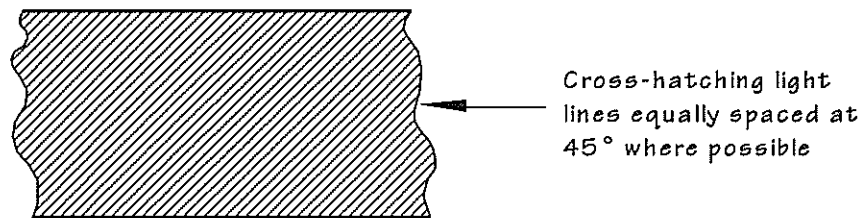


Sectioning standards and conventions - recognition

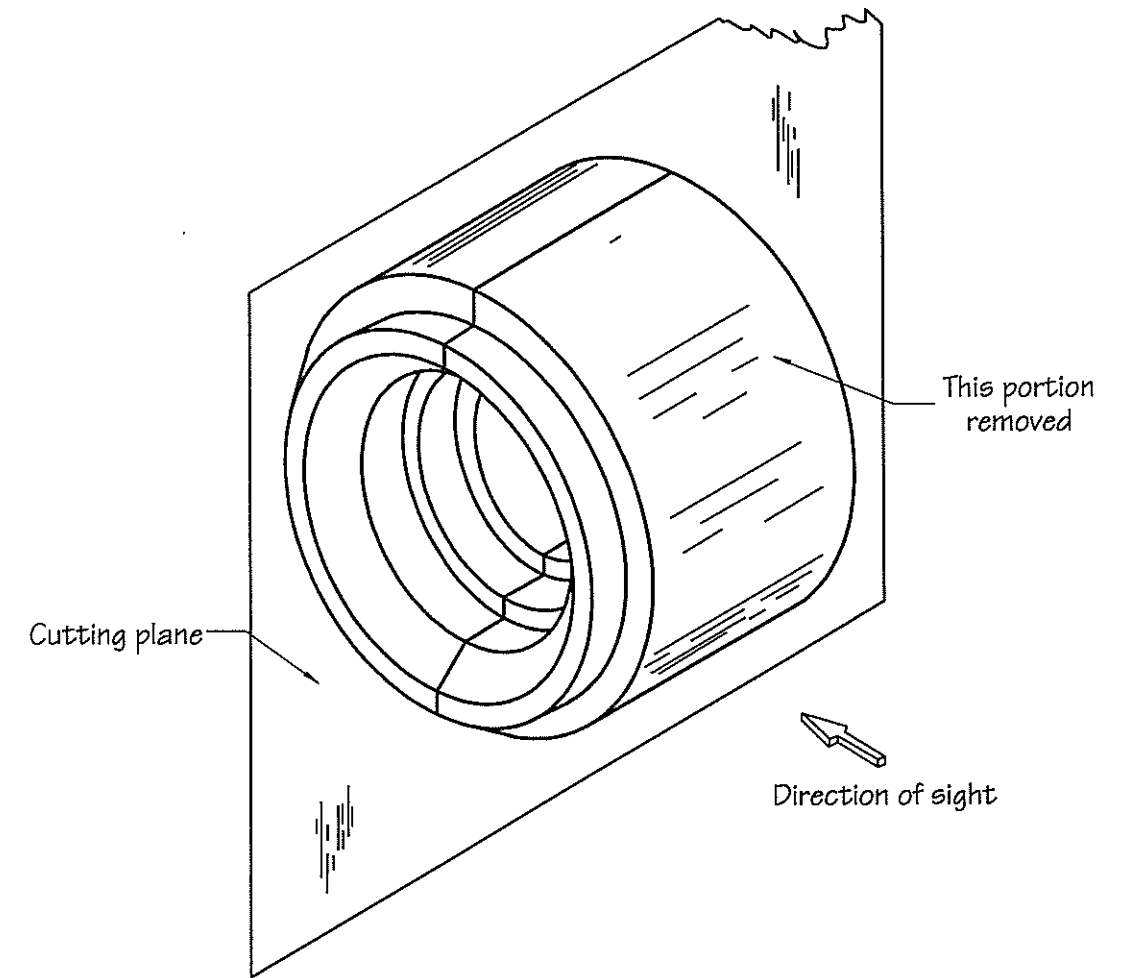
An engineering drawing often needs to show features that we can't see because they are inside the object. If the thing we are drawing is quite simple, we can mark the hidden parts by a hidden outline.

If the thing we are drawing is too complicated for this method, instead of drawing hidden outlines we can make sectional views. This means we imagine that the front part of the object has been cut off so we can see what is inside. The cut off part is only removed in the sectional view and no other view.

