

AS LEVEL Section D

FACT FILES

Technology & Design

For first teaching from September 2011

For first award in Summer 2012

Design and  
Communication



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and  
design

## 1.29 Design and Communication



### Learning Outcomes

#### Students should be able to:

- Illustrate designs using 2D and 3D methods to include freehand sketching, pictorial, orthographic projection (3rd angle only) and use of mixed media;
- Enhance drawings e.g. use of rendering and texture;
- Produce quantitative drawings e.g. graphs, pie and bar charts, pictograms and sequential flow charts;
- Make use of CAD for drafting;
- Use these to communicate innovative design ideas



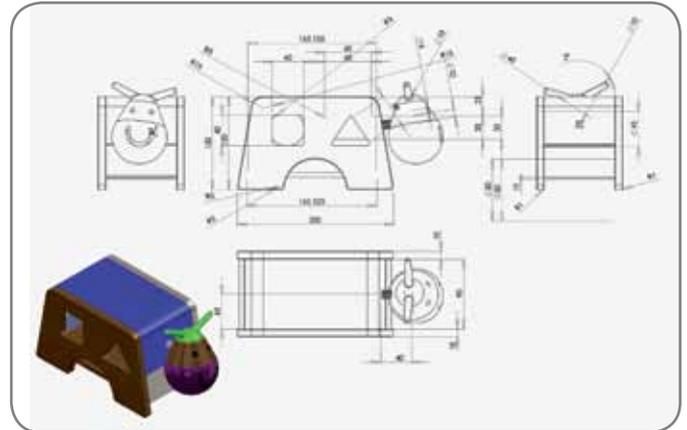
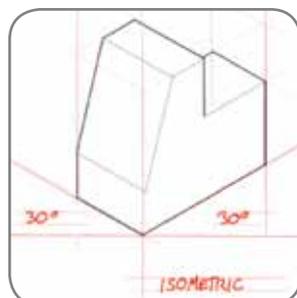
### Course Content

In order to convey ideas to other interested parties designers need to sketch ideas with a range of methods.

Initial ideas will start with quick 'thumbnail' sketches to allow the designer to get a range of concepts on to paper. They will usually lack colour as this can often affect the design choice. Designers often use only one colour or light grey shading to make favoured designs stand out. At this stage the best concepts are singled out for development, often with other designers.

### 2D, 3D and Isometric Sketches

- 2D sketches are easier to produce than 3D and so this is often the best way to start sketching. 2D sketching would include side elevations and section views to show additional details.
- 3D sketches are best done using isometric and perspective views, colour is usually introduced at this stage.
- Isometric sketches require two lines to be drawn at 30° to a horizontal base line. Vertical lines at 90° to the horizontal base line can be drawn to create the required shapes. As isometric does not illustrate objects true to life like two point perspective does, it is sometimes overlooked as an effective sketching technique. However, as isometric shows three sides of an object clearly and the same view can be repeated over and over again on the same design page, it can be easier to compare designs without the influence of perspective.



### Orthographic Projection:

Orthographic projection are detailed line drawings which convey technical and dimensional information. The drawings normally show the product in front, end and plan view. The advantages of using orthographic are:

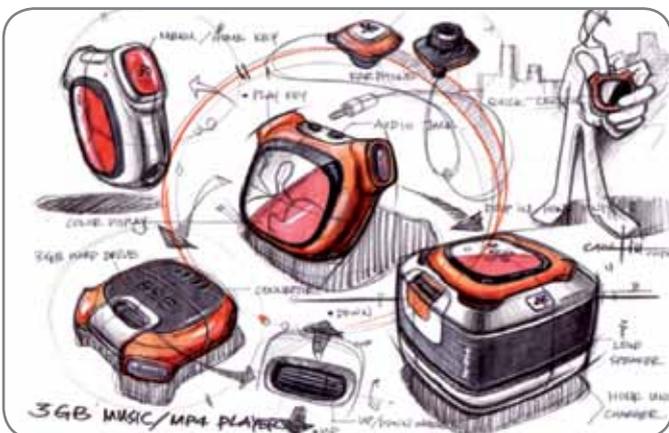
- They can show hidden detail and all connecting parts.
- They can show all dimensions necessary for manufacture.
- They can be annotated to display material and finishes.
- They can be scaled to size, for example aeroplane parts would be too big to fit on standard paper sizes so scaling down e.g. 1:100 where 1mm on the drawing represents 100mm in reality.
- A tolerance can included, this allows the designer to inform the manufacturer how much their manufacturing can deviate from the dimensions on the drawing. So if there is a tolerance of  $\pm 0.01$ mm then all parts manufactured should not be dimensionally any larger or smaller by 0.01mm of the original drawings.

