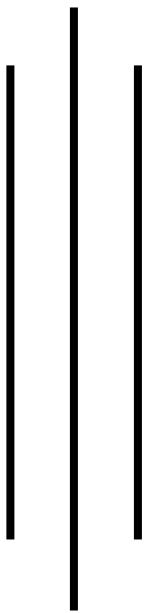


**INSTITUTE OF ENGINEERING  
DEPARTMENT OF MECHANICAL  
ENGINEERING**



**ENGINEERING DRAWING I  
[TUTORIAL SHEETS]**

**2061**

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# **ENGINEERING DRAWING I**

## **SHEET NO: 1**

### **(TECHNICAL LETTERING)**

1. Write down alphabets (A to Z) of different size in
  - Vertical capital
  - Inclined capital
  - Vertical small, and
  - Inclined small letters.
2. Write down vertical and inclined numerals (0 to 9) and fractions different size.
3. Draw the following lines with 100 mm length
  - Visible outline
  - Hidden
  - Center
  - Projection
  - Cutting plane
  - Break
4. Dimension the following figures. Size may be obtained by measuring the drawing.

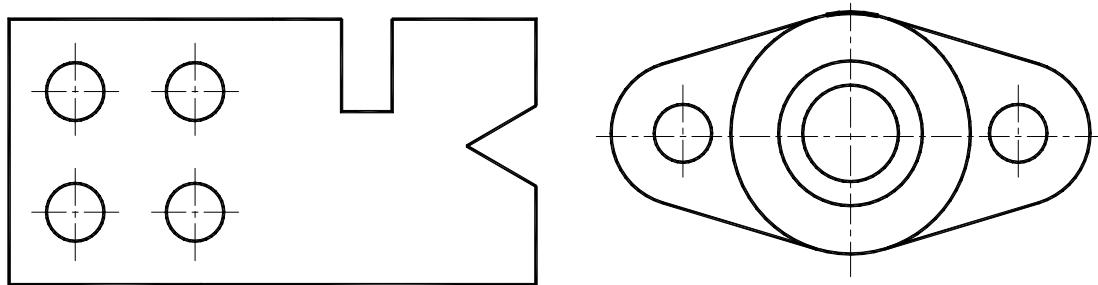
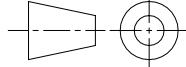


Figure T1.4

	20	60	10	25 25	
S. N.	DESCRIPTION		QTY.	MATERIAL	REMARK
DRAWN BY			<b>NAME OF THE INSTITUTE</b>		
ROLL NO					
CHKD BY					
<b>TITLE</b>					
SCALE			DRG SHEET NO.		
DATE					
<b>METRIC SYSTEM</b>					

# ENGINEERING DRAWING I

## SHEET NO: 2

### (PLANE GEOMETRICAL CONSTRUCTION)

1. (a) Draw a 50 mm line and trisect it.  
(b) Draw an angle of  $75^0$  and trisect it.  
(c) Draw a line whose length is greater than 50 mm and divide the same into 7 equal parts and proportionately in the ratio of 1:2:3.
2. (a) Construct a regular hexagon with 66 mm distance across flats.  
(b) Construct a regular octagon with 80 mm distance across corners.  
(c) Draw a regular pentagon on a circumscribing circle of 60 mm diameter.
3. (a) Draw circular arc of radius 20 mm tangent to two lines which are inclined at  $45^0$ ,  $90^0$  and  $120^0$  to each other.  
(b) Draw a line AB of any length. Mark a point O at a distance of 25 mm from AB. With O as a center, draw a circle of 40 mm diameter. Describe another circle (i) of 20 mm radius, touching circle and AB; (ii) of 35 mm radius, touching AB and the circle, and including the circle within it.  
(d) Draw two horizontal lines 50 mm apart. Locate two points 75 mm apart horizontally, one on each line. Draw an ogee (reverse) curve tangent to these lines.
4. Reconstruct the Figure Shown in Figure T2.4 (a) and T2.4 (b).

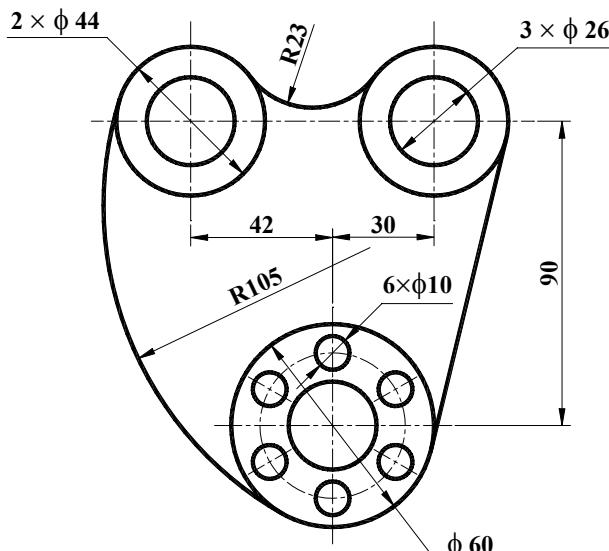


Figure T2.4 (a)

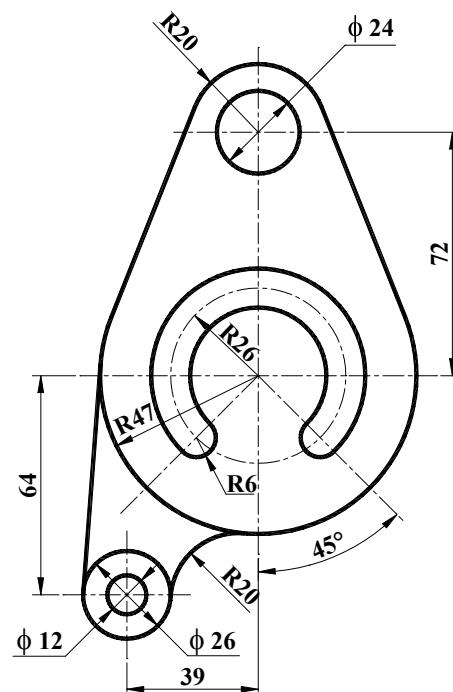


Figure T2.4 (b)

5. Draw an ellipse with major minor axis of 90 mm and 60 mm respectively.

- 6.** Draw a parabola with double ordinate 100 mm and axis 60 mm.
- 7.** The distances between the focii and between the vertices of a hyperbola are 100 mm and 60 mm respectively. Construct the hyperbola.
- 8.** Draw a locus of a point on the circumference of a circle of radius 35 mm for one complete rotation when it rolls on a horizontal surface.
- 9.** Draw an involute of circle having diameter of 50 mm.
- 10.** Draw one turn of a helix of pitch 60 mm on a cylinder of diameter 40 mm.
- 11.** Draw an Archimedean's spiral of one convolution of radius 100 mm.

# **ENGINEERING DRAWING I**

## **SHEET NO: 3**

### **(DESCRIPTIVE GEOMETRY I)**

1. Draw the projections of the following points.
  - (a) Point A, 25 mm in front of VP and 30 mm above HP.
  - (b) Point B, 32 mm in front of VP and in the HP.
  - (c) Point C, 22 mm behind VP and 28 mm above HP.
  - (d) Point D, 35 mm behind VP and in the HP.
  - (e) Point E, 28 mm behind VP and 30 mm below HP.
  - (f) Point F, in the VP and 40 mm below HP.
  - (g) Point G, 20 mm in front of VP and 25 mm below HP.
  - (h) Point H, in the VP and HP.
2. Draw the projections of the following lines:
  - (a) Line AB, 45 mm long, parallel to HP and VP both, when its distance from HP and VP is 25 mm and 30 mm respectively.
  - (b) Line CD, 45 mm long, perpendicular to HP and 20 mm away from VP, when one of its extremities nearer to HP is 10 mm away from the HP.
  - (c) Line EF, 45 mm long, contained by HP, and perpendicular to VP, when one of its extremities is 10 mm away from the VP.
  - (d) Line GH, 50 mm long, parallel to VP and inclined to HP at  $30^0$ , when one of its ends is 15 mm from HP and 20 mm from the VP.
  - (e) Line IJ, 50 mm long, contained by HP and inclined to VP at  $45^0$ , when one of its ends is 15 mm from the VP.
  - (f) Line KL, 40 mm long contained by both the HP and the VP.
3. Draw the projections of the line MN when its end M is 10 mm from HP and 15 mm from VP and end N is 30 mm from HP and 40 mm from VP. Its end projectors are 40 mm apart.
4. The front view of a line, inclined at  $30^0$  to the VP is 65 mm long. Draw the projections of the line, when it is parallel to and 40 mm above the HP, its one end being 30 mm in front of the VP.
5. A 90 mm long line is parallel to and 25 mm in front of the VP. Its one end is in the HP while the other is 50 mm above the HP. Draw its projections and find its inclination with the HP.
6. A square lamina ABCD, of 25 mm side is parallel to HP and is 10 mm from it. Its side nearer to VP is parallel to and 10 mm from VP. Draw its projections.
7. A rectangle ABCD 60 mm  $\times$  40 mm is parallel to HP with one of its sides inclined at  $30^0$  to VP and the end of the side near to VP is 15 mm in front of the VP and 30 mm above the HP. Draw its projections.

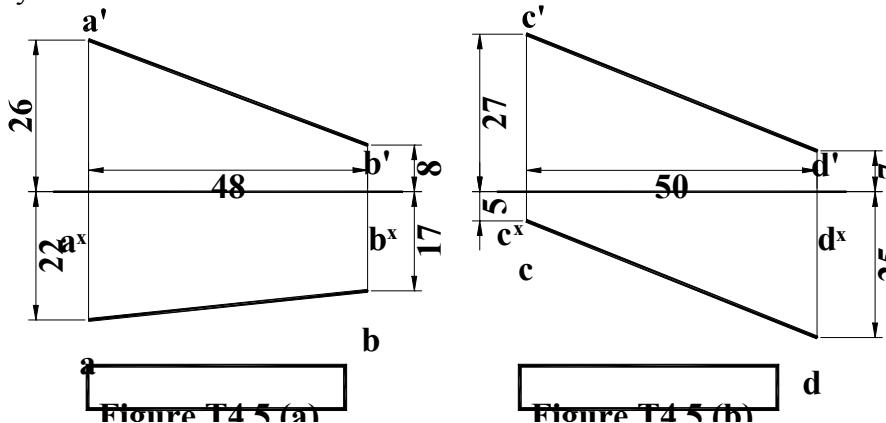
8. A regular pentagon ABCDE 20 mm side has its corner A in HP and the side CD parallel to the HP. Draw its projections when its plane is parallel to and 10 mm from the VP.
9. A square lamina ABCD of 30 mm side is perpendicular to VP and inclined to HP at  $45^0$ . It rests on its side BC in HP. Draw its projections when corner point C is 12 mm in front of the VP.
10. A regular pentagon ABCDE, of 25 mm side, has its side BC in HP. Its plane is perpendicular to the HP and inclined at  $45^0$  to the VP. Draw the projections of the pentagon when its corner nearest to VP is 10 mm from it.
11. Draw the projections of a thin circular sheet of 50 mm diameter and negligible thickness, when its plane is inclined at  $45^0$  to VP and is perpendicular to HP. A point on its circumference and nearest to the VP is 40 mm away from the HP and 14 mm from the VP.

# **ENGINEERING DRAWING I**

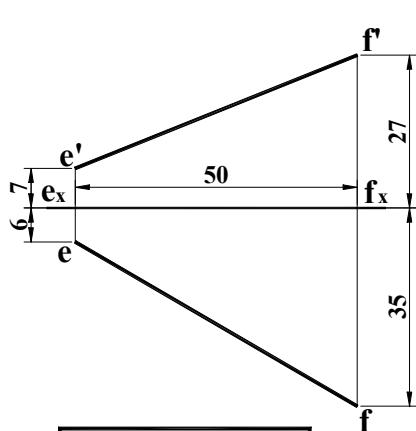
## **SHEET NO: 4**

### **(DESCRIPTIVE GEOMETRY II)**

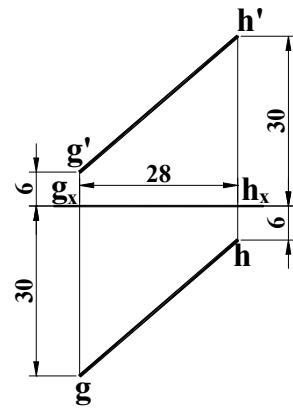
1. A line AB 75 mm long is inclined at  $45^0$  to the HP and  $30^0$  to the VP. Its end B is in the HP and 40 mm in front of the VP. Draw its projections.
2. Draw the projections of a line AB, 90 mm long, its midpoint M being 50 mm above the HP and 40 mm in front of the VP. The end A is 20 mm above the HP and 10 mm in front of the VP.
3. The top view of a 75 mm long line measures 65 mm while the length of its front view is 50 mm. Its one end is in the HP and 12 mm in front of the VP. Draw the projections of AB and determine its inclinations with the HP and the VP.
4. A line 65 mm long has its one end 20 mm above the HP and 25 mm in front of the VP. The other end is 40 mm above the HP and 65 mm in front of the VP. Draw the projections of the line and determine its inclinations with the HP and the VP.
5. Reproduce the given view of the lines and determine the true lengths using the auxiliary view method.



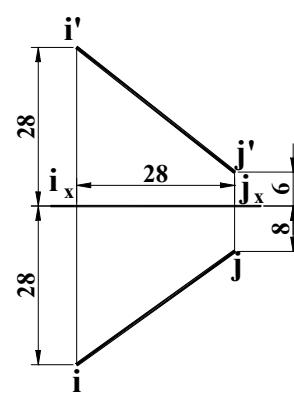
6. Reproduce the given view of the lines and determine the true lengths using the revolution method.



**Figure T4.6 (a)**

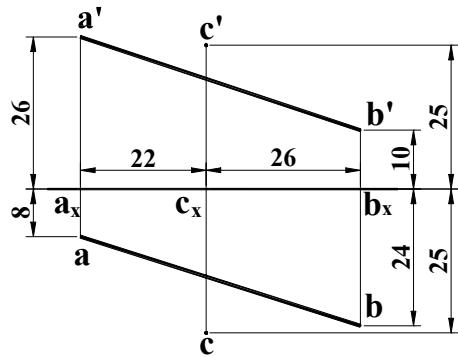


**Figure T4.6 (b)**

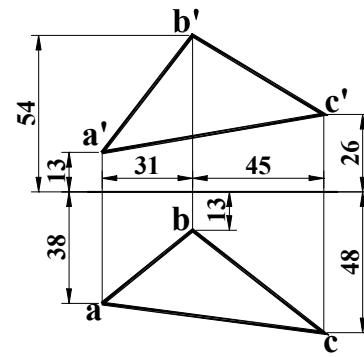


**Figure T4.6 (c)**

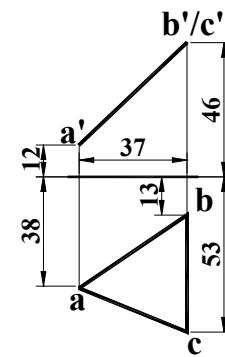
7. Determine the shortest distance between the point C and line AB.  
8. Reproduce the given views of the plane and draw the view showing the true size and shape.



**Figure T4.7**



**Figure T4.8 (a)**



**Figure T4.8 (b)**

9. Determine the angle between the line MN and non-transparent plane ABC. Also determine the visible portion of the line.  
10. Determine the shortest distance between the lines MN and ST.  
11. Determine the angle between the planes ABC and BCD.

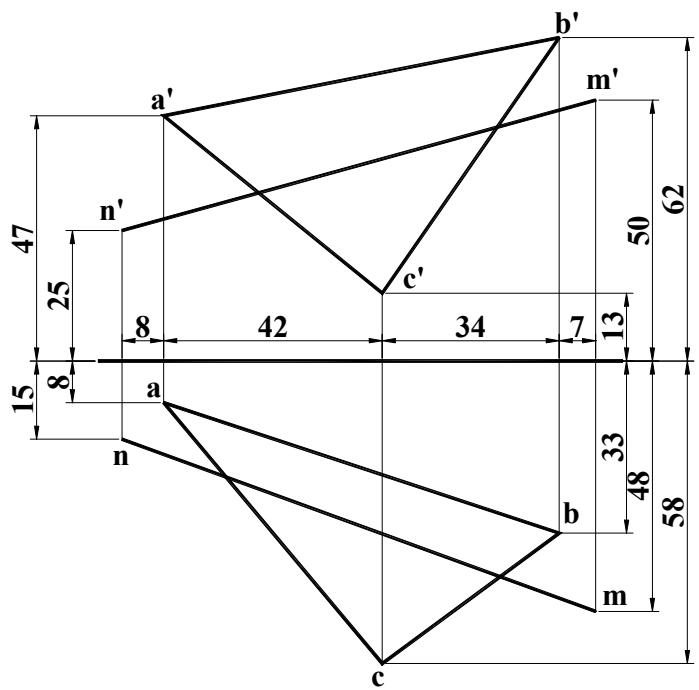


Figure T4.9

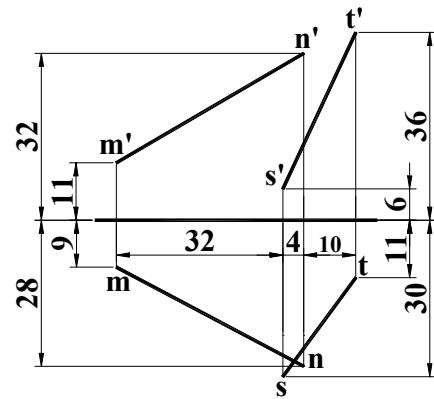


Figure T4.10

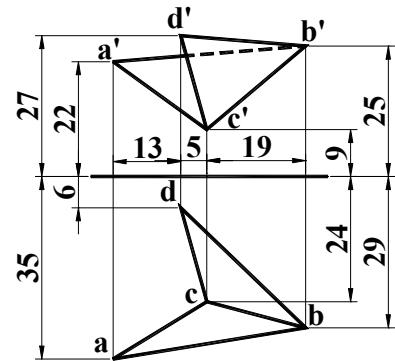


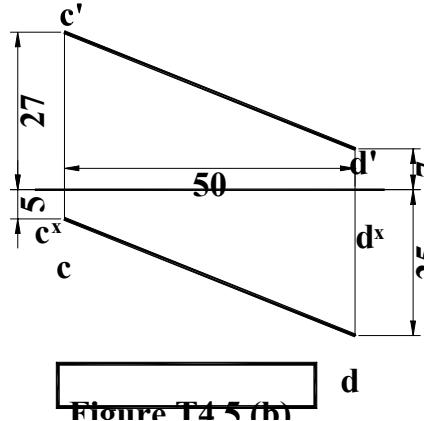
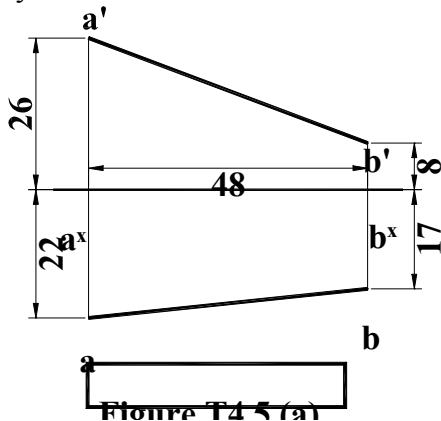
Figure T4.11

# **ENGINEERING DRAWING I**

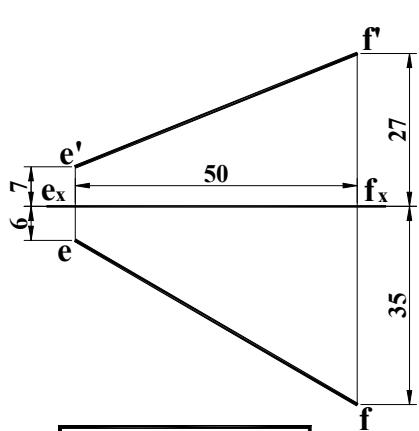
## **SHEET NO: 4**

### **(DESCRIPTIVE GEOMETRY II)**

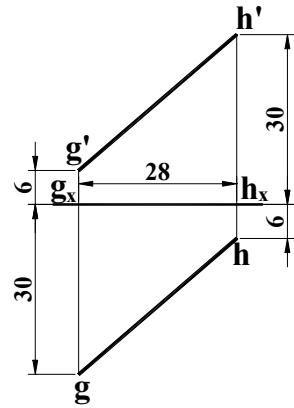
12. A line AB 75 mm long is inclined at  $45^0$  to the HP and  $30^0$  to the VP. Its end B is in the HP and 40 mm in front of the VP. Draw its projections.
13. Draw the projections of a line AB, 90 mm long, its midpoint M being 50 mm above the HP and 40 mm in front of the VP. The end A is 20 mm above the HP and 10 mm in front of the VP.
14. The top view of a 75 mm long line measures 65 mm while the length of its front view is 50 mm. Its one end is in the HP and 12 mm in front of the VP. Draw the projections of AB and determine its inclinations with the HP and the VP.
15. A line 65 mm long has its one end 20 mm above the HP and 25 mm in front of the VP. The other end is 40 mm above the HP and 65 mm in front of the VP. Draw the projections of the line and determine its inclinations with the HP and the VP.
16. Reproduce the given view of the lines and determine the true lengths using the auxiliary view method.



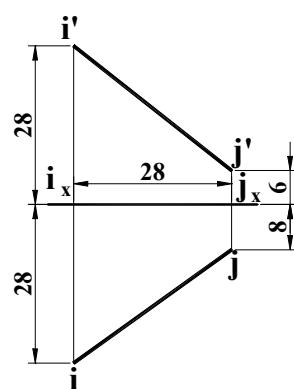
17. Reproduce the given view of the lines and determine the true lengths using the revolution method.



**Figure T4.6 (a)**

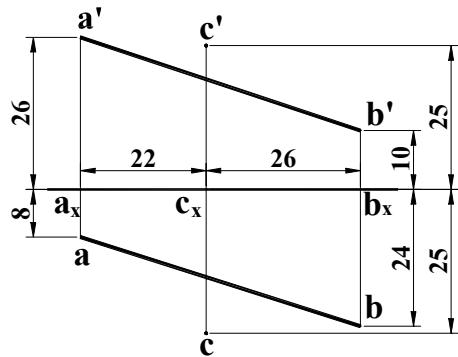


**Figure T4.6 (b)**

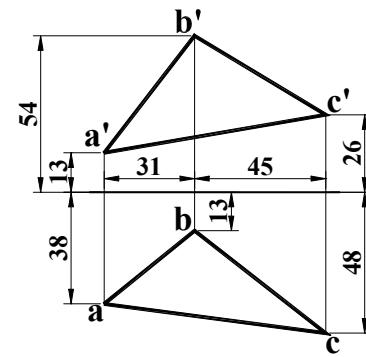


**Figure T4.6 (c)**

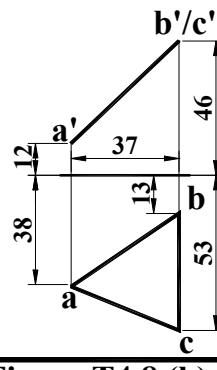
18. Determine the shortest distance between the point C and line AB.
19. Reproduce the given views of the plane and draw the view showing the true size and shape.



**Figure T4.7**

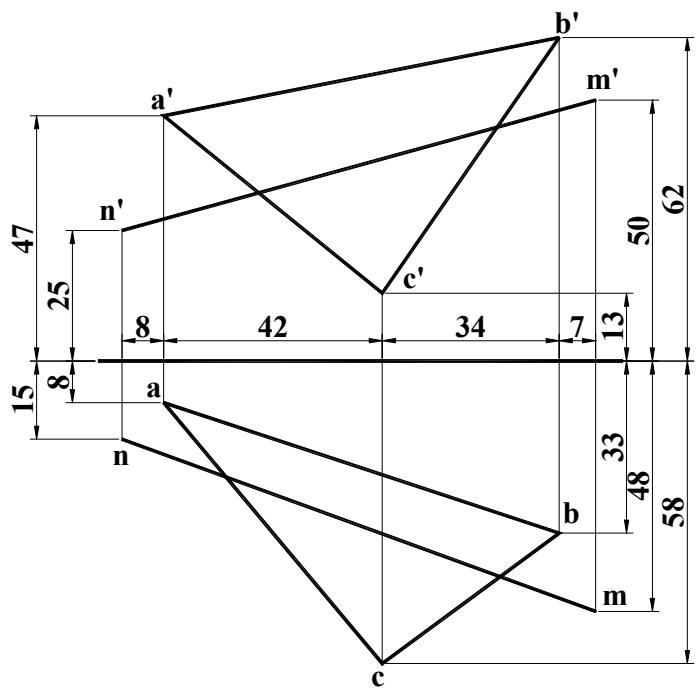


**Figure T4.8 (a)**

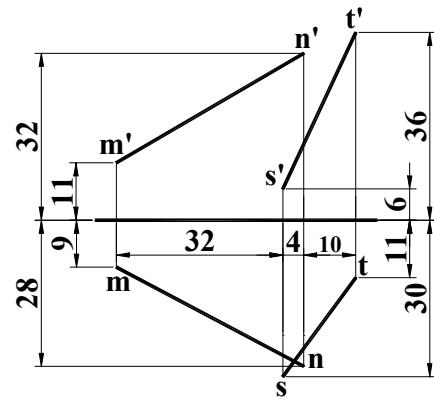


**Figure T4.8 (b)**

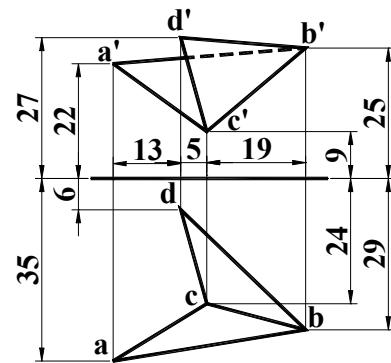
20. Determine the angle between the line MN and non-transparent plane ABC. Also determine the visible portion of the line.
21. Determine the shortest distance between the lines MN and ST.
22. Determine the angle between the planes ABC and BCD.



**Figure T4.9**



**Figure T4.10**



**Figure T4.11**

# ENGINEERING DRAWING I

## SHEET NO: 5

### (ORTHOGRAPHIC DRAWINGS I)

The figures for Problems T5.1 to T5.12 contain a number of pictorial views of pieces of various shapes. Translate them into three-view orthographic drawings.

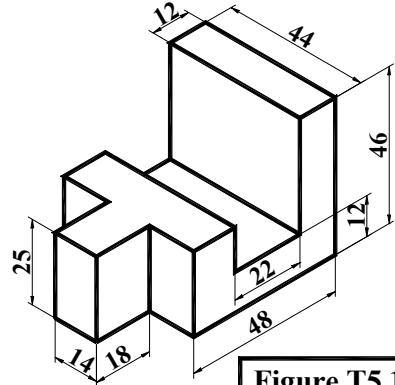


Figure T5.1

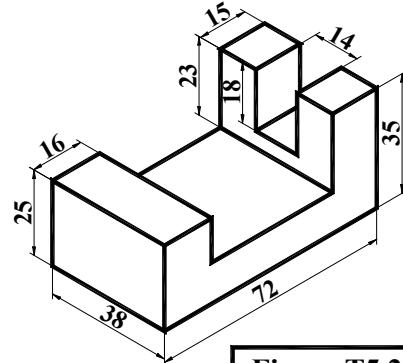


Figure T5.2

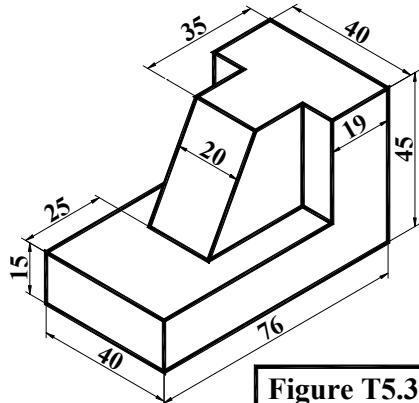


Figure T5.3

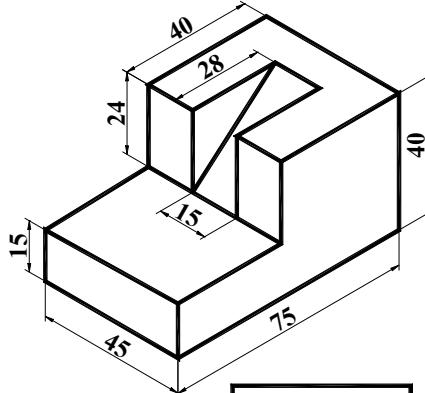


Figure T5.4

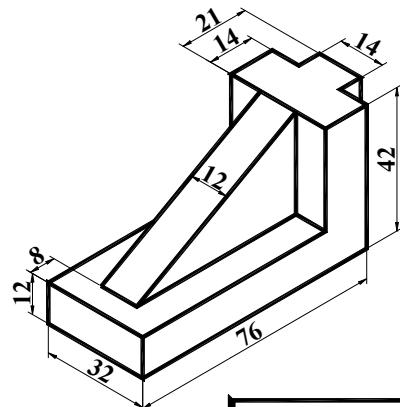


Figure T5.5

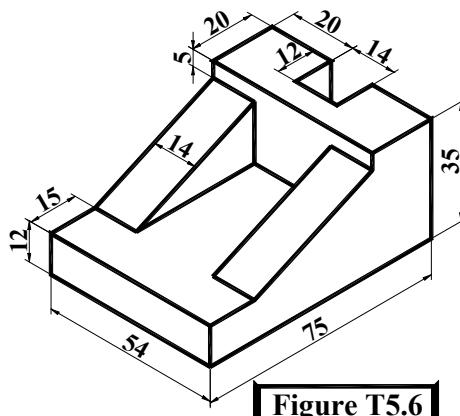


Figure T5.6

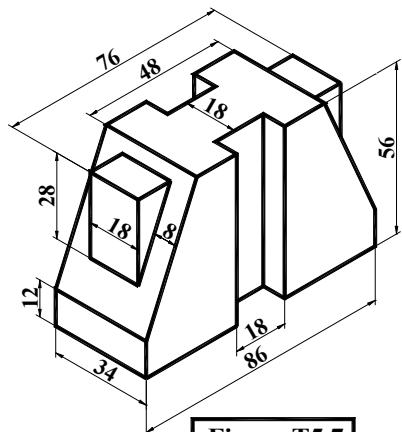


Figure T5.7

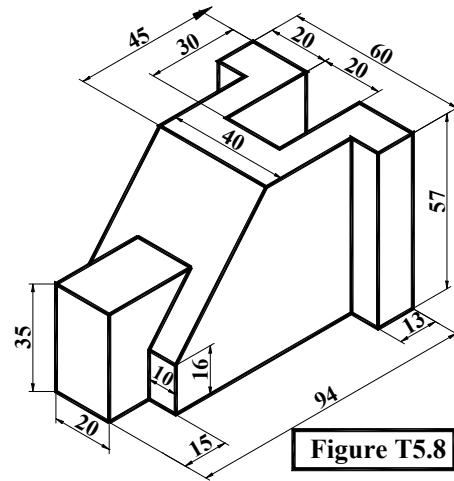


Figure T5.8

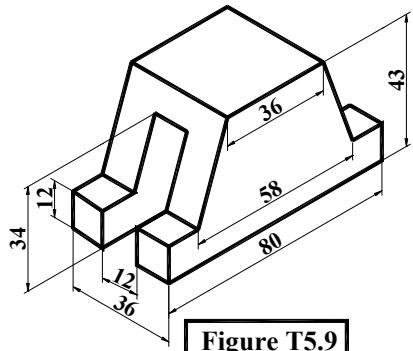


Figure T5.9

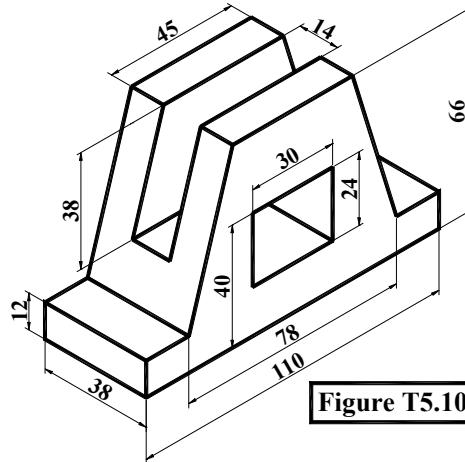


Figure T5.10

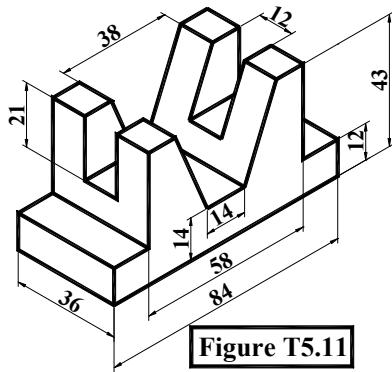


Figure T5.11

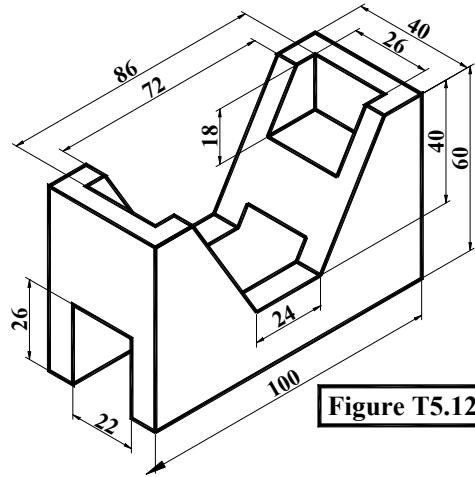


Figure T5.12

# ENGINEERING DRAWING I

## SHEET NO: 6

### (ORTHOGRAPHIC DRAWINGS II)

Make a complete orthographic drawing (with necessary number of projections) of each model and dimension it.

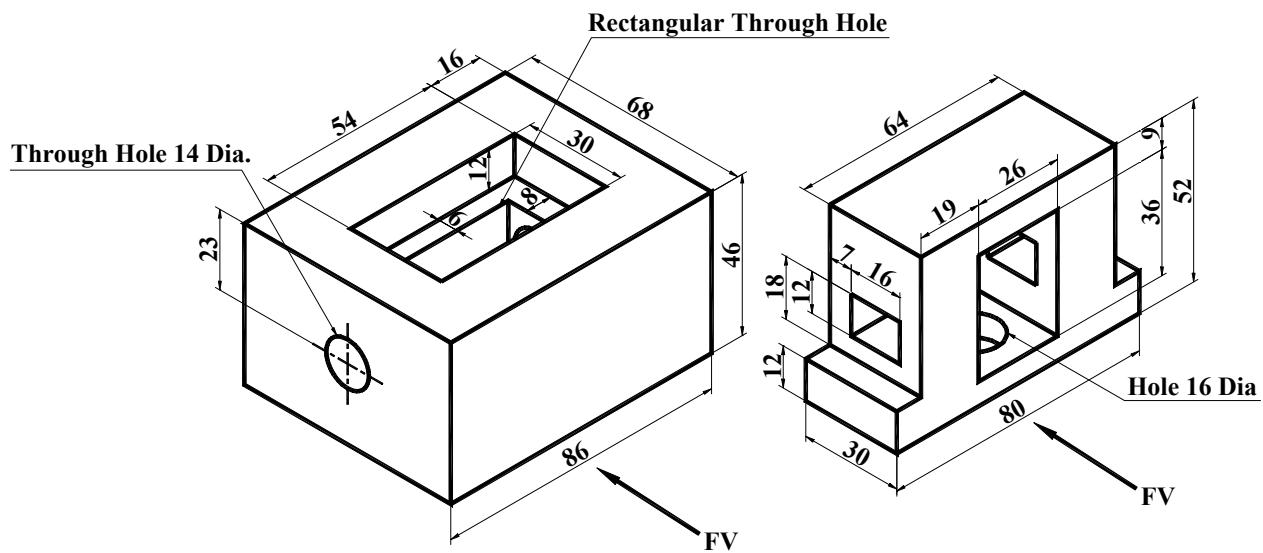


Figure T6.1

Figure T6.2

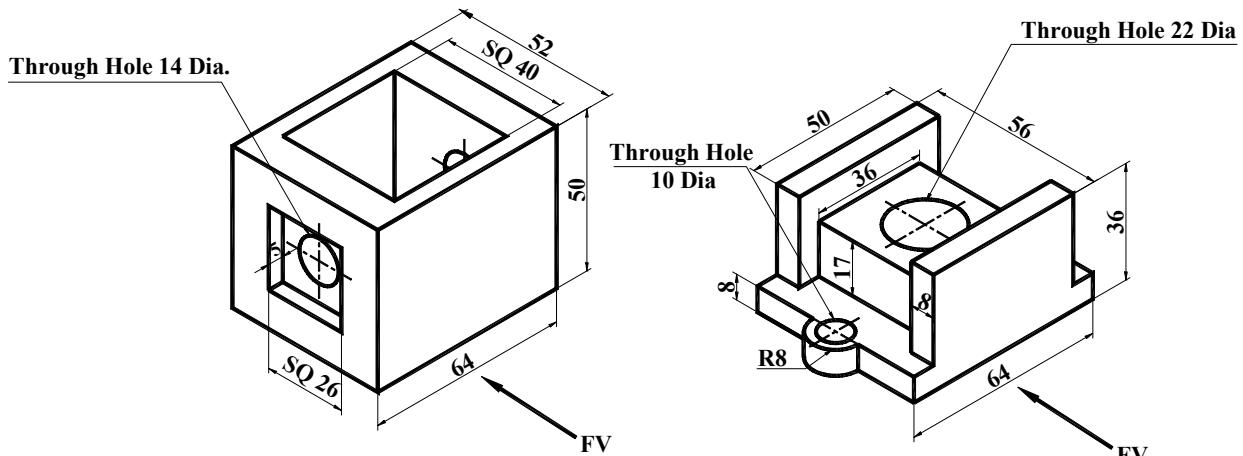
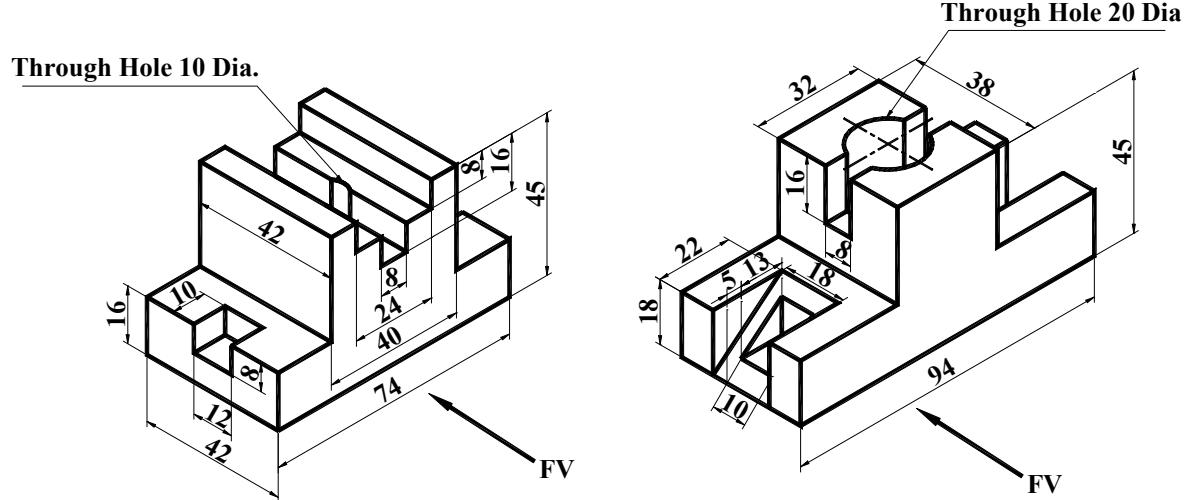


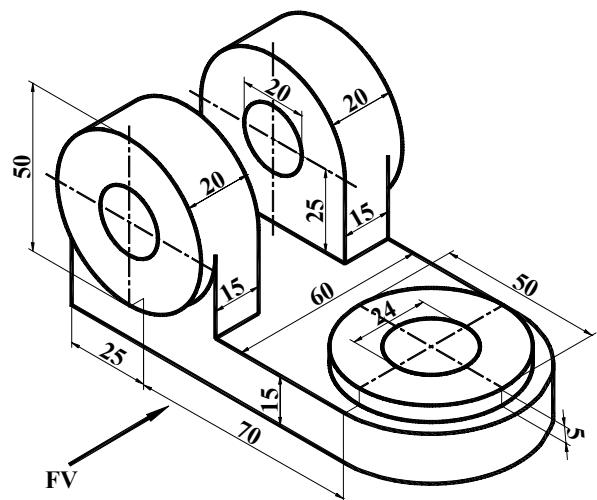
Figure T6.3

Figure T6.4

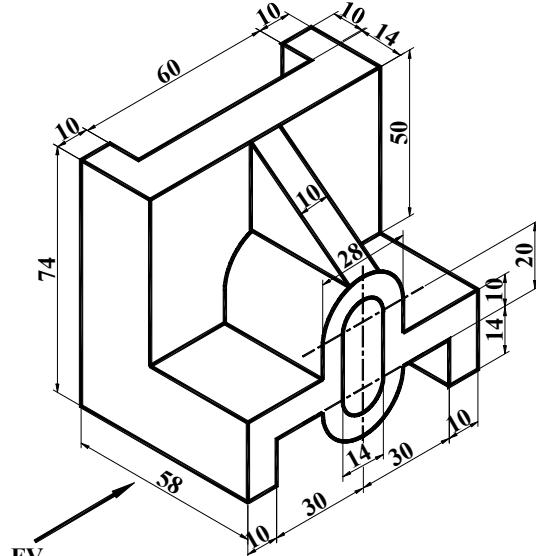


**Figure T6.5**

**Figure T6.6**



**Figure T6.7**



**Figure T6.8**

# ENGINEERING DRAWING I

## SHEET NO: 7

### (SECTIONAL AND AUXILAIRY VIEWS)

1. Draw the views of the objects given below with sectional front view.

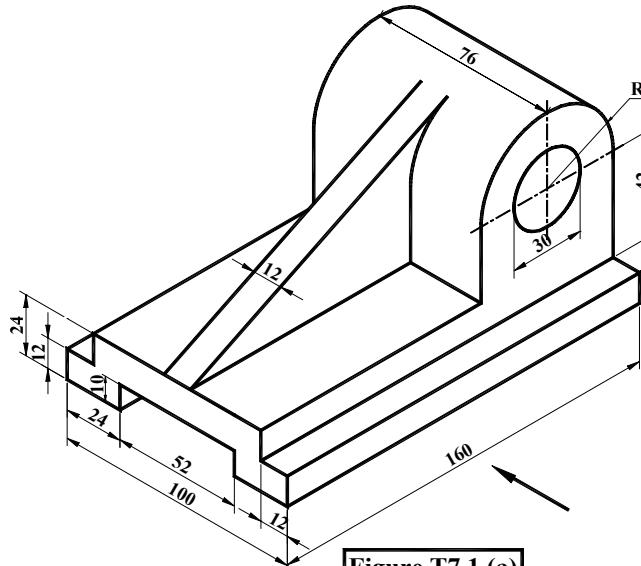


Figure T7.1 (a)

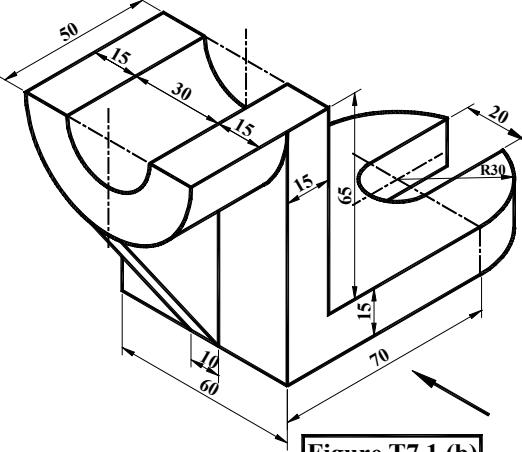


Figure T7.1 (b)

2. Draw the views of the objects given below with sectional front view and sectional side view.

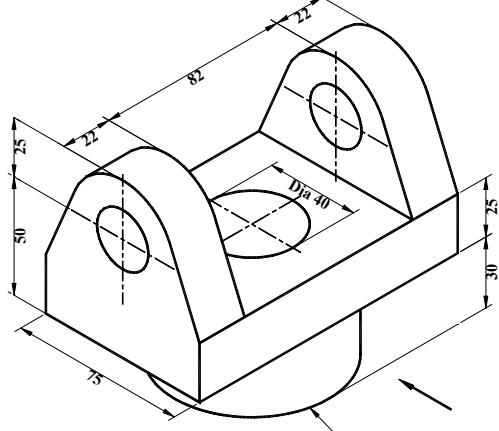


Figure T7.2 (a)

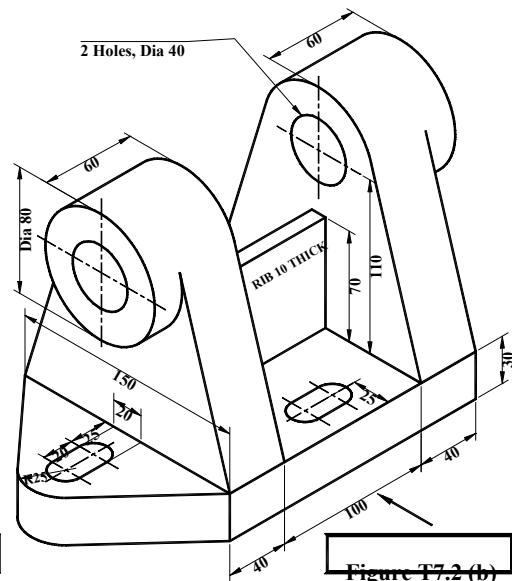
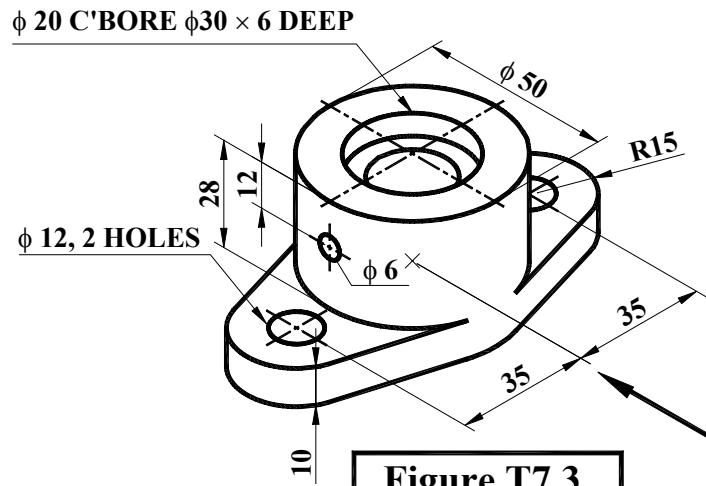


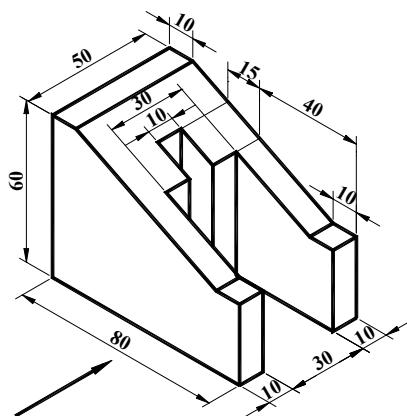
Figure T7.2 (b)

3. Draw the half sectional front view, half sectional side view and top view for the given object.

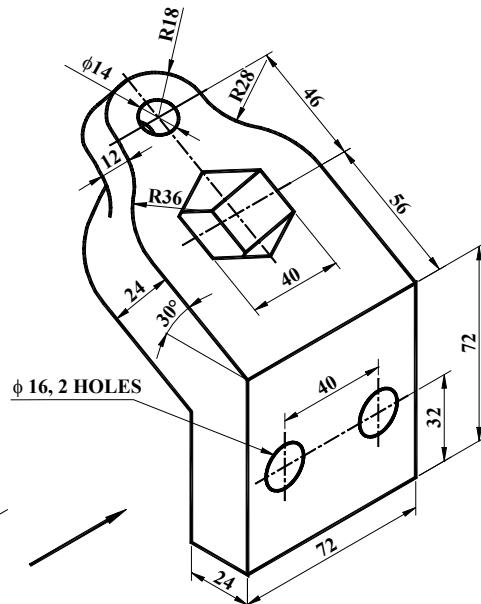


**Figure T7.3**

4. Draw the front view, the top view, and the normal view of the inclined surfaces for objects given below.



**Figure T7.4 (a)**



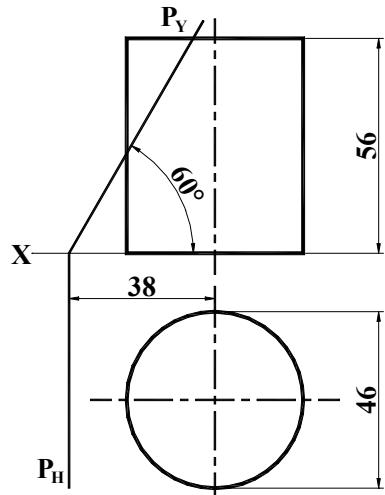
**Figure T7.4 (b)**

# ENGINEERING DRAWING I

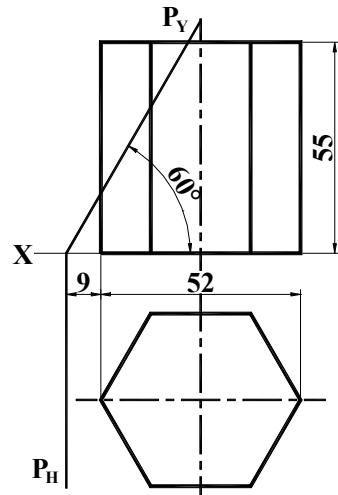
## SHEET NO: 8

### (DEVELOPMENT OF SURFACES I)

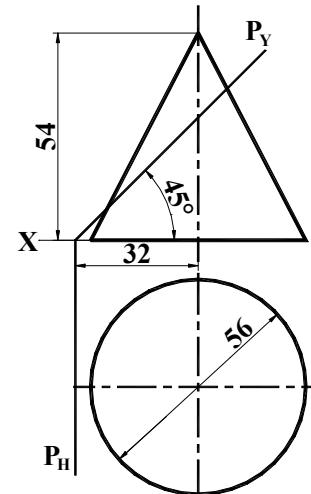
Make a complete orthographic drawing of a geometrical solid cut by a plane. Find the true shape of the section. Construct the development of the surface of the solid.



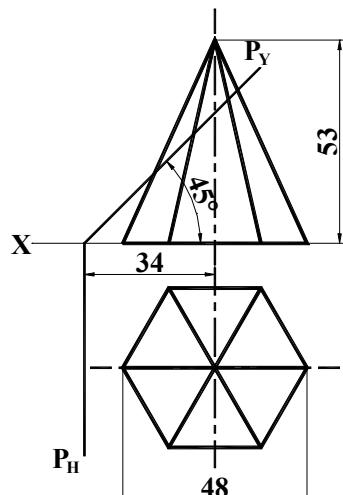
**Figure T8.1**



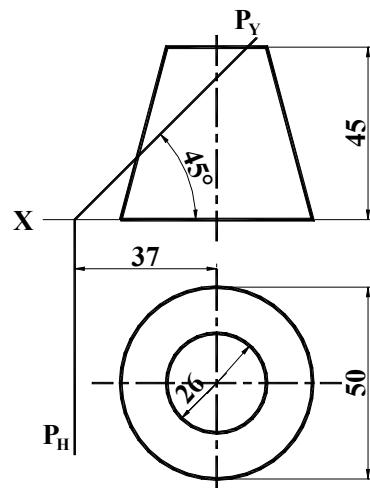
**Figure T8.2**



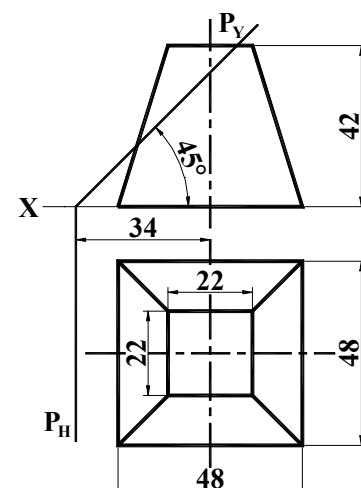
**Figure T8.3**



**Figure T8.4**



**Figure T8.5**



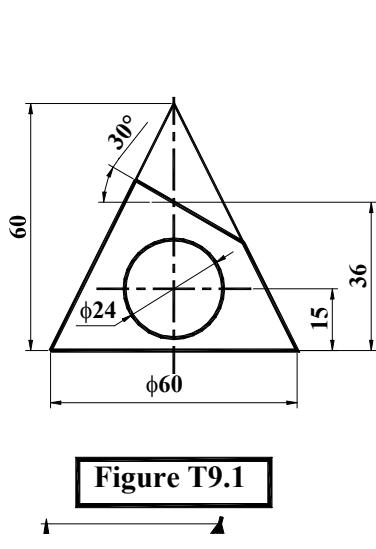
**Figure T8.6**

# ENGINEERING DRAWING

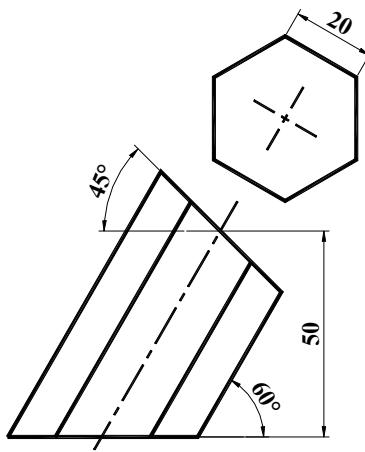
## SHEET NO: 9

### **(DEVELOPMENT OF SURFACES II)**

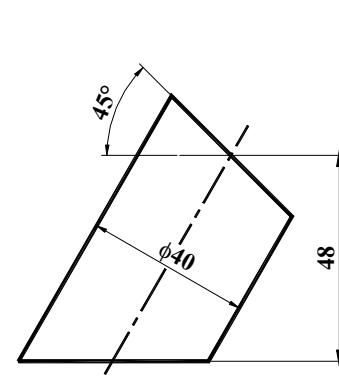
1. A right circular cone is cut as shown in Figure T9.1. Develop its lateral surface.
2. Two views of right regular hexagonal prism cut at both end by section planes and resting on its lower cut end on ground are shown in Figure T9.2. Develop its lateral surface.
3. Develop the lateral surface of a cylindrical piece shown in Figure T9.3.



**Figure T9.1**

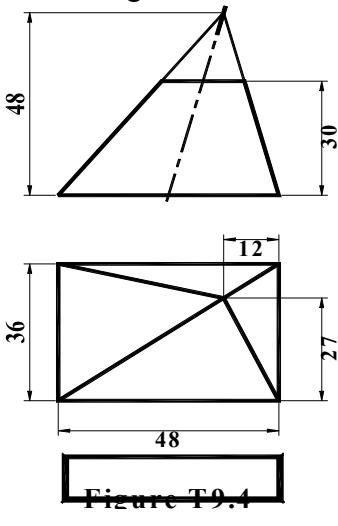


**Figure T9.2**

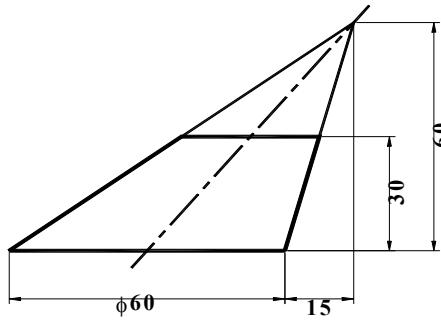


**Figure T9.3**

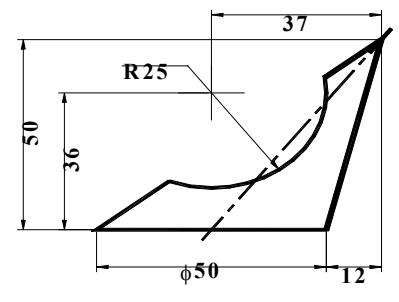
4. Two views of an oblique, truncated rectangular pyramid are shown in Figure T9.4. Develop its lateral surface.
5. Figure T9.5 and T9.6 show parts of oblique cone. Develop the surfaces.



**Figure T9.4**



**Figure T9.5**



**Figure T9.6**

# ENGINEERING DRAWING I

## SHEET NO: 10

### (INTERSECTION OF SOLIDS)

Draw the given views of assigned form and complete the intersection. Then develop the lateral surfaces.

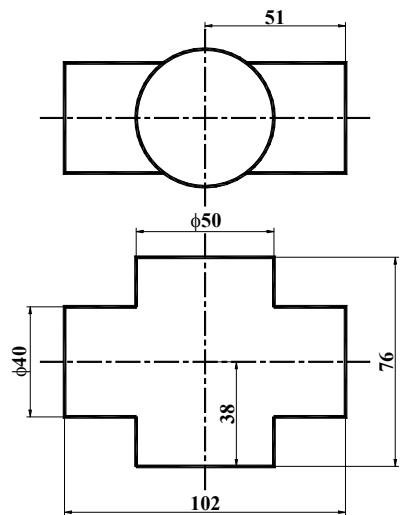


Figure T10.1

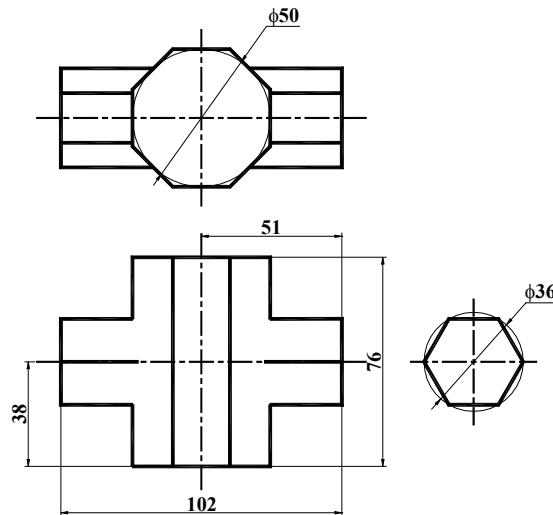


Figure T10.2

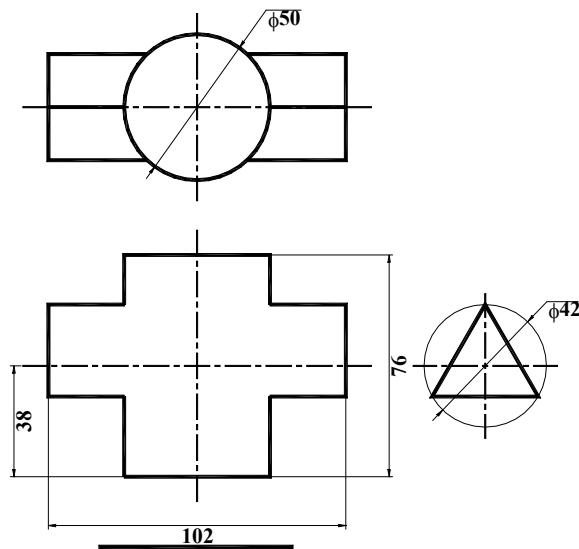


Figure T10.3

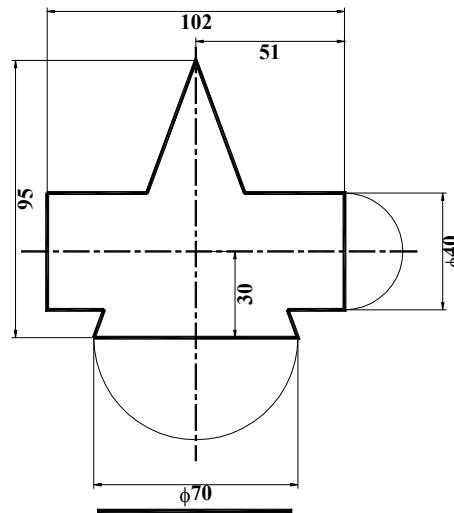
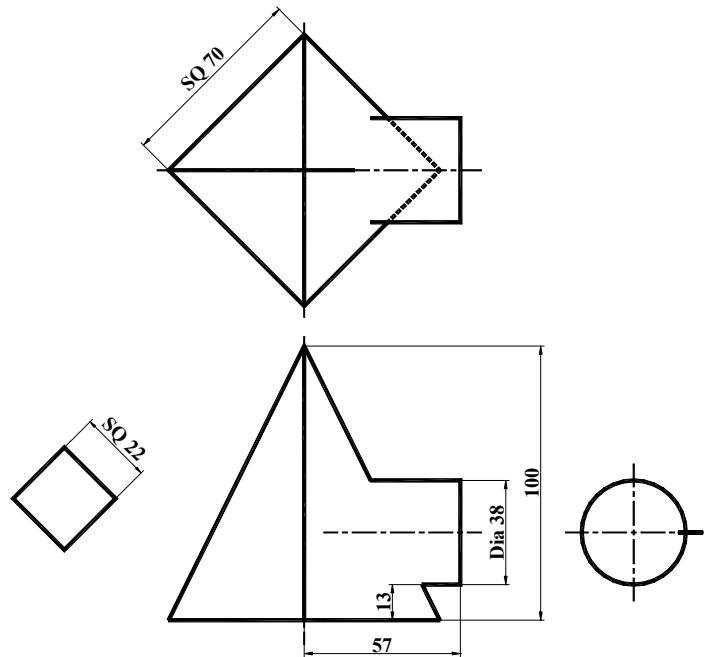
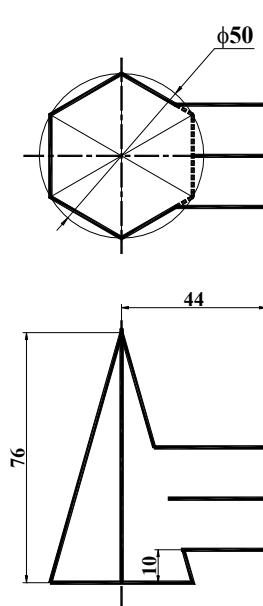
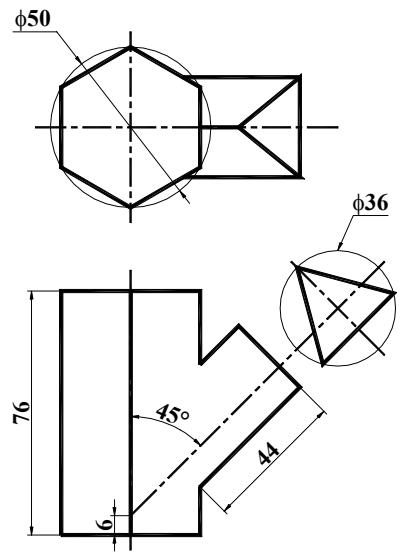
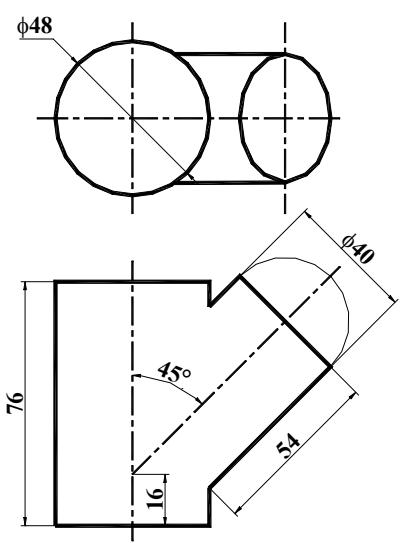


Figure T10.4



# ENGINEERING DRAWING I

## SHEET NO: 11

### (ORTHOGRAPHIC AND SECTIONAL VIEWS)

1. Construct and dimension three projections of a model with a vertical section.

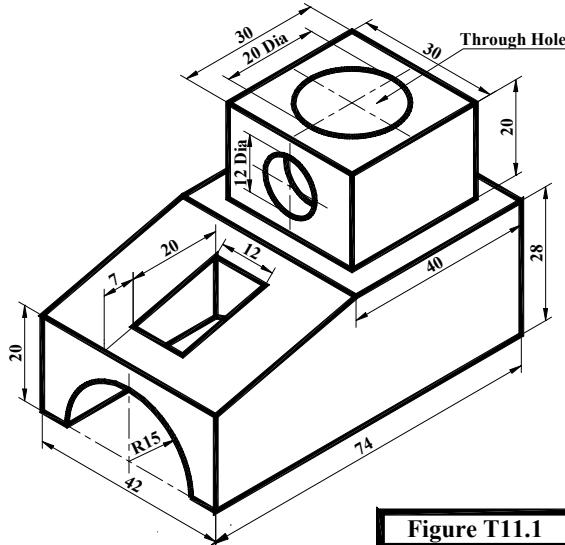


Figure T11.1

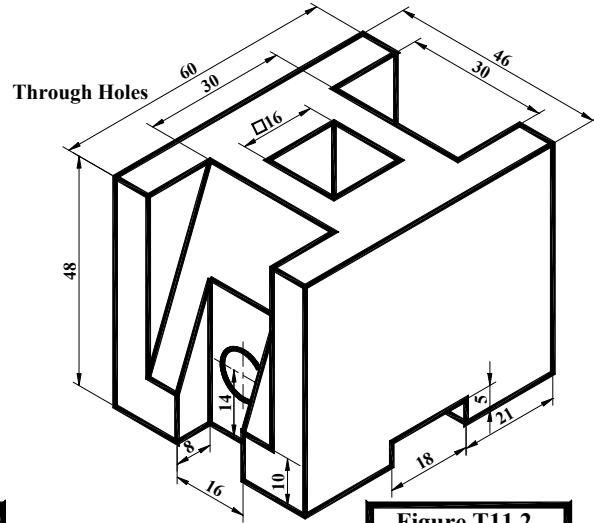


Figure T11.2

2. Construct and dimension three projections of a model with a horizontal section.

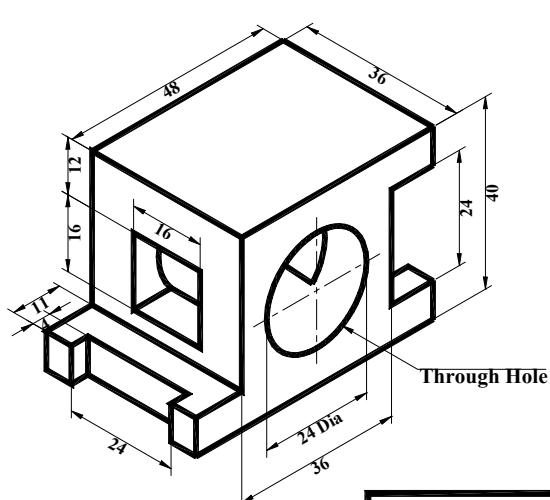


Figure T11.3

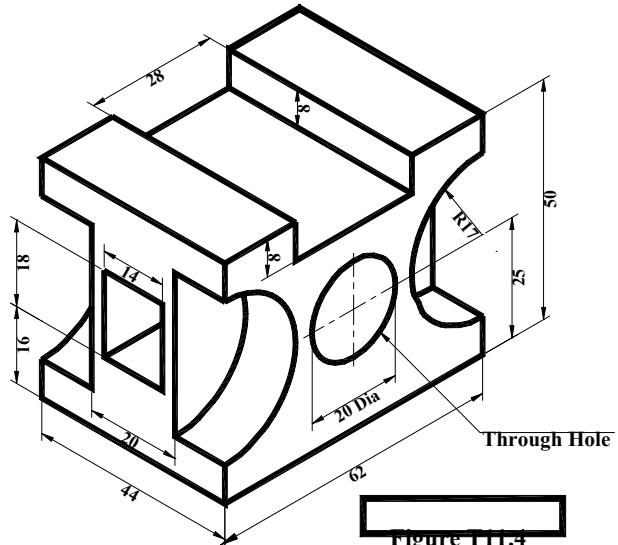


Figure T11.4

# ENGINEERING DRAWING I

## SHEET NO: 12

### (FREEHAND SKETCHING)

3. Sketch, freehand, the following one view drawings.

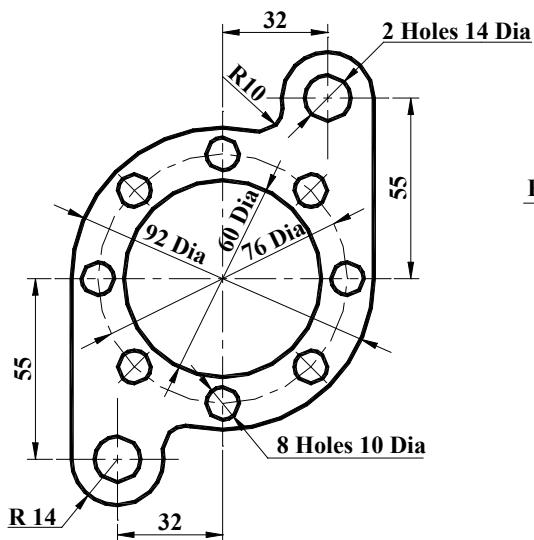


Figure T12.1(a)

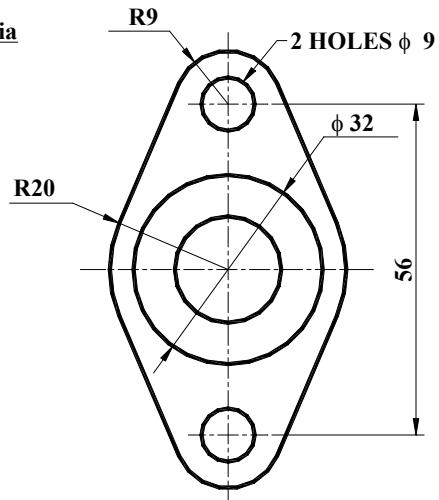


Figure T12.1(b)

4. Sketch the required views of the objects given below.

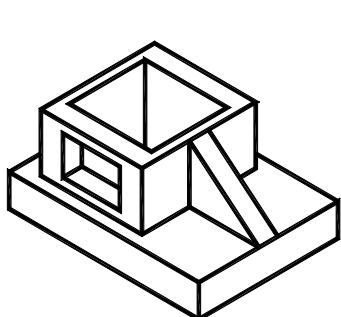


Figure T12.2(a)

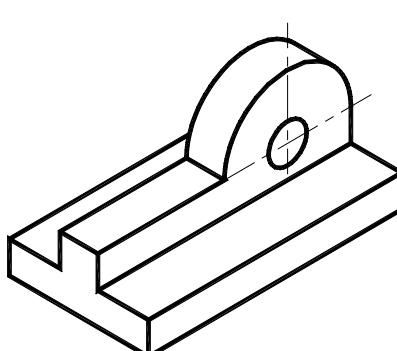


Figure T12.2(b)

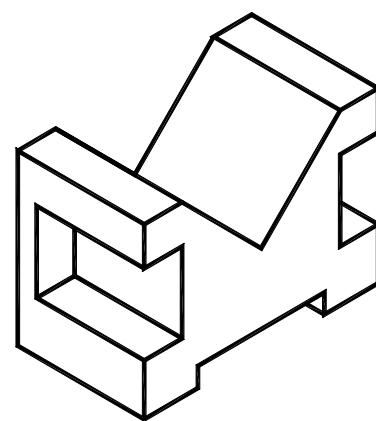
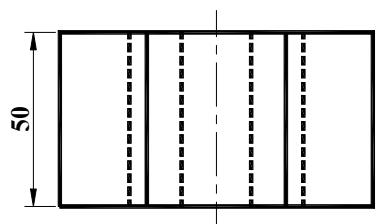
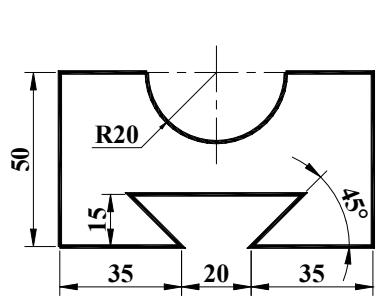
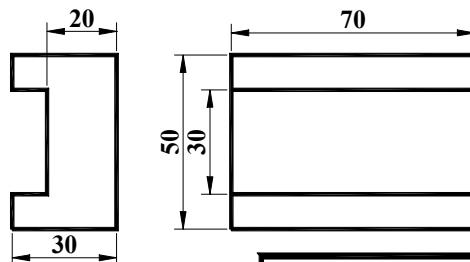


Figure T12.2(c)

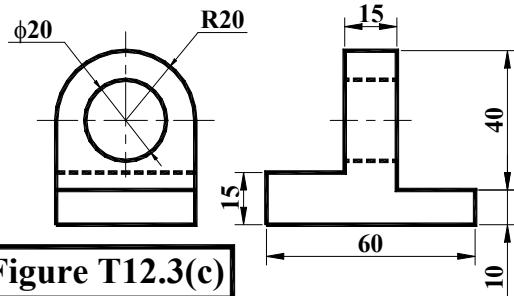
5. Sketch the pictorial view from the orthographic views given.



**Figure T12.3(a)**



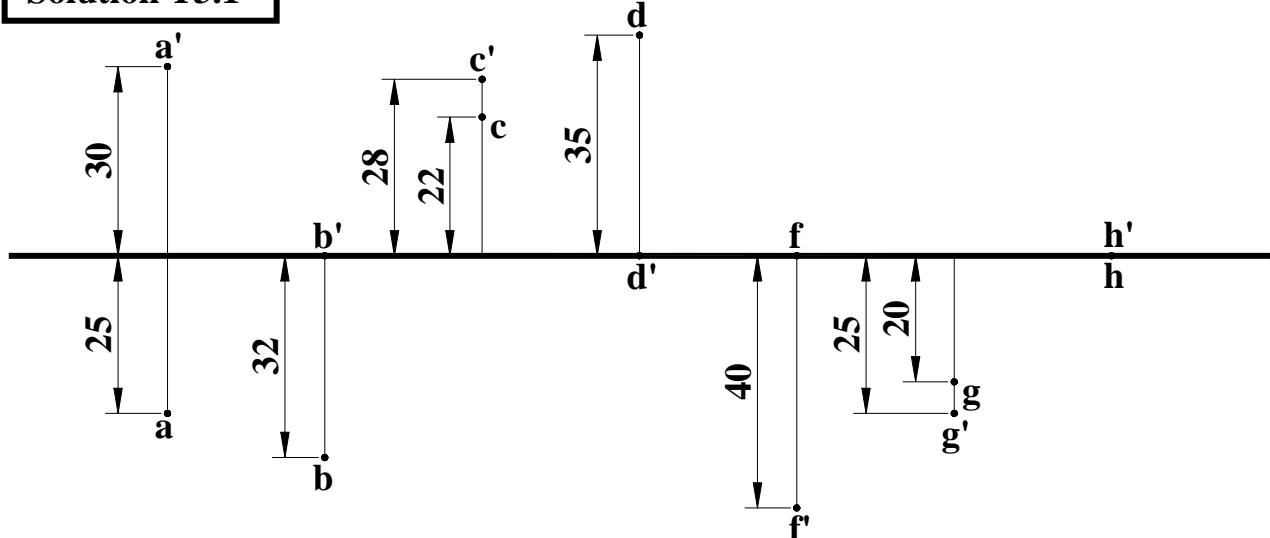
**Figure T12.3(b)**



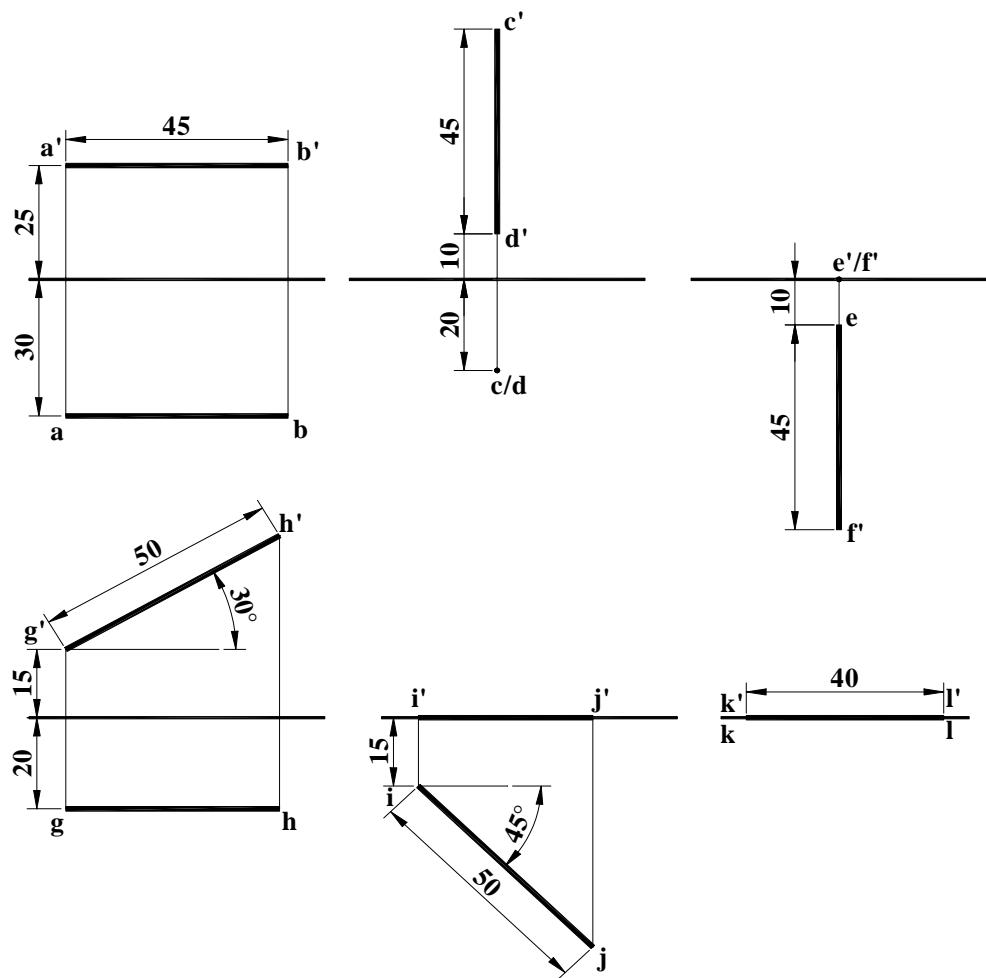
**Figure T12.3(c)**

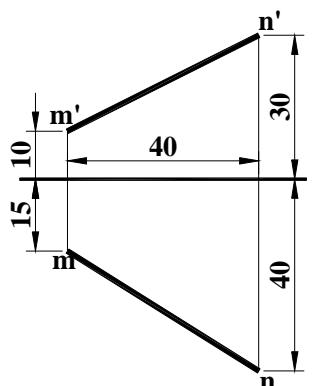
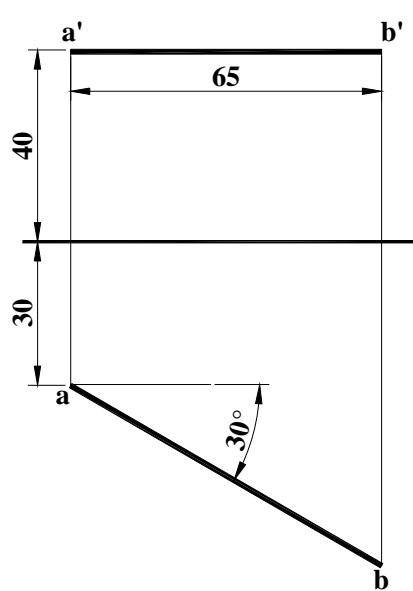
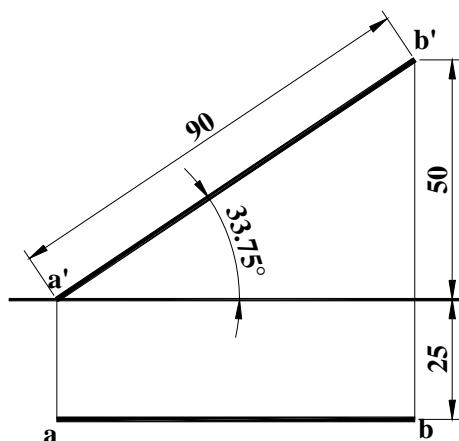
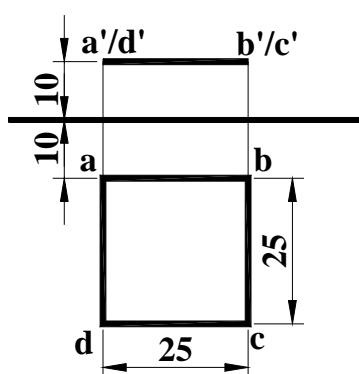
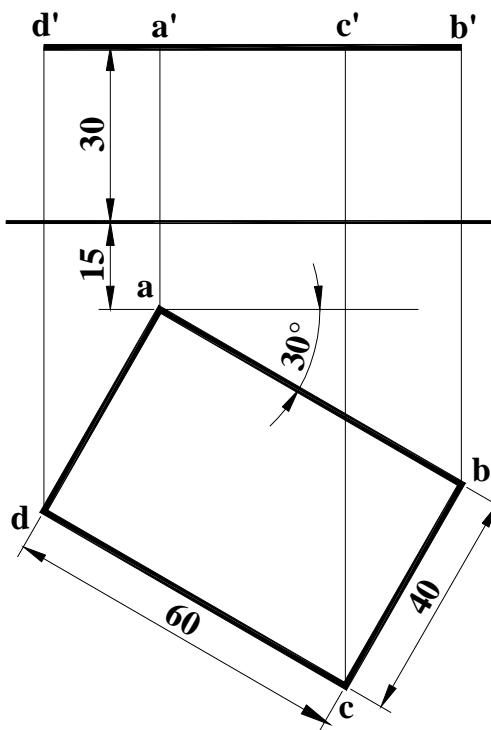
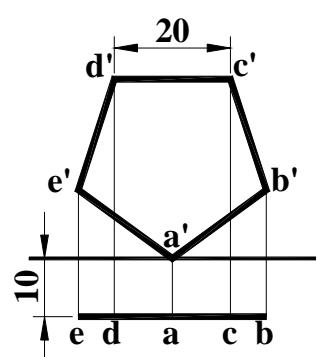
**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 3**

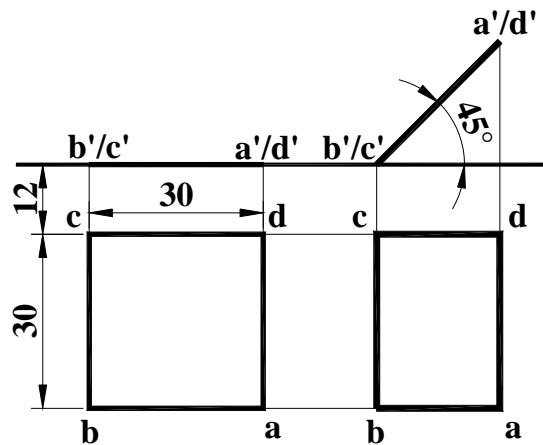
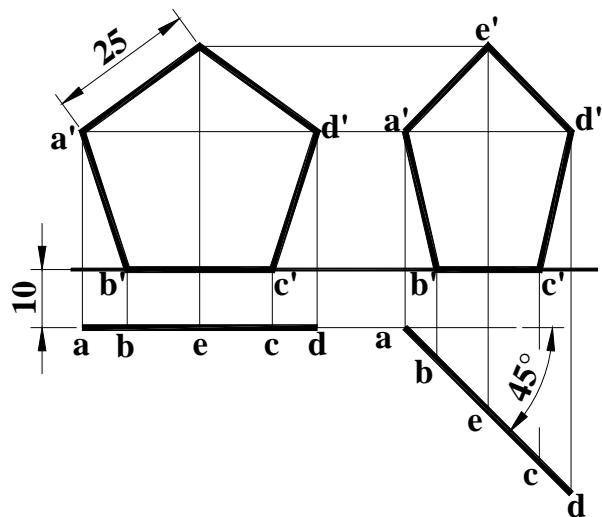
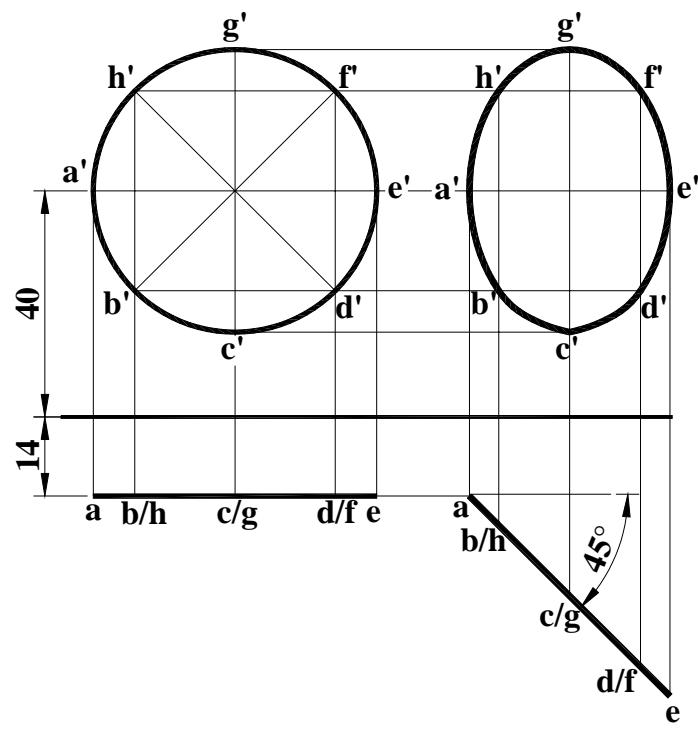
**Solution T3.1**



**Solution T3.2**

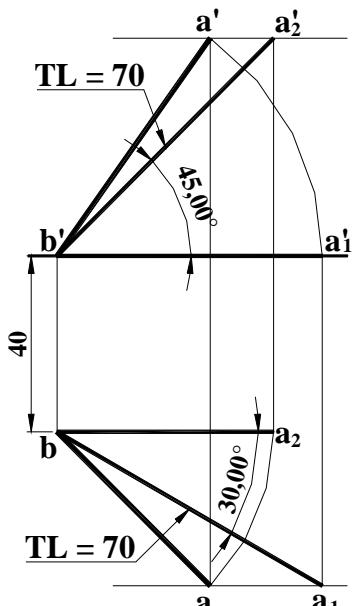


**Solution T3.3****Solution T3.4****Solution T3.5****Solution T3.6****Solution T3.7****Solution T3.8**

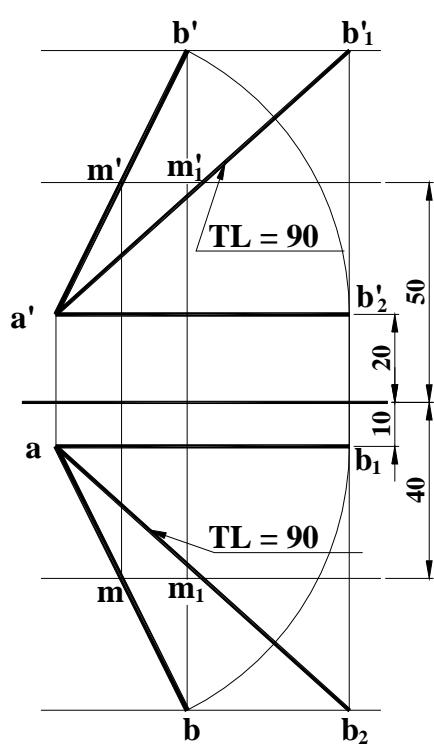
**Solution T3.9****Solution T3.10****Solution T3.11**

**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 4**

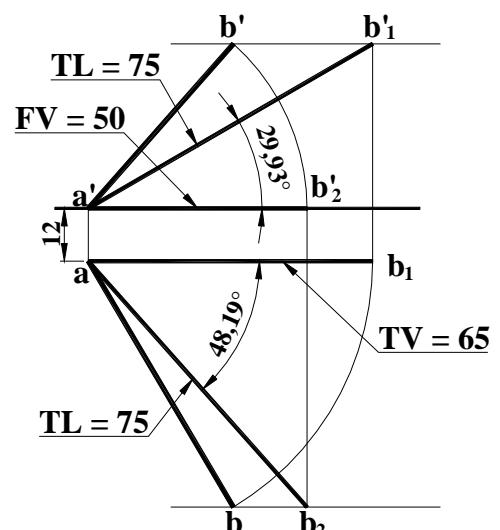
**Solution T4.1**



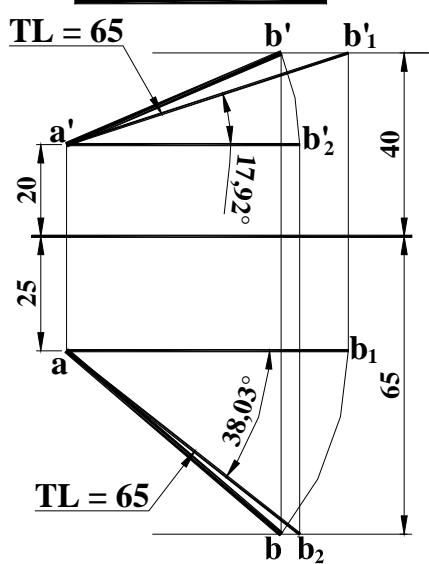
**Solution T4.2**



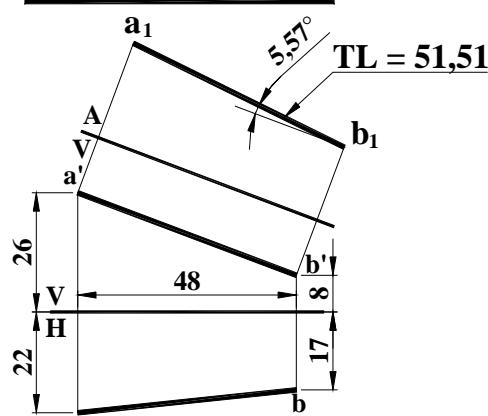
**Solution T4.3**



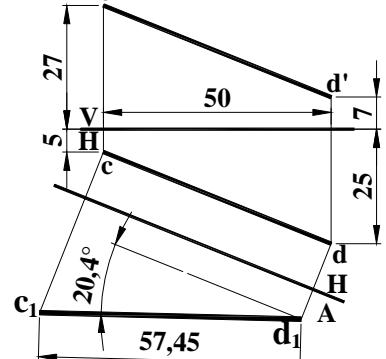
**Solution T4.4**



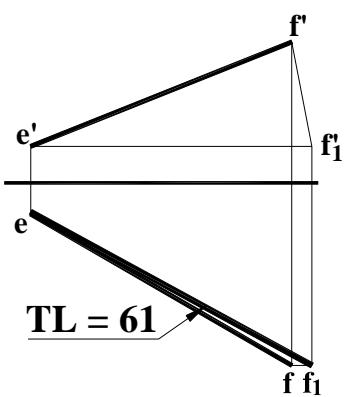
**Solution T4.5(a)**



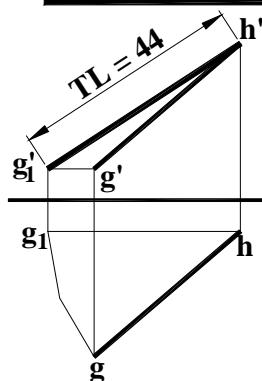
**Solution T4.5(b)**



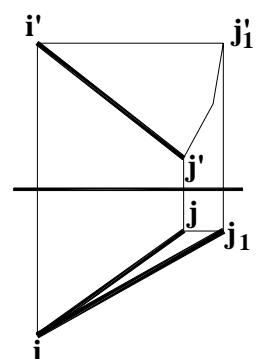
## Solution T4.6(a)



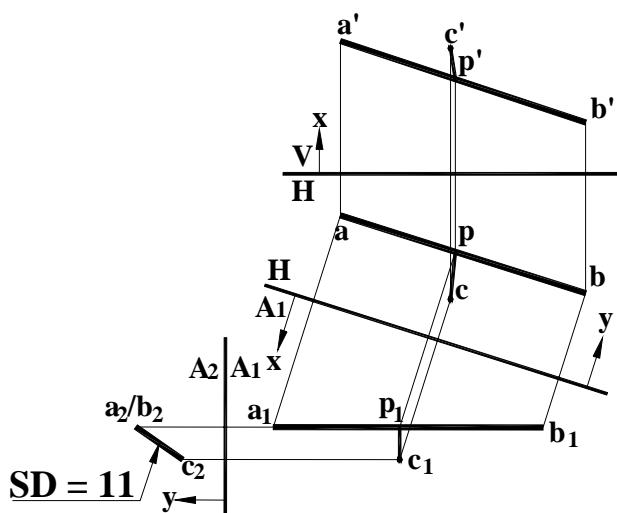
### Solution T4.6(b)