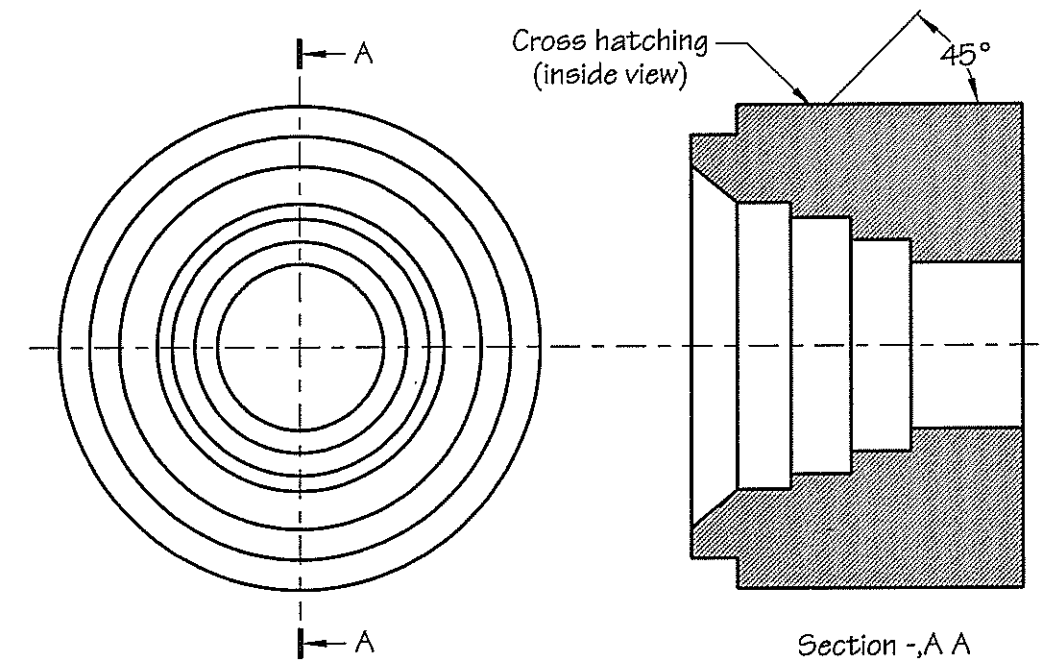
To make the cut parts stand out on the drawing, we use cross hatching. This is a series of parallel lines, drawn very lightly, usually at a 45° angle.



A section plane is shown on a drawing by a light chain line with heavy ends. It indicates where we imagine the object is cut through. We use arrows to show where we are looking from, and letters to identify the sections.

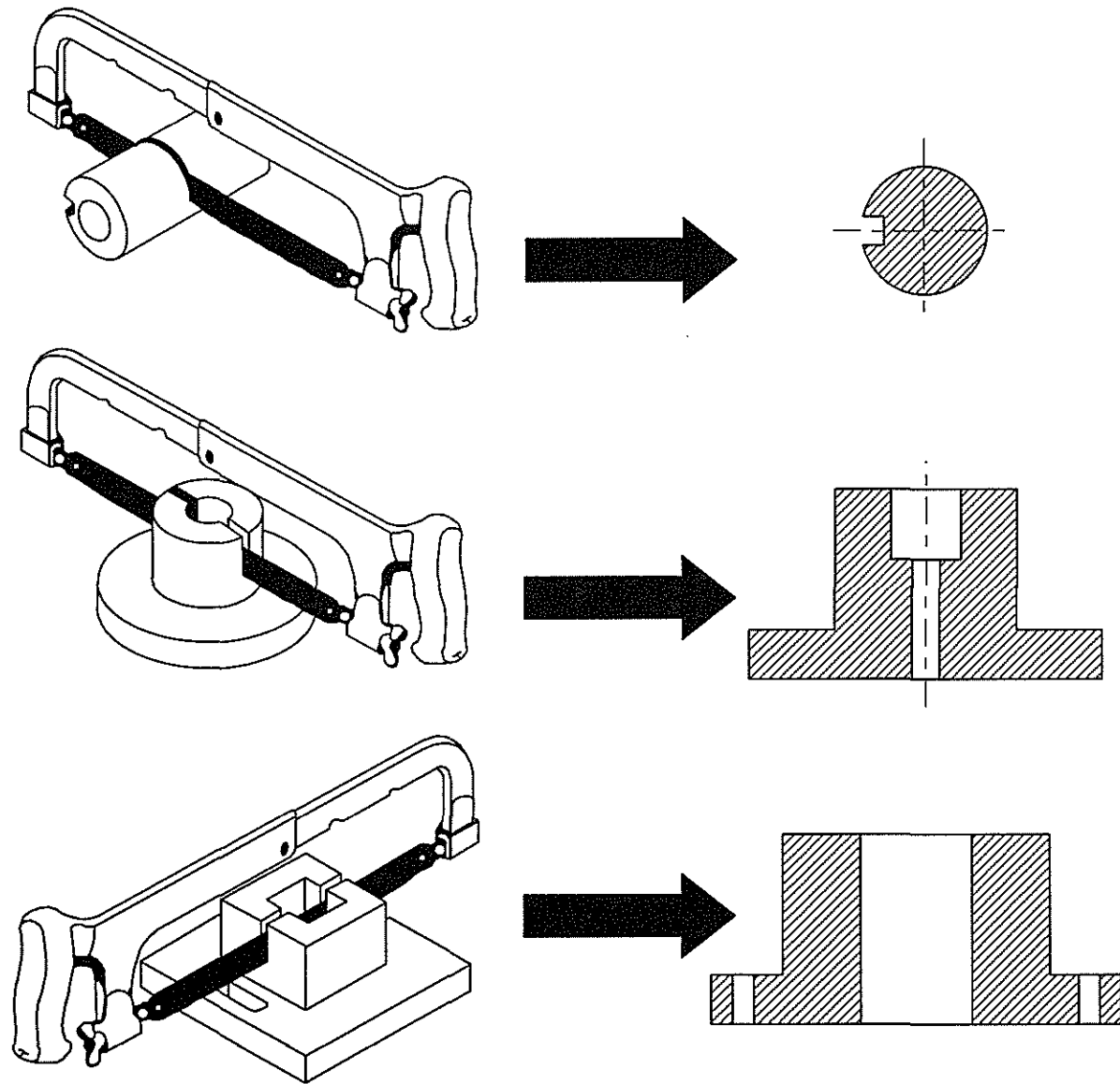


Pictorial representation



Orthogonal representation

Another way of looking at a sectional view is to picture an object being cut by a hacksaw so that you can remove the front portion of the object to reveal internal features.



