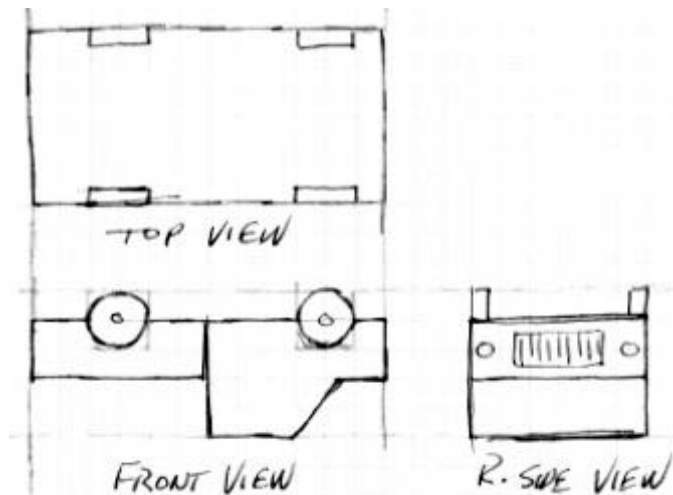
So far, an imaginary box is cut along several edges, folded flat and three of its sides are removed. What is left with are 3 sides of the box. The next step is to separate the remaining sides. Note that the Front View, Top View and Right Side View are still in the same relative position to each other. Also, all surfaces are viewed straight on. Note that in the pictorial drawing, a three dimensional object was displayed and all the surfaces were tilted away.

Finally, the three remaining sides are separated.

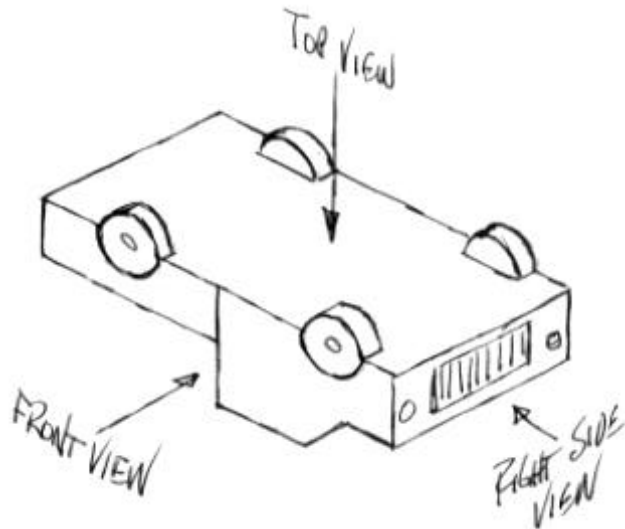


The three views are now starting to look like orthographic views or projections. They are located in particular positions. **They are always located in these positions.** Floor plans for a house are really a special type of Top View.

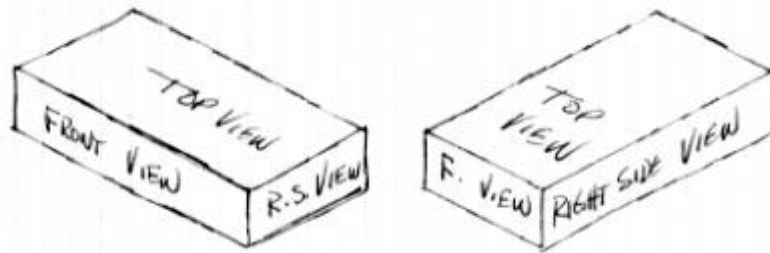
Orthographic views of the truck illustrate the location of views.



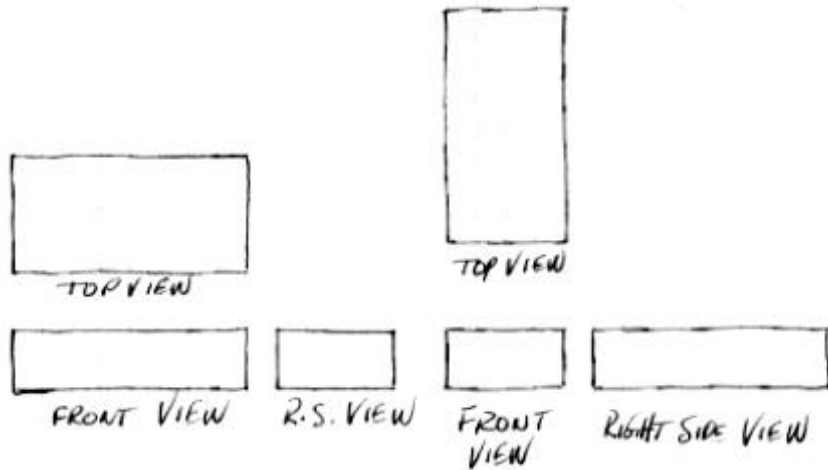
Notice that the views are in the same relative position as they are in the isometric drawing below.



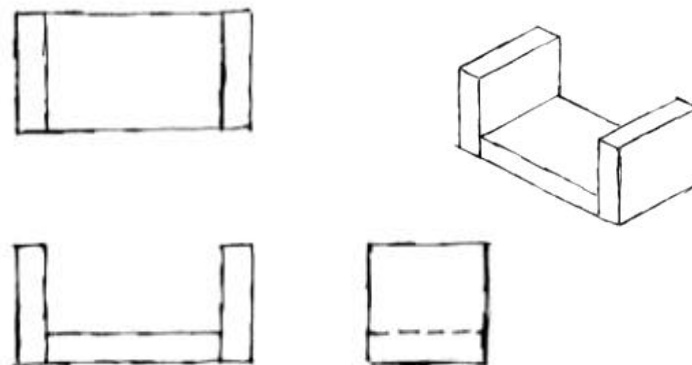
One final set of examples will illustrate why we put the longest side in the front view. The next two isometric drawings are of the same box, but with the long side in different views.



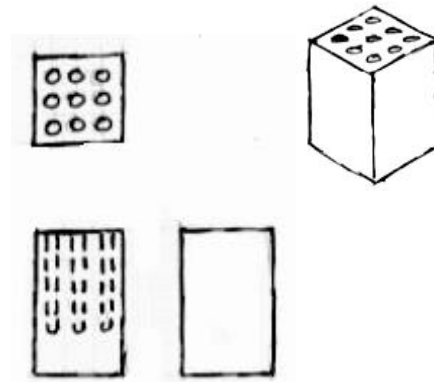
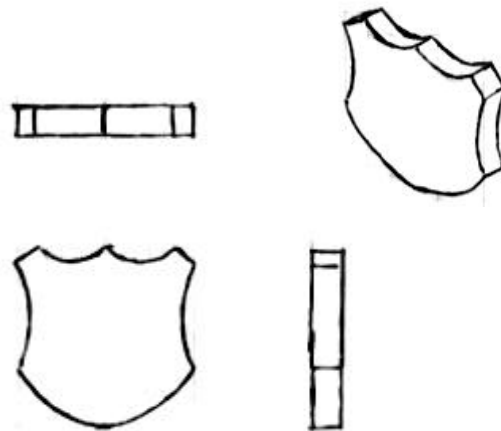
Above are the orthographic projections for the 2 boxes. Notice that the orthographic representation of the one on the right takes up much more space than the one on the left. Notice also that the views are labelled by location and are not related to the part of the object.