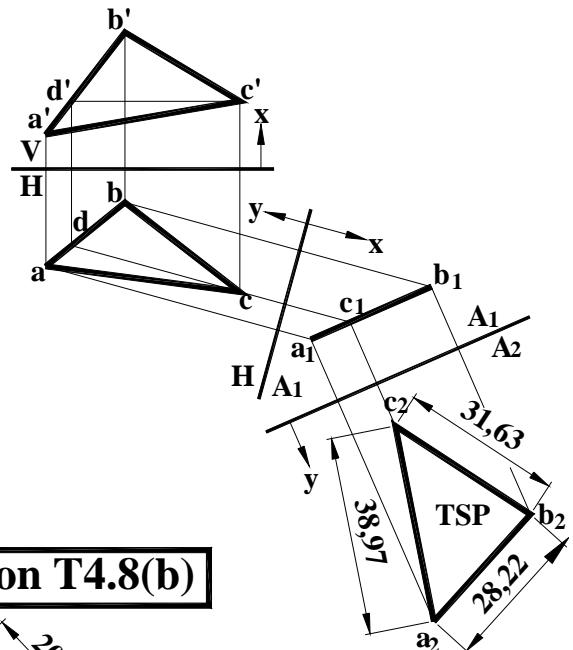
### Solution T4.6(c)



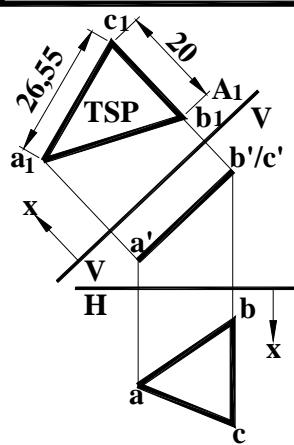
## Solution T4.7

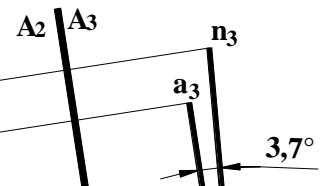


### Solution T4.8(a)

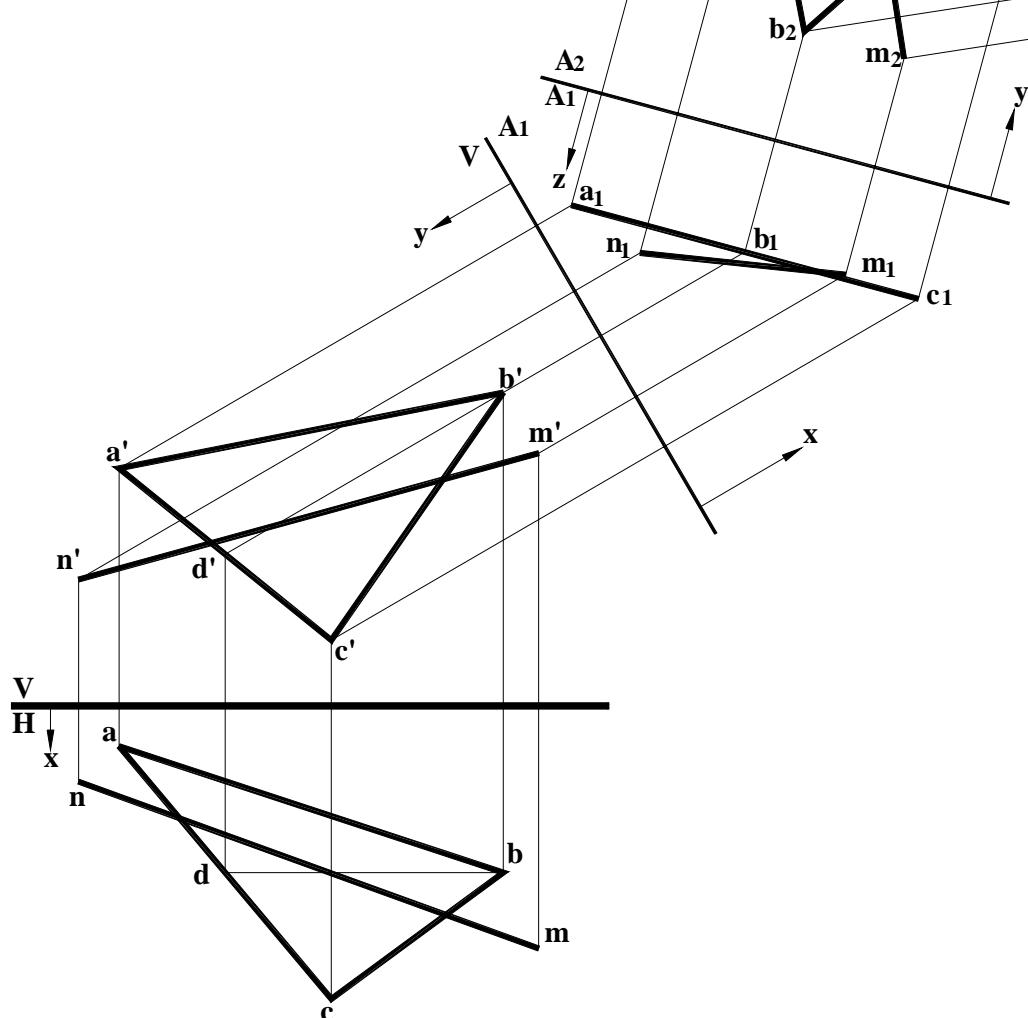


## Solution T4.8(b)

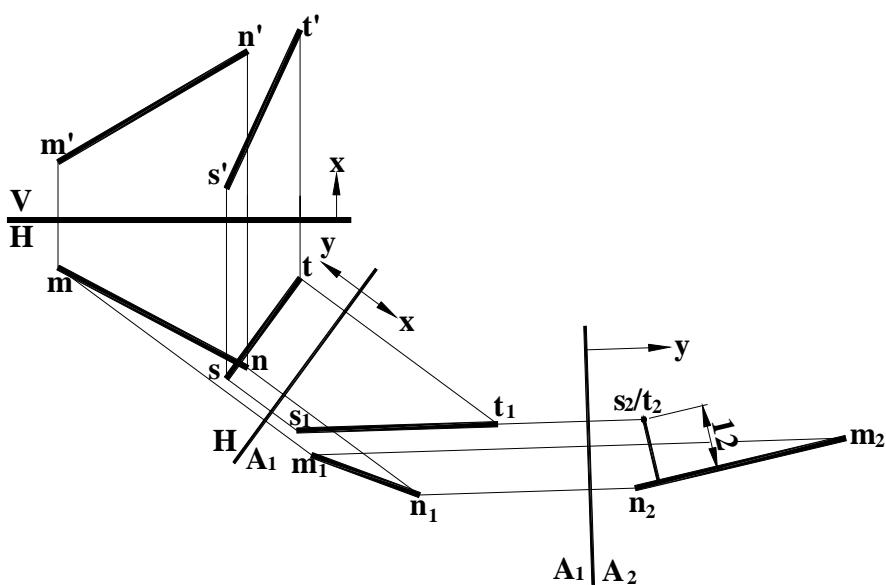




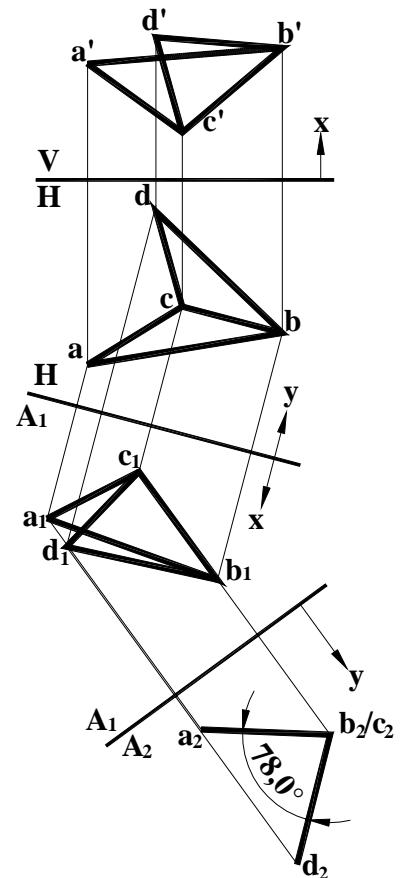
**Solution T4.9**



### Solution T4.10

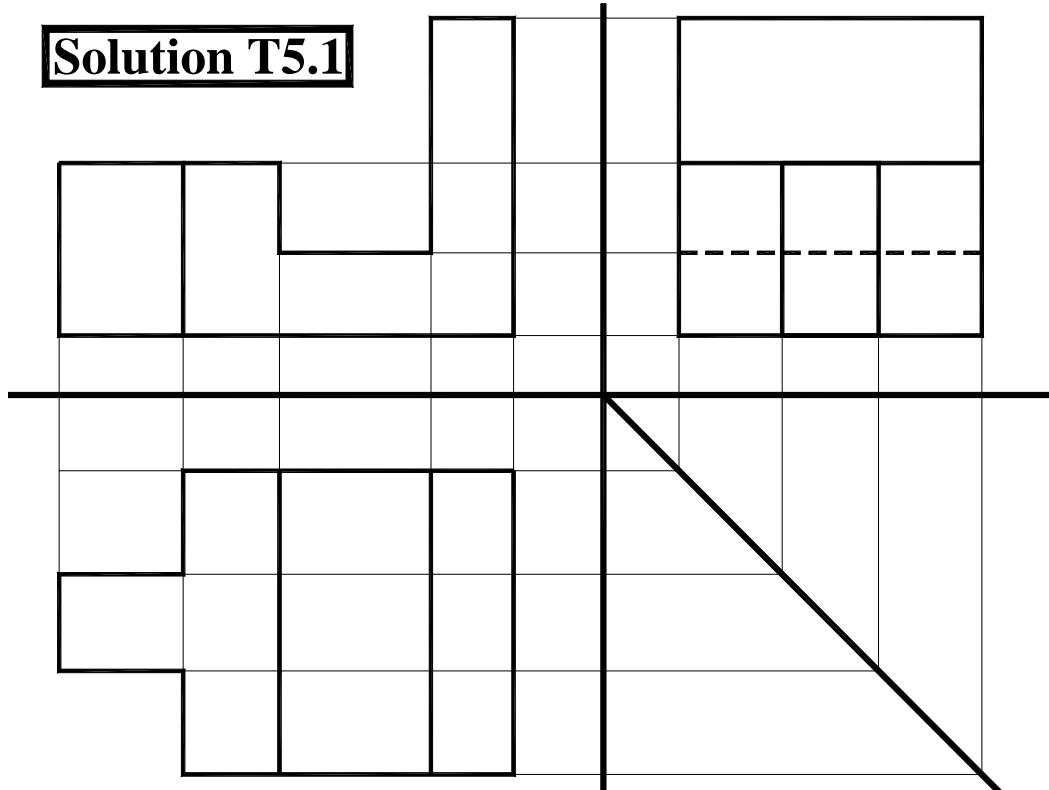


### Solution T4.11

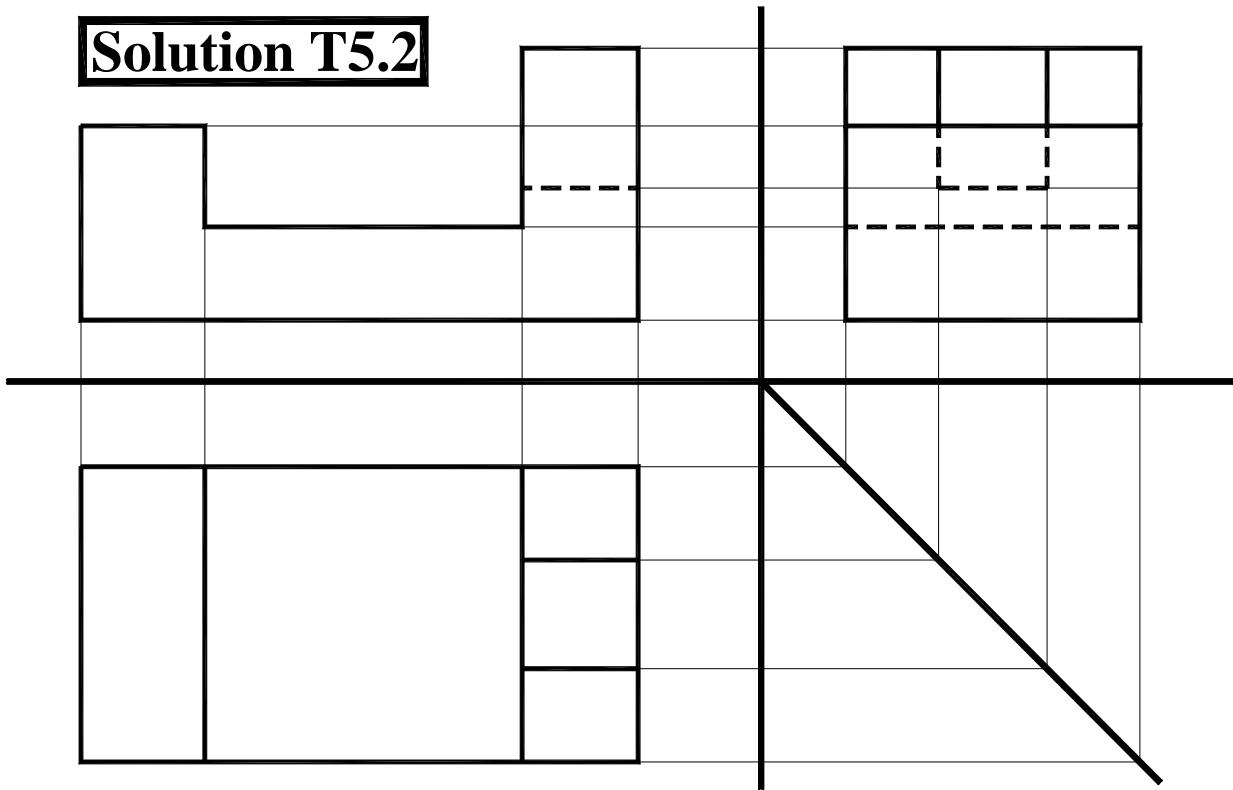


**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 5**

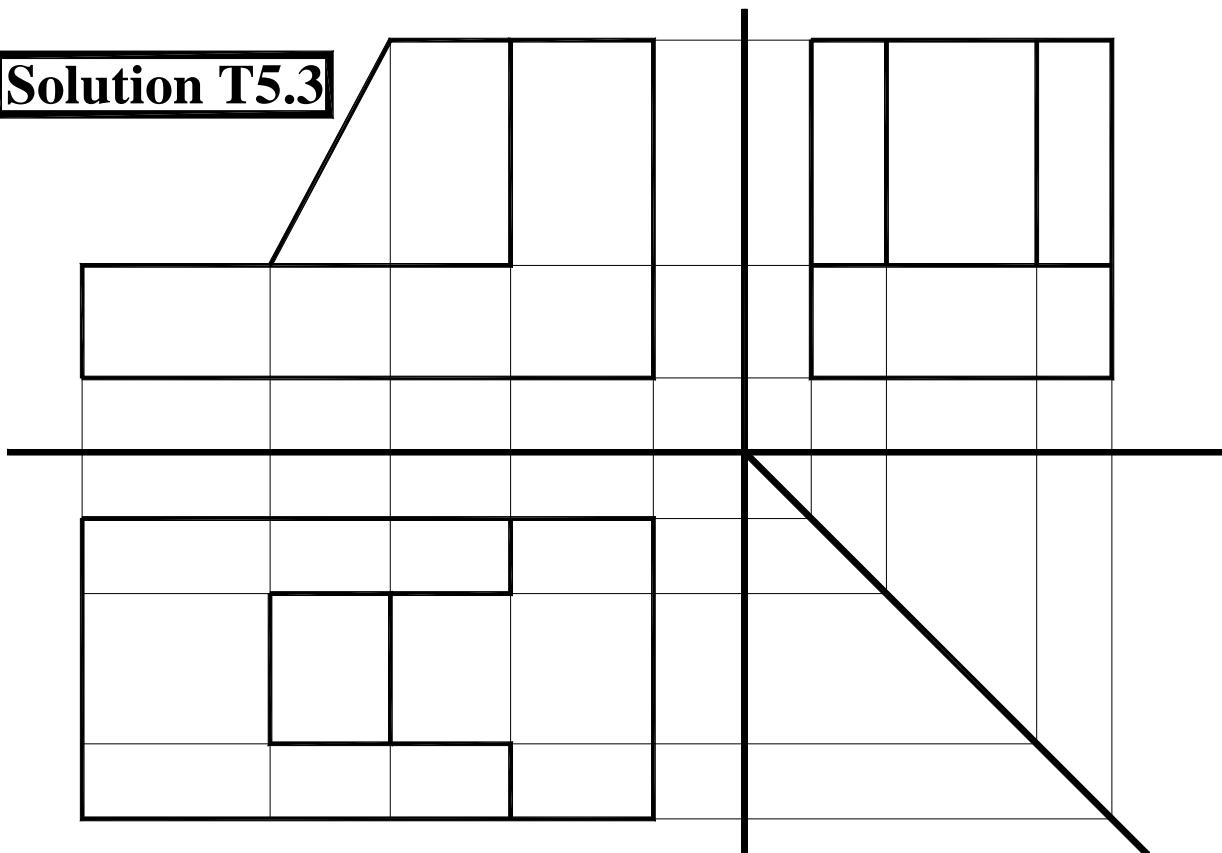
**Solution T5.1**



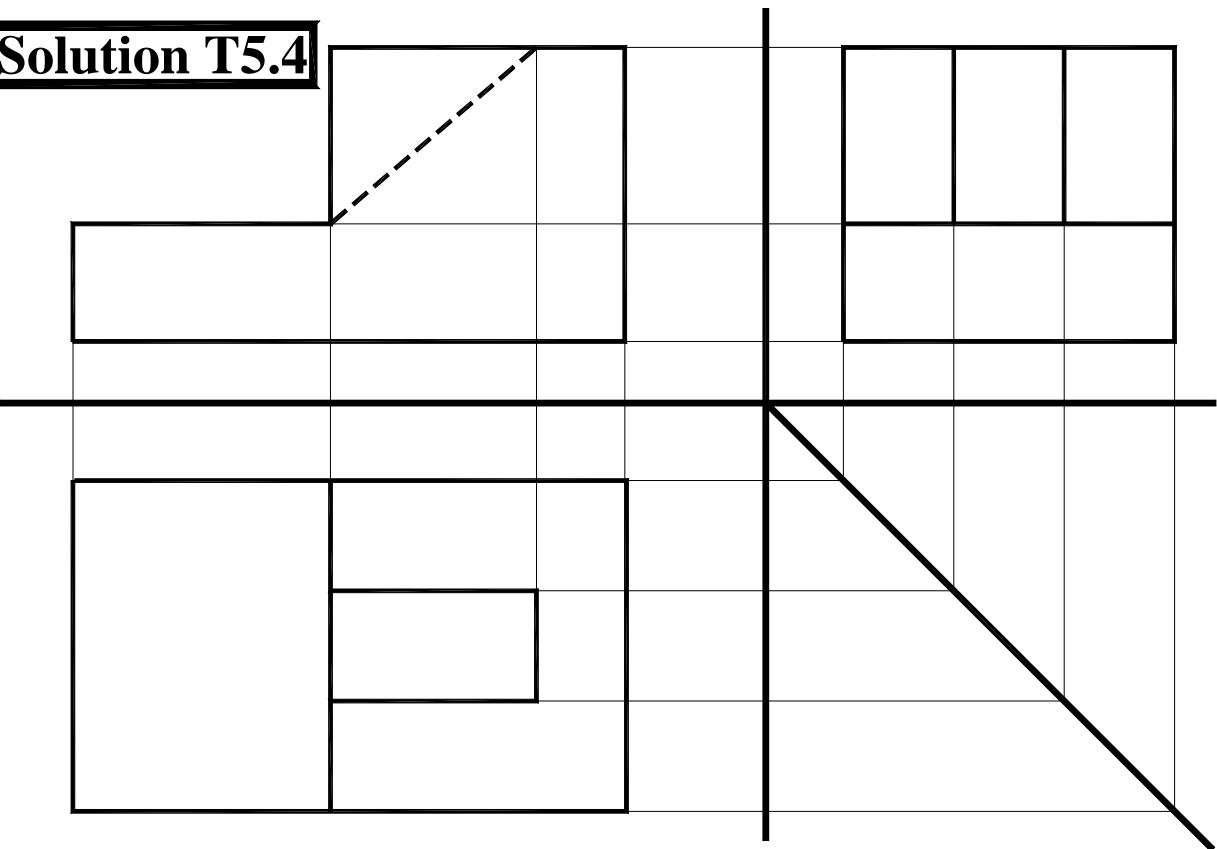
**Solution T5.2**



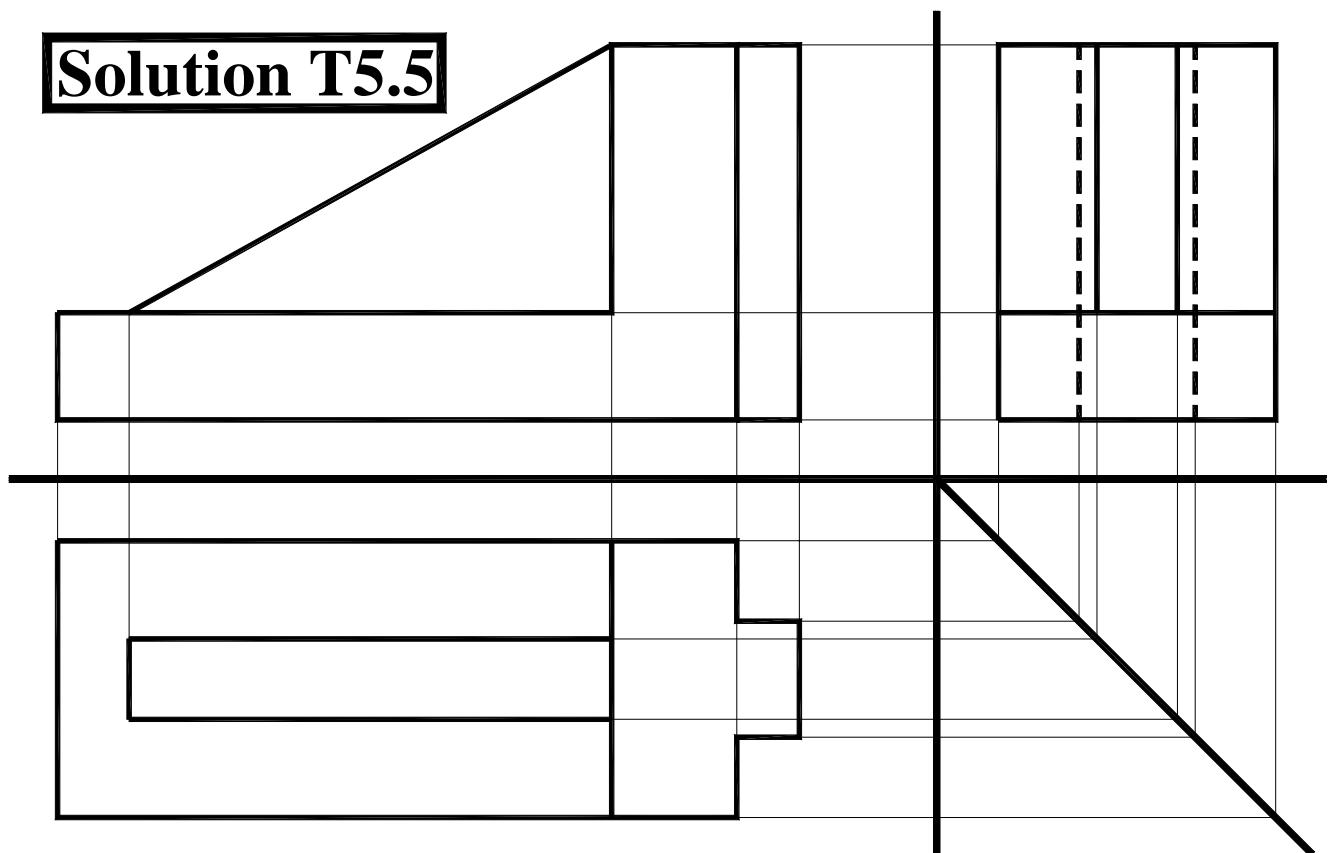
**Solution T5.3**



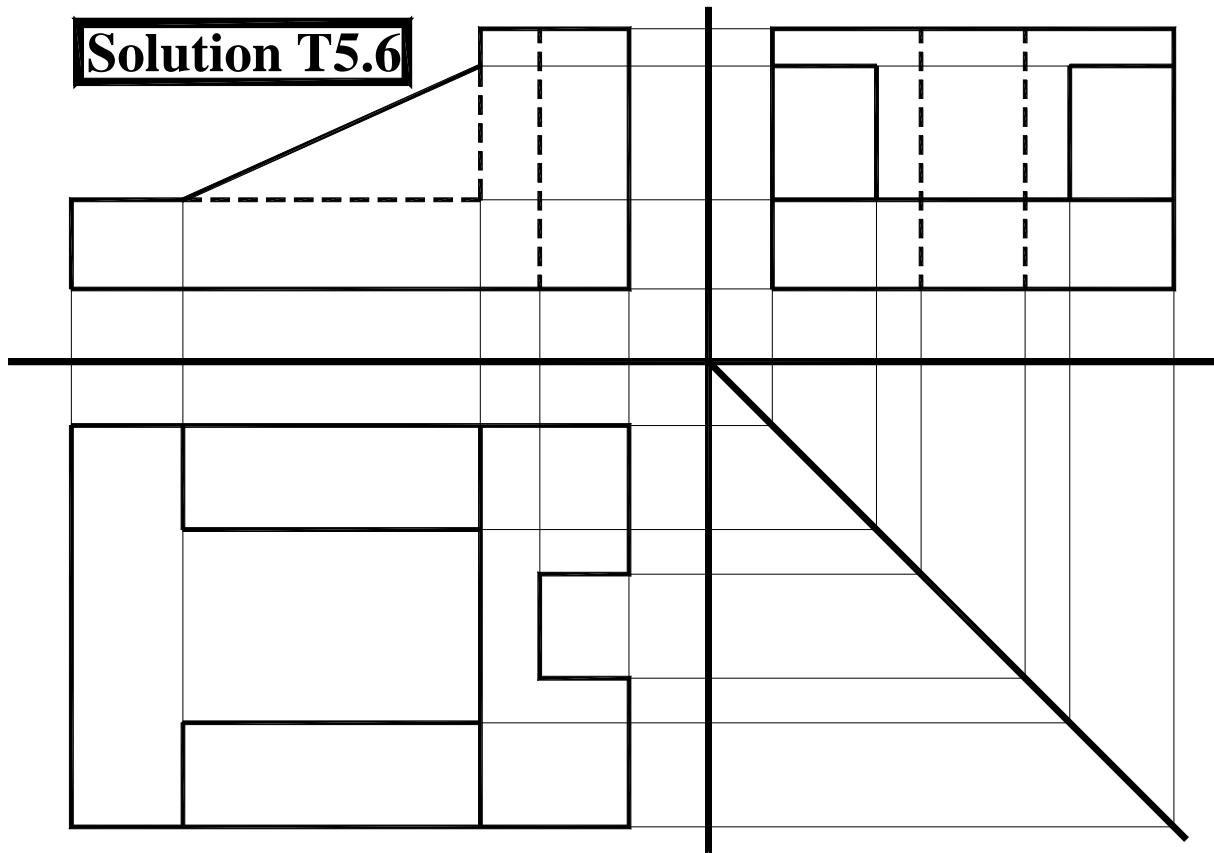
**Solution T5.4**



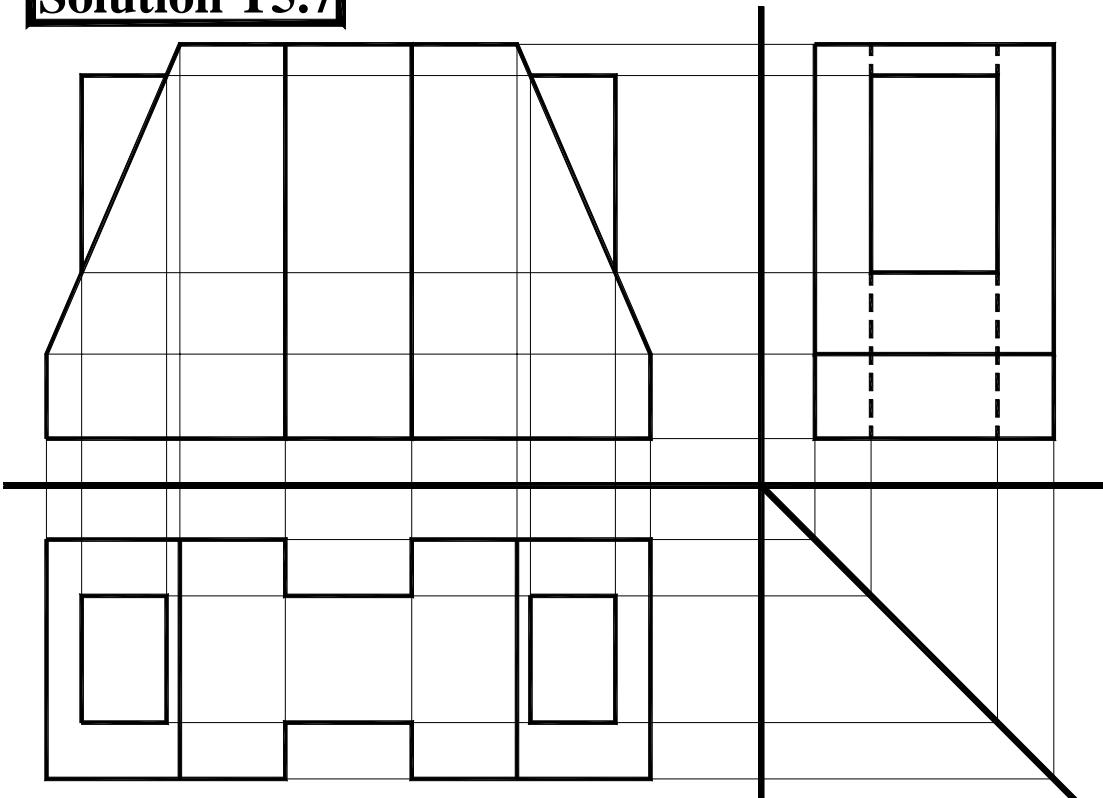
### **Solution T5.5**



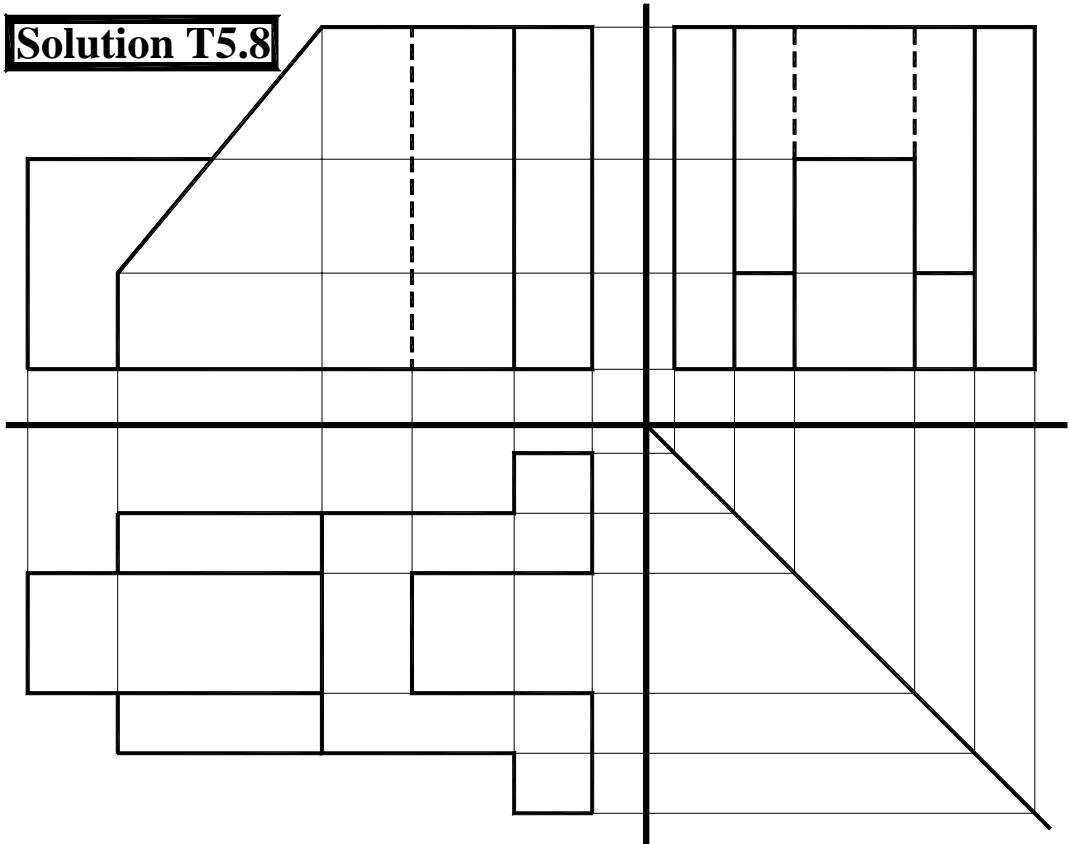
### **Solution T5.6**



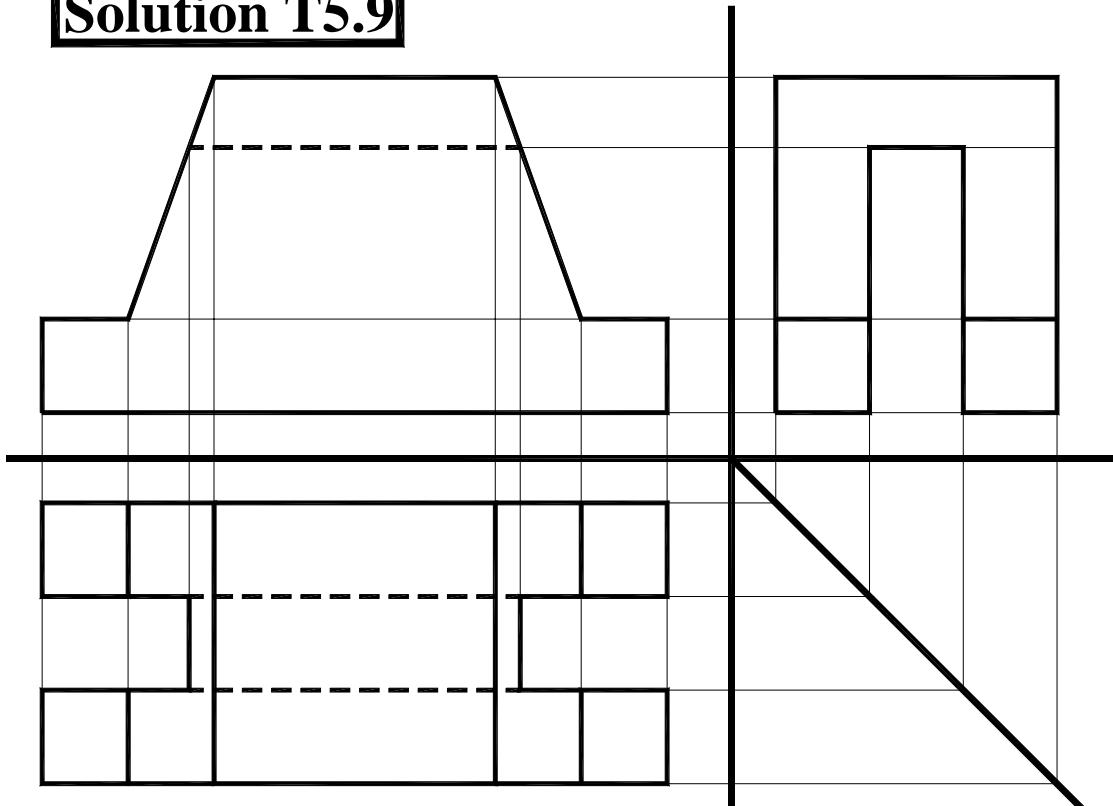
### **Solution T5.7**



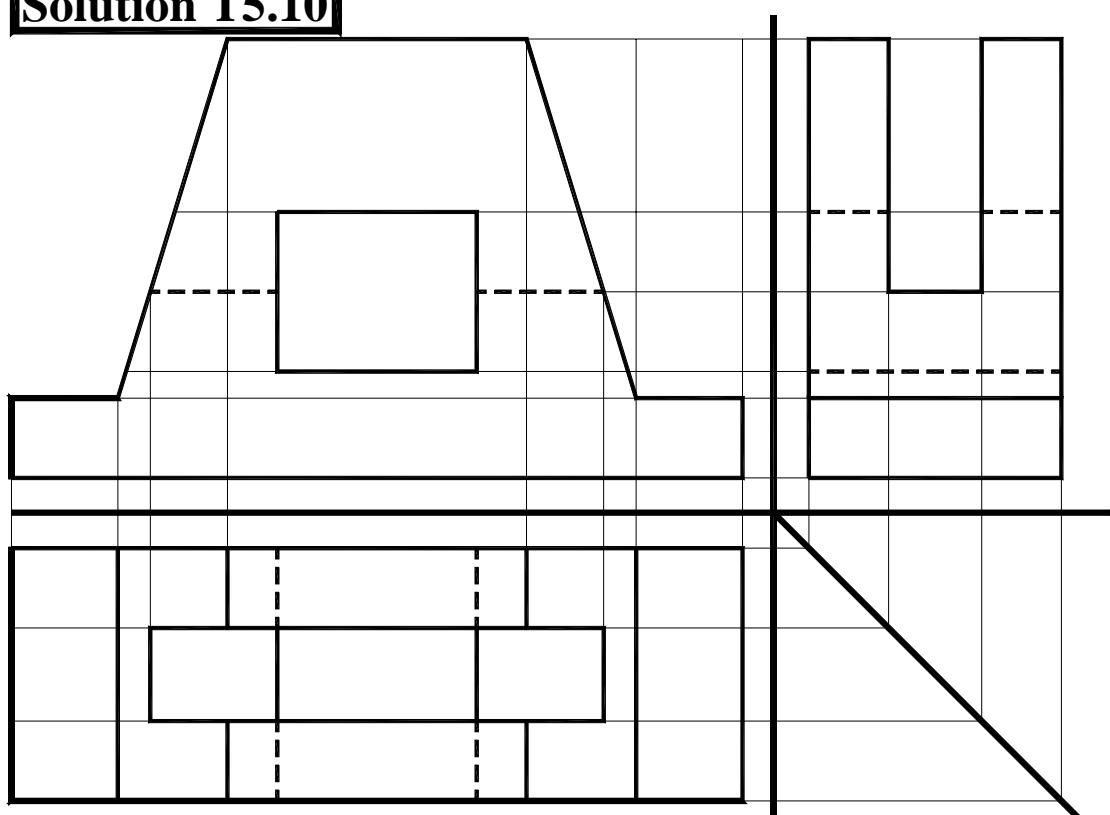
### **Solution T5.8**



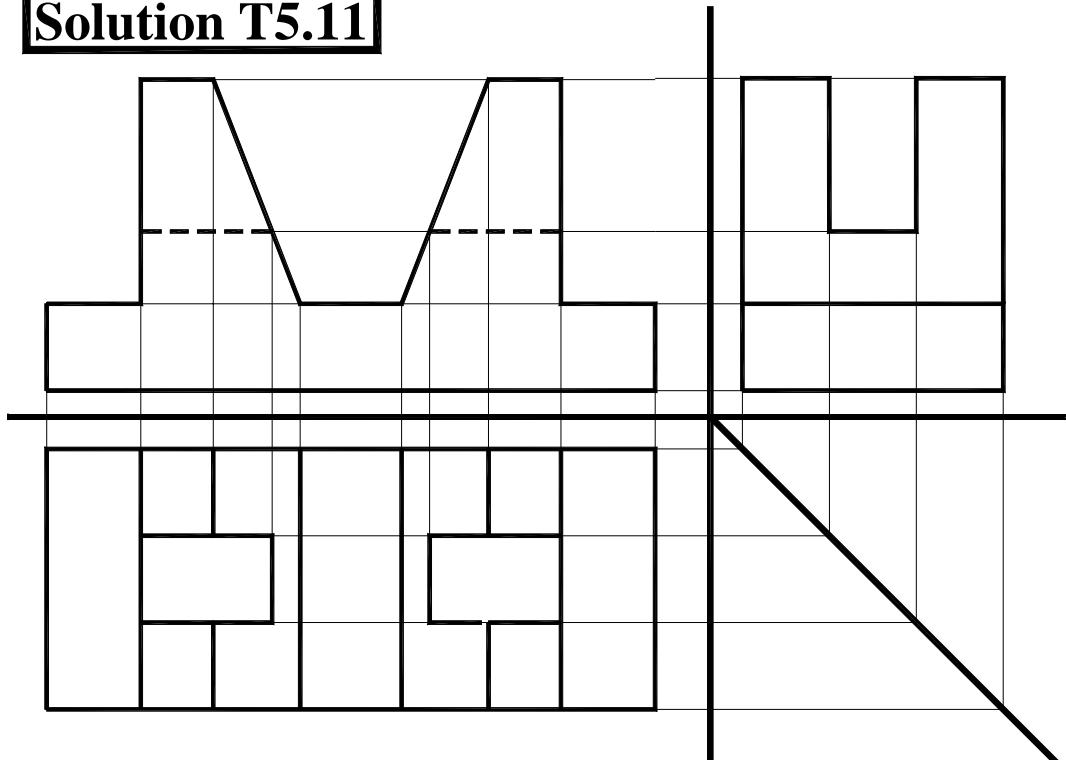
### **Solution T5.9**



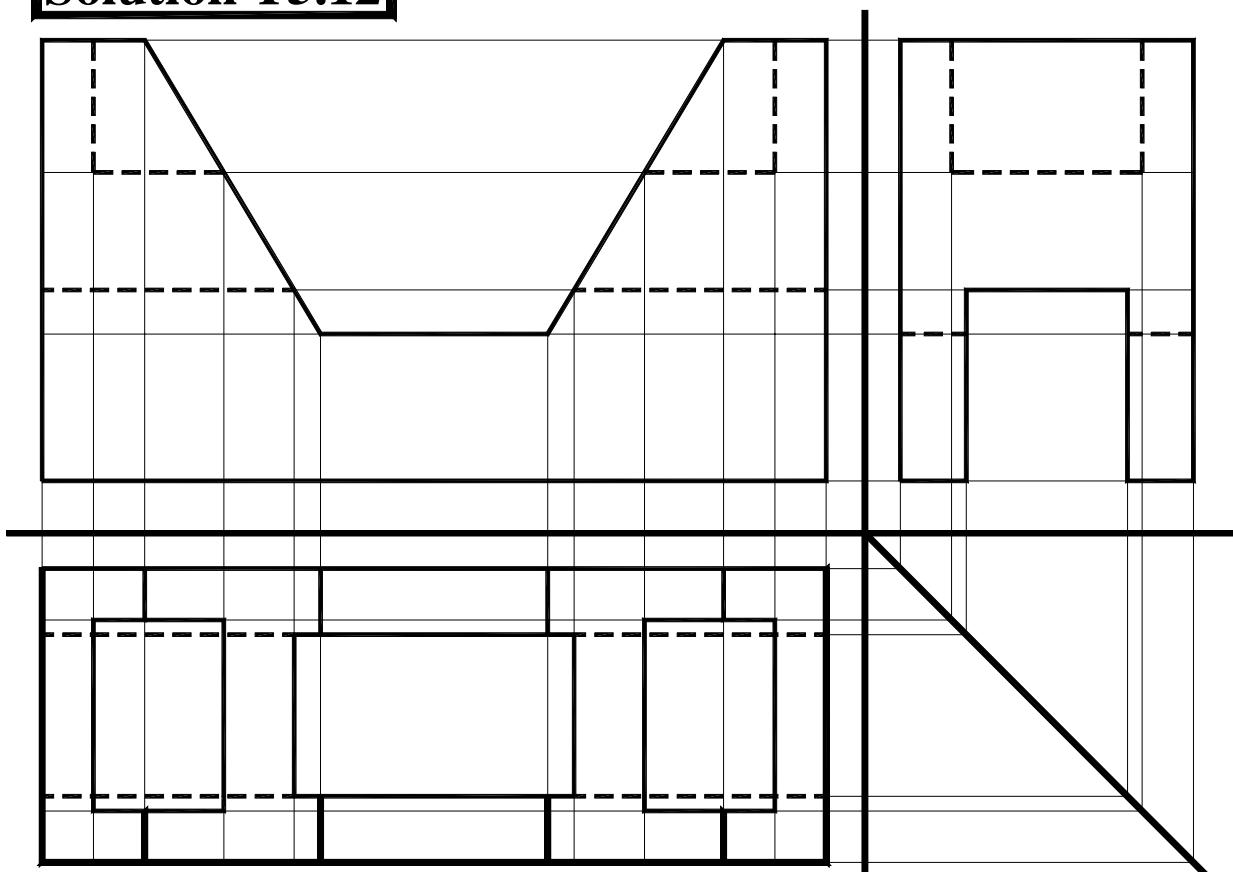
### **Solution T5.10**



### **Solution T5.11**

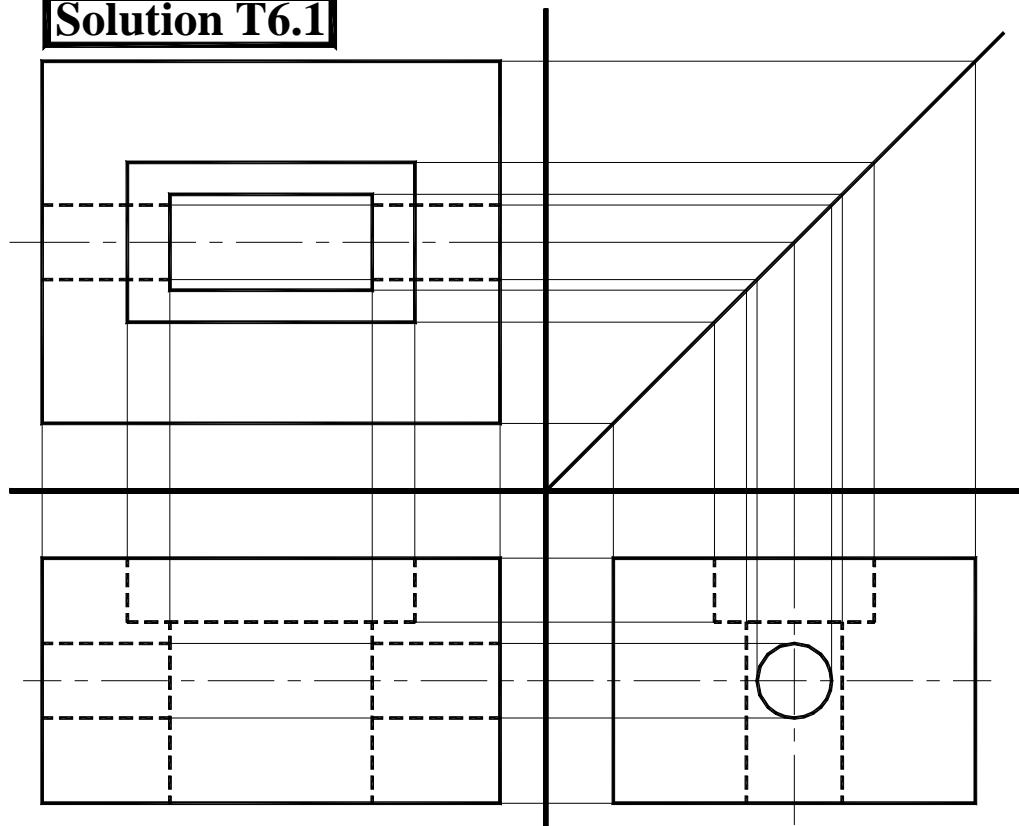


### **Solution T5.12**

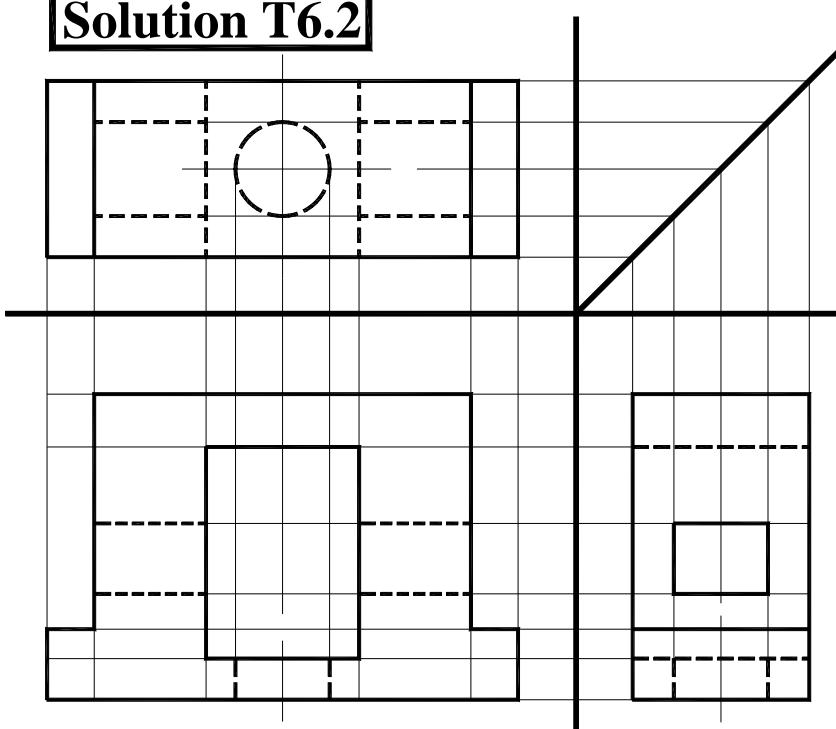


**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 6**

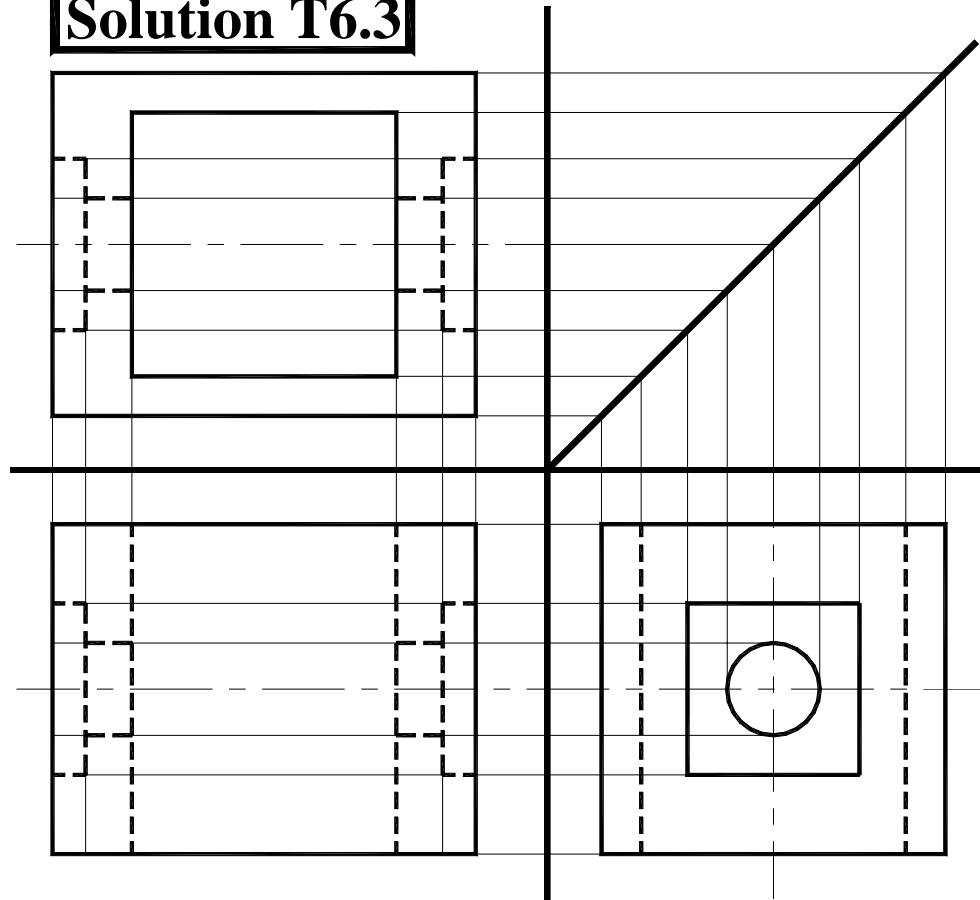
**Solution T6.1**



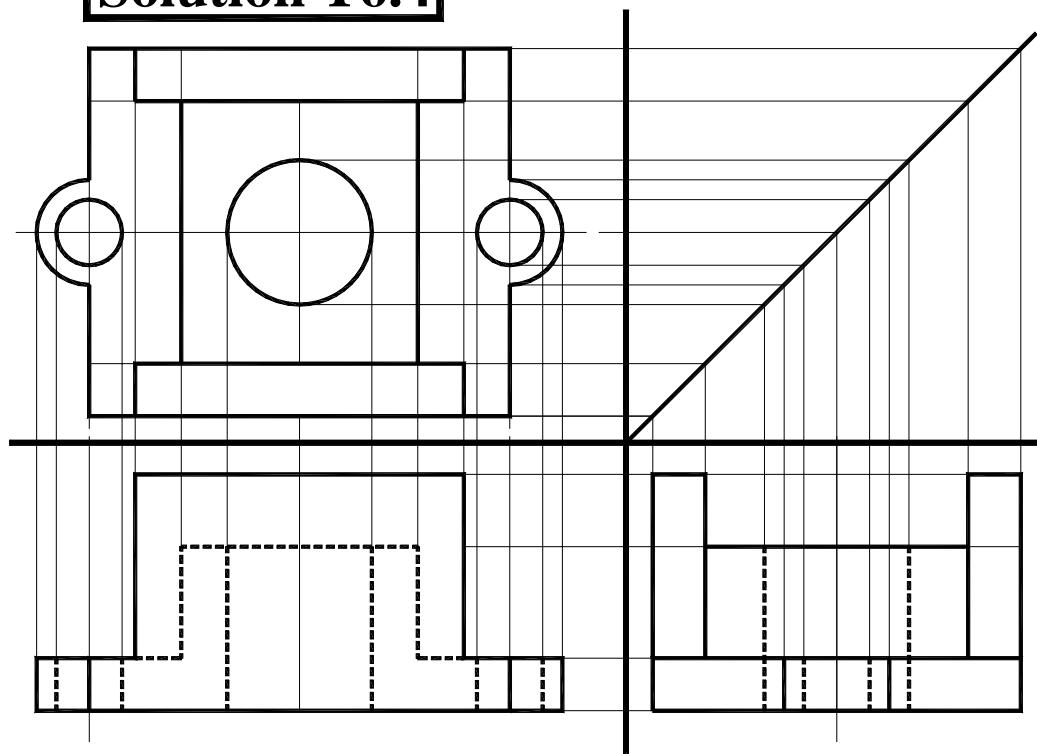
**Solution T6.2**



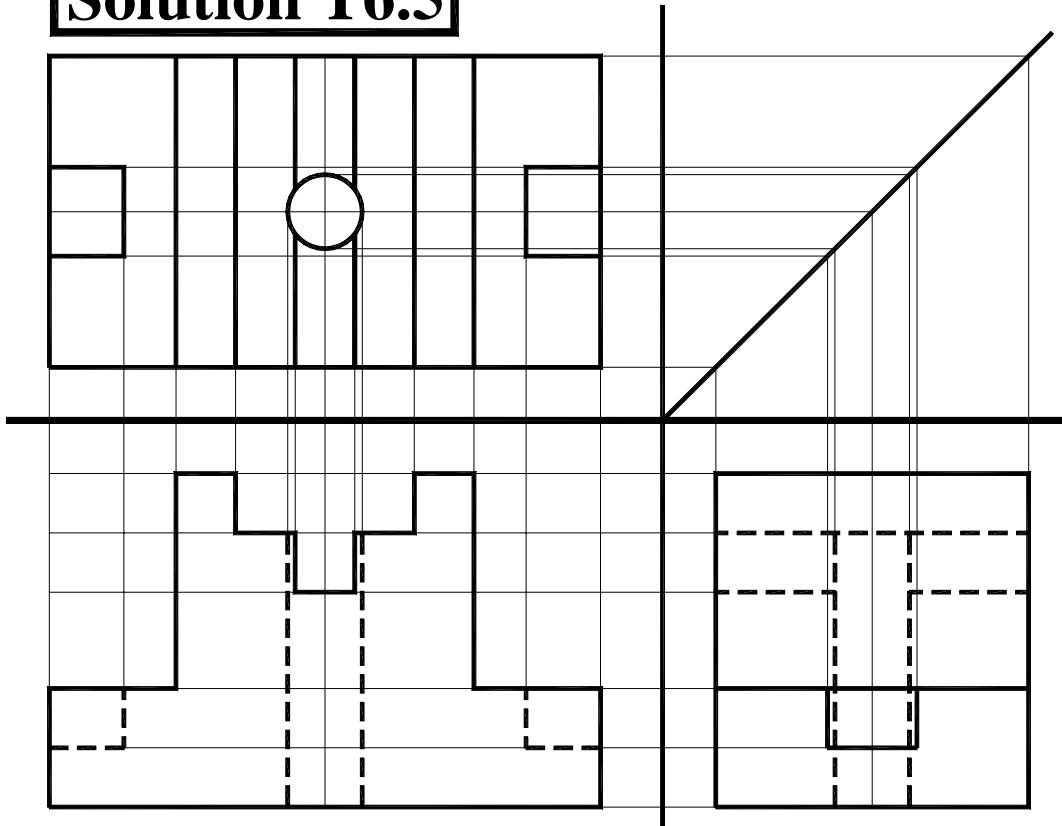
### **Solution T6.3**



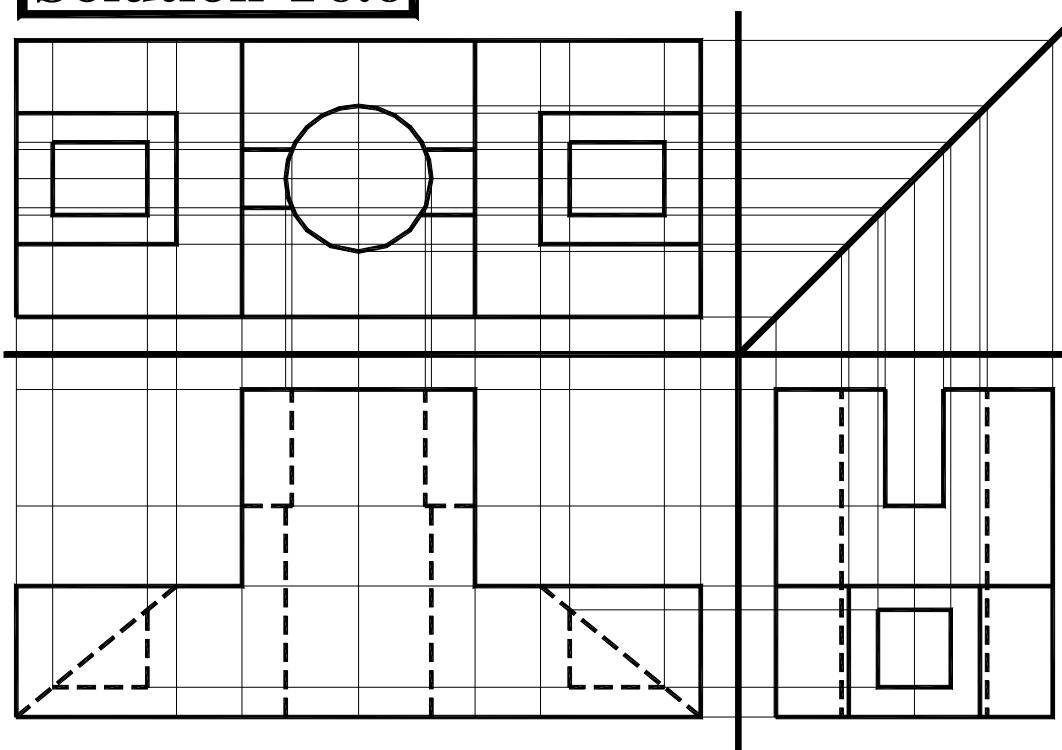
### **Solution T6.4**



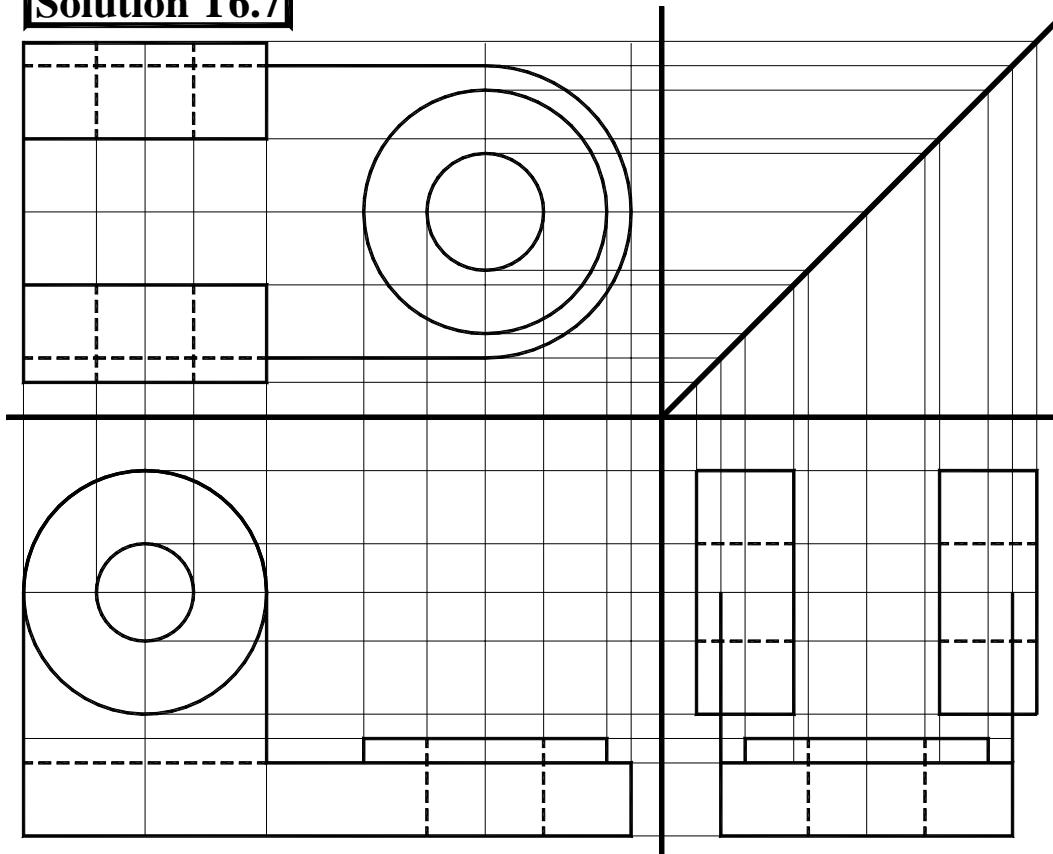
## Solution T6.5



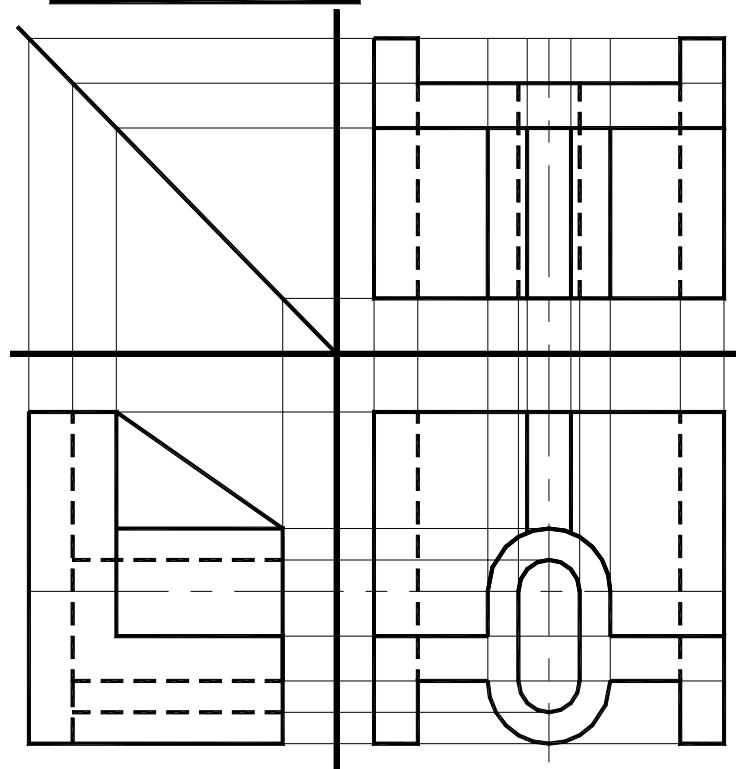
## Solution T6.6



**Solution T6.7**

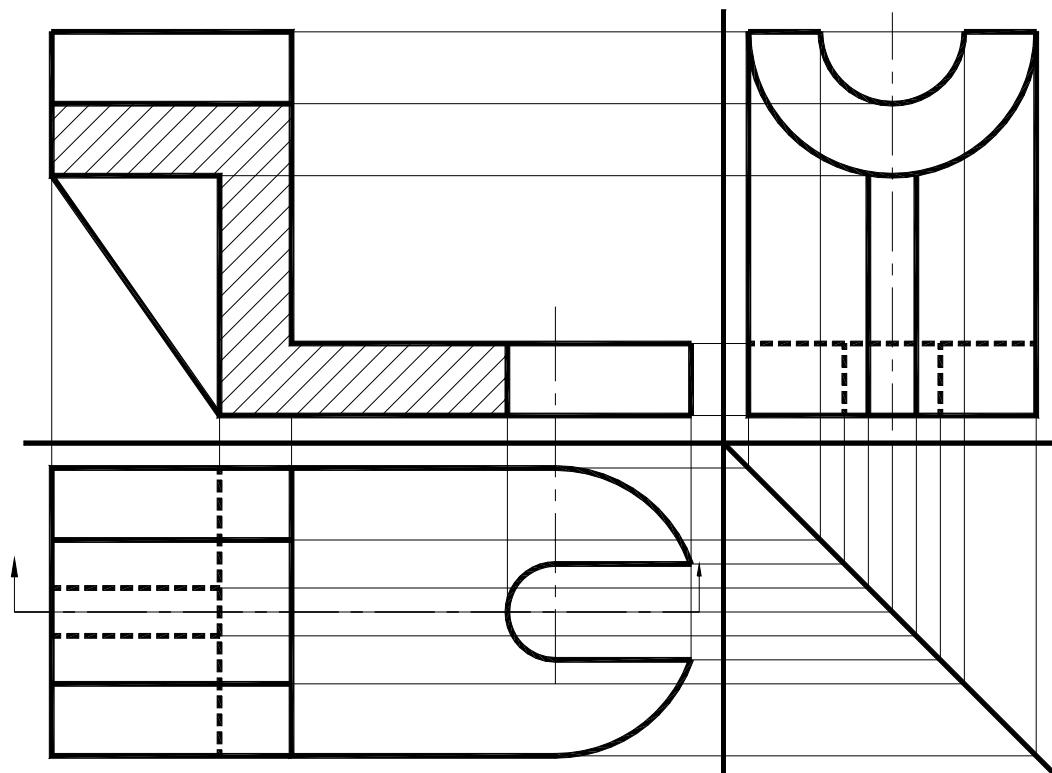
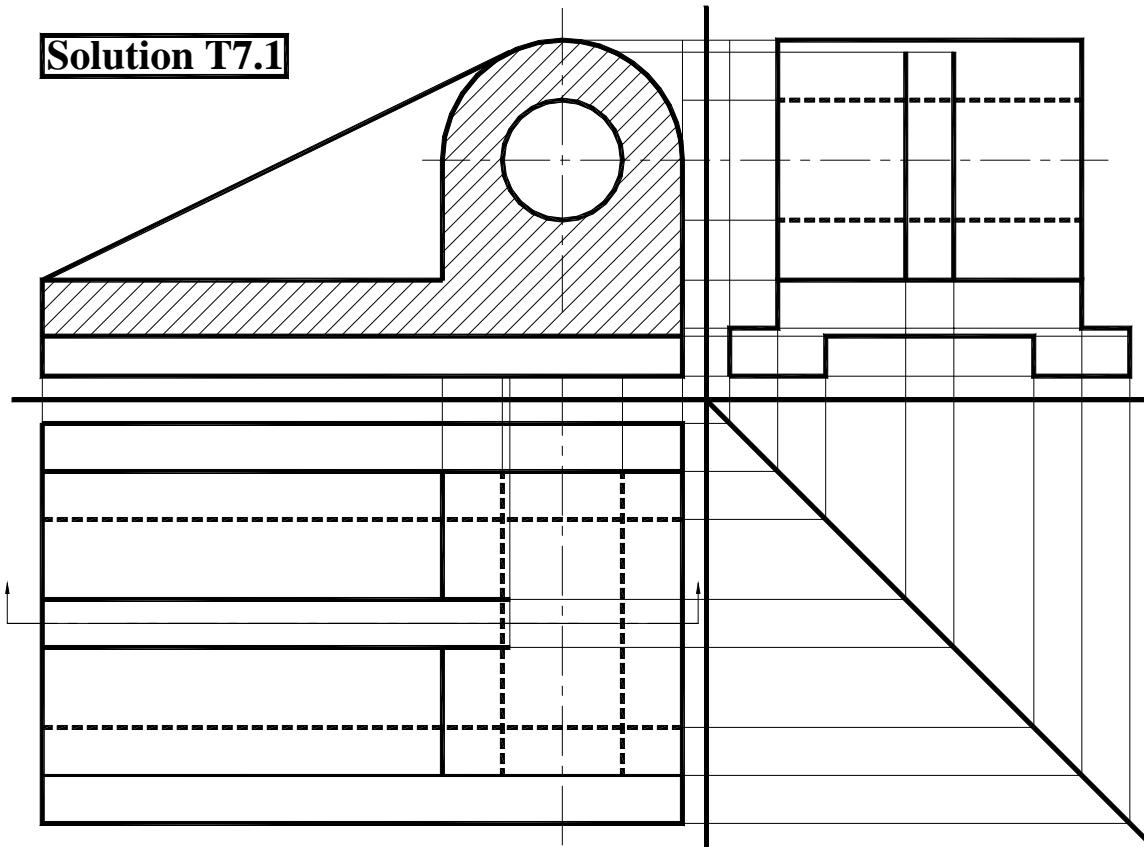


**Solution T6.8**

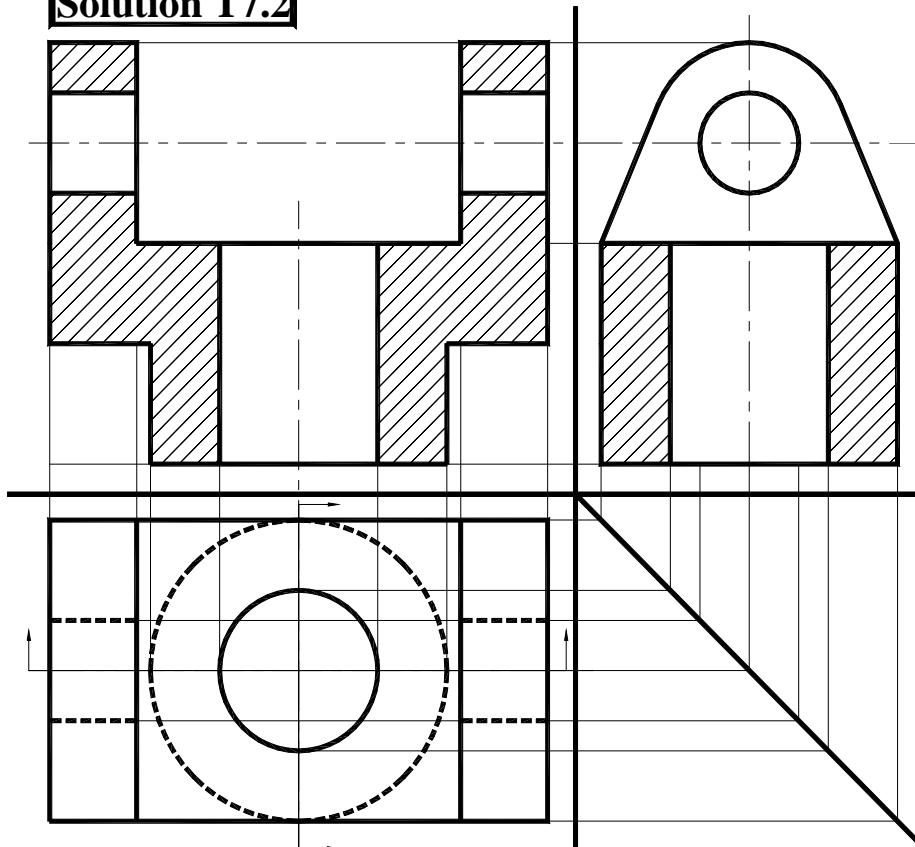


**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 7**

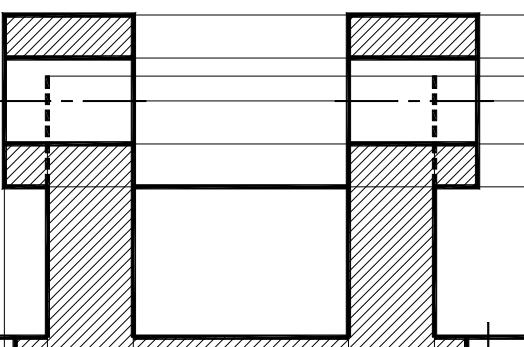
**Solution T7.1**



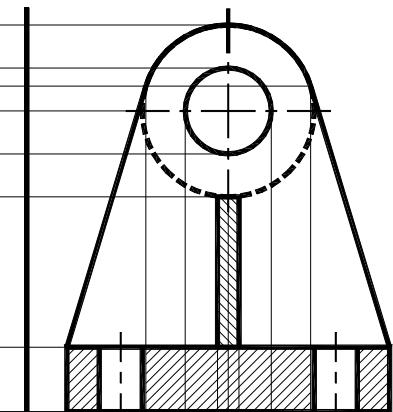
**Solution T7.2**



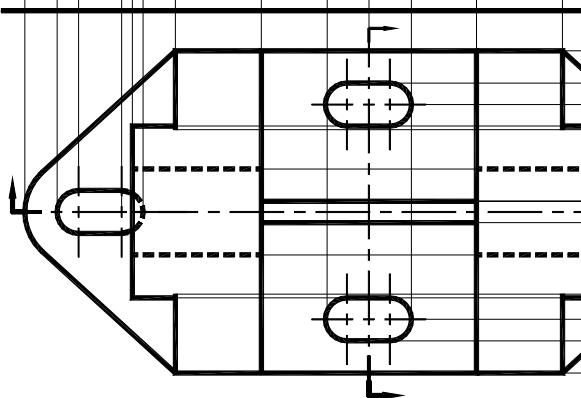
→ ←



→ ←

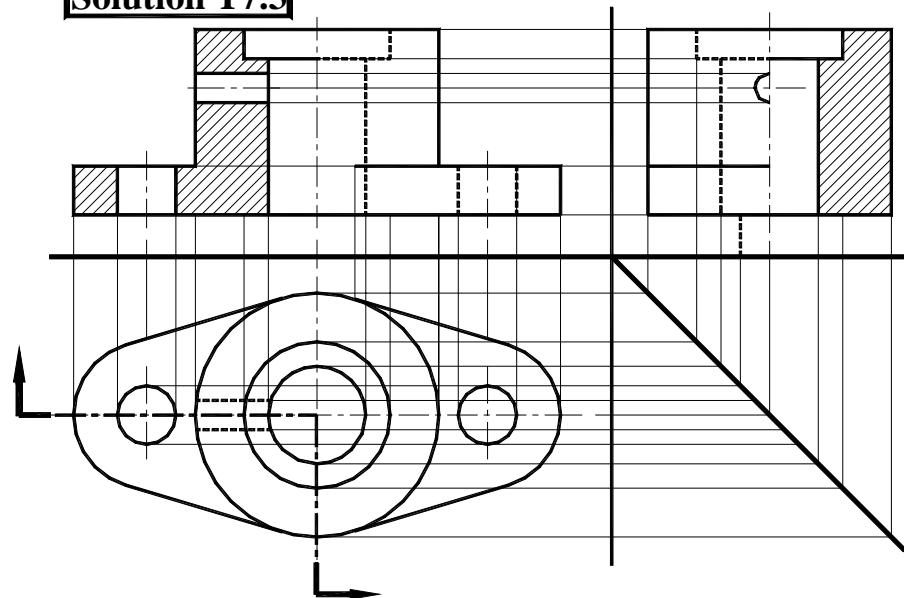


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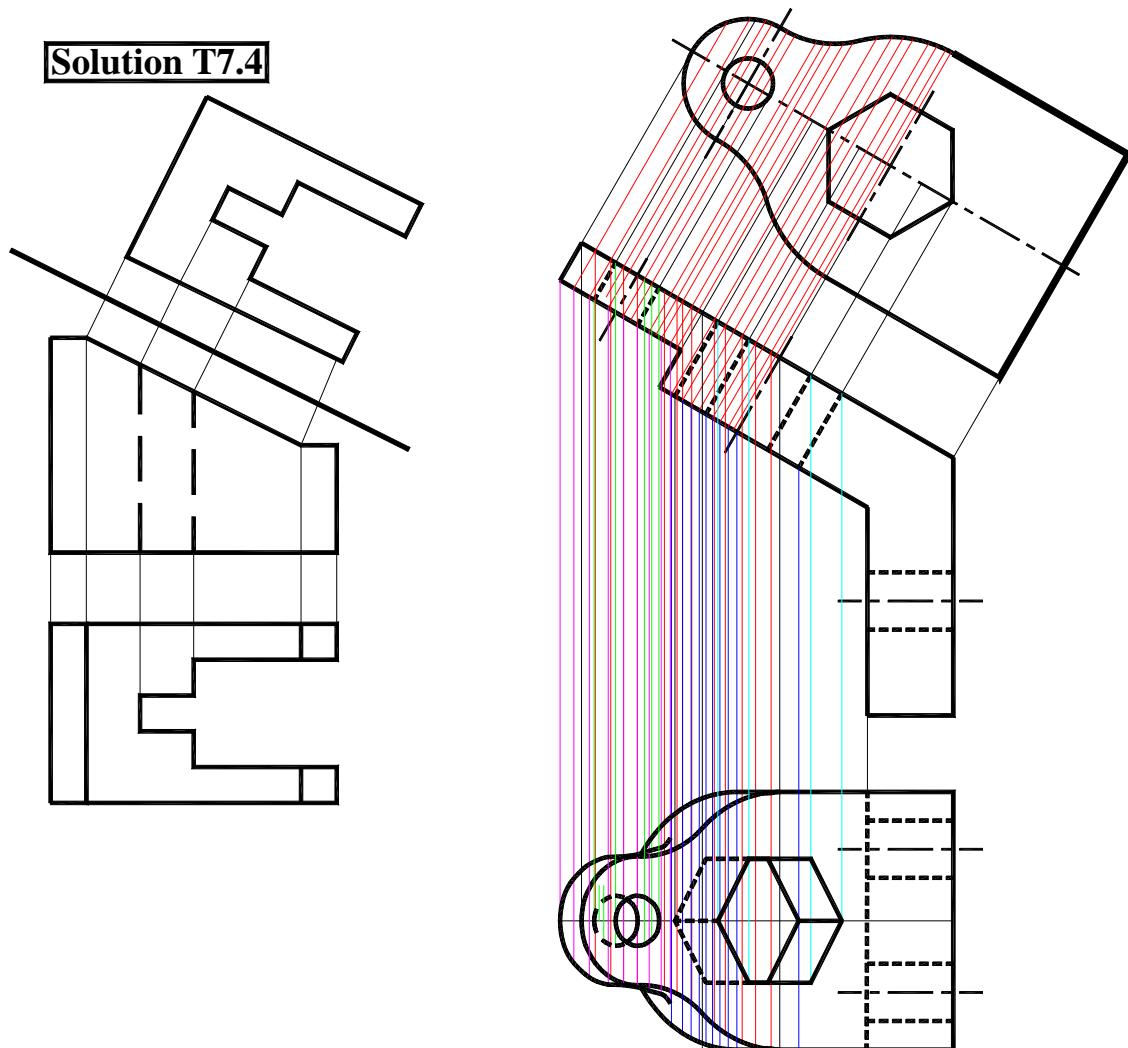


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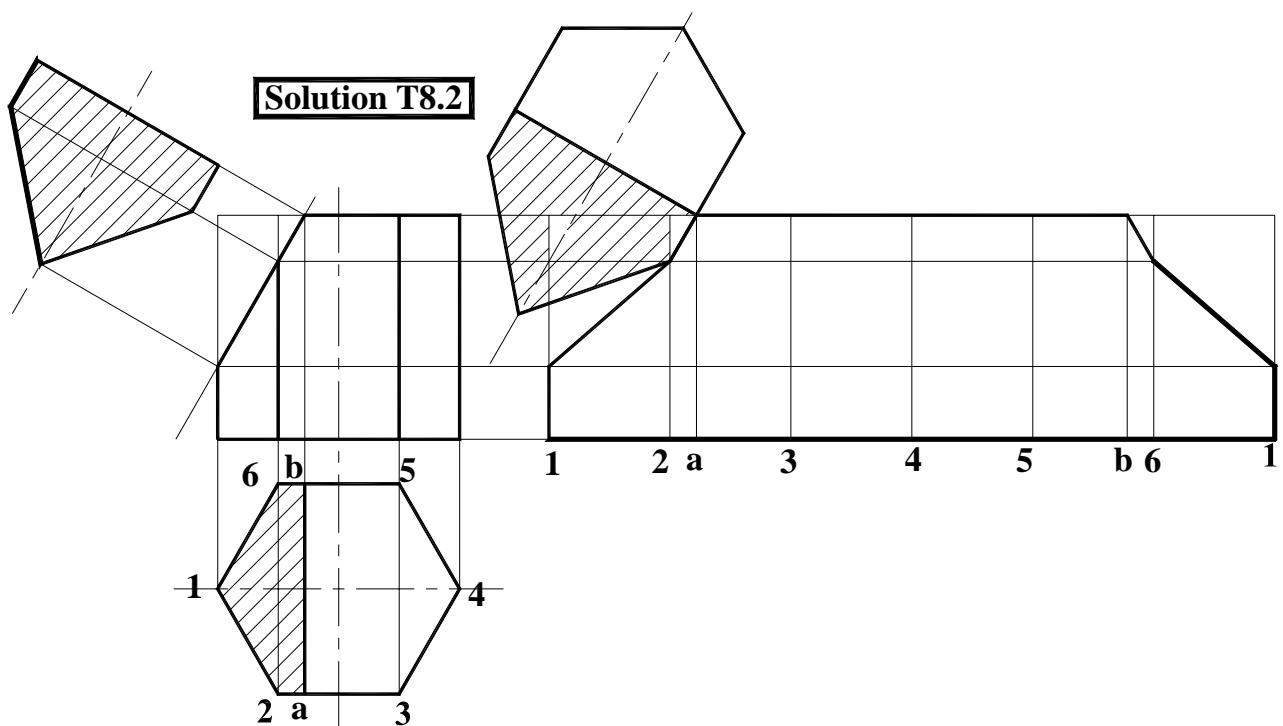
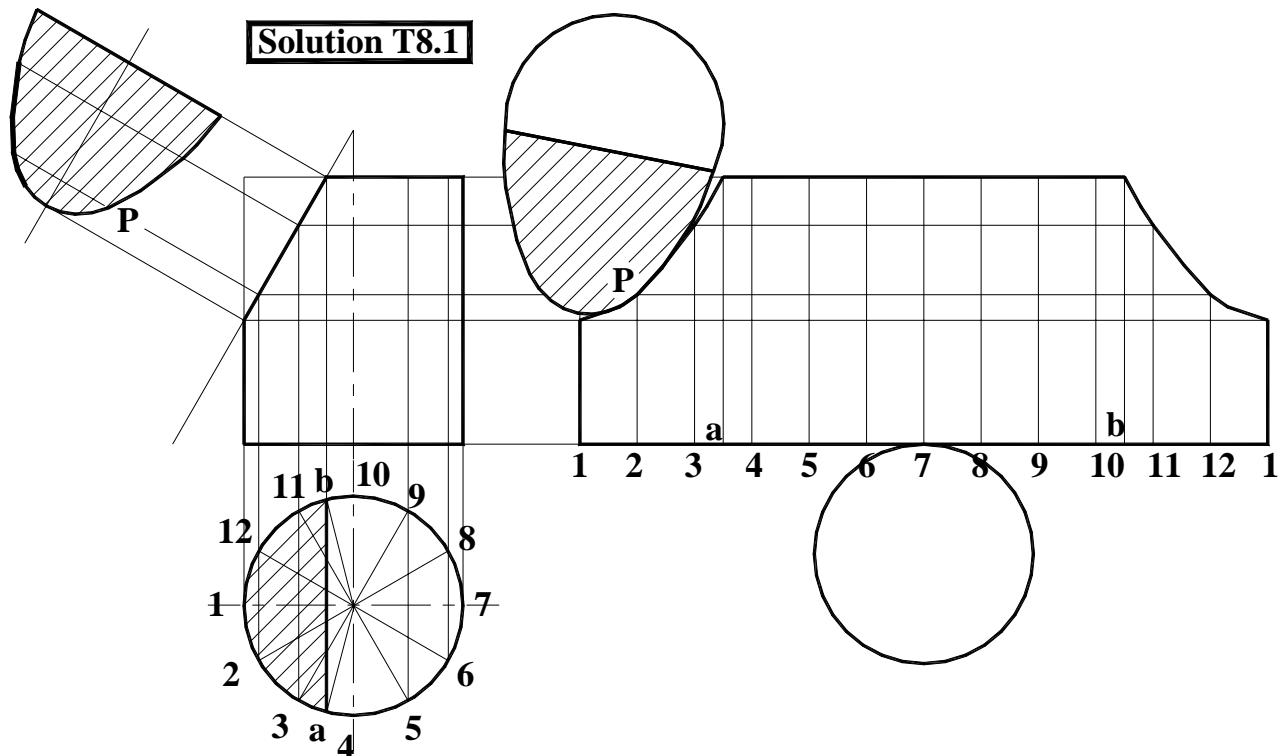
**Solution T7.3**

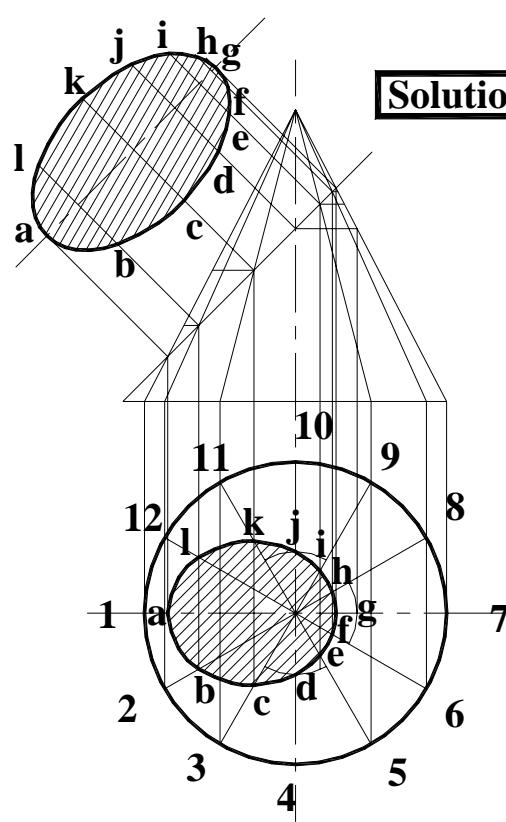


**Solution T7.4**

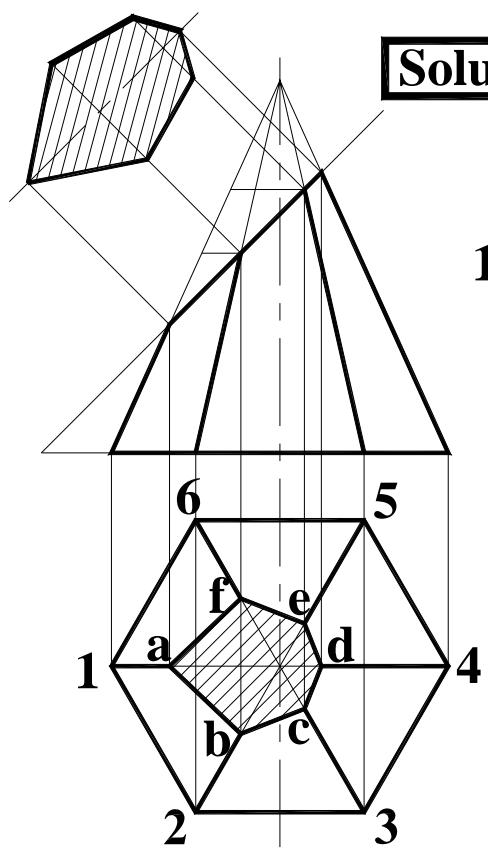
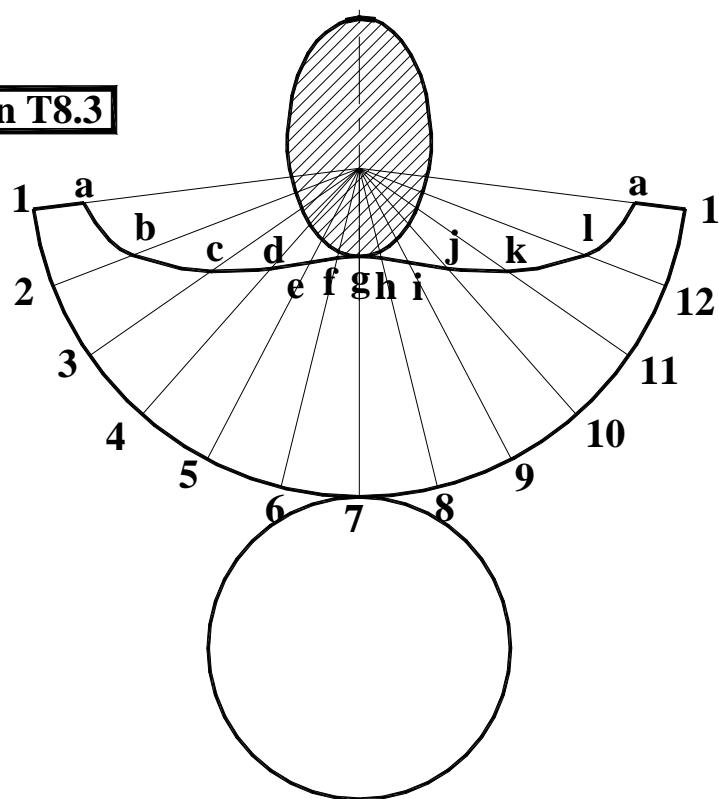