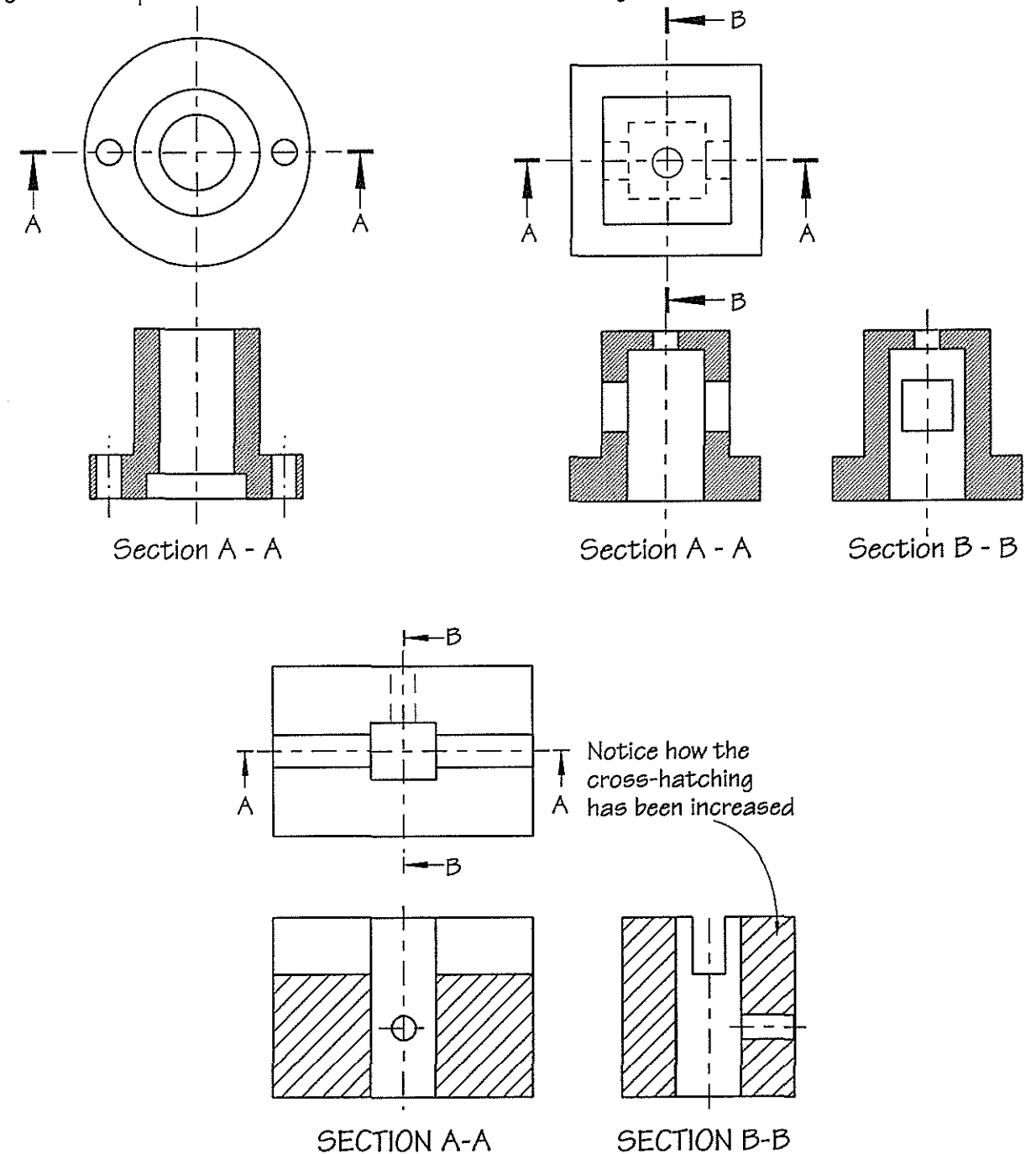
Note: All surfaces cut by the hacksaw are drawn with 45° lines (45° preferred) called sectioning, or cross hatching lines.

Surfaces that are not cut are left blank.