Orthographic and Pictorial Drawings - Examples



Example 1

**Example 2****Example 3**

Making Working Drawings

There are three main ways to create working drawings. All of them use the alphabet of lines and employ the same rules for technical drawings.

Sketches. Sketches are drawn freehand without any aids such as rulers. It is the fastest way to create a drawing. It takes a little practice, but gives good results. It is used to work out ideas and details very quickly. Beginners often try to use rulers and other aids, but this is self-defeating as it unnecessarily slows down the sketching process.

Mechanical drawing tools. Mechanical drawing tools include drafting tables, T-squares, plastic triangles, protractors, and a number of specialized tools. Until PCs and CAD tools came along, it was the only way to construct neat, detailed working drawings. These tools make for a slow process and require a high level of technical skill.

Computer tools (CAD, Illustration software). Computer Assisted Drafting (CAD) tools are used extensively for creating technical and working drawings. Besides the high level of accuracy, they allow creation of libraries of drawing parts which may be used again in different drawings - a significant time saver. Three dimensional CAD software simultaneously creates orthographic and pictorial drawings. Any view is instantly available, including the perspective view.

Using Working Drawings

Working drawings are used

- to describe objects
- to describe how an object may be constructed
- to identify the components and develop cost estimates
- to communicate an idea from one or more persons to others

Topic 6: Introduction to Graphic Design

Introduction

Graphic design is a term traditionally applied to a collection of processes and strategies used in publishing, advertising, and other industries. A graphic product typically has copy (text) and images (line drawings, photos, or some other form of artwork). Its purpose is to convey information to a particular audience or group of audiences. Although the purpose is the same, the concepts and practices are substantially different than the previous topic of communications graphics or technical drawings. Frequently, technical drawings are incorporated into graphic designs or document layouts.

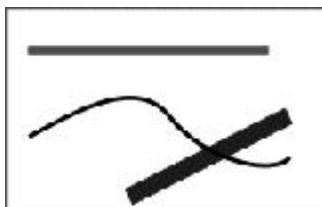
The major concepts of graphic design include basic design elements and principles, typography, and image design. These are typically incorporated into the principles and practices of page layout. Page layout refers to the overall organization of images and text on a page or a screen.

Basic Design Elements and Principles

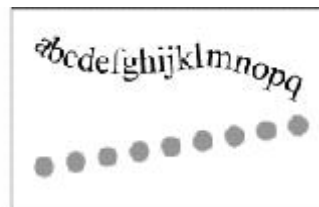
Elements of Graphic Design

Graphics are composed of basic elements. These may appear as defined, or physical, features. They may also be implied by positioning one or more elements in particular arrangements.

Line. A line is the most fundamental element of a graphic. Lines can exist alone or be part of a collection.

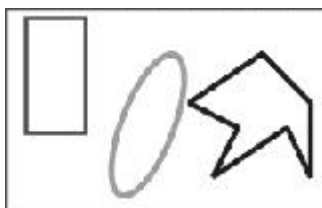


Defined Lines



Implied Lines

Shape. Shapes are areas enclosed by lines. They can also be a result of a collection.

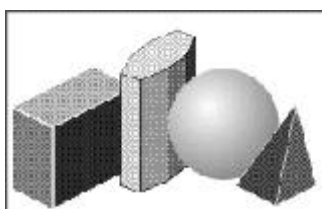


Defined Shapes

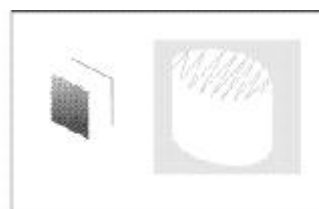


Implied Shapes

Form. Forms are 3-dimensional or can have the appearance of being 3-dimensional.



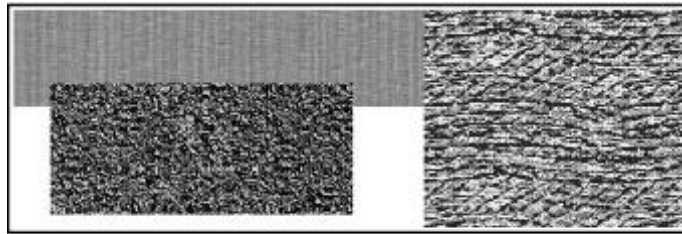
Defined Forms



Implied Forms

<http://www.stemnet.nf.ca/eastwest>

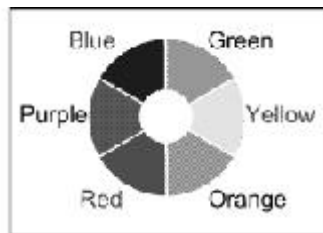
Texture. Texture refers to the visual look or feel of a surface. It is, or implies, a 3-dimensional feature. For printed graphics, texture can be a tactile element as well as a visual one. Graphics on a wallpaper, for example, can be embossed or 'raised' on the surface so that the texture can be felt. This is not possible with video and computer graphics, so the texture has to be visual and has to imply a physical texture. Texture can, for example, be rough, smooth, soft, hard, or appear warm or cold.



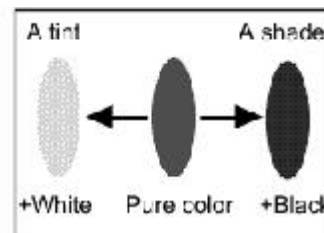
Various textures

Color. Color affects the attention given to parts of a graphic. Some colors appear to stand out, while others appear to recede. Color affects the overall appearance of a graphic as well as the detail that the viewer sees.

Some groups of colors work together very well and are considered harmonious; others do not and are in contrast to one another. Color affects the appearance of size and weight, and often affects a person's feelings. Many colors are associated with specific events or products.



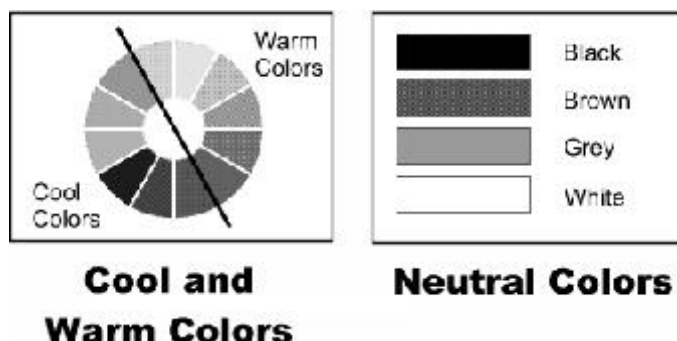
Basic Color Wheel
Primary color Secondary color



Color Tone

Example 1

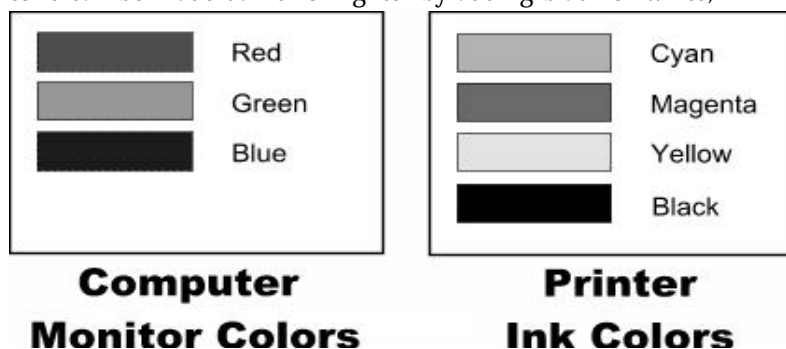
<http://www.stemnet.nf.ca/eastwest>



Example 2

Color is employed differently in print and on computer monitors. Colors on a video screen are created differently than those on physical materials. Video images are light sources. The primary colors used to create them are red, green and blue. Mixing them in equal proportions gives white. An absence of all three gives black