**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 8**

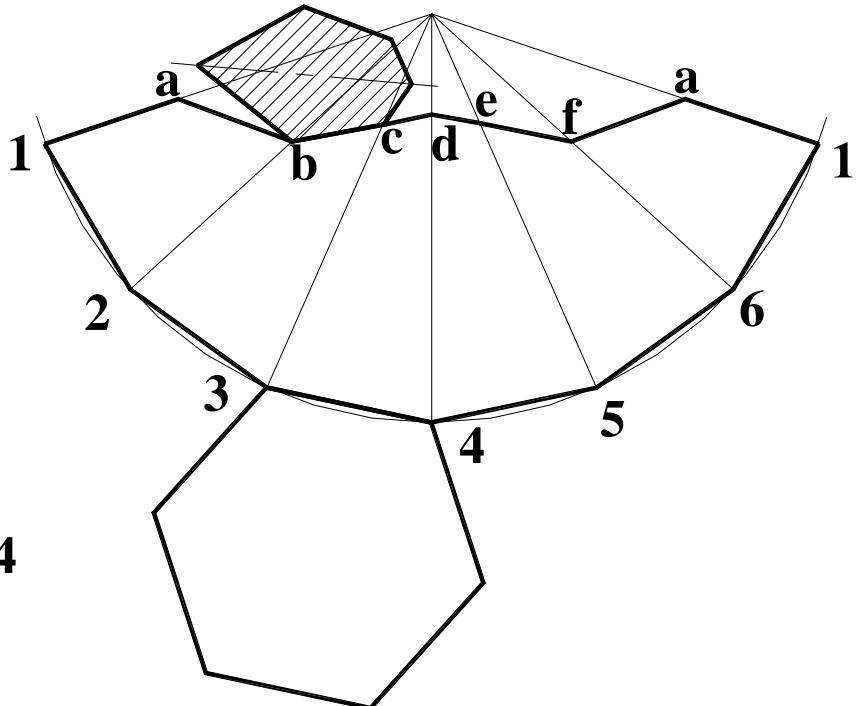


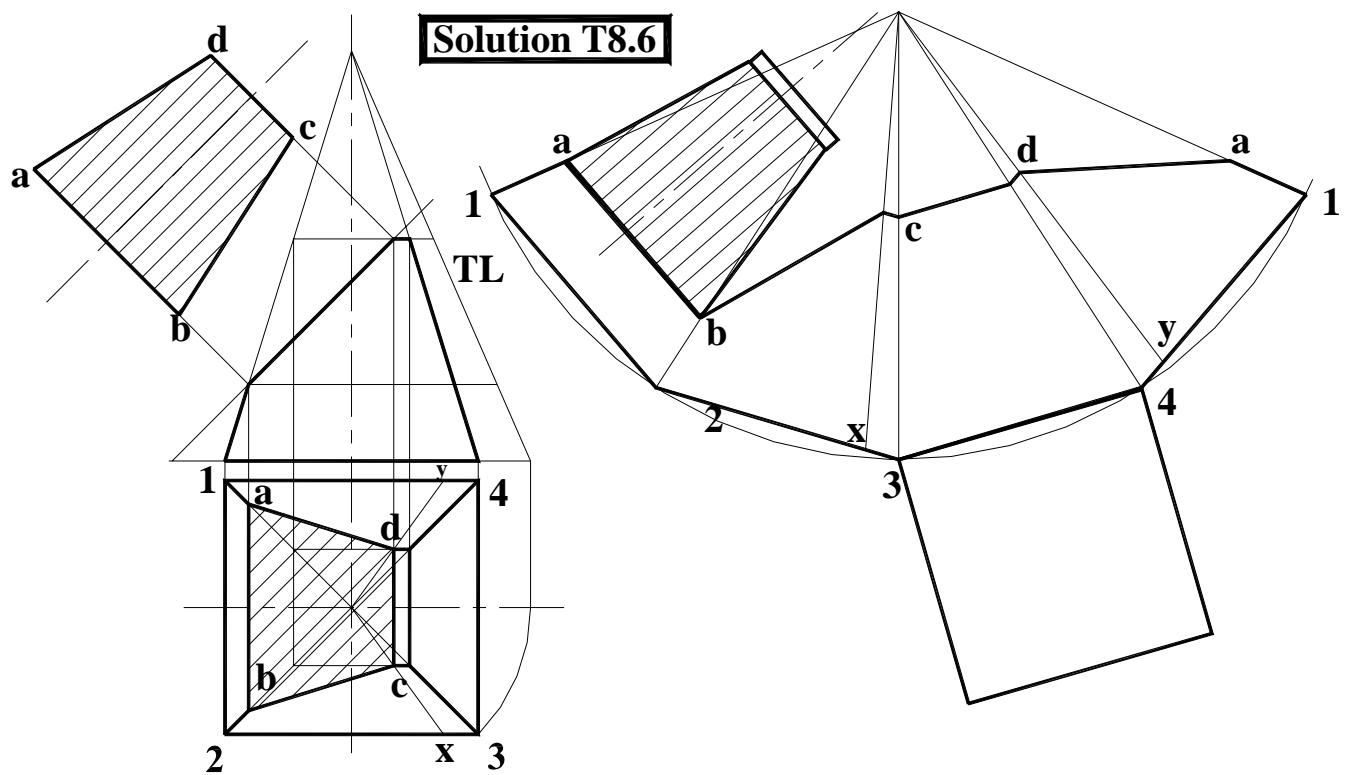
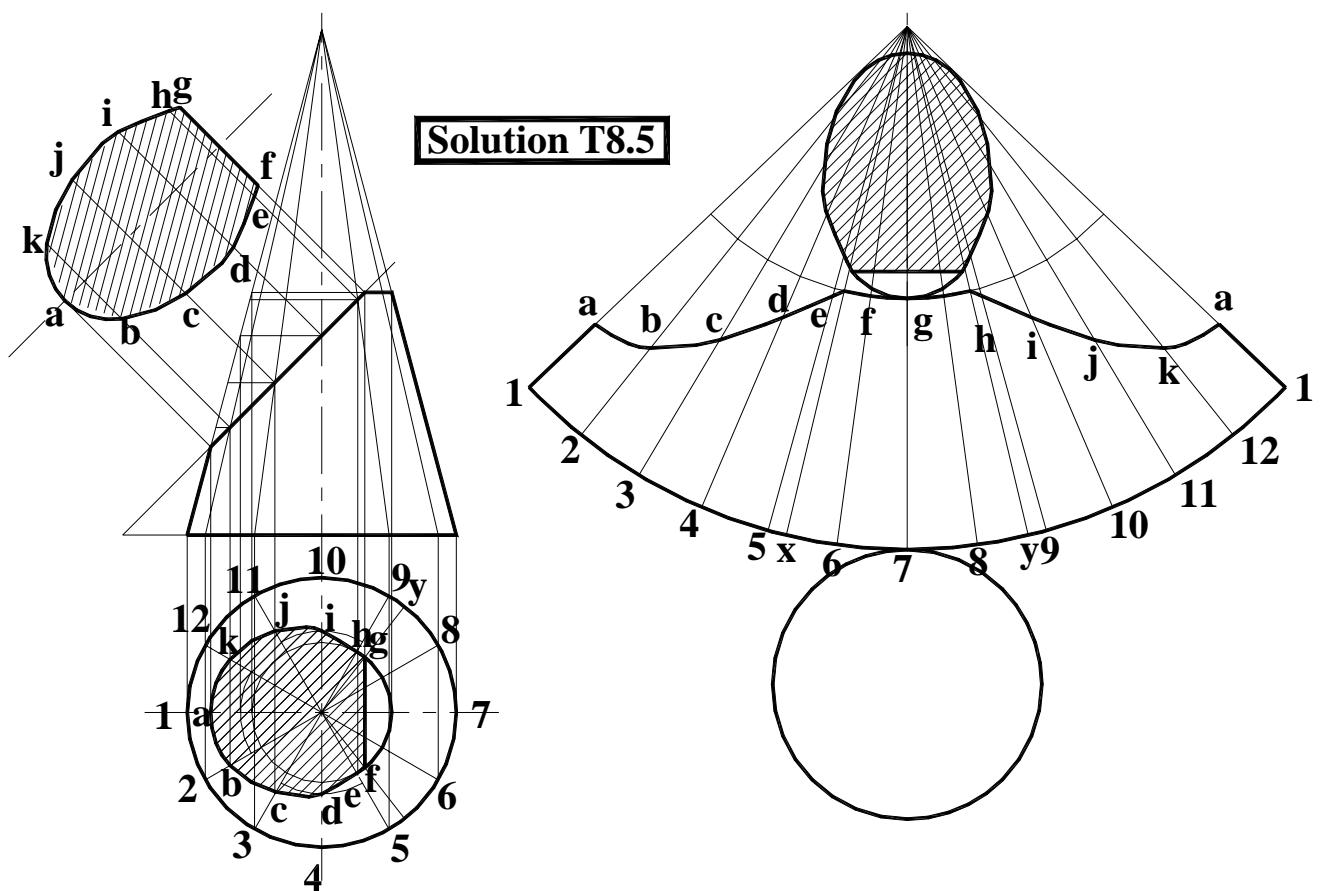


**Solution T8.3**

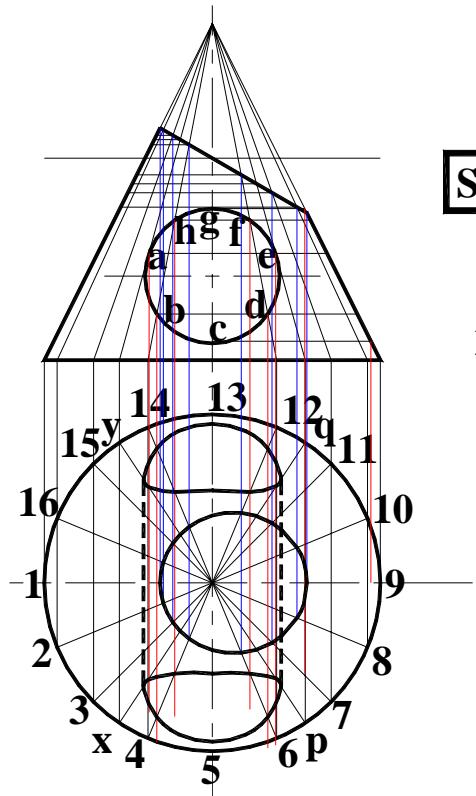


**Solution T8.4**

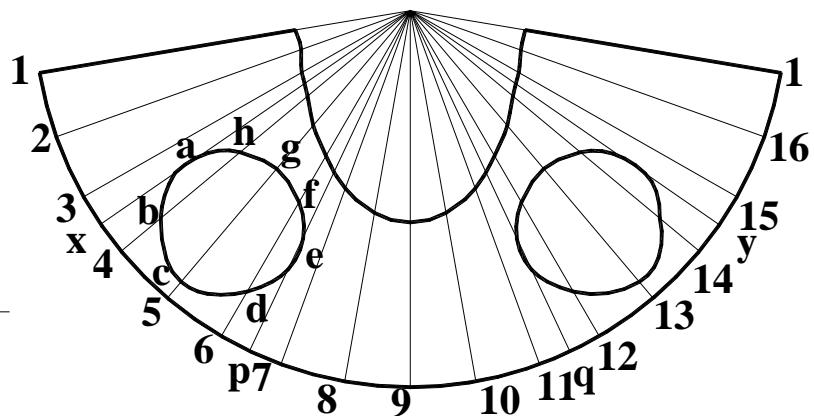


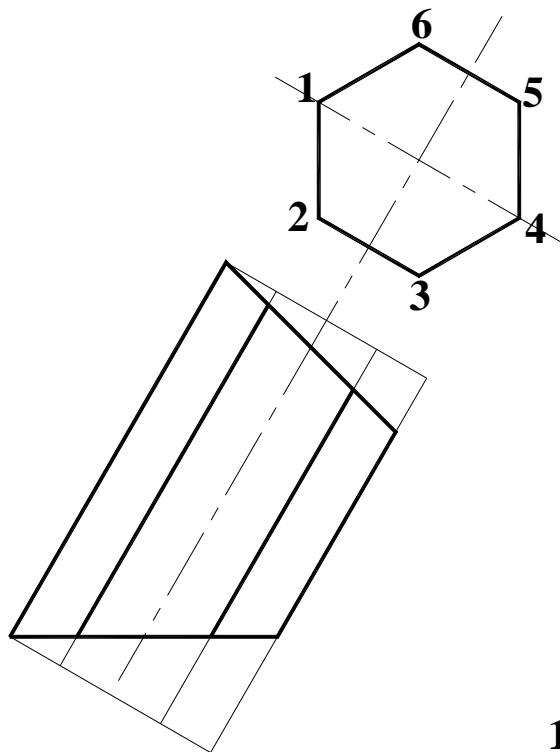


**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 9**

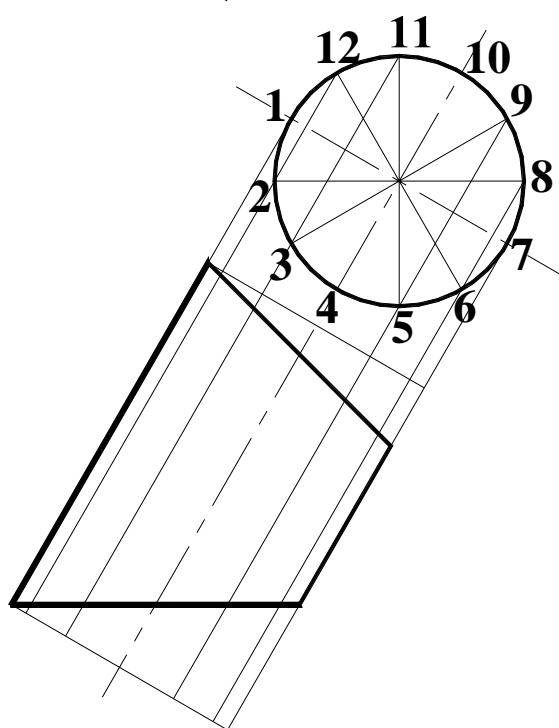
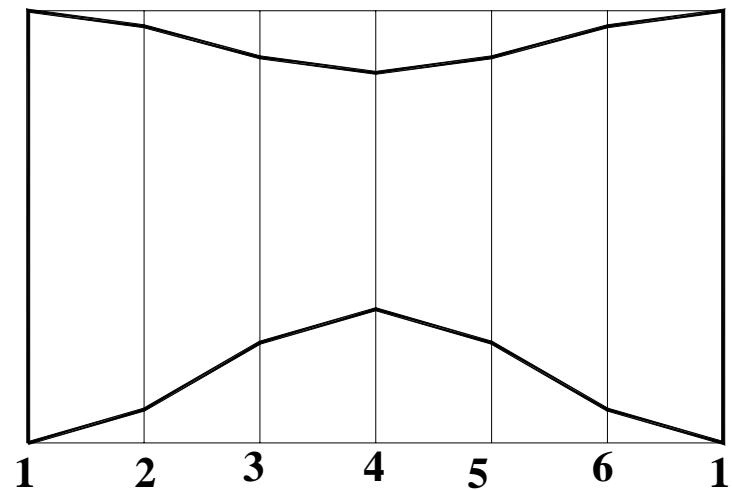


**Solution T9.1**

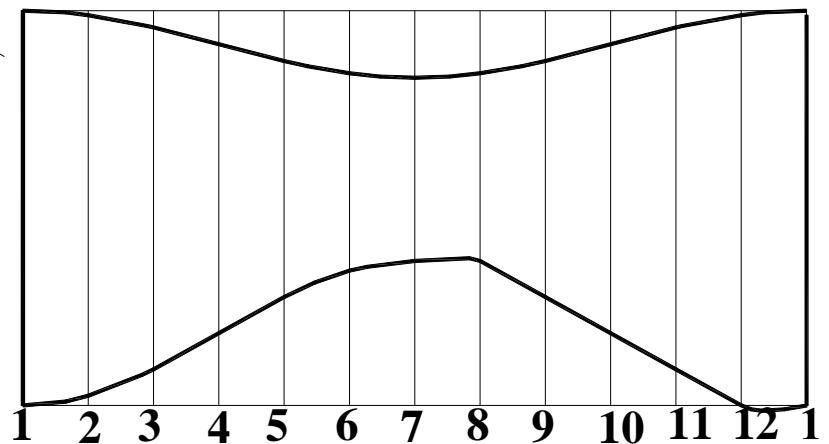




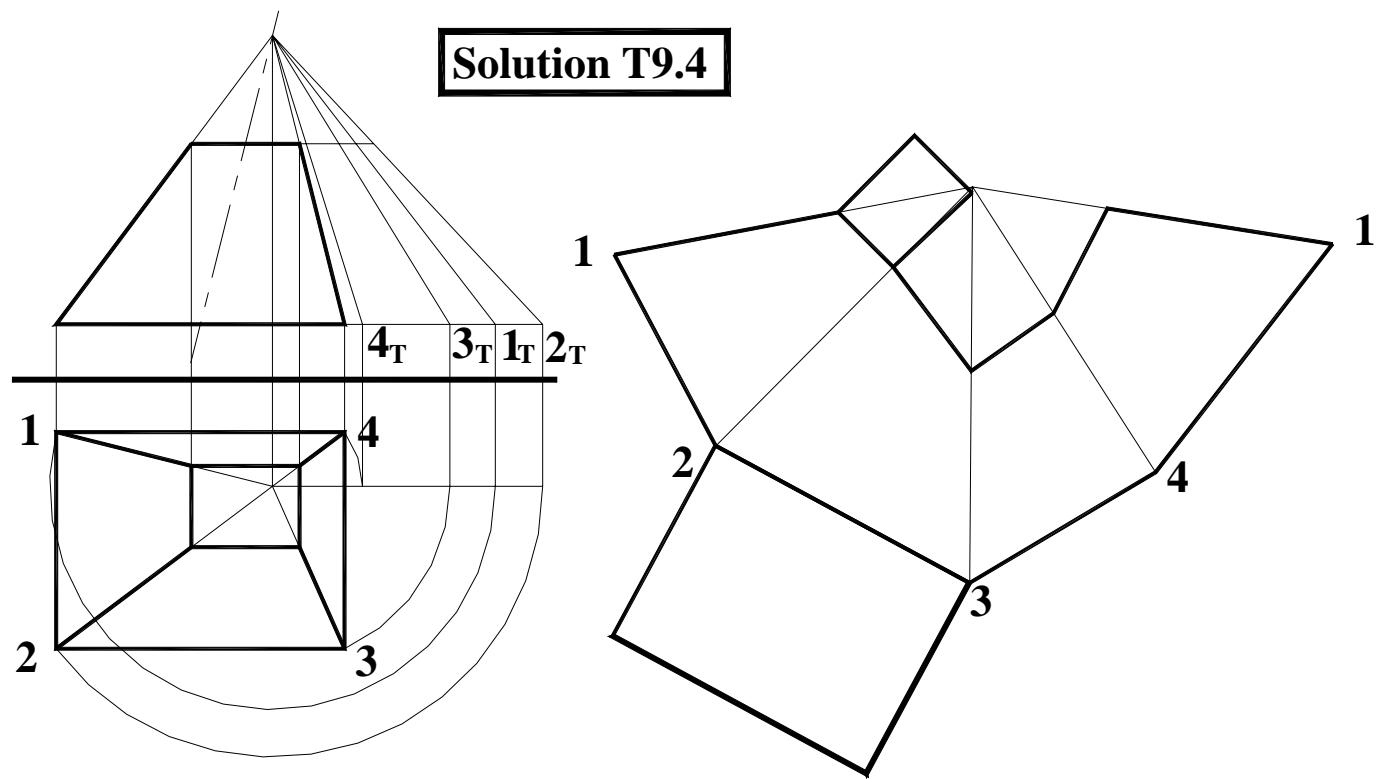
**Solution T9.2**



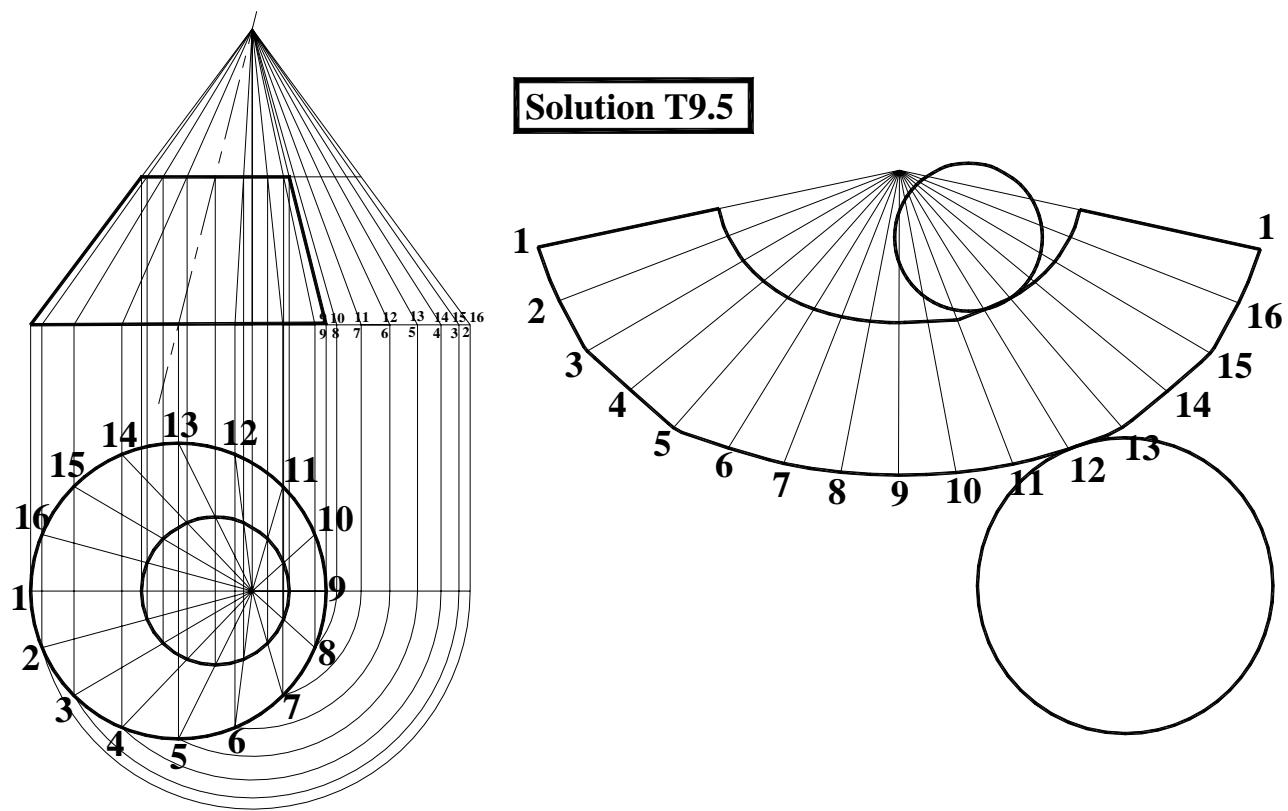
**Solution T9.3**

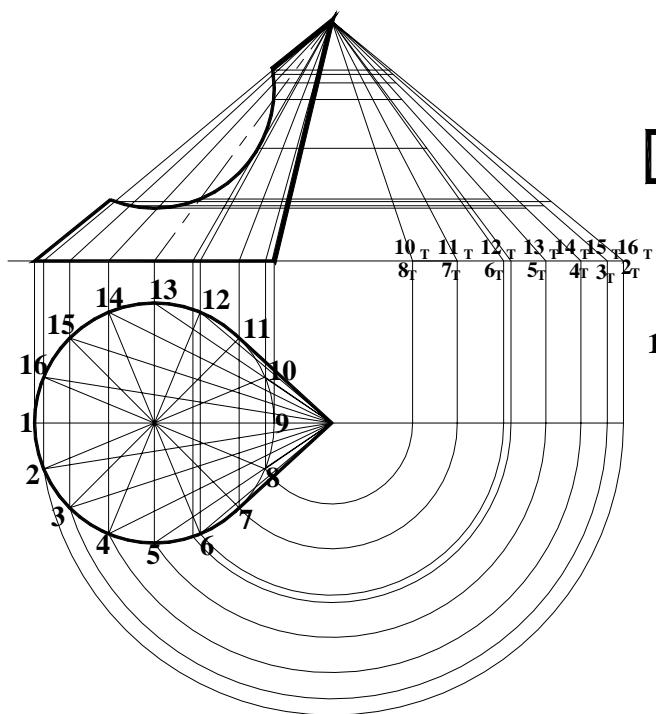


**Solution T9.4**

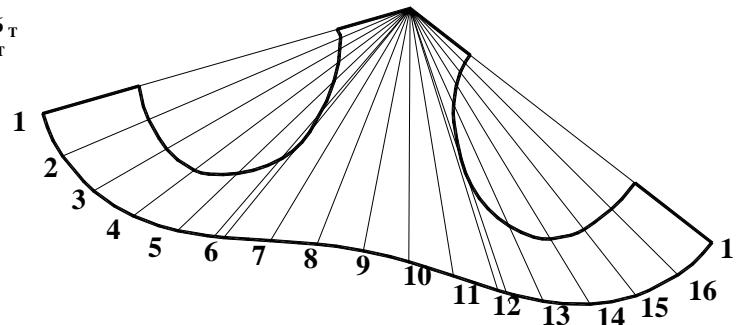


**Solution T9.5**



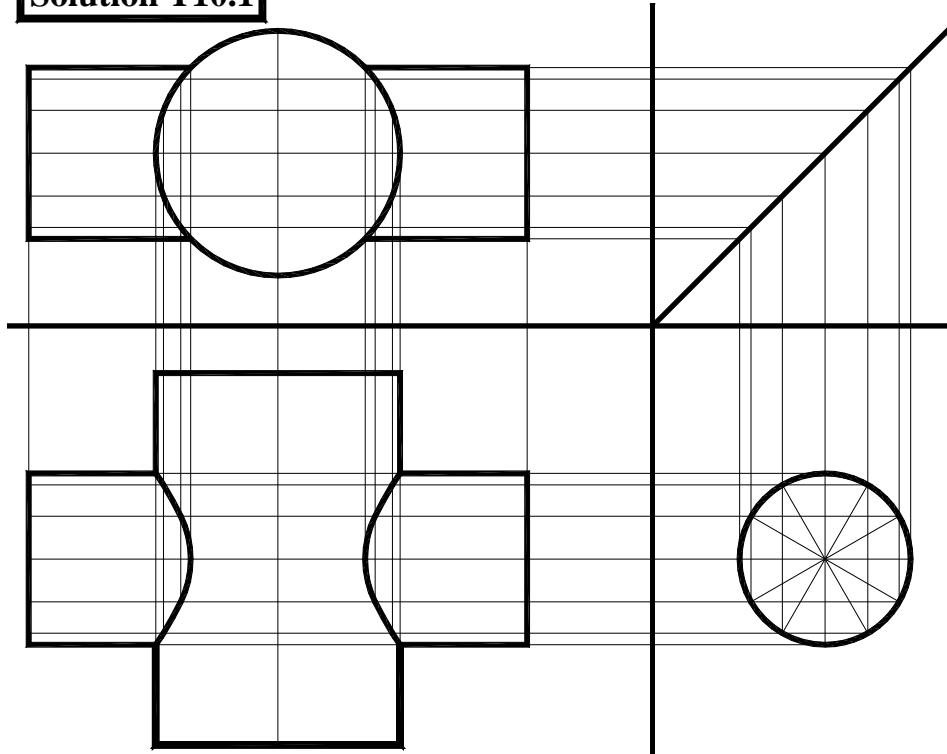


**Solution T9.6**

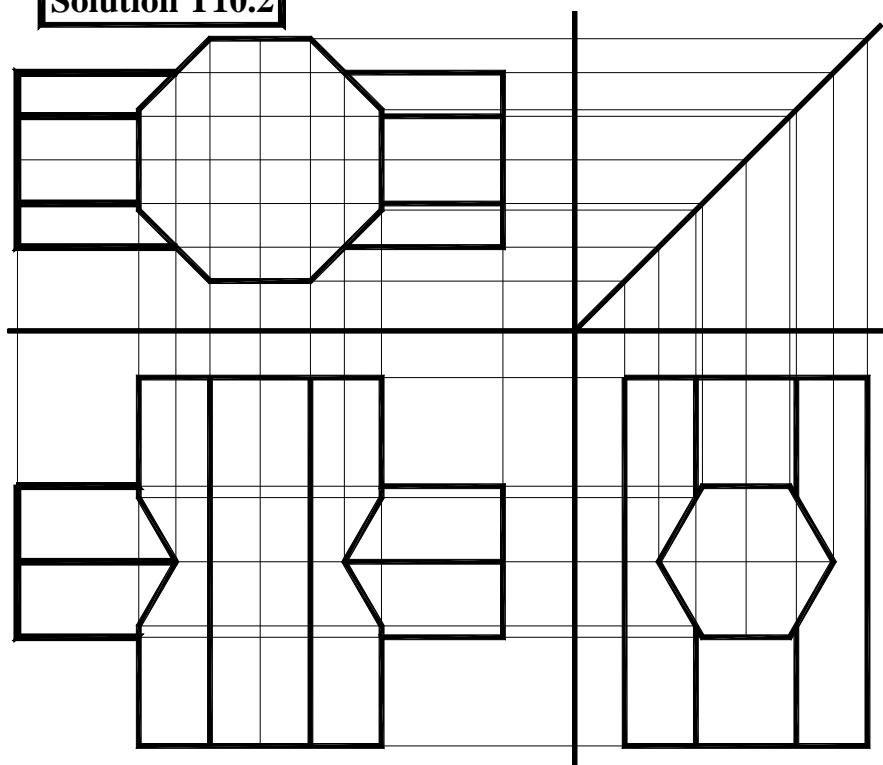


**ENGINEERING DRAWING I**  
**SOLUTION FOR TUTORIAL NO. 10**

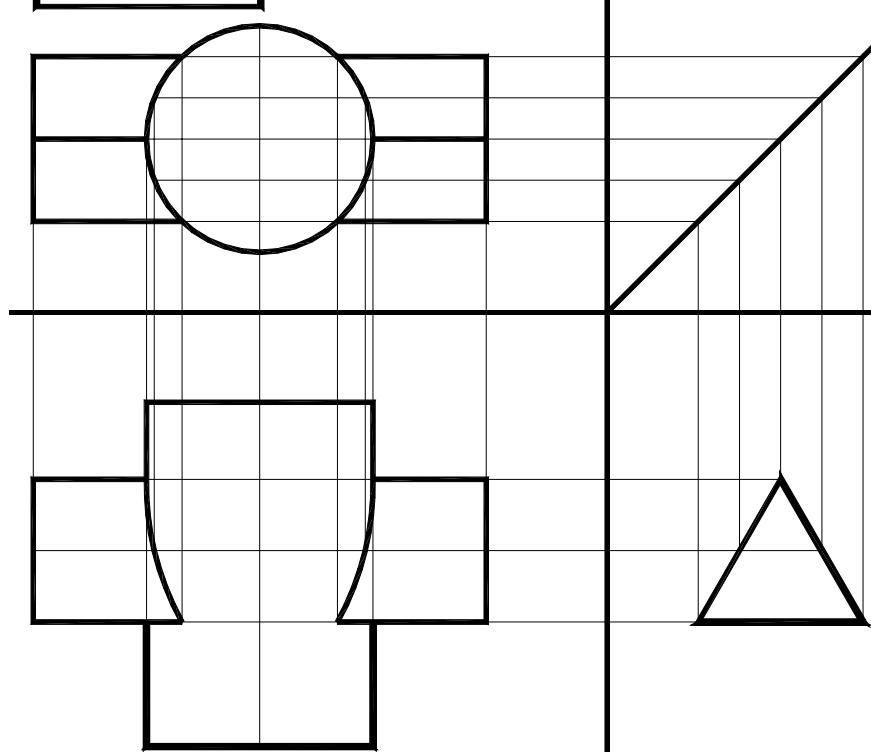
**Solution T10.1**



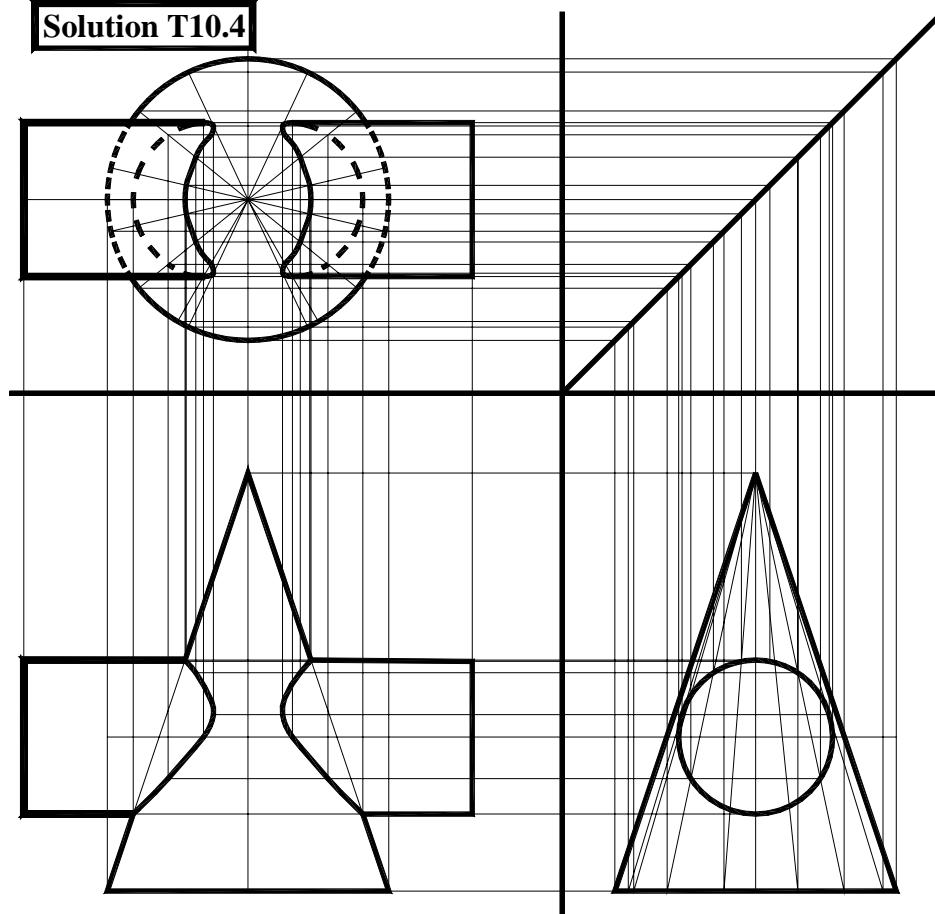
**Solution T10.2**



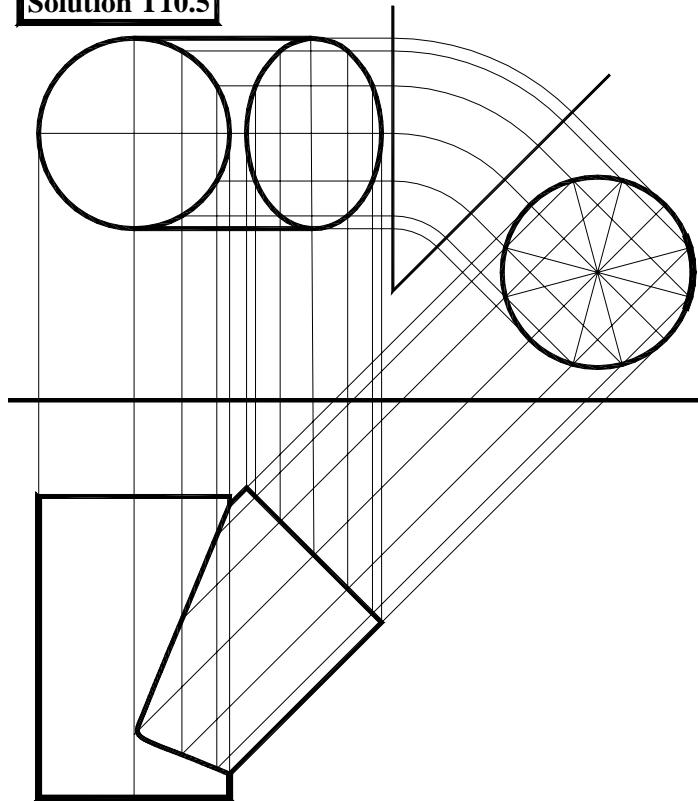
**Solution T10.3**



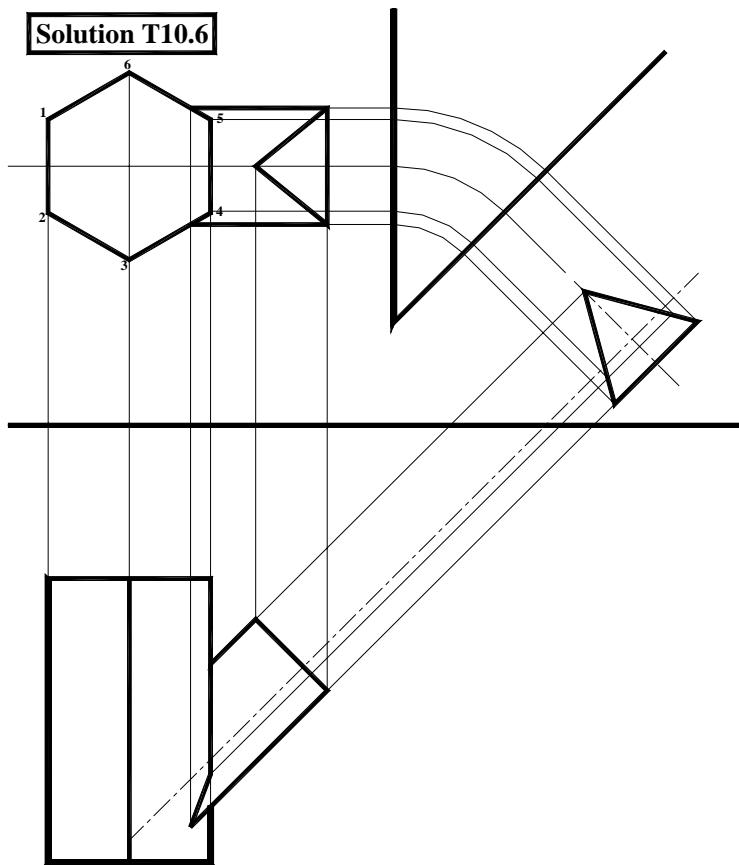
**Solution T10.4**



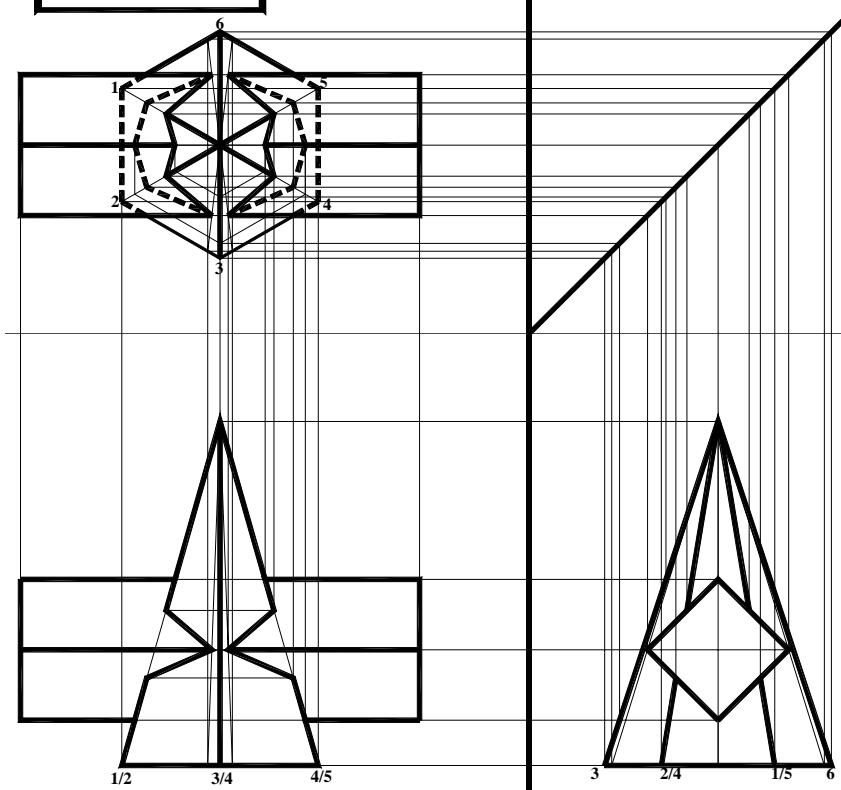
**Solution T10.5**



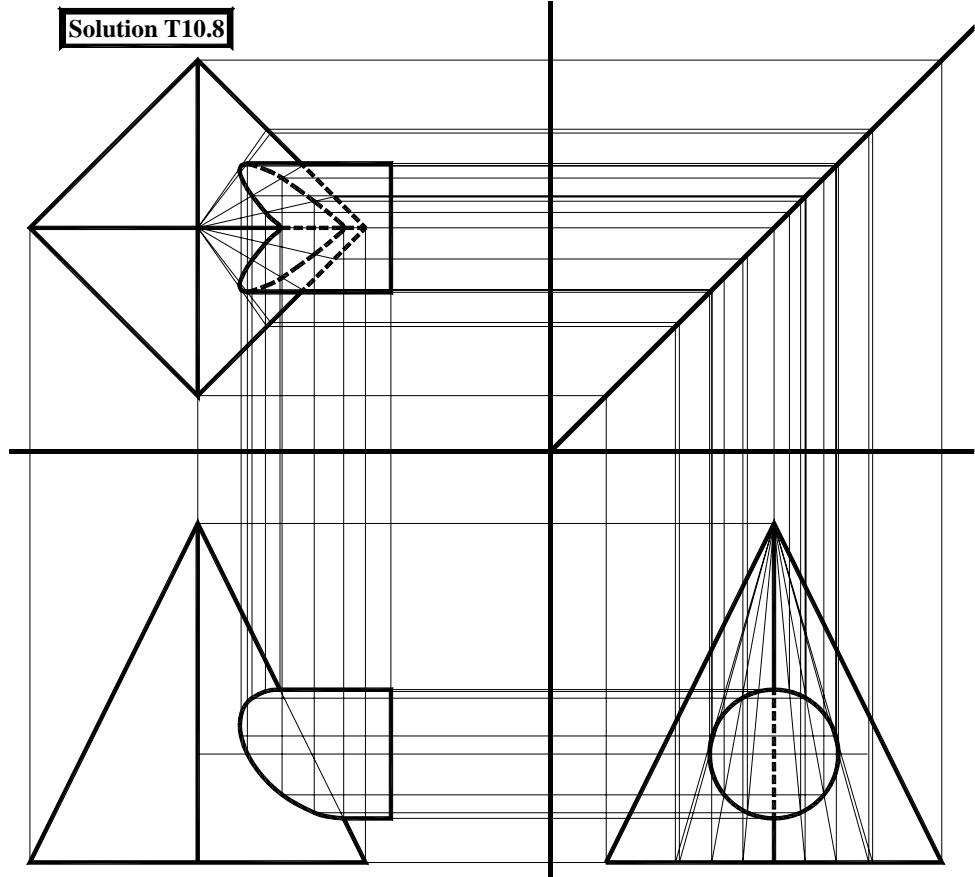
**Solution T10.6**



**Solution T10.7**



**Solution T10.8**



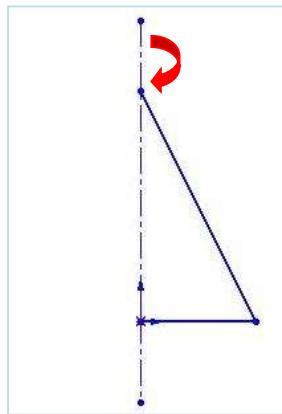
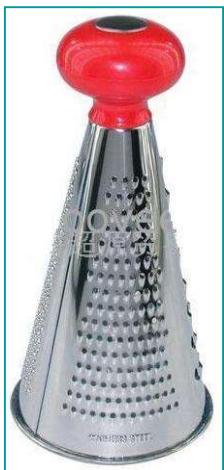
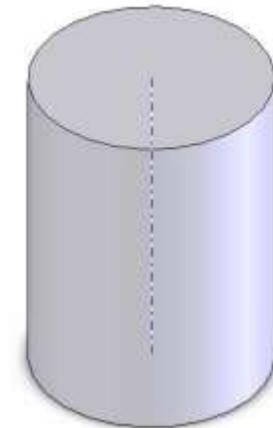
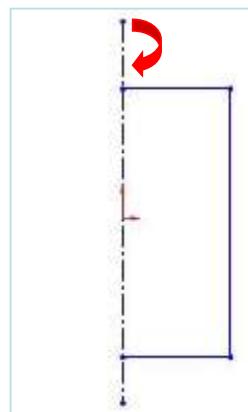
# Chapter 6

## 2. Rotatory object

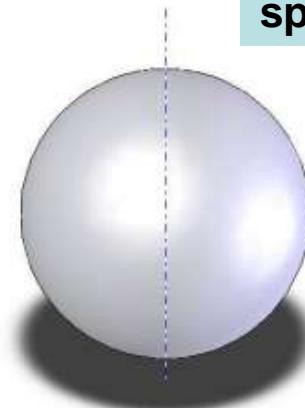
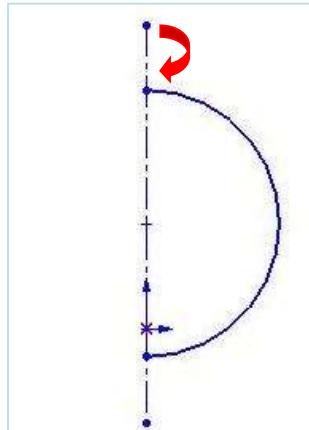


cylinder

# 1. Form the rotatory objects?

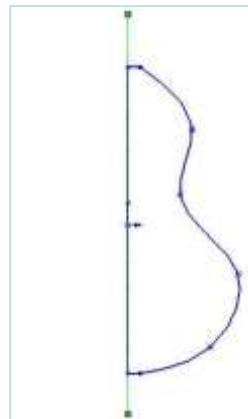
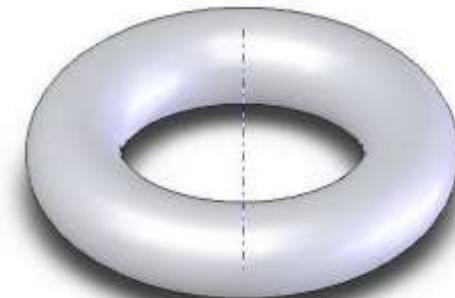
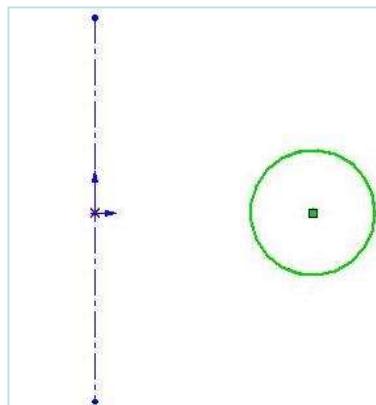
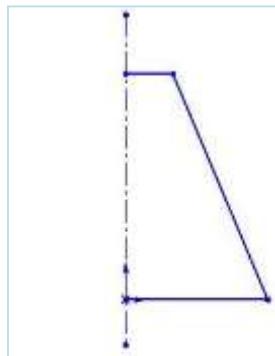
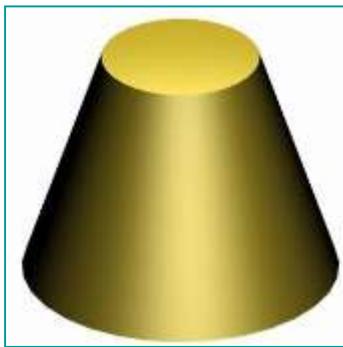


cone

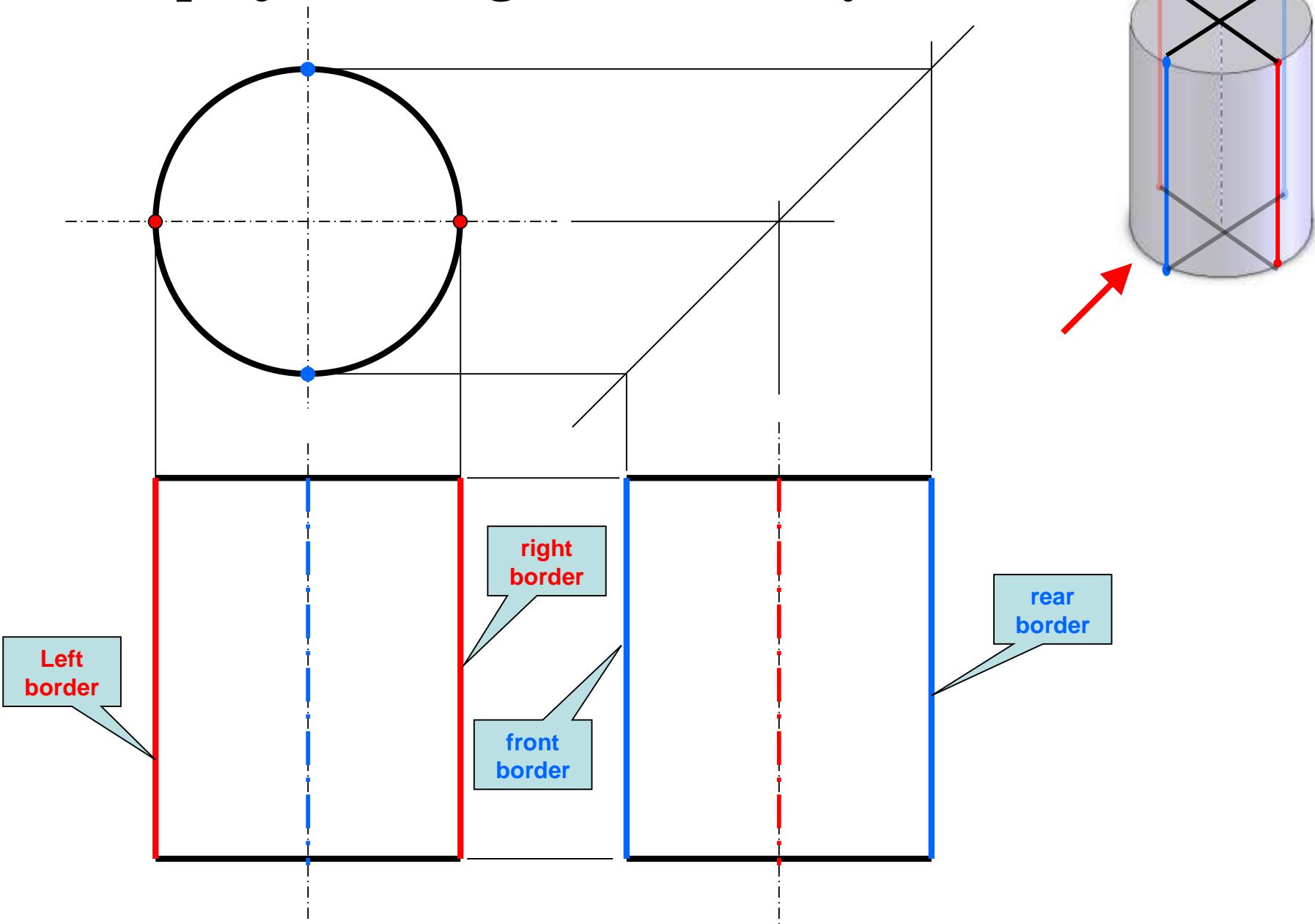


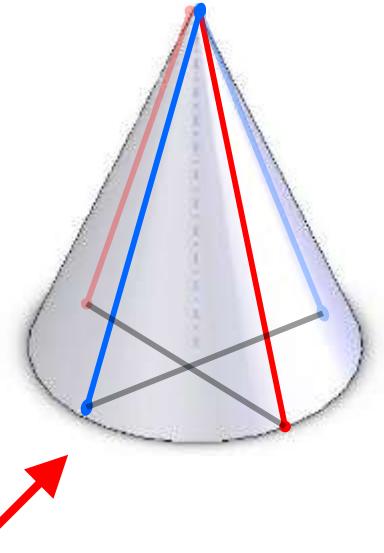
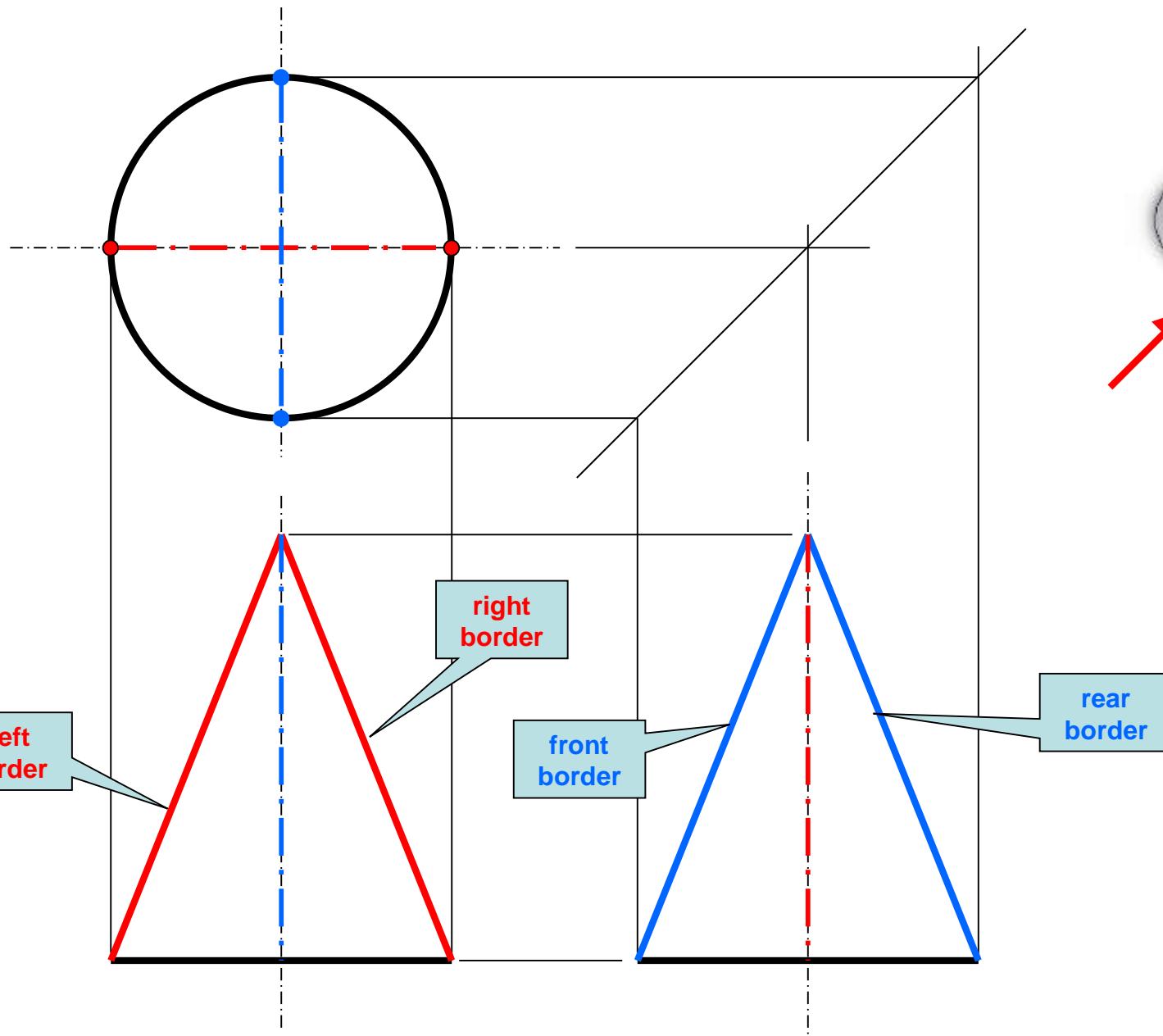
sphere

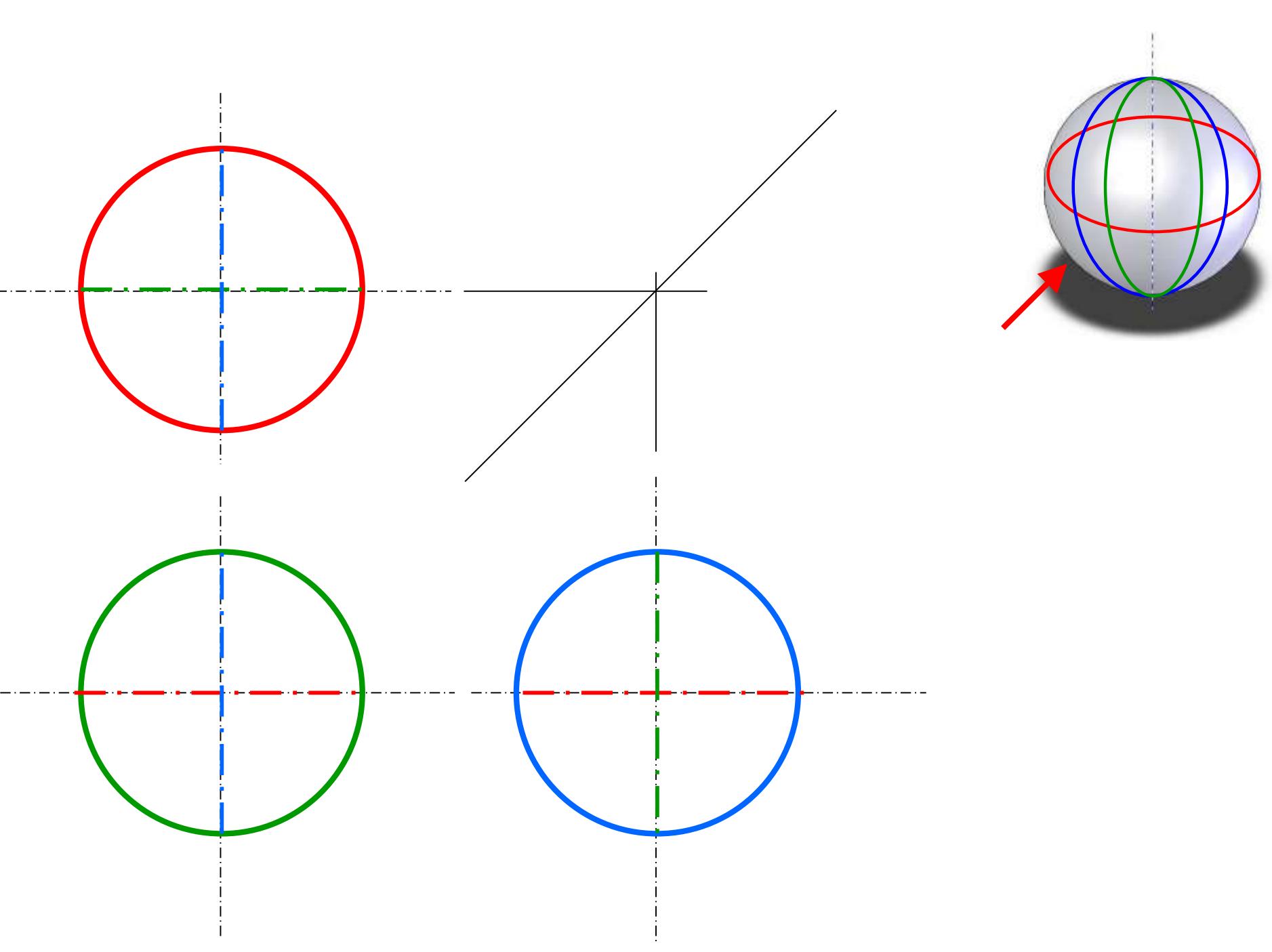
# 1. Form the rotatory objects?



## 2. The projection of general rotatory solids?

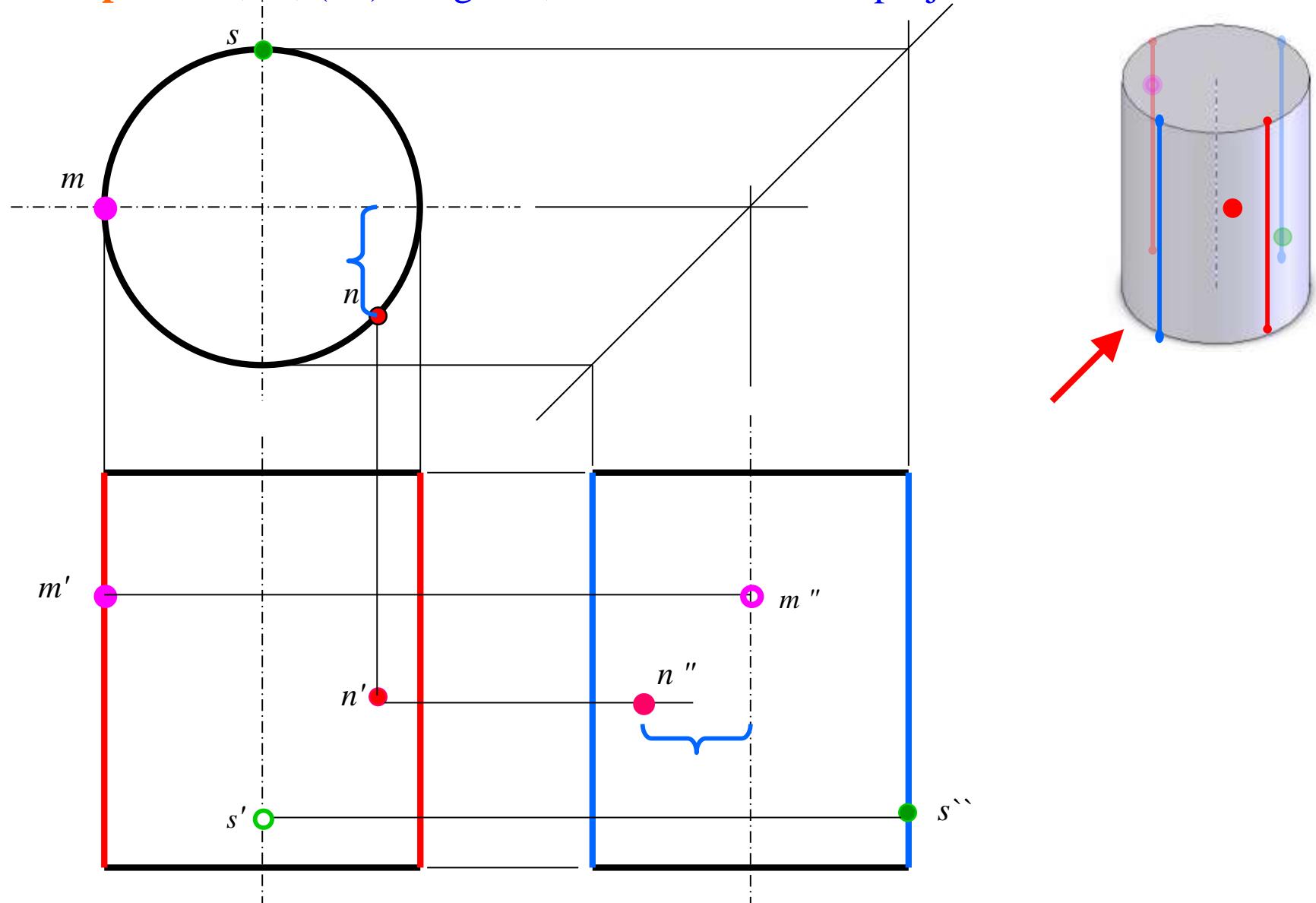




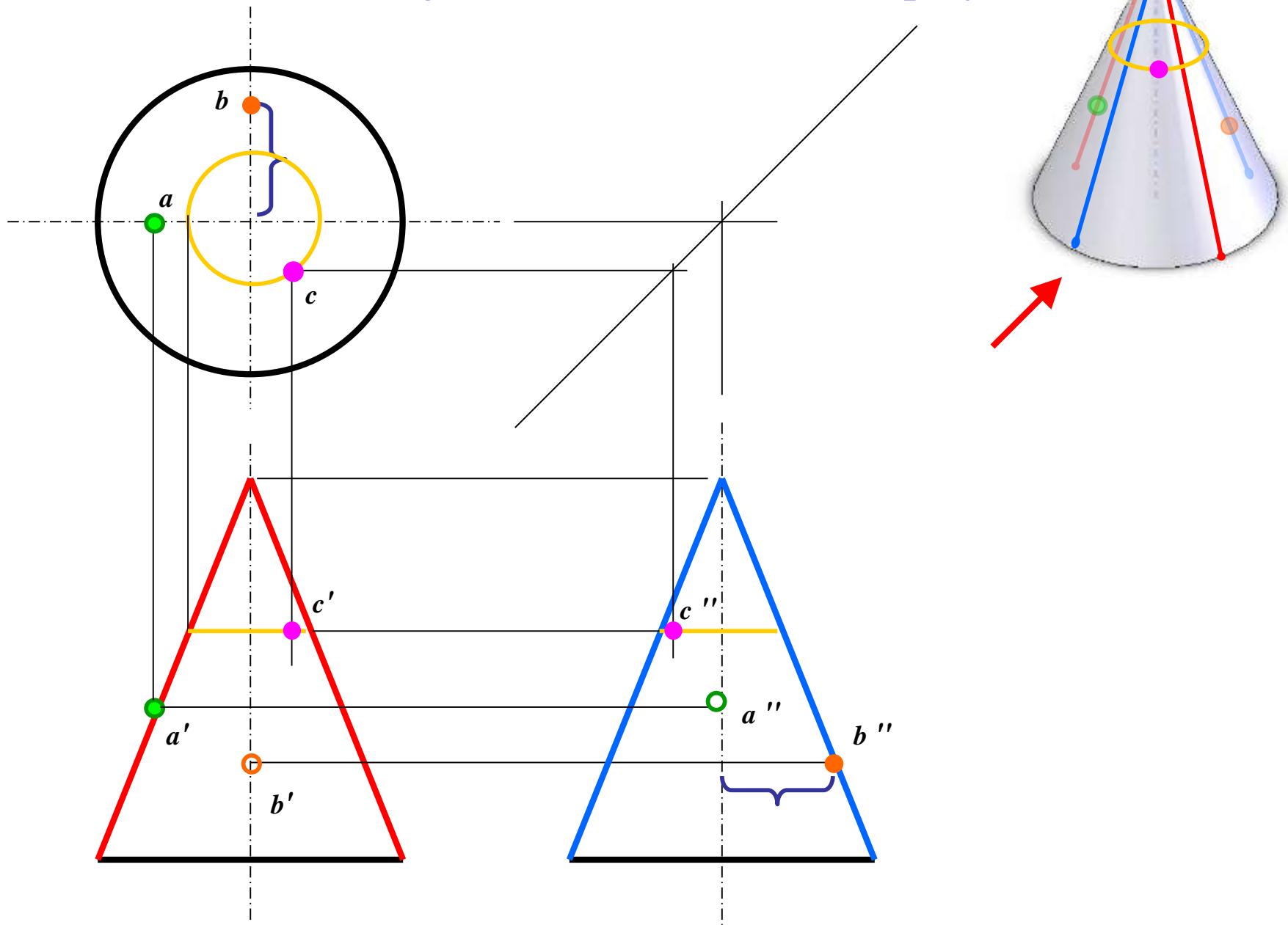


### 3.The points on rotatory surface?

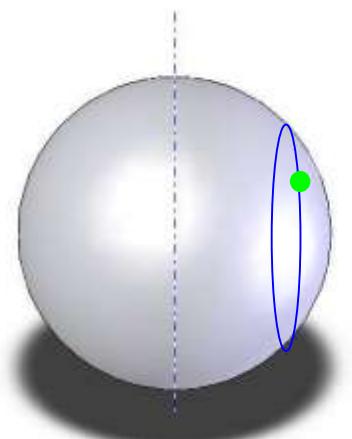
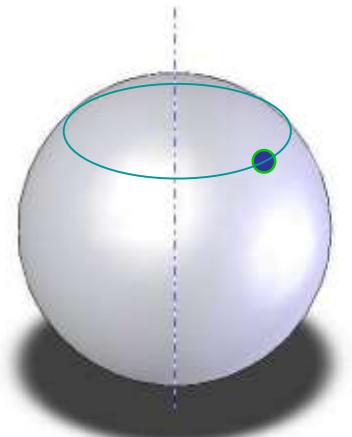
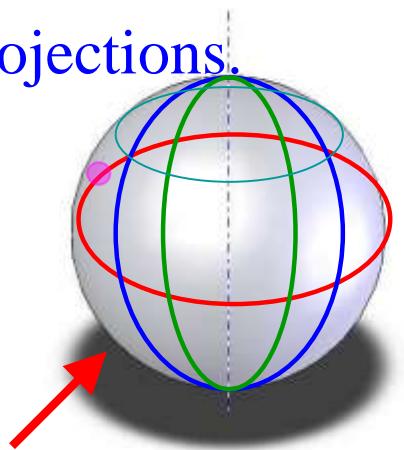
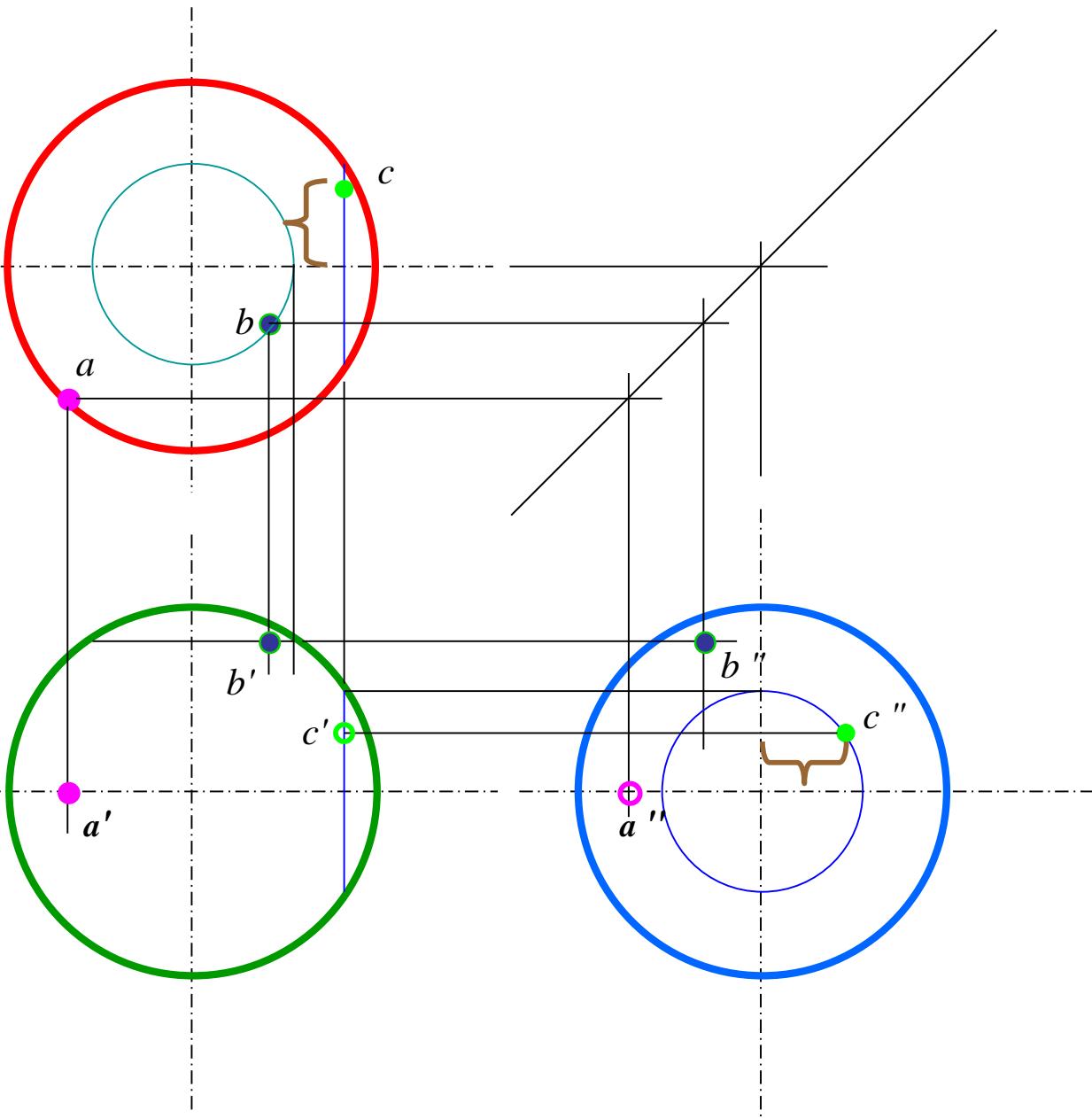
example1  $m'$ ,  $n'$ , ( $s''$ ) are given, find the other two projections.

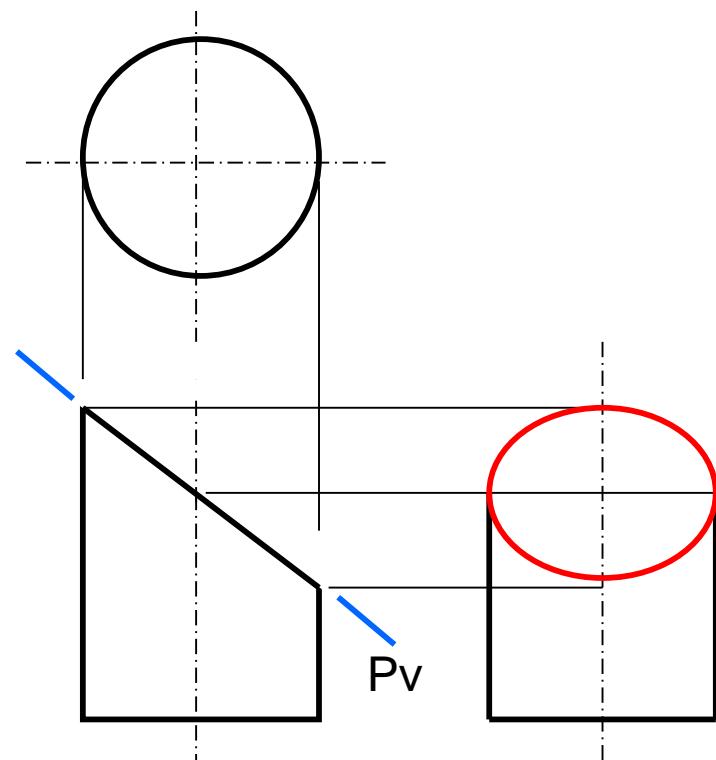
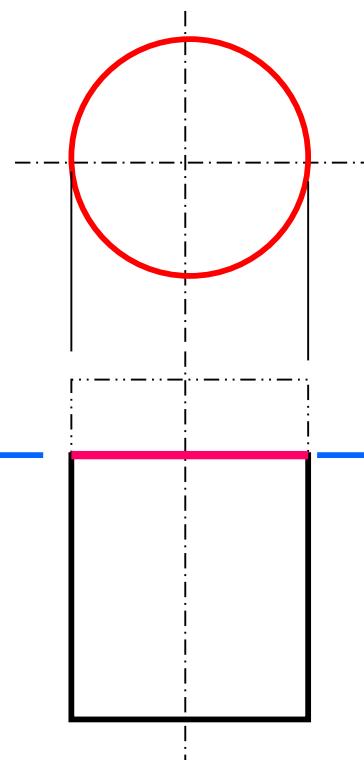
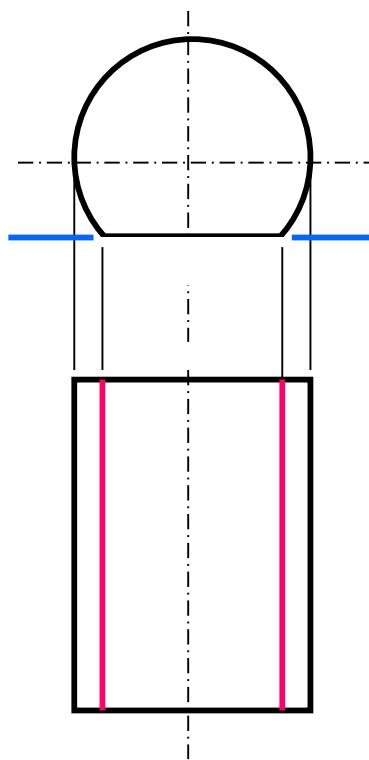
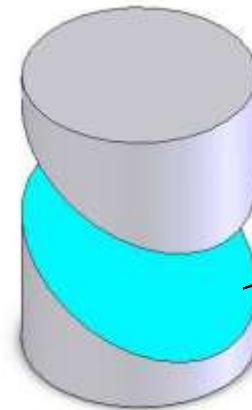
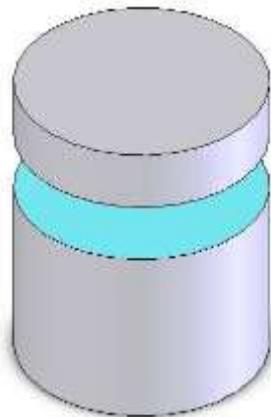
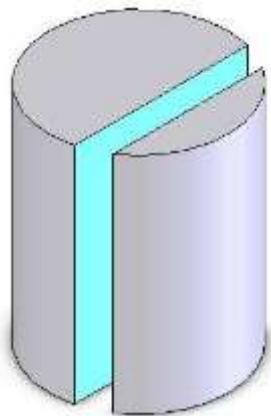


**example2**  $a'$  and  $b''$  are given, find the other two projections.

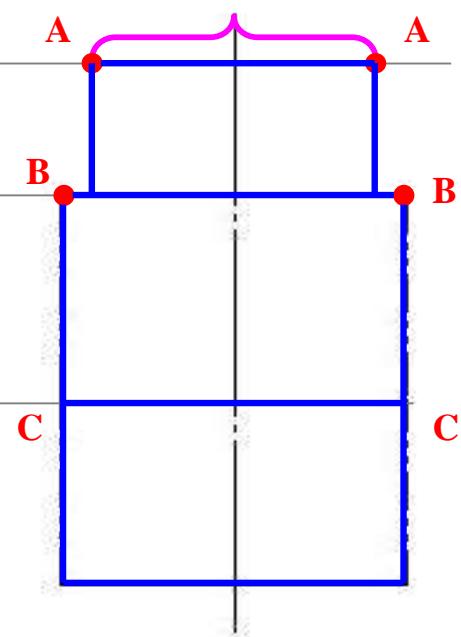
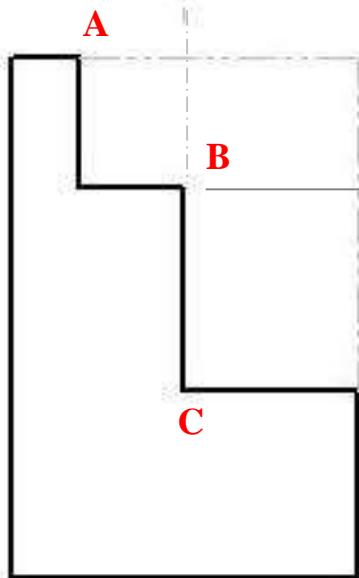
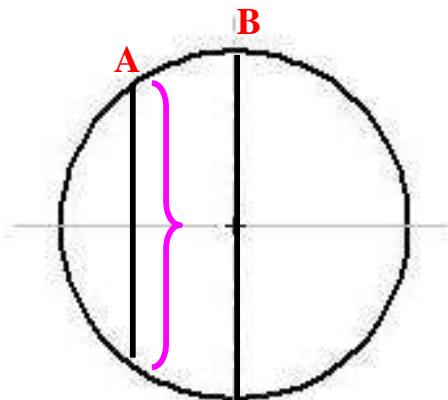
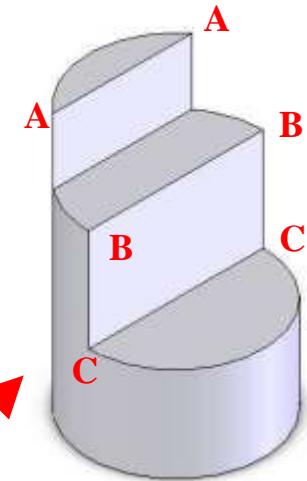


**example3** *a , b' and c “* are given, find the other two projections.

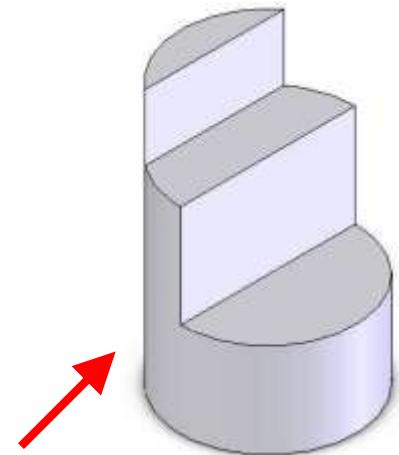
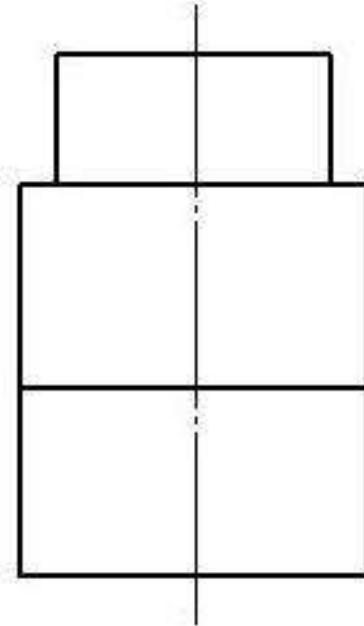
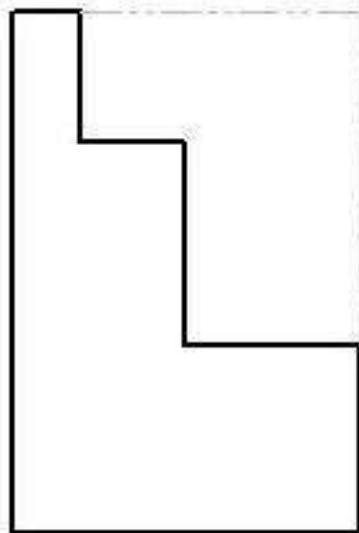
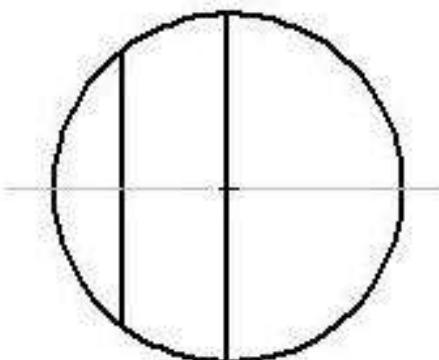




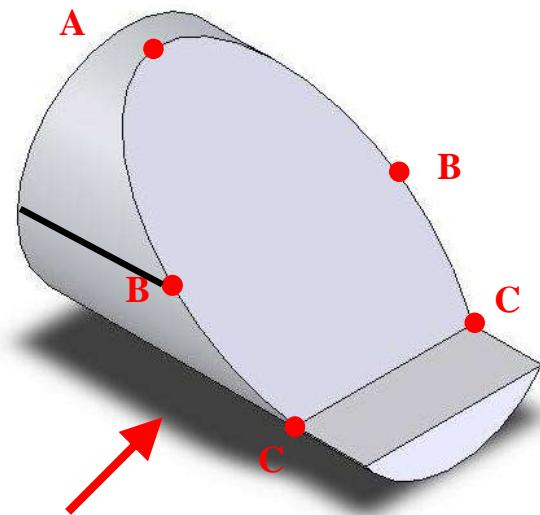
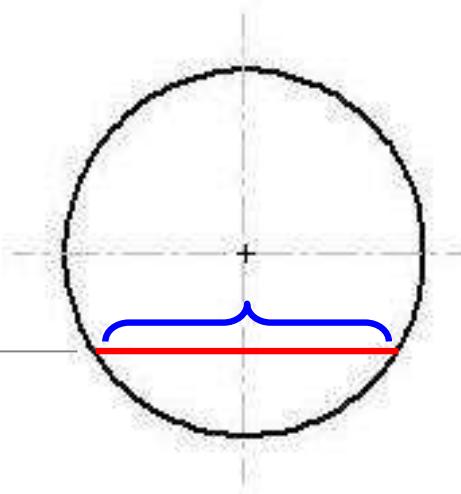
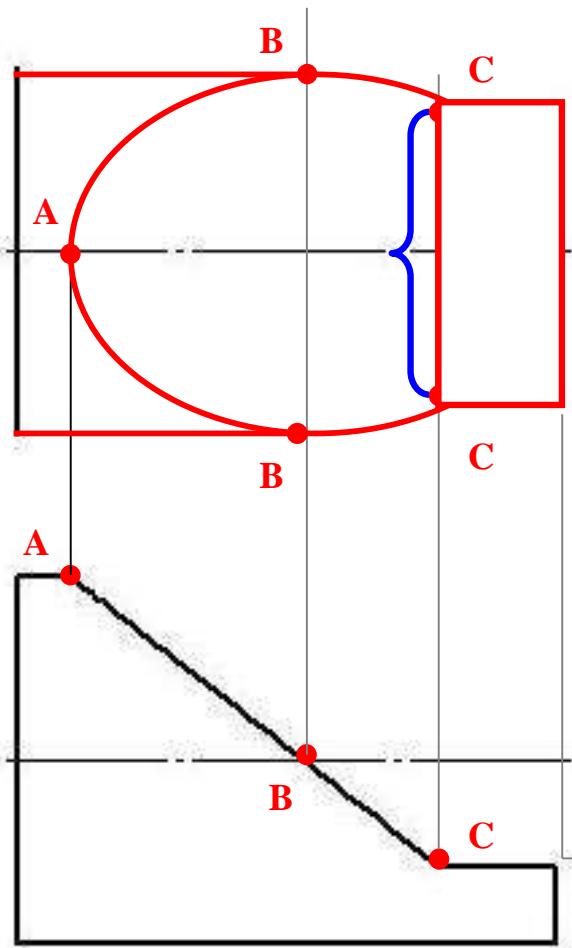
example 1 The projection of cylinder cut by plane?



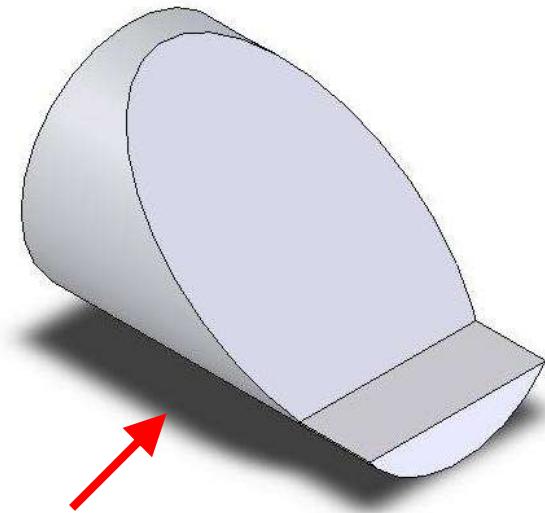
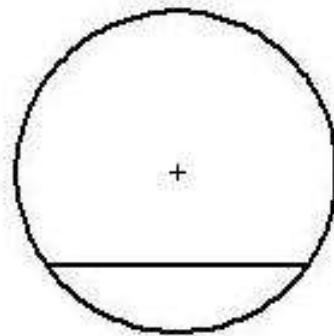
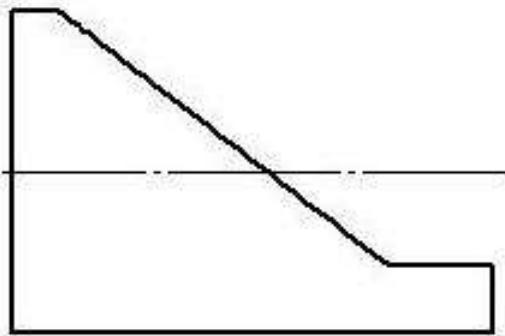
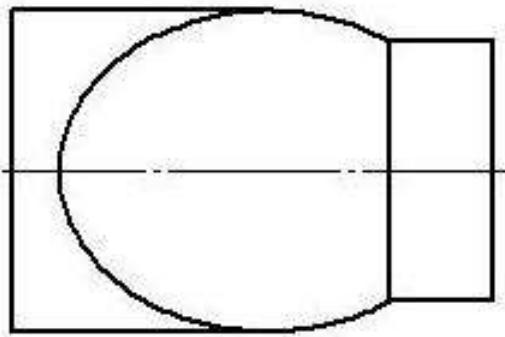
example 1 The projection of cylinder cut by plane?



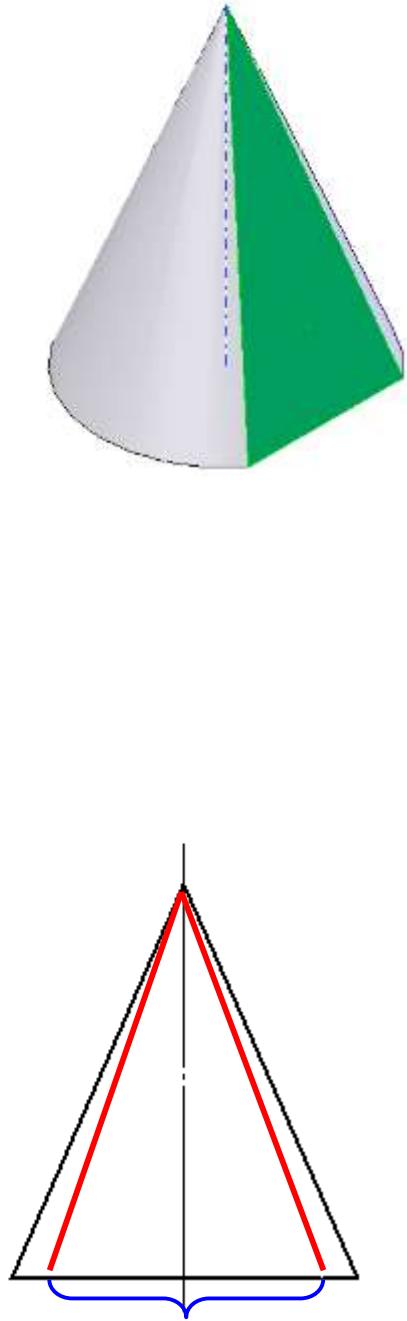
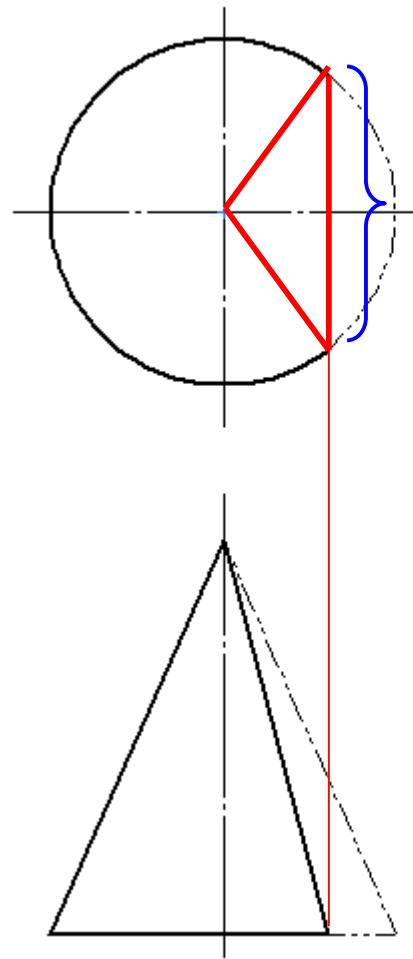
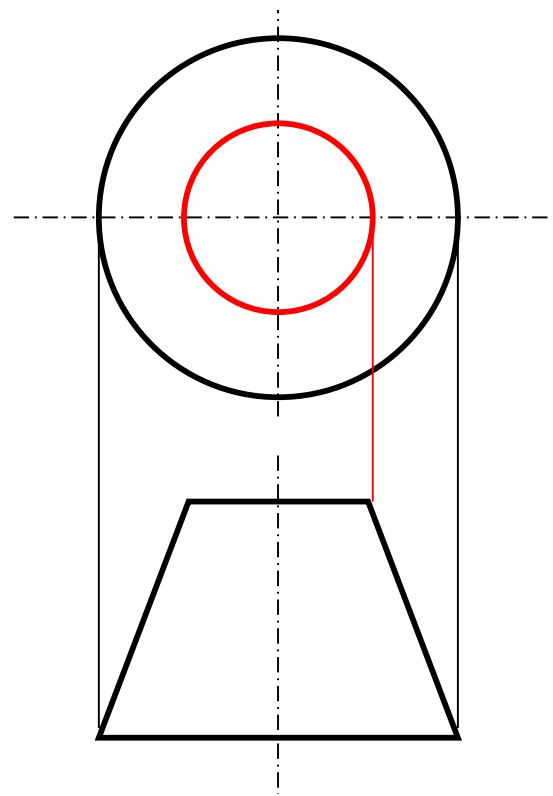
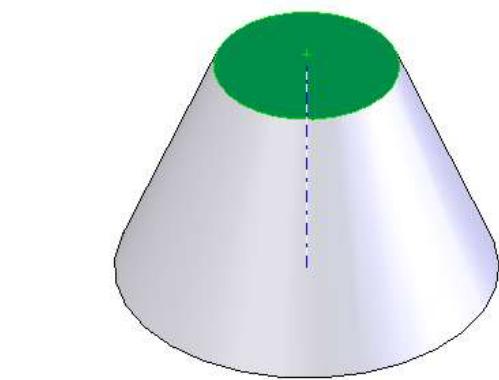
example 2 The projection of cylinder cut by inclined plane?