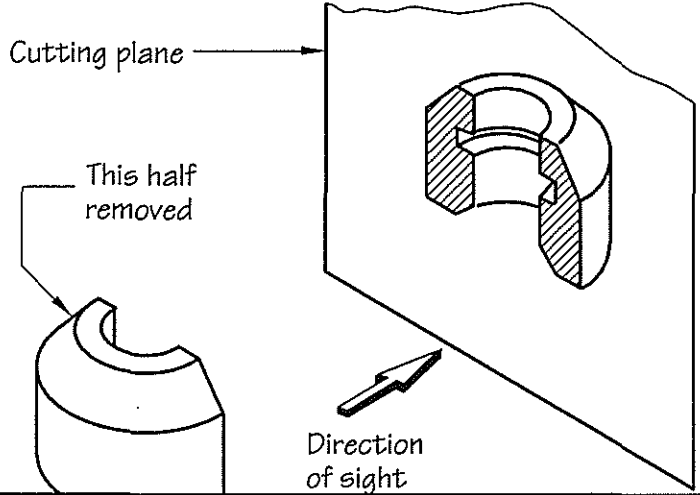
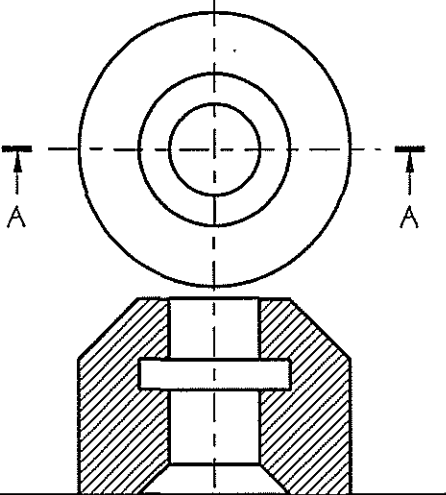
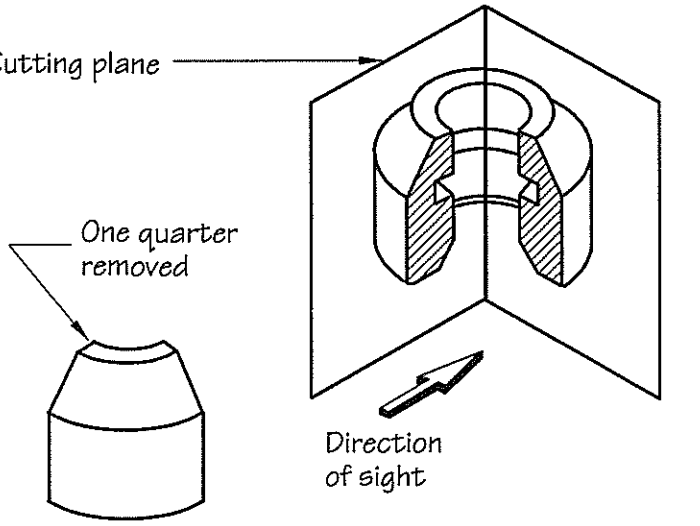
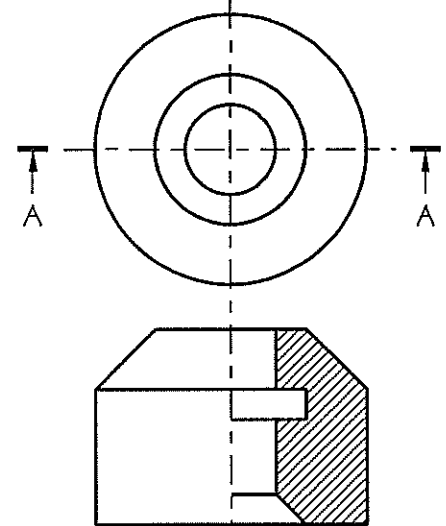
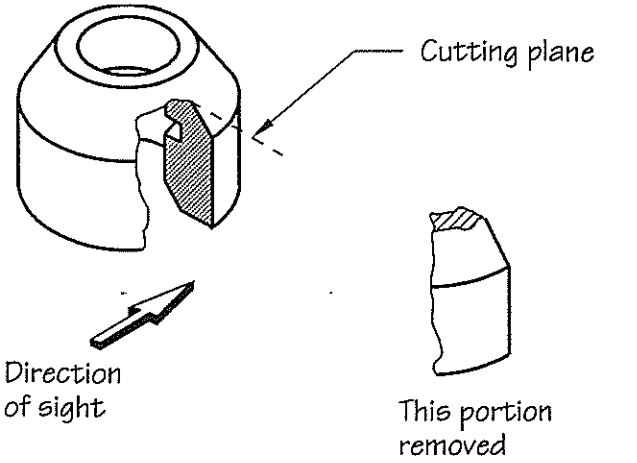
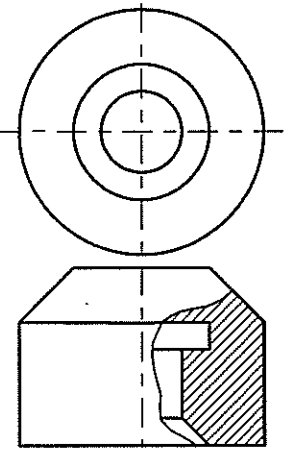
Cross hatching of single parts

Solid material which has been cut by the sectional cutting plane should be indicated by cross hatching (also known as sectioning lines). Cross hatching should consist of a series of equally spaced thin parallel lines usually drawn at 45° to the horizontal. The distance between the parallel lines should be in relation to the area to be covered.

As the drawing process of crosshatching is time consuming it is recommended that wide spacing be used, provided that there is no loss of clarity of the sectioned view.



Common types of sections

Description	Pictorial representation	Orthogonal representation	Remarks
<p>Full section</p> <p>When an object is cut straight through the centre, so that we can see everything inside, we call it a full section.</p> <p>In orthogonal projection, the cutting plane is shown by a thin chain dotted line and arrows.</p>			<ol style="list-style-type: none"> 1. Invisible lines behind the cutting plane are omitted. 2. Visible lines behind the cutting plane are shown. 3. Only the parts cut by the cutting plane are cross hatched.
<p>Half section</p> <p>In a half section, one quarter of the object is removed, so that we see part of the outside and part of the inside.</p> <p>The cutting plane is shown as a full section. The section view is titled 'Half Section'.</p>			<ol style="list-style-type: none"> 1. The intersection of the cutting plane is represented by the centre line, not the outline. 2. Used for showing both internal and external features of an object in one view. 3. The cutting plane and arrows may be omitted because the object is symmetrical. 4. The cutting plane may be omitted because it falls on a major axis.
<p>part or local section</p> <p>This section may be removed at any convenient place on the actual view of the object to show hidden detail. The boundary of the section is shown by a thin line.</p>			