Printed images are viewed from light reflected from the image. The colors used to create a printed image are cyan, magenta, yellow, and black. Cyan, magenta and yellow are the complementary colors for red, green and blue. Theoretically, mixing the three colors gives black. Black ink is required in printing because mixing the three inks does not give a true black. When creating computer based graphics that are to be printed this conversion process has to be considered. Color tone can be made darker or lighter by adding black or white,



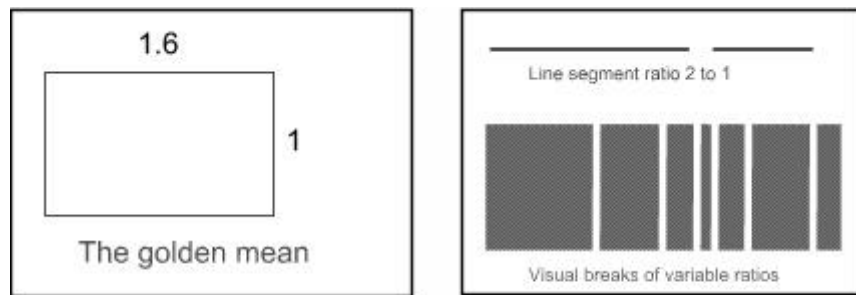
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Principles of Graphic Design

A number of principles of visual design have been identified. These principles provide rules for arranging the elements of a graphic. By following these principles, one can create graphics which most people find pleasing to view.

Proportion. Proportion is the relative size of the various elements of the graphic. When they are correct, the graphic looks 'right'. The ancient Greeks, for example, frequently used proportions of 1 to 1.6 when constructing buildings and works of art. We call this the golden mean and continue to use it.

Examples:

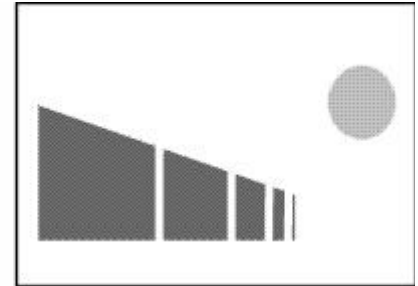


Proportion - ratio of sizes

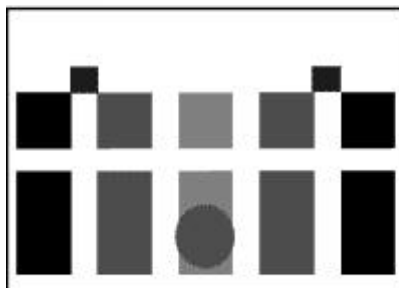
Balance. This refers to the relationship of the left and right sides of a graphic. If one is the mirror image of the other, it is formal balance (static or symmetrical). Formal balance can also occur when both sides are different but have equal visual weight. If they are different and one side is dominant visually, it is informal balance (dynamic or asymmetrical).

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Examples:



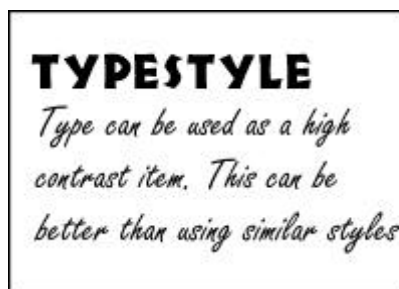
Informal Balance



Formal Balance

Contrast. Contrast provides a strong attention-getting feature, but should normally be used in moderation. If used well, it can improve harmony. Contrast can be provided by color, shape, position, type, or images.

Examples:

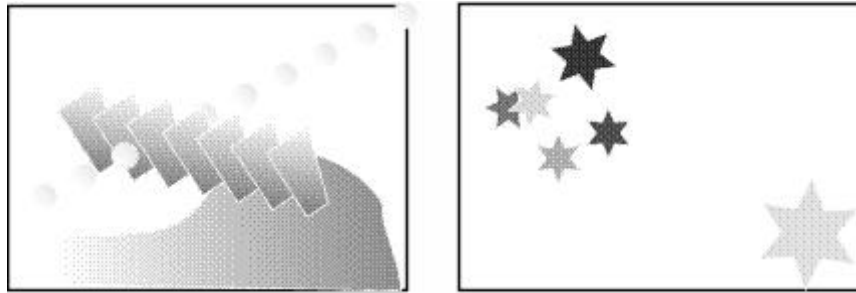


Contrast

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Pattern. Pattern is the use of repeated elements. Patterns can be 2-dimensional and 3-dimensional.

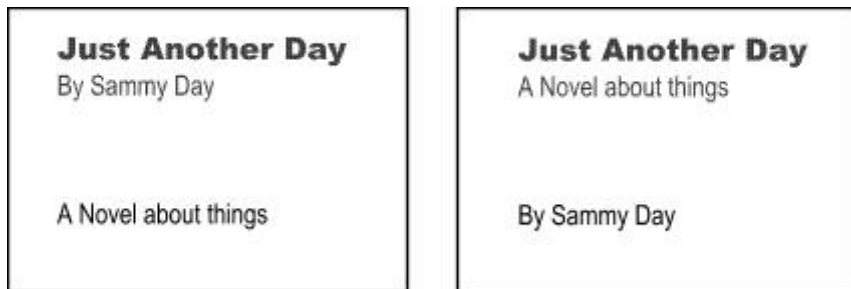
Examples:



Pattern

Proximity. Information items that are related to each other should be placed closer together. Items that are not related should be moved further apart.

Examples:



Poor Proximity Good

Alignment. Alignment is the relationship of elements in the graphic. They should be aligned to the right, left, or center or should use another strong visual organization. Try to avoid some items aligned one way and some items aligned another way on the same page.

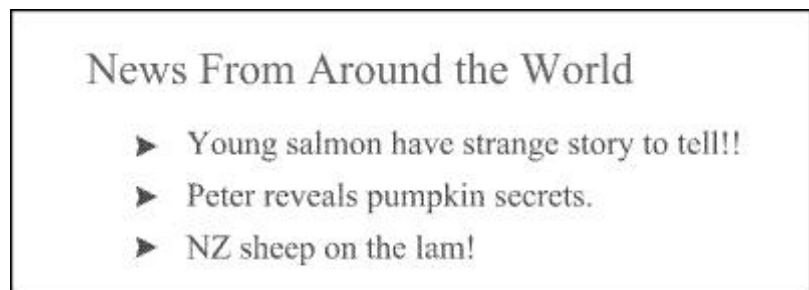
Examples:



Alignment

Repetition. This refers to consistency of some feature in the design. Use of a specific font and type size, a color, bullets, or a specific graphic item can increase the strength of the design and give it a unified look.