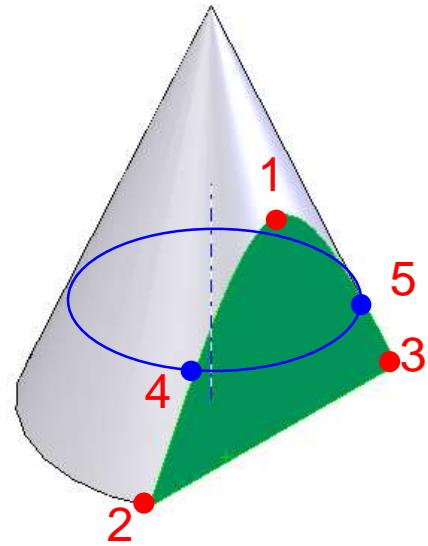
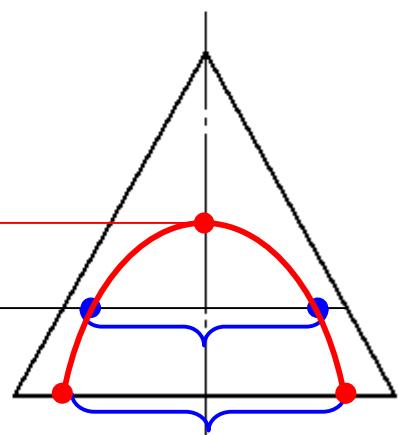
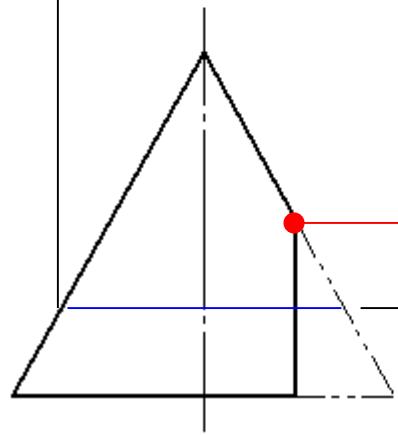
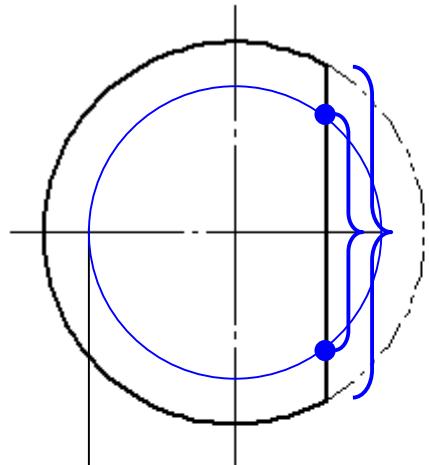
**example 2** The projection of cylinder cut by inclined plane?



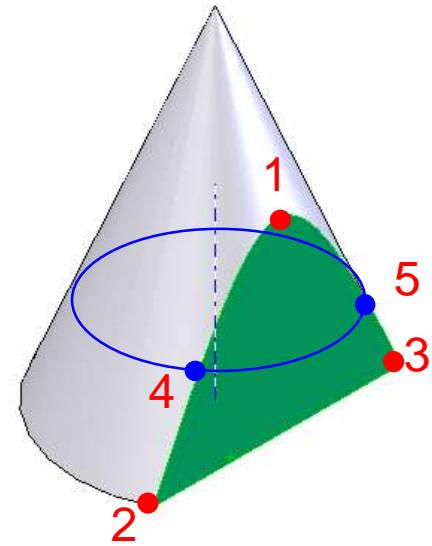
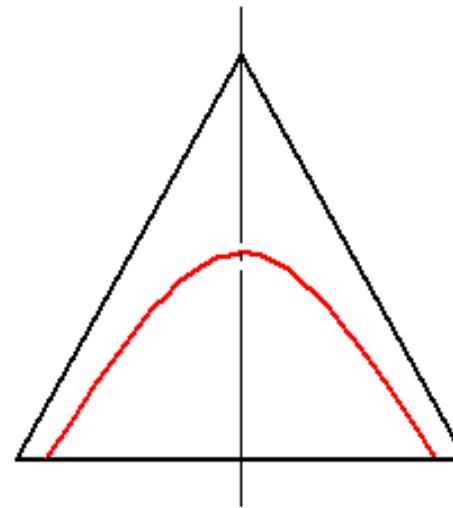
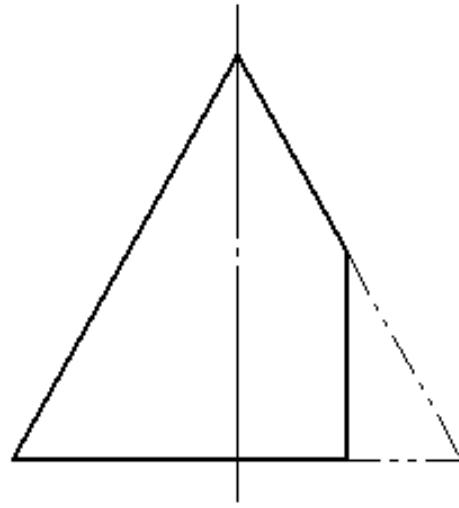
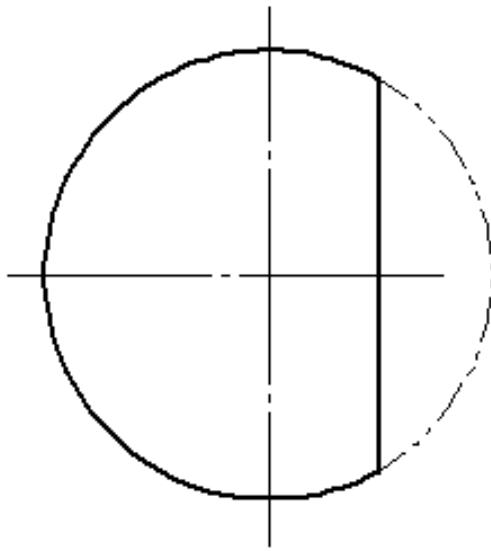
# Cut cone?



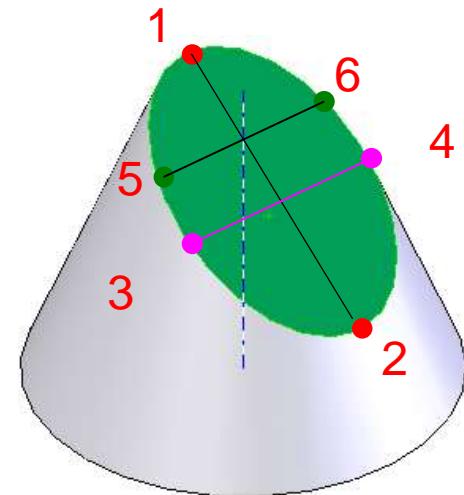
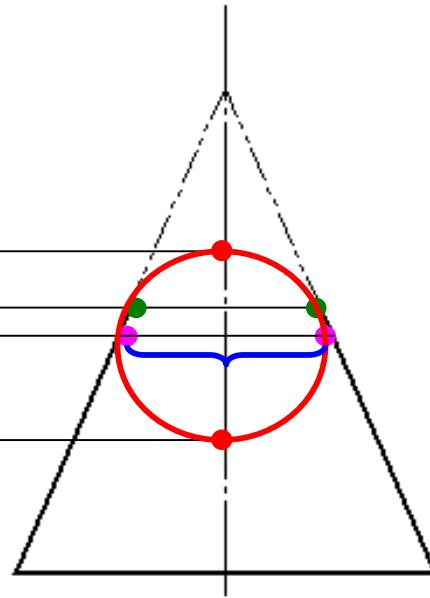
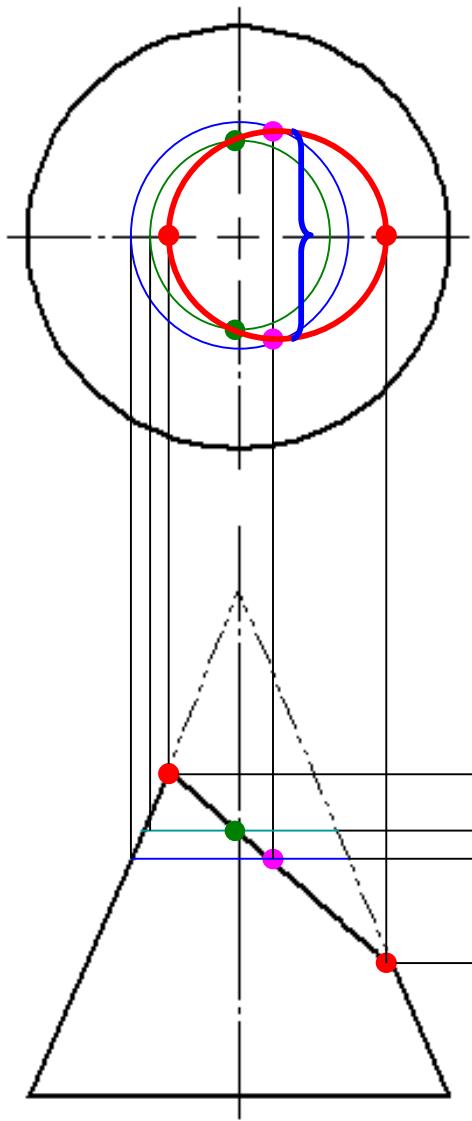
# Cut cone?



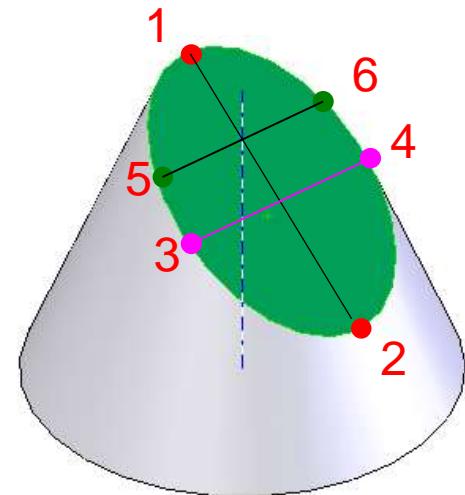
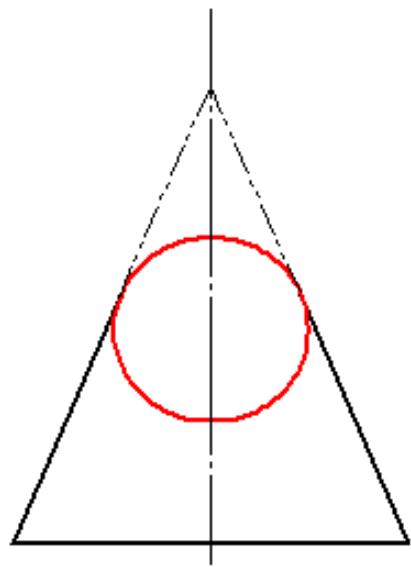
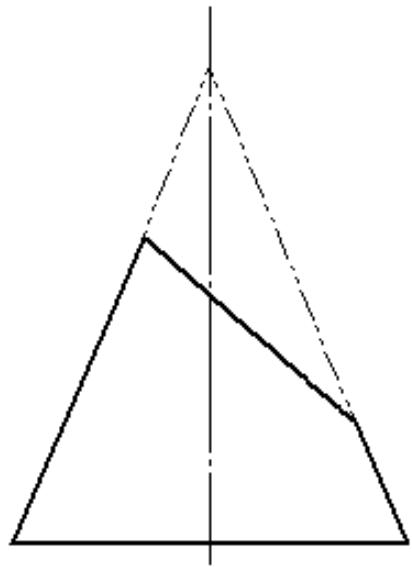
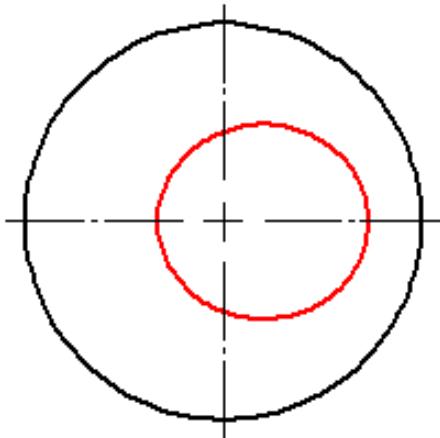
# Cut cone?



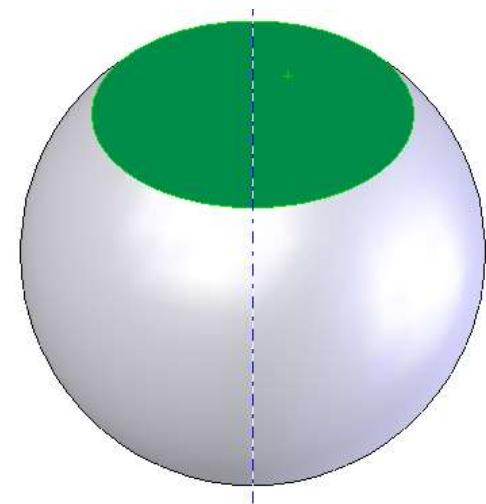
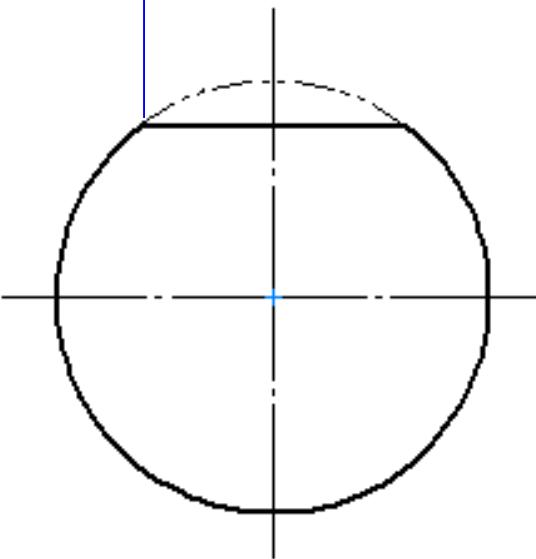
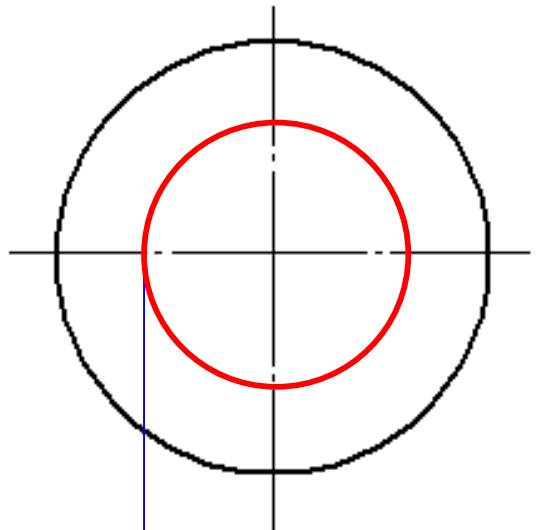
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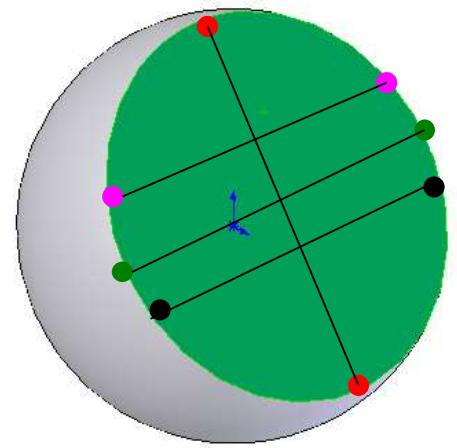
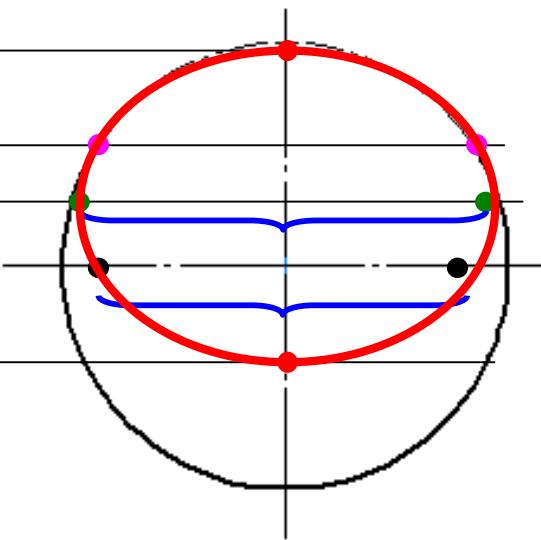
# Cut cone?



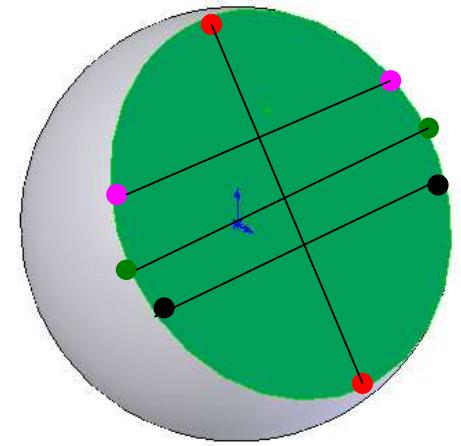
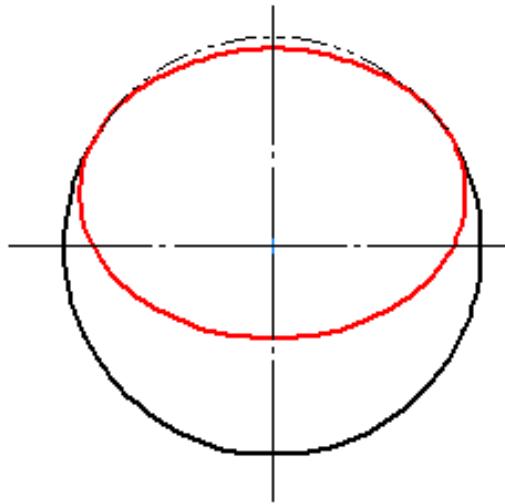
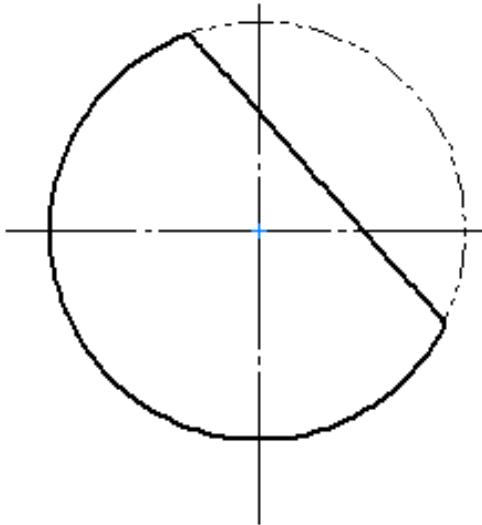
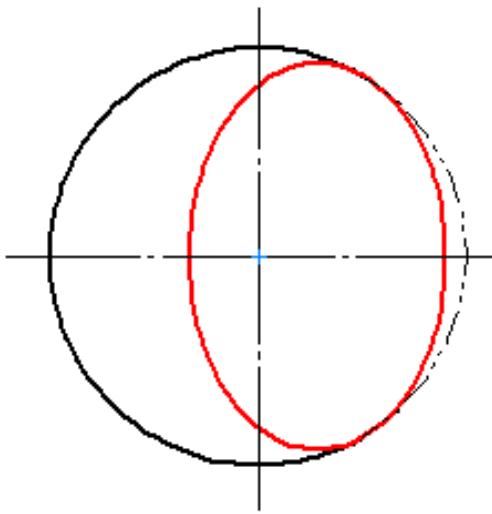
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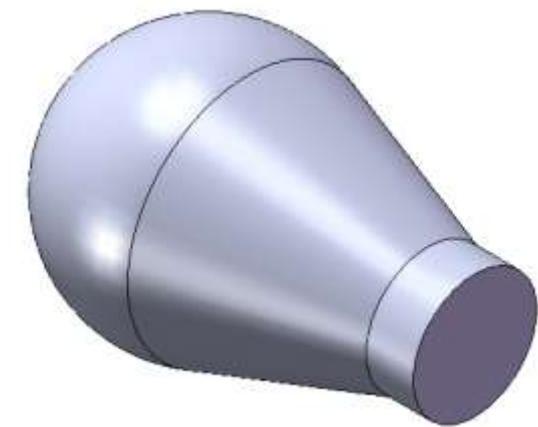
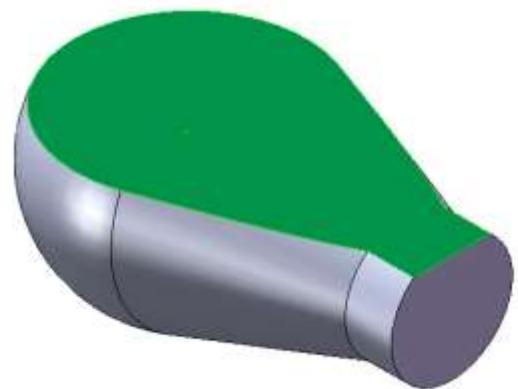
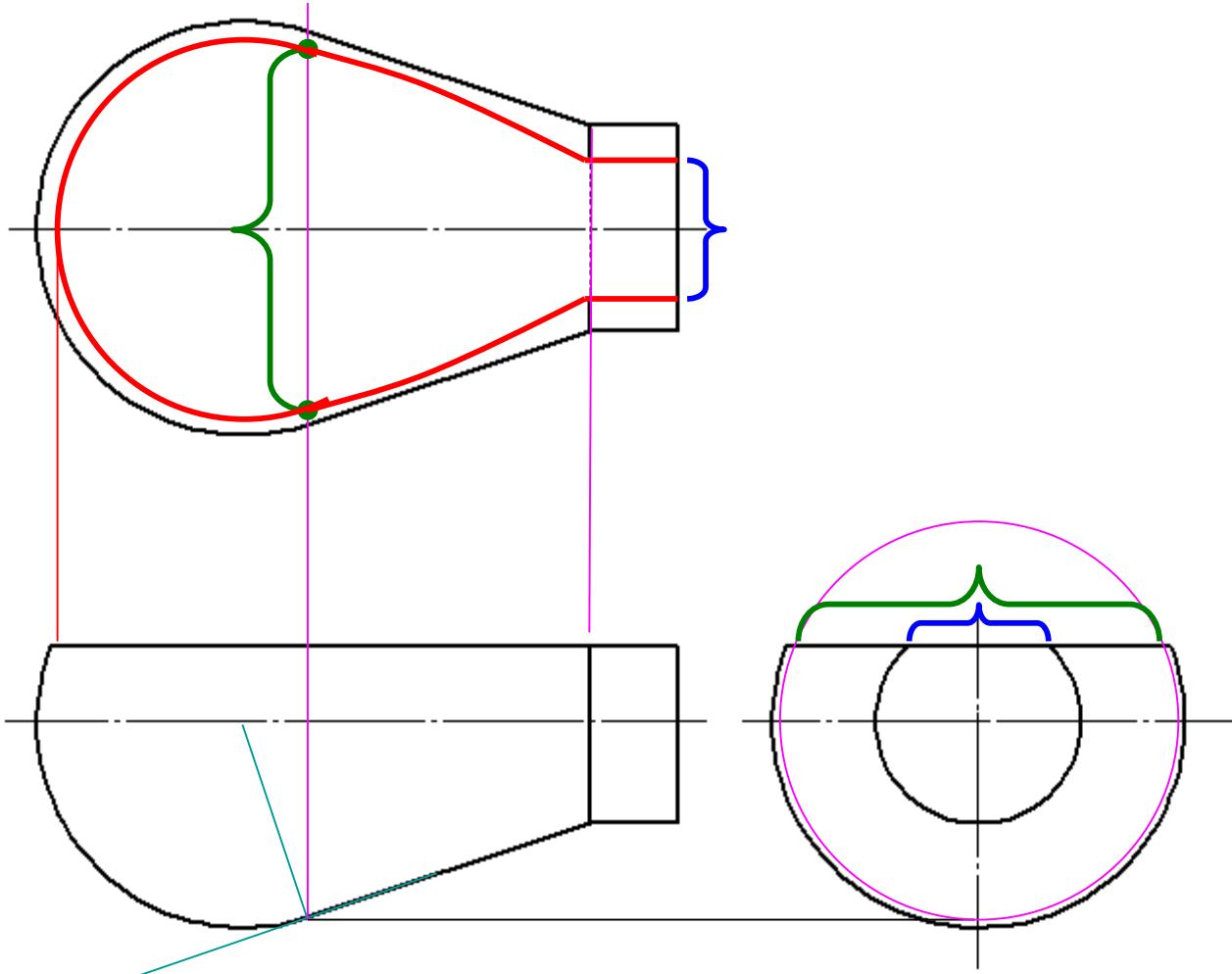
# Cut sphere?



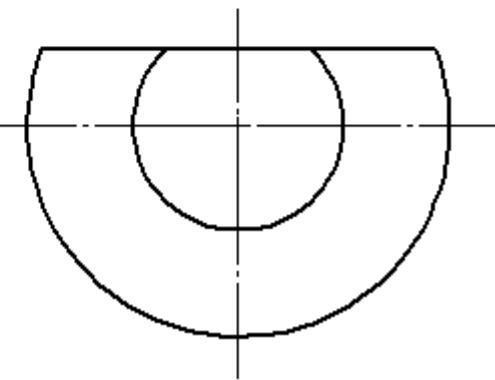
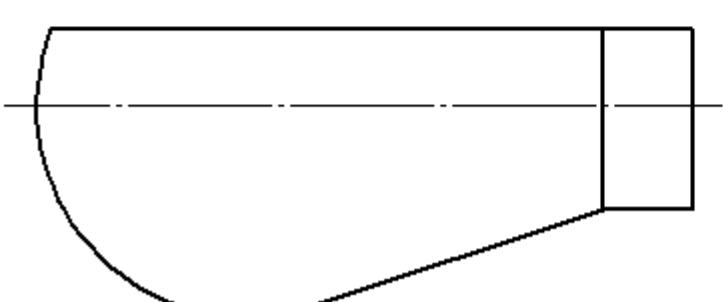
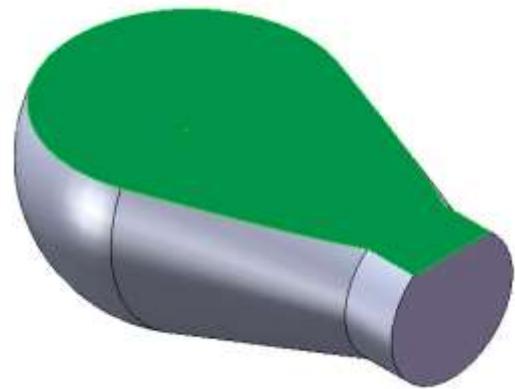
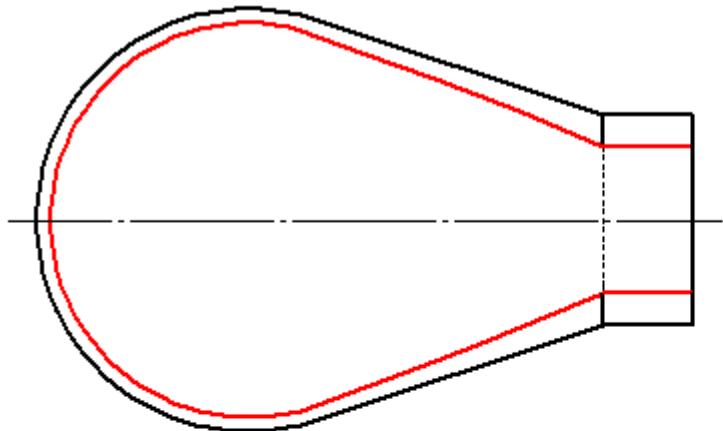
# Cut sphere?



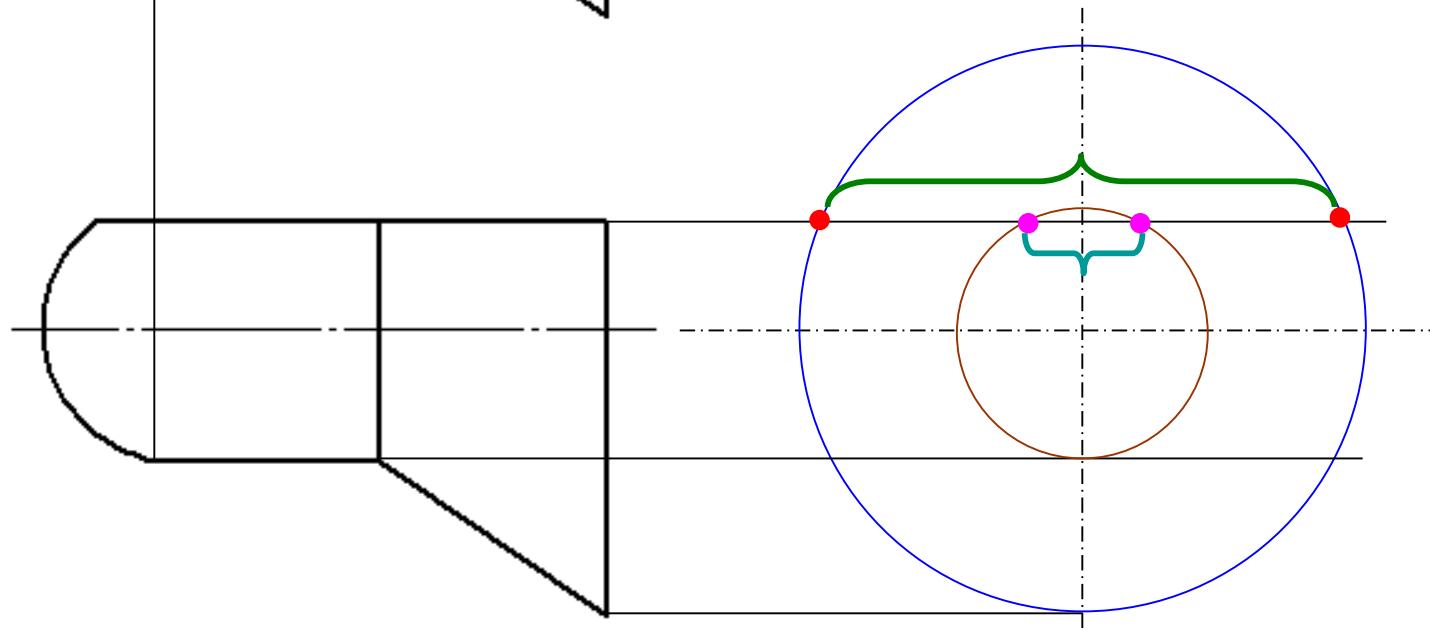
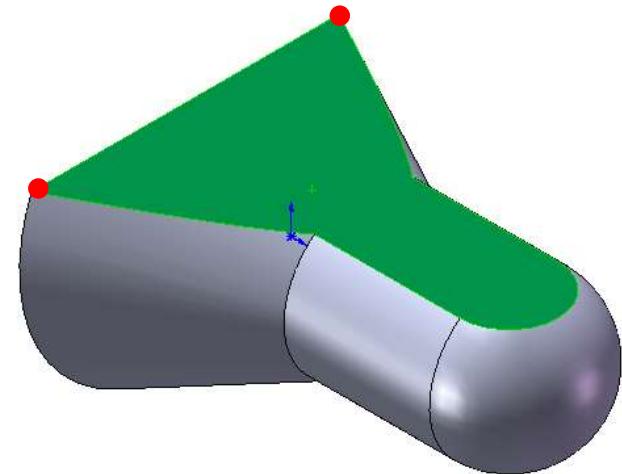
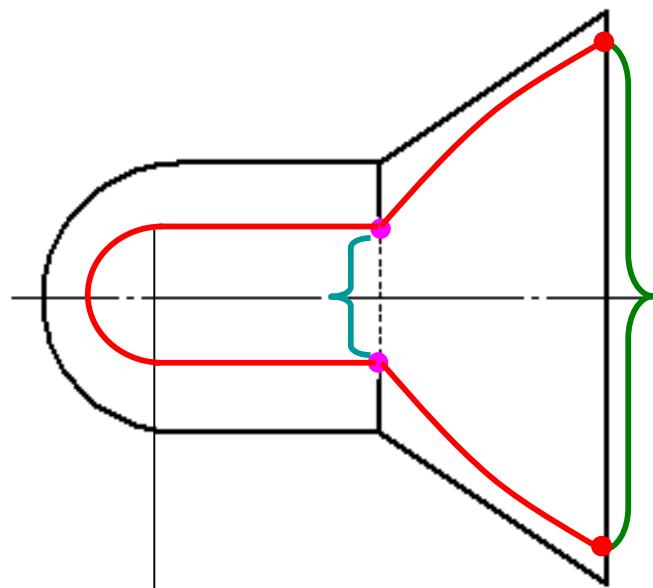
## example5 *Combined solid cut ?*



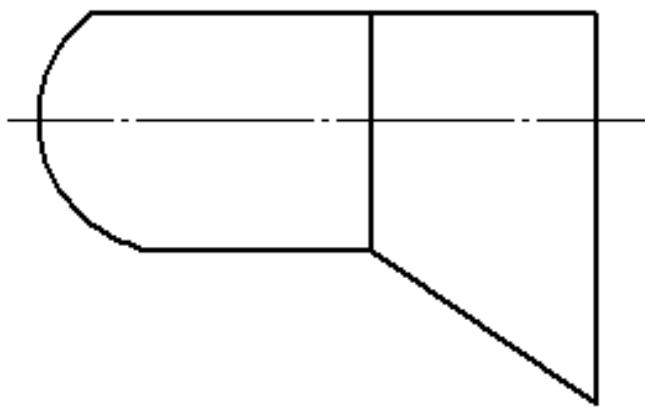
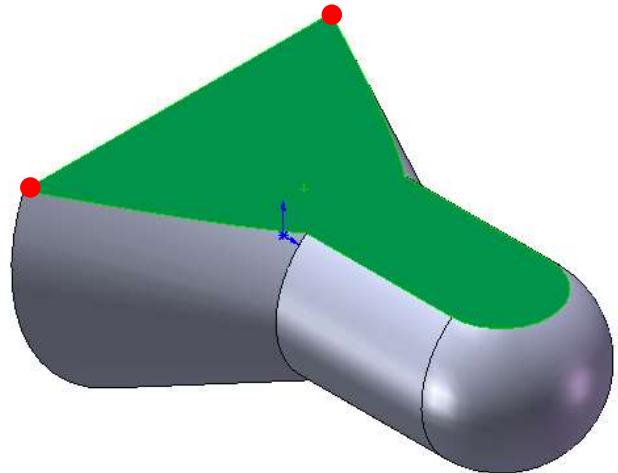
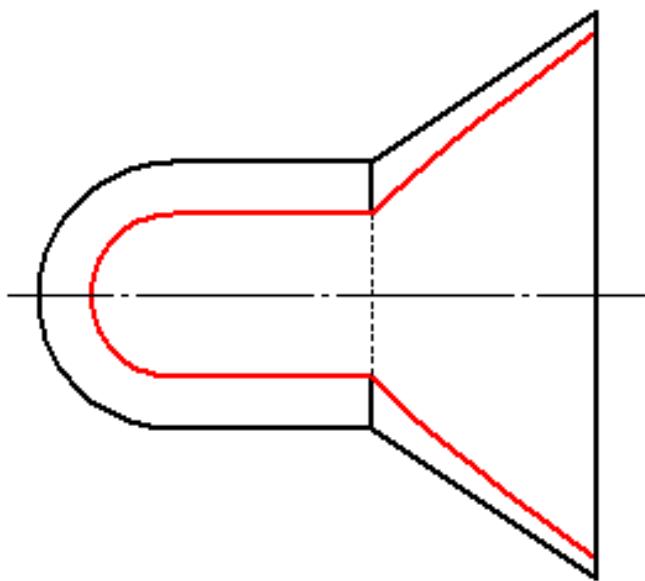
## example5 *Combined solid cut ?*



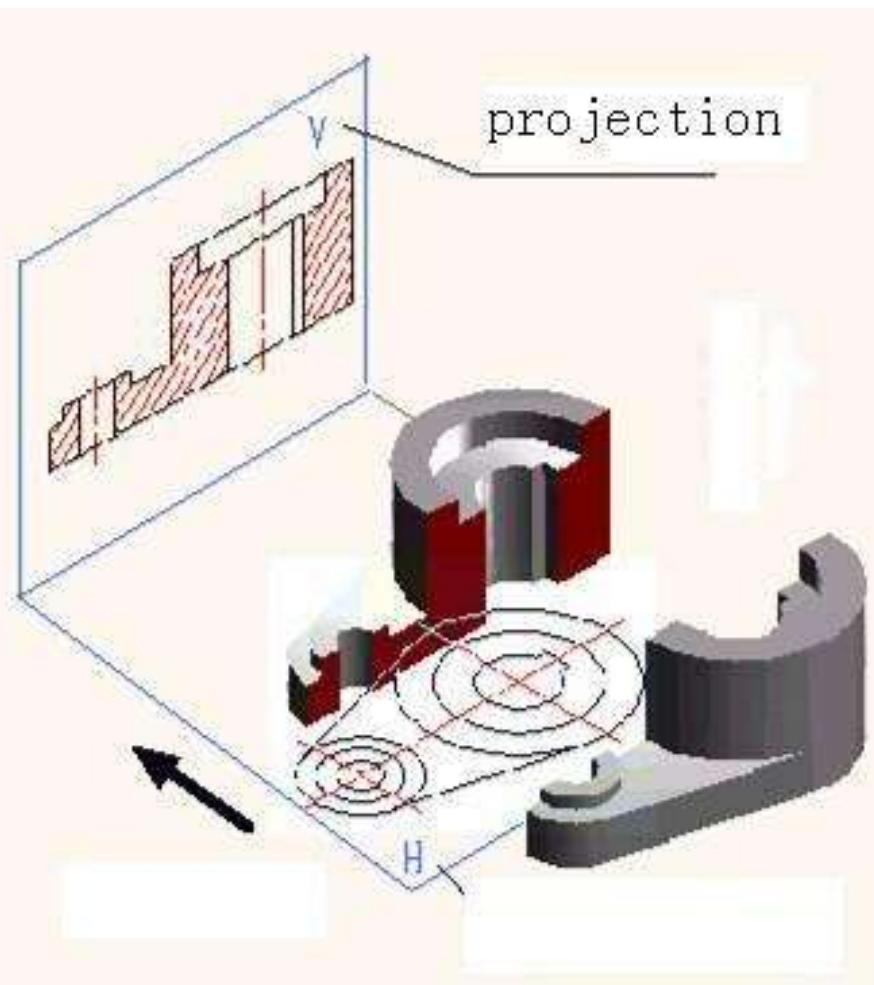
## example4 *Combined solid cut ?*



## example4 *Combined solid cut ?*

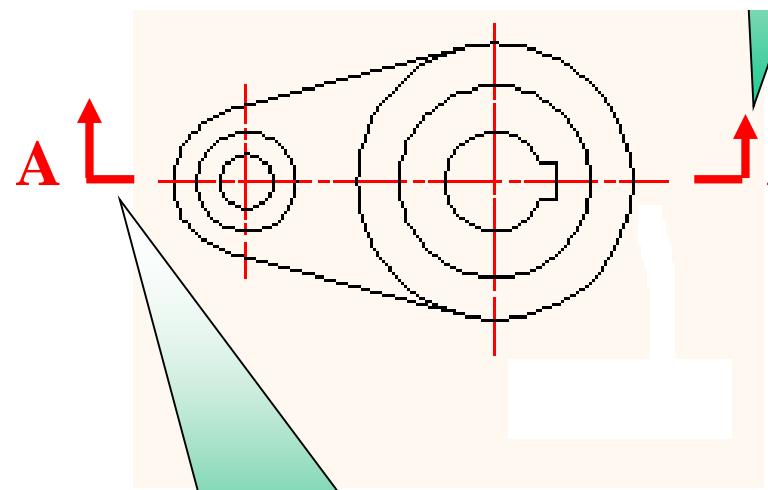


# Chapter 7 Sectional Views

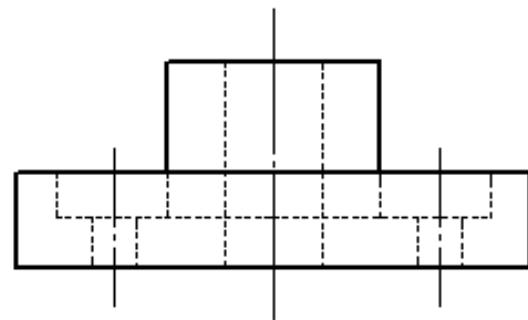
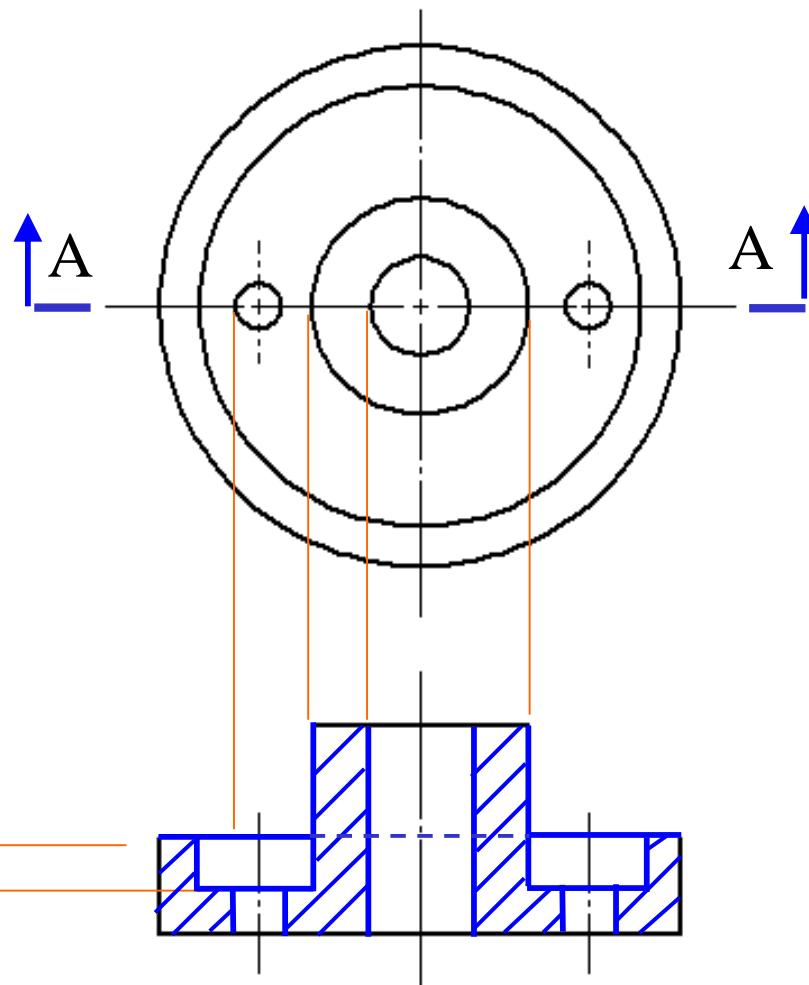
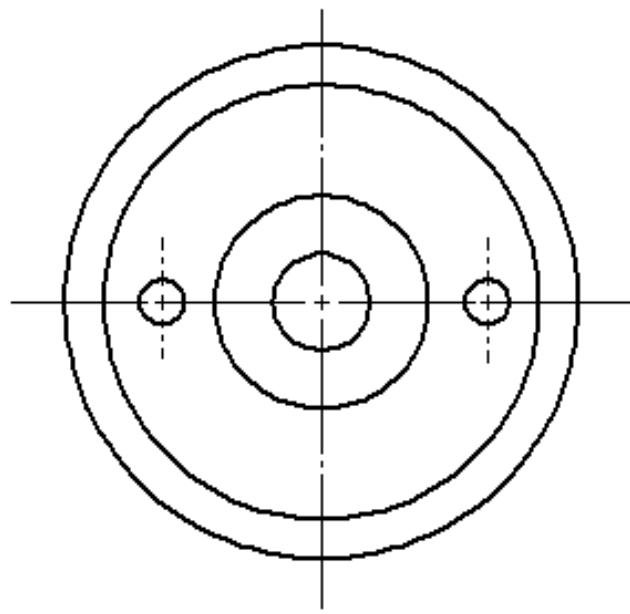
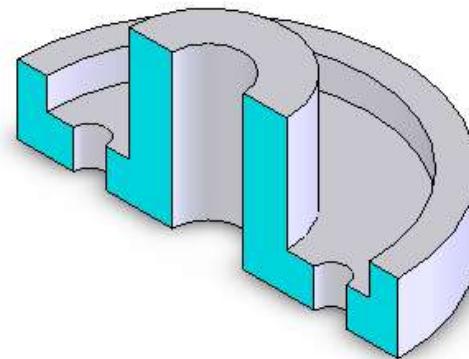
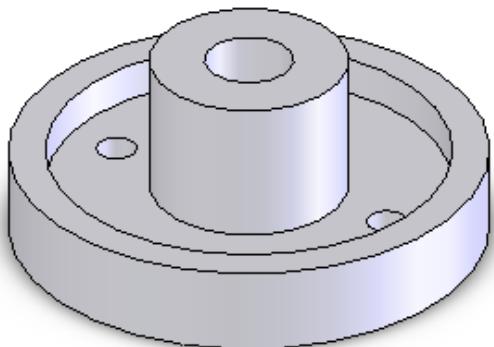


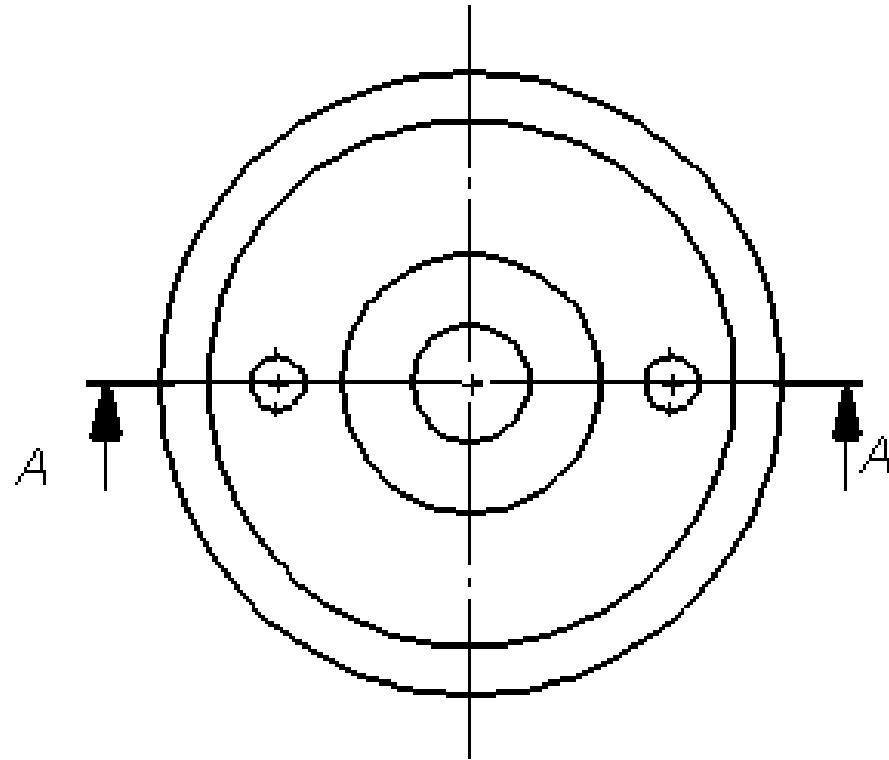
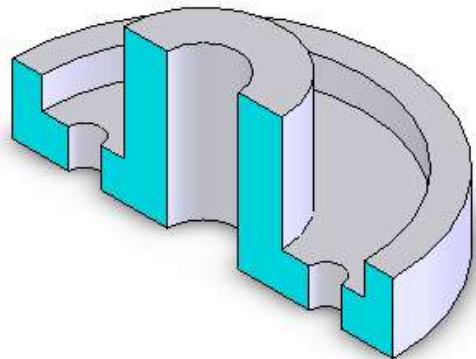
Name

A-A

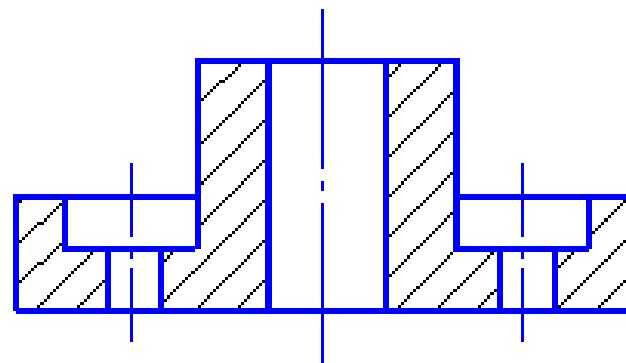


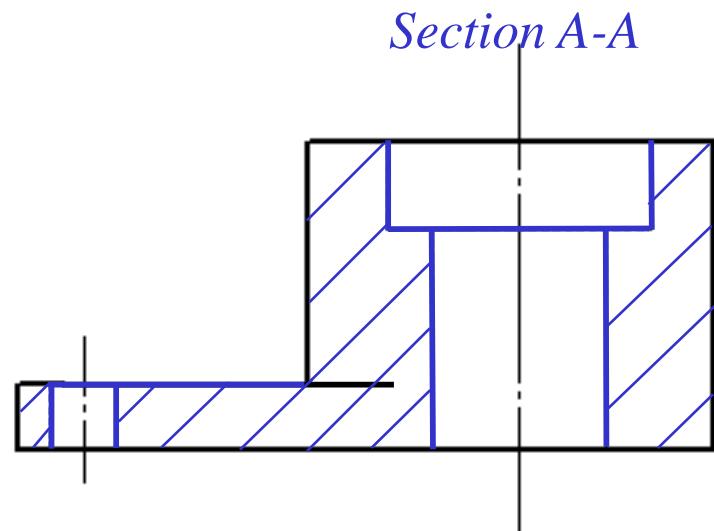
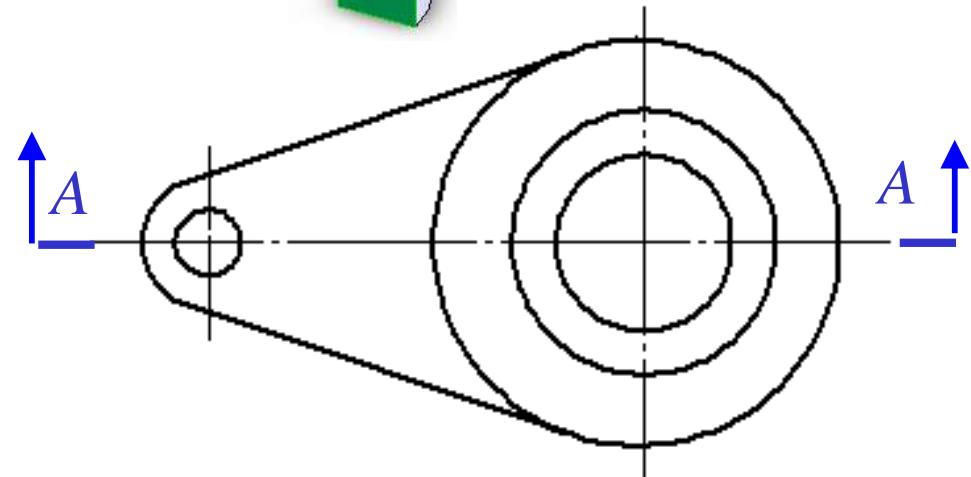
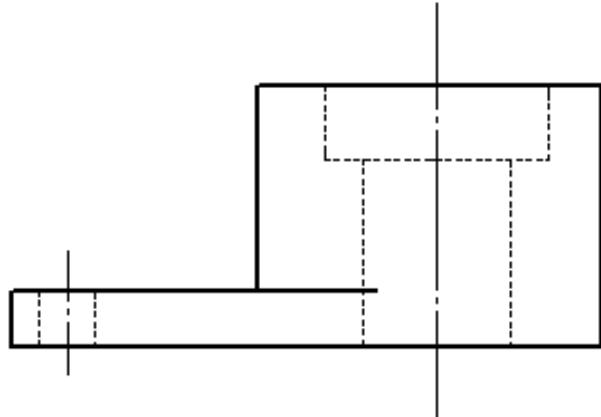
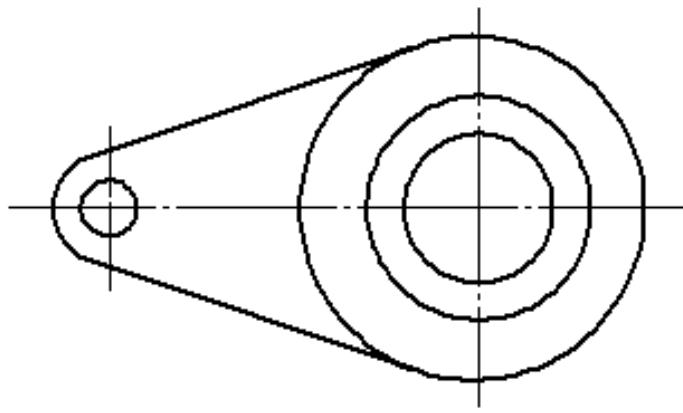
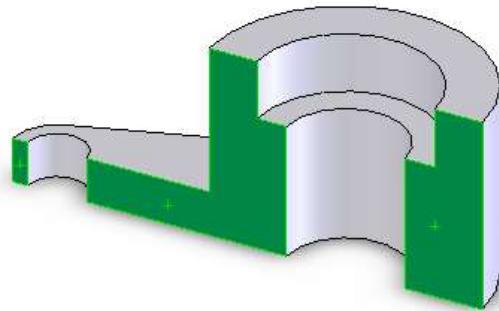
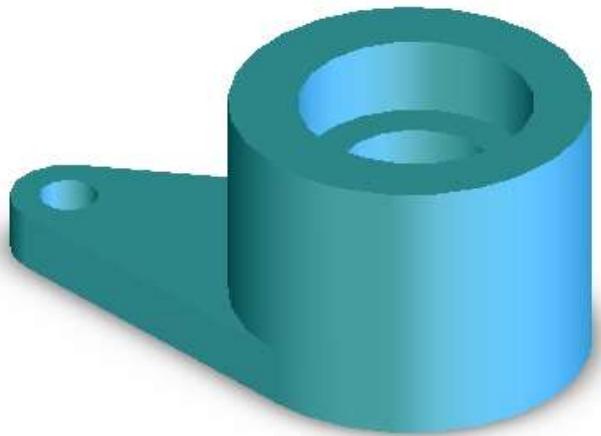
Cutting -plane line



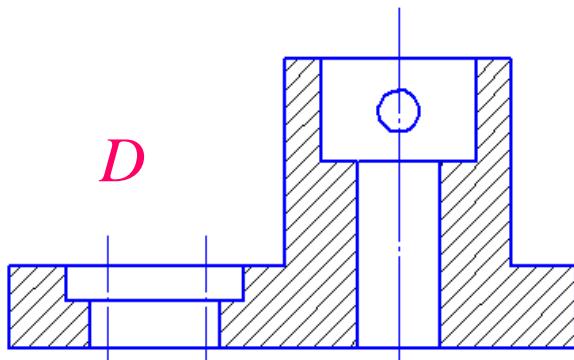
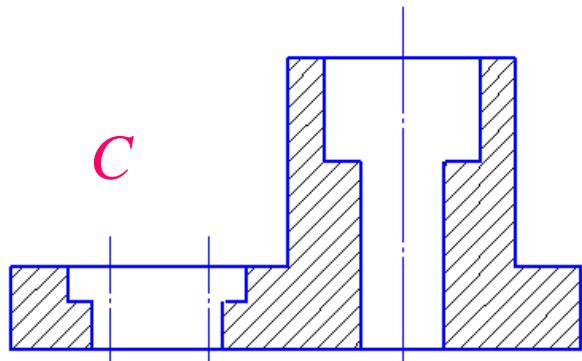
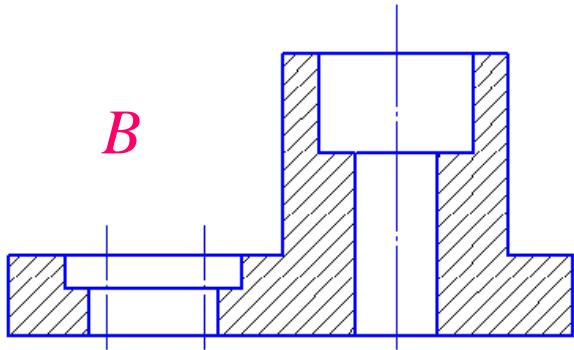
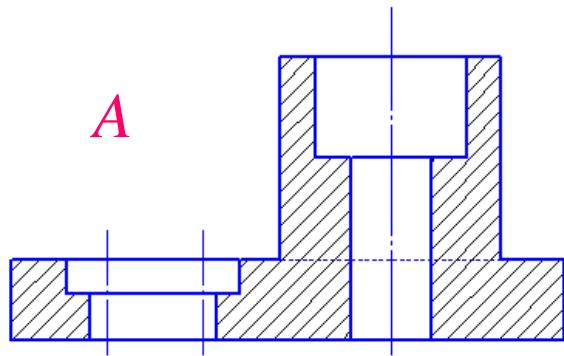
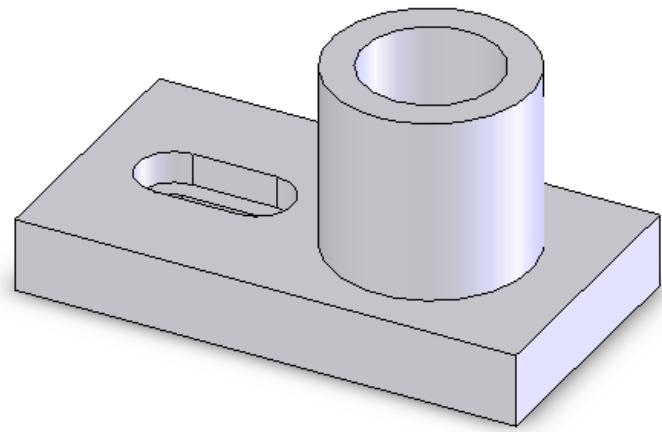
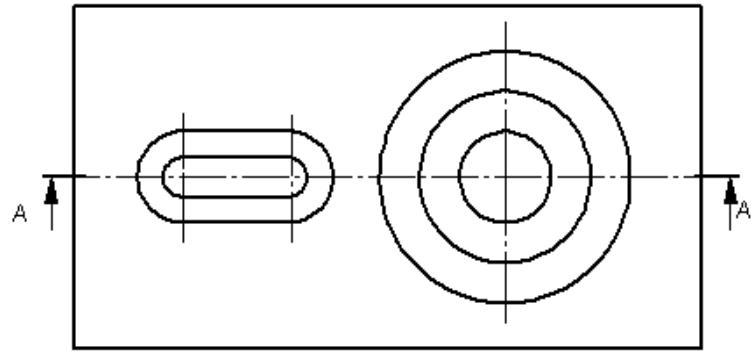


SECTION A-A

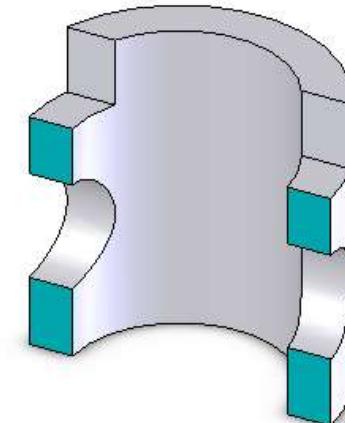
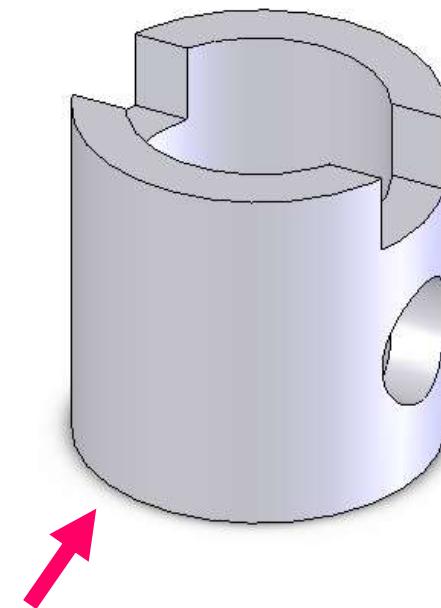
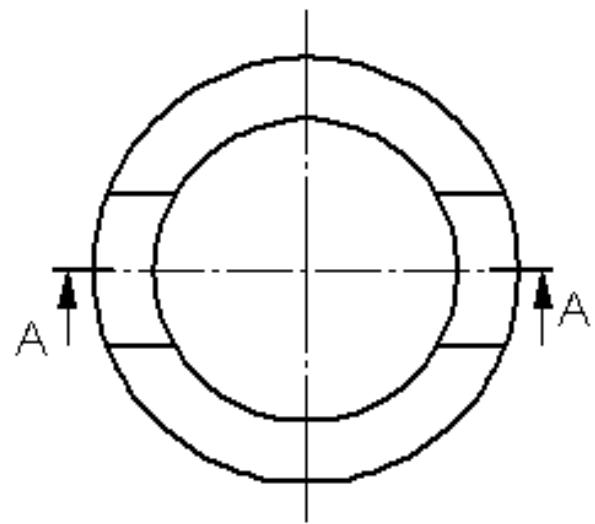




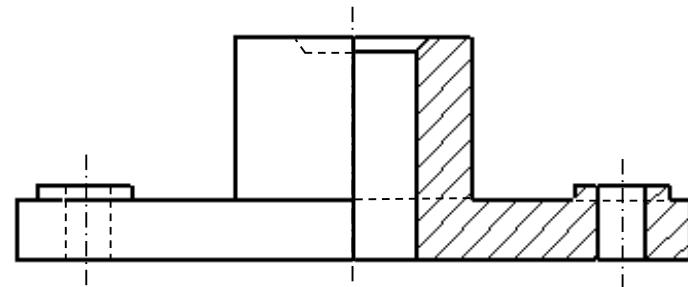
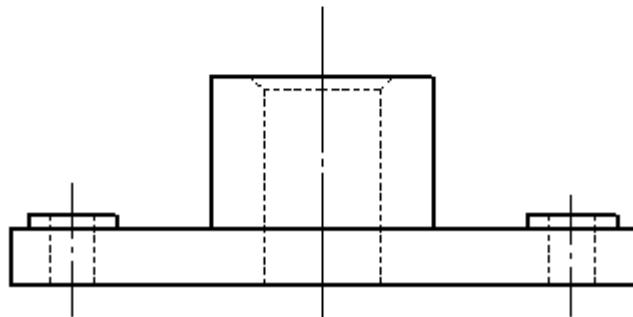
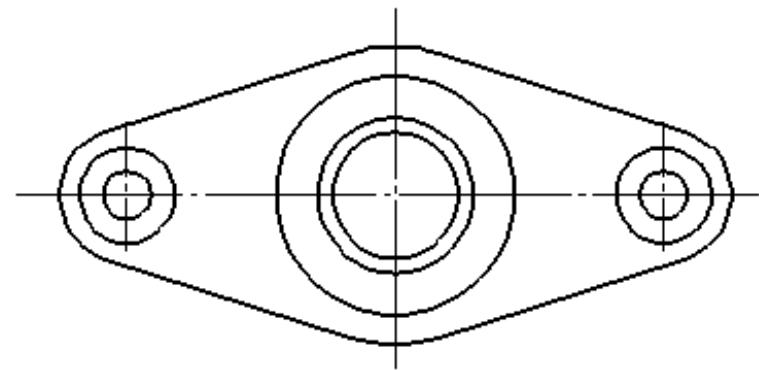
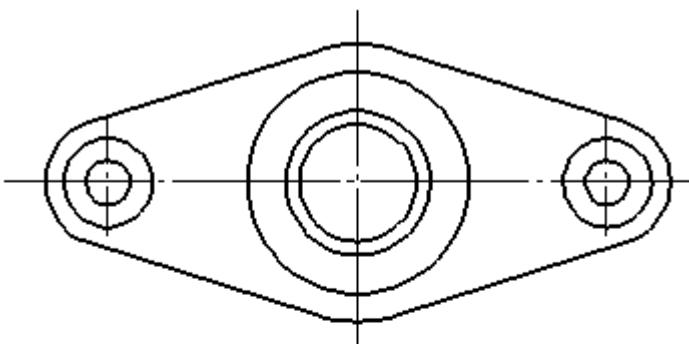
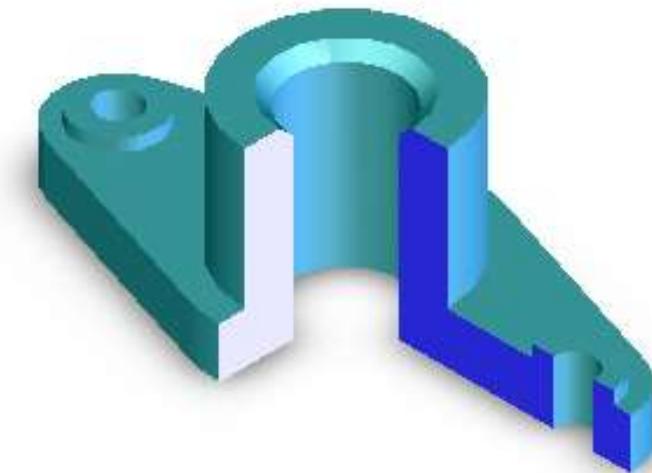
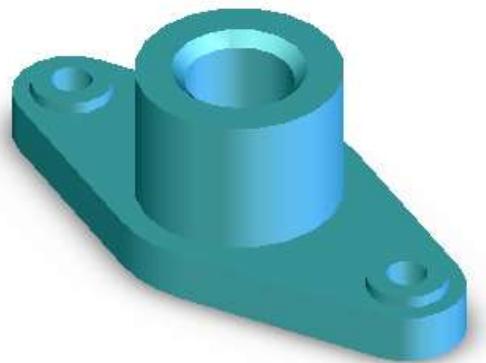
Example 1 front view ->full section?

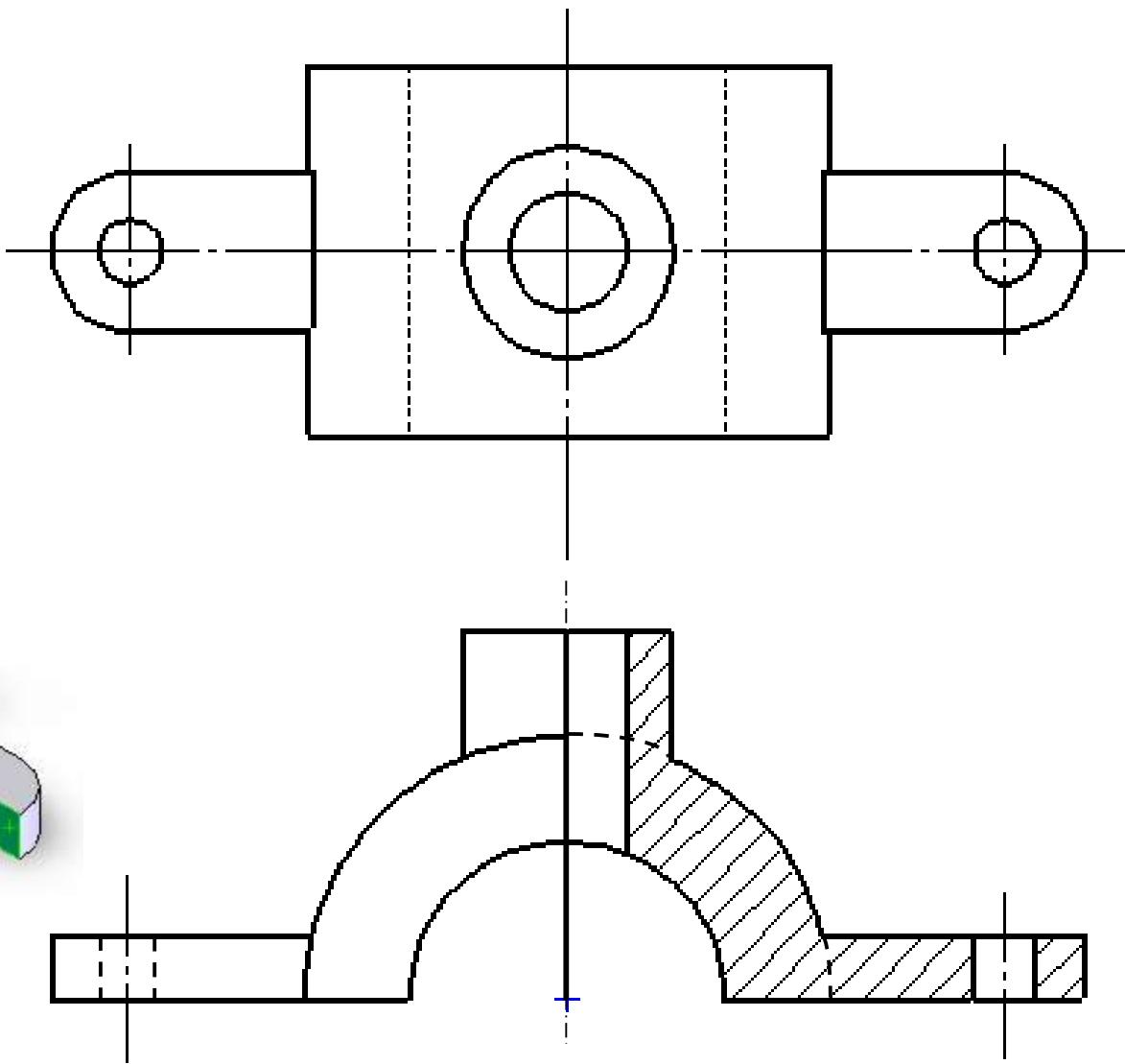
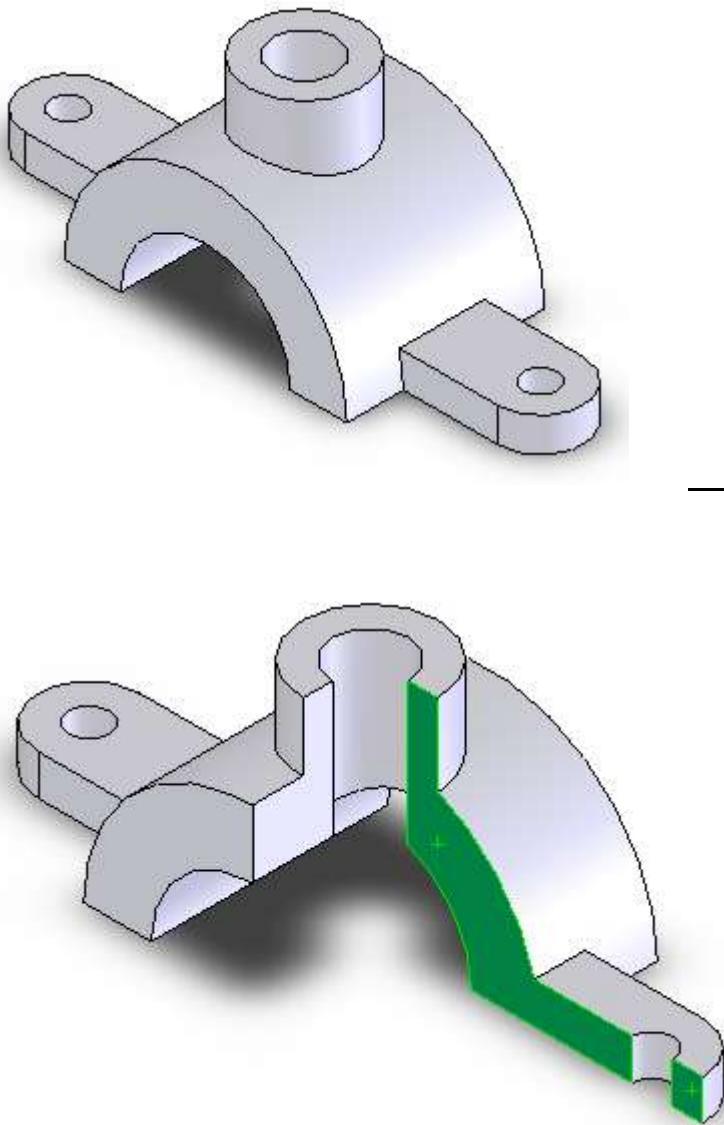


Example 2 front view ->full section?



# HALF SECTION

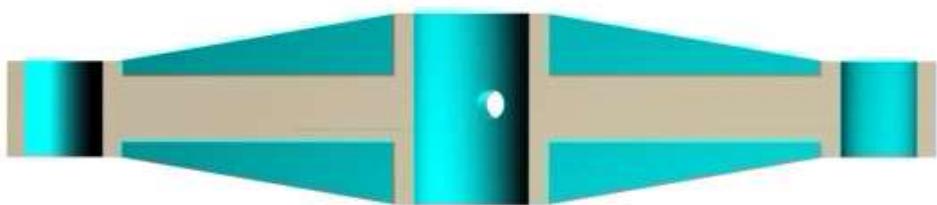
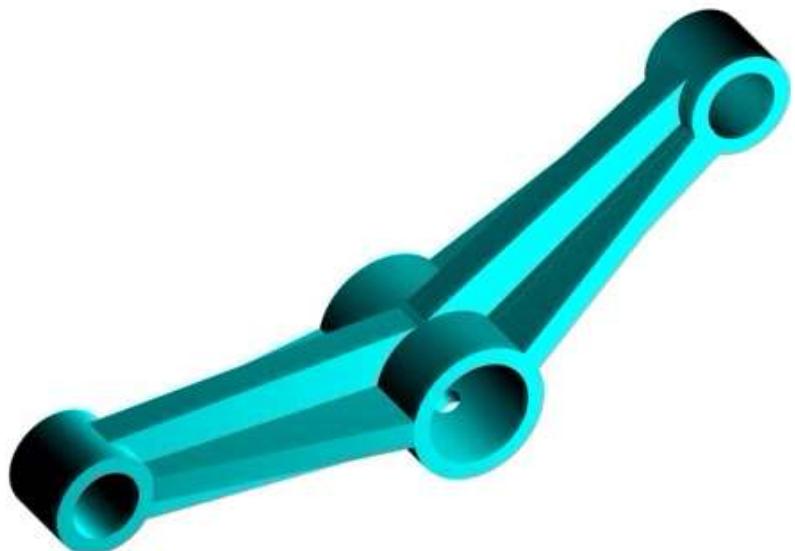




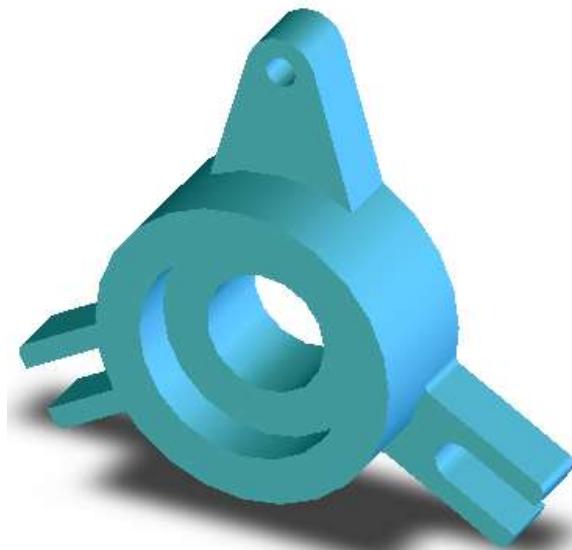
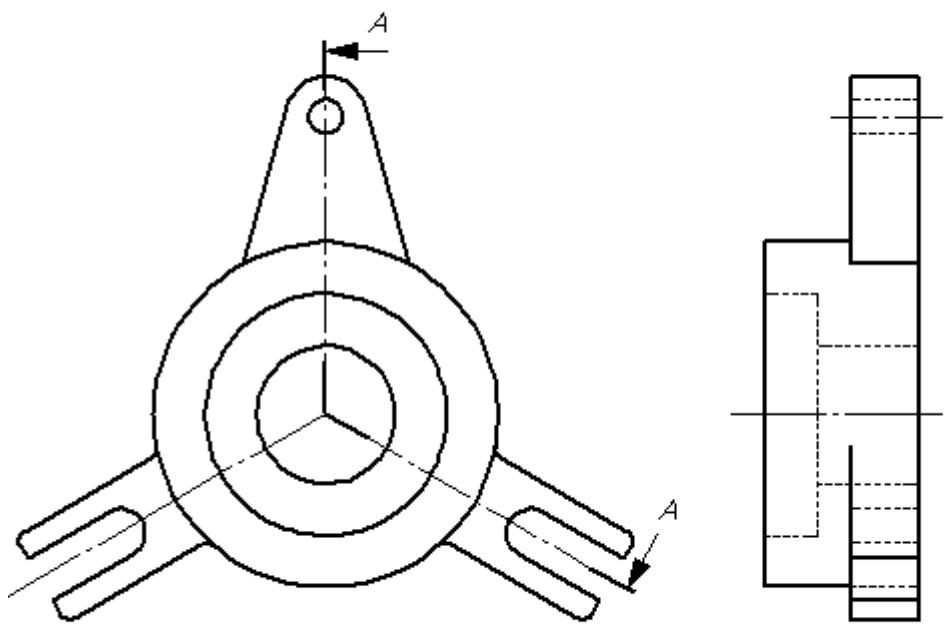
# ALIGNED SECTION



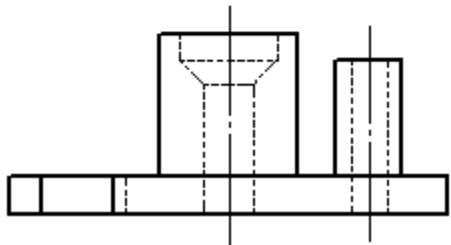
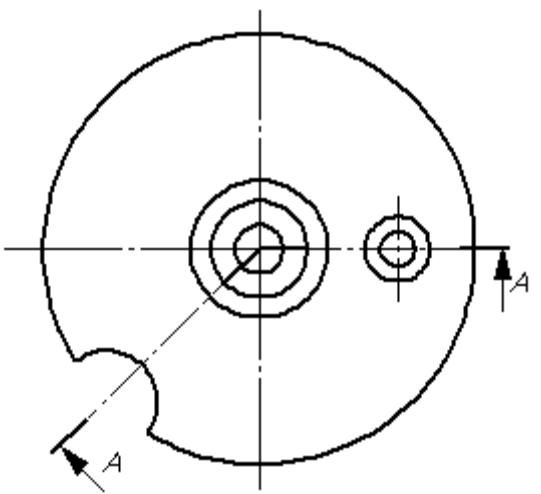
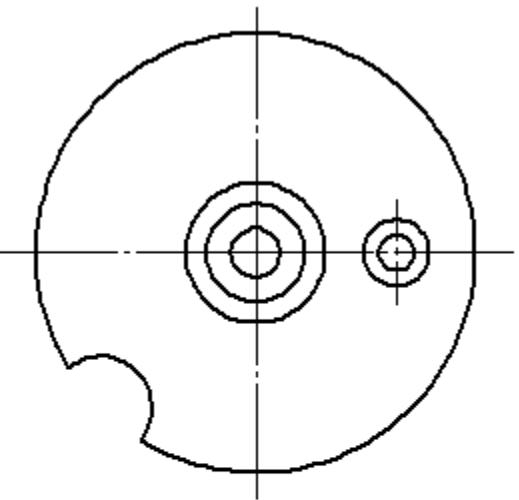
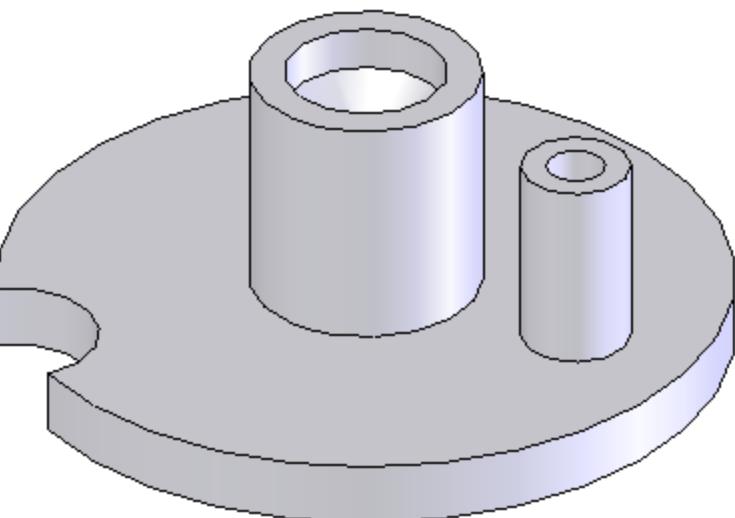
## ALIGNED SECTION



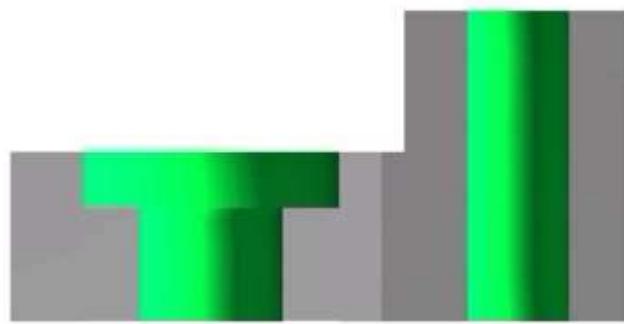
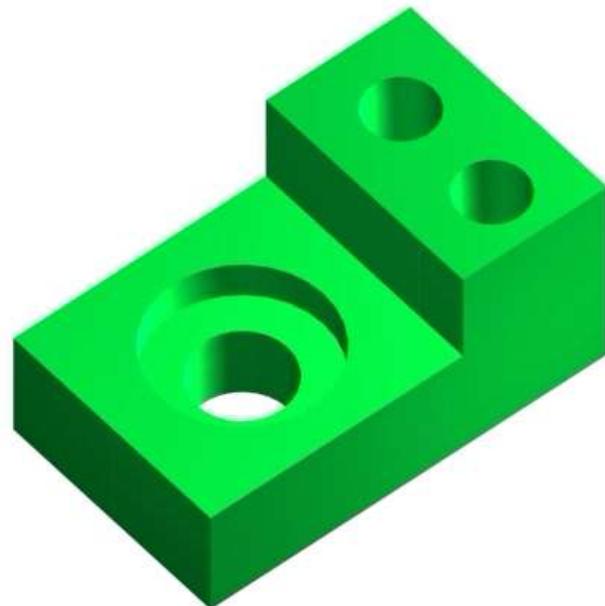
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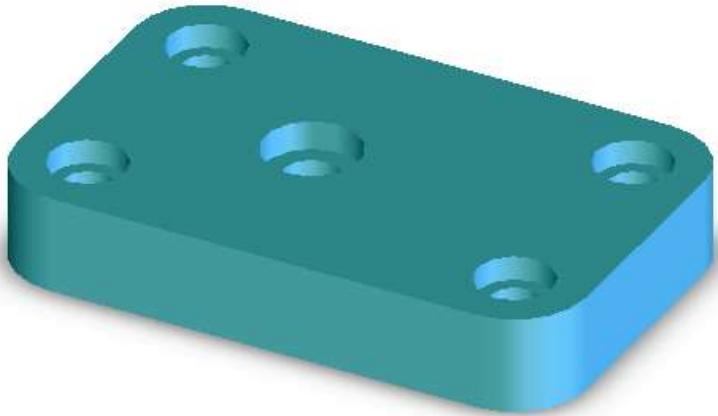
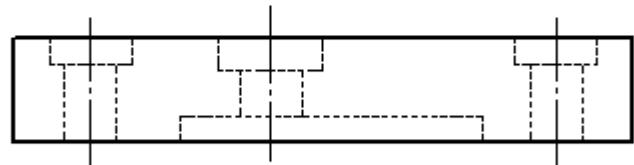
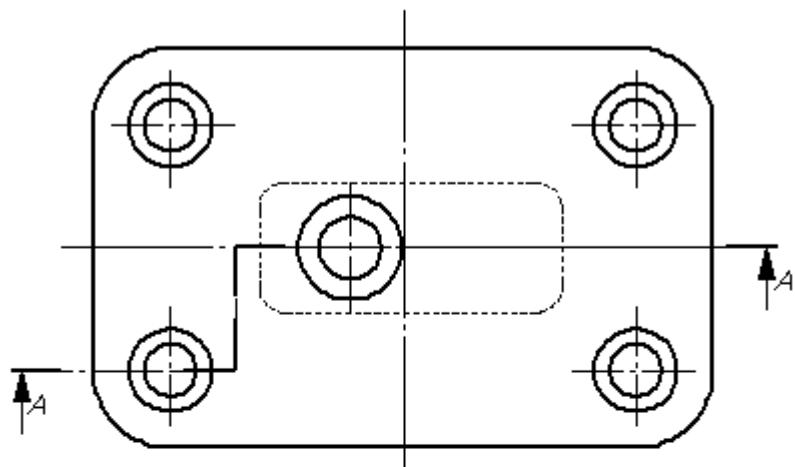
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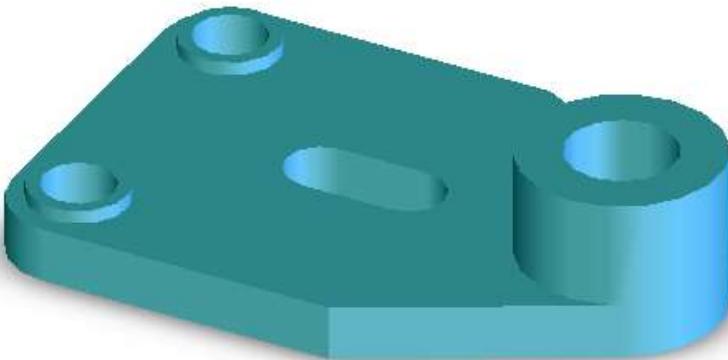
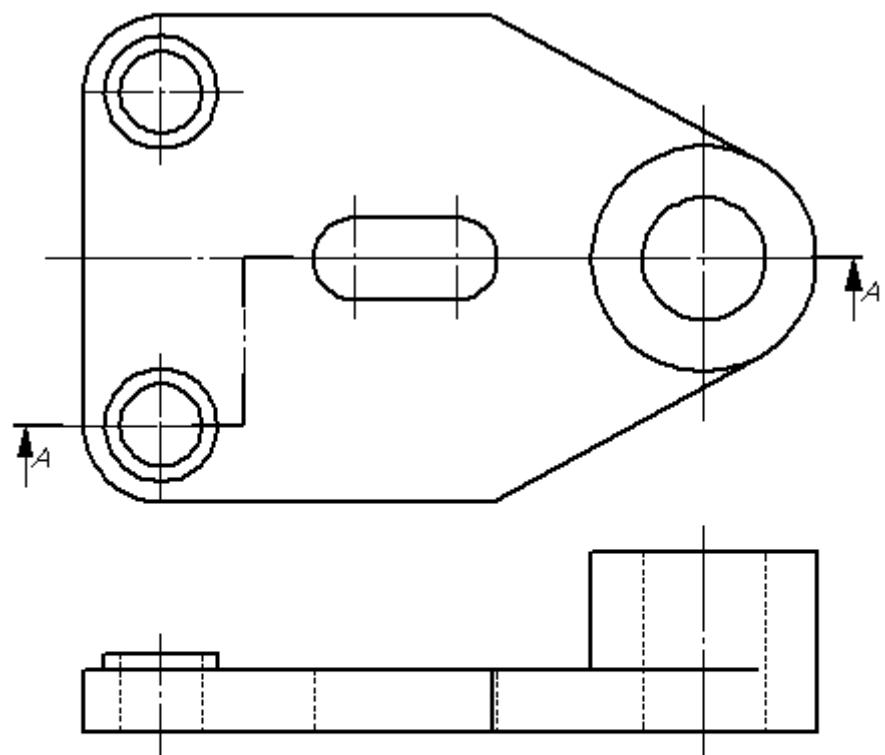
# OFFSET SECTION



## OFFSET SECTION

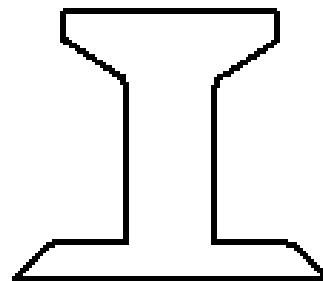
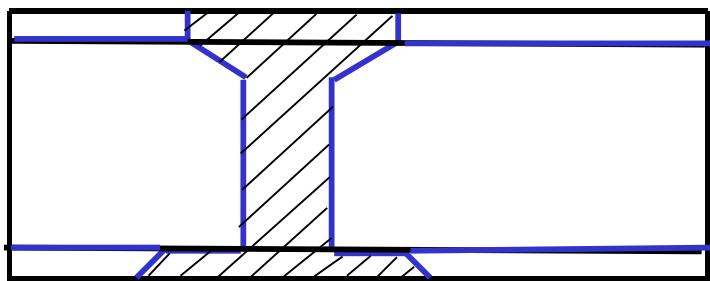
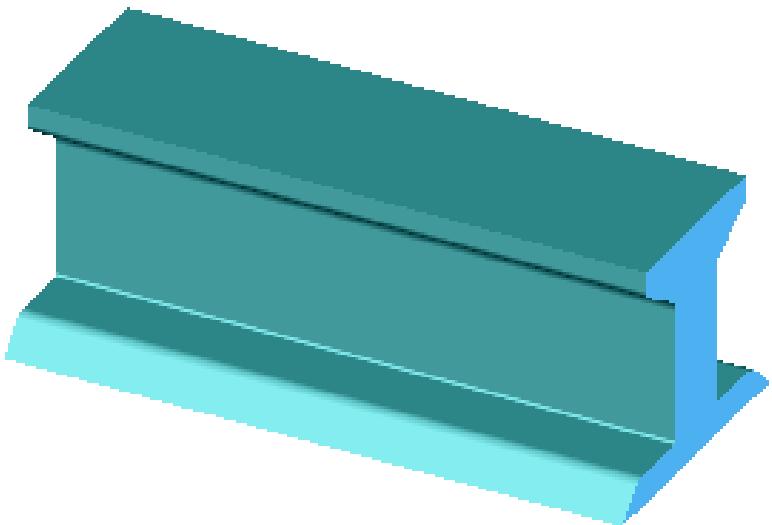


## OFFSET SECTION



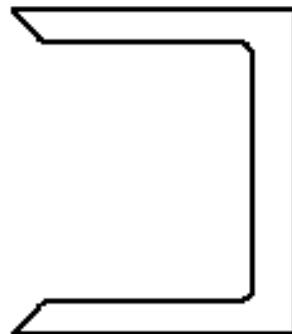
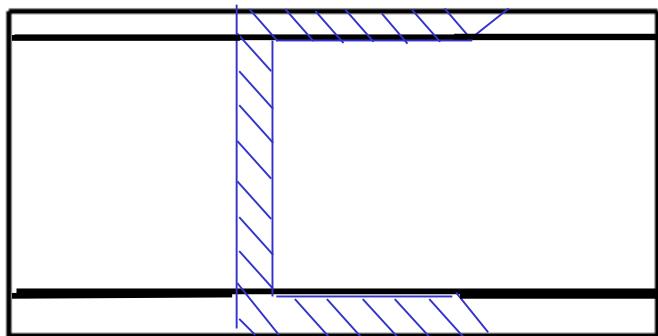
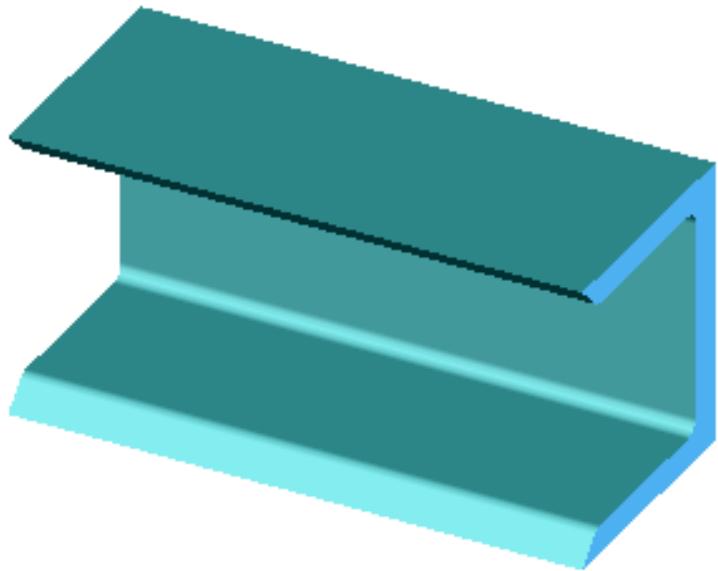
# REVOLVED SECTION