Sectioning

For simple shaped objects the internal parts are shown as hidden outlines

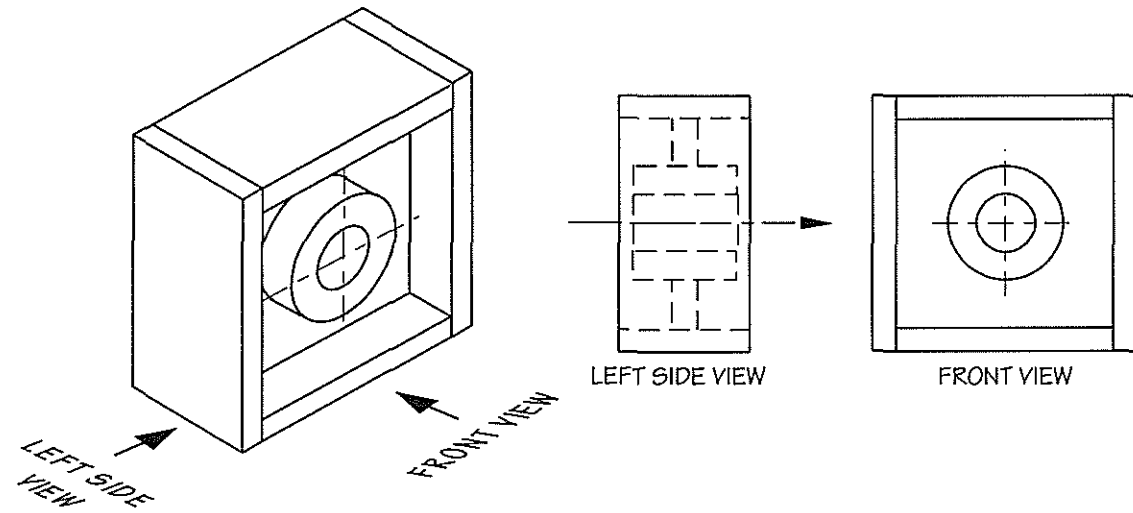
When several parts are shown together the internal details shown as hidden outlines makes the drawing harder to read

This can be made clearer for reading and dimensioning by drawing a SECTION VIEW

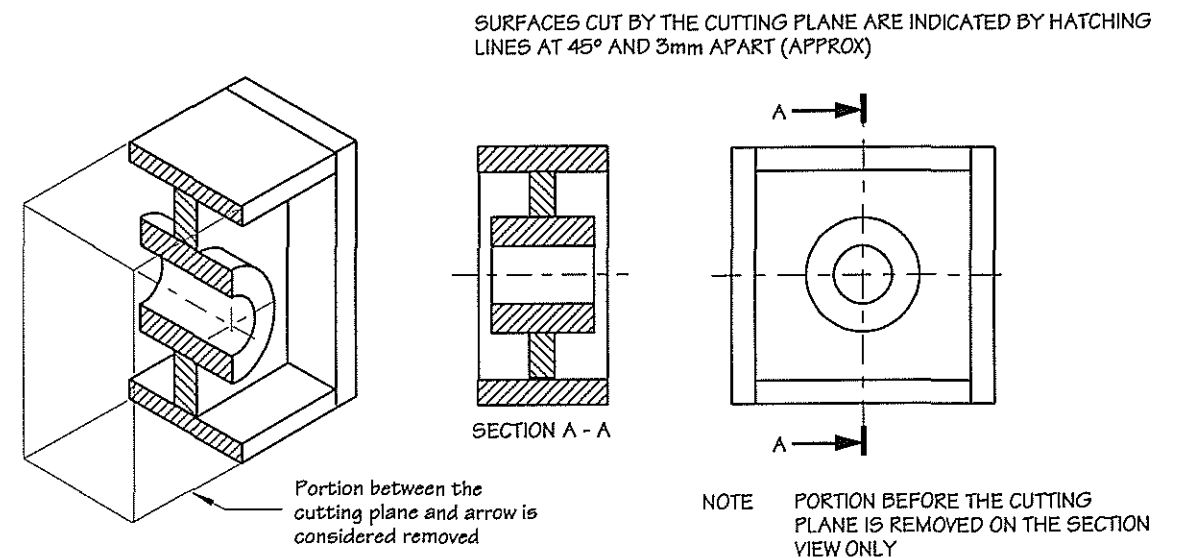
In a section we assume that the object is cut by a cutting plane in a convenient position, and portion of the object is removed temporarily so when we look at the view, the hidden surfaces cut by the cutting plane become outlines and the cut surfaces are indicated by hatching lines.