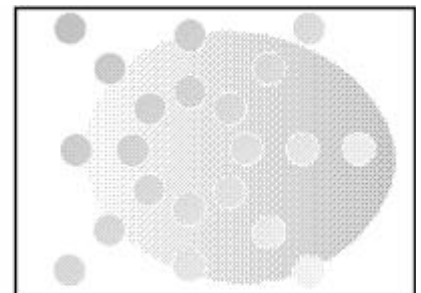
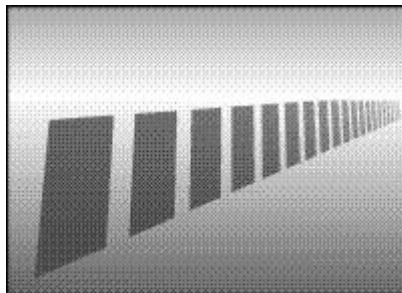
Examples:



Repetition

Rhythm. Rhythm is the feeling of movement in a graphic. It can be achieved by repeating a design element (line, shape, color), by gradual changes in the elements as they are repeated, and by radiating them out from a central point.

Examples:



Rhythm

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Whitespace. Whitespace is the amount of space in a graphic that is not filled by text or images. Although the term initially was used to refer to printed graphics and documents, it also applies to other graphics media. Whitespace is as important as any other part of the design. It provides eye relief and gives greater strength to the elements that are important to the design.

Examples:

Poor use of whitespace
This text is completely filling the space. There is no rest for your eyes. Reading becomes tiresome very quickly and the reader leaves without knowing what you have to say. This is not effective or useful, since the whole purpose of the exercise is to relate a message to th

Better use of whitespace
This text is placed with whitespace to provide eye relief.

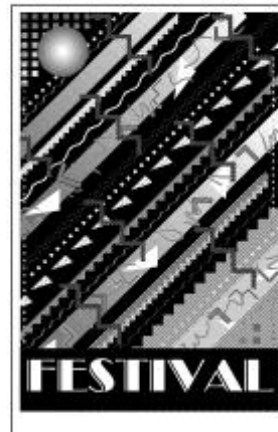
Whitespace

Unity. This is the intended effect of every graphic design. All the elements appear as if they belong together. The graphic has good balance, proportion, and harmony. There are several forms of unity.

Thematic unity occurs when all the items are related to one another.

Tonal unity occurs when all the items in the graphic have a consistent look and feel. Visual unity results when the items have a clear visual relationship and it is in keeping with the message of the graphic.

Typographic unity occurs when the style of the typeface is consistent with the message of the graphic.



Unity

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Typography

Basic Typography Information

Type is the set of letter shapes or graphic symbols that make up an alphabet.

A typeface is a particular alphabet design. Many different typefaces have been developed by changing the shapes of letters. A typeface can have different styles such as light, heavy, bold, and italic. In the computer world, a single style of a typeface (e.g., Antiqua Bold) is known as a font.

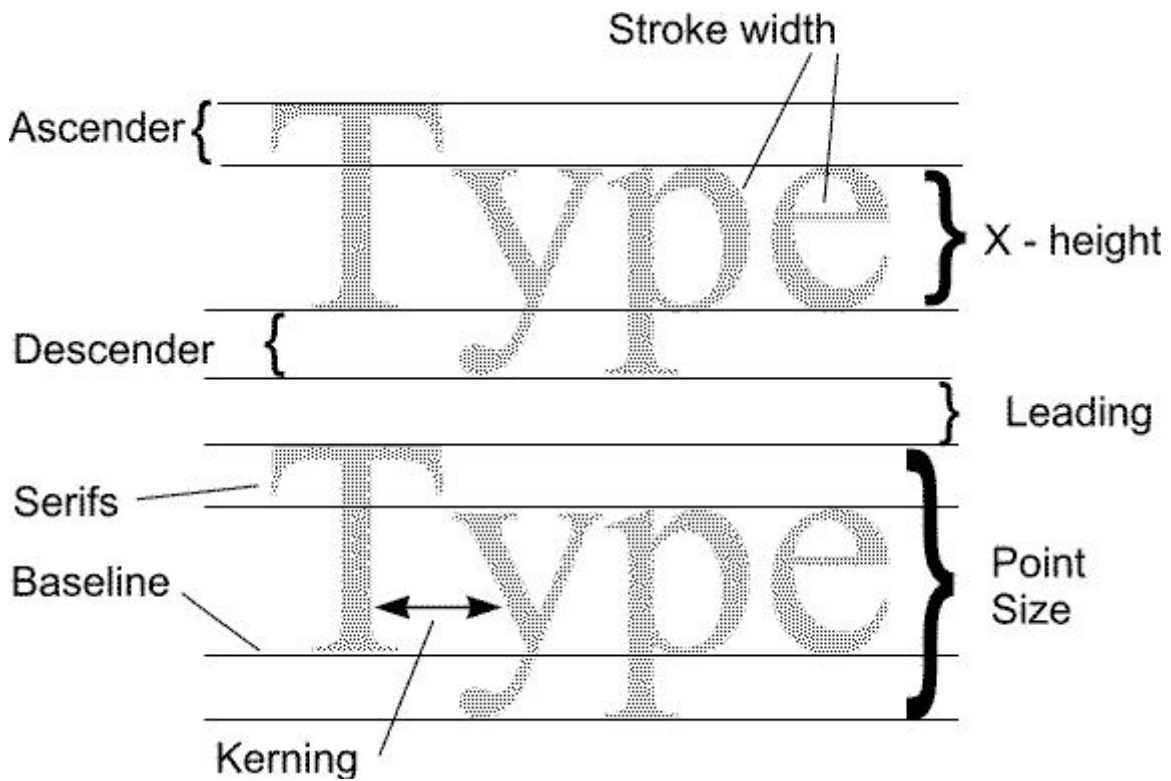
Alphabets in the Western world usually have two distinct cases of letters, upper and lower. Capital letters are often called upper case and small letters are called lower case. These terms probably originated during the time of movable type when lead type was stored in cases. The capitals were in the upper part of the cabinet, and the smaller letters in the lower part.

There are six general classifications of typefaces, ranging from serif to novelty. All fonts fit into one of these six categories. In addition there is a variety of attributes. Knowledge of these classifications and attributes is essential for choosing an effective typeface or font for a particular purpose.

Type Attributes

Each character, or letter, in a typeface can have a variety of attributes as demonstrated by the following diagram. Each of the terms is described in the section following the diagram on the next page.

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Explanation of Terms

- **Baseline**

This is not an attribute. It is the horizontal line that all characters rest on. Only descenders extend below the line.

- **X-height**

This is the height of standard lowercase characters (usually the letter x).

- **Descender**

This is the part of the character below the baseline. The distance is set by the descender line. Different typefaces use different length descenders.

- **Ascender**

The part of the character that extends above a line at the x-height. The distance that ascenders extend above the x-height is set by the ascender line. This also varies from one typeface to another. Often the ascender height is not the same as the height of capital letters.

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- **Stroke width**

This is the thickness of the strokes that make up a character. It often varies along the shape of the character as in these examples. There is a variety of widths available for many typefaces. These include hairline, thin, light, book, regular, medium, demibold, bold, heavy, and ultra.

- **Point size**

This is the total height of the character set measured from ascender to descender lines.

- **Leading**

Pronounced "ledding." This is the spacing between lines of text. The name comes from the lead type used in printing presses. Additional spacing between lines of type was created by inserting a thin strip of lead between each line.

- **Kerning**

This is the spacing between pairs of characters. Kerning is usually adjusted so that the area between each pair of characters is the same.

- **Serif**

A short line added to the ends of characters.

Type Classification

- **Serif**

A serif is a short line or shape added to end of characters to improve the readability of words and sentences. Serif type has these elements as thin strokes and are usually called roman letters. This is the most legible form of text and is used extensively in books and other publications. It works very well in headlines.