Only sketch section surface

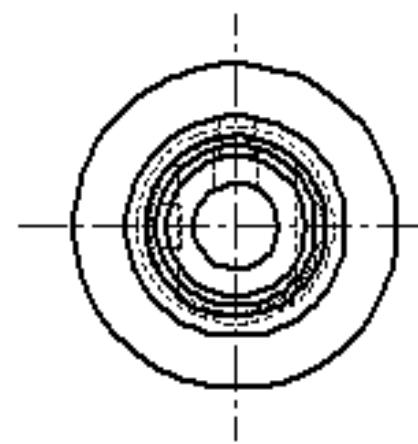
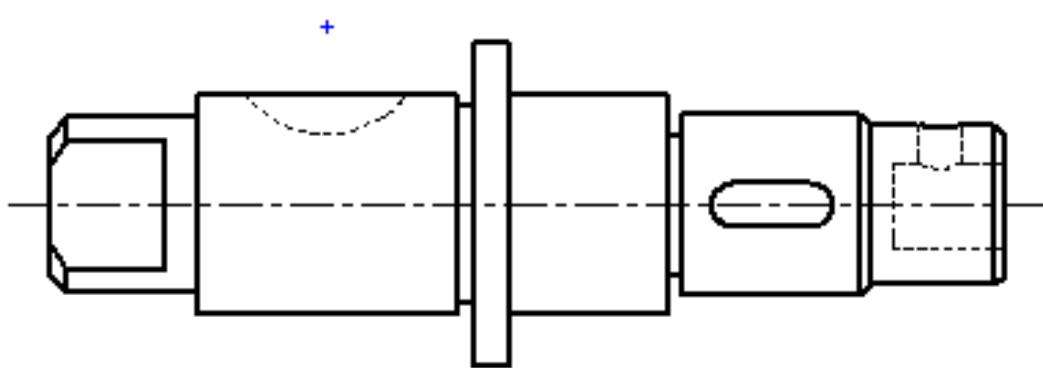
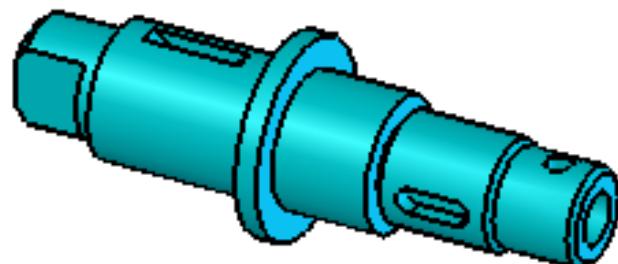
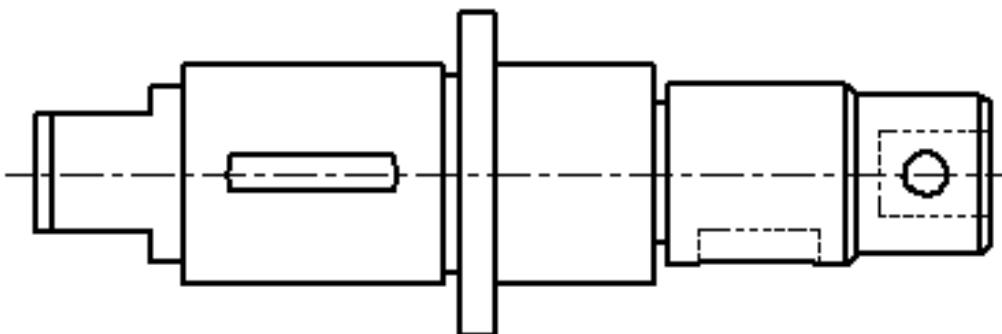


# REVOLVED SECTION

Only sketch section surface

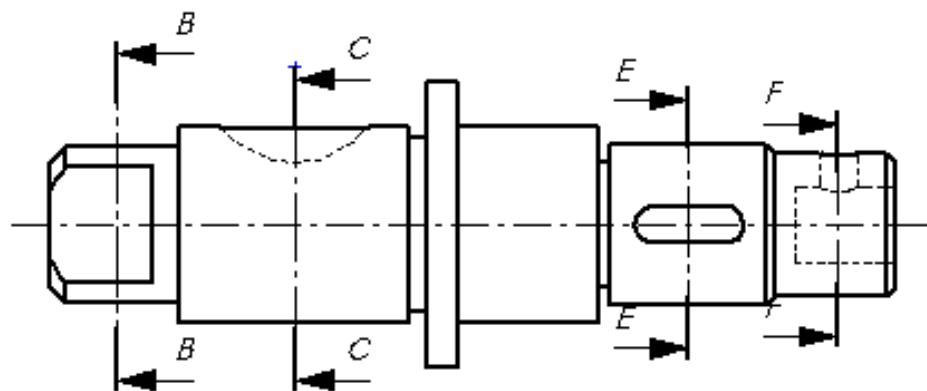
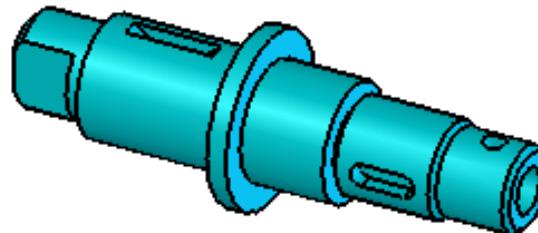


# REMOVED SECTION



**REMOVED SECTION**

Only sketch section surface

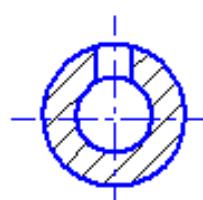
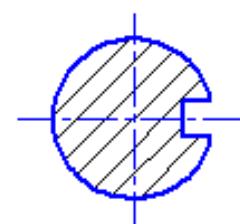
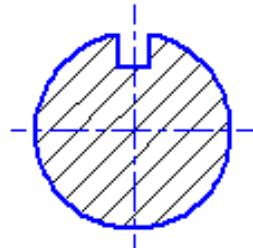
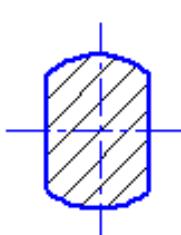


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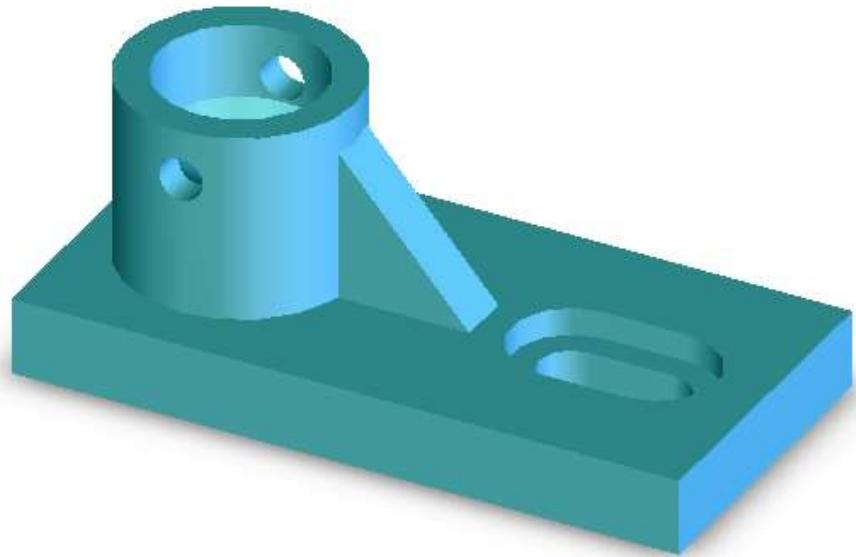
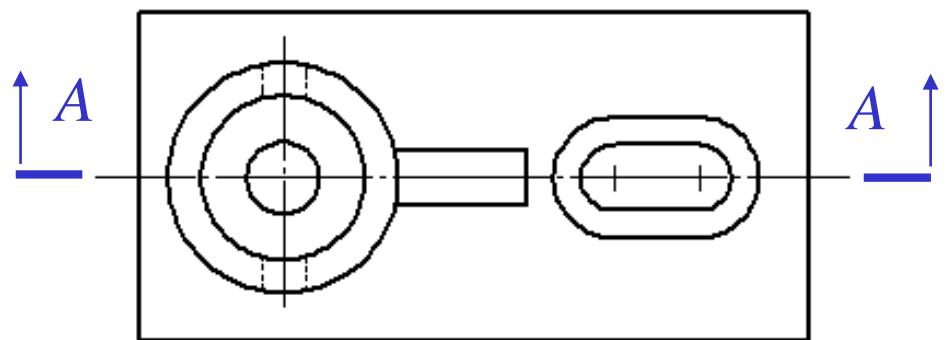
*SECTION C-C*

*SECTION E-E*

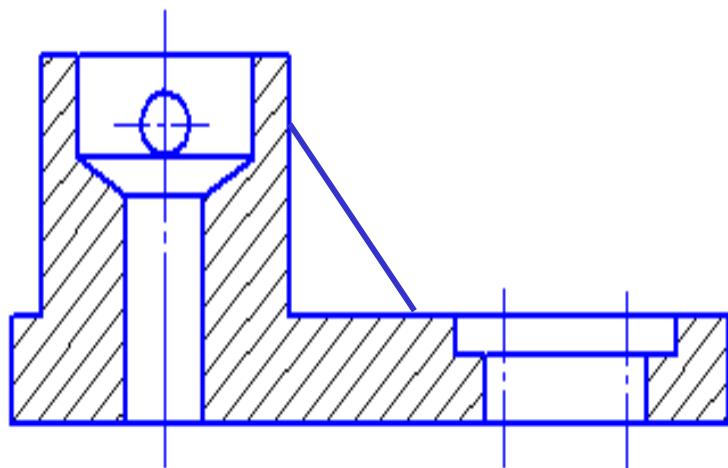
*SECTION F-F*



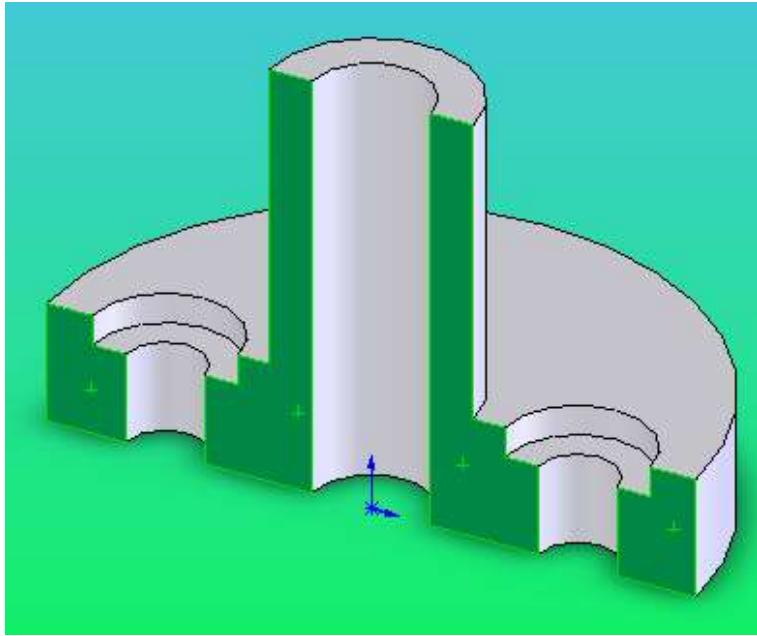
## FULL SECTION (Rib)



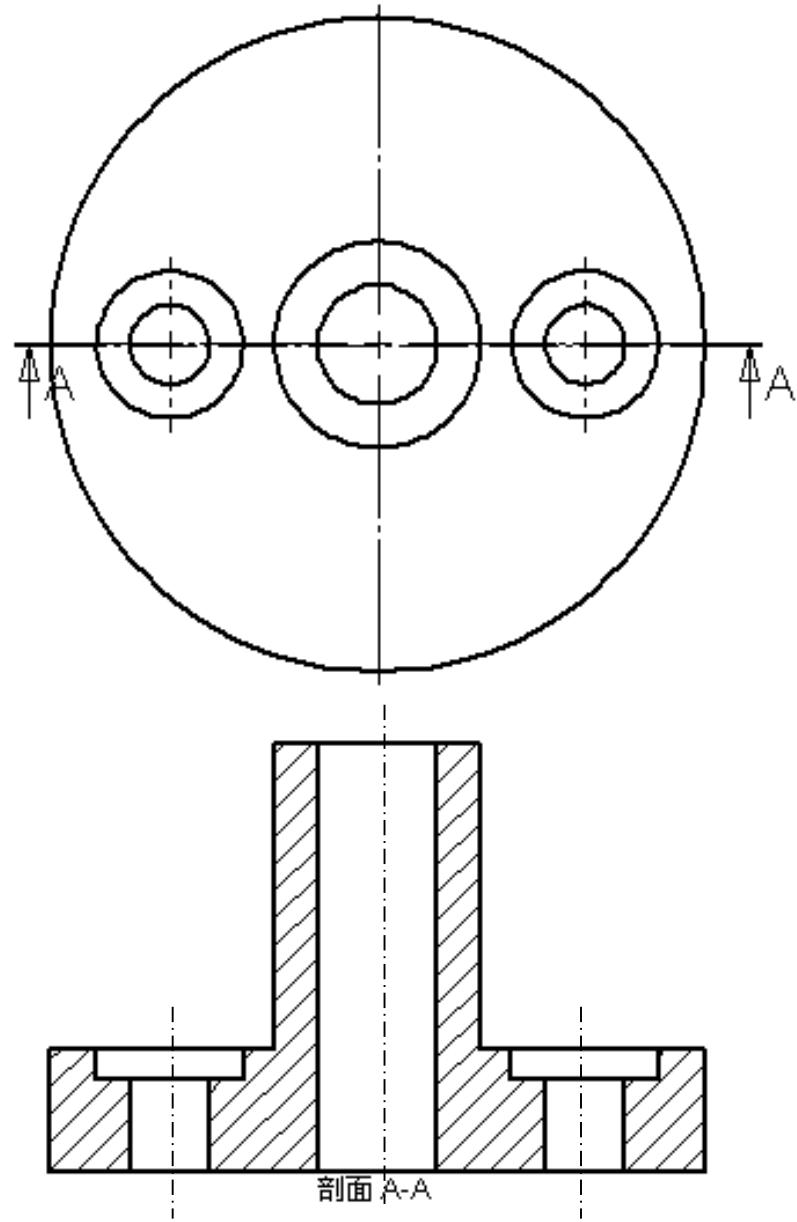
*SECTION A-A*



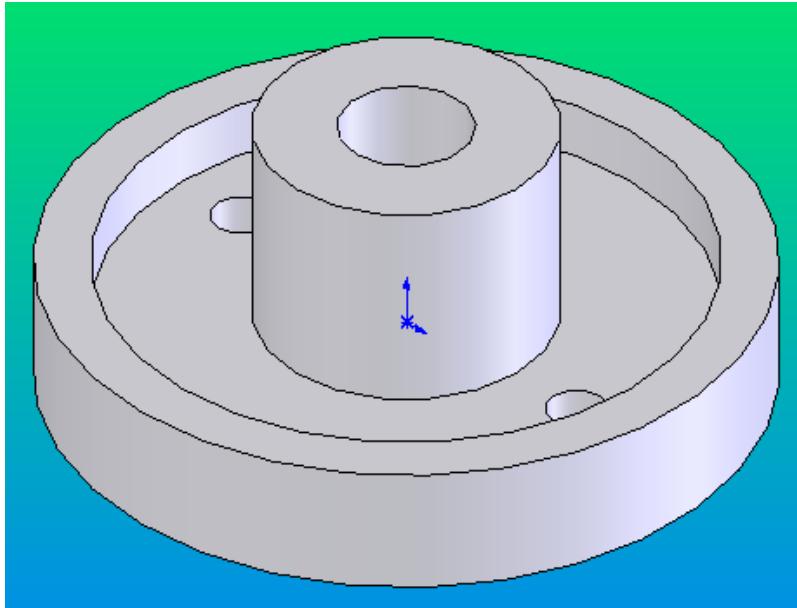




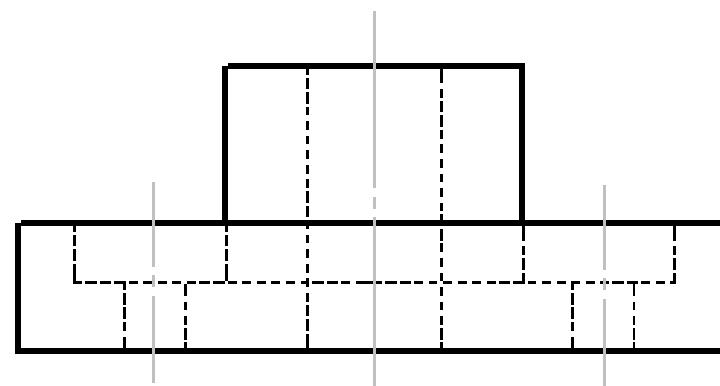
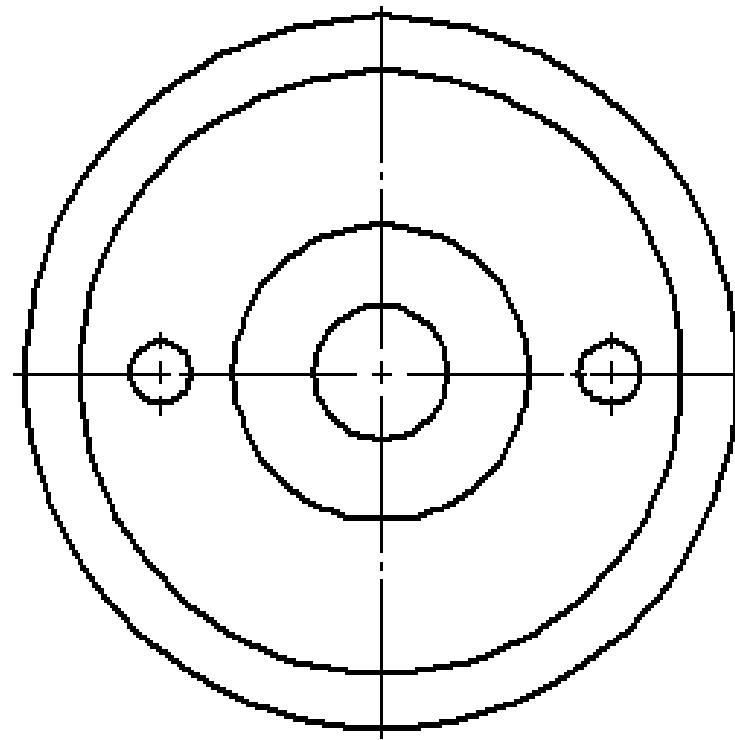
FULL SECTION

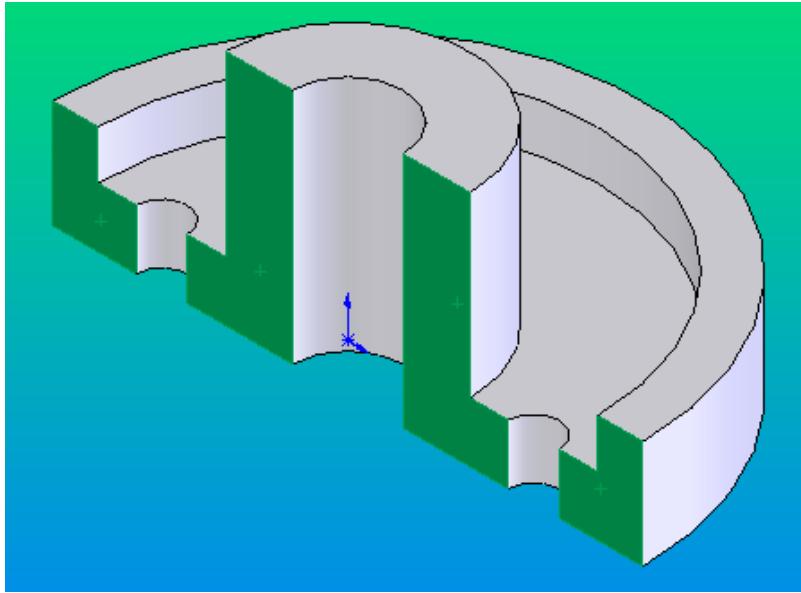


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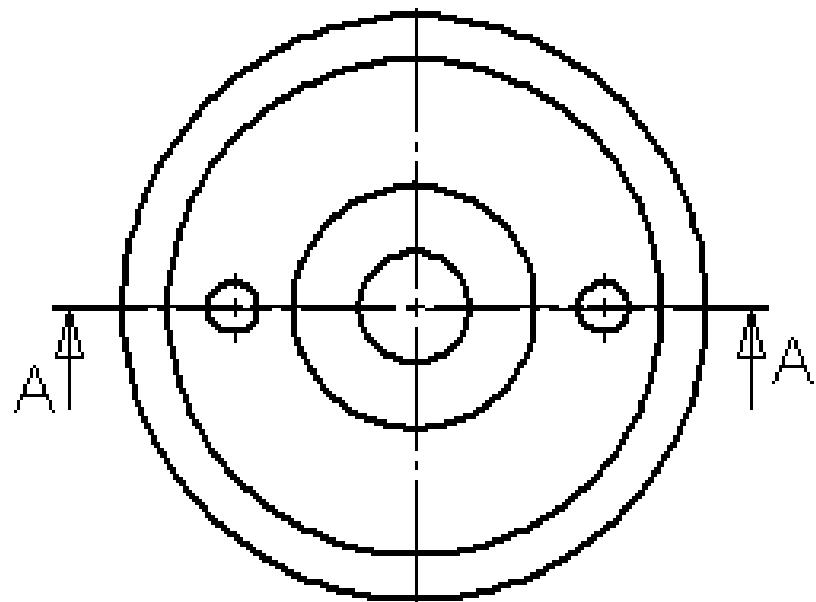


FULL SECTION

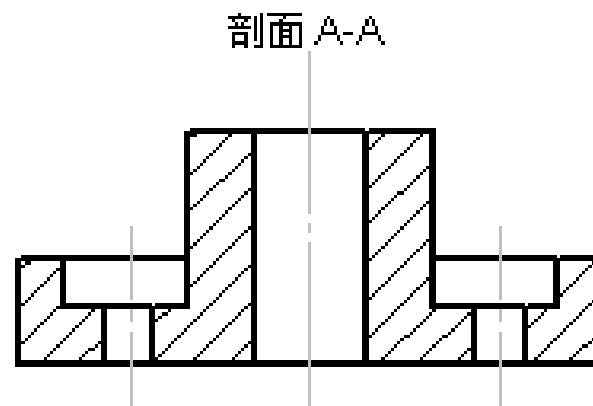




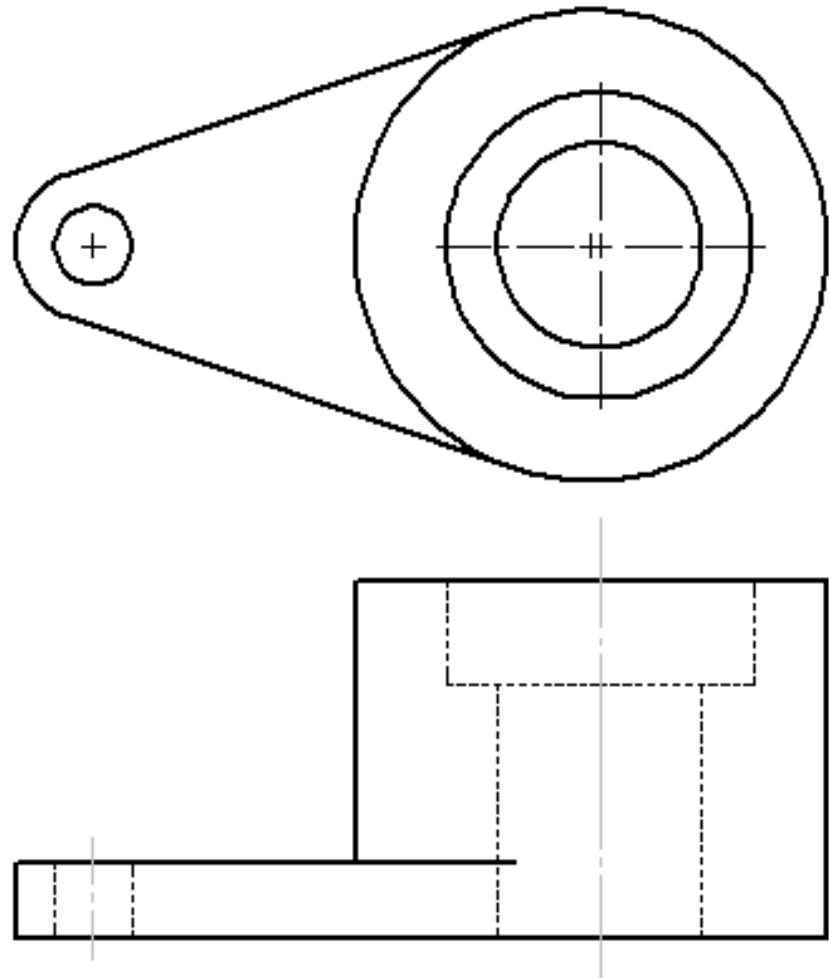
FULL SECTION

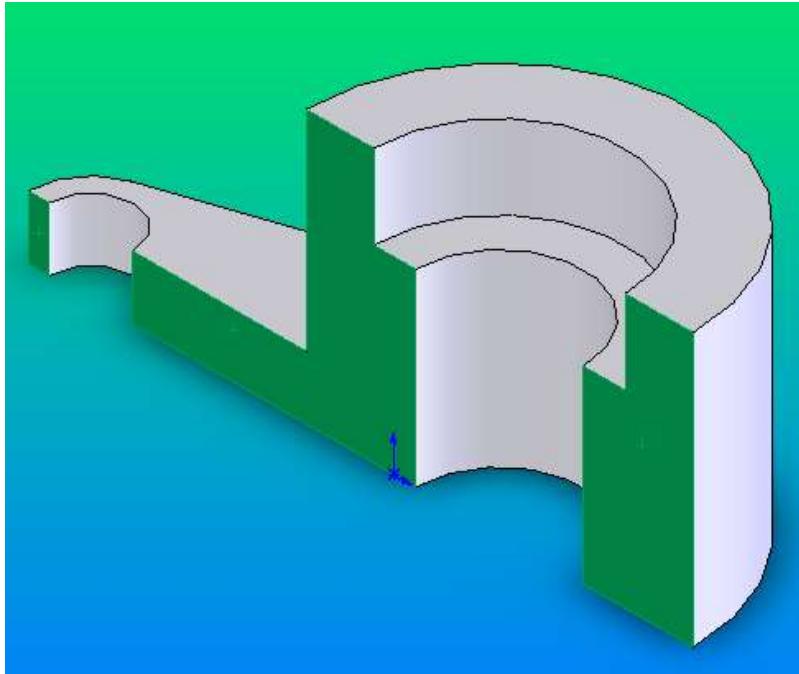


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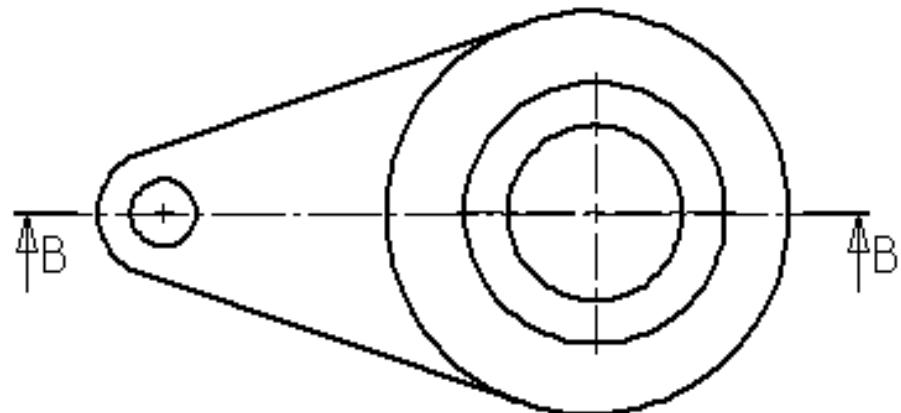
# FULL SECTION



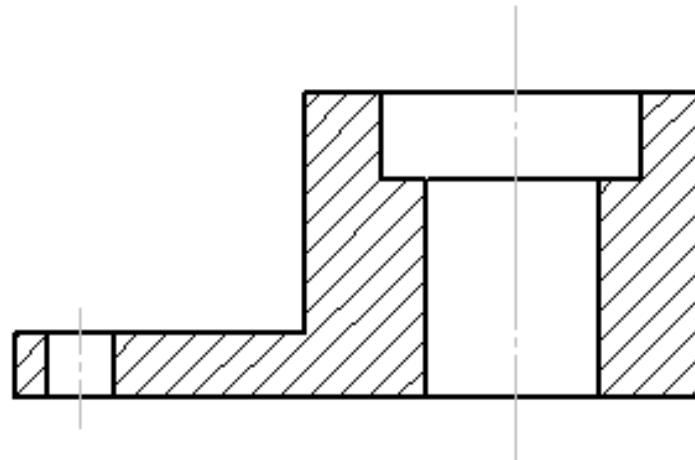


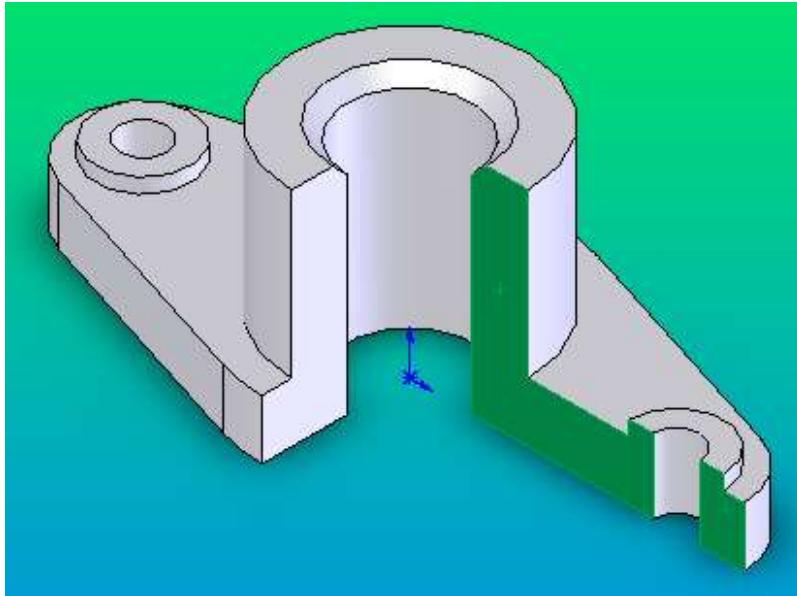
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## FULL SECTION

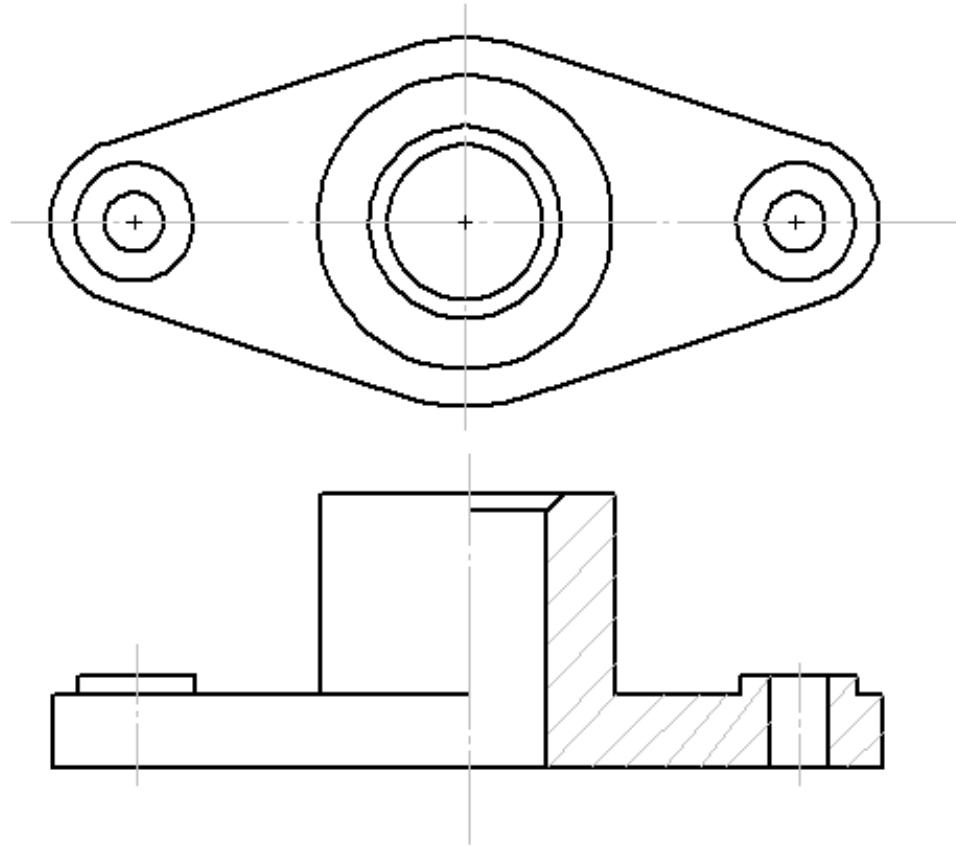


B - B

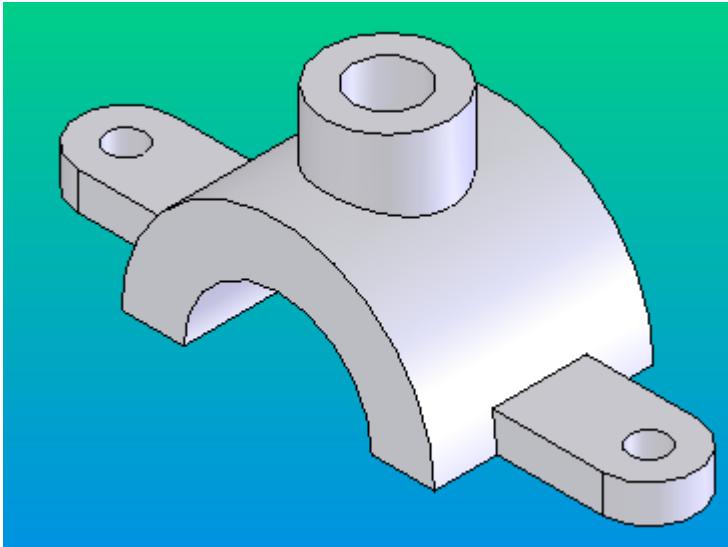




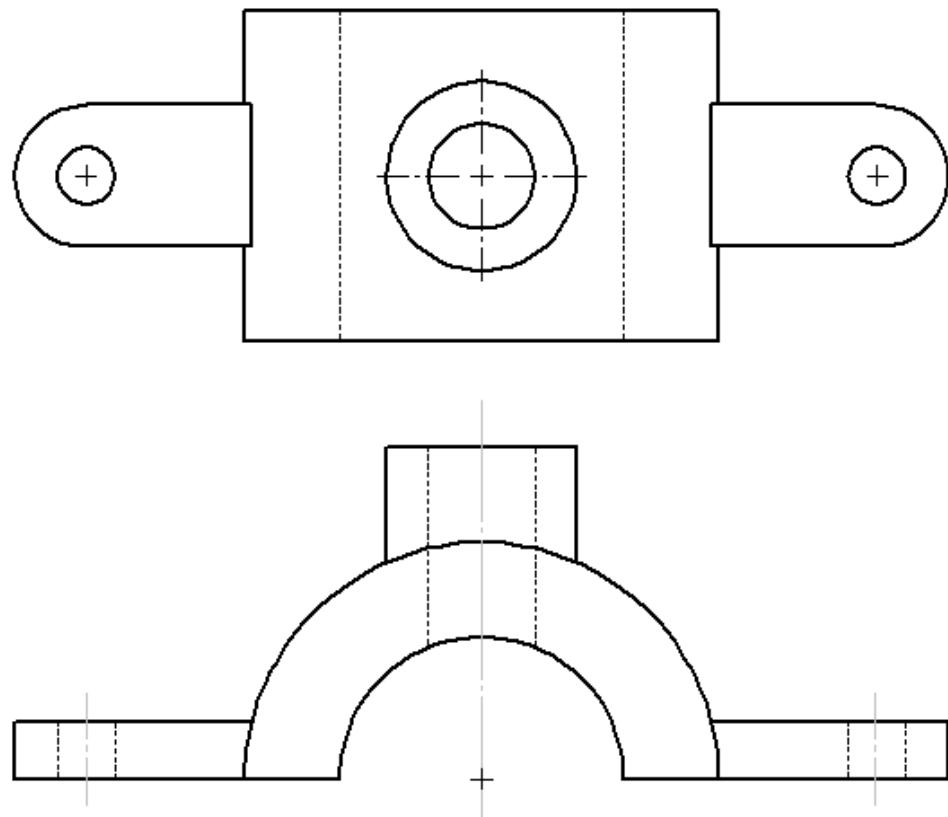
HALF SECTION

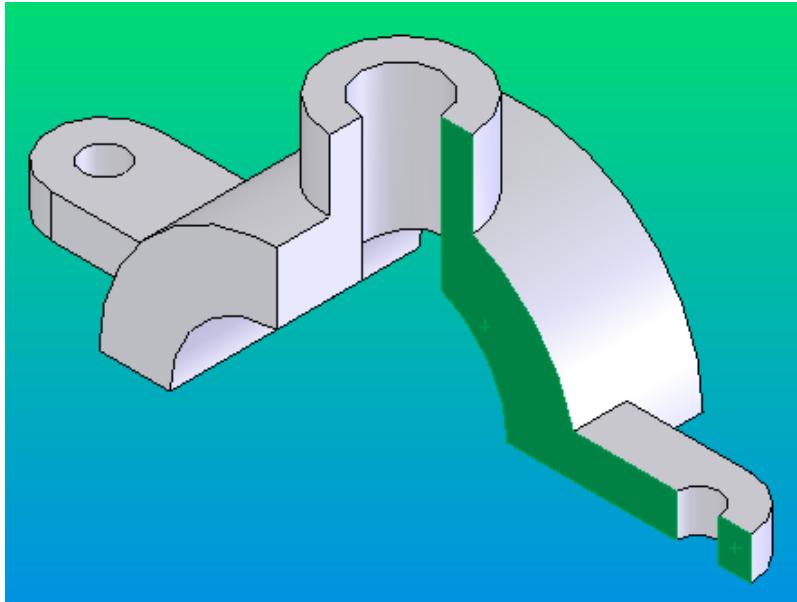


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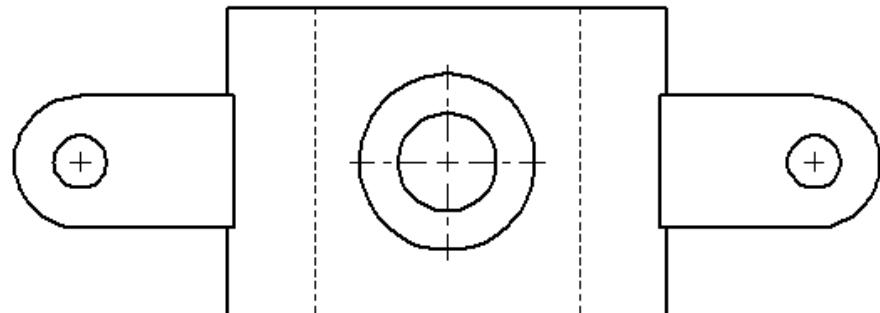


## HALF SECTION

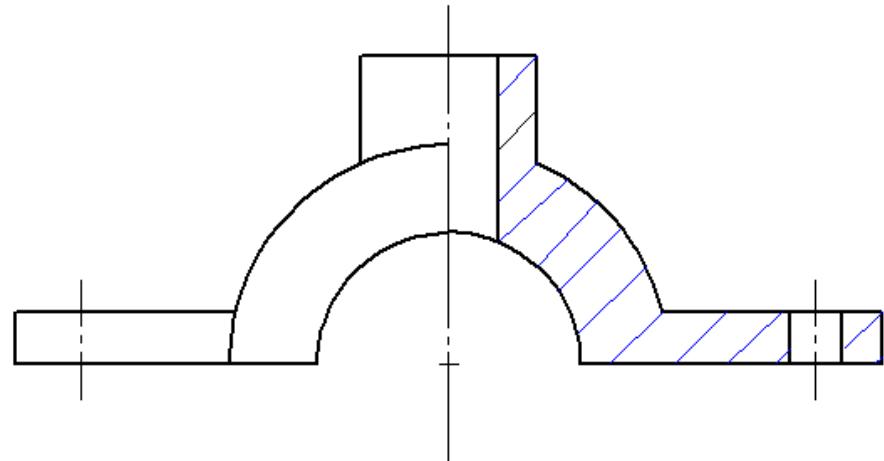


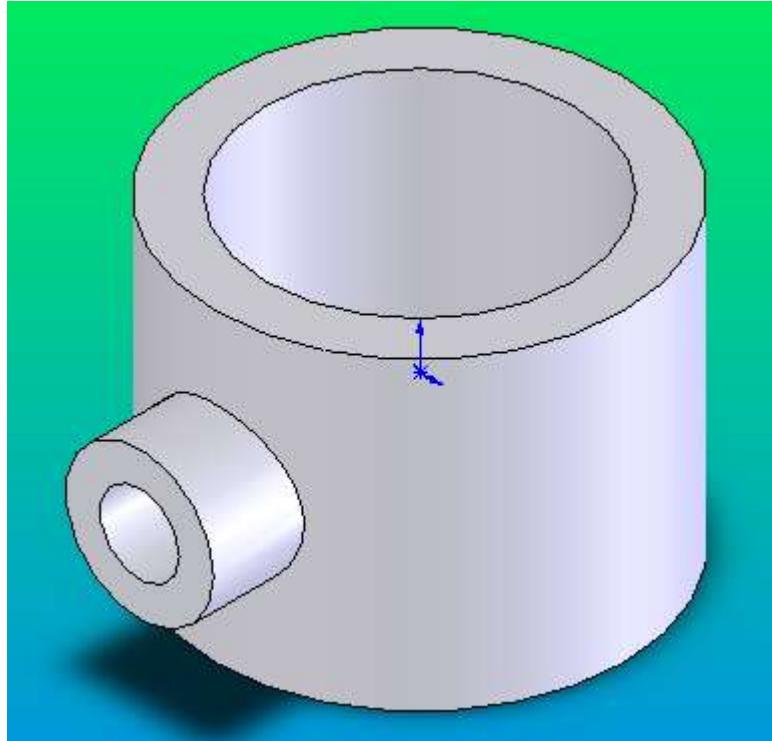


## HALF SECTION

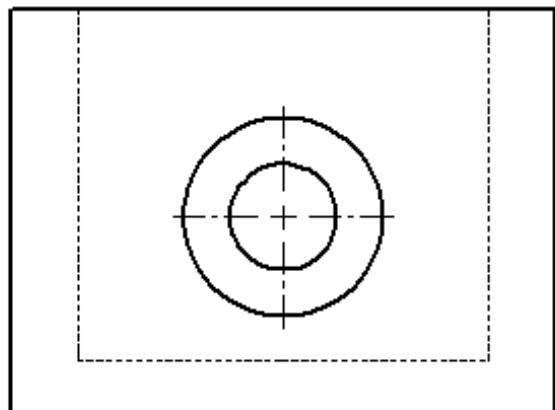
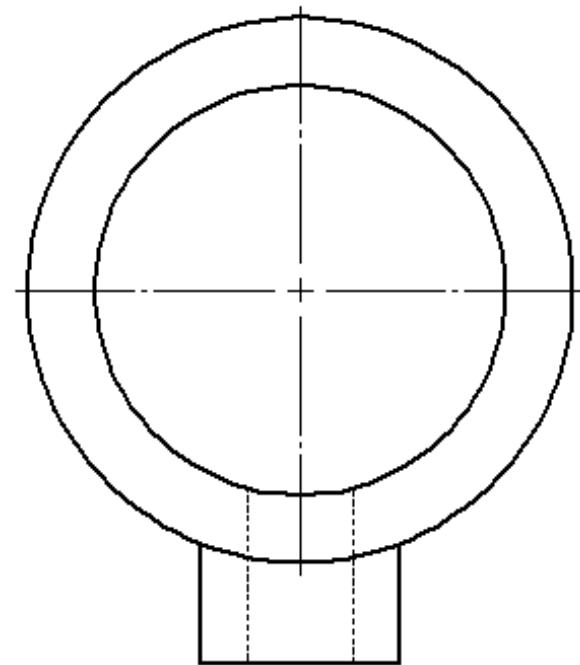


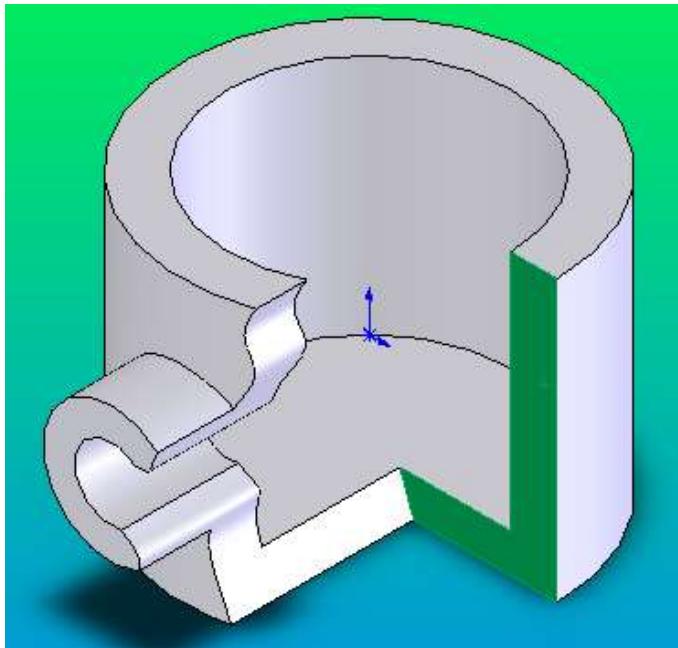
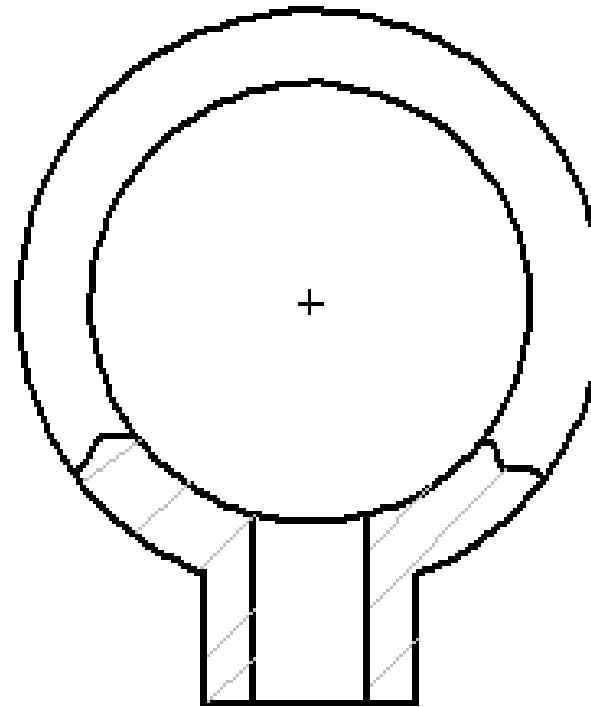
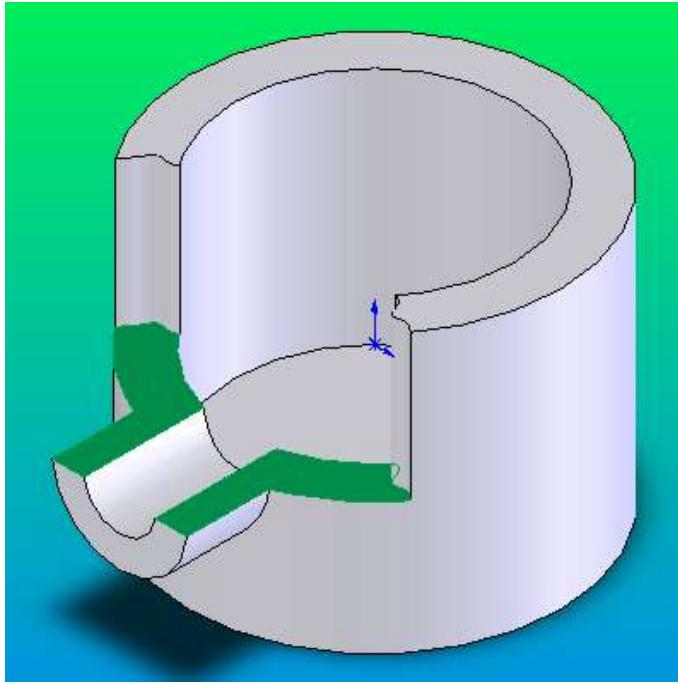
Hidden lines omitted



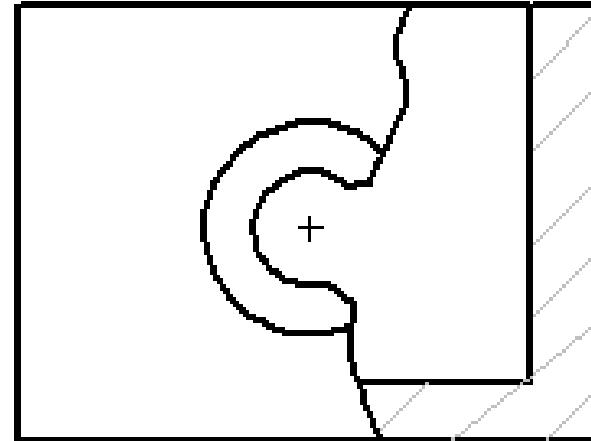


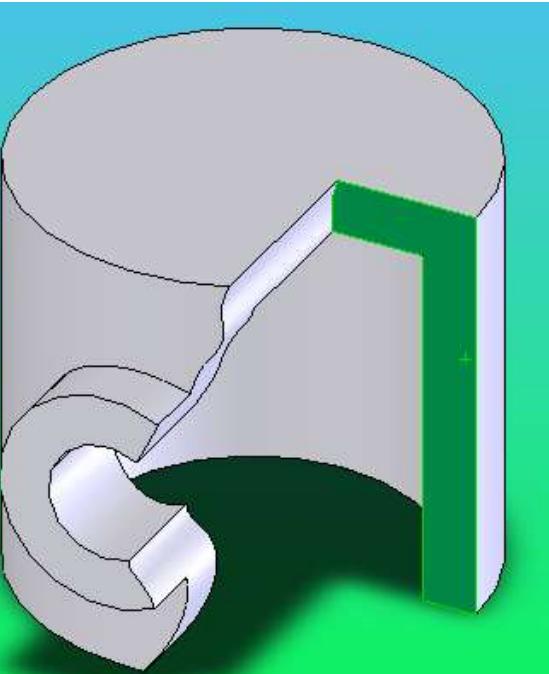
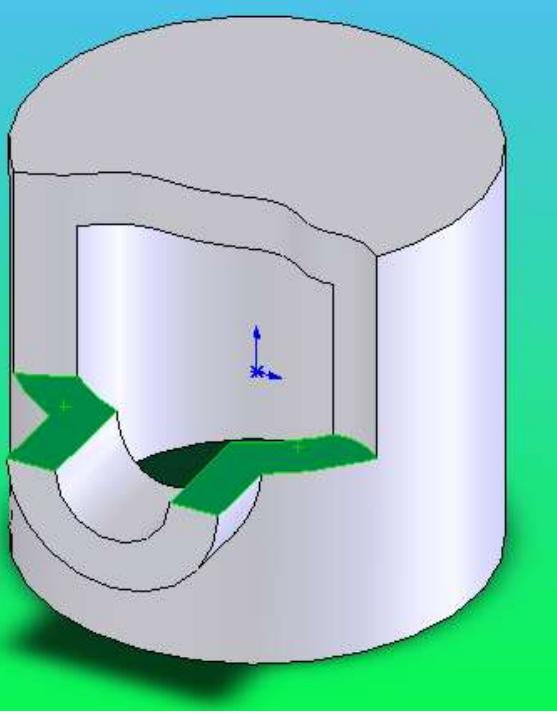
## BROKEN-OUT SECTION



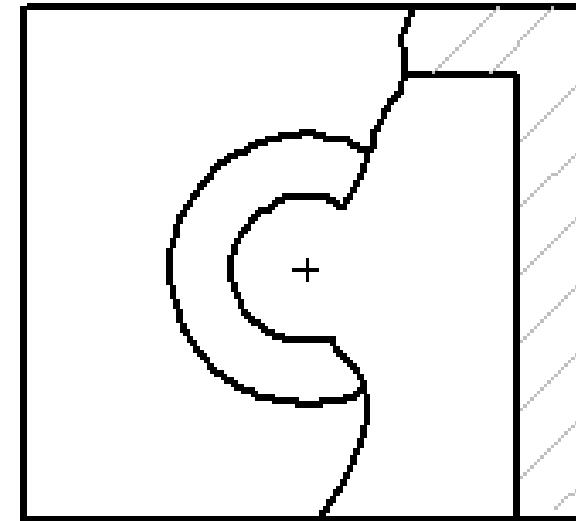
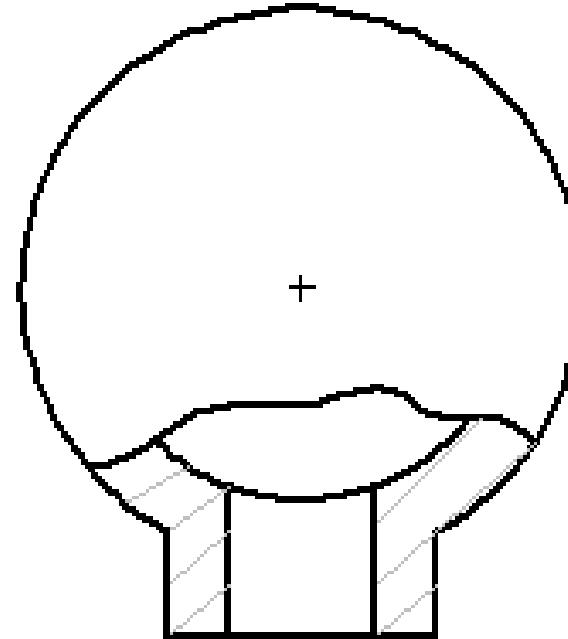


Hidden lines omitted



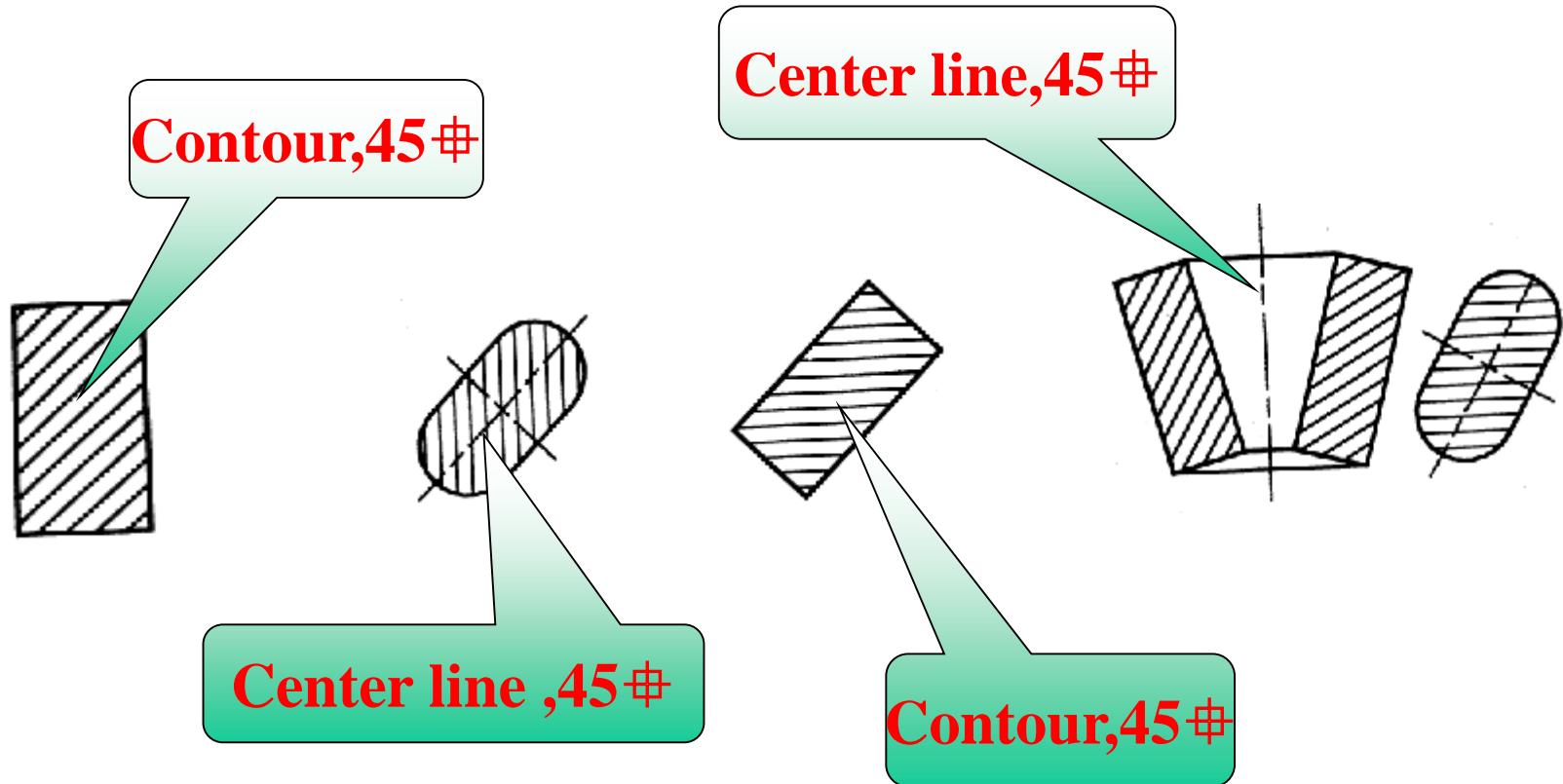


Hidden lines omitted



# Chapter 7 section views

*attention*

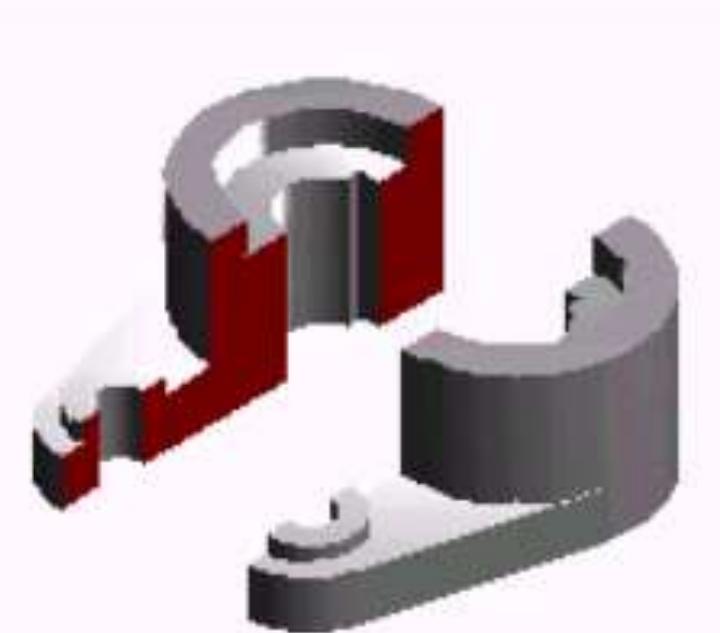
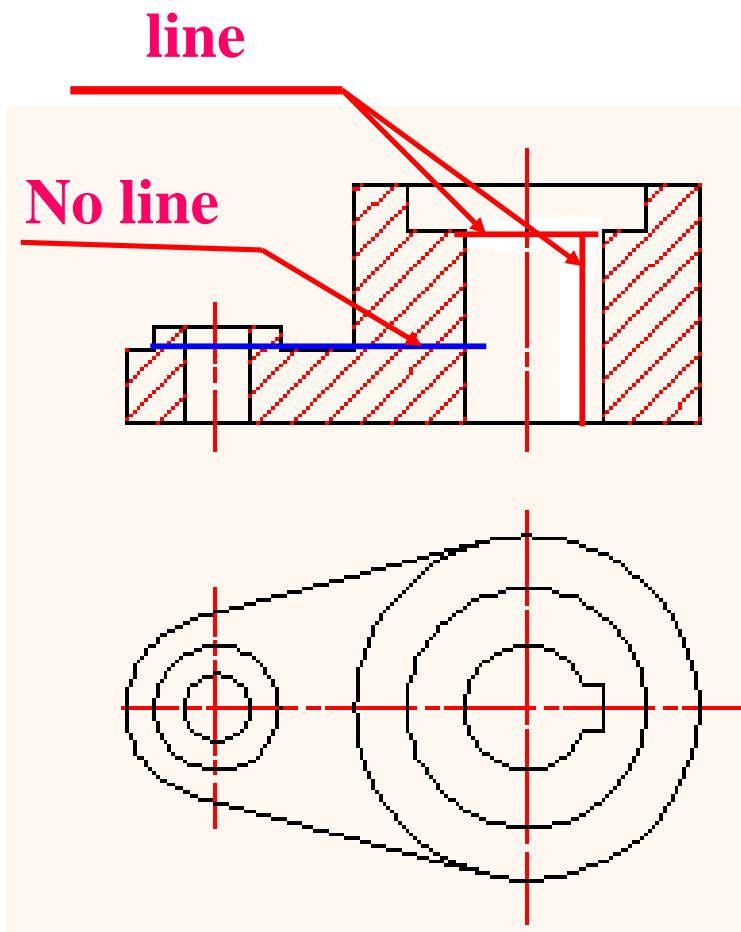


Section lines-thin!!



# Chapter 7 section views

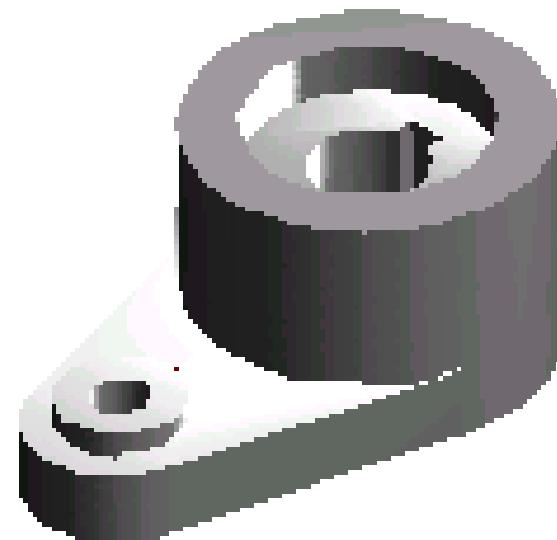
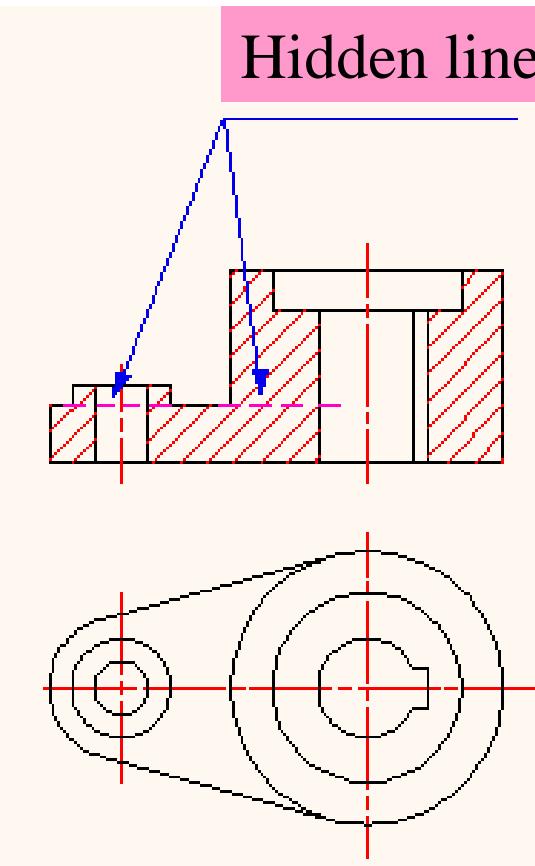
*attention*



# Chapter 7 section views

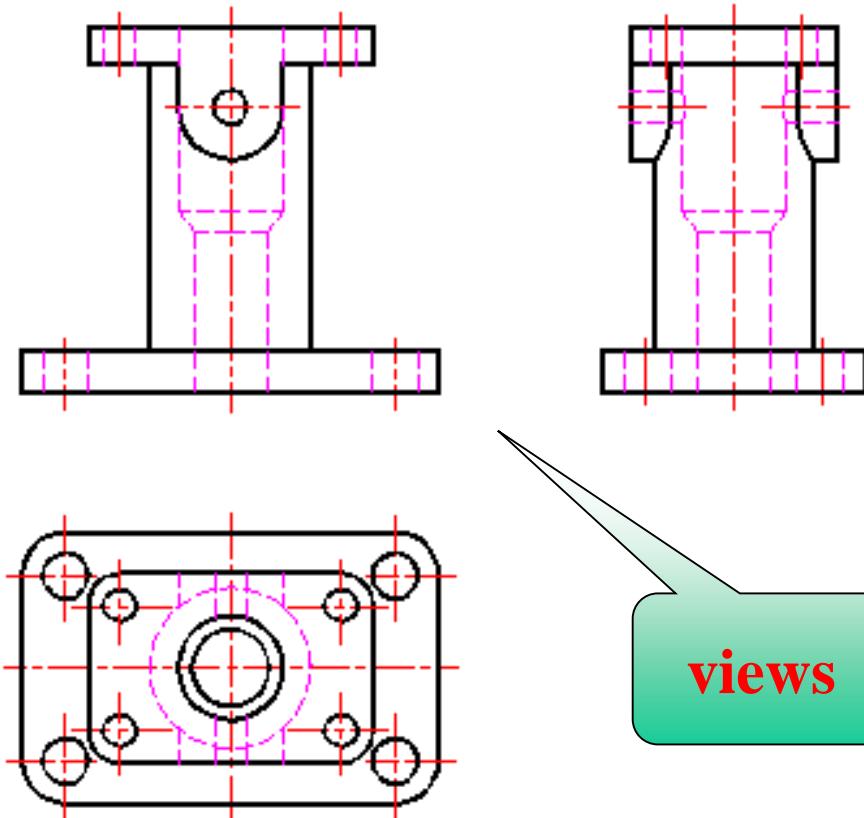
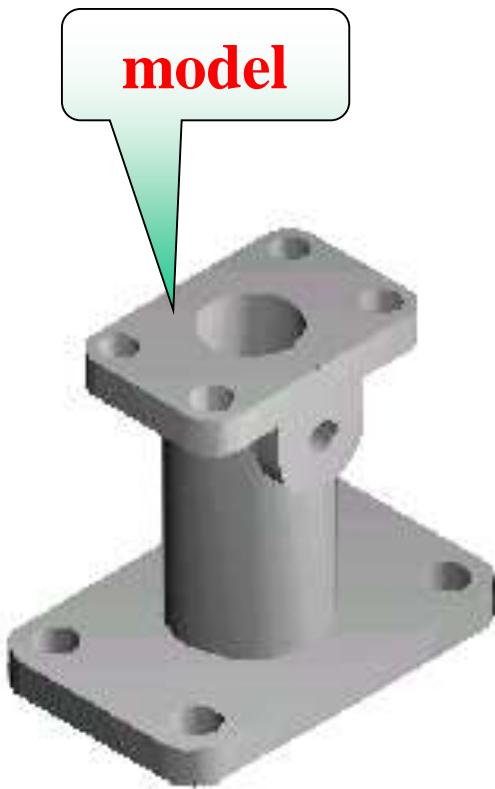
*attention*

Hidden line should be omitted!!!



# Chapter 7 section views

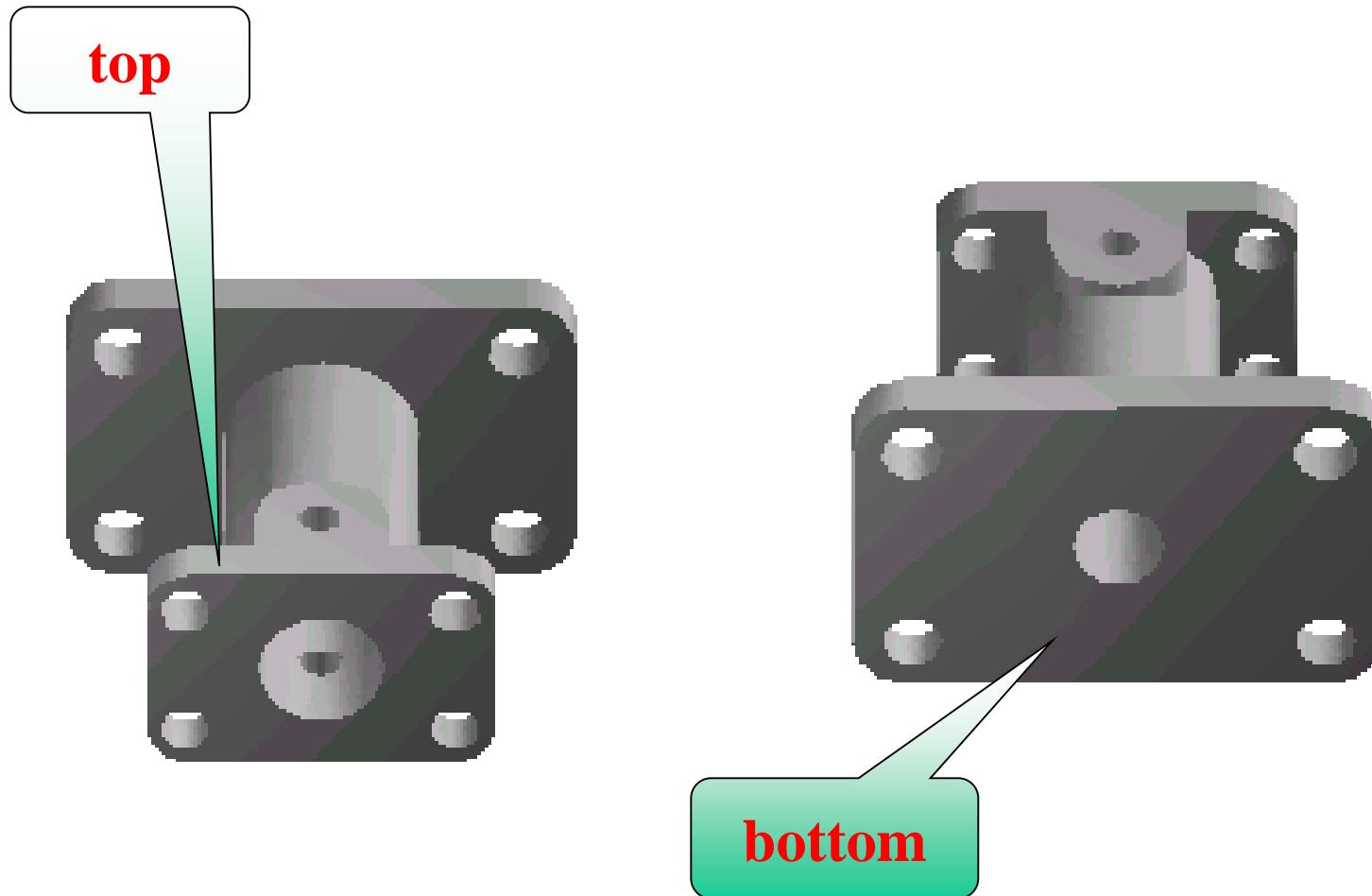
## 2.half sections



views

# Chapter 7 section views

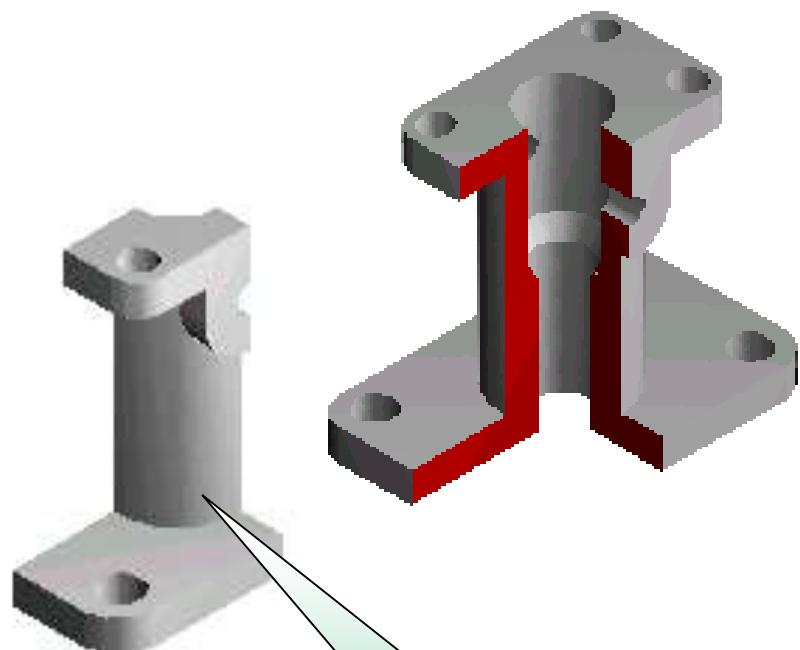
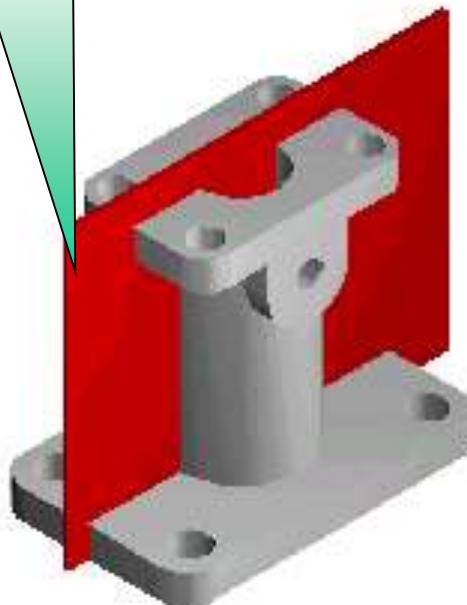
## 2.half sections



# Chapter 7 section views

## 2.half sections

Cutting plane

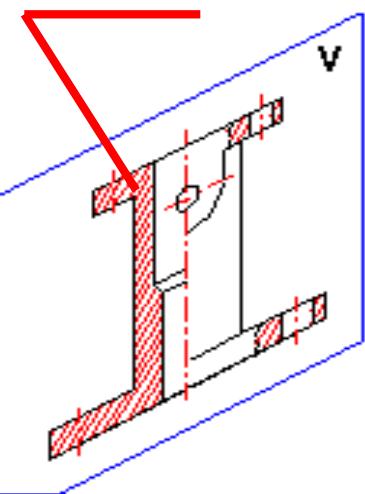


remove

# Chapter 7 section views

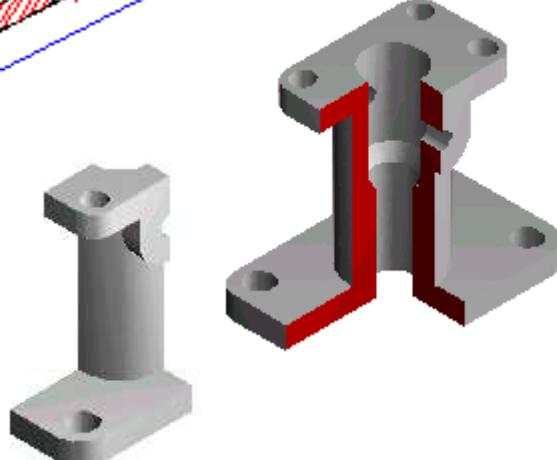
## 2.half sections

**Half section**

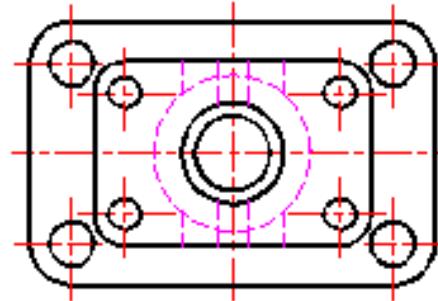
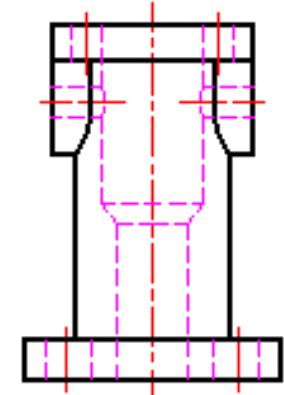
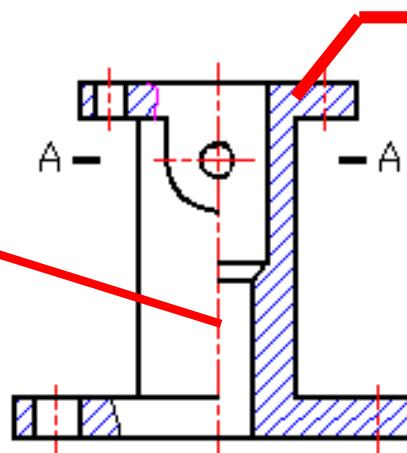


**symmetry**

**direction**



**Half section**

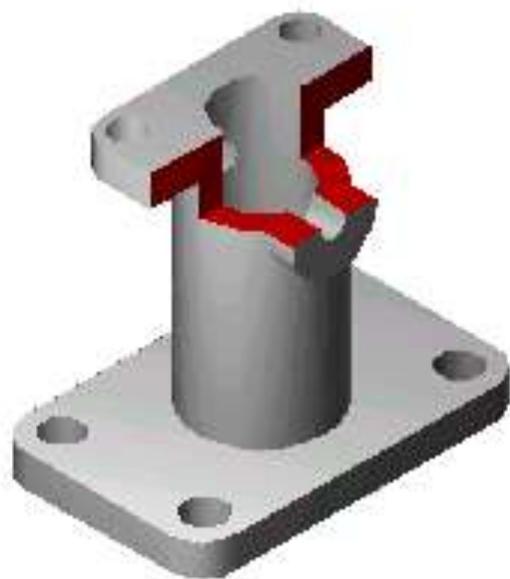
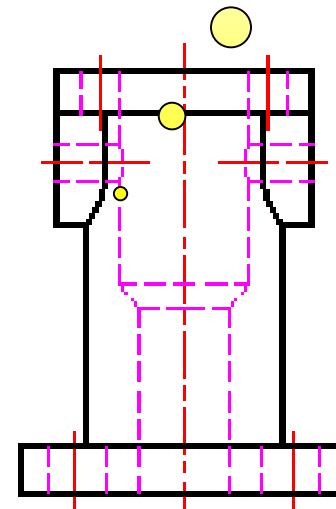
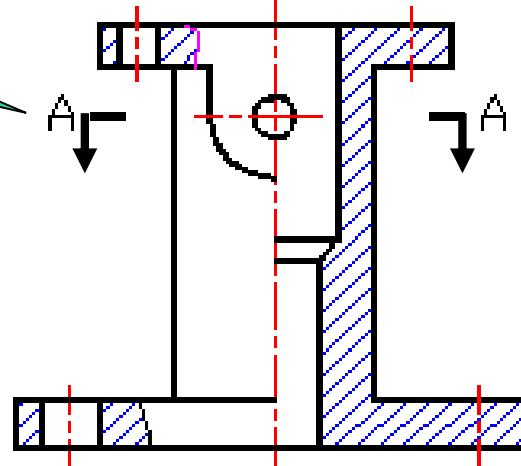


# Chapter 7 section views

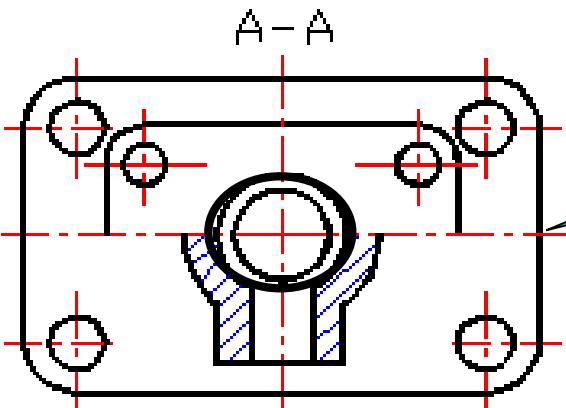
2.half sections

hidden?

label

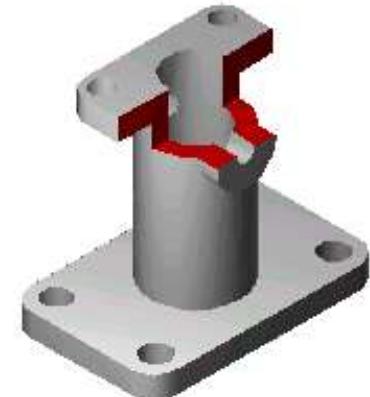
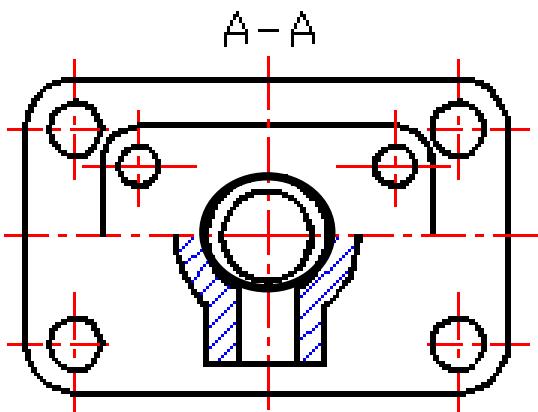
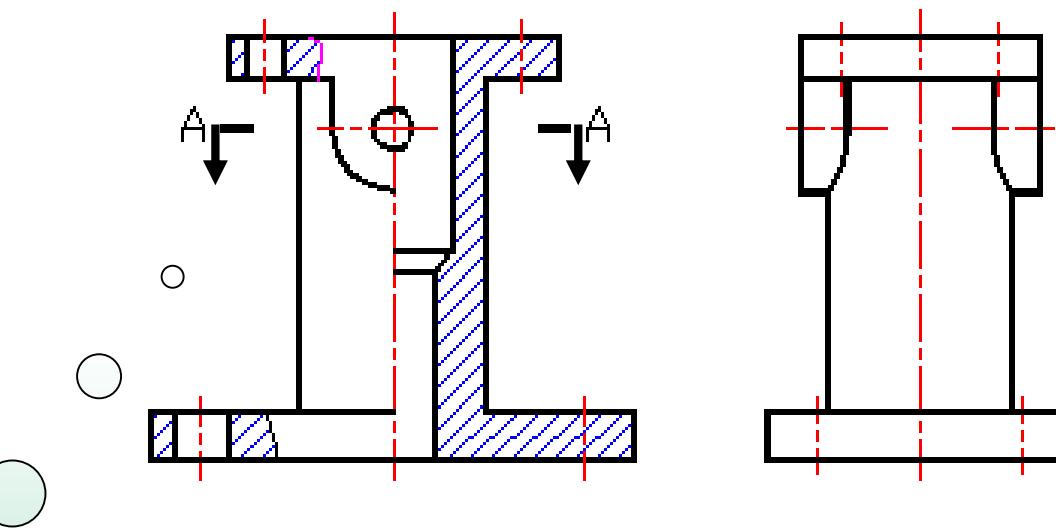
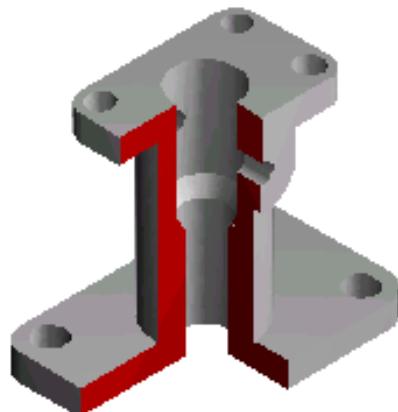


symmetry



# Chapter 7 section views

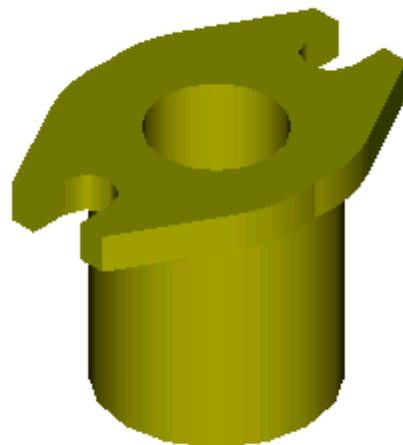
## 2.half sections



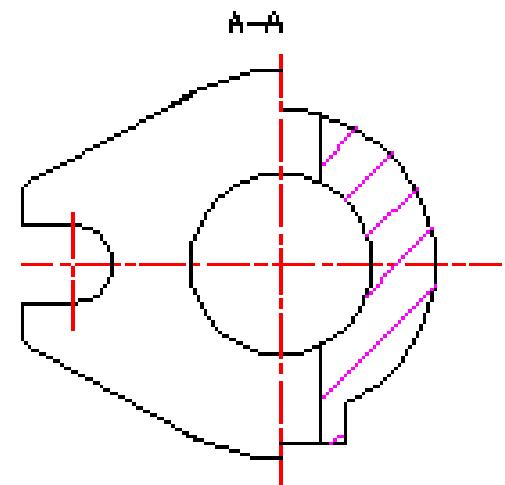
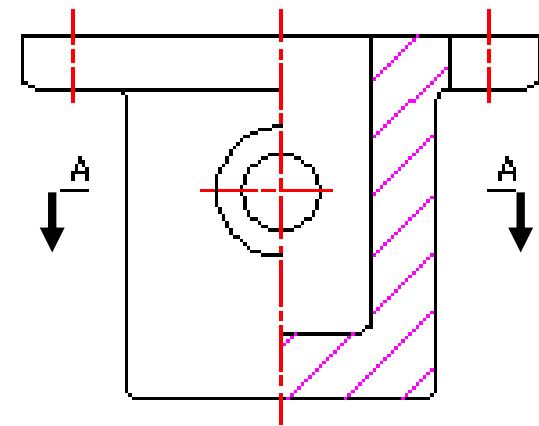
**Notice:  
the direction  
of section lines**

# Chapter 7 section views

## 2.half sections



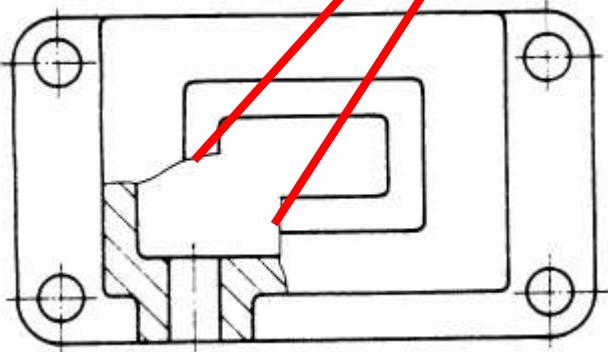
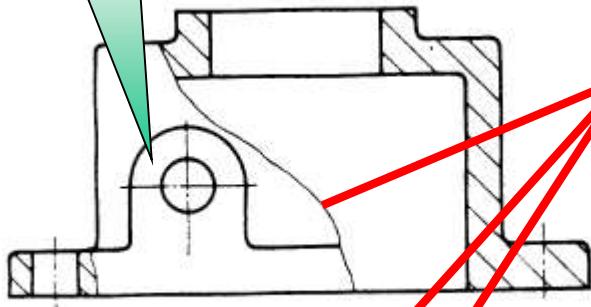
example



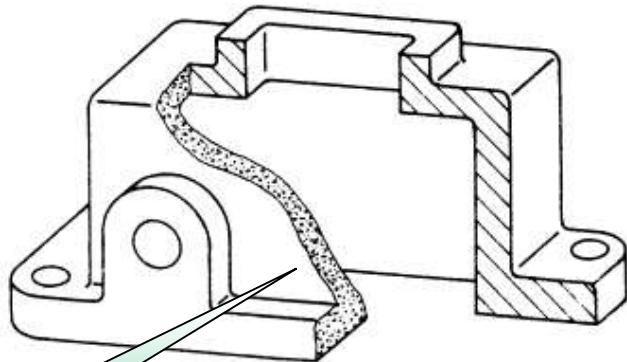
# Chapter 7 section views

## 3.Broken-out sections

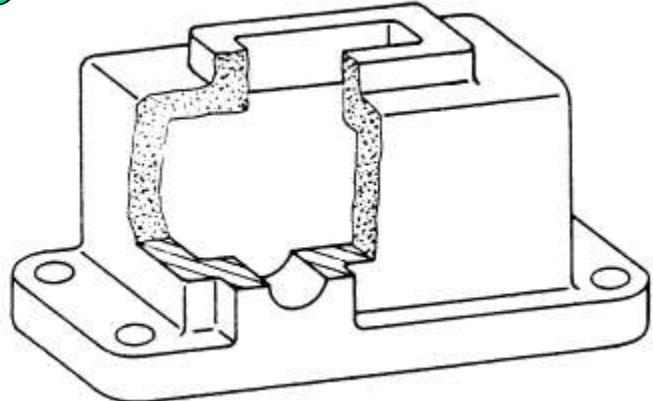
External



Short break  
lines (thick)



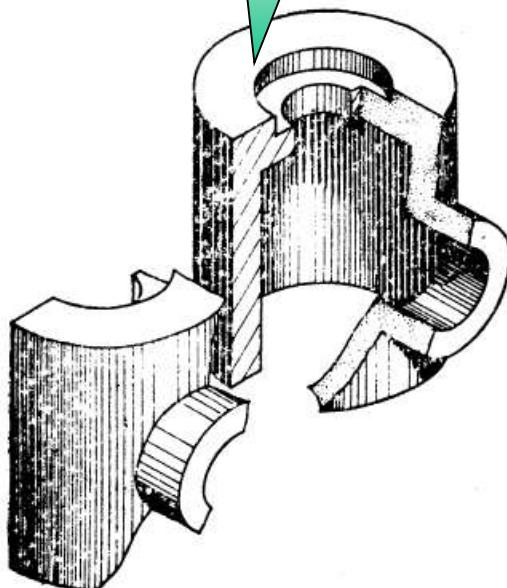
model



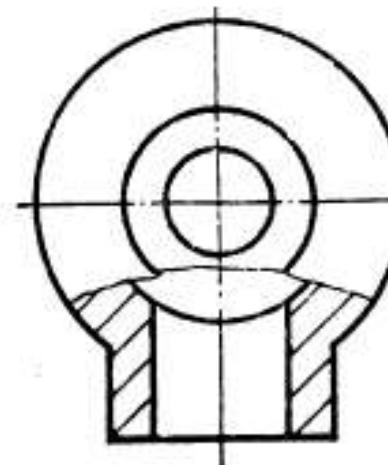
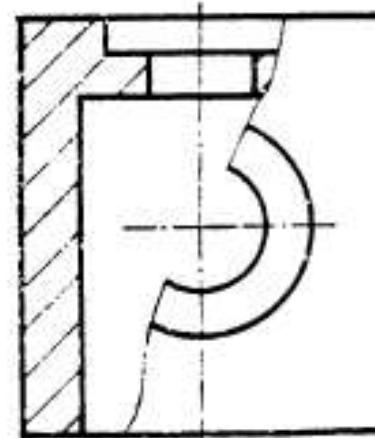
# Chapter 7 section views

## 3.Broken-out sections

model



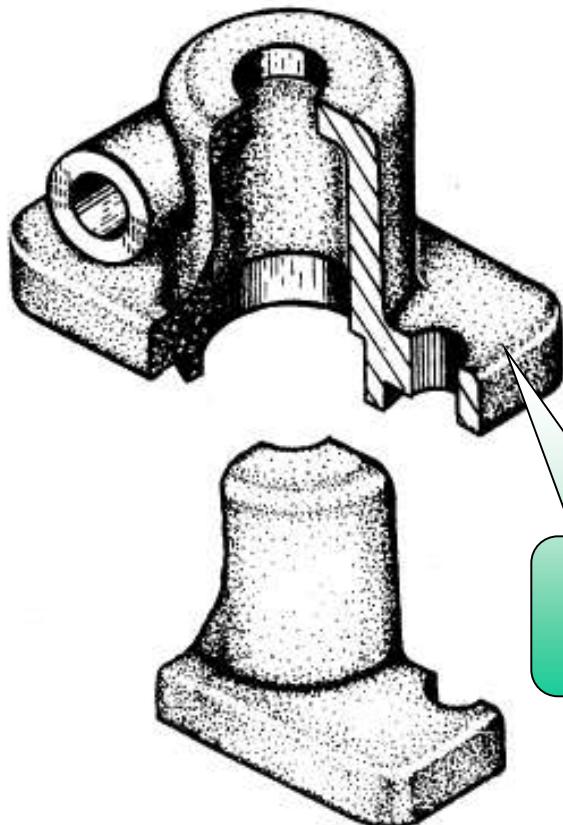
example



Section plane?