See the numbered blocks 1-4

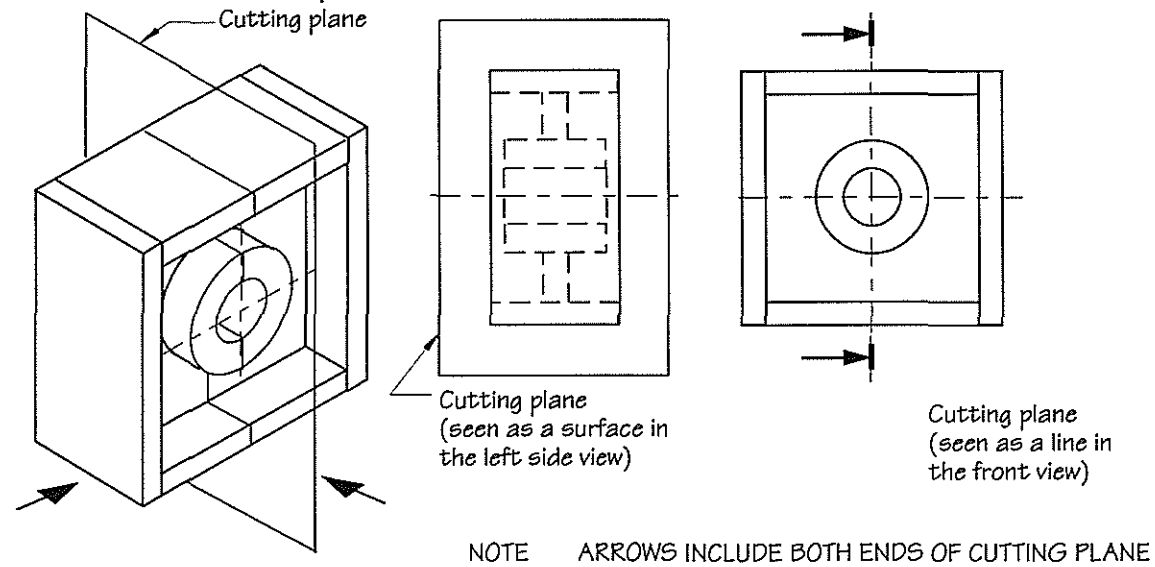
1 Outlines



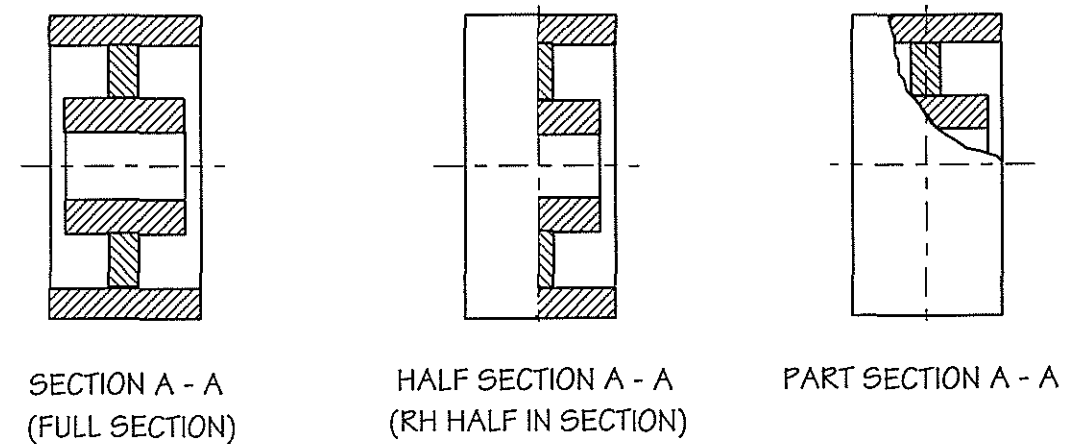
3 Section views



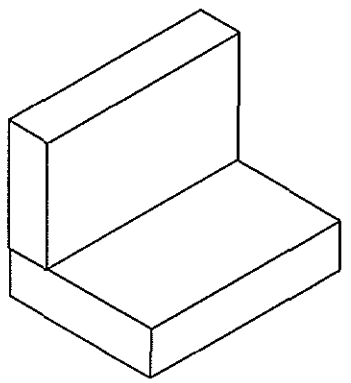
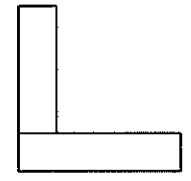
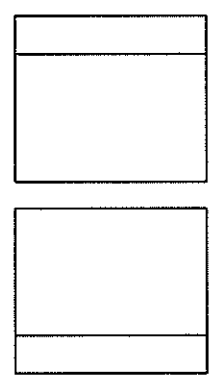
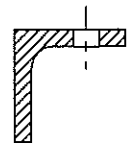
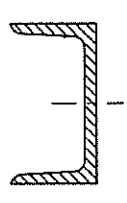
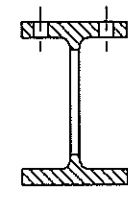
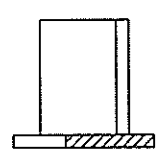
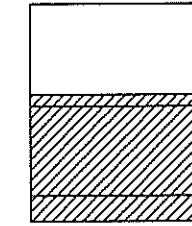
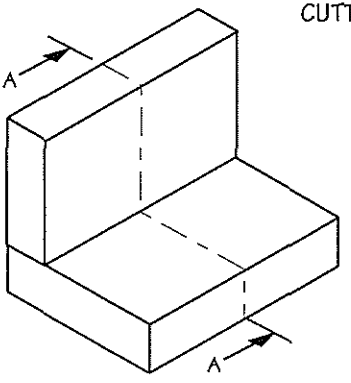
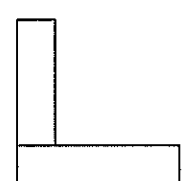
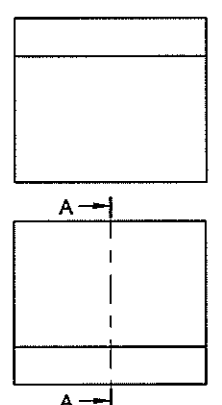
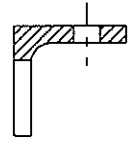
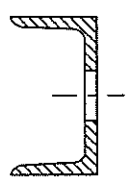
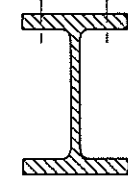
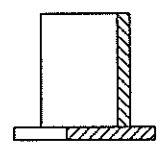
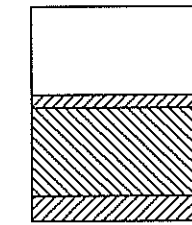
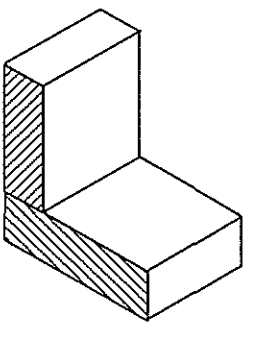
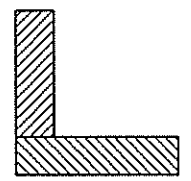
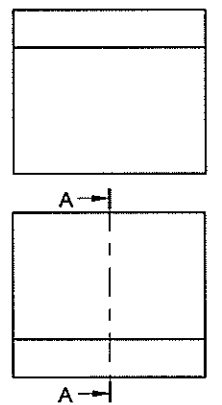
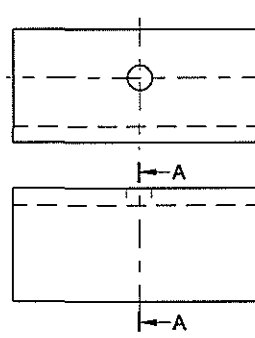
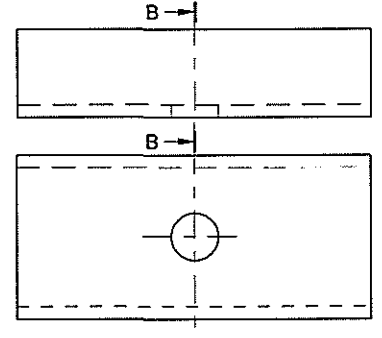
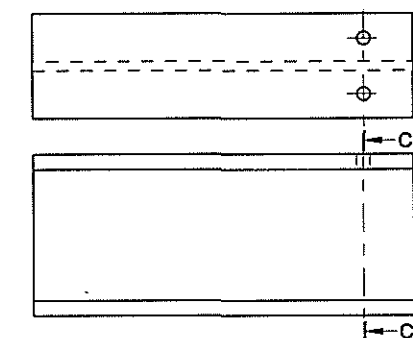
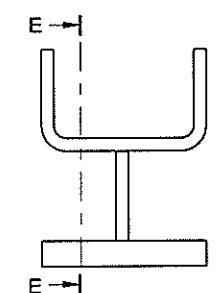
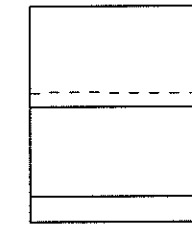
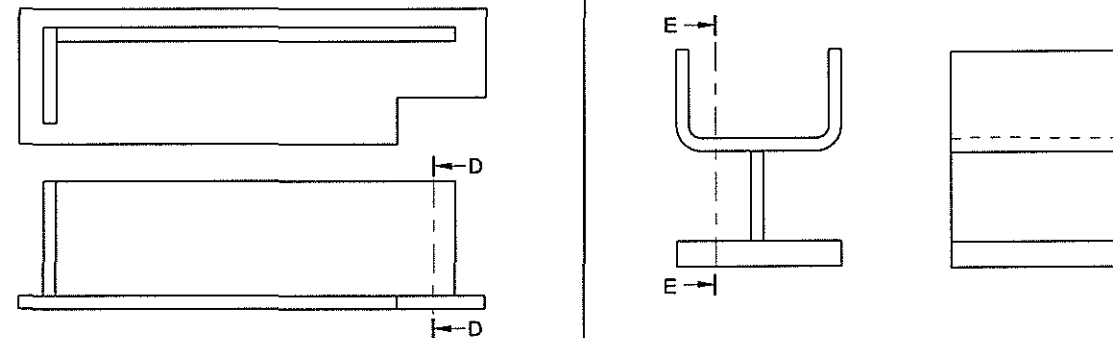
2 Position of cutting plane



