

## 12.4 Projections

*Write into notes please*

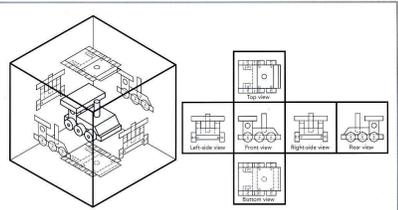
- A **projection** is the representation of a 3D object on a 2D surface.
- Two of the most commonly used projections are:
  1. Isometric (3D view)
  2. Multiview (a.k.a orthogonal)

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*Write into notes please*

- In a **multiview projection**, each face of the object is drawn separately looking at it from straight on. (not distorted)
- Usually the **top**, **front** and **right side** of the object are illustrated.



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## 12.5 Engineering Drawings

*Write into notes please*

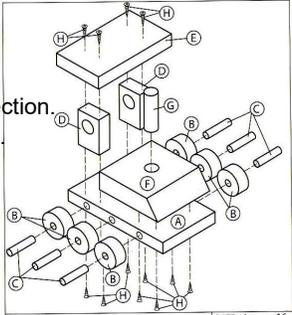
- A **general arrangement** is a technical drawing representing the overall appearance on an object.
- It usually includes:
  - Multiview projection (top, front, & right side)
  - Isometric projection drawn to scale.
  - and a **title block**
    - Name
    - Date
    - Title
    - Scale

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*Write into notes please*

- An **exploded view**
  - separates the parts.
  - uses an isometric projection.
  - Must give a list of parts.
  - See p404



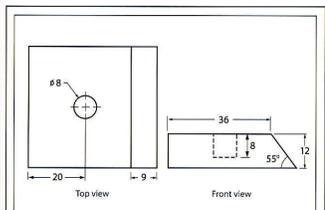
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## 12.6 Detail Drawings:

*Write into notes please*

- specify all of the relevant information for manufacturing a part.
- Are usually drawn to scale.



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## Scale in Drawings

- 1:1 object is drawn life size
- 1:2 **reduced scale** (drawing of object is 1/2 of its actual size)
  - 1 cm on drawing is 2 cm on the item.
  - other ratios include 1:5, 1:10 etc.
- 2:1 **enlarged scale** (a small object is drawn larger)
  - 2 cm on drawing represents 1 cm on the item.

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## Short review on lines

- On blackboard ☺

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## 12.7 Accuracy

- Since machines, tools, instruments, and the people operating the machines are not perfect, the manufactured parts may be slightly different from the dimensions indicated on the drawing.
- A **dimensional tolerance** is an indicator of the maximum acceptable difference between a specified measurement and the actual measurement on the finished object.
  - Ex.1  $3.0 \pm 0.5$  cm → From 2.5 to 3.5
  - Ex.2  $.12^{+0.1}_0$  → From 12.0 to 12.1
  - Ex.3  $22^{+0.1}_{-0.2}$  → From 21.8 to 22.1

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- If the dimensional tolerance applies to all of the parts on a diagram, it may be indicated in the title block.
- It can also be applied to a single part and indicated as shown in the diagram.

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- The **functional dimensioning** of a drawing specifies the information required for the object to work.
  - Eg. How much play is required for a blade to slide freely in a utility knife is shown as the space between the blade and the guide.

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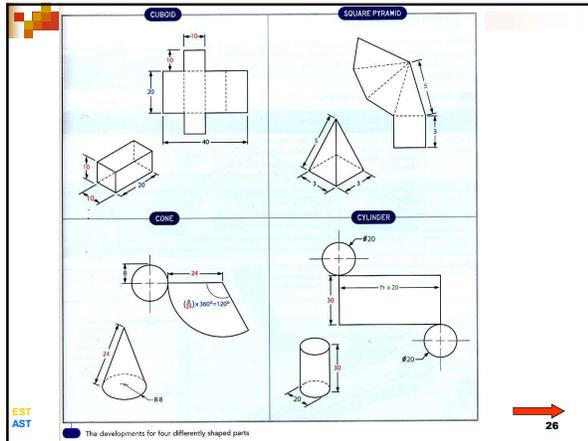
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## 12.8 Developments

- A **development** is the representation of the surface area required to make a part by bending.
  - Eg Sheet metal
  - A dashed line shows where the sheet will be bent.
- p407 You need to know the development of a:
  - Box
  - Cone
  - Cylinder
  - Pyramid

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*Write into notes please*

## 12.9 Diagrammatic Representations

- **Diagram** is a simplified representation of an object, a part of an object, or a system.
- They are used to help explain an object's **operating principals** as well as any other characteristics that must be considered during the manufacturing process.

- Design Plan
- Technical Diagram
- Circuit Diagram

see page 409

AST

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- **Design Plan (shows operation)**
  - Name of parts
  - Movement of parts
  - Shows forces (constraint symbols are used)
  - Other...

*Write into notes please*

AST

Design plan for a pair of pliers

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## Symbols for motion

*Write into notes please*

- Unidirectional translation
- Bidirectional translation
- Unidirectional rotation
- Bidirectional rotation
- Unidirectional helical motion
- Bidirectional helical motion

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- **Technical Diagram (for manufacturing)**
  - Name of parts
  - Material to be used
  - Links
  - Guiding
  - Other ...

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Technical diagram for a pair of pliers

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## Symbols for links & guiding

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- Complete link
- Rotational guiding control
- Translational guiding control
- Translational & Rotational guiding control

MORE ON LINKS & GUIDING IN CH13

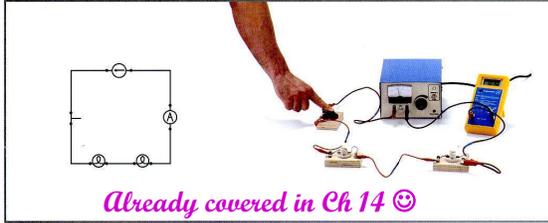
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■ Circuit Diagram

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- Shows circuit components
- Other....



*Already covered in Ch 14 😊*

AS1  Circuit diagram for an electrical circuit assembly

Fill-in Manufacturing notes  
handout.