## Rendering and Texture

Colouring with shadows and highlights is known as rendering and makes ideas look a bit more life like. Tools used at this stage are layout paper, pencils, markers, pastel and correction fluid (for highlights). This work is often done on layout or marker paper which reduces the amount of 'bleed' from the ink of the marker pens.

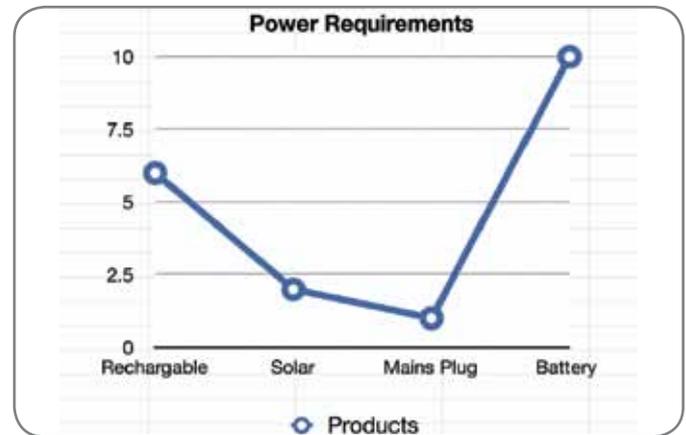


Pastels are also used as they can help produce reflective surfaces when used in conjunction with markers. Both these types of media are popular because they are quick to use and a good designer can produce a range of rendered designs in a very short time span.



It is important to accentuate light and shadow in these sketches, this adds to the 3D perception and designs which are preferred would be rendered in more detail to help them stand out from the other drawings. Light can be shown using white pencil on edges and correction fluid for highlights. Black colour pencil or cool grey markers can be used to add depth and shadow.

## Quantitative Drawings

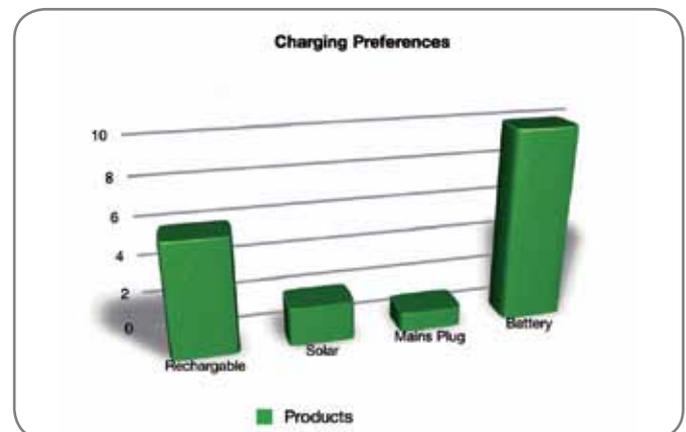


The image above illustrates a graph.

Graphs, Bar graphs and Pie charts allow manufacturers and designers to convey information to a range of different audiences. They can be used to show how well a product performs against it's competitors or for a designer to show clients how research provides evidence for a particular style of design or evidence for the need of a type of product.

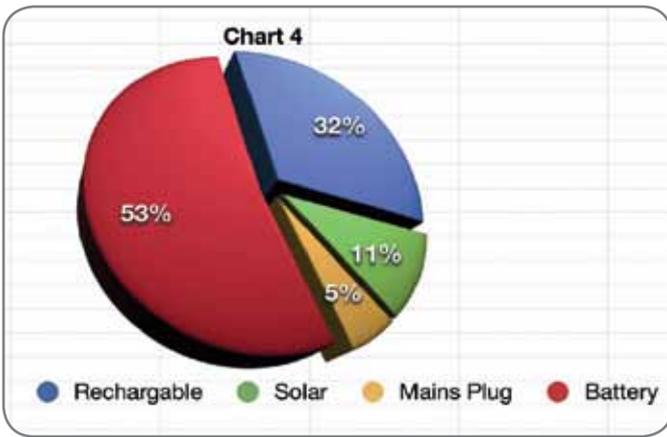
## Bar Chart

Colour helps the intended audience process and comprehend and compare the information easily.