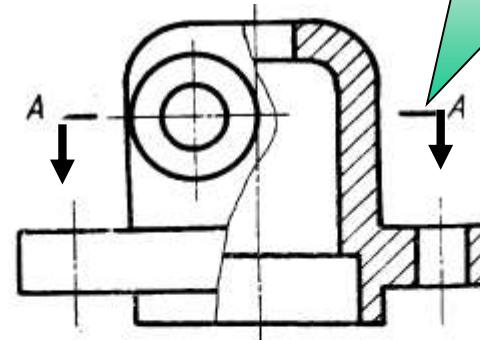
# Chapter 7 section views

## 3.Broken-out sections

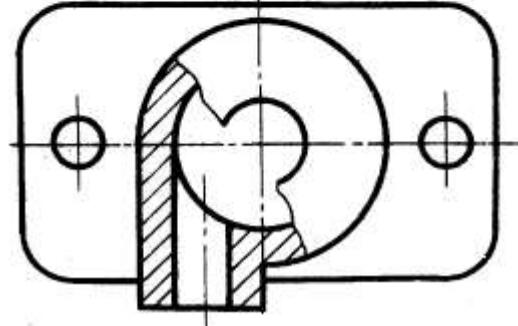


模型

label



Cutting position

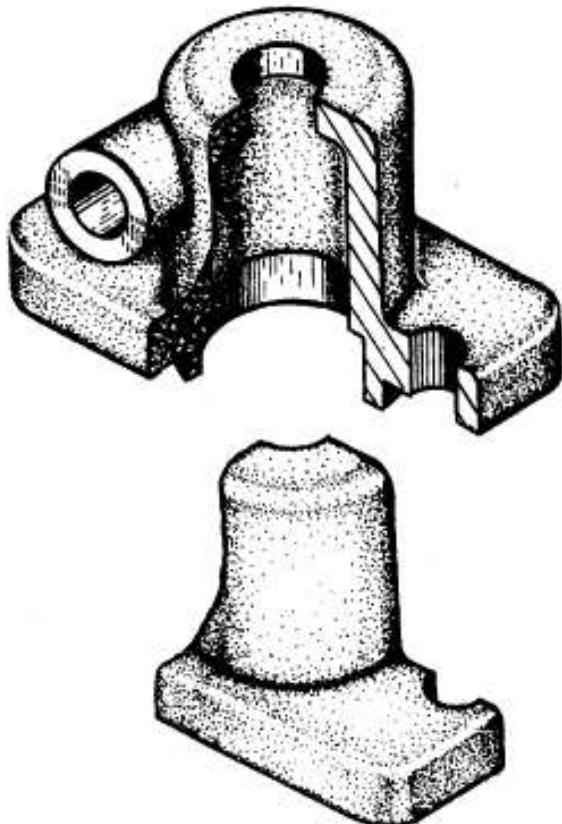


Name

# Chapter 7 section views

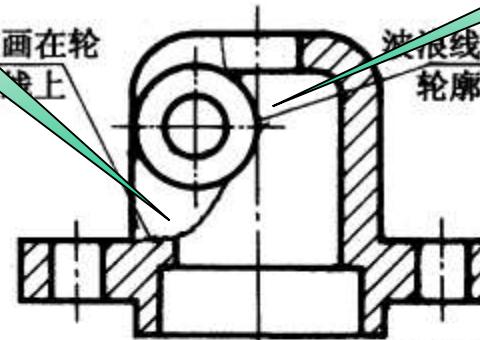
## 3.Broken-out sections

attention



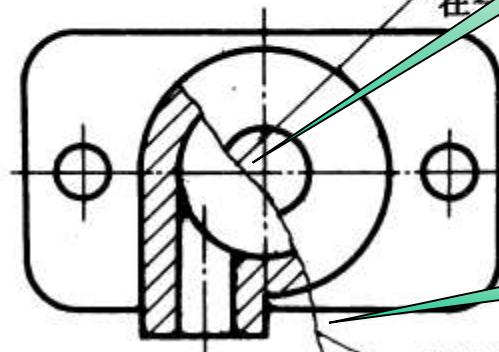
false

波浪线不应画在轮廓线的延长线上



false

波浪线不能与轮廓线重合



false

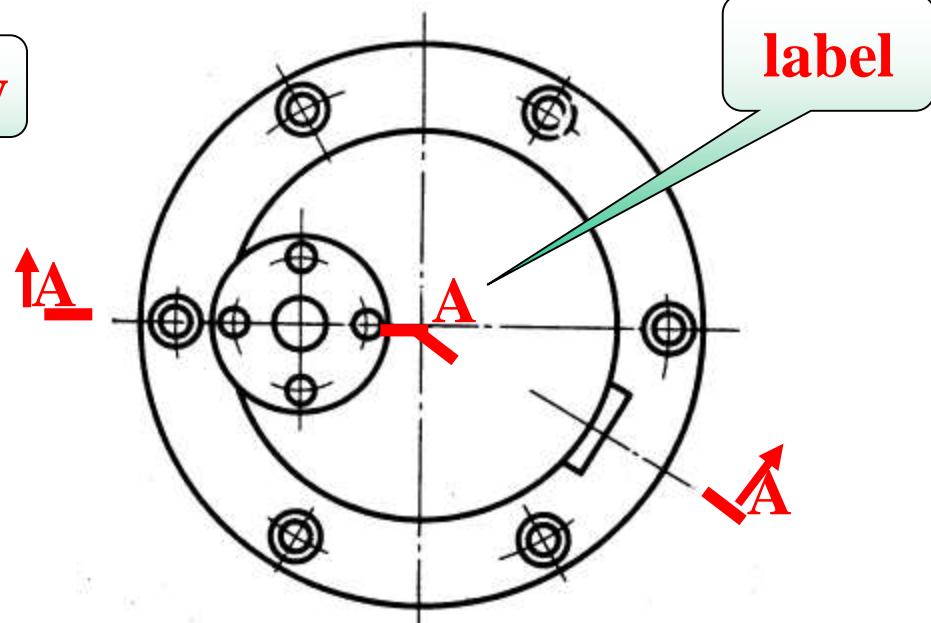
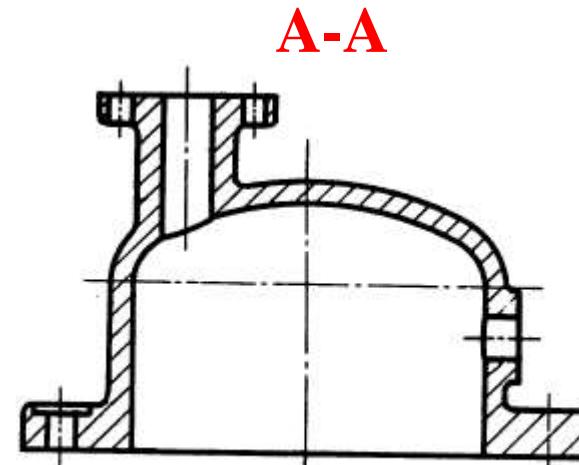
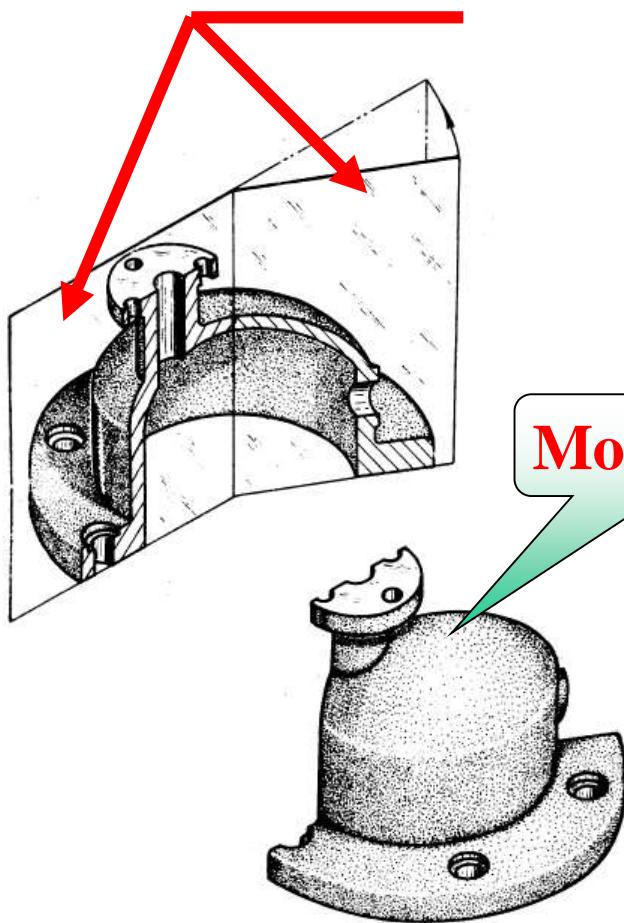
波浪线不能画在空洞地方

波浪线不能超出视图轮廓线

# Chapter 7 section views

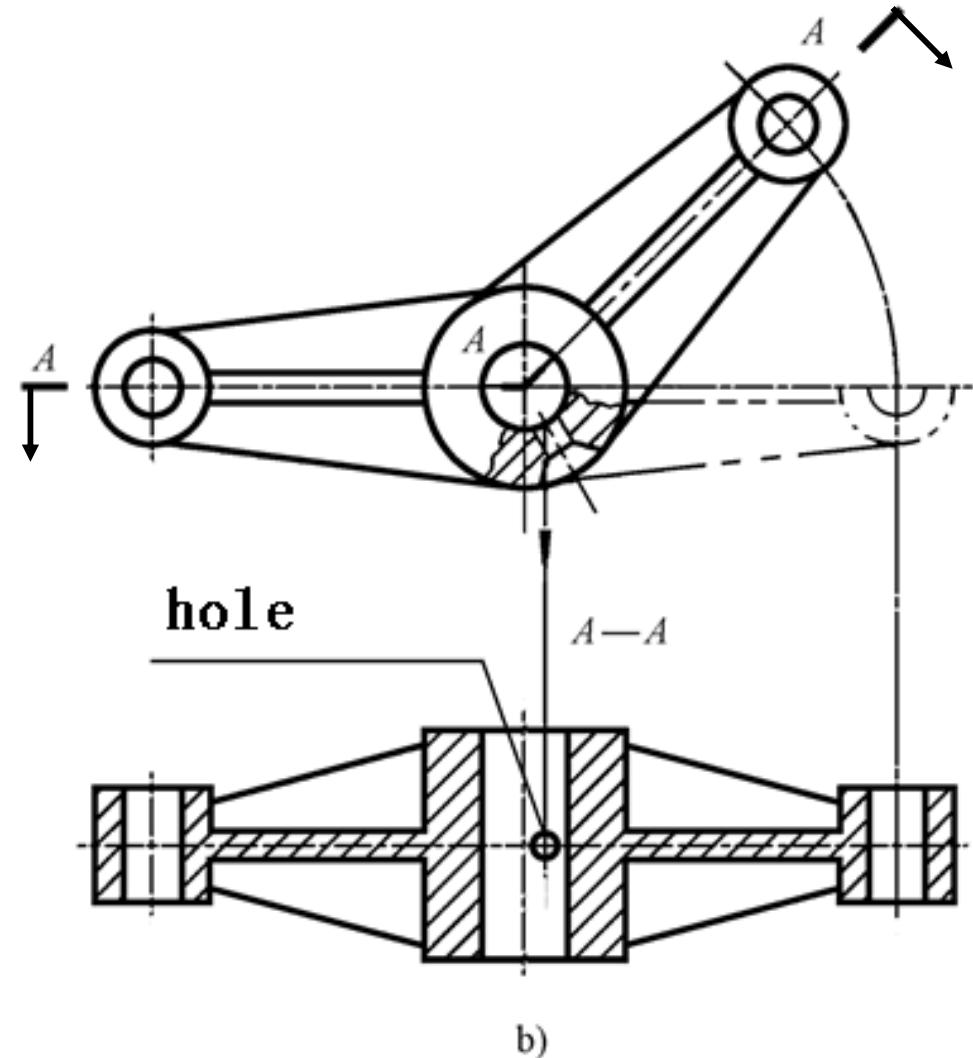
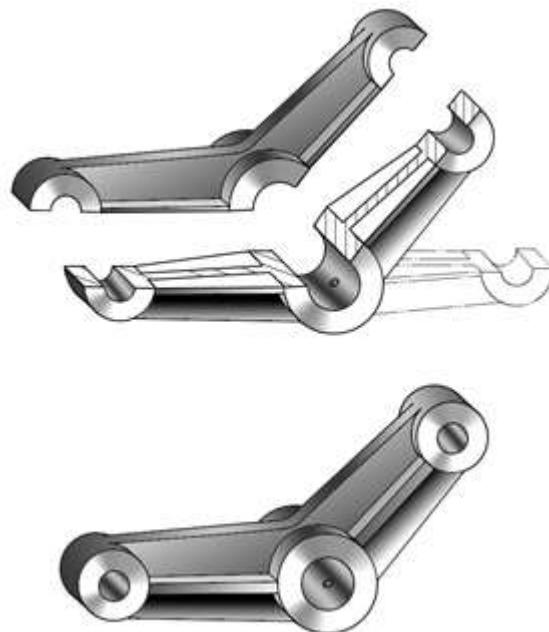
## 4.aligned sections

Two intersecting planes



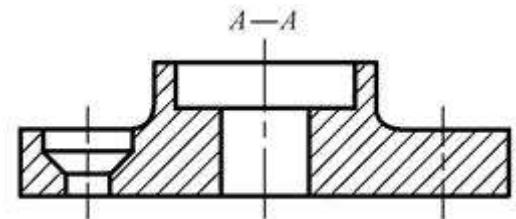
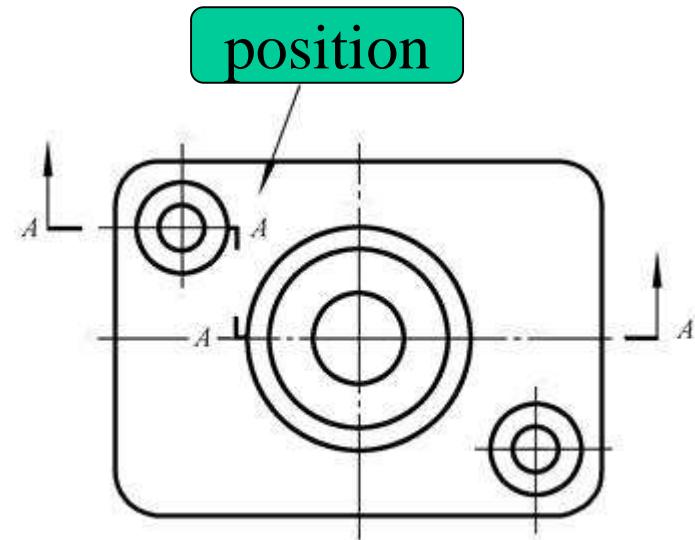
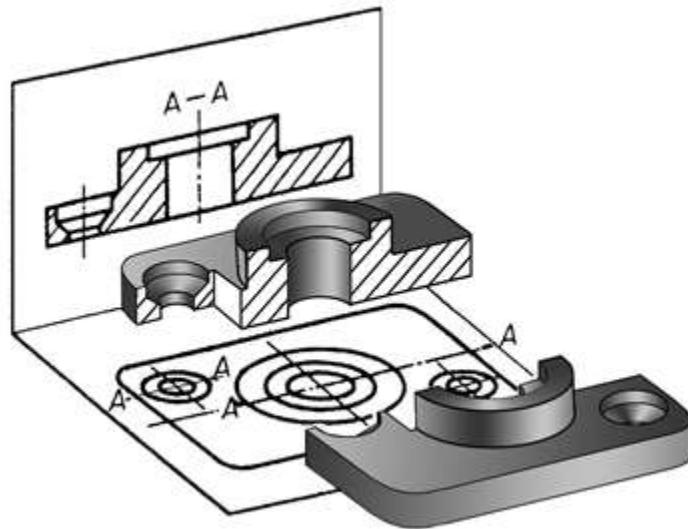
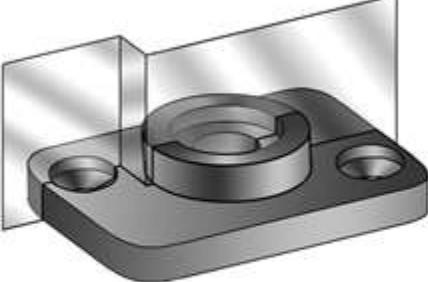
# Chapter 7 section views

## 4.aligned sections



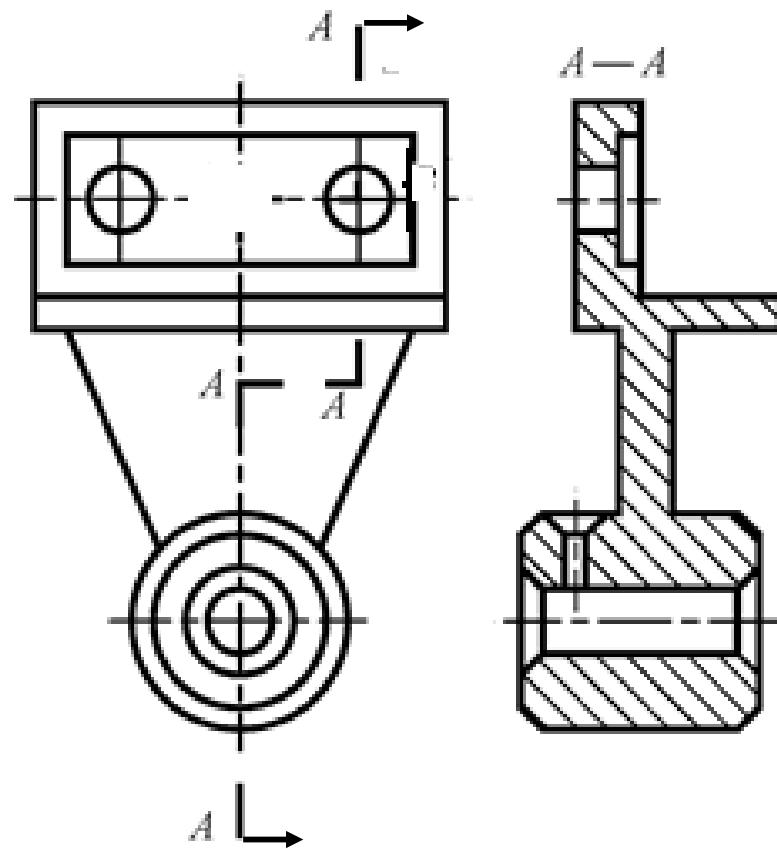
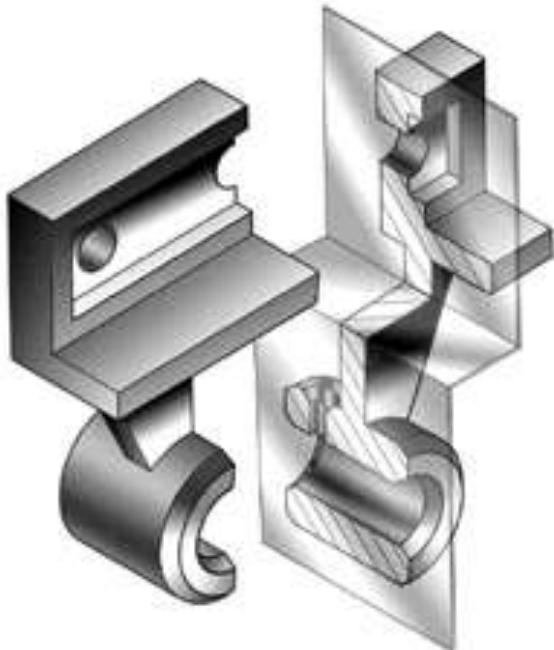
# Chapter 7 section views

## 5.offset sections



# Chapter 7 section views

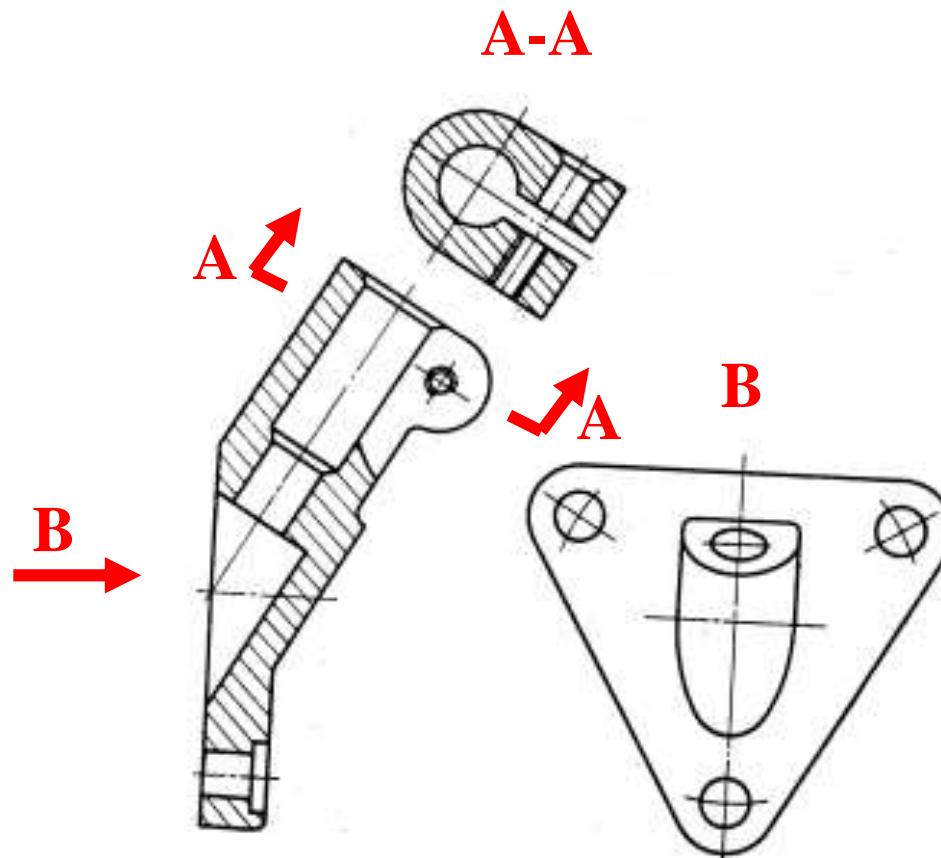
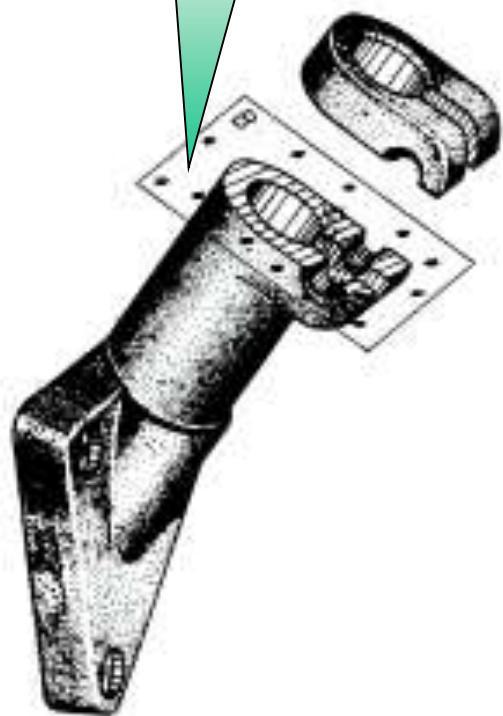
## 5.offset sections



# Chapter 7 section views

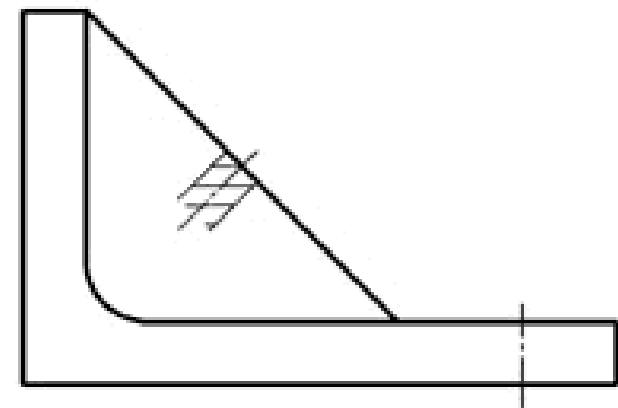
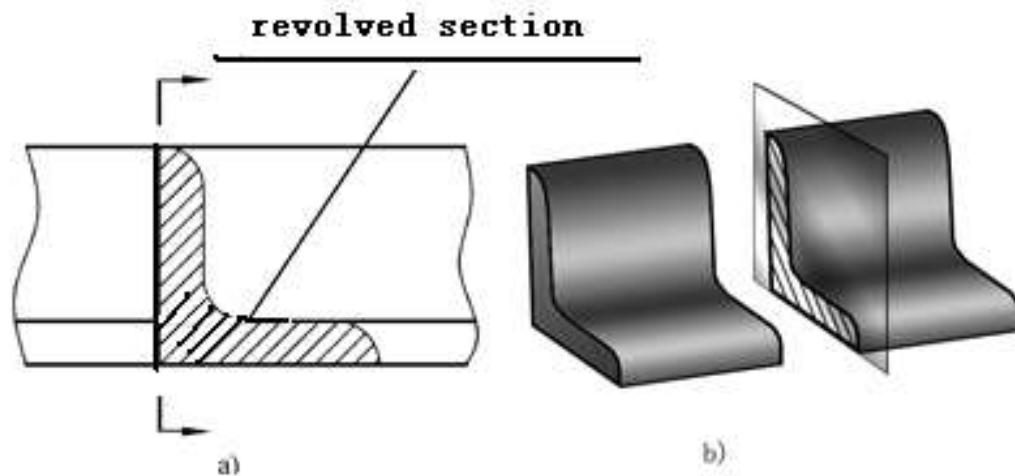
## 6.inclined sections

Section plane



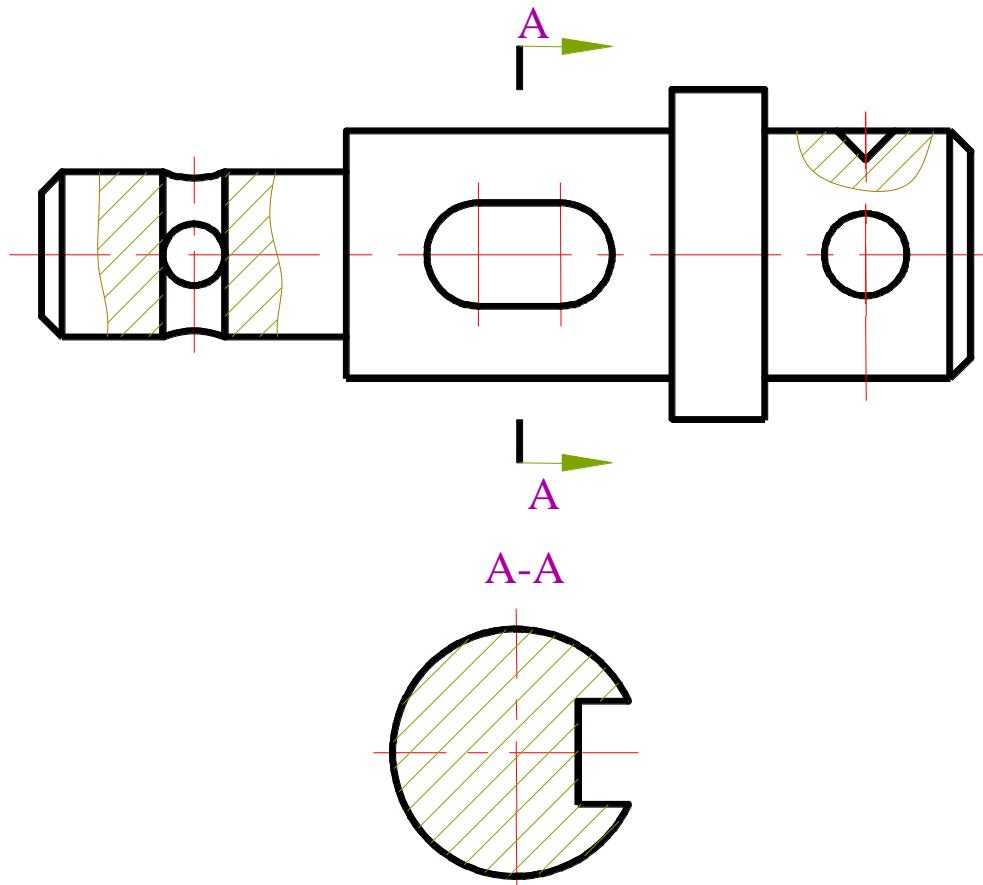
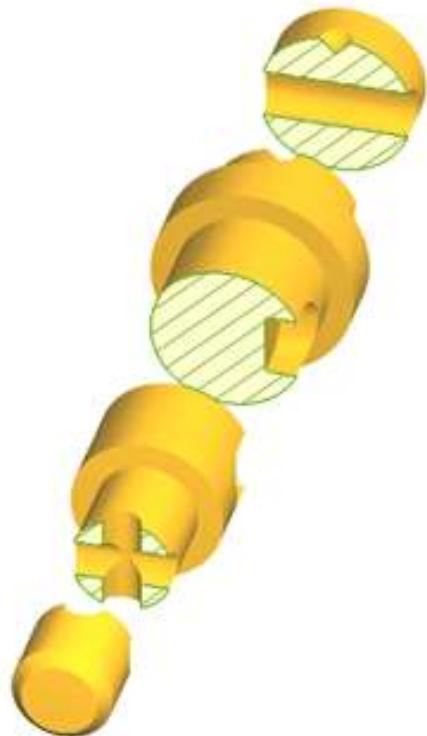
# Chapter 7 section views

## 7.revolved sections



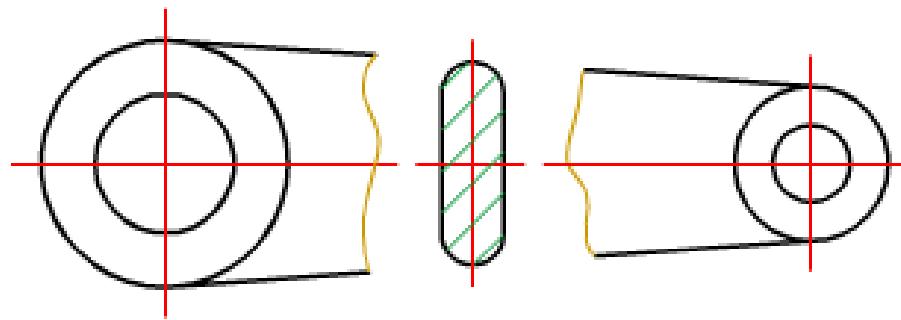
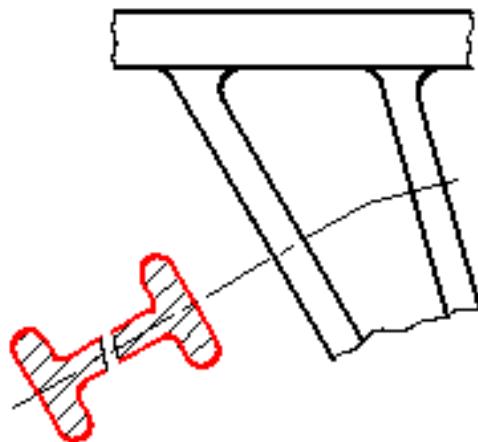
# Chapter 7 section views

## 8.removed sections



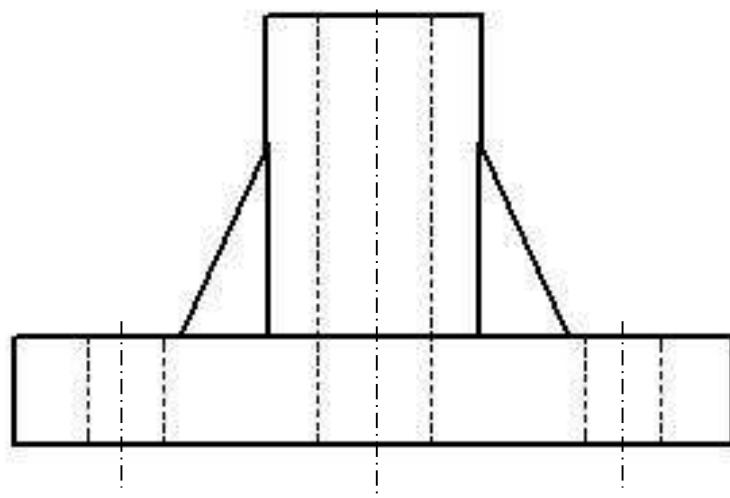
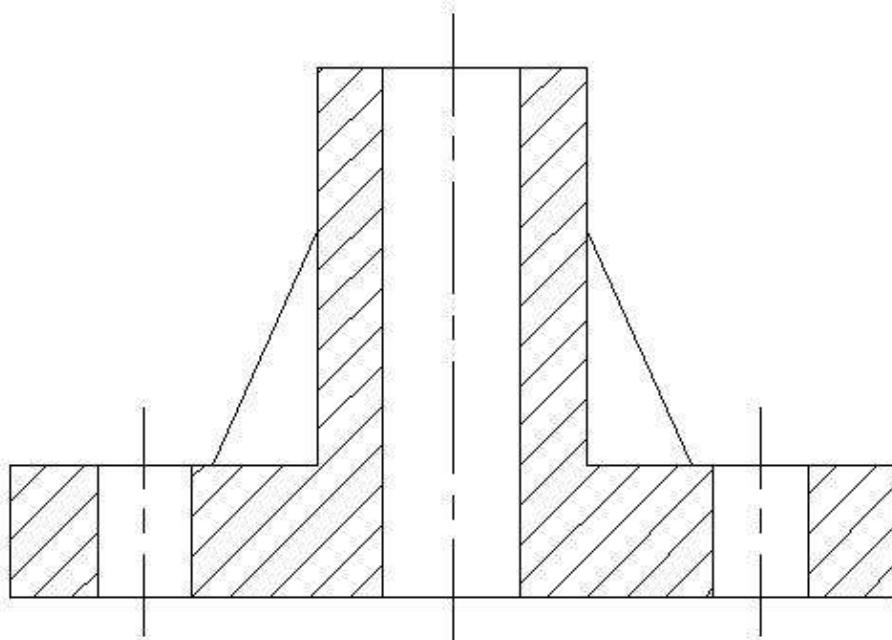
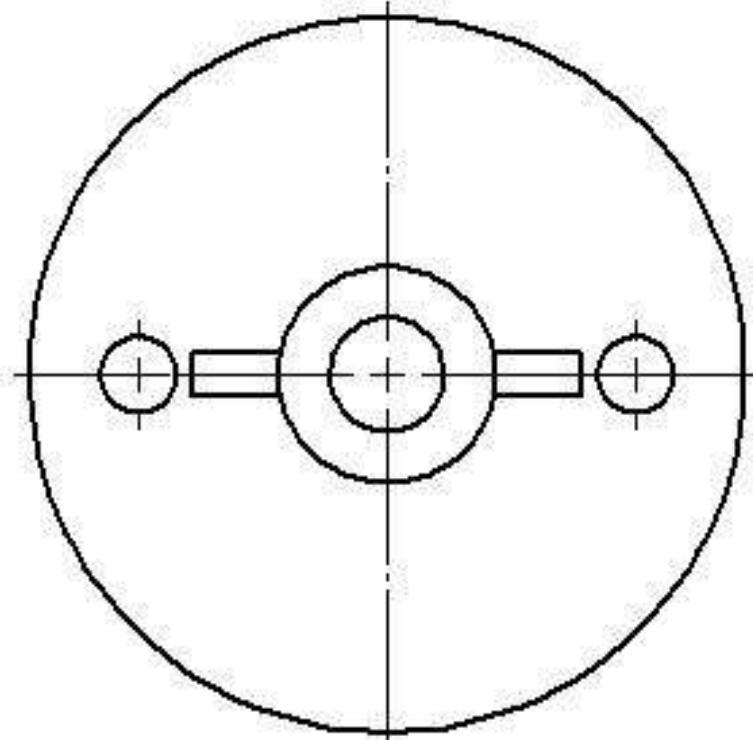
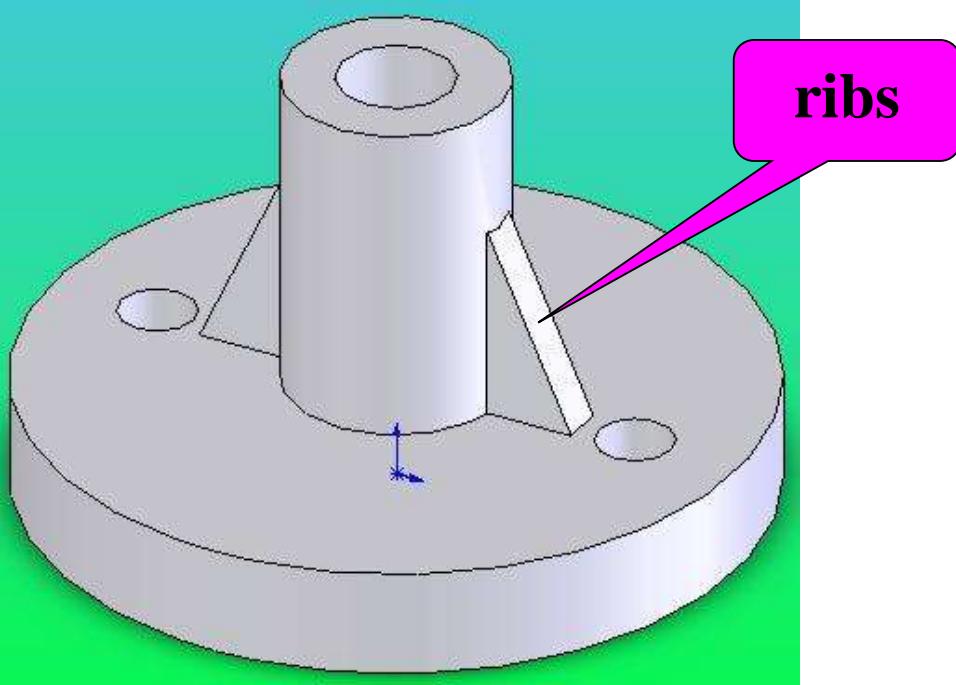
# Chapter 7 section views

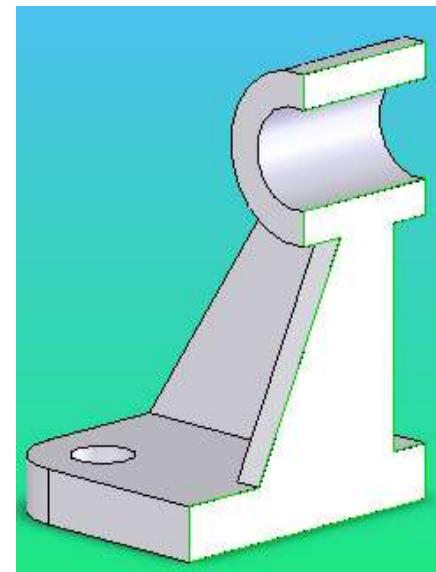
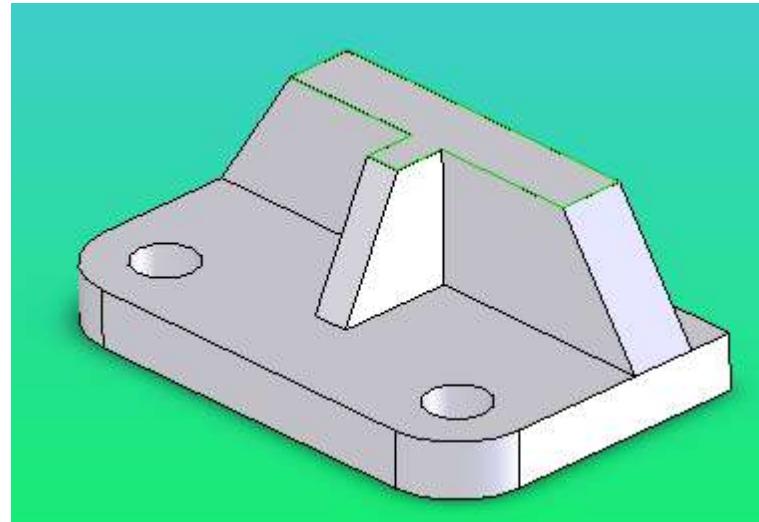
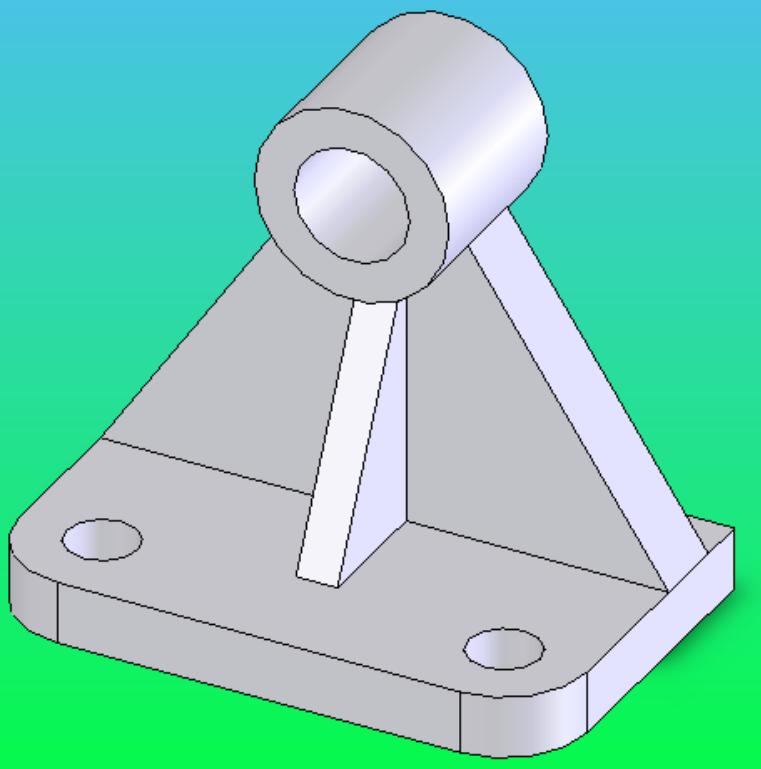
## 8.removed sections



## **9. Ribs in sections**

**To avoid a false impression of thickness and solidity,  
ribs, webs, gear teeth, and other similar flat features are not  
sectioned even though the cutting plane passes along the  
center plane of the feature.**



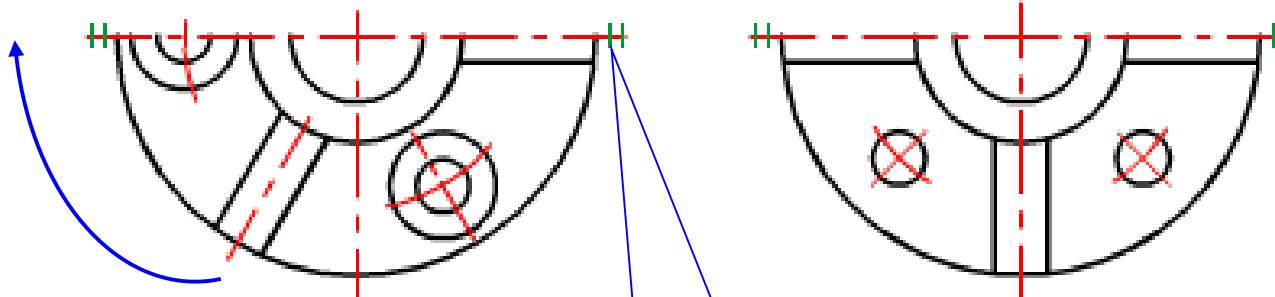
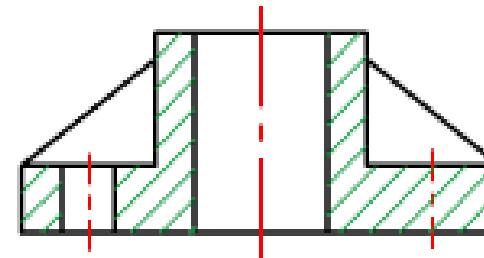
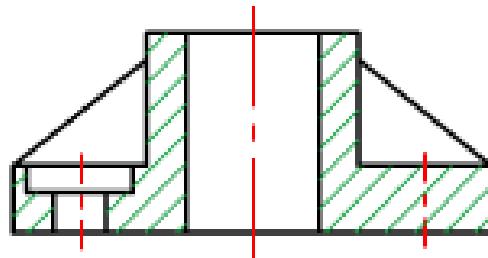


.....Cutting plane passes along **the center plane** of the feature.



# Chapter 7 section views

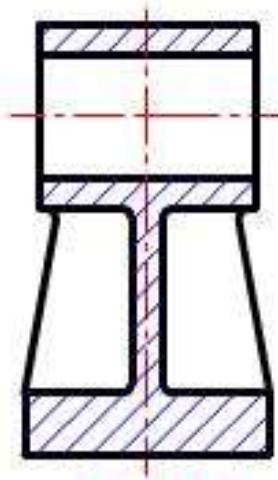
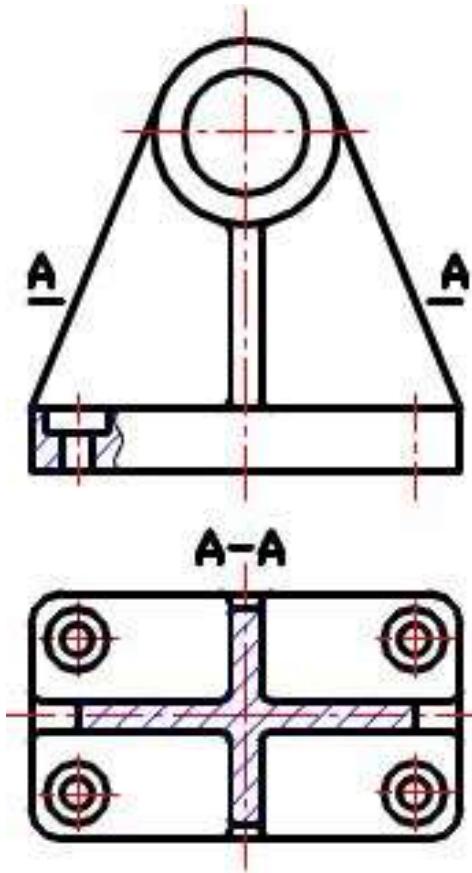
Ribs in sections



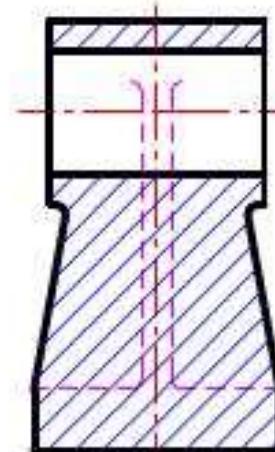
Vertical section

# Chapter 7 section views

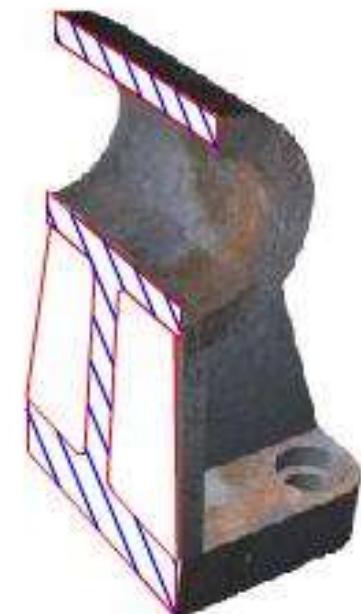
Ribs in sections



true

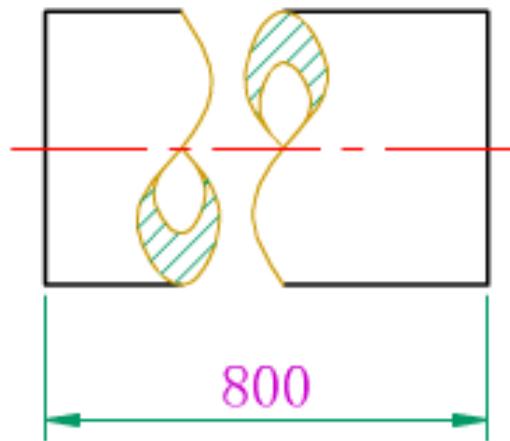
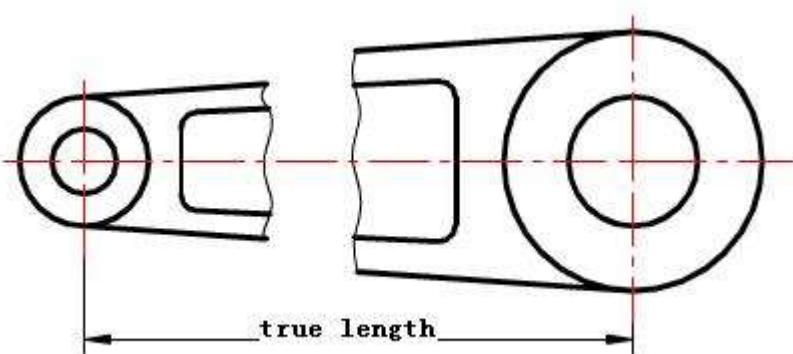


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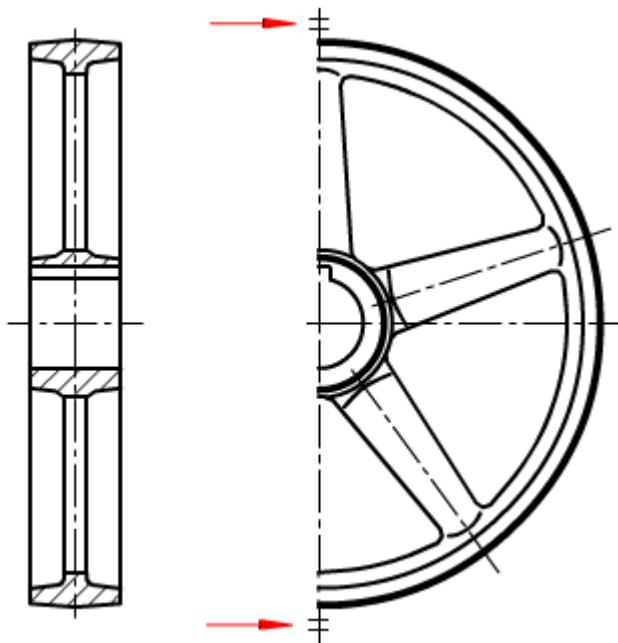
# Chapter 7 section views

To shorten a view of an elongated object, conventional breaks are recommended

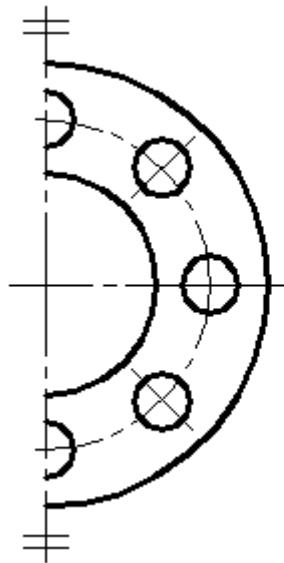


# Chapter 7 section views

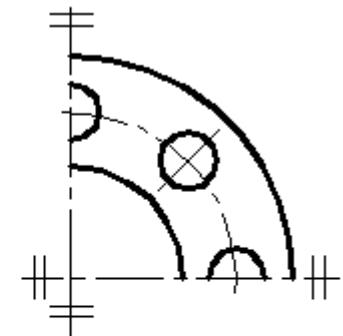
Space is limited & object is symmetry == partial views



1/2



1/2

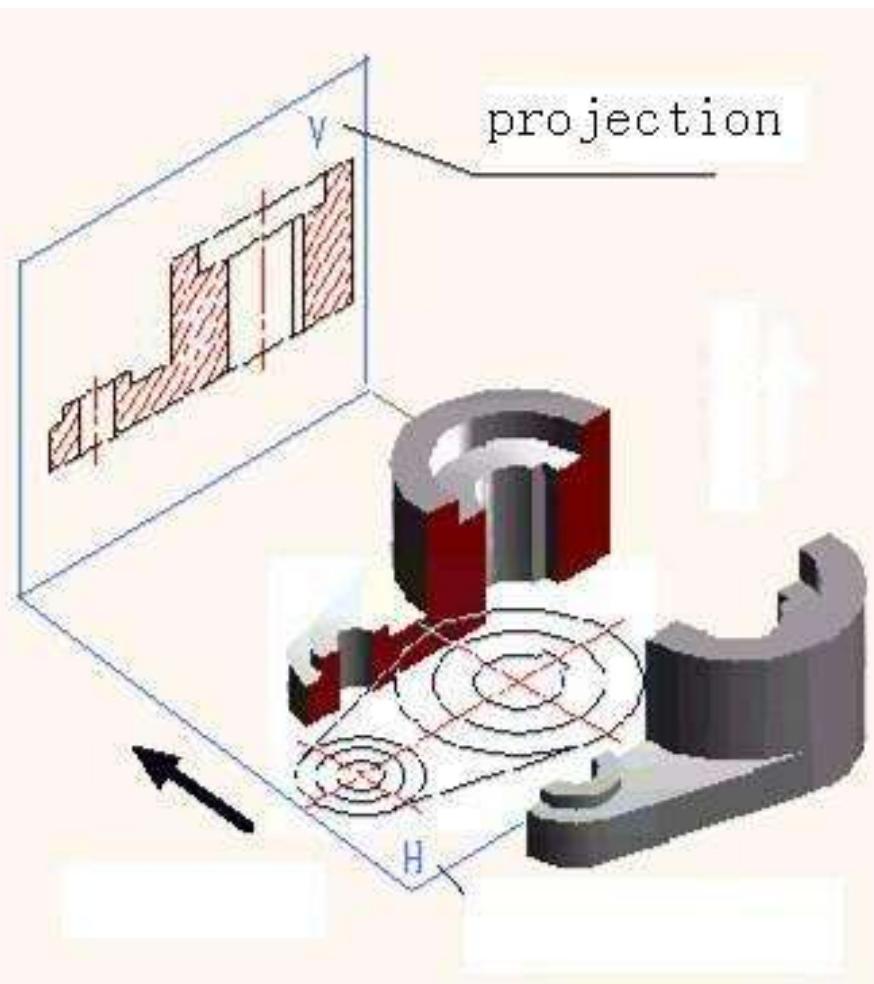


1/4

# *Home work*

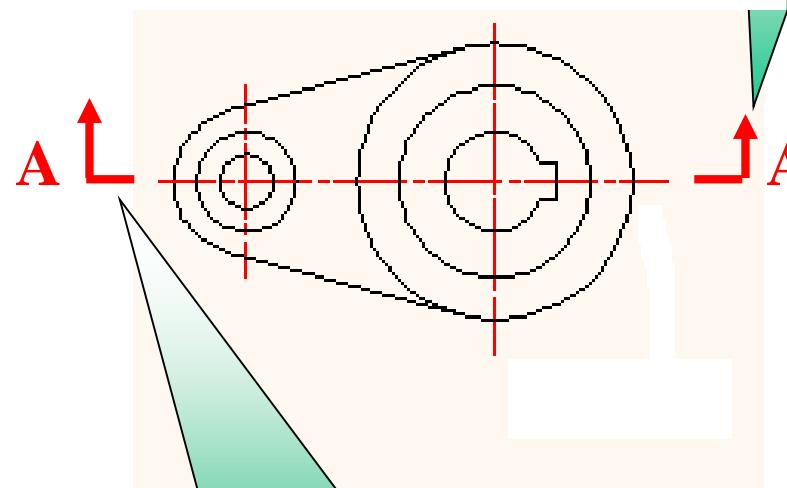
- Page 64 missing lines
- page 65 (1) front view->full section , left view-> half section
- page 67 front view& top view-> broken views
- Page 69 II-4-9 align section
- Page 70 (1) front view-> offset section
- Page 72 II-4-13 revolved section
- page 73 II-4-15 (1,2) removed section
- page 74 (1,2)draw correct full sections (about ribs)

# Chapter 7 Sectional Views

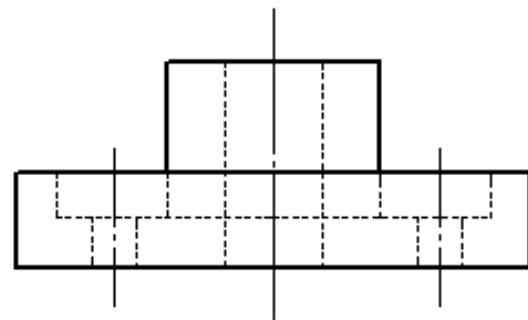
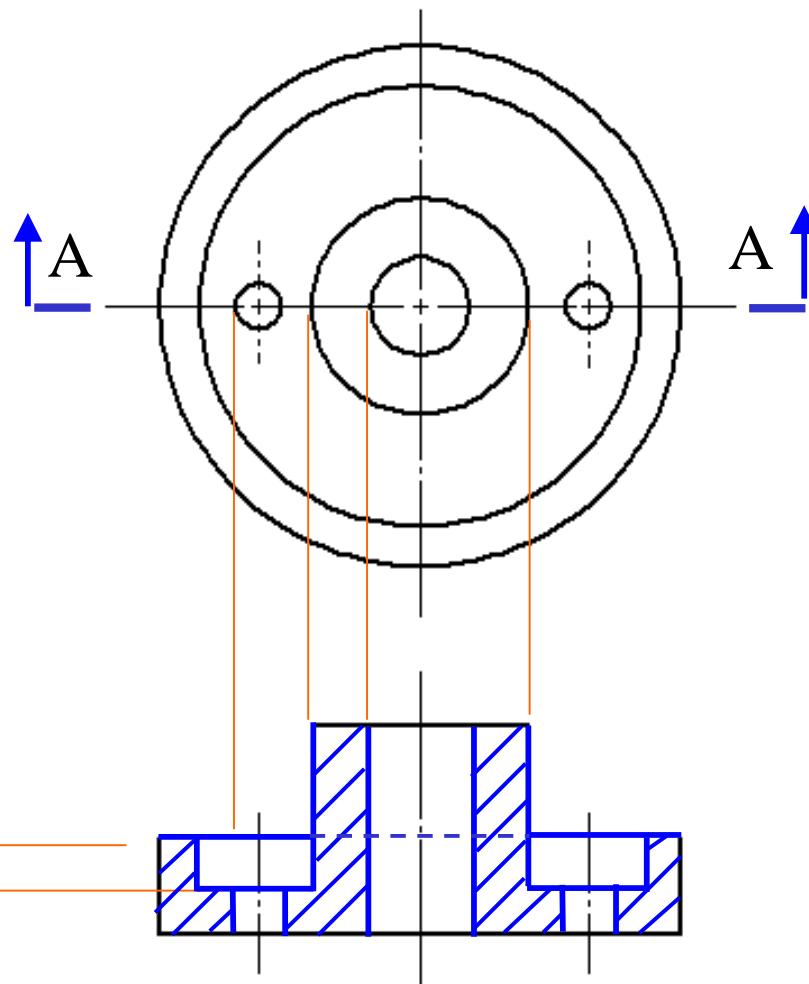
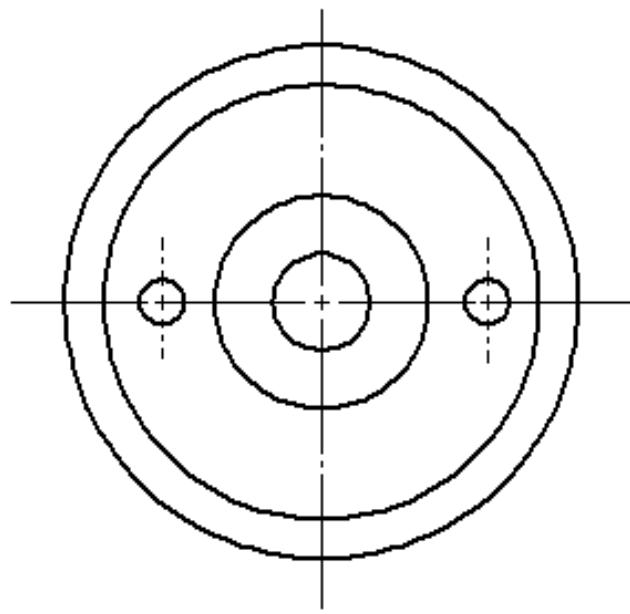
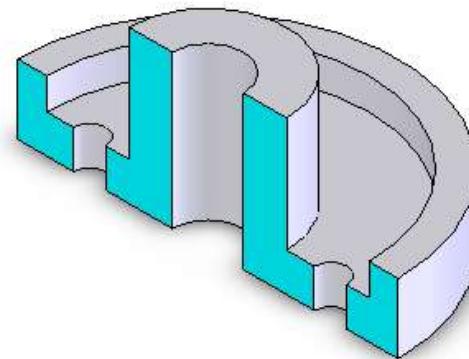
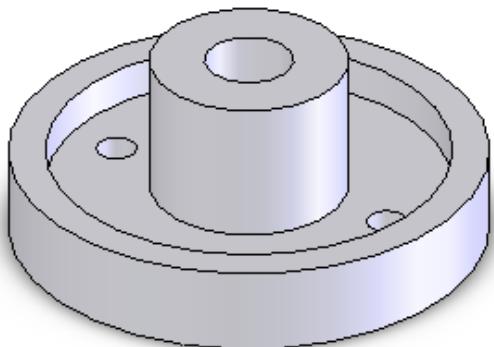


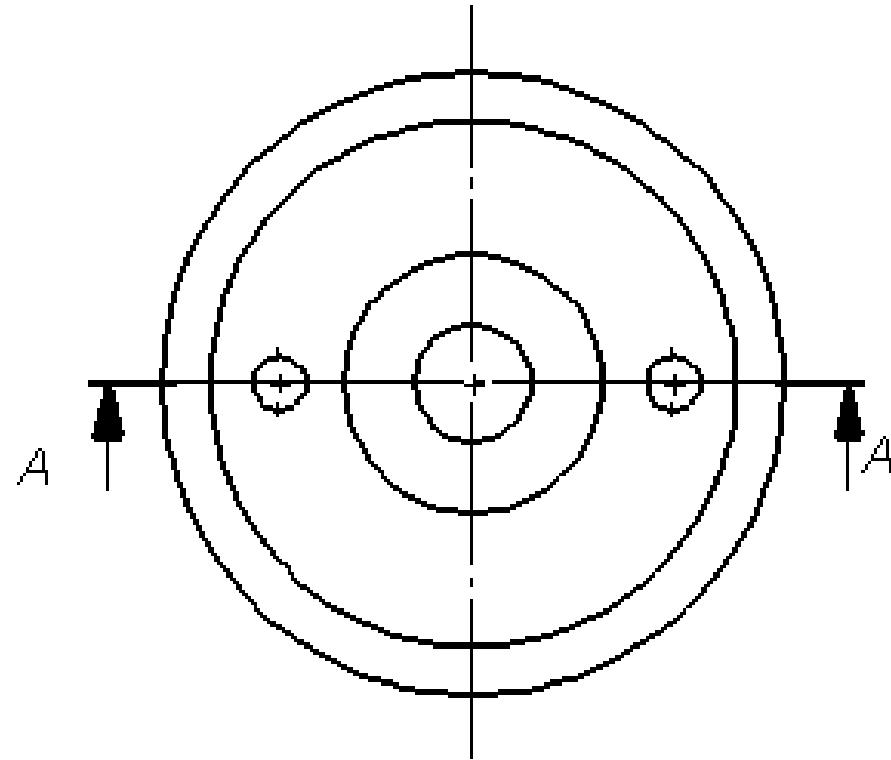
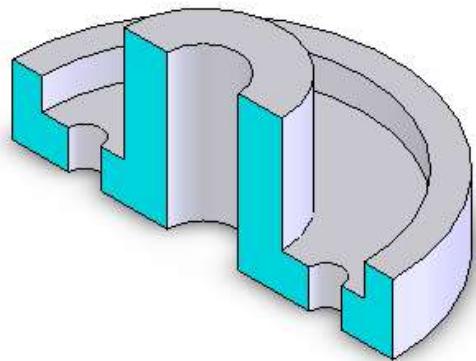
Name

A-A

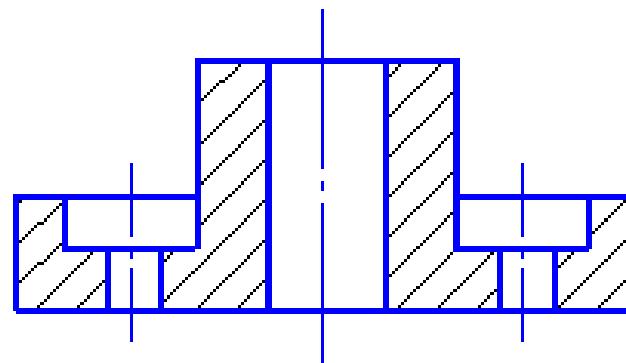


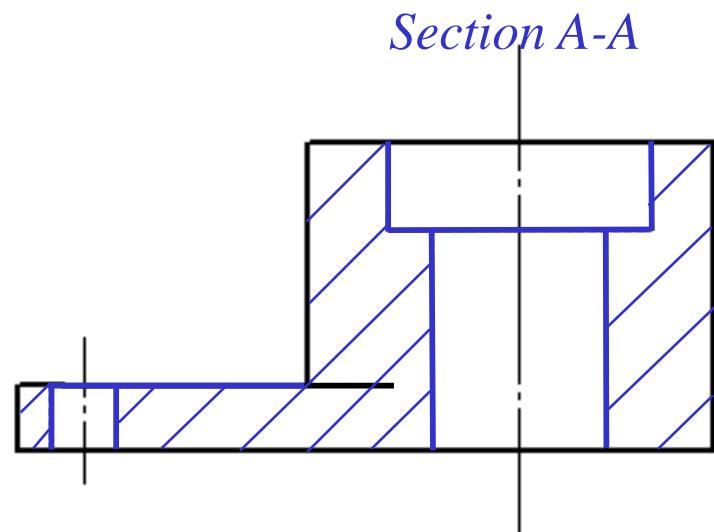
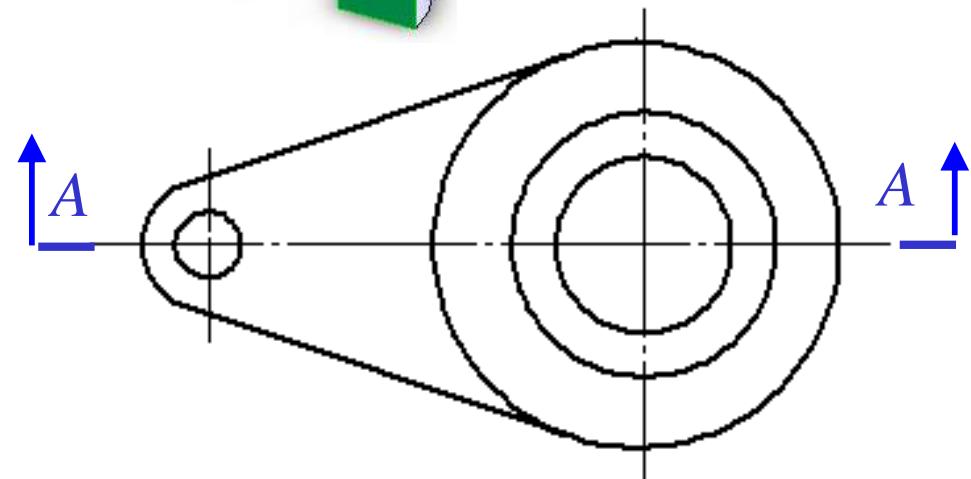
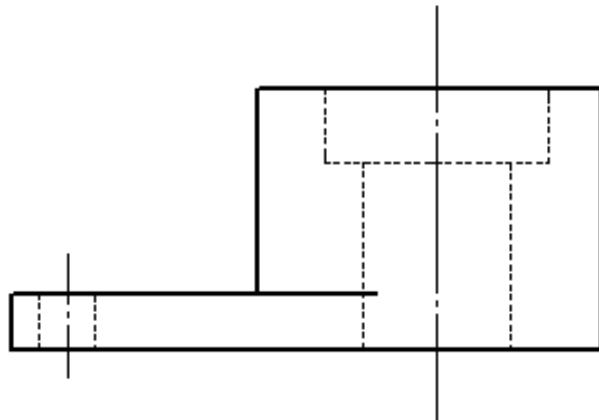
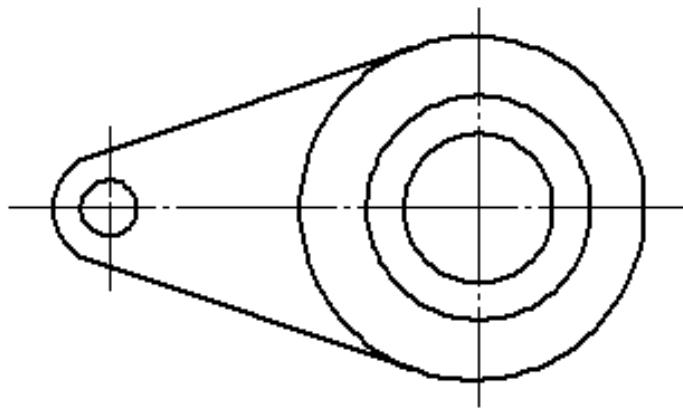
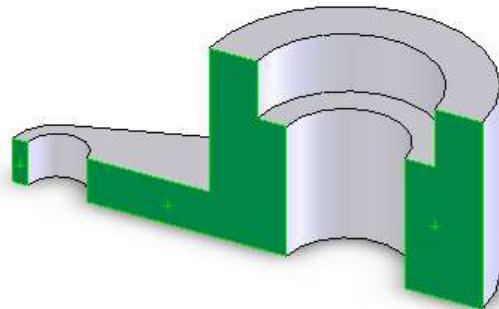
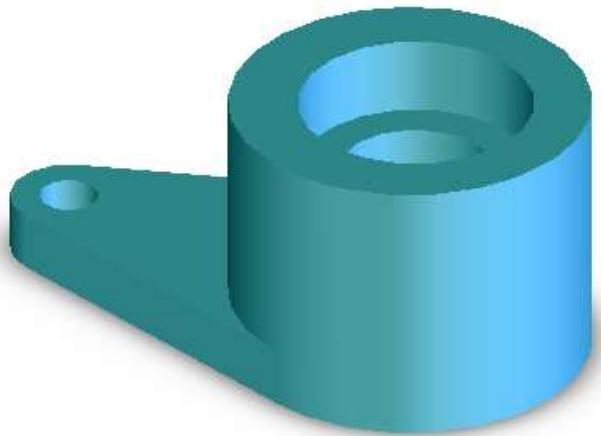
Cutting -plane line



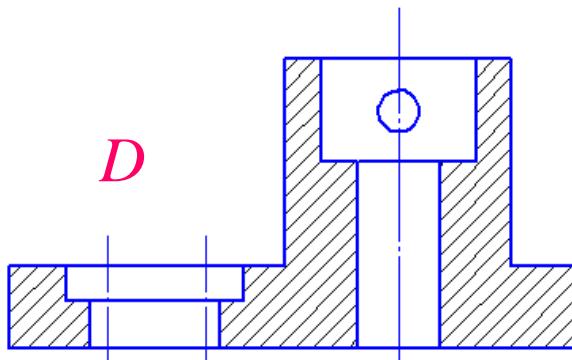
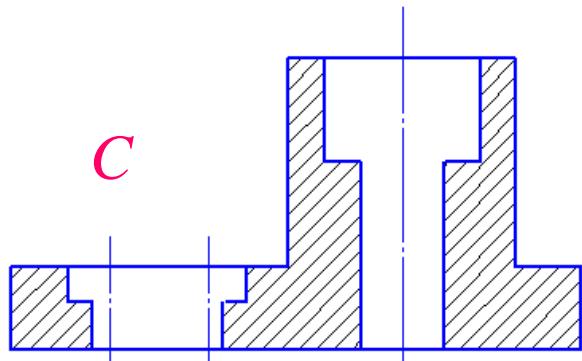
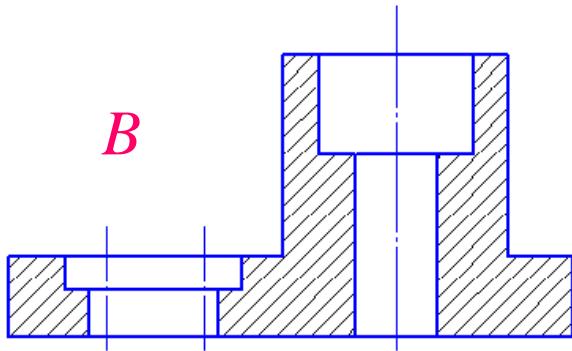
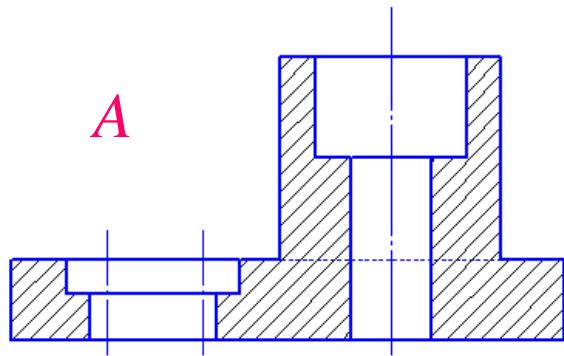
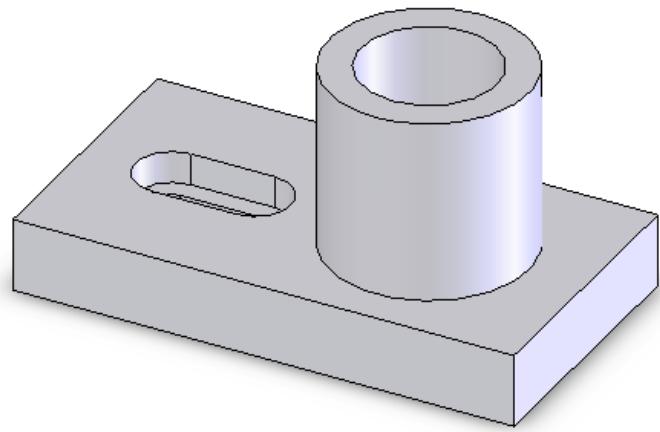
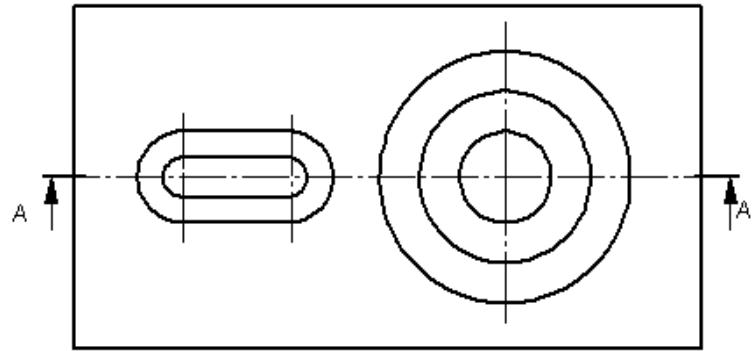


SECTION A-A

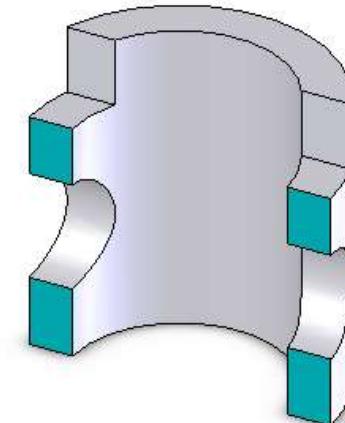
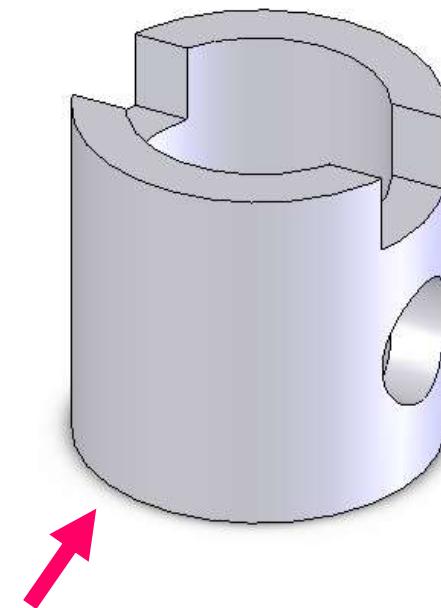
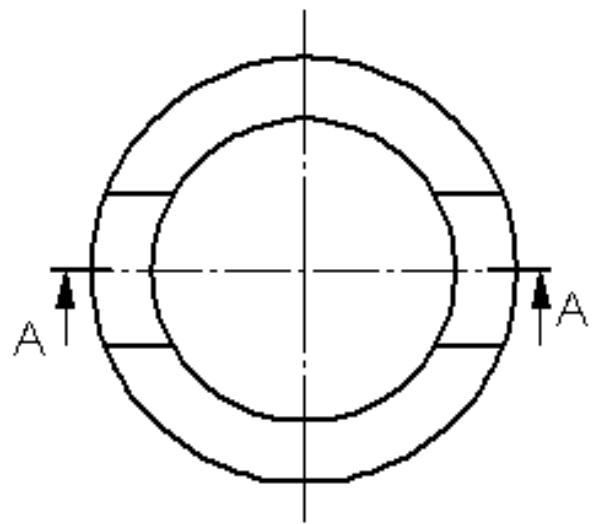




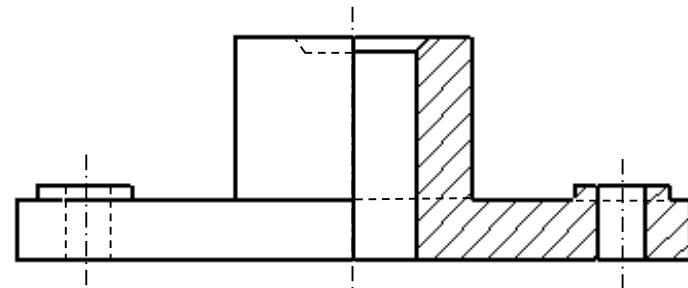
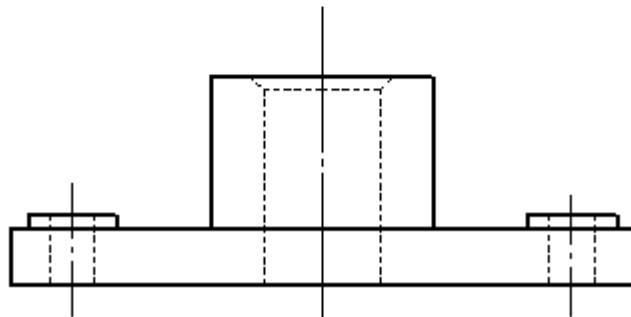
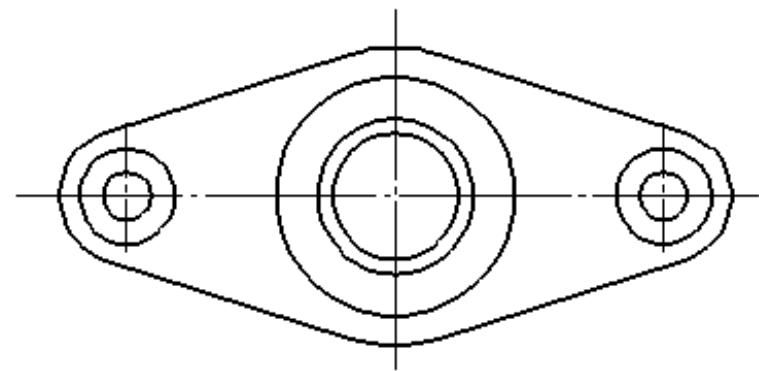
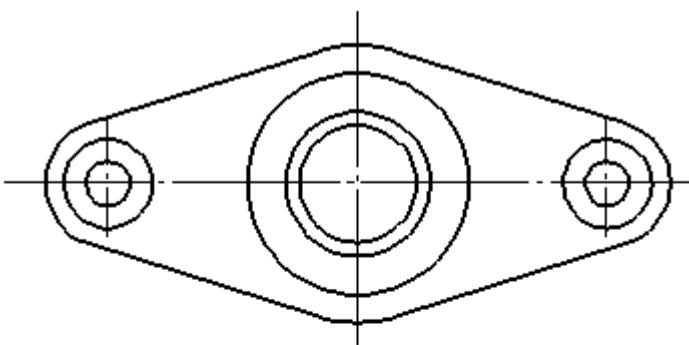
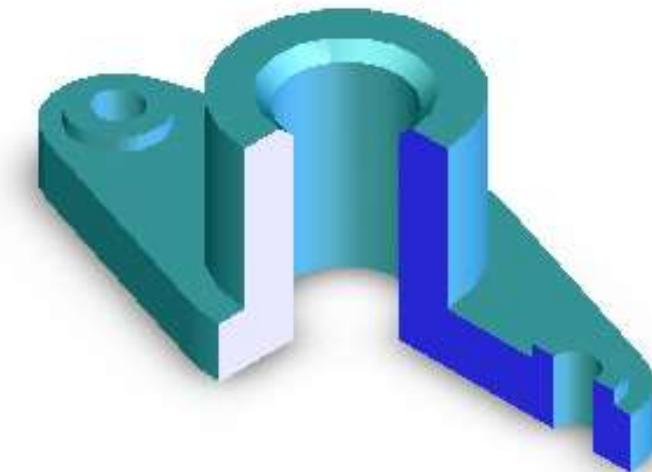
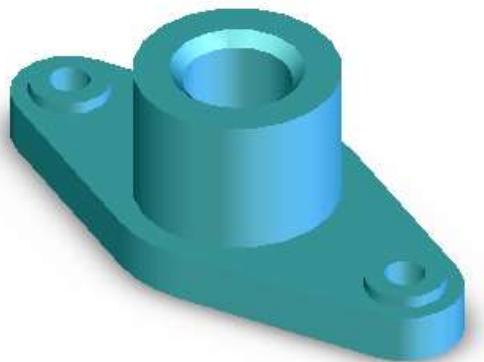
Example 1 front view ->full section?

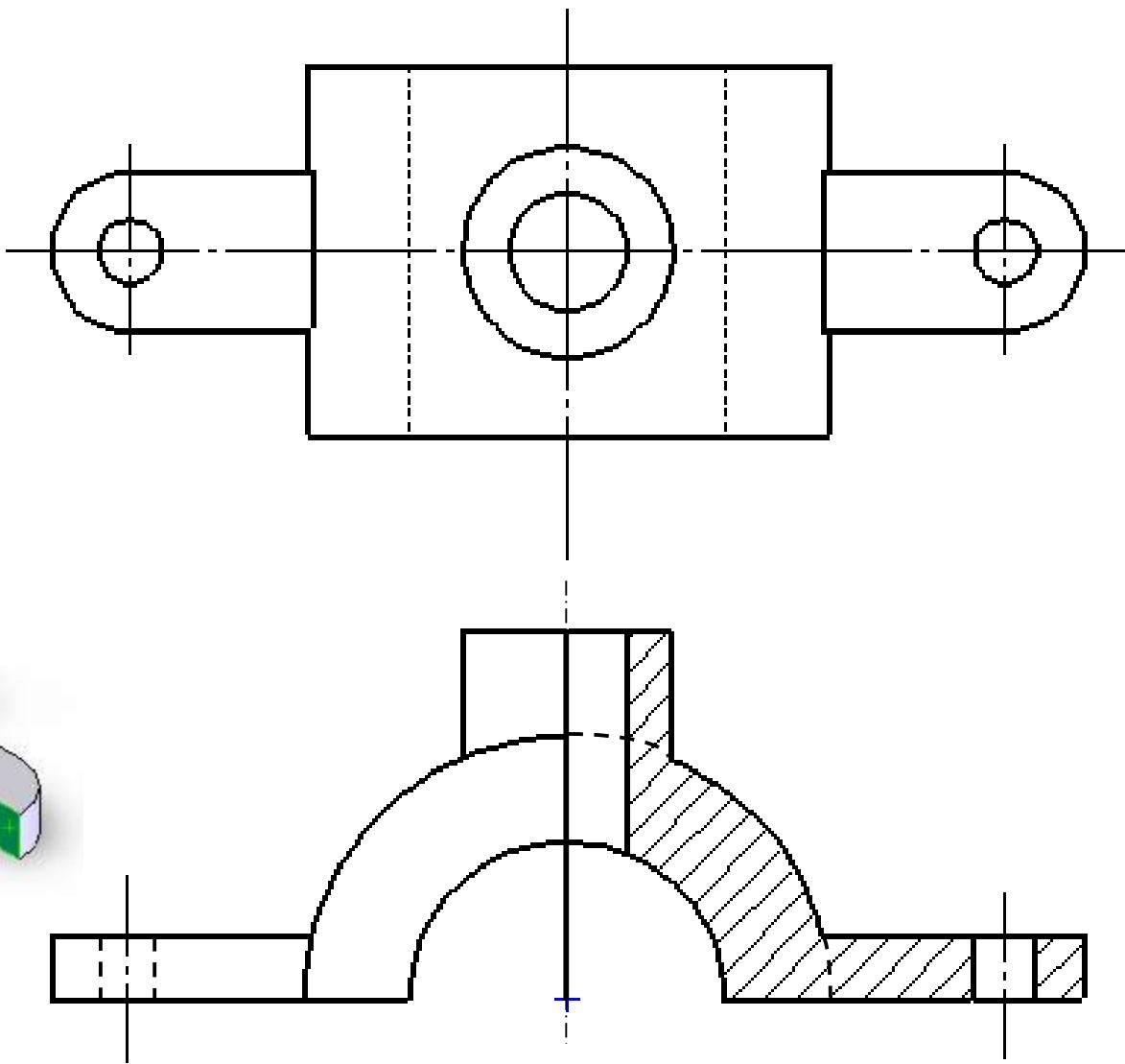
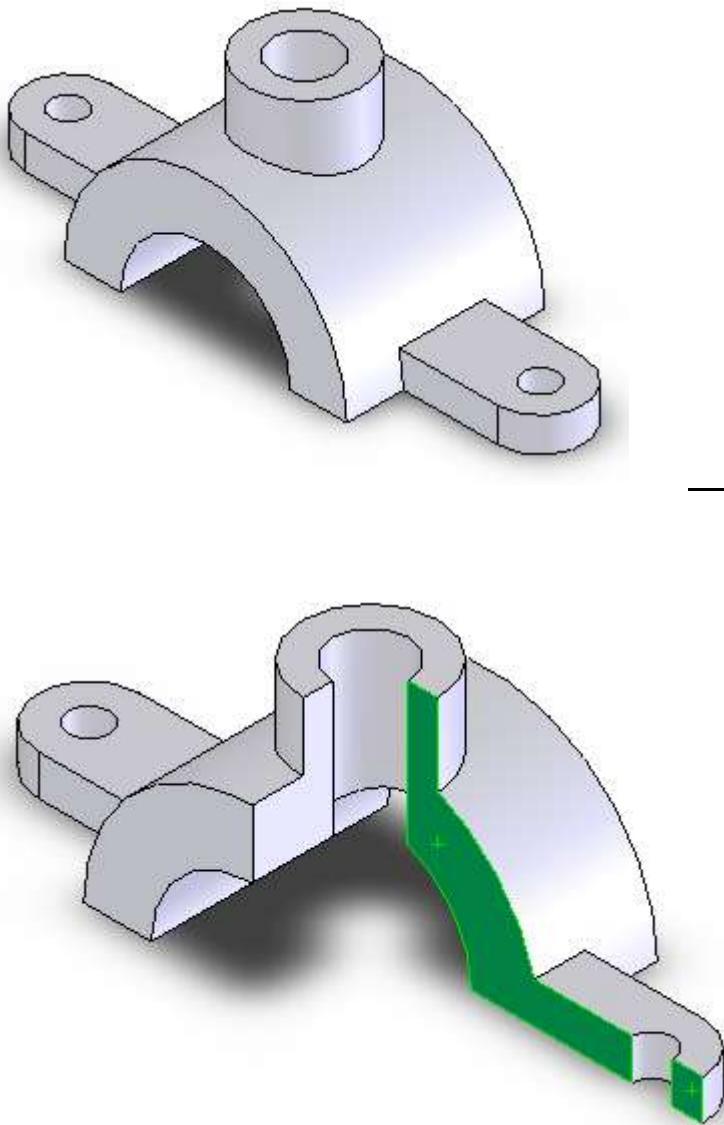


Example 2 front view ->full section?