Bookman Old Style
Century Schoolbook
Times New Roman

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- **Sans-serif**

Type without serifs. This is a very clean design. Some examples are very legible. It is often a good choice for headlines and special emphasis.

AvantGarde
Arial
Helvetica

- **Square serif**

This is similar to serif, but the serifs are blocks. This form is more difficult to read and should be used sparingly for special purposes.

Aachen BT
Alexandria Medi
GeoSlab703 Lt

- **Script**

Script is a type that is similar to handwriting. It is often used in invitations, greetings and announcements. It is never used in all capitals.

Brush Script
Lucida Handwriting
Linus
Park Avenue

- **Old English**

Sometimes called **Text**. This is a very ornate style with elaborate decorations. It was used by scribes during the middle ages. It is mainly used for special purposes.

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Uechi Regular
 Saxon
 RSLaserLondon
 Monk

- **Novelty**

Any typeface that cannot fit the previous 5 is assigned to this category. Often a typeface is designed for a particular purpose, such as company names, special events, or to portray a 'feeling'.

DESOTO
 NEWFOUNDLAND
 Ransom Note

Type Styles

Many typefaces are available in a variety of styles. For example, normal is vertical, italic is redesigned to be thinner and tilted slightly to the right, and oblique is tilted without being redesigned.

Bodini Normal
Bodini Normal Italic
Bodini Oblique
Bodini Bold

Characters can also be **normal**, **condensed** (squeezed together across the width), or **expanded** (stretched across the width). This is often done with computer software.

Bodini Normal
Bodini Condensed
Bodini Expanded

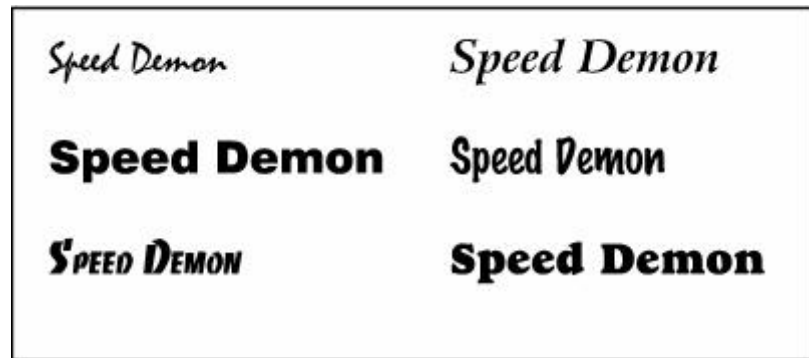
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Effective Use of Type

Typeface makes a significant difference to the effectiveness of type in a graphic design. It can appear heavy or light, inviting or forbidding. Several considerations must be accommodated when choosing an appropriate face.

- **Type effect**

This is the overall look of the type. It can enhance or detract. Which of the following do you think goes better with the message?



Type Effects

- **Type texture**

The texture of type is created by three factors:

- The **x-height** controls the body height of the characters and affects amount of whitespace between the lines of text. Smaller x-height makes a page of text seem lighter.
- **Stroke weight** affects the appearance of heaviness of the characters. Some typefaces have variable widths and look very delicate, while others are thick and look very heavy.
- **Leading** refers to the spacing between lines of text. More leading gives an open, airy look and less leading gives it a heavy, dark look.

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Example 1

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

Type Texture: x-height of characters*Example 2*

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

Type Texture: stroke weight*Example 3*

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

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Type Texture: leading

- **Serif versus Sans-Serif**

A good rule of thumb is to use serif fonts for body text. It can also be used for headings and most other applications. Sans-serif fonts are quite effective for headlines, short attention getting messages, and larger type sizes used for contrast. If the type is to be very small, sans-serif is most effective.

- **Justification**

This refers to the alignment of the left and right edges of a column of text. There are four possibilities - left justified, right justified, centered and full justification. Left justified is always easiest to read because the whitespacing between characters and words is constant and the left margin is visually easy to find.

Left Justified

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

Right Justified

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

Centered

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

Full Justification

John was lost without his old socks. They were simply essential to his plans. He intended to find them at first light.

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- **Capital Letters**

Sometimes all capitals are used for emphasis. This is tricky to do since it decreases the readability of the text. Text is read by observing the outlines of the words. Use of all capitals means that all words will have the same shape - rectangular. It is usually best to avoid all caps except for very special occasions, and then only for one or two words.

Example 1

THIS WAS THE FINAL STRAW. NOW THE
YOUNG OFFICER KNEW JUST WHAT TO

This was the final straw. Now the young officer
knew just what to do. He would invest his money
with a different banker, that was for sure.

All Capitals vs. Upper/lower case

Example 2

ALL CAPITALS

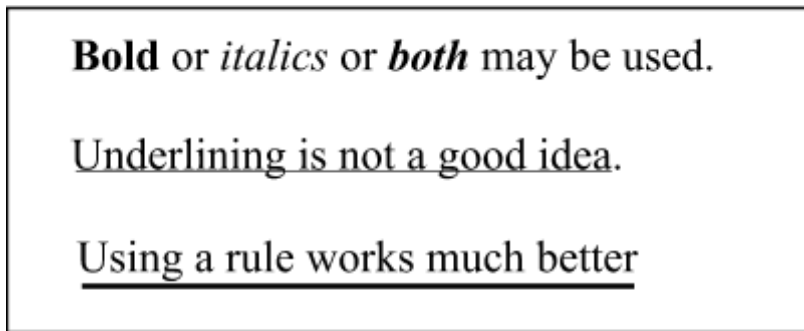
All Capitals

All Capitals vs. Upper/lower case

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- **Emphasis and Contrast**

Emphasis and contrast can be achieved with type by using different typefaces and/or sizes. In addition one may use bolding and italics as well as other effects. Underlining is never a good thing. If a line under text is desired (and never in the body of a document) use a rule. A rule is a separate line. Its thickness and length can be controlled. It is always placed below the descenders.



Use of Text for Emphasis

Image Design Issues

Images (line art or photographic) are an important element in any graphic design. Just as with typography, there are do's and don'ts which, if observed, can lead to a better image. Some of these are listed below. As with the design considerations for typography, these are not absolute rules. All the elements and principles of design from the previous lessons apply here as well. Each is used to contribute to the unity of the image.

- **The Dominant Feature**

In this type of image, a particular component of the image is clearly the most important. Everything else supports this element.

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The Dominant Feature

- **Balance**

Balance in images can be symmetrical (formal) or asymmetrical (informal). Image components of color, size, shape, location or visual interest may contribute to the balance.

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Informal Balance

- **Proportion**

Proportion is achieved through the distribution of elements in the image. Often some elements are placed slightly out of proportion to add tension and interest. Sometimes an additional element in an otherwise perfectly proportioned image does the same thing. The angle of a photograph can achieve the same effect.



Proportion

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- **Rhythm**

Rhythm, or a recognizable pattern, is often used to imply flow or movement. By repeating an element or very similar elements, attention is drawn through the image.



Rhythm

- **Perspective**

Perspective incorporates the visual cues that distance provides. Objects get smaller as they move further away. Parallel lines (roads, fences, railway tracks) converge in the distance.