The image above illustrates a bar chart.

## 3D Pie Chart

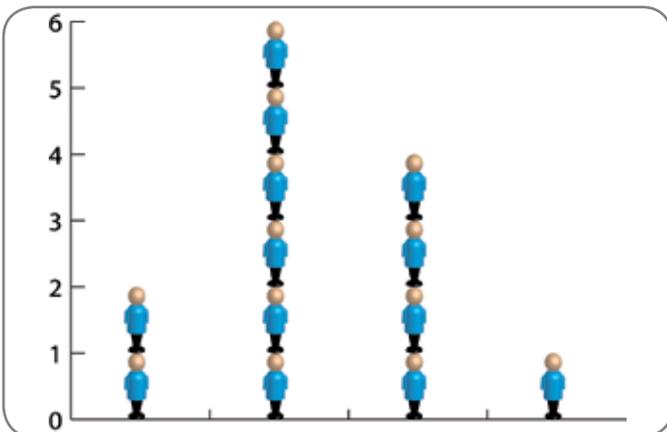


The image above illustrates a 3D pie chart.

This type of chart makes it easy to distinguish proportion, allowing the reader to identify which choice is most popular.

## Pictograph

A pictograph is usually used in infographics, magazines or other literature where symbols are used to represent the graph's content.

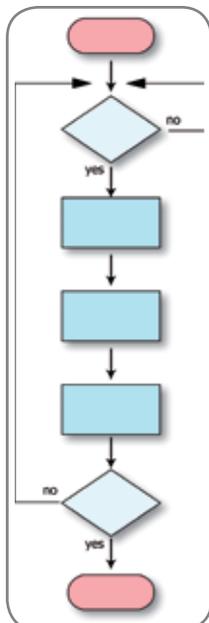


The image above illustrates a pictograph.

## Sequential flowcharts

Sequential flowcharts allow sequential planning of a range of systems from the control system of a product to manufacturing system planning.

Breaking a system down to a flowchart makes it easier to identify problems that might occur during manufacture. This also allows processes to be timed to fit in with availability of materials and machinery.



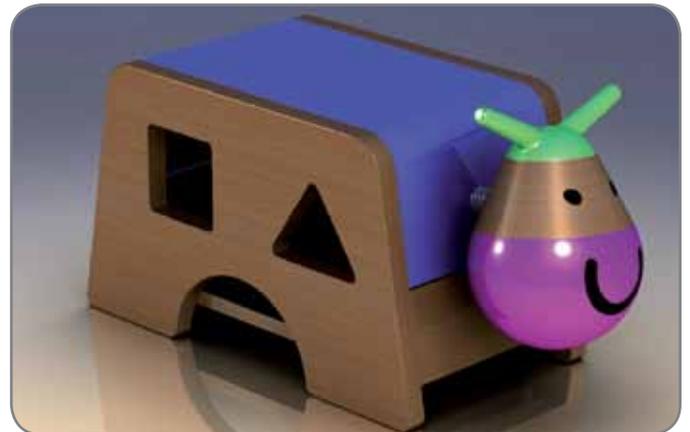
## CAD for Drafting

Computer Aided Design packages like Solidworks and Pro Engineer allow designers to quickly draft ideas in 2 dimensional and 3 dimensional views. They allow designers to quickly exchange ideas electronically and allow exchange of parts between design teams for the assembly of a product.

Ideas can be quickly rendered using the software and colours and textures can be easily adjusted before models are produced.

Designs are produced as parts and can be easily disassembled or exploded for further analysis. These drawings can ultimately be outputted to CNC machines and as they are dimensionally accurate whole products can be quickly assembled.

Exploded views and sectional views allow designers and manufacturers to understand the construction of the production detail.



## Exploded View





## Revision questions

1. Describe **two** advantages and **two** disadvantages sketching has over computer aided drafting. [4]
2. Computer aided design software can produce 'life like' rendered images of a design. How might a designer make use of these types of images? [3]