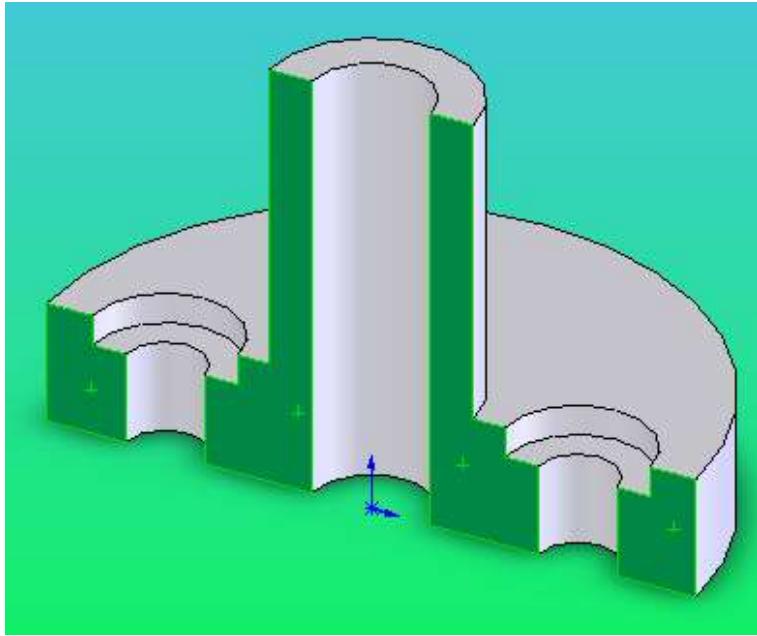


# HALF SECTION

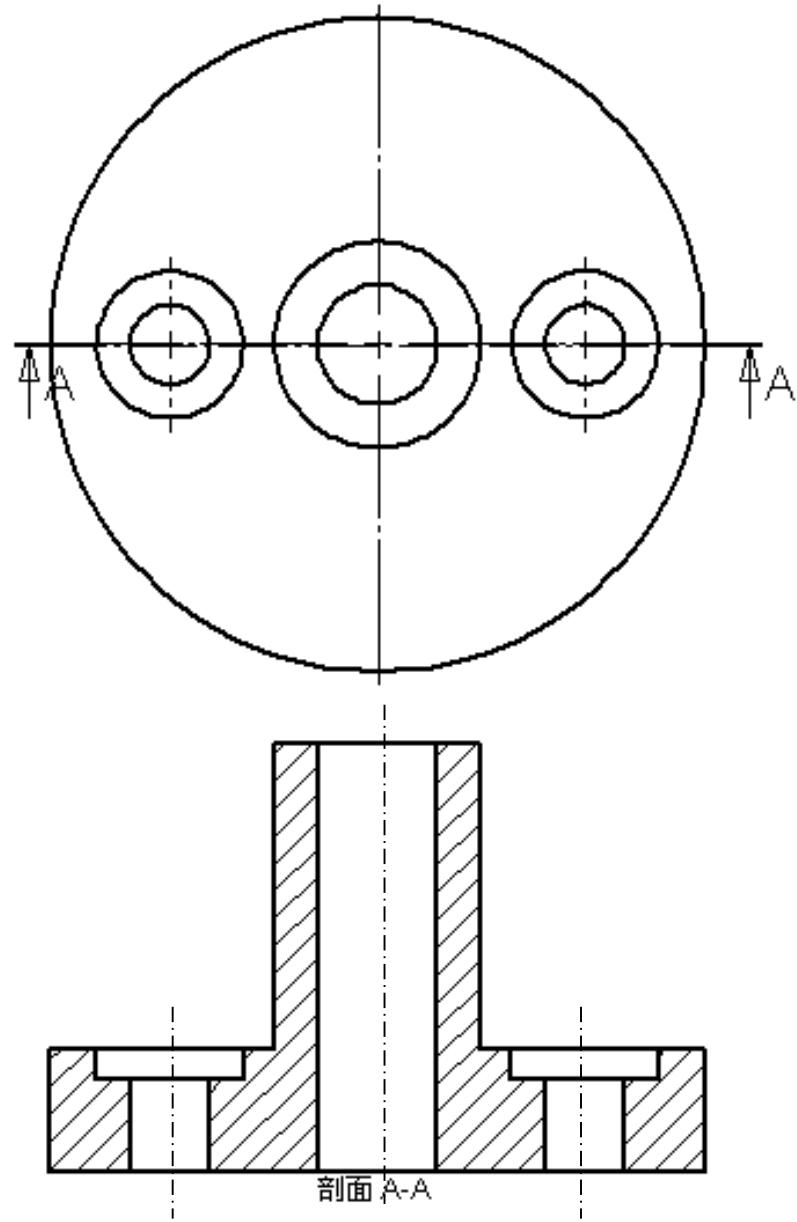




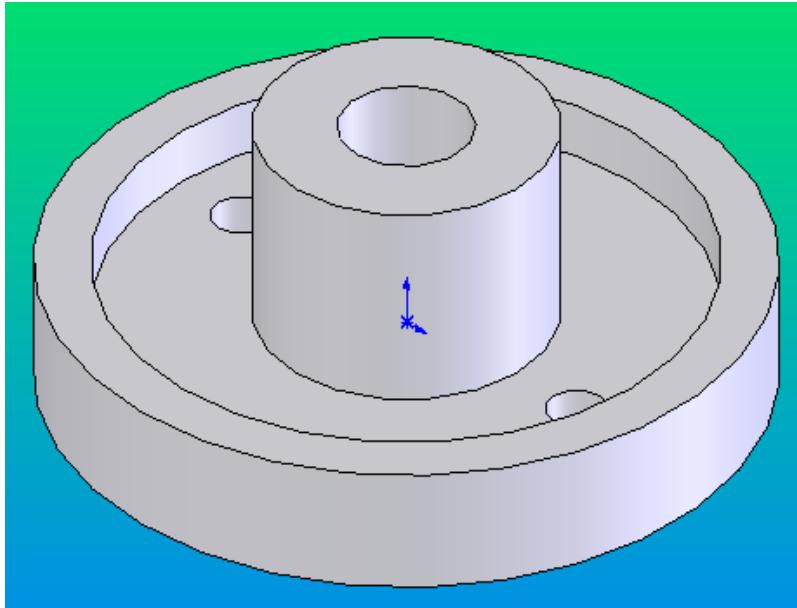




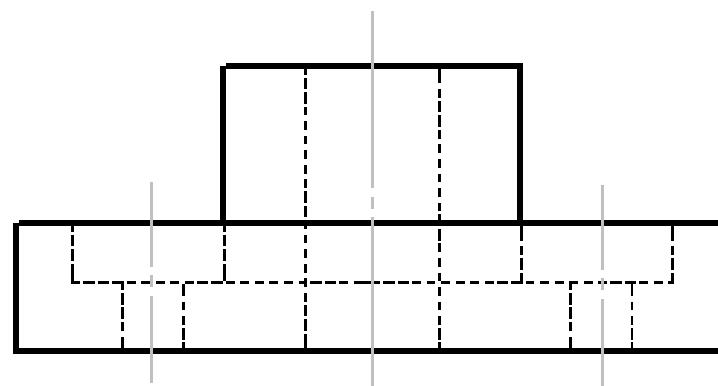
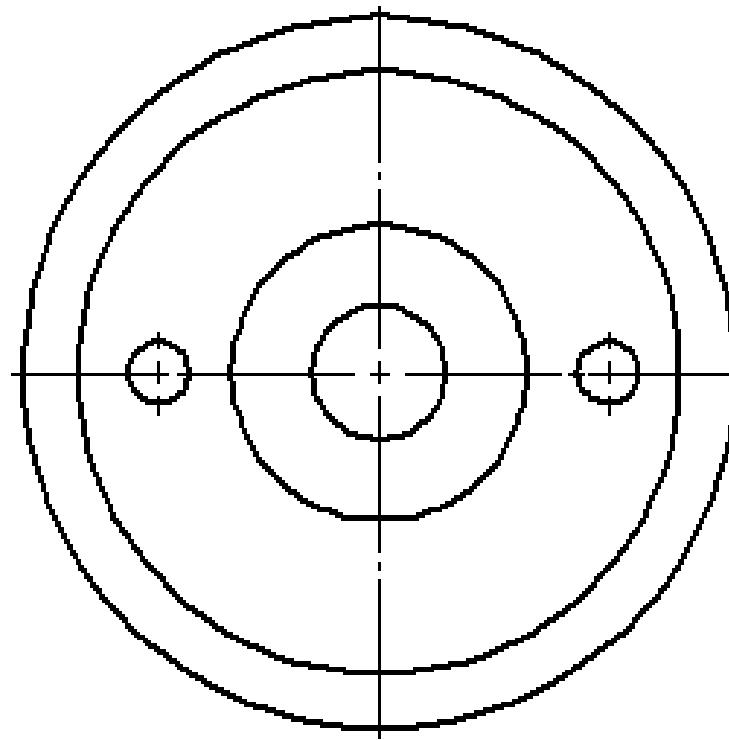
FULL SECTION

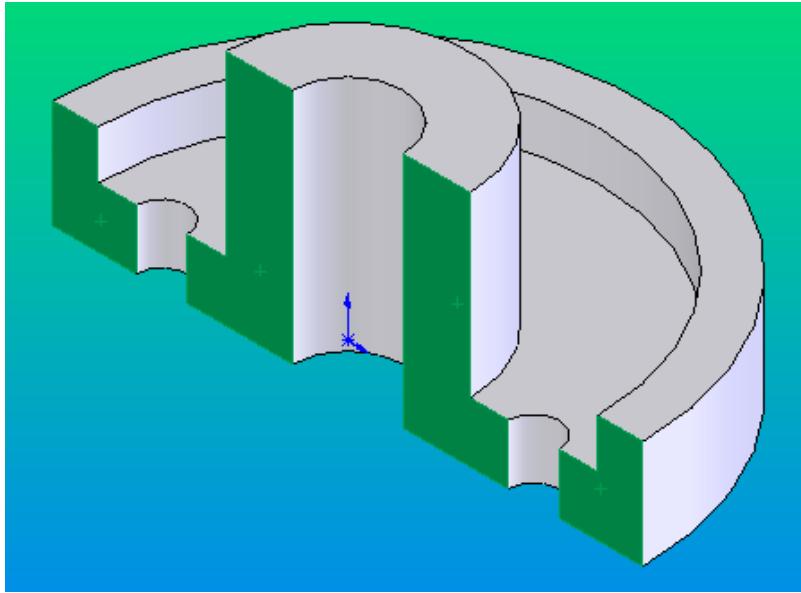


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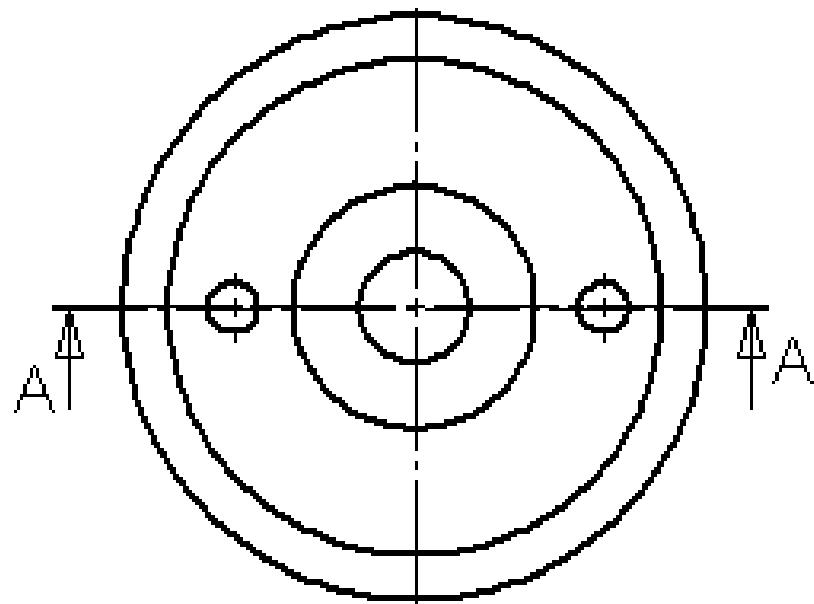


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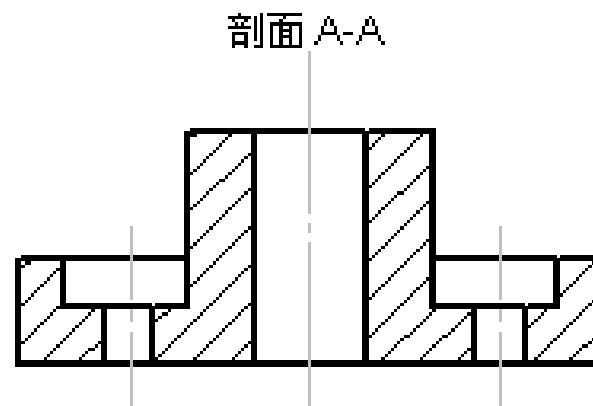




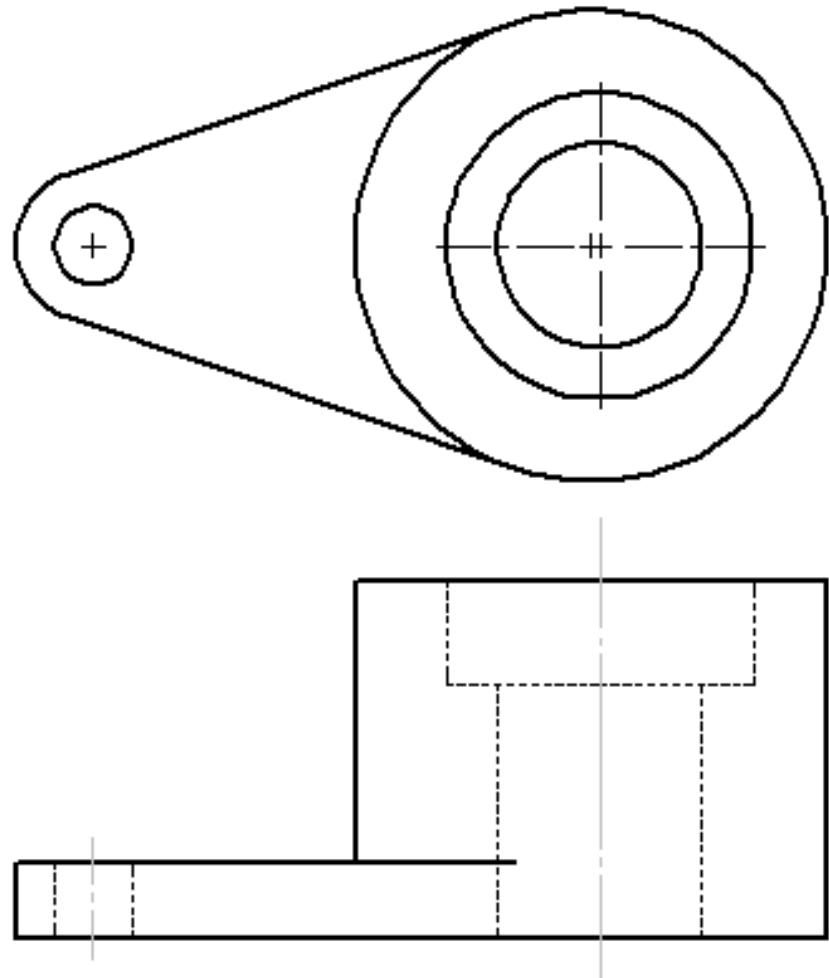
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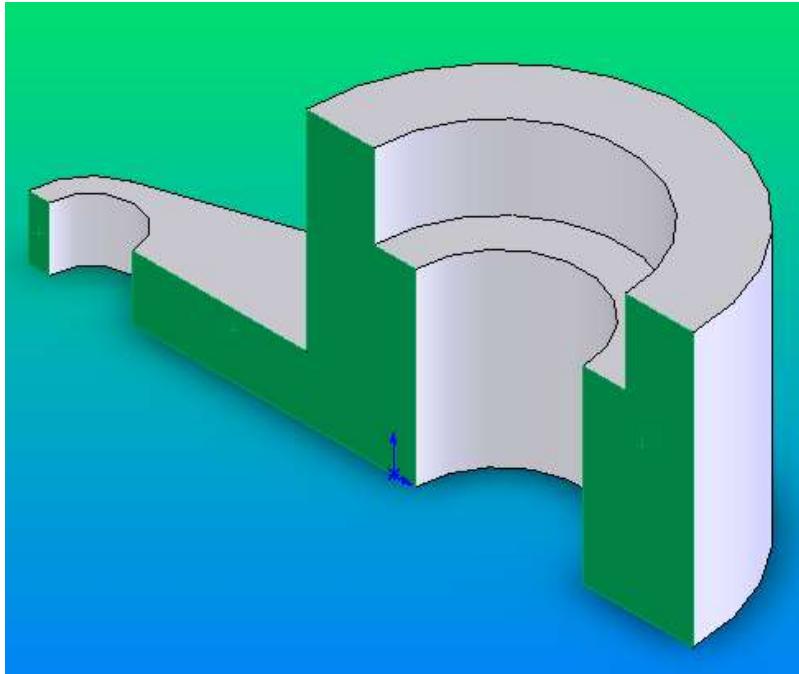


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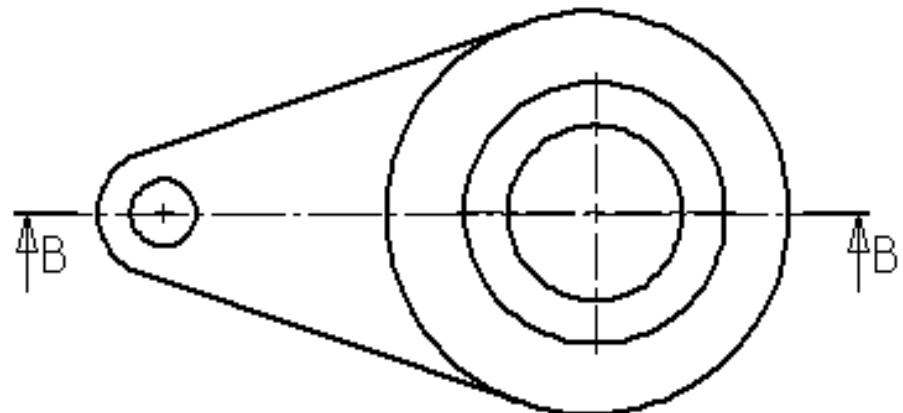
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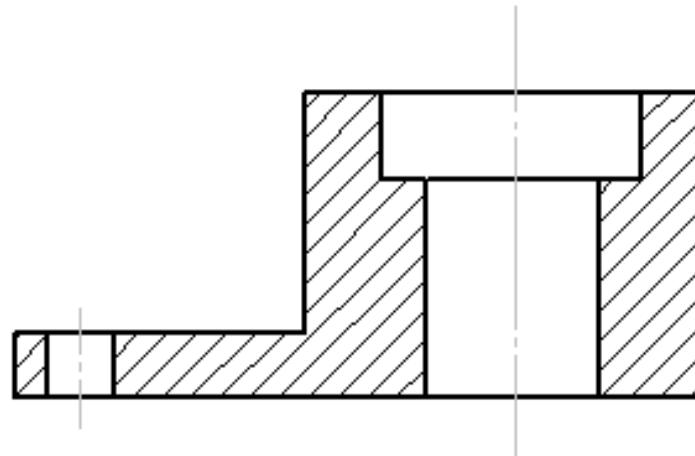


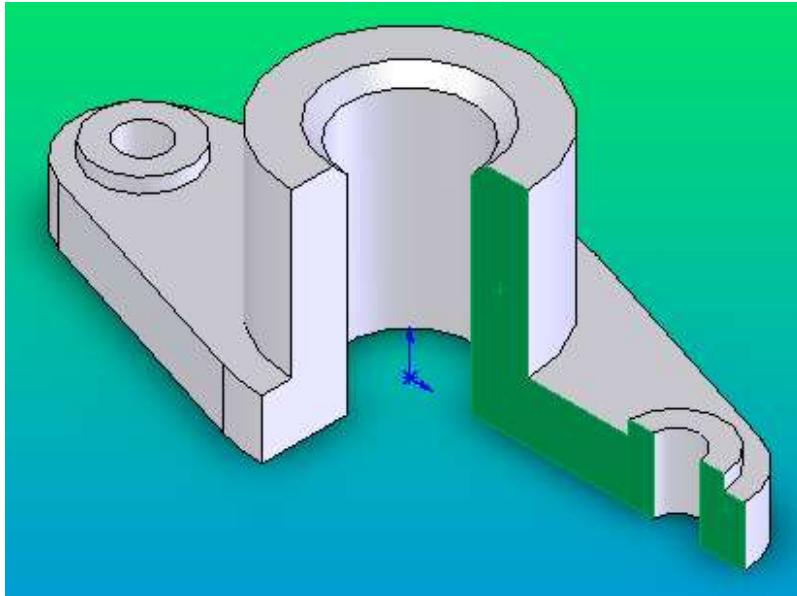
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## FULL SECTION

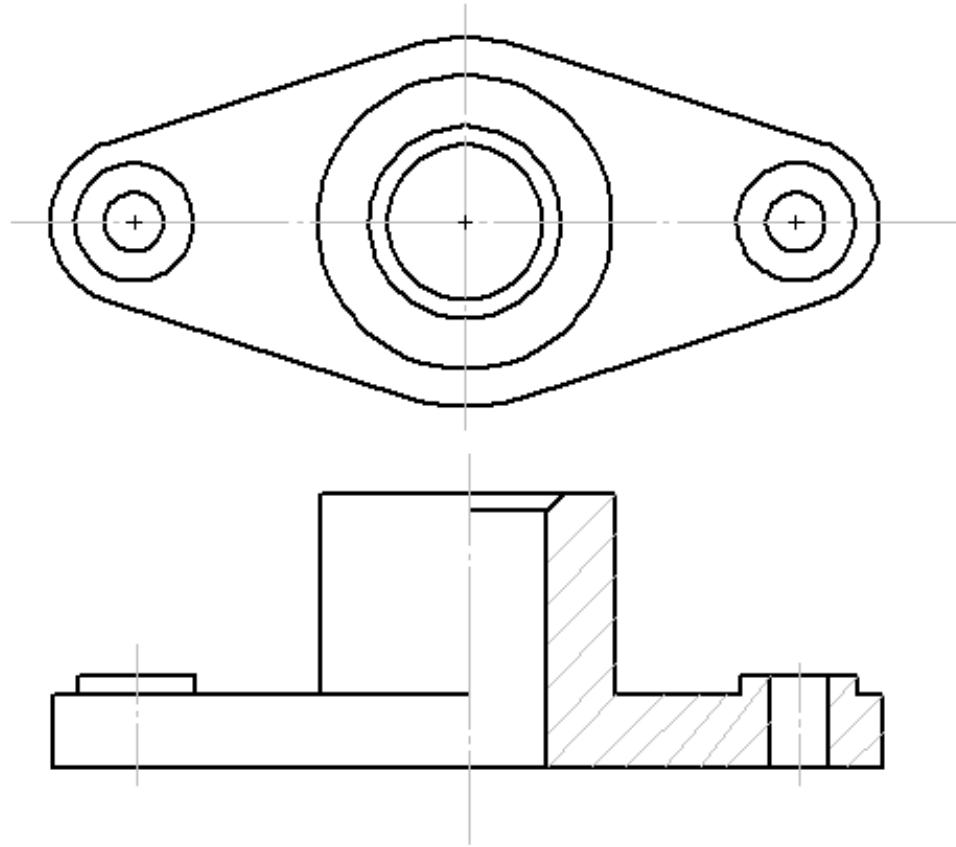


B - B

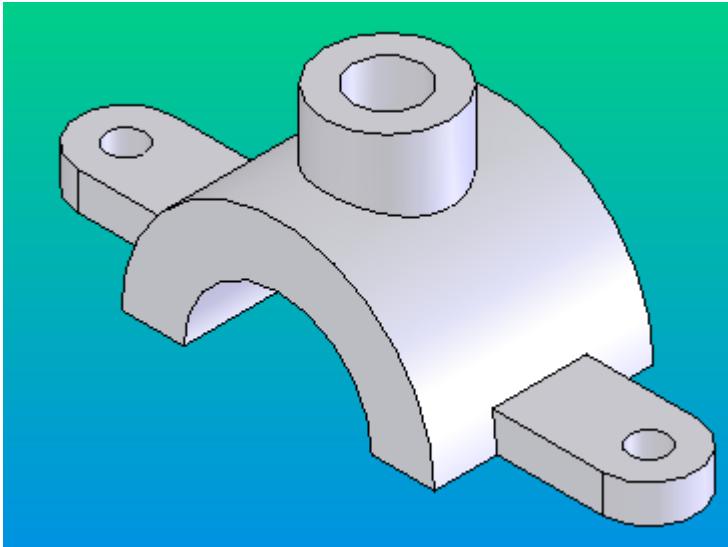




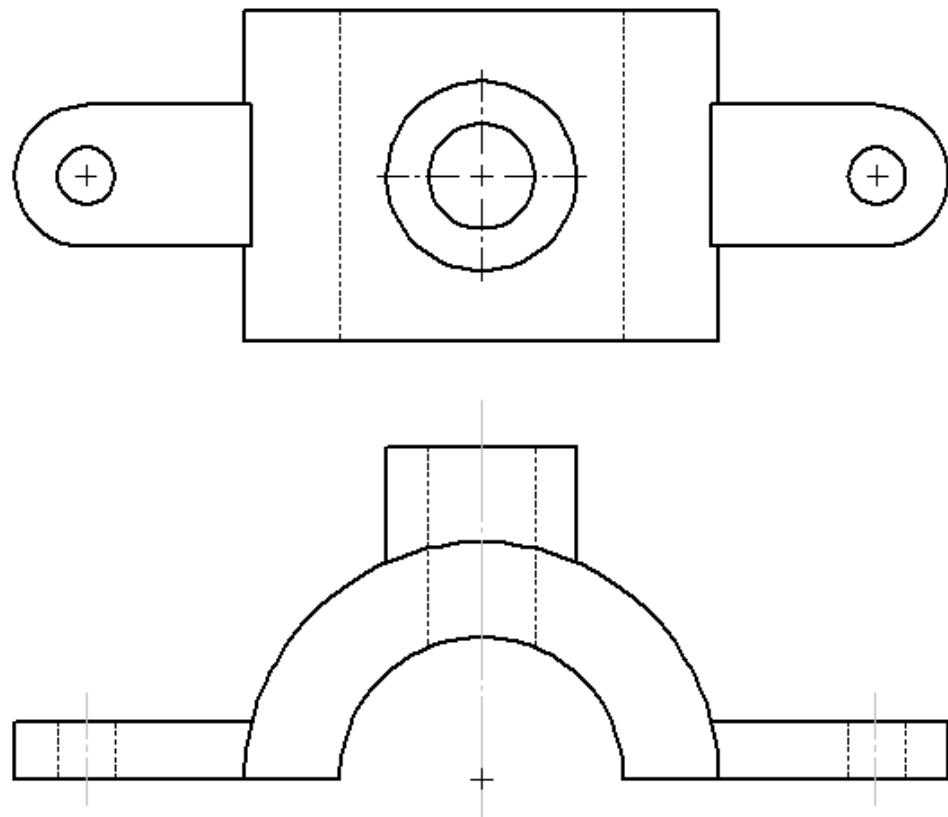
HALF SECTION

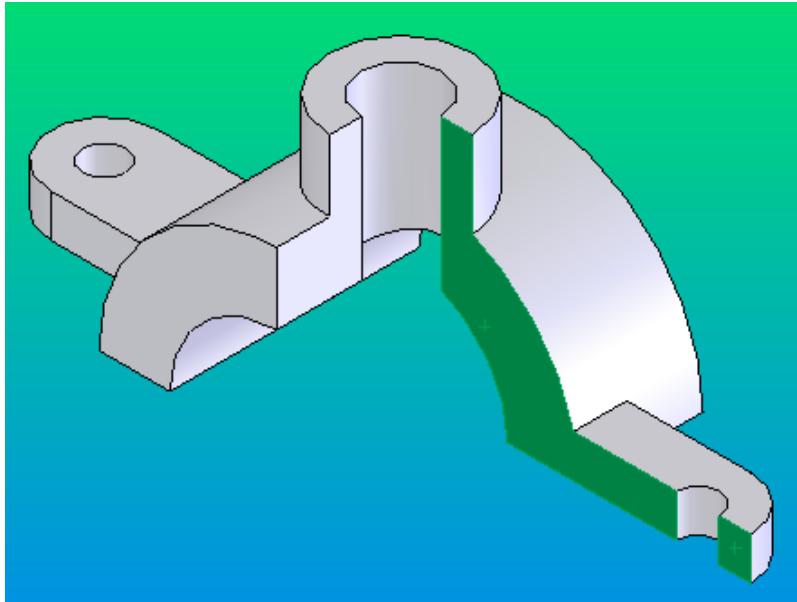


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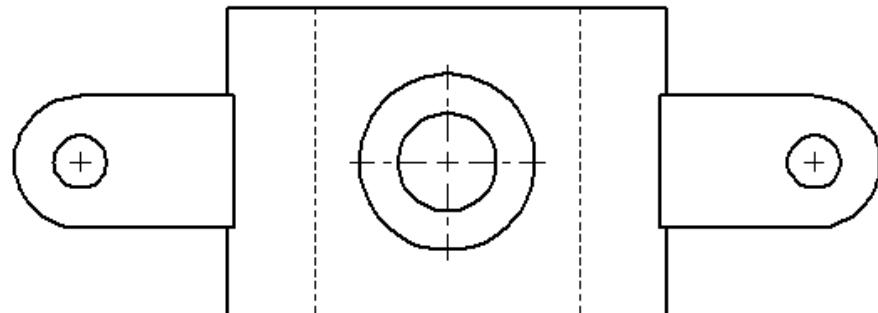


HALF SECTION

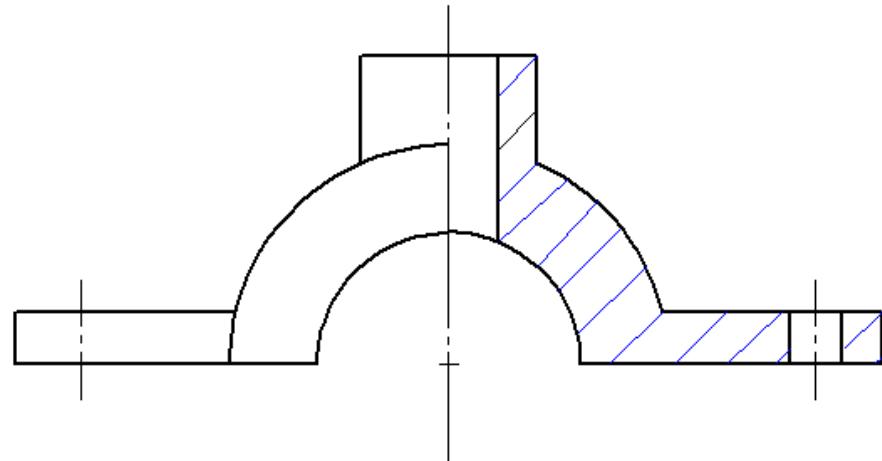


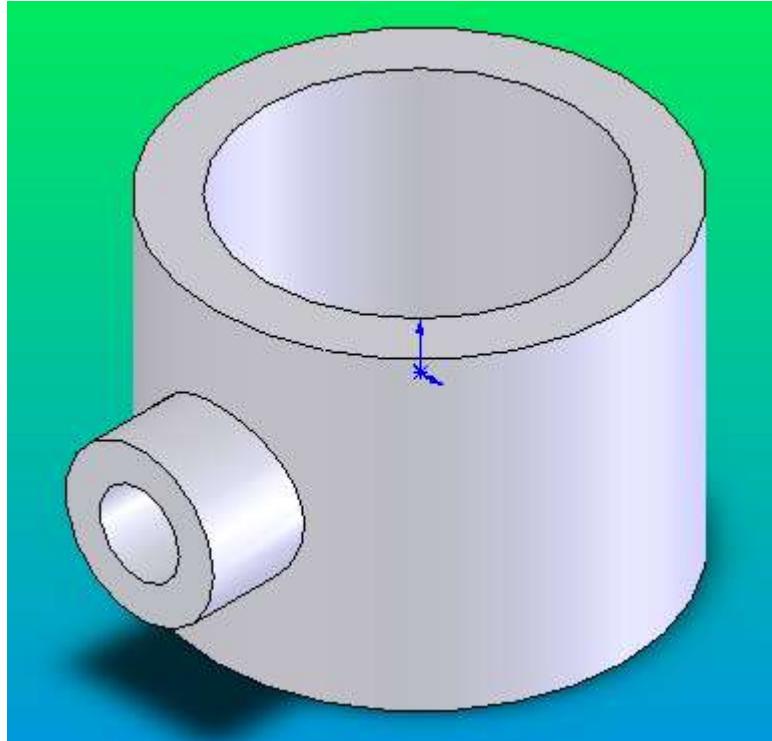


## HALF SECTION

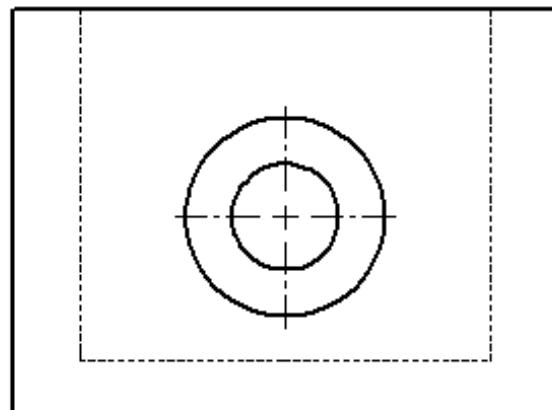
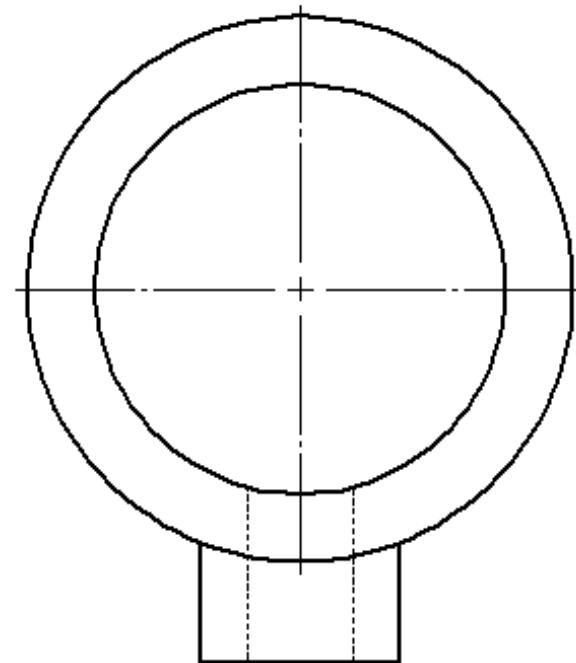


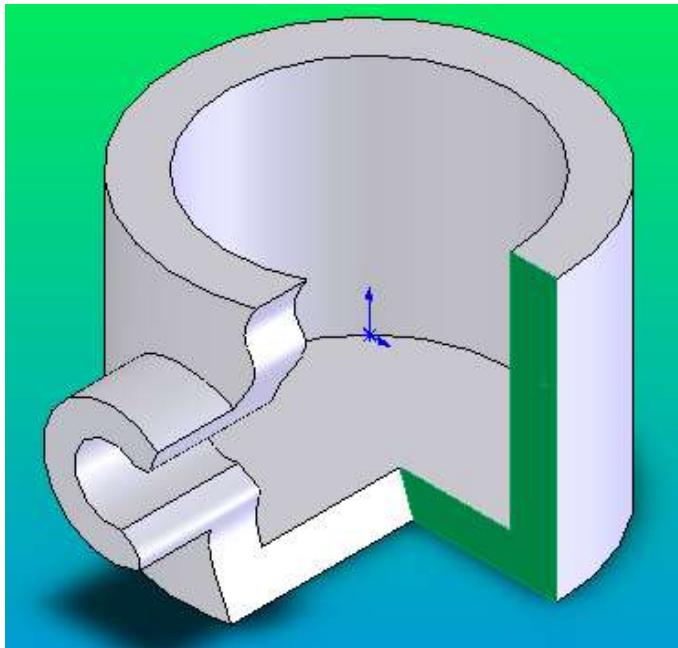
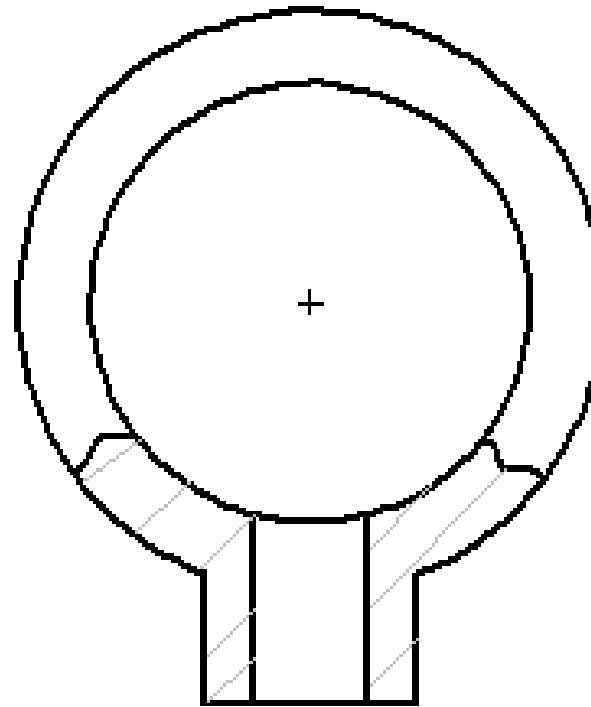
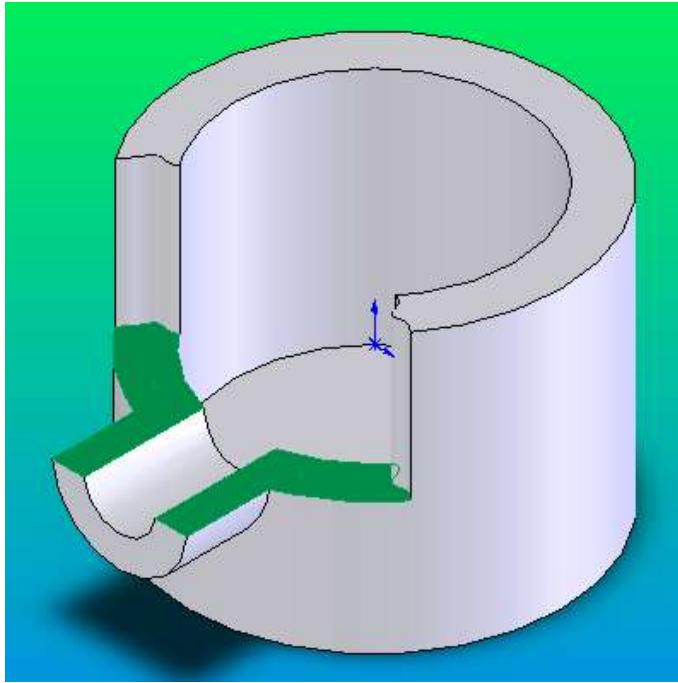
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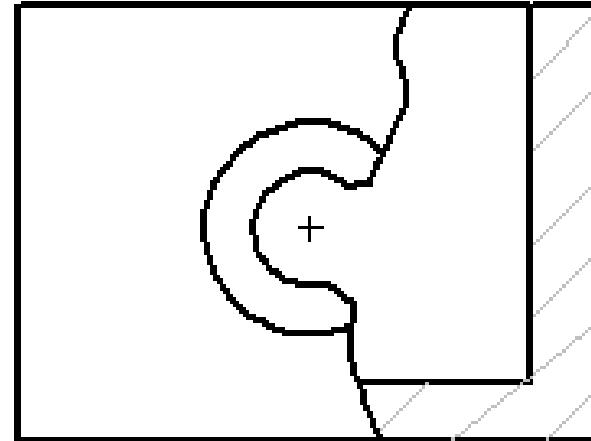


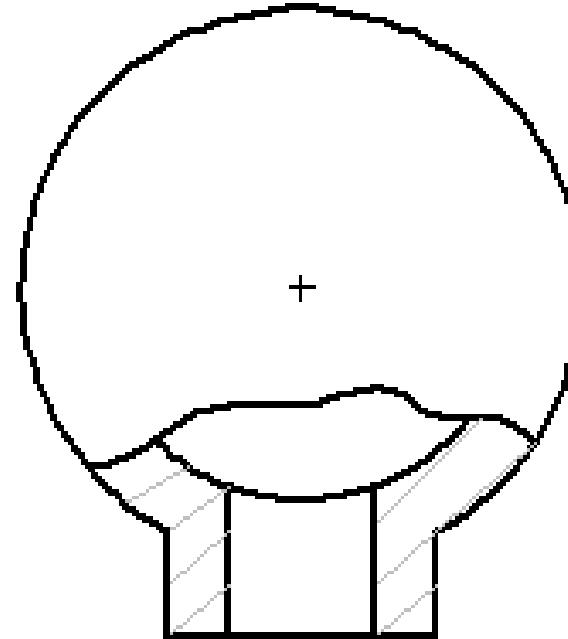
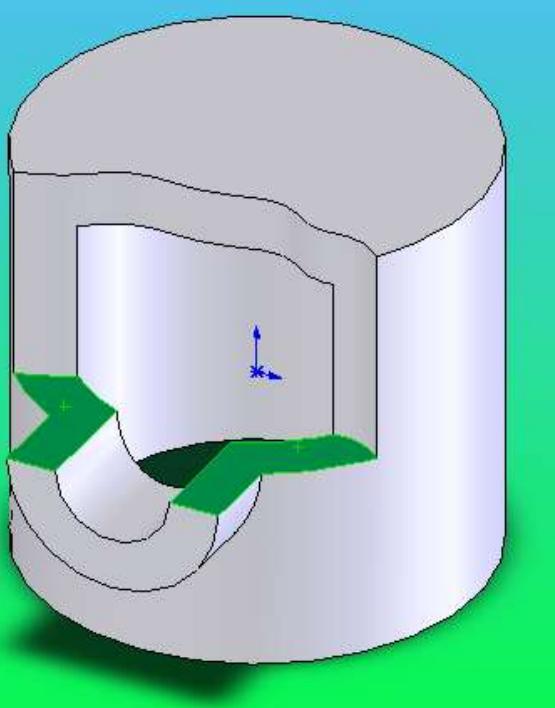
## BROKEN-OUT SECTION



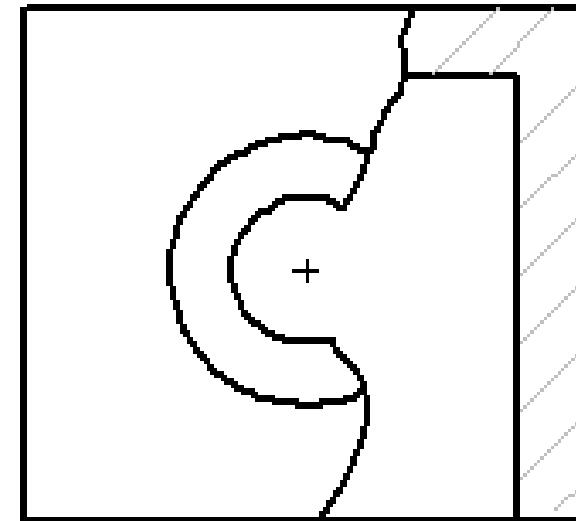
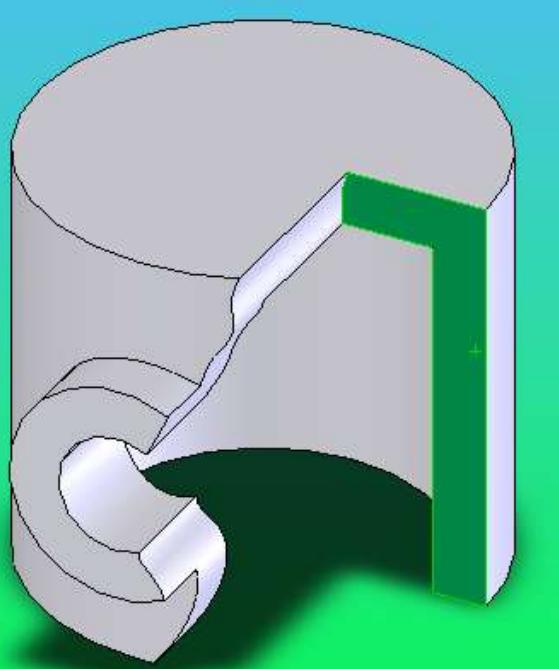


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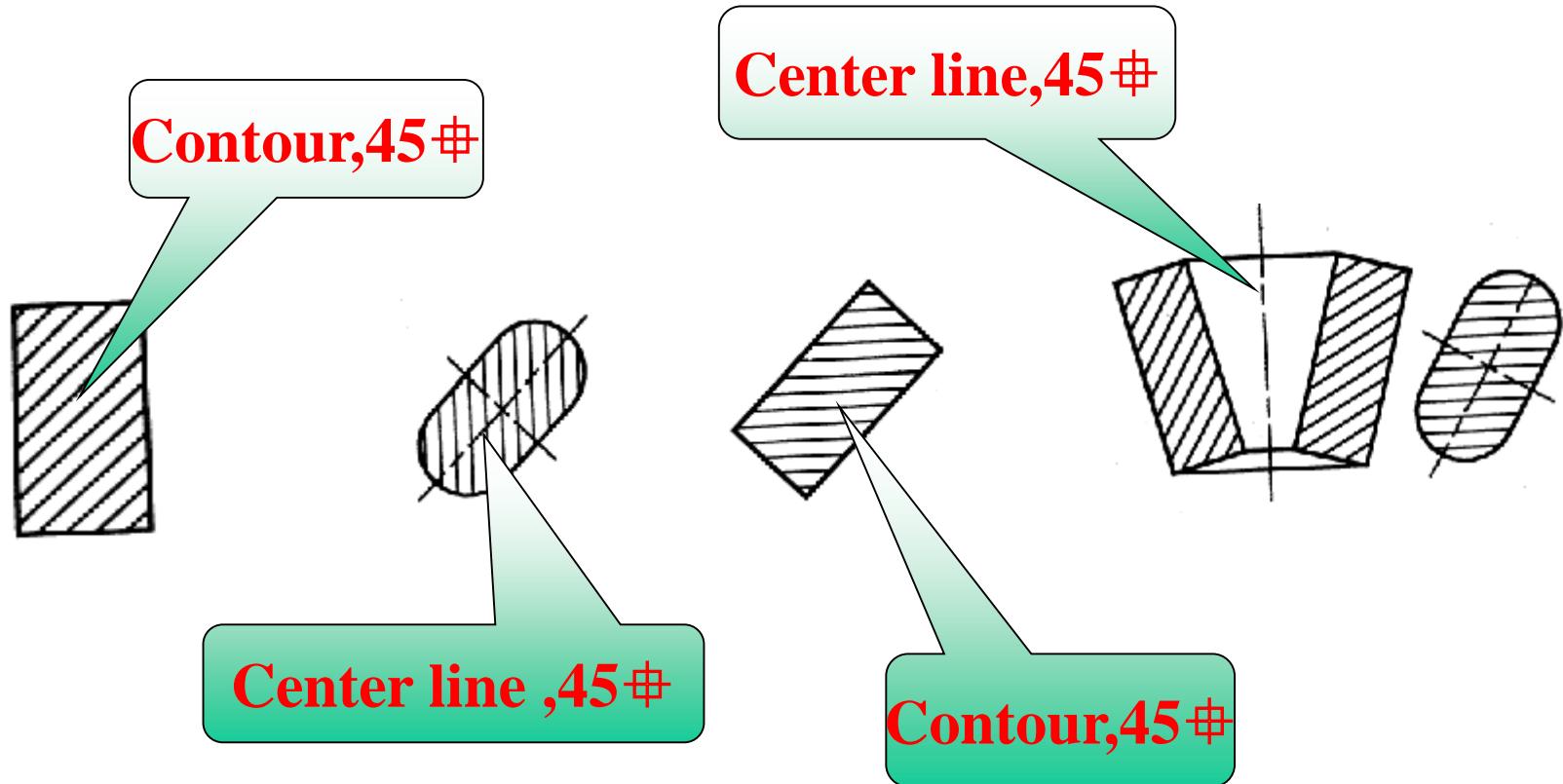


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# Chapter 7 section views

*attention*

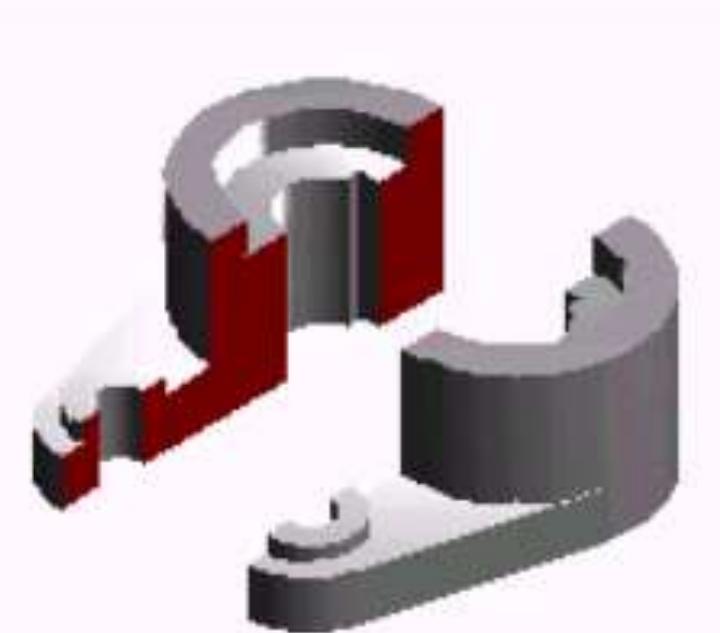
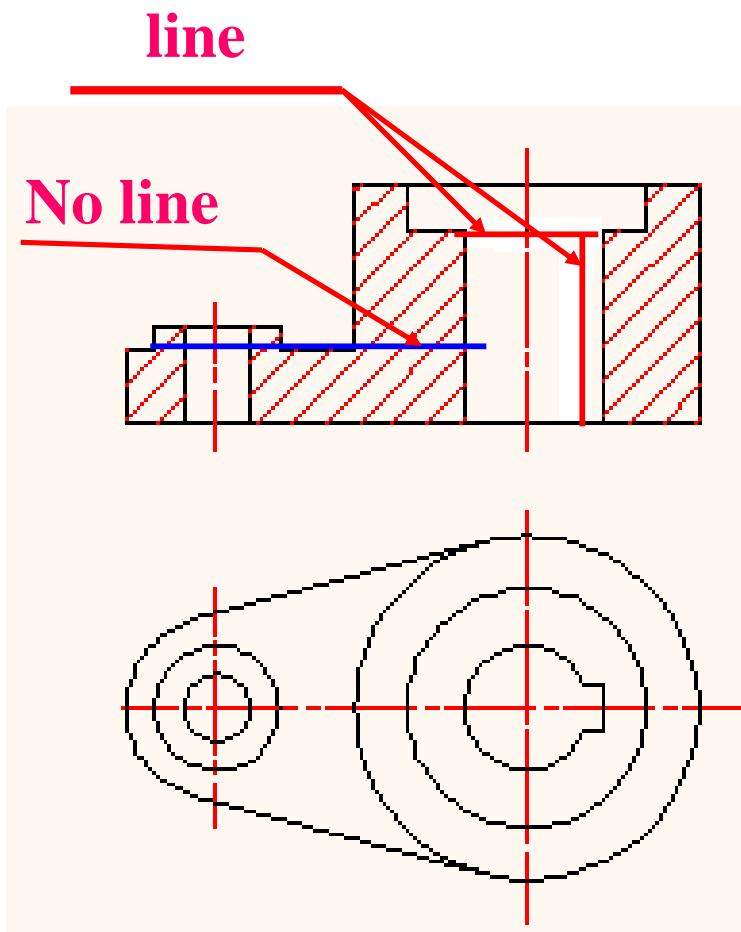


Section lines-thin!!



# Chapter 7 section views

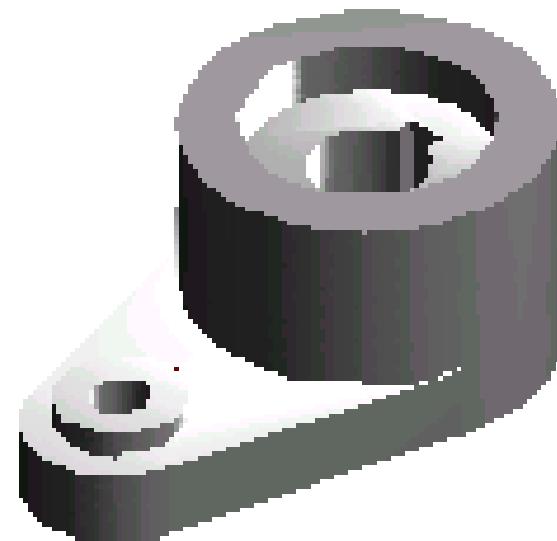
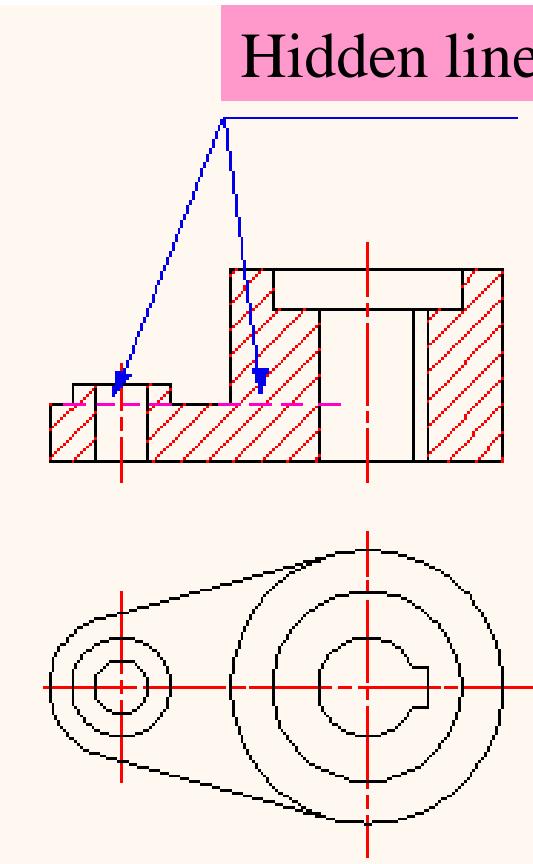
*attention*



# Chapter 7 section views

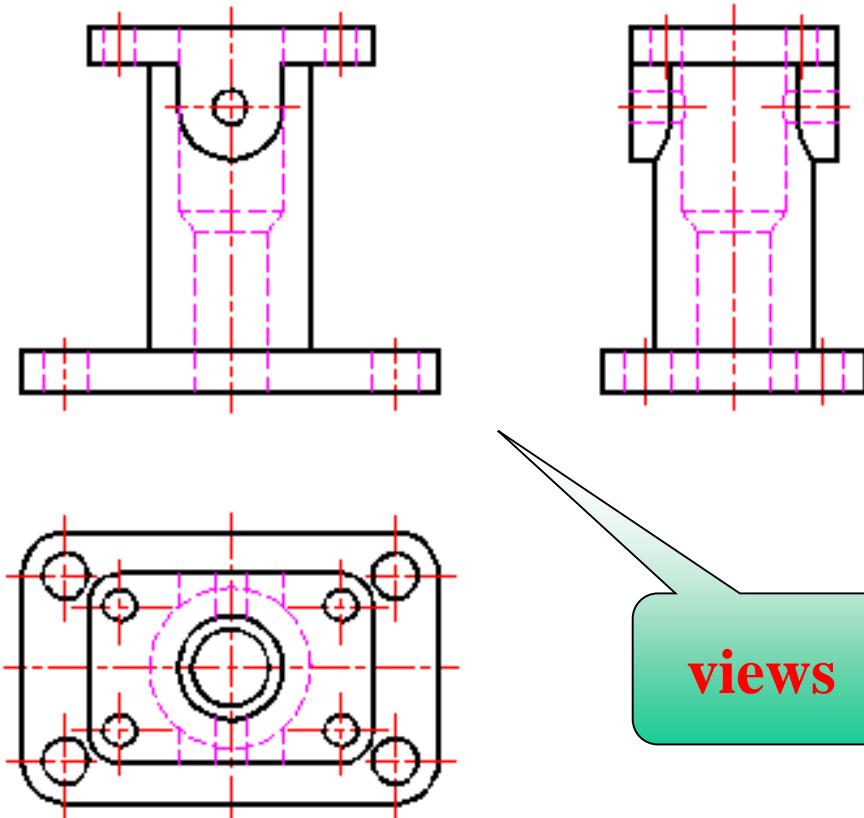
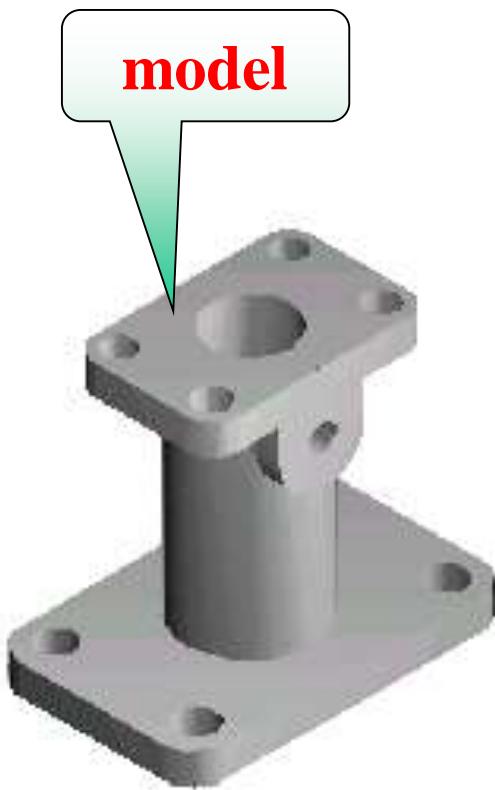
*attention*

Hidden line should be omitted!!!



# Chapter 7 section views

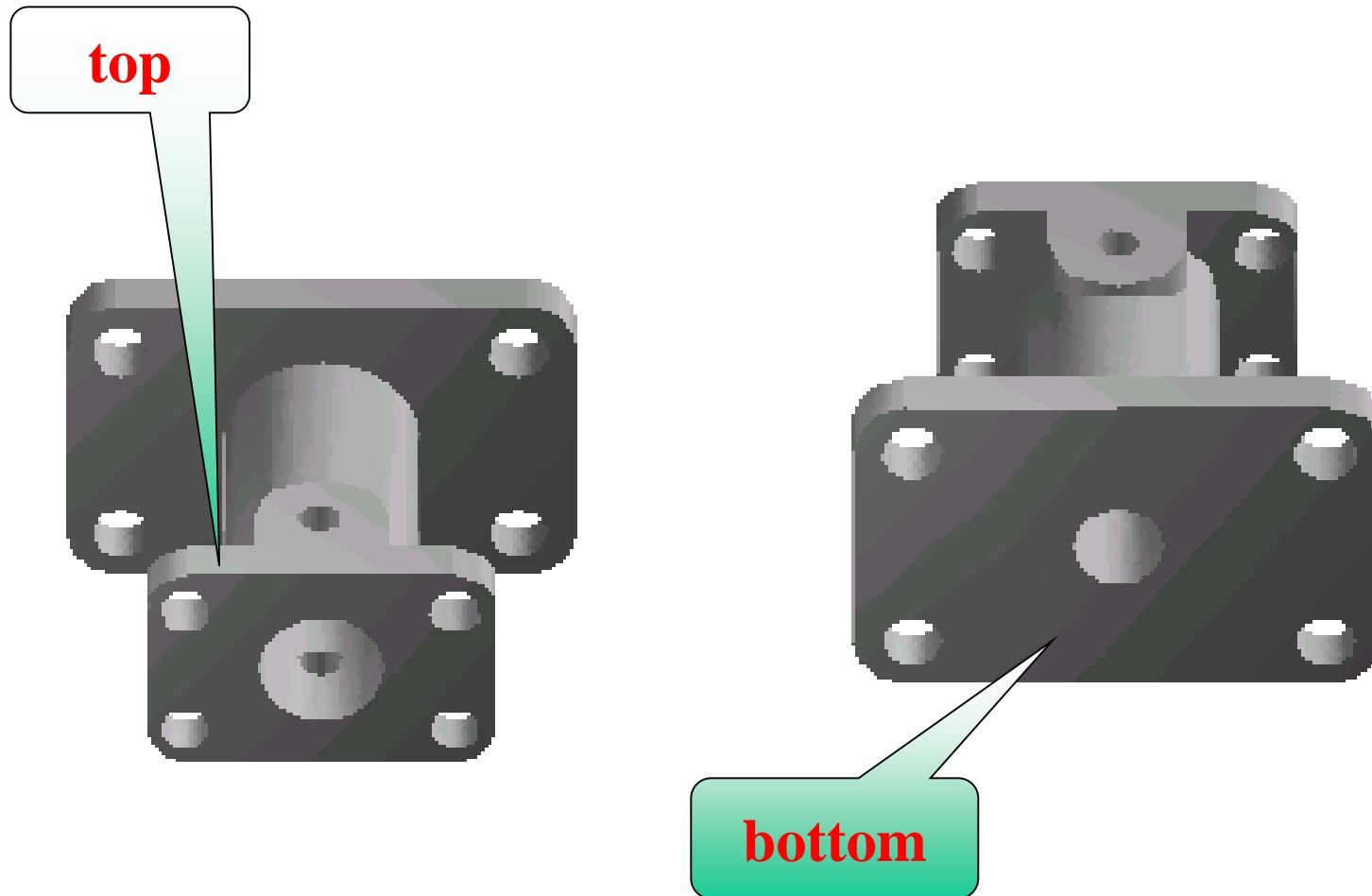
## 2.half sections



**views**

# Chapter 7 section views

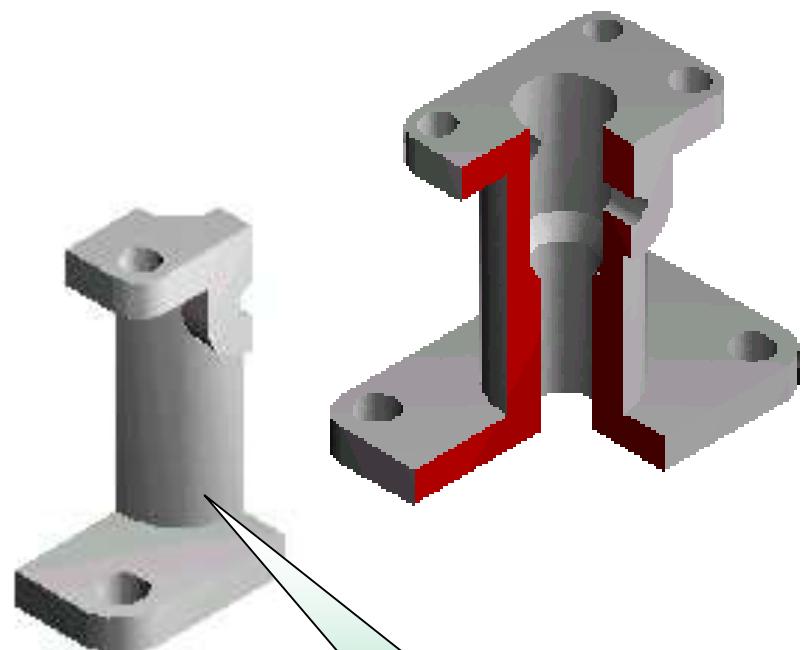
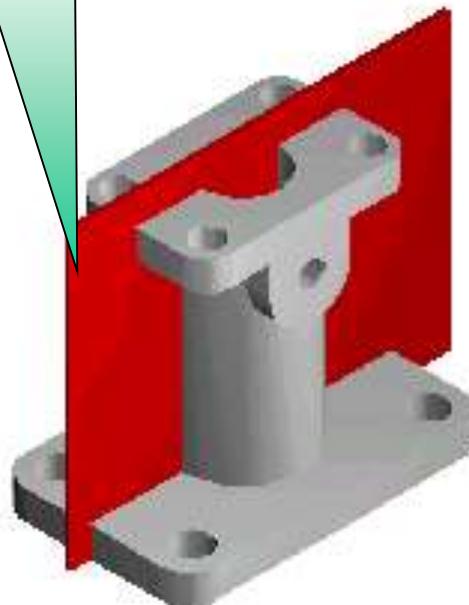
## 2.half sections



# Chapter 7 section views

## 2.half sections

Cutting plane

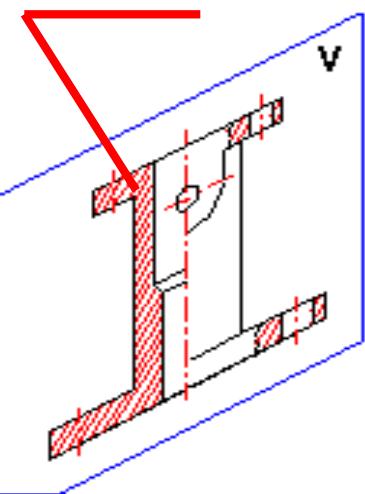


remove

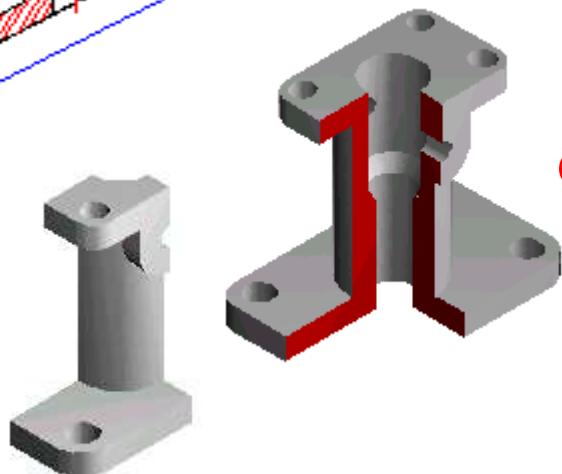
# Chapter 7 section views

## 2.half sections

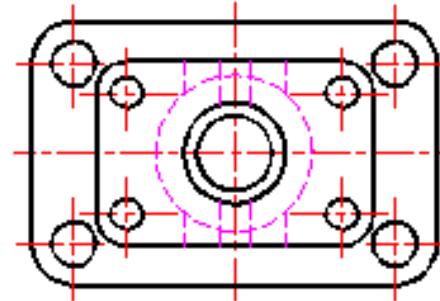
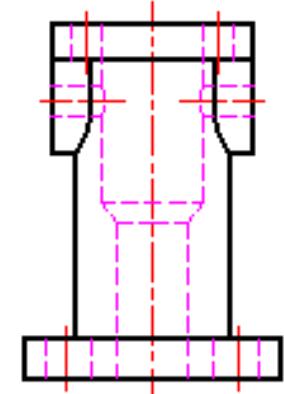
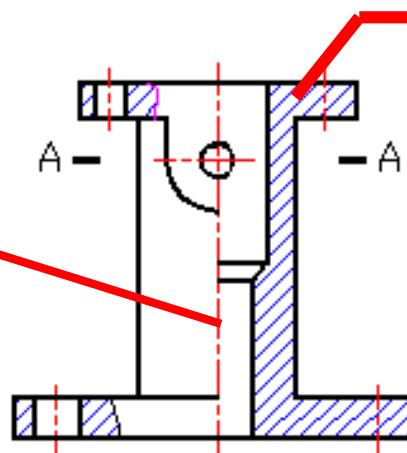
**Half section**



**symmetry**



**Half section**

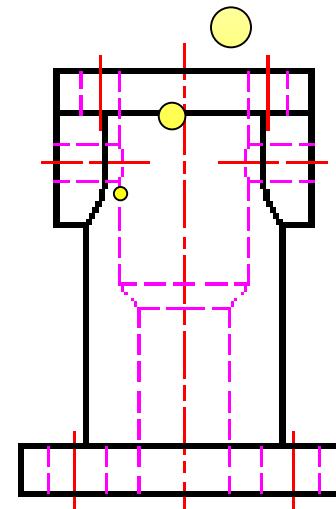
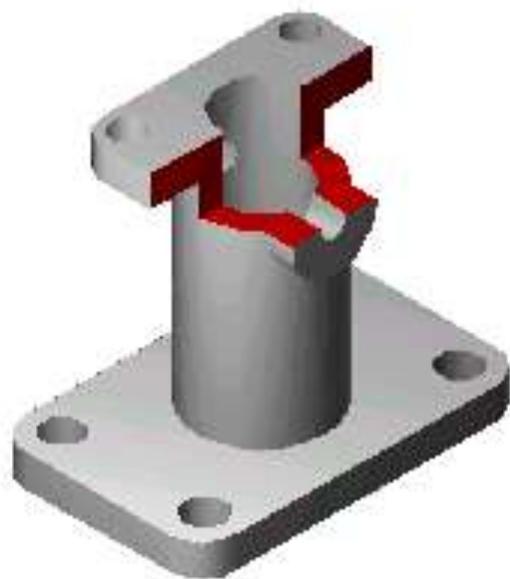
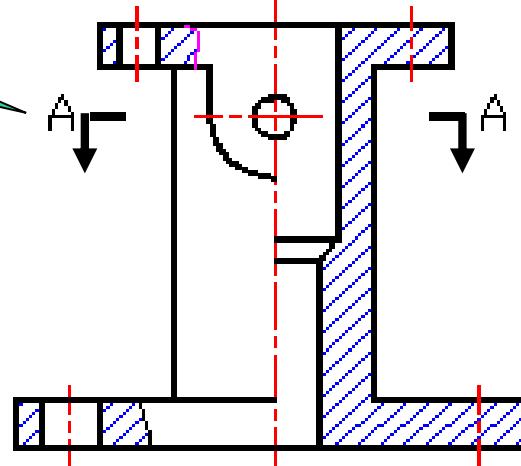


# Chapter 7 section views

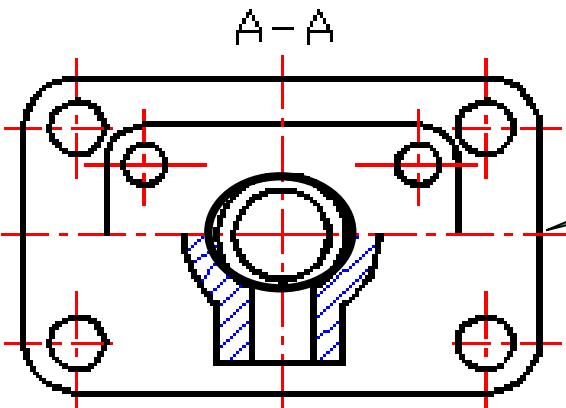
2.half sections

hidden?

label

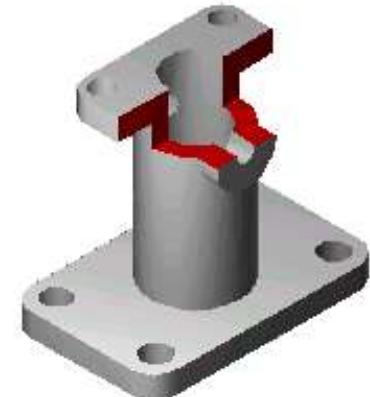
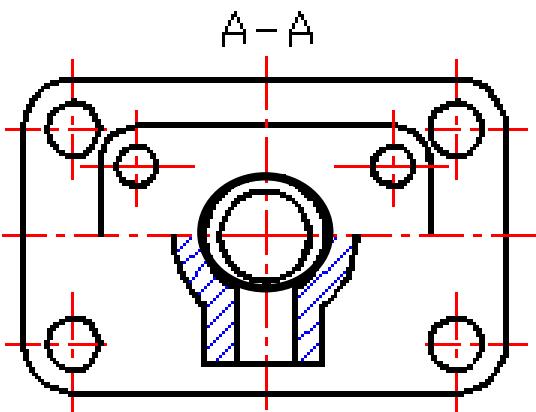
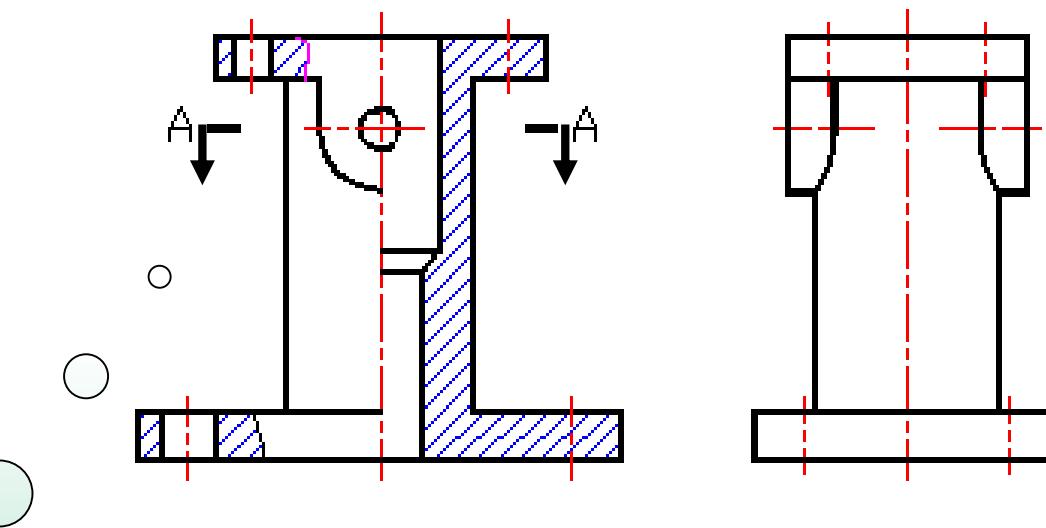
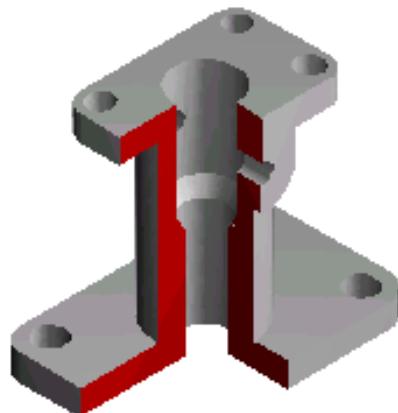


symmetry



# Chapter 7 section views

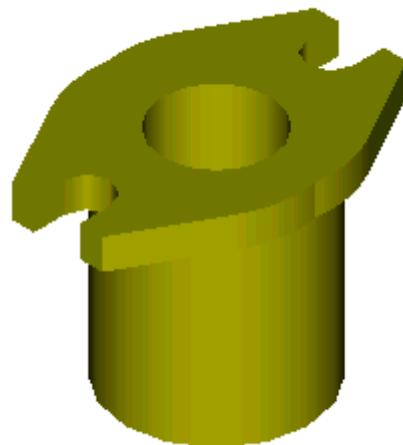
## 2.half sections



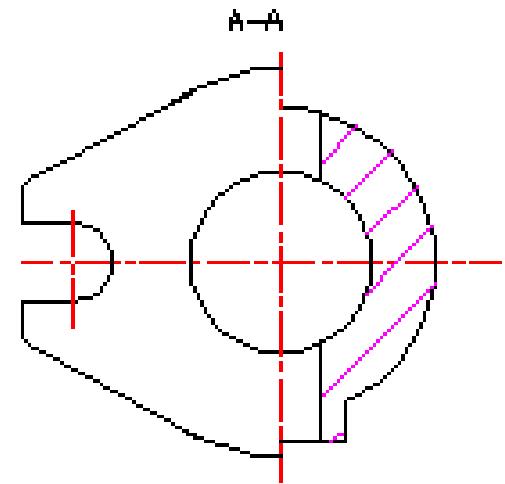
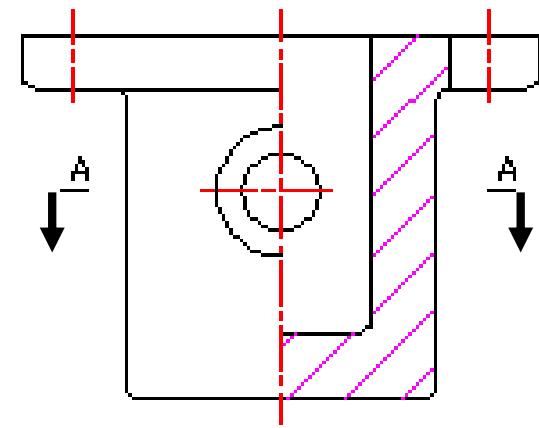
**Notice:**  
**the direction  
of section lines**

# Chapter 7 section views

## 2.half sections



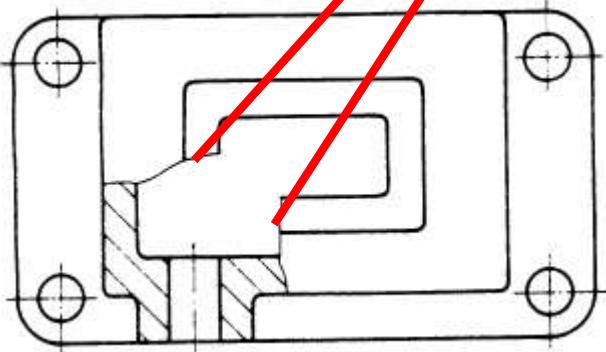
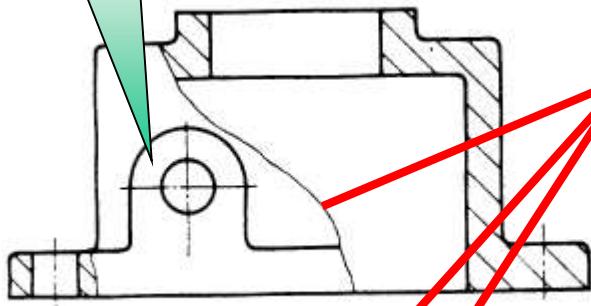
example



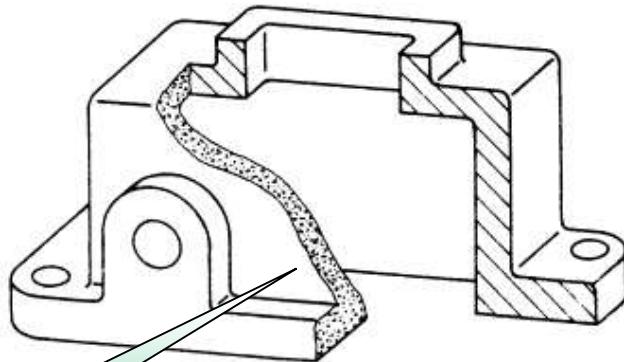
# Chapter 7 section views

## 3.Broken-out sections

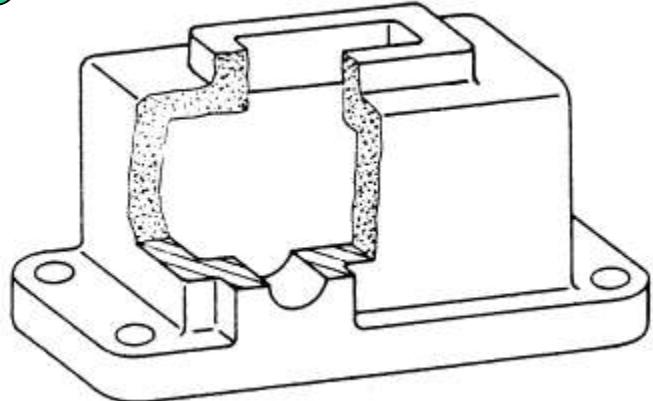
External



Short break  
lines (thick)



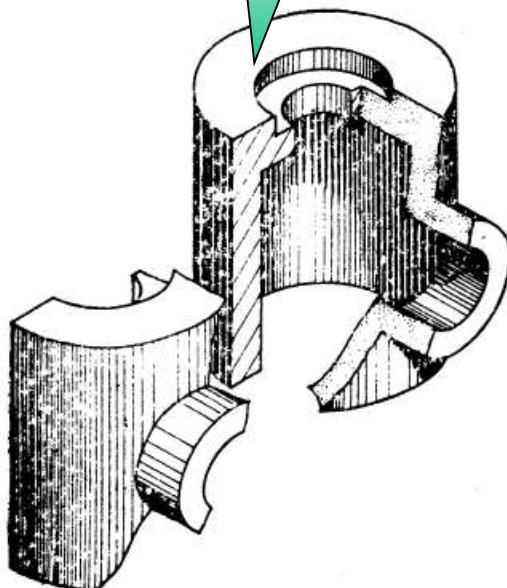
model



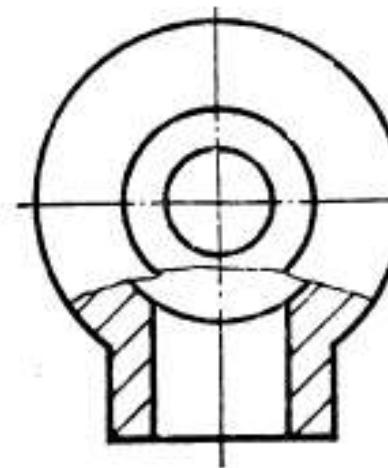
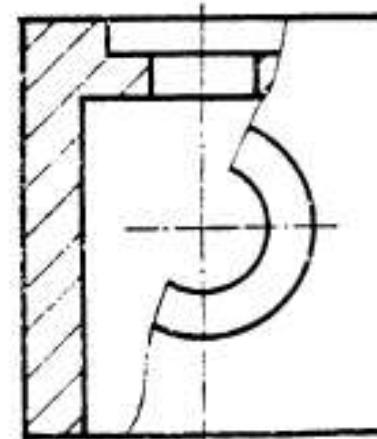
# Chapter 7 section views

## 3.Broken-out sections

model



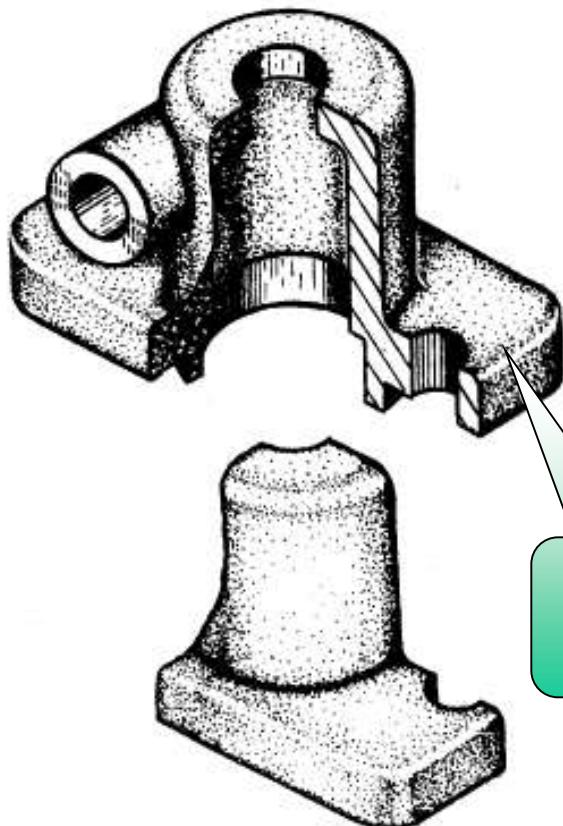
example



Section plane?

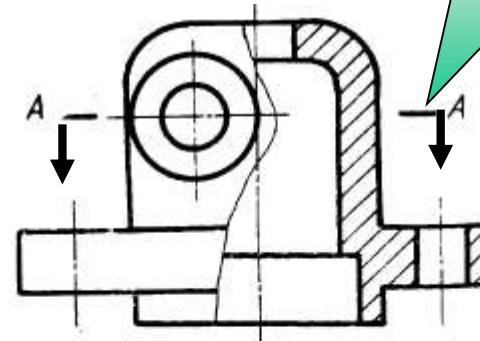
# Chapter 7 section views

## 3.Broken-out sections

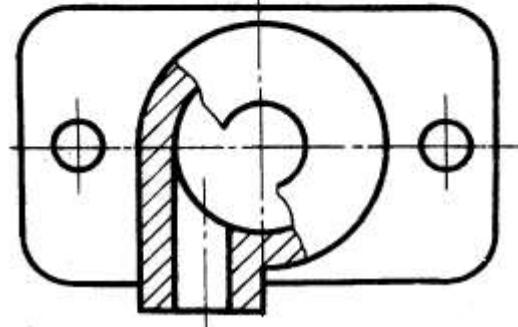


模型

label



Cutting  
position

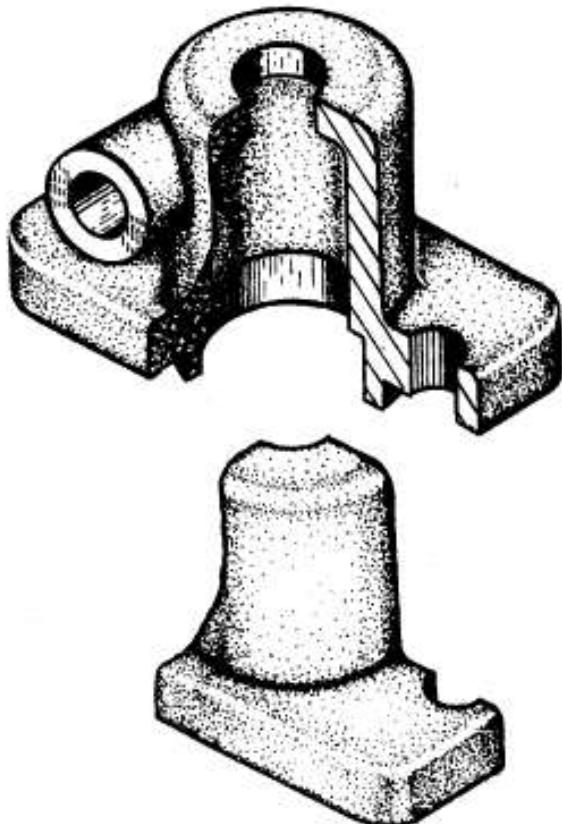


Name

# Chapter 7 section views

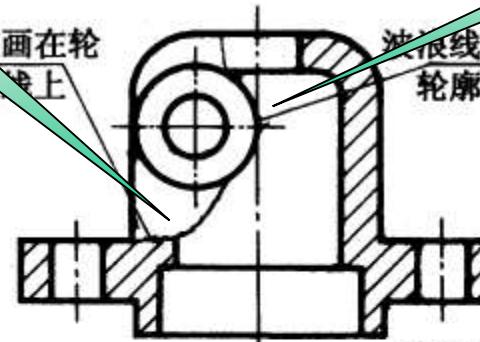
## 3.Broken-out sections

attention



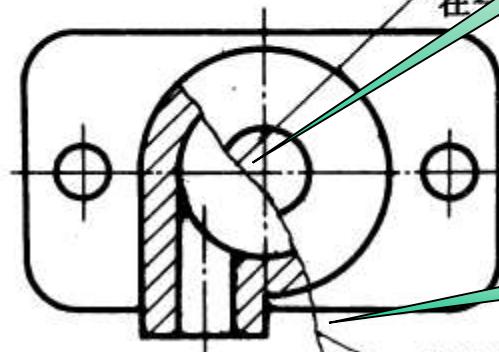
false

波浪线应画在轮廓线的延长线上



false

波浪线不能与轮廓线重合



false

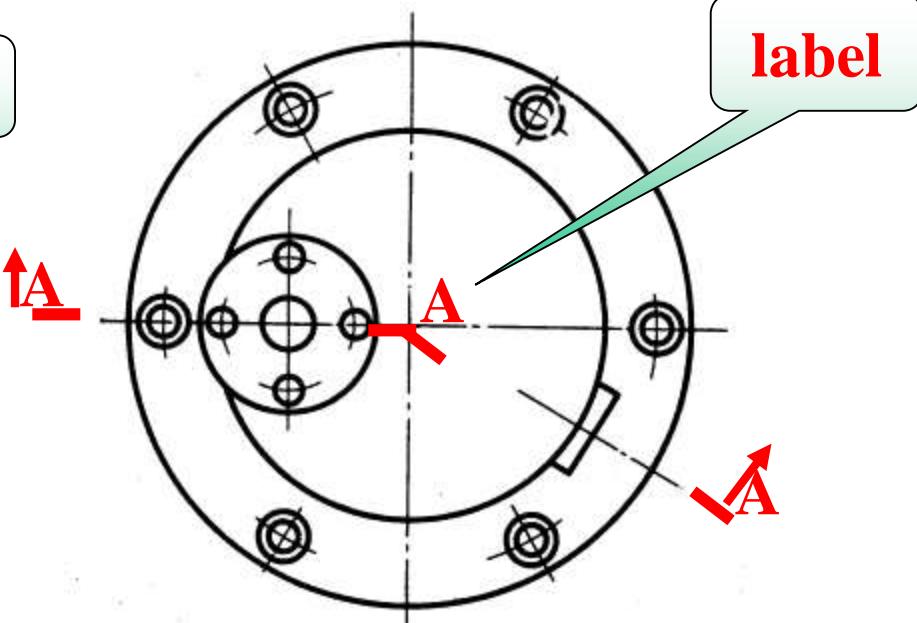
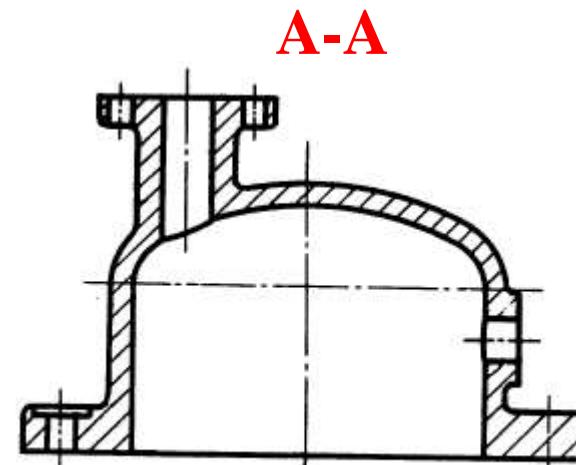
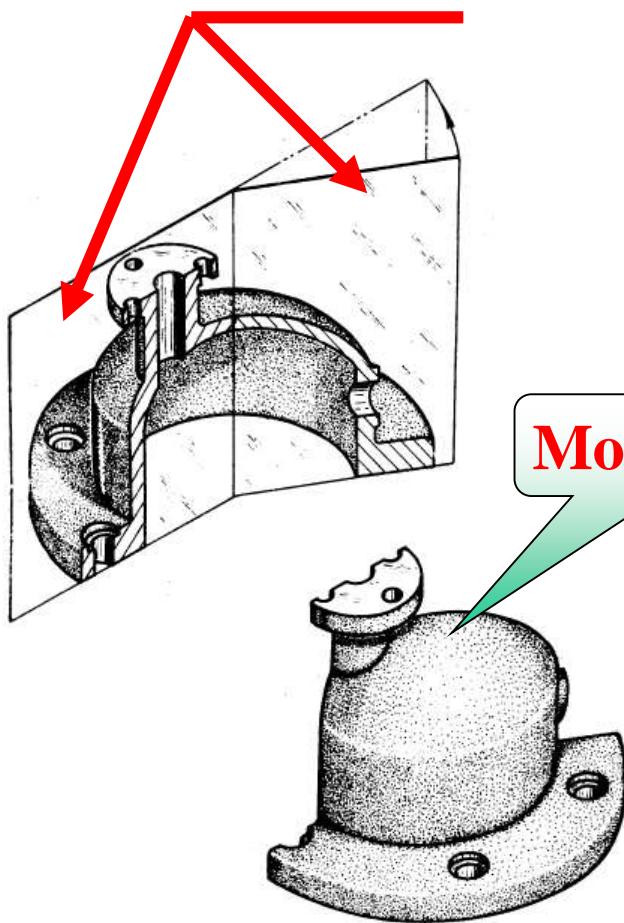
波浪线不能圆在空洞地方

波浪线不能超出视图轮廓线

# Chapter 7 section views

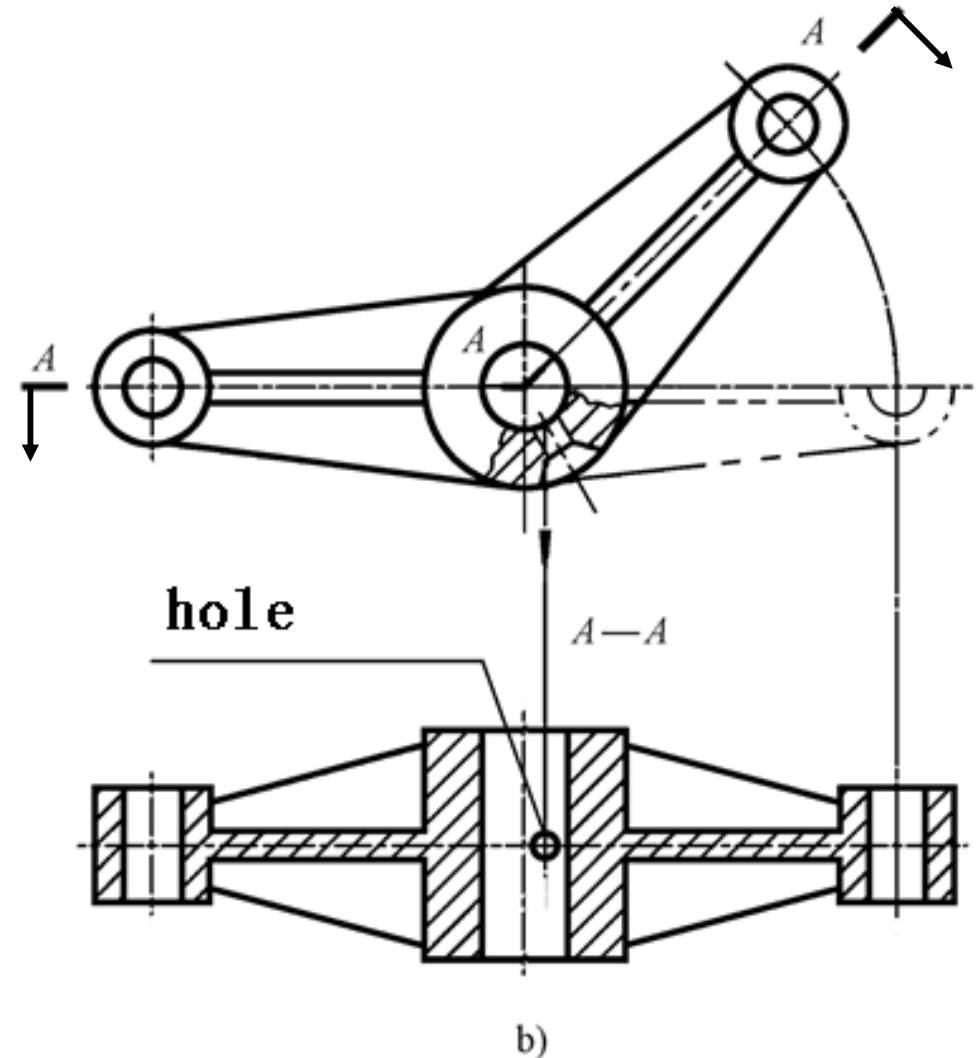
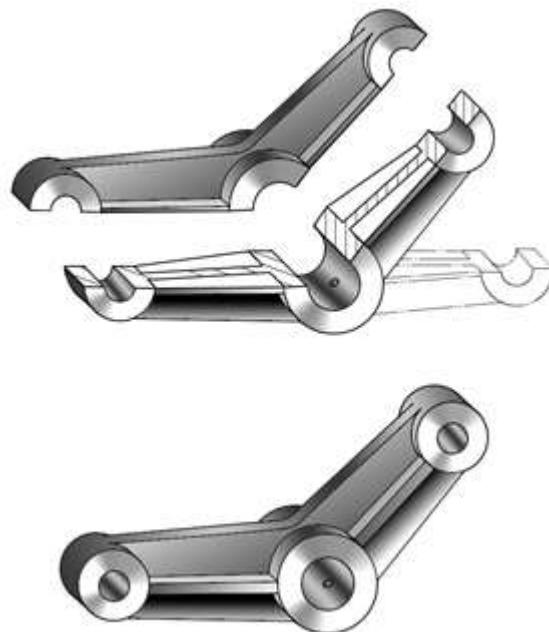
## 4.aligned sections

Two intersecting planes



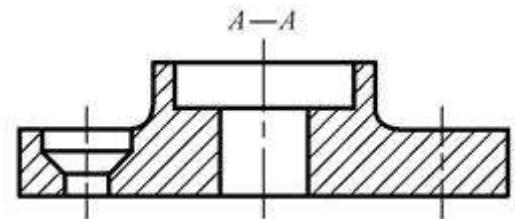
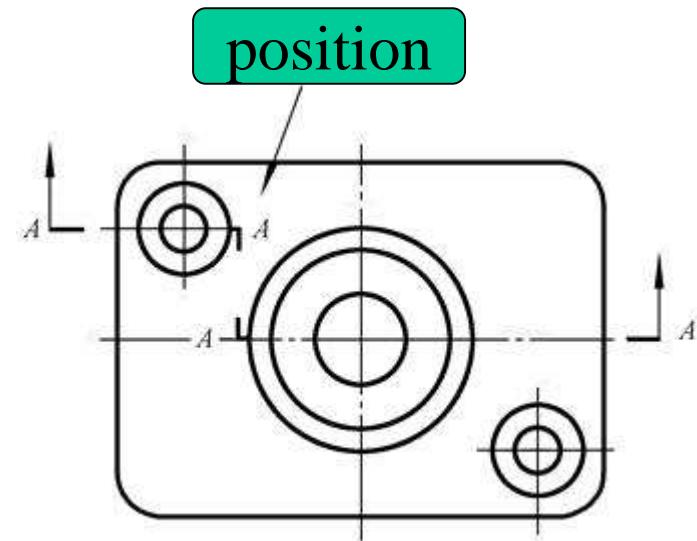
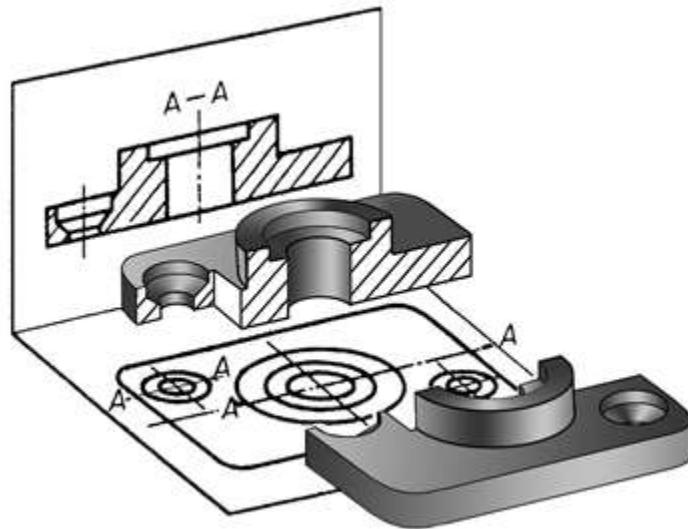
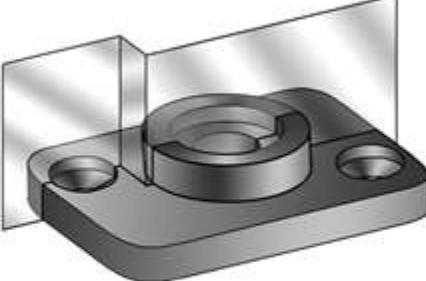
# Chapter 7 section views