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Perspective

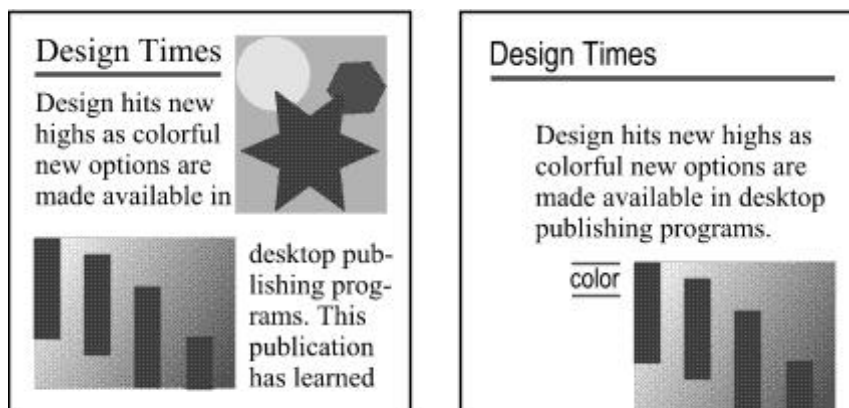
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Basic Document Layout Issues

Layout is the process of placing the graphic elements in a graphic. It most often refers to document design. Documents usually have multiple pages. For electronic publishing, either to a screen (e.g., for the Internet) or to a printer, the basic considerations are the same. There is a message, there is an audience, and an effective layout is required to get the audience's attention and keep it.

- **Simplicity**

The most basic requirement is to keep the layout simple. Visual confusion is easy. Visual clarity requires a simple layout. Include only those elements essential to the message. Bring the reader's attention to the message as quickly as possible. Make the message clear and obvious. This can be done without being boring. Which of the following examples is the easiest to follow?

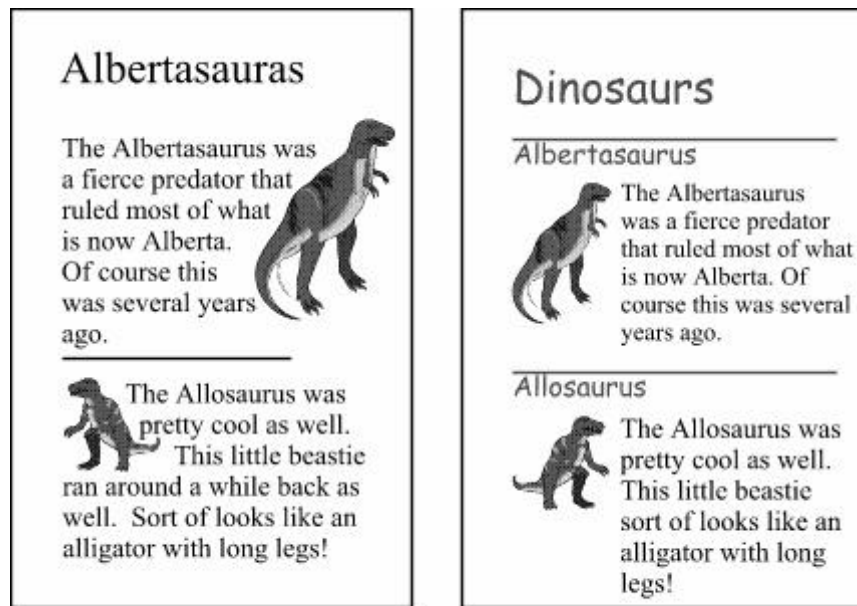


Simplicity

- **Consistency**

Once a particular pattern has been established (e.g., typeface for headings/body text, size and color for rules, position of images), use it consistently. This provides visual cues which help the reader to follow the flow of information. Examine the following to determine which is more consistent. Why did you choose that particular one?

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Consistency

Consistency in layout can be achieved by using tags and grids:

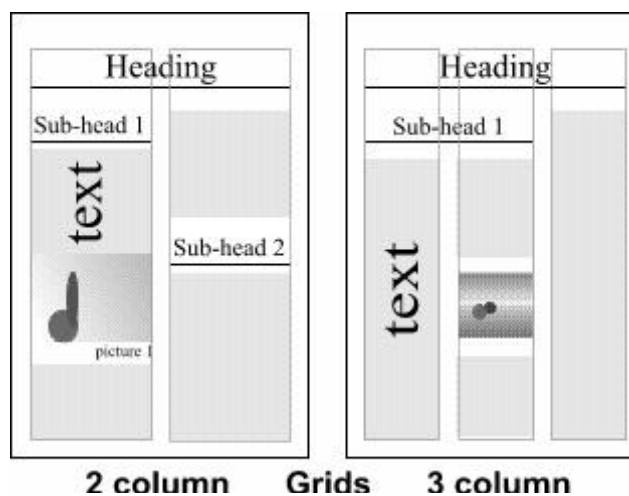
- **Tags**

These are electronic markers which specify typeface, fontsize, margins, character and line spacing, paragraph spacing, and a number of other criteria. Many wordprocessors and all desktop publishing tools employ tags. Some programs call them styles. Using a tag to format all items that are called **headinglevel2**, for example, ensures that they all look alike. HTML documents, like the one you are reading, use tags to format text and place images on the screen.

- **Grids**

These are standard practice in publishing. Two, three and four column grids are used. Electronic publishing for the Internet is generally restricted to 2 columns since most computer screens are between 600 and 800 pixels (picture elements consisting of a red, a green, and a blue dot) wide. A grid allows consistency without being boring. Items may span one or more columns.

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- **Make the Message Easy to Find**

Different approaches are possible, depending on the message and the audience. Information should be easy to find and follow. Remember your medium. What works for a technical manual may not be very good for a story. Where possible, use visual cues and markers to draw attention to key locations and points in the information. Which example provides the most obvious message?

New Car News

The decision had been made. There would be no reprieve. This vehicle was going to be let loose on an unsuspecting public. It had things no previous vehicle had ever seen. There was the new brake system, for example. They stopped this vehicle in less than 10 feet. Of course, that was if it was only moving slower than 10 kph. If the speed exceeded 100 kph, the required distance was 75 meters. Another new feature was the air intake system. It gave the engine a better air-fuel ratio with increased fuel economy. A liter of fuel was good for 50 kilometers. This was true only for downhill driving.

New Car News

All New Vehicle Ships

The decision had been made. There would be no reprieve. This vehicle was going to be let loose on an unsuspecting public. It had things no previous vehicle had ever seen.

New Brake System

There was the new brake system, for example. They stopped this vehicle in less than 10 feet. Of course, that was if it was only moving slower than 10 kph. If the speed exceeded 100 kph, the

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Ease of access to the message

- **Give the Layout Breathing Room**

Squeezing too much information into the available space is self defeating. Readers will get tired quickly. Allow lots of whitespace. Whitespace is not necessarily white if you are designing for video or a computer screen. An open, airy look is achieved through the methods discussed in the previous lesson on effective type usage. Examine the examples on the next page and other pages to determine which ones make effective use of white space.