4 types of section views (some common ones)

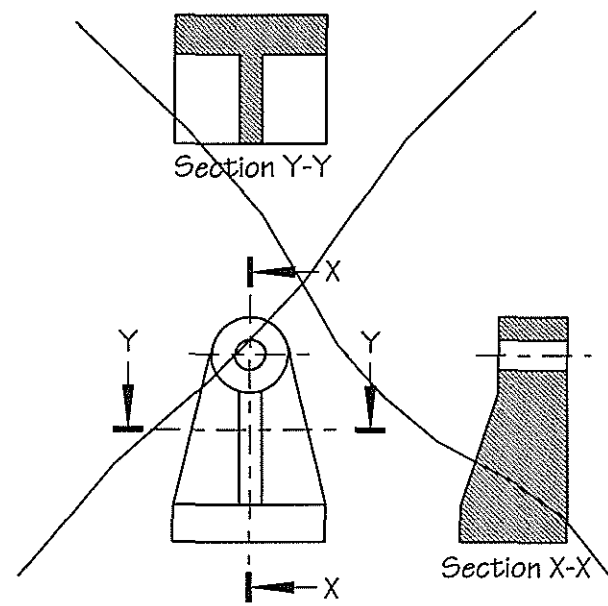


Exercise 6-1

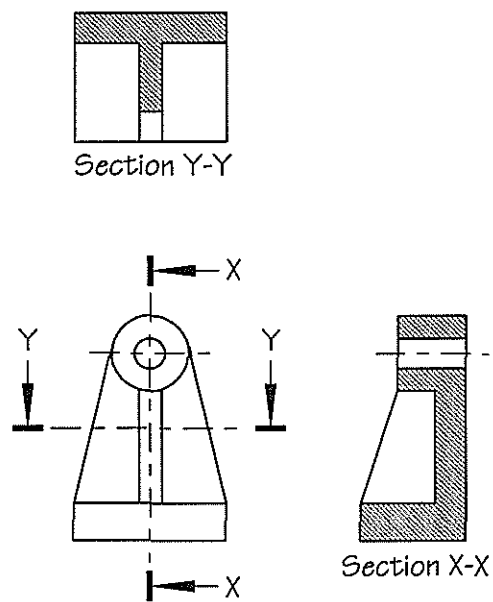
SECTIONING RULES (FABRICATED OBJECTS)			SKILL PRACTICE		IDENTIFYING SECTION VIEWS				
	<p>OUTLINE VIEW</p> 								
	<p>CUTTING PLANE POSITION</p> 								
	<p>SECTION VIEW</p> 		<p>SECTION AA</p> 	<p>SECTION BB</p> 	<p>SECTION CC</p> 	<p>SECTION DD</p> 	<p>SECTION EE</p> 		
<p>NOTE:</p> <ol style="list-style-type: none"> 1. The section view is a view of the object along the cutting plane in the direction of the arrows 2. Parts cut by the cutting plane are shown by hatching lines at 45° and 3mm apart (approx) 3. Different parts which are touching and cut by the cutting plane are hatched in opposite directions 4. The cutting plane and section view are linked by 'A - A' 5. The cutting plane can be shown on any view EXCEPT the section view 			<p>EXERCISE 1 Tick (✓) the correct view for the respective cutting plane</p> 						

The treatment of webs in sectioned views (cast article)

If a web (when it has been sectioned) is crosshatched, it would make the object appear solid (below left) Therefore, when a web is cut along its thickness, (below right). The web is show without cross hatching.