- **Design for the Whole Project**

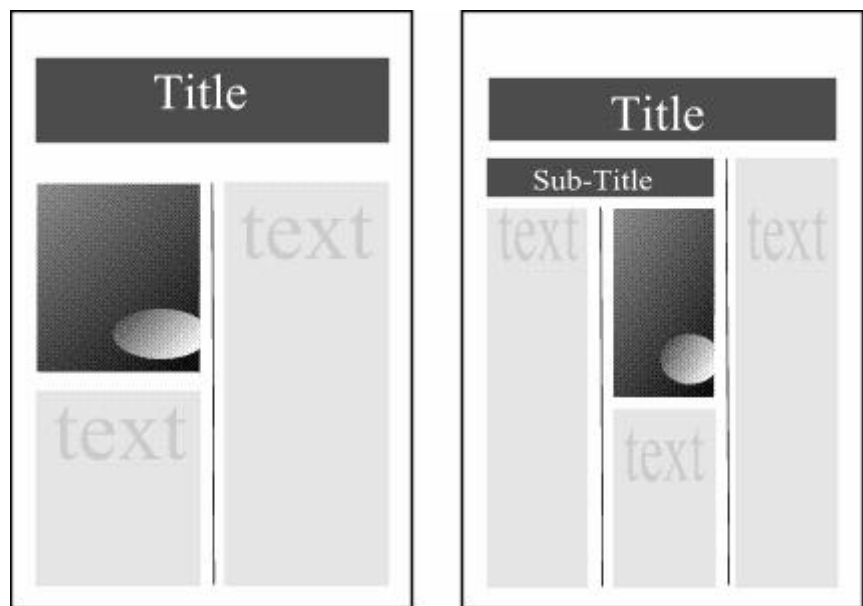
When developing the look for a layout, do it for the entire project. If it changes from page to page (or screen to screen) the reader will get confused. This is particularly true for parts of the project that will be viewed side by side as in two pages of a book, or scrolled continuously on a computer screen. Persistence of vision will also ensure that inconsistencies stand out in a video sequence.

In a multimedia project, the user can be expected to move back and forth and across all parts of the product. Any differences would be very obvious and confusing. Are there examples in this lesson of layouts that could be used through the whole project? In other lessons?

- **How Many Visual Items?**

Three major visual items seem to work well. This can be the heading, an image, and the main text of a single story, or it can be the beginning of two different pieces of information with an image being associated with one of them. In any event, three design features that compete for attention are effective, provided they imply a sequence or clearly distinguish relationships.

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Three items to focus attention

Combining Copy (Text) and Images

Most graphics are composed of text (copy) and images. The advertising industry has discovered that certain basic principles are effective in conveying a message to the audience. It seems reasonable to assume that they will be effective in any situation. As with all previous principles, the designer has to use personal judgement about when to use them. They should be kept in mind when a strategy is being developed. Most of these principles make it easier for the reader to understand the message and to get to that level of understanding very quickly.

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- **Copy versus Illustration/Image**

Copy has priority over illustration. This is a basic rule. A picture may be worth a thousand words, but if the message is simple then state it in simple terms. If there is text over an image, it must be clearly readable. It cannot blend into the image. What message is being given in each of the following images?



Copy versus Image

- **Serif versus Sans-Serif**

Copy should be in serif type for all body text. Anywhere there is to be more than a line or two of text, a serif style font should be used. If you want maximum readability, make it easier for the reader's eyes to follow the text. Sans-serif fonts should only be used with deliberate planning. In the following examples, look at the way the serifs create a horizontal line which draws your eyes across the text.

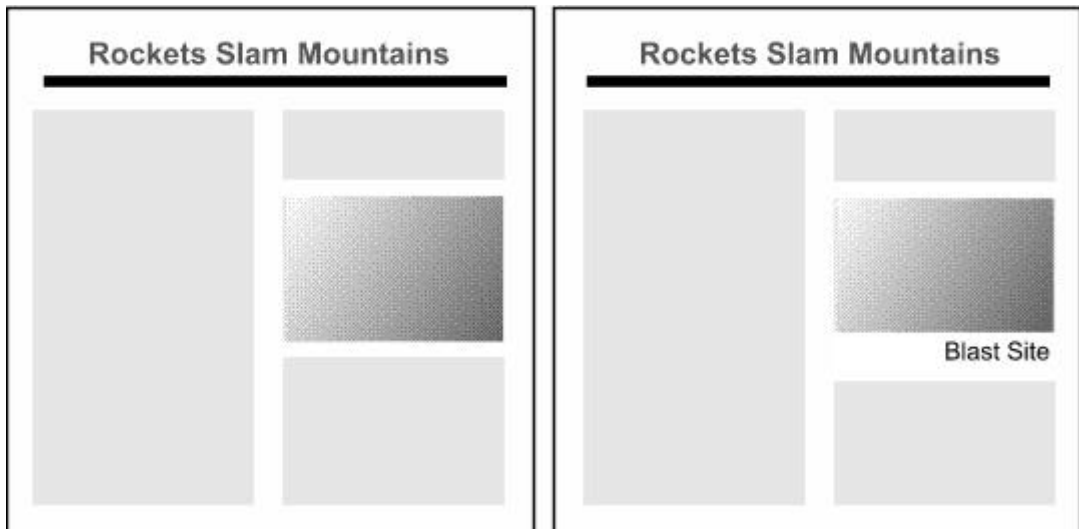
<p>Read this passage to determine how easily sans-serif fonts can be read. This is a typical sans-serif. The typeface is Arial. Text is set in 11 points. Leading is %110 of fontsize. Notice that the stroke width is very constant in each character.</p>	<p>Now read this passage. It is set in Book Antigua. It is also 11 point and set with %110 leading. Notice that the stroke width is variable. Do you feel that this is better or worse for large selections of text?</p>
---	--

Sans-Serif versus Serif

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- **Use Captions**

Every photo/illustration should have a caption. A caption makes it easier for the reader to decide the relationship of the image to the text. Which of the following do you think makes the purpose of the image obvious?

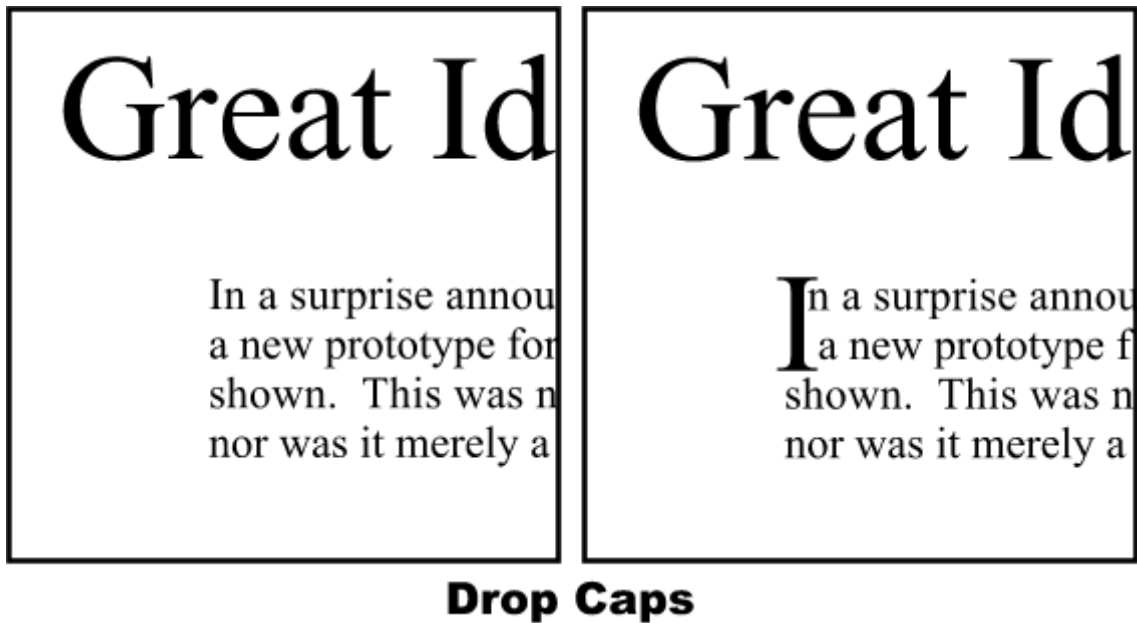


No Caption versus Caption

- Use Drop Caps (capitals)

Start text with drop caps. This leads the eye into the text quickly from the headings. Headings are usually much larger type sizes than body text. A drop cap makes the transition much smoother. Note that in this example, the drop cap goes from the ascender line on the first line of text to the descender line on the second line of text.