Incorrect method of showing webs in section



Correct method of showing webs in section

When a web is cut across its thickness by a sectional cutting plane it is cross hatched in the normal manner. (top view above right)

Hidden detail (that is holes) are not shown on the section views.

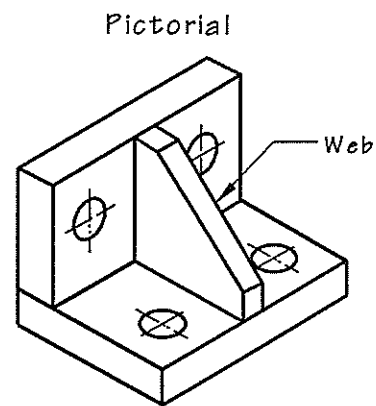
Pictorial	Orthogonal
	<p>The web is crosshatched when cut across its thickness</p> <p>The web is not crosshatched when cut along its thickness</p>

Sectioning webs (Fabricated articles)

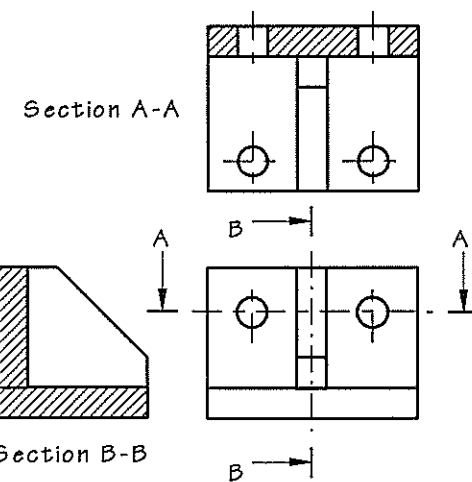
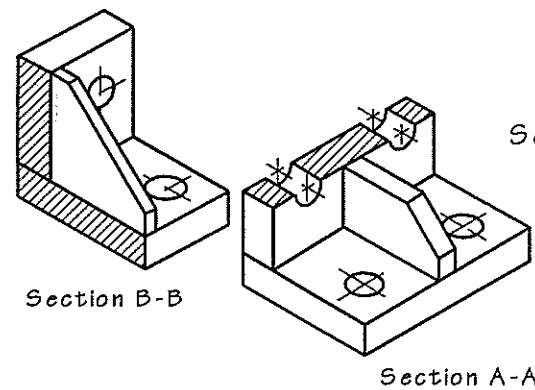
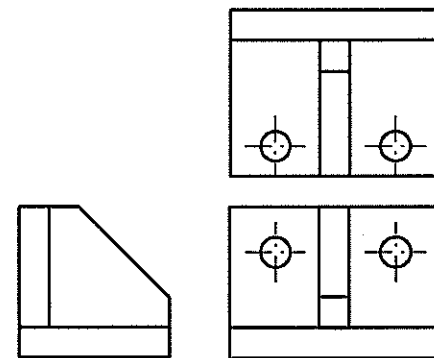
A web is a supporting piece between two surfaces which are at an angle to each other.

Note:

1. When the cutting plane cuts through the length of the web, the web is not cross hatched in the section view. (Section B-B).
2. When the cutting plane cuts across the web, the web is hatched in the section view (Section A-A).
3. Hidden detail (like holes) are not shown on the section view.



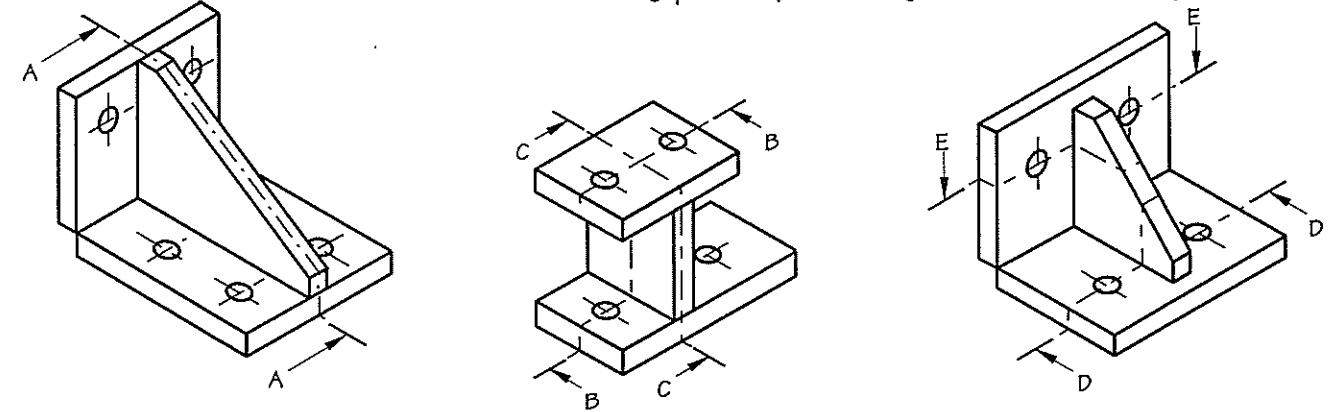
Orthogonal



Exercise 6-1

Identifying section views (fabricated objects)

Tick the correct section view for each cutting plane. (discuss your choices with your teacher)



Section AA	Section BB	Section CC	Section DD	Section EE