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- **Use of Black Type on White**

Readability is the issue. Black text on a white background is always more readable than any other color combination. Sometimes it is unavoidable to use other combinations, especially when text is being superimposed over images. This probably applies more to graphics for video, computers and multimedia than to paper. Most professionally designed Web sites tend to use black text on white backgrounds when more than a paragraph of text is involved.

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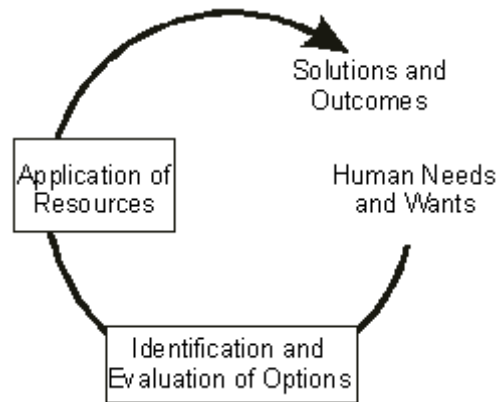
Effects of Text/Background Color

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Topic 7: Technological Problem Solving

Technological Problem Solving

Technological problem-solving is a universal response to human needs and wants. A need or want is identified and a solution is sought. There are many ways of getting from one point to the other. Collectively, these ways may be analyzed and implemented as the technological problem-solving model. In its simplest form, the model involves the steps outlined in the following diagram:



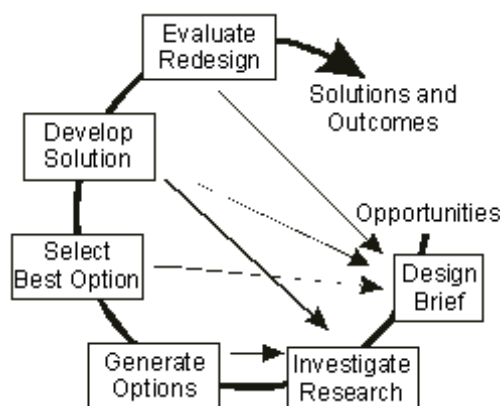
- **Human Needs and Wants.** Needs are basic such as food, shelter and other things considered essential for survival. Wants are much broader and include the full range of things people desire but don't need. By clarifying the needs or wants, one can identify a particular problem (or problems) to be resolved if to allow the need to be met. Problems are usually specific and require immediate, or near term, solutions. Opportunities, on the other hand, are more futures oriented. Often, a want is perceived by an individual only after an opportunity to meet it is presented. This is frequently the case in a consumer society.
- **Identification and Evaluation of Options.** Solution options are identified and variations are determined. Best possible solutions are identified based on a careful consideration of the problem and available resources. After appropriate evaluation a solution is adopted.
- **Application of Resources.** Technological activity always involves the application and consumption of resources including information, knowledge, capital (money), time, raw and synthetic material, tools, machines, and people. Resources are used to develop and test the solution.

- **Solutions and Outcomes.** The solution always has outcomes - some known, some unknown, some positive, some negative. Invariably, technological solutions lead to more needs, wants, problems, and opportunities and the cycle continues.

Design as a Technological Problem Solving Strategy

Design can be used as a noun or verb. As a noun, it often means a drawing, plan or representation. As a verb, it refers to a way of thinking and doing. It is the verb mode that is referenced in the definition 'design (designing) is a purposeful activity that results in a technological solution to a problem'. The design model is a widely used technological problem solving method. Good design tends not to just solve the problem but to provide an elegant solution. Elegance is considered to be simple, uses minimal resources and energy, may be novel, is not always obvious, is reliable, is cost effective, and is of good quality.

The diagram below illustrates the sequence of steps used in technology education programs to engage students in technological problem solving activities. It emulates many of the practices used in industry. Note the way that each stage is connected to other stages, and is dependant on them for input.



- **Opportunities.** Represents the problem situation or opportunity which is used as a starting point for the design activity.
- **Design Brief.** A short document that provides information about the problem, what the solution has to do, if there are any special conditions, and what the student is expected to deliver. It emulates the contract used in various business and industry activities.
- **Investigation and Research.** A fact finding stage that results in information and knowledge about how to proceed, resources that are available and those that are required.
- **Generate Options.** A step that involves idea generation strategies such as brainstorming. Its purpose is to generate a wide variety of ideas, regardless of their value.
- **Select Best Option.** The stage is used to evaluate all the ideas that were generated in the previous step. The same criteria are used for evaluating all the ideas. The best idea usually is selected, depending on the resources that are available to develop it.
- **Develop Solution.** This step usually takes more time than all the others combined. The solution is developed from an idea into a fully functioning product.
- **Evaluate/Redesign.** This is a continuous process. It gets done throughout the development process. It is also done as a formal process after the solution is developed.
- **Solutions and Outcomes.** The consequence of design activity. Seems like the end, but all solutions and outcomes result in new problems and opportunities, and the process continues.

Topic 8: Ownership and Copyright

Concepts and Information

Ethics

Ethics and intellectual honesty in technology education are important issues:

- Design often relies on and employs information and ideas from many different people and sources. It is important to credit those sources and demonstrate how knowledge gained from them assists in further development of new knowledge and new solutions to design problems.
- One of the fundamental purposes of student based design activities is to develop capability with the process component. It is important for students to 'connect' what they are doing and give reasons for their choices. This requires intellectual honesty.

- Use of technological tools sometimes provides opportunities for students to bypass the development of ‘truly’ original material in favor of pre-developed material. Students need to develop the self restraint and integrity that will ensure they do the right thing rather than the easy thing.
- There are often legal consequences for technological decisions.

Copyright

The following quote from the CanCopy web site (<http://www.cancopy.com/>) describes copyright:

"Rights established by the Copyright Act give copyright owners control over their creations, including the exclusive right to authorise reproduction of their works and decide how, and by whom, they are used. Creators are entitled to benefit from their works financially, whether their work is photocopied (as in a page from a novel), or reprinted (as in a short story republished in a new collection)."

Copyright is specified in Canada by *The Canadian Copyright Act*.

CanCopy

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<http://www.cmec.ca/else/copyright/matters/indexe.stm>

Canadian Foundation for Economic Education

"To help teachers and students, the Canadian Foundation for Economic Education, in partnership with the Canadian Intellectual Property Office of the federal government, the Society of Composers, Authors and Music Publishers of Canada (SOCAN), and the Canadian Copyright Licensing Agency (CANCOPY), has produced a teaching kit for use in grades 7, 8 and 9. The kit comprises an 80-page Teacher's Guide and two videos." (Canadian Foundation for Economic Education - **<http://www.cfee.org/>**)