## 4.aligned sections



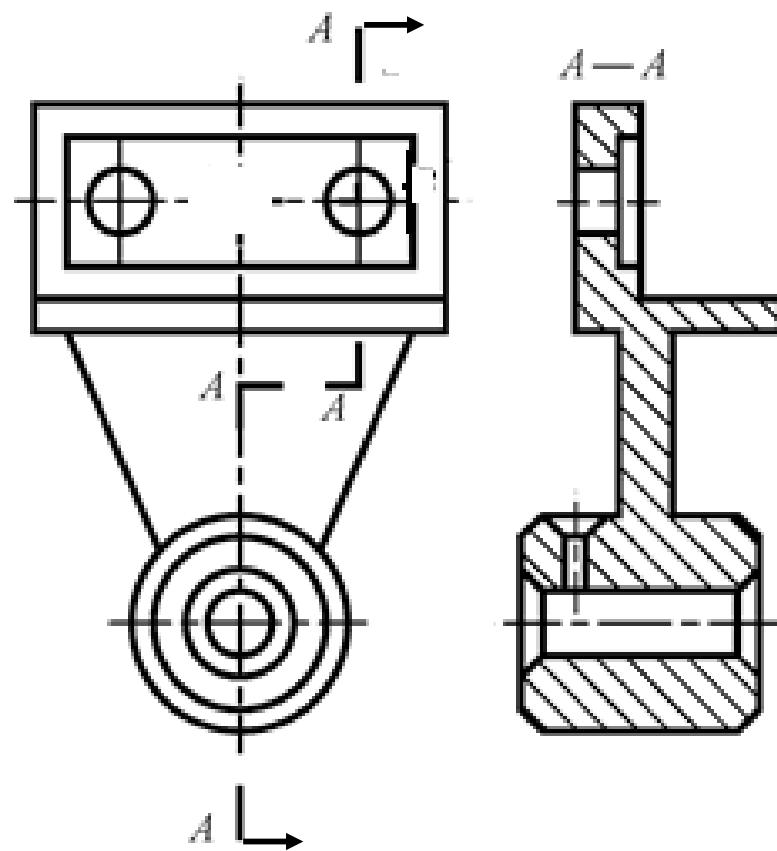
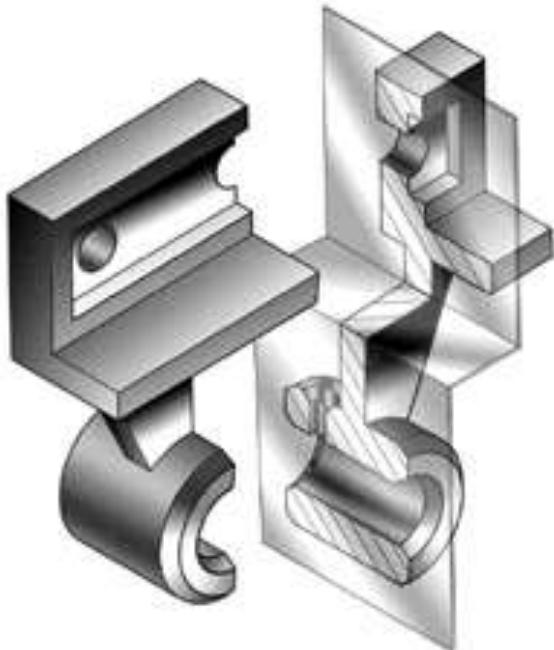
# Chapter 7 section views

## 5.offset sections



# Chapter 7 section views

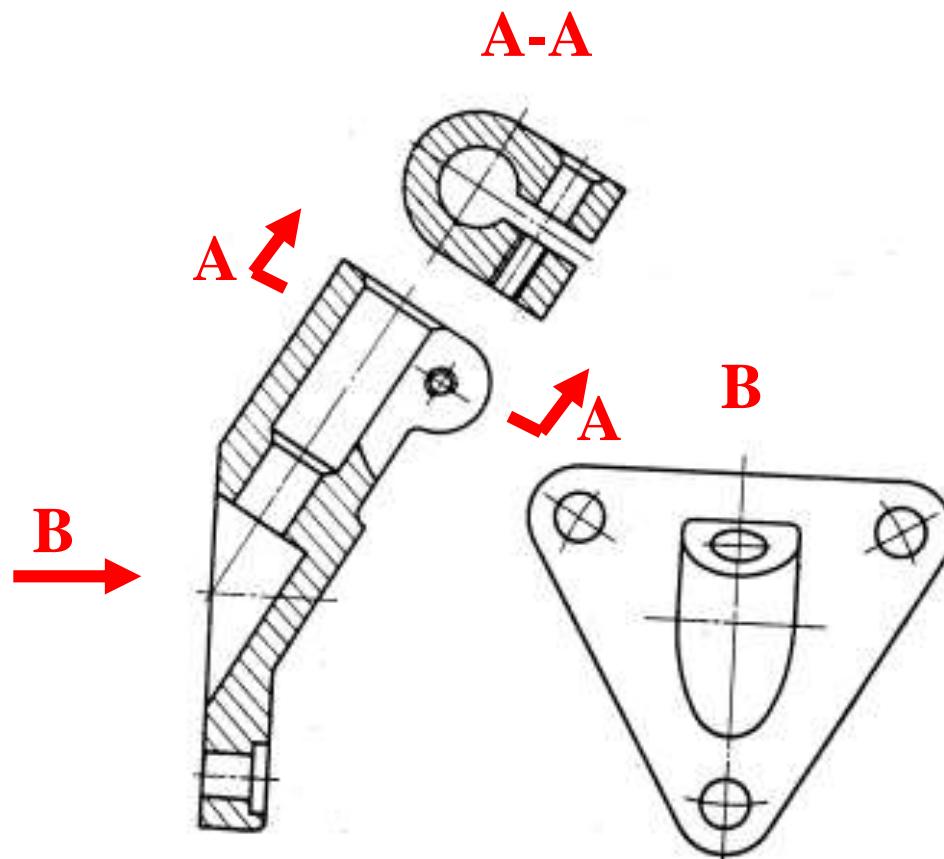
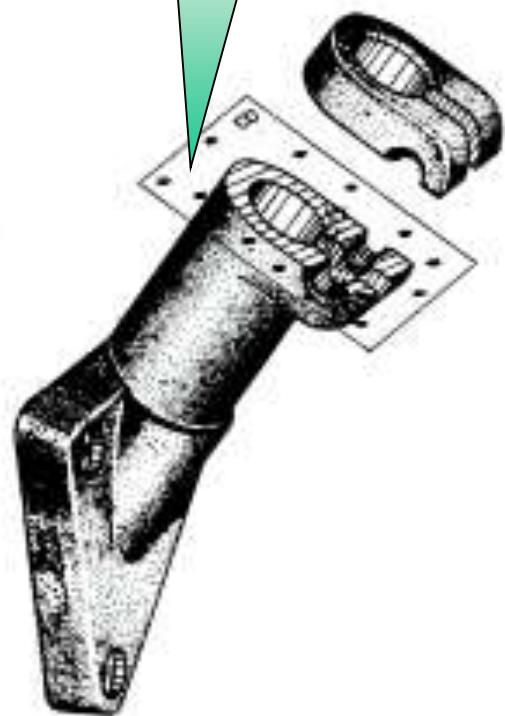
## 5.offset sections



# Chapter 7 section views

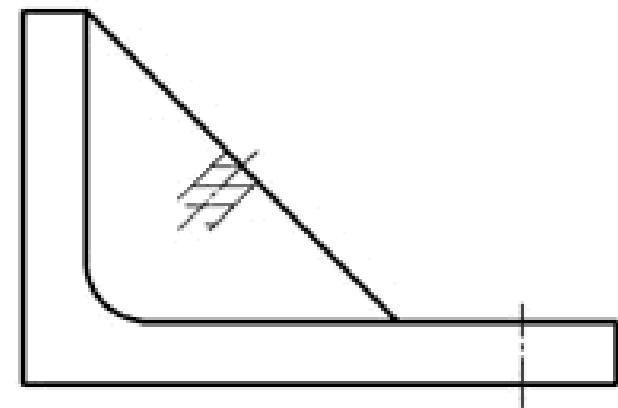
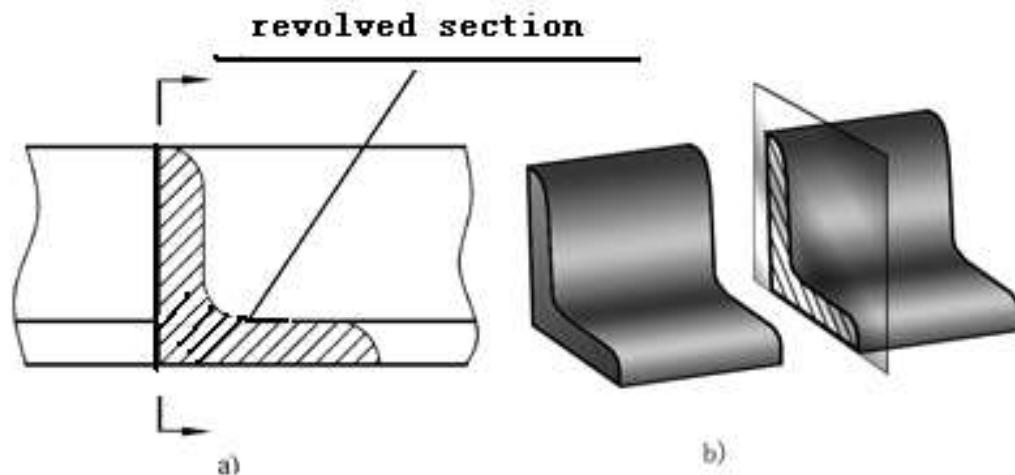
## 6.inclined sections

Section plane



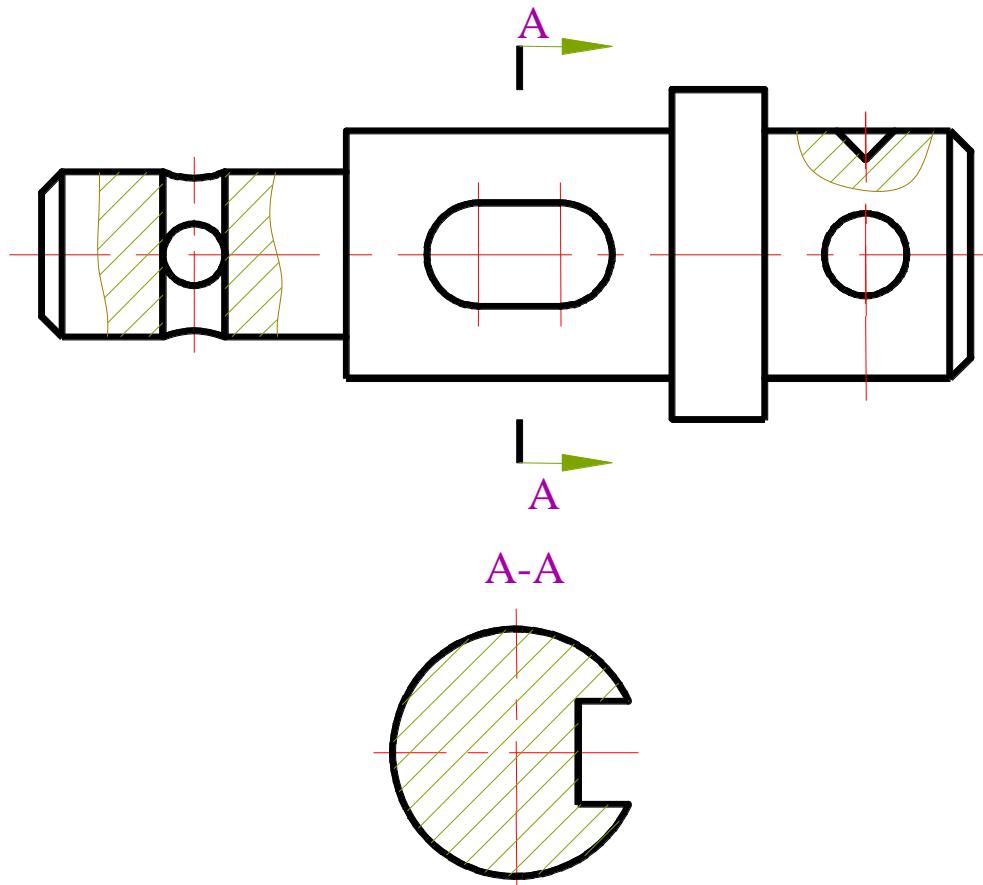
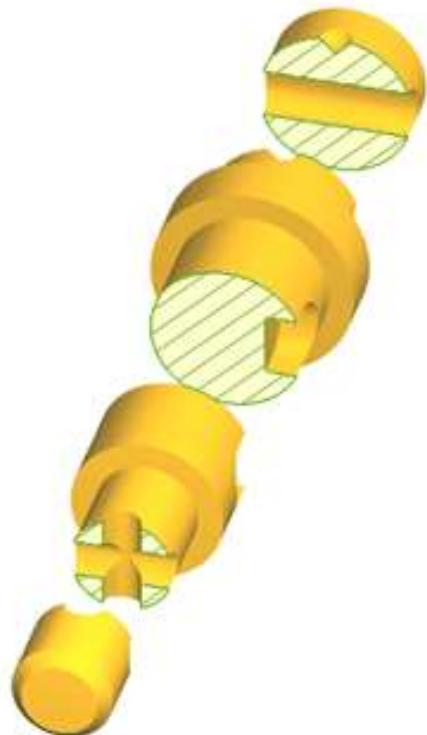
# Chapter 7 section views

## 7.revolved sections



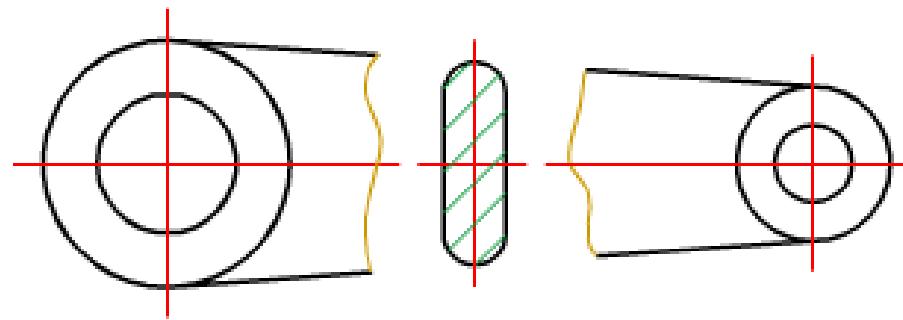
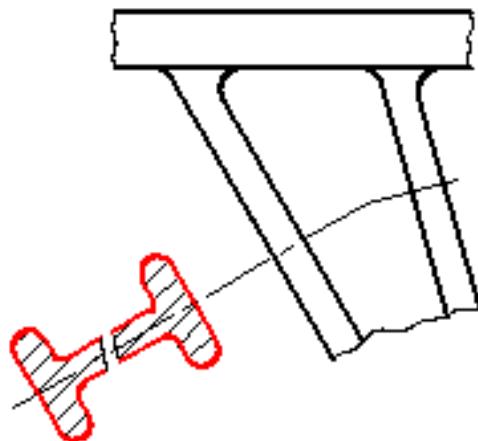
# Chapter 7 section views

## 8.removed sections



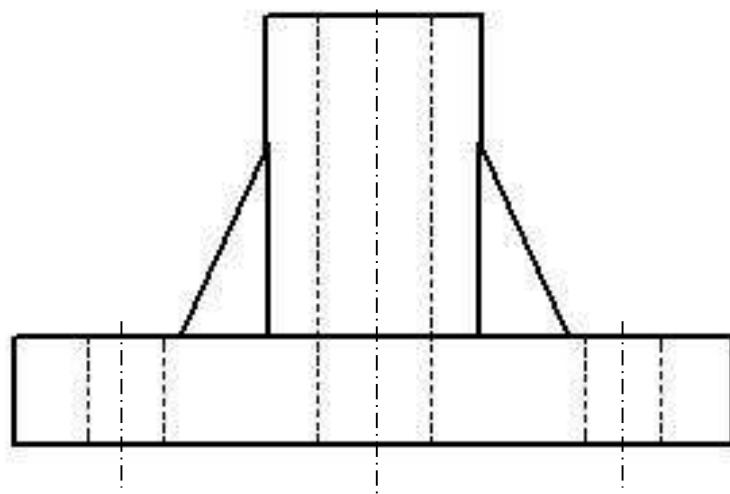
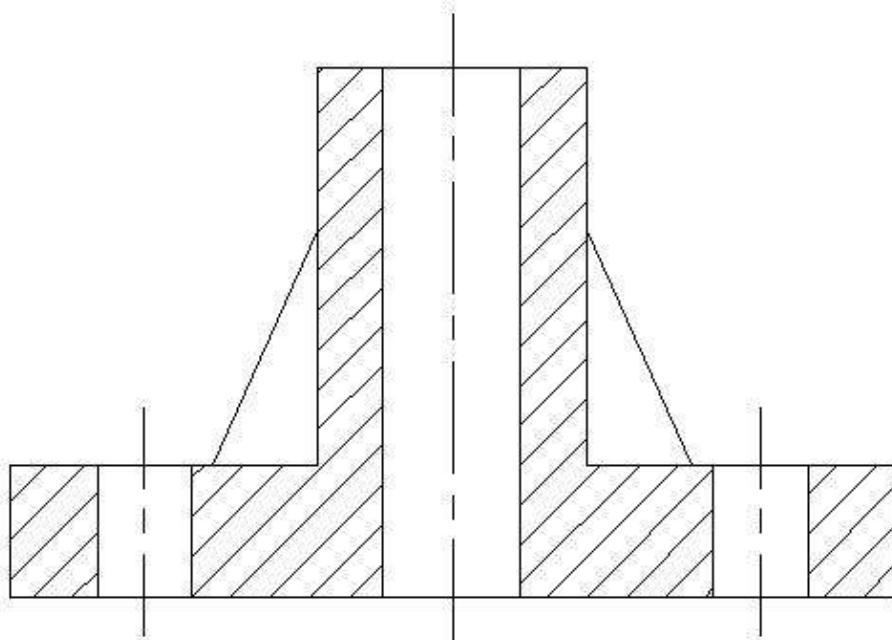
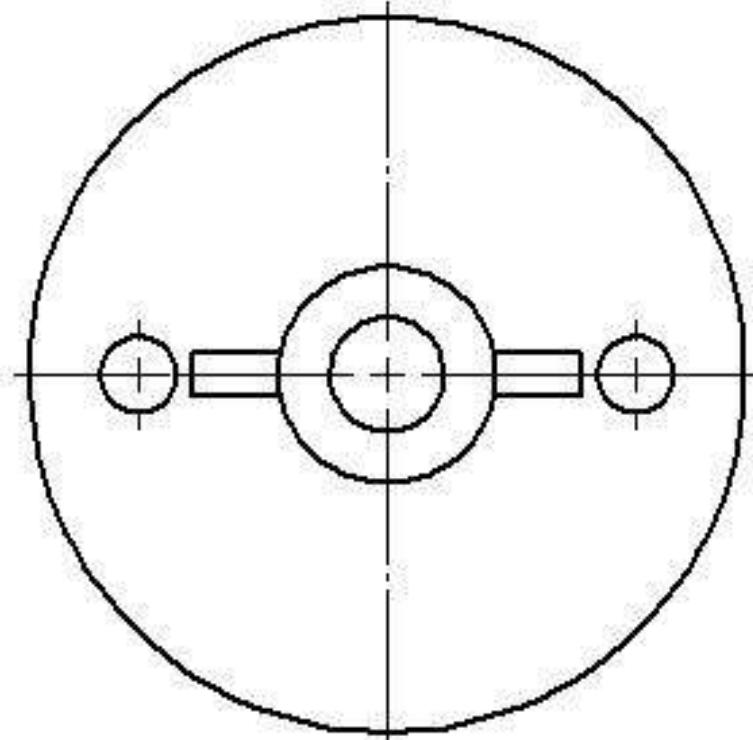
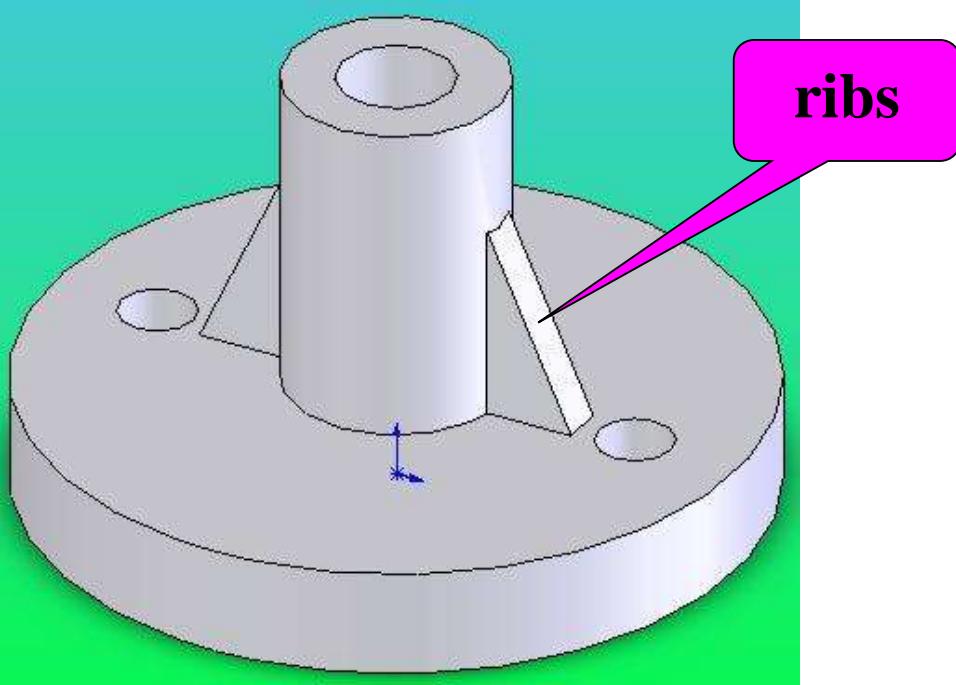
# Chapter 7 section views

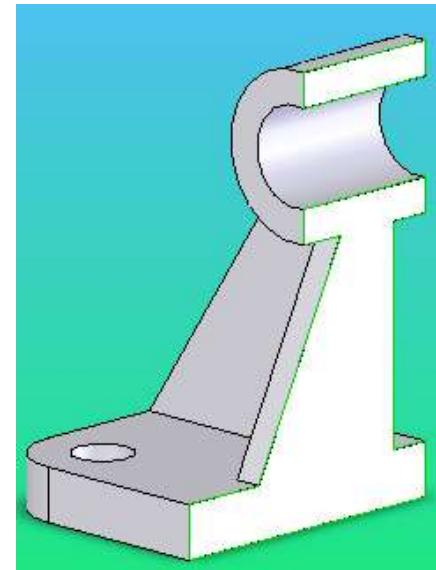
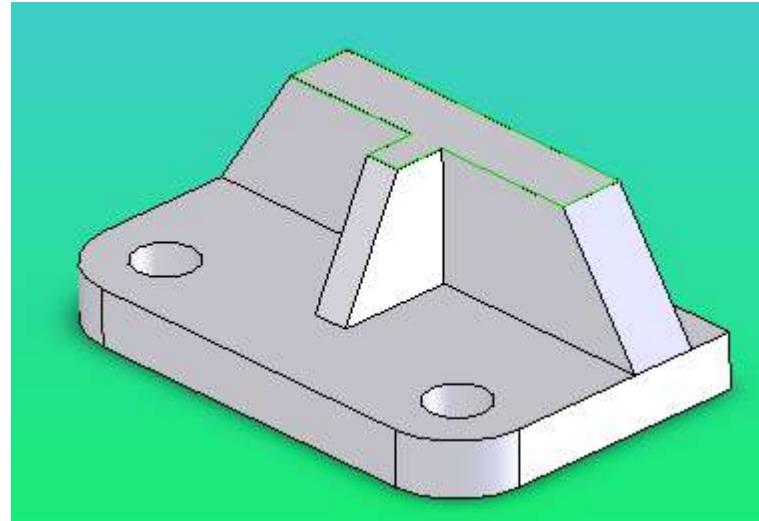
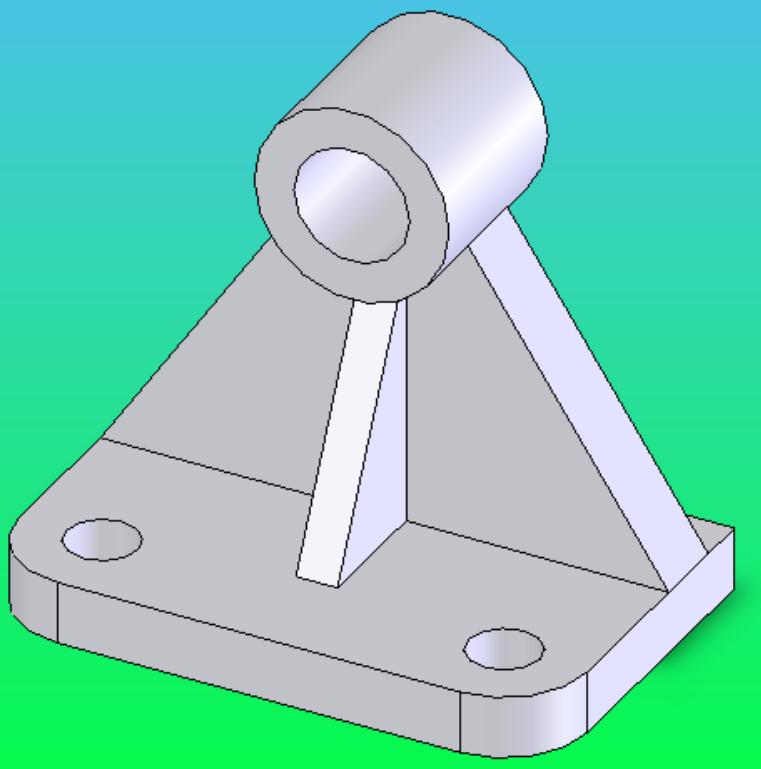
## 8.removed sections



## **9. Ribs in sections**

**To avoid a false impression of thickness and solidity,  
ribs, webs, gear teeth, and other similar flat features are not  
sectioned even though the cutting plane passes along the  
center plane of the feature.**



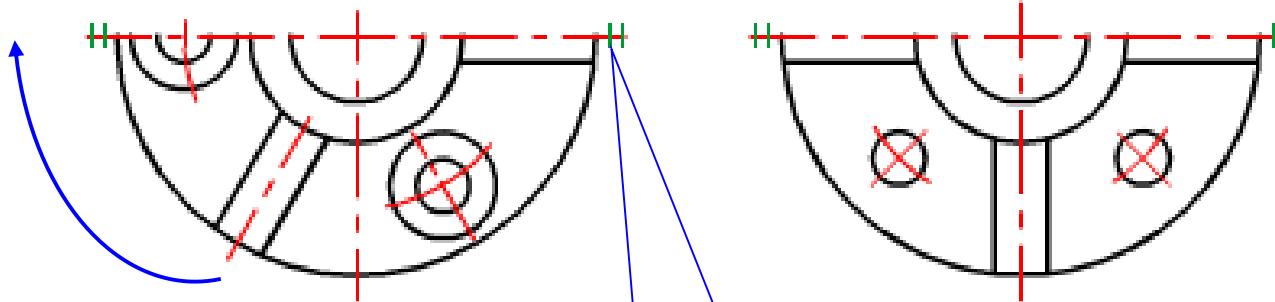
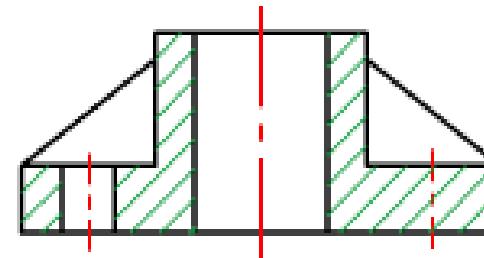
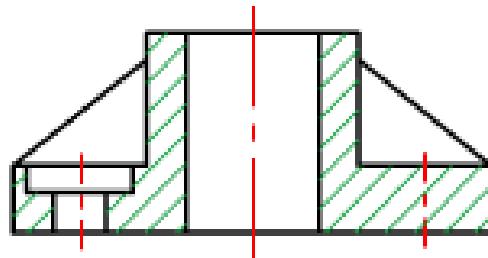


.....Cutting plane passes along **the center plane** of the feature.



# Chapter 7 section views

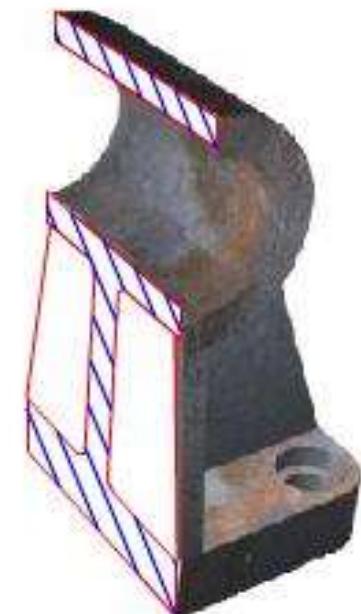
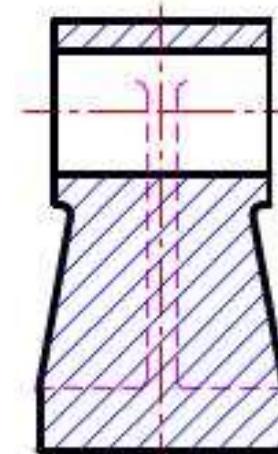
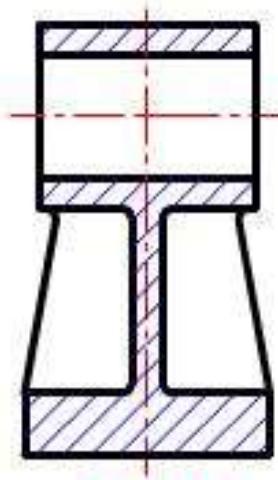
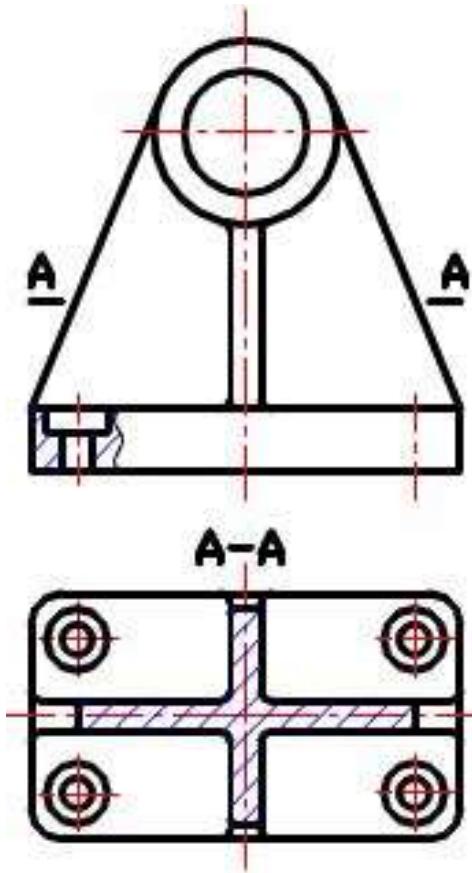
Ribs in sections



Vertical section

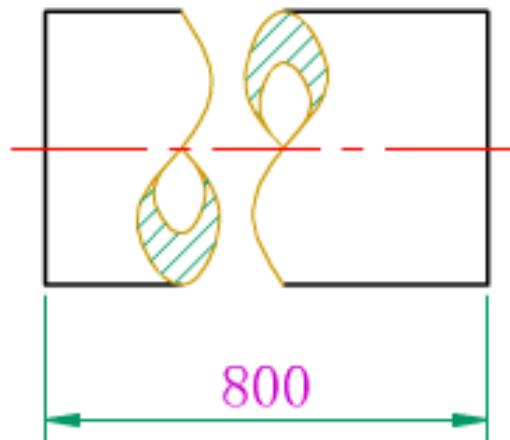
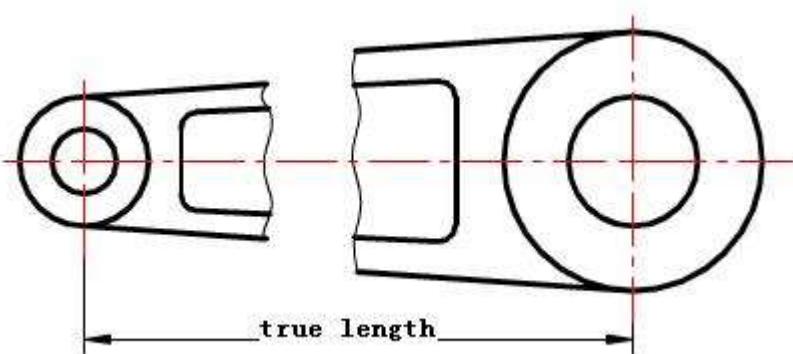
# Chapter 7 section views

Ribs in sections



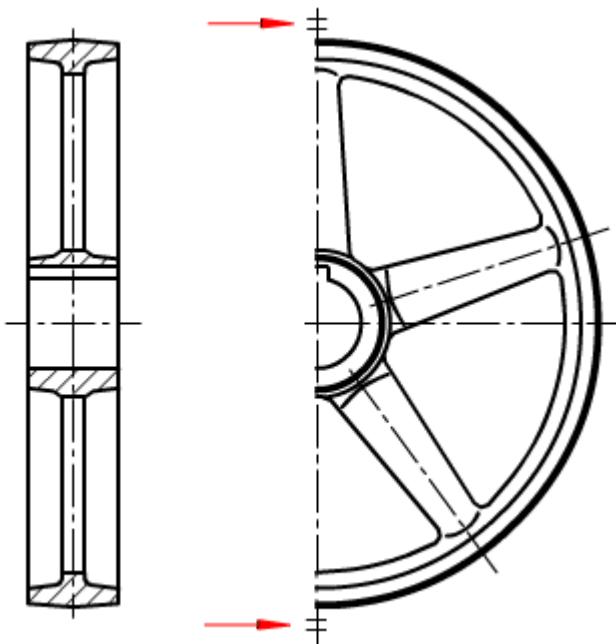
# Chapter 7 section views

To shorten a view of an elongated object, conventional breaks are recommended

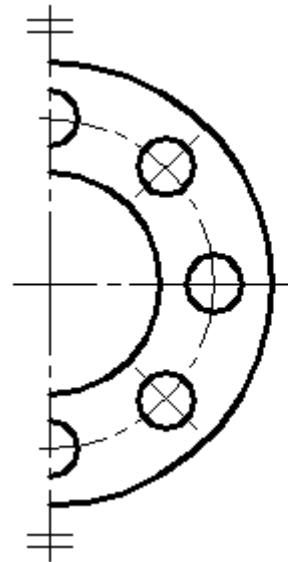


# Chapter 7 section views

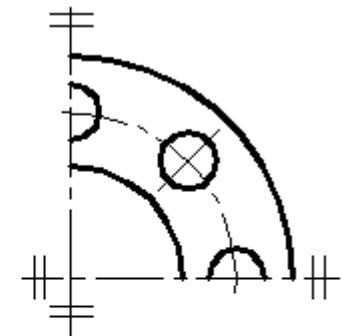
Space is limited & object is symmetry == partial views



1/2



1/2



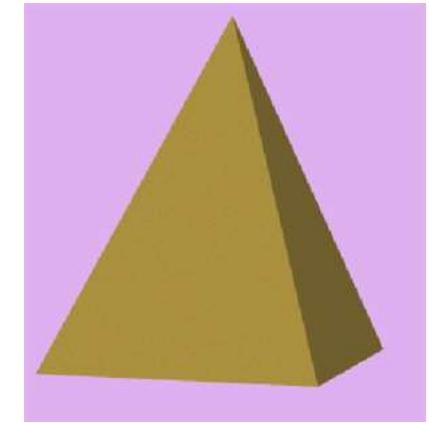
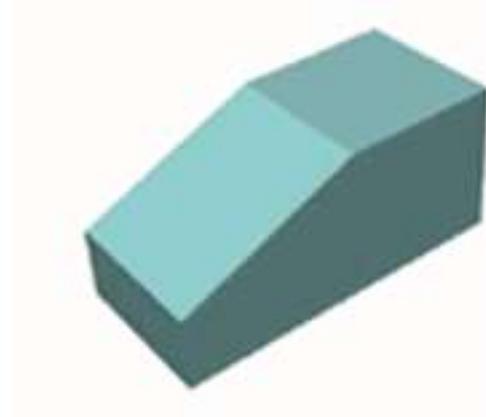
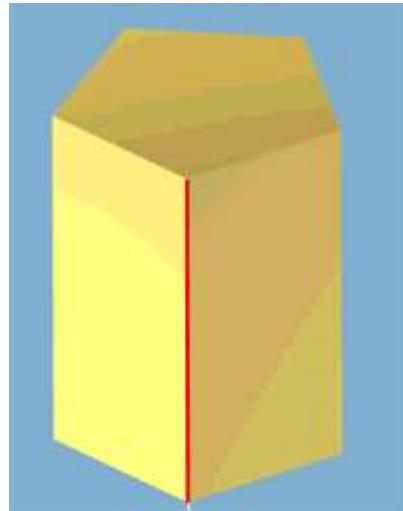
1/4

# ***Home work***

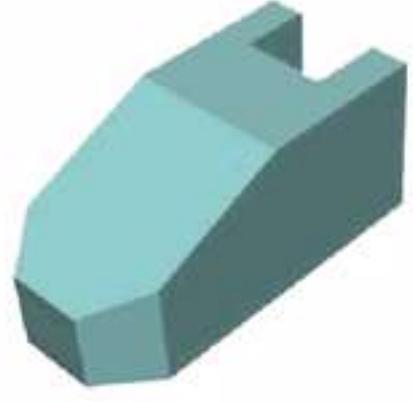
- Page 64** missing lines
- page 65** (1) front view->full section , left view-> half section
- page 67** front view& top view-> broken views
- Page 69** II-4-9 align section
- Page 70** (1) front view-> offset section
- Page 72** II-4-13 revolved section
- page 73** II-4-15 (1,2) removed section
- page 74** (1,2)draw correct full sections (about ribs)

# Chapter 6

## *Plane object*

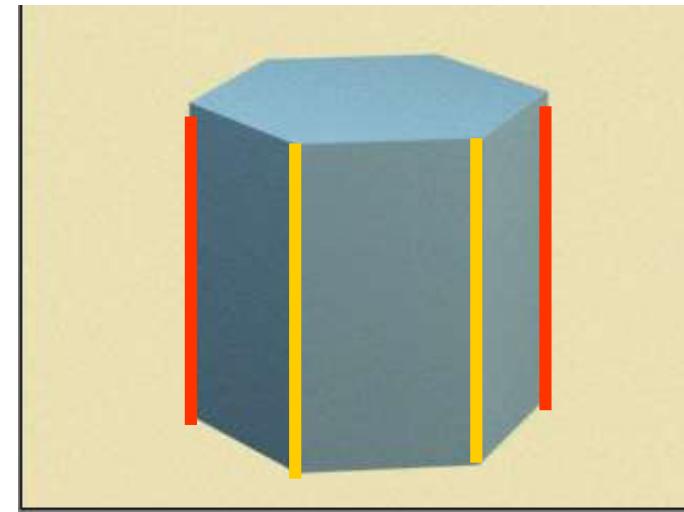
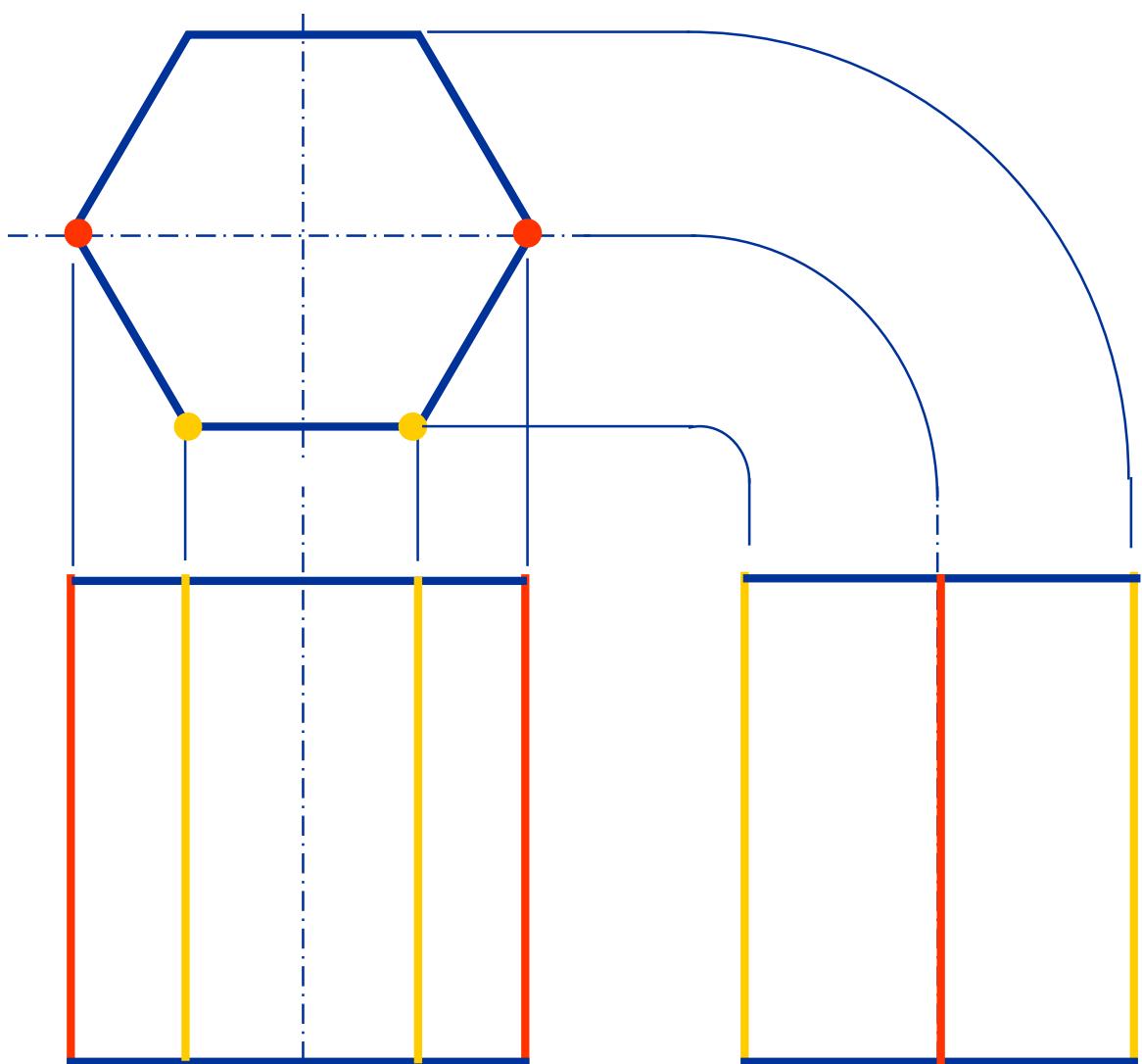


# 1.What is the plane solid?



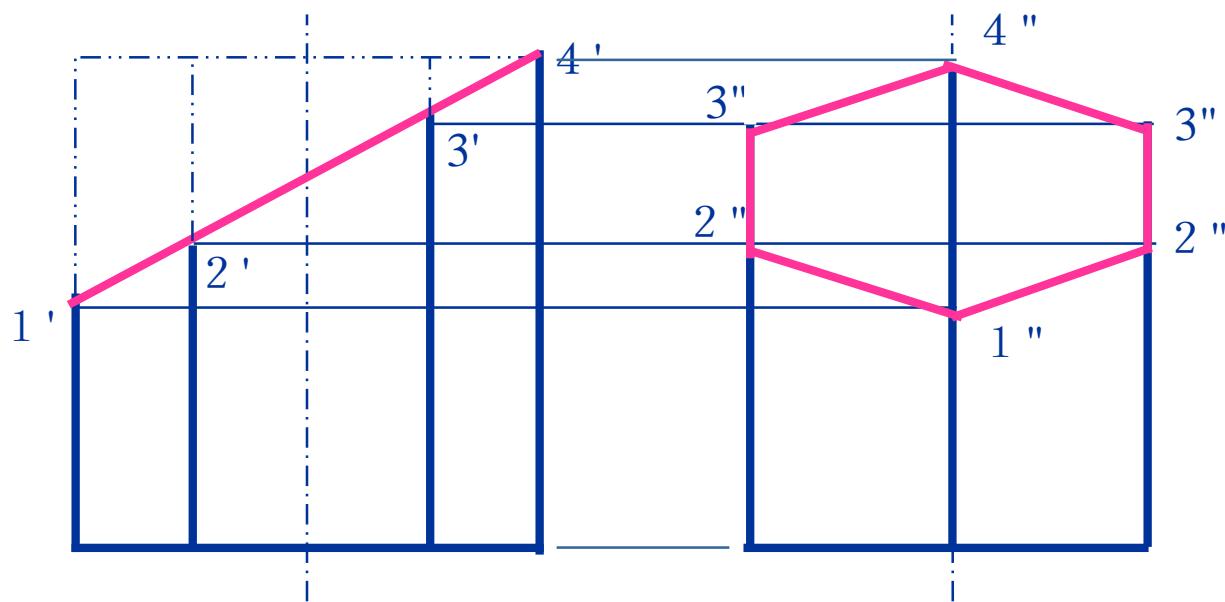
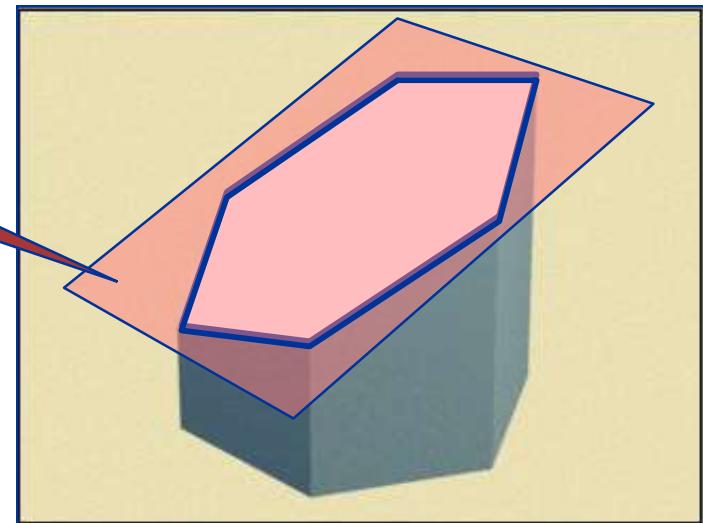
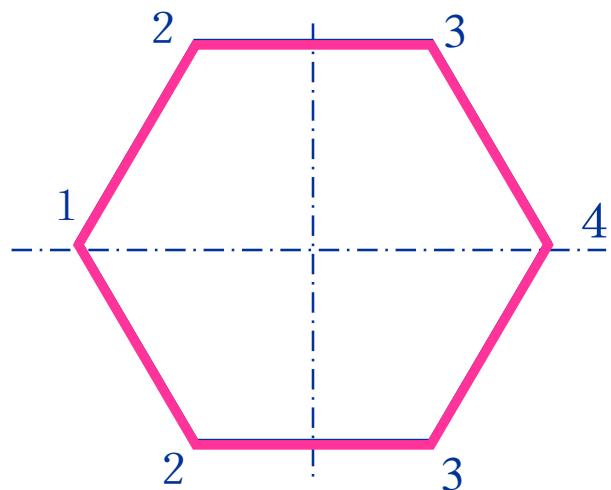
1. The plane solid consists of several surfaces;
2. Each surface is a Closed polygon.
3. Each polygon consists of beelines.

## 2.The projection of prism?

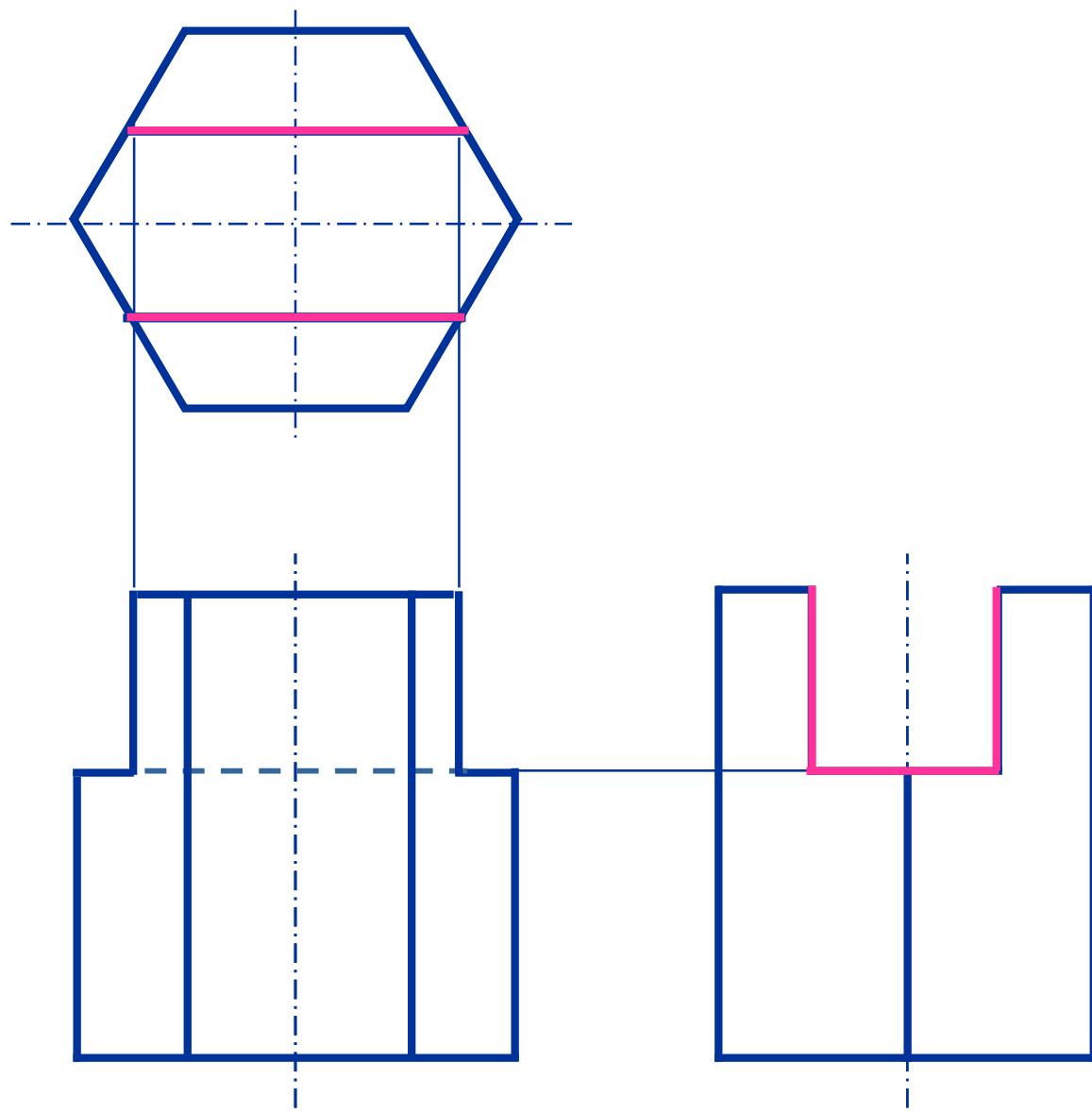


# Cut?

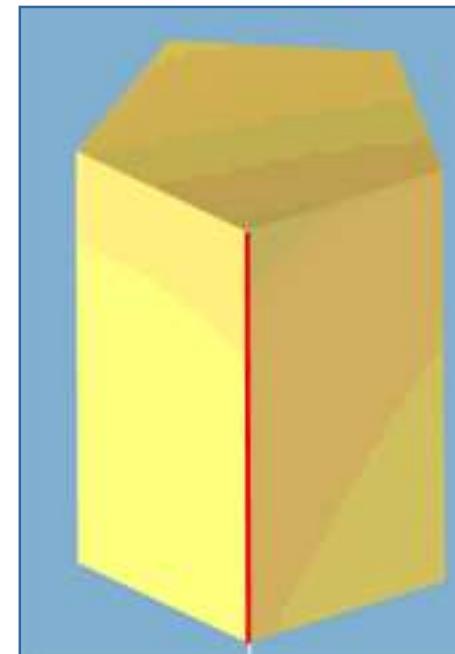
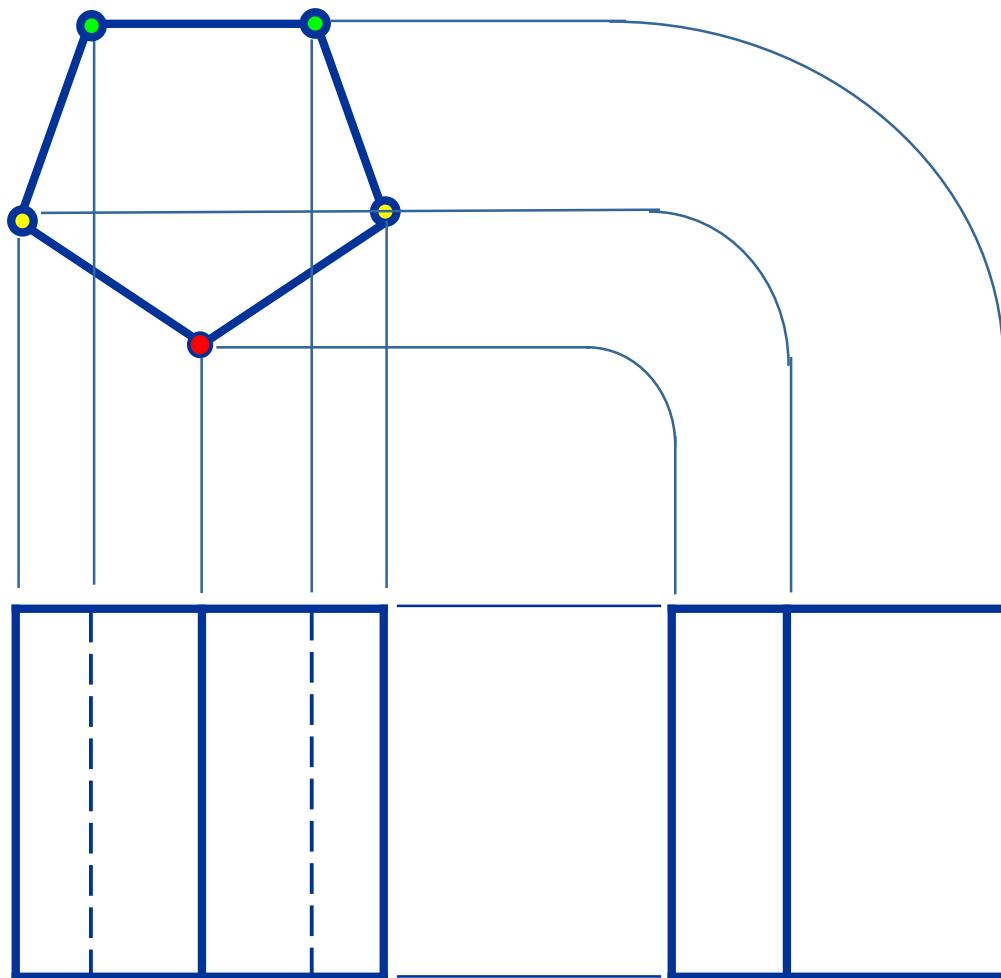
Cutting plane



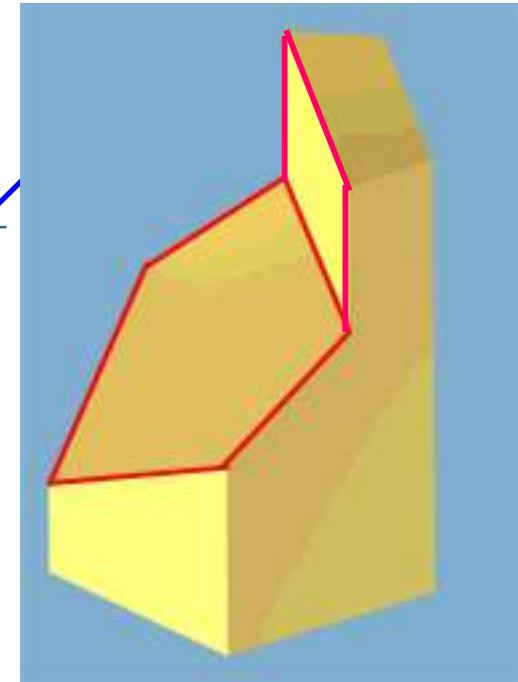
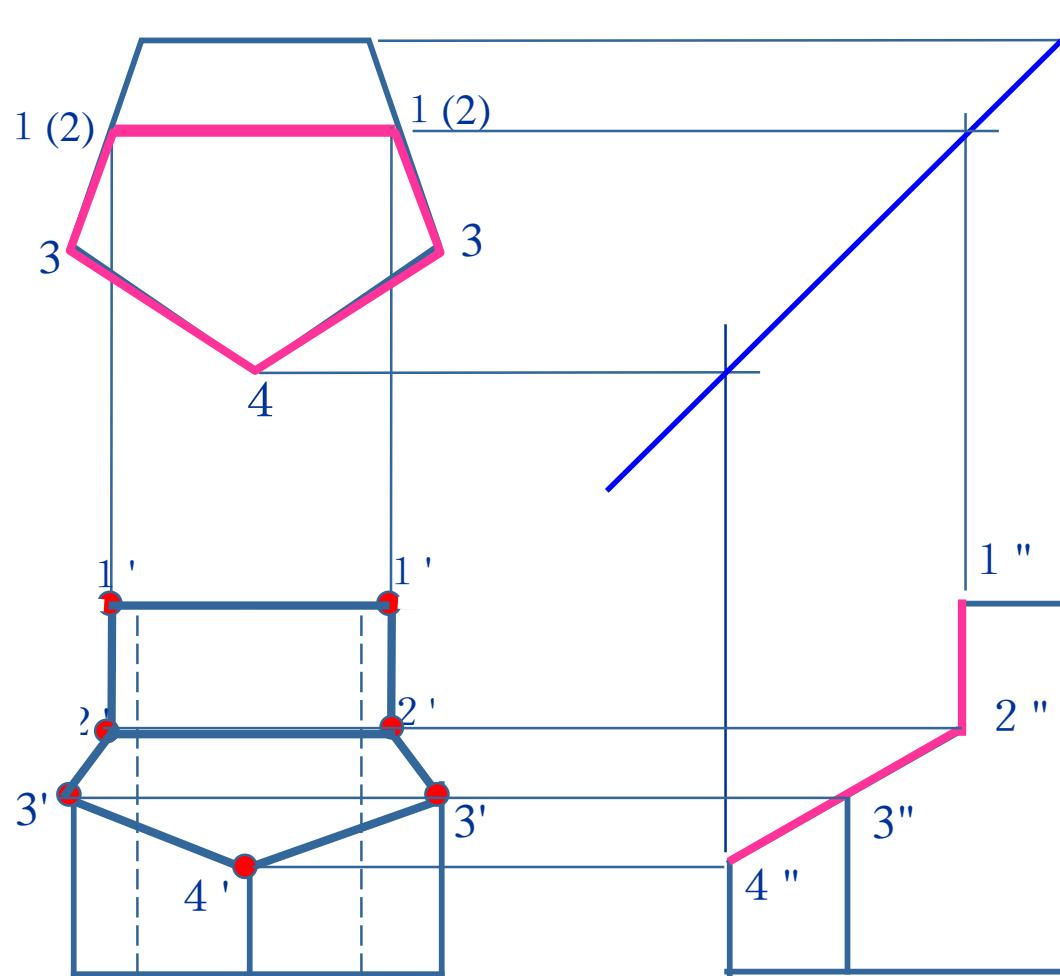
# Cut?



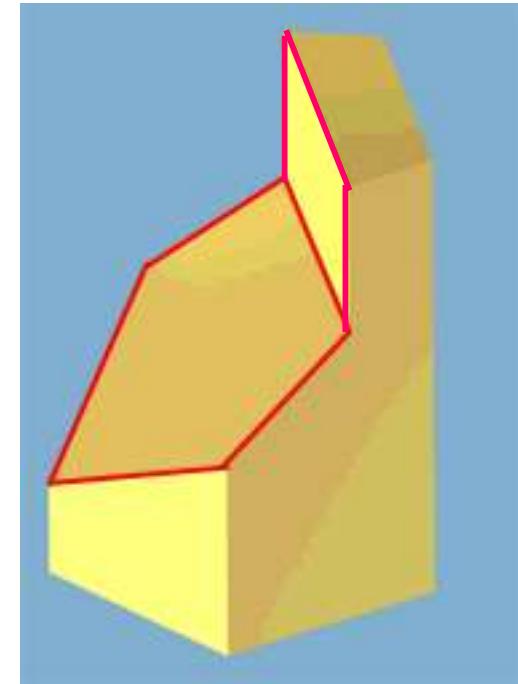
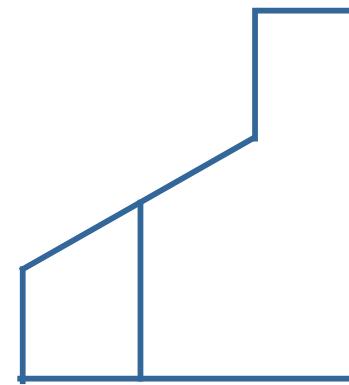
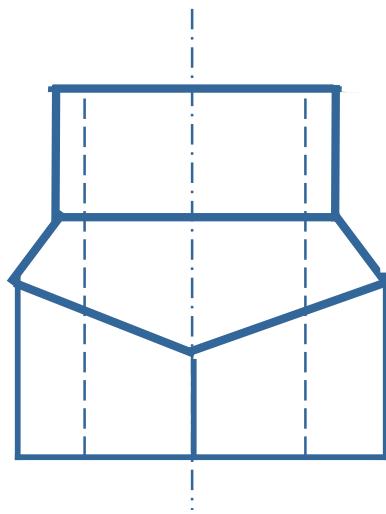
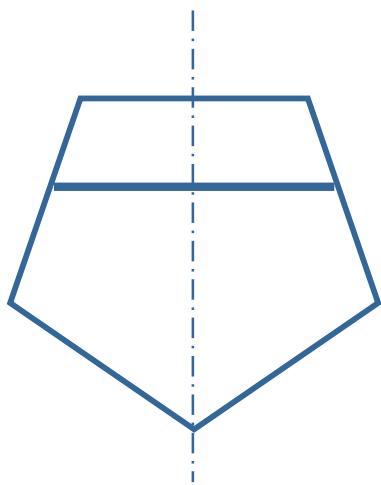
## 2.The projection of prism?



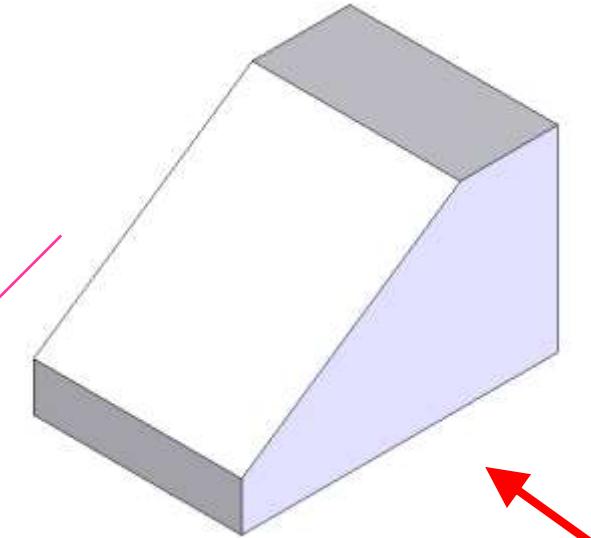
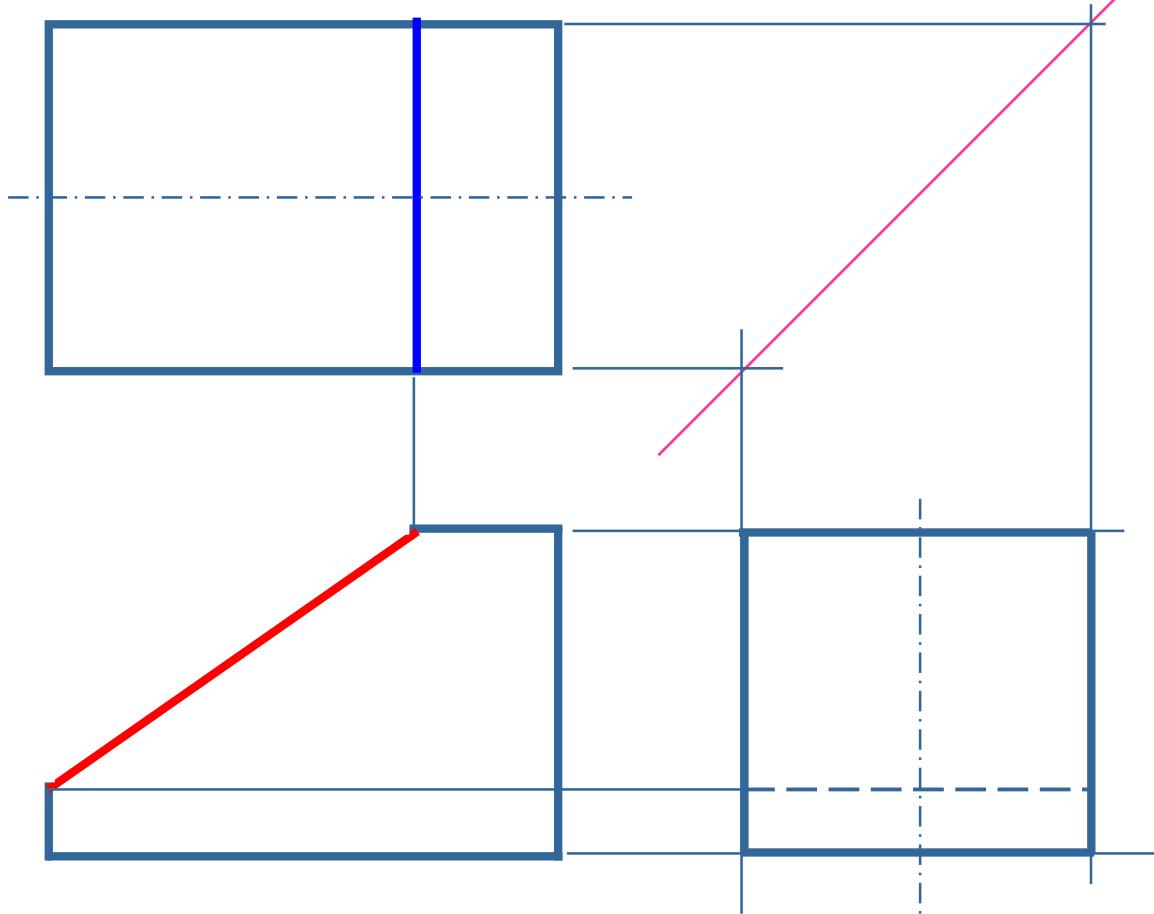
# Cut?



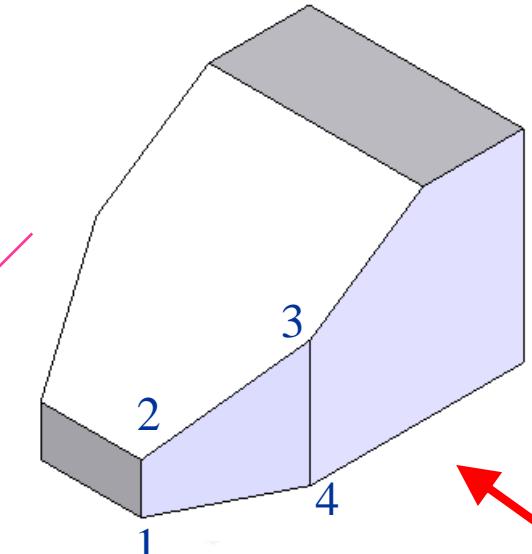
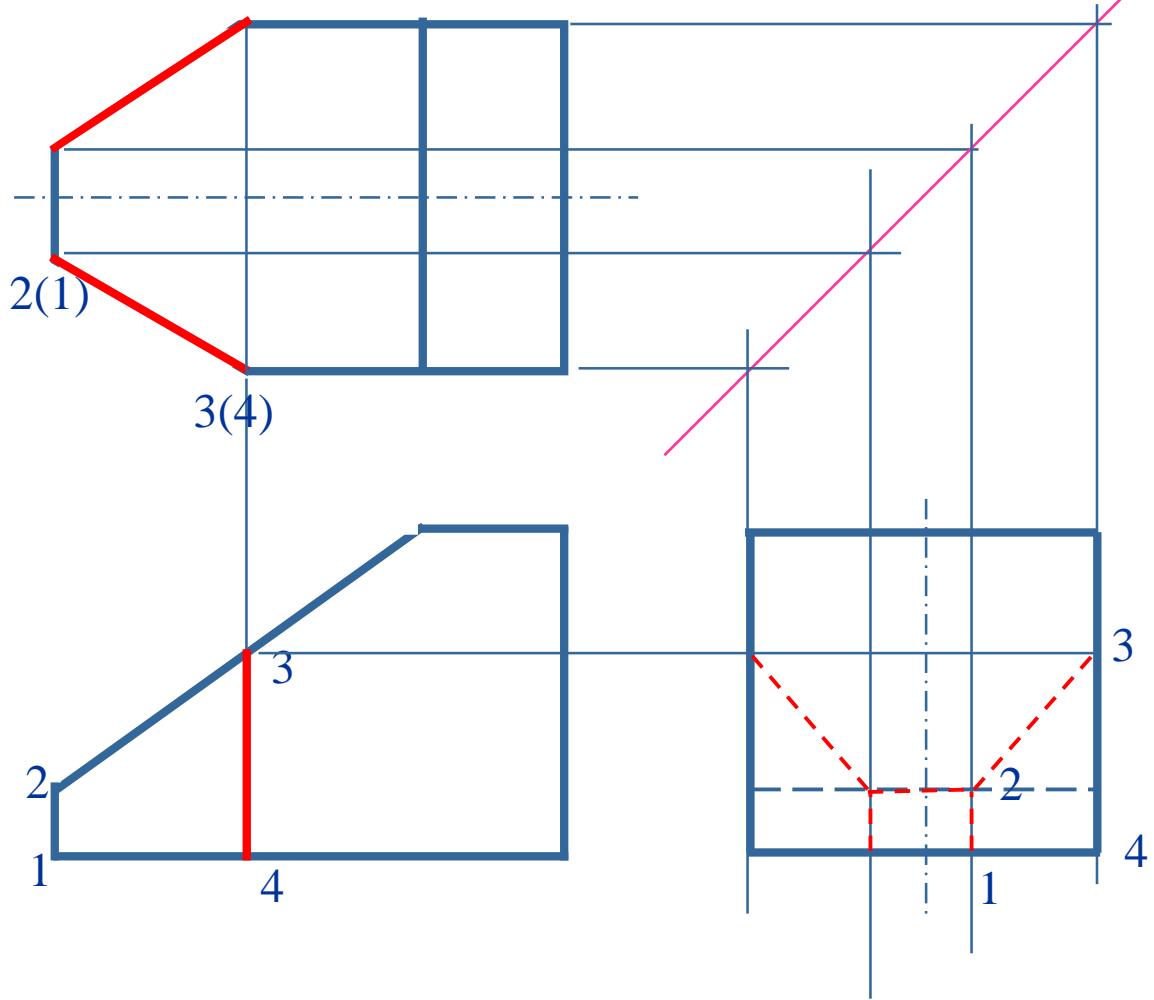
# Cut



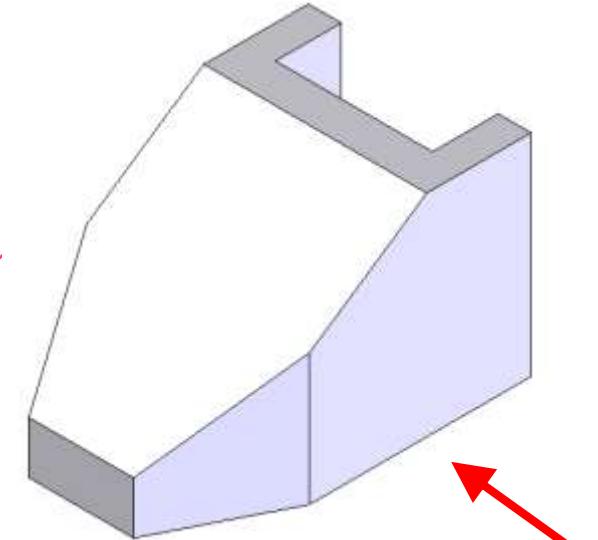
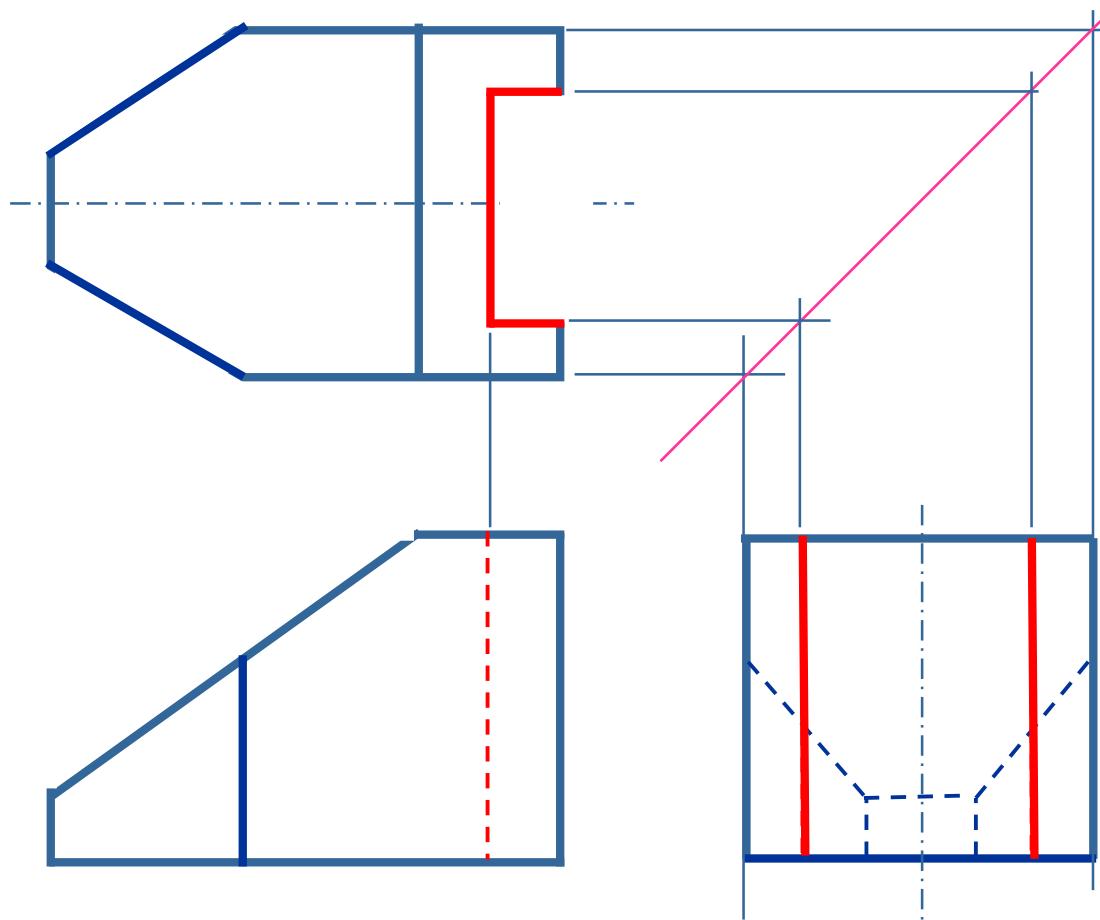
# Example1 Cut cuboid?



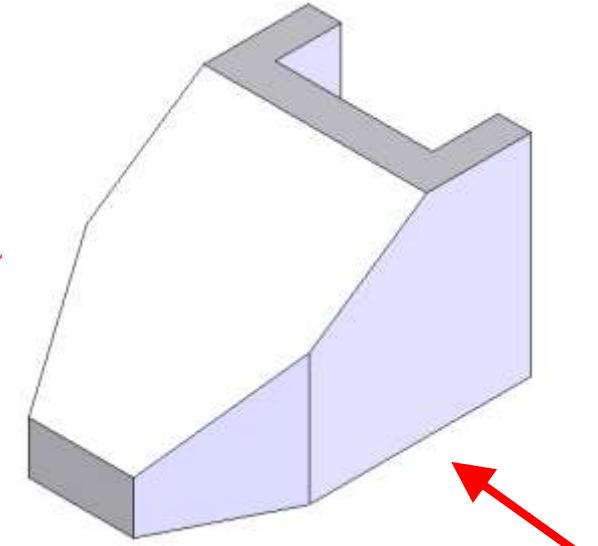
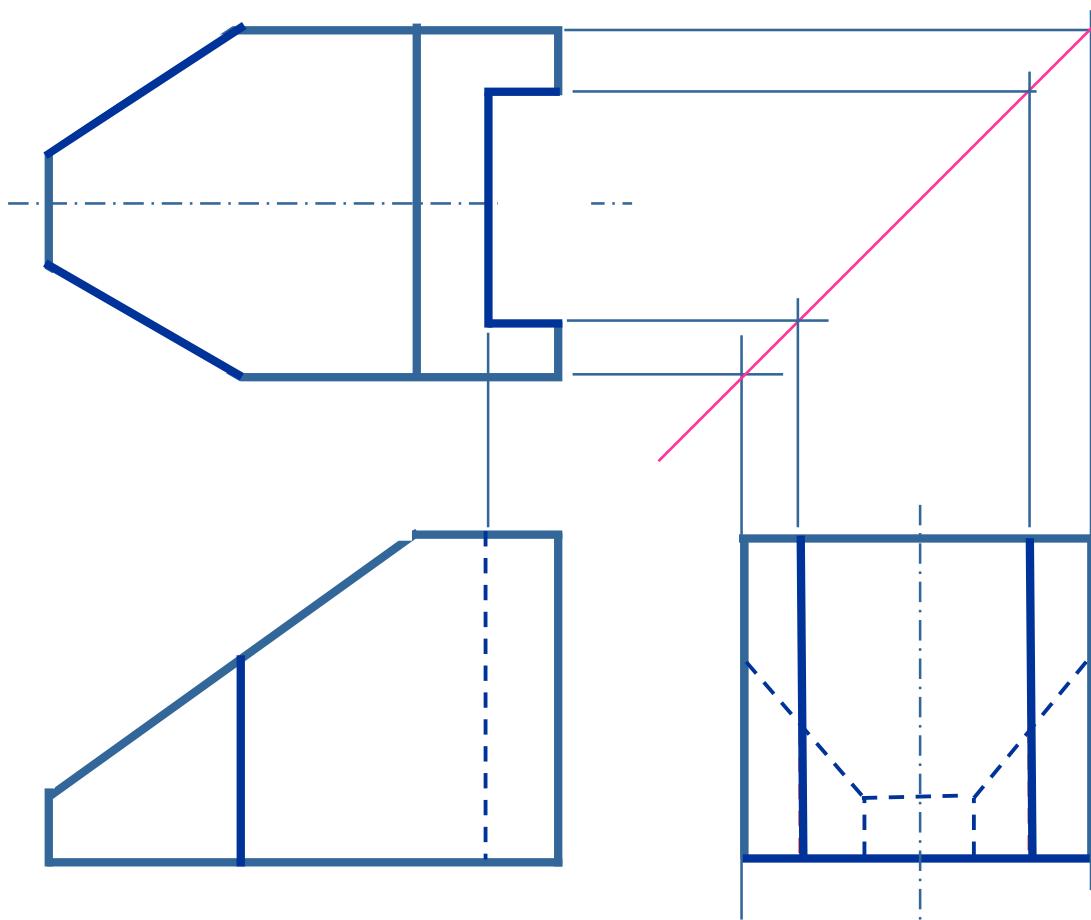
# Example1 Cut cuboid?



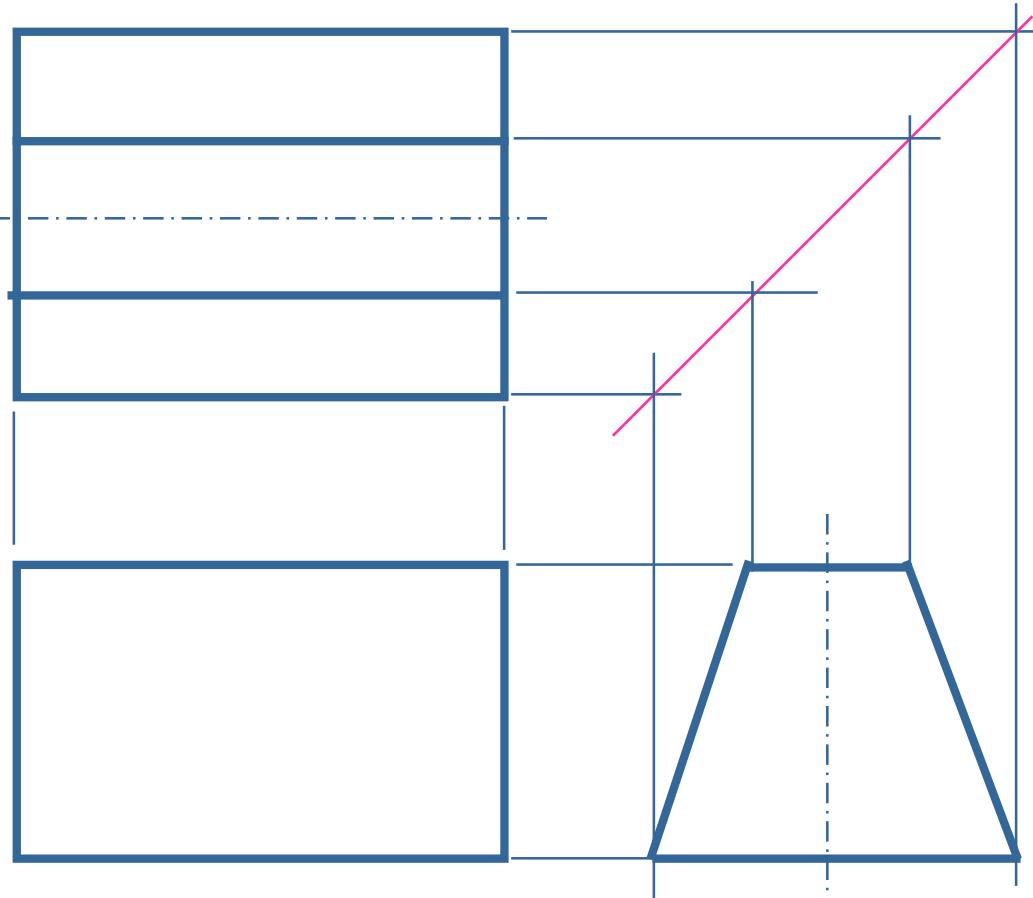
# Example1 Cut cuboid?



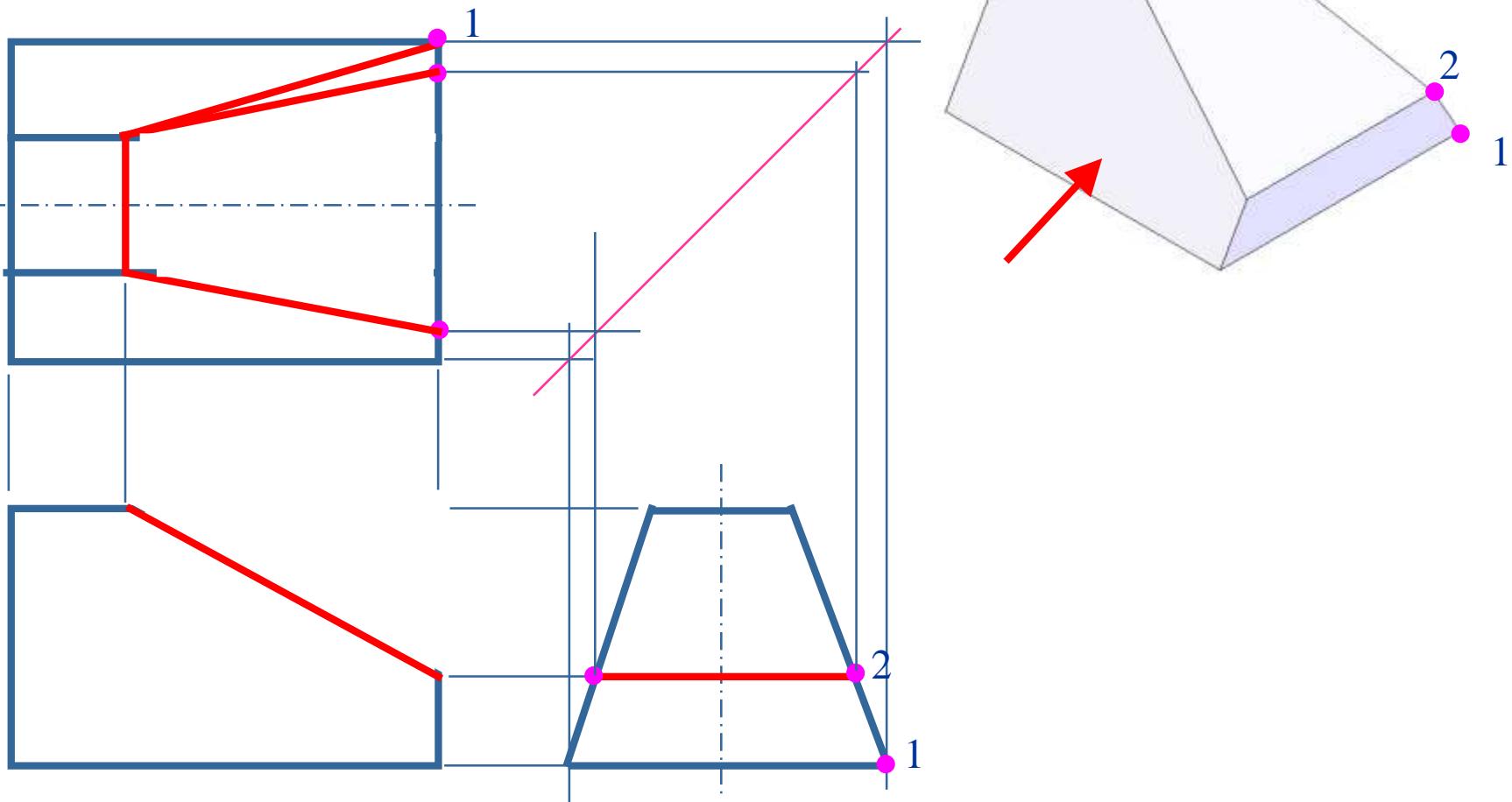
# Example1 Cut cuboid?



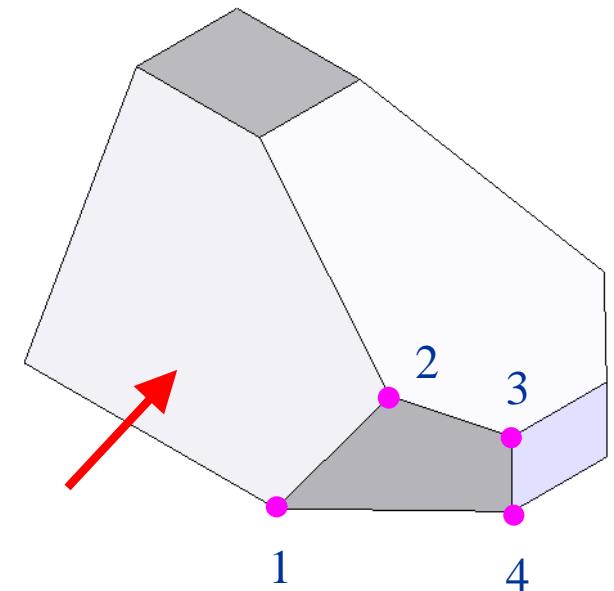
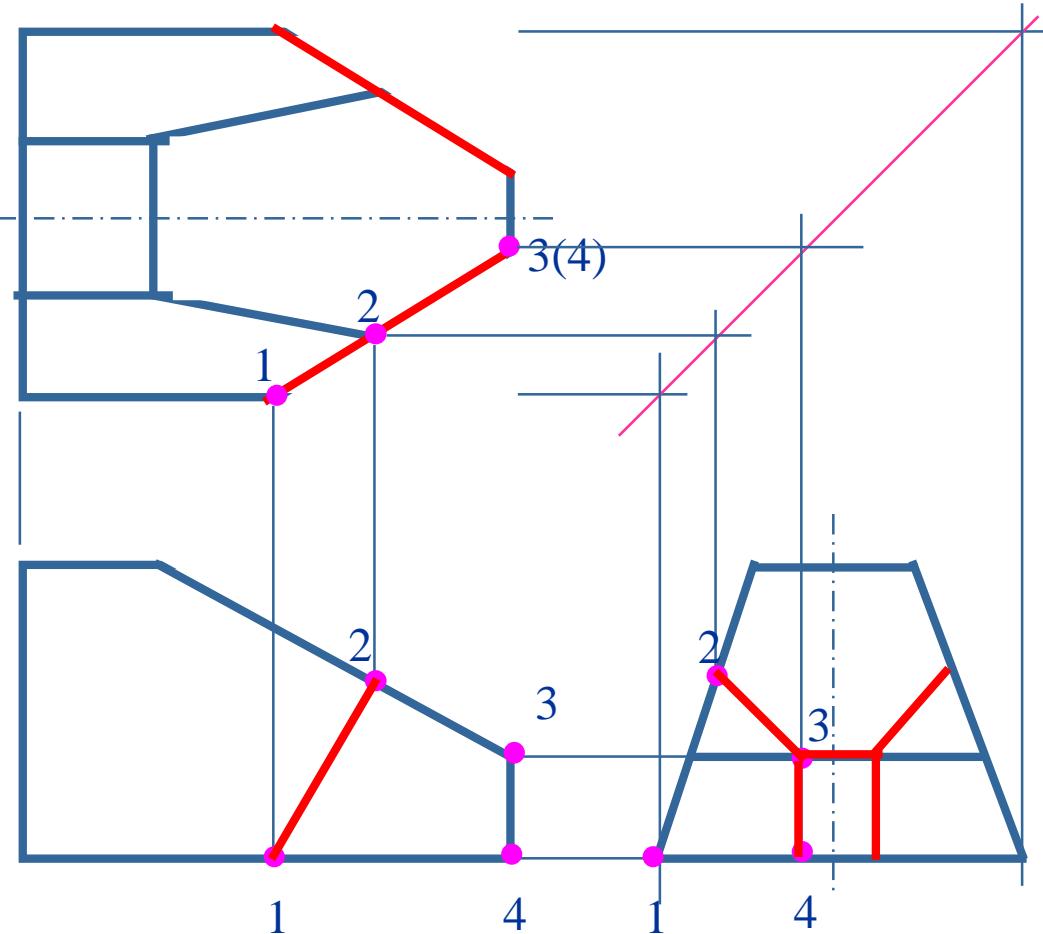
## Example2 Cut trapeziform solid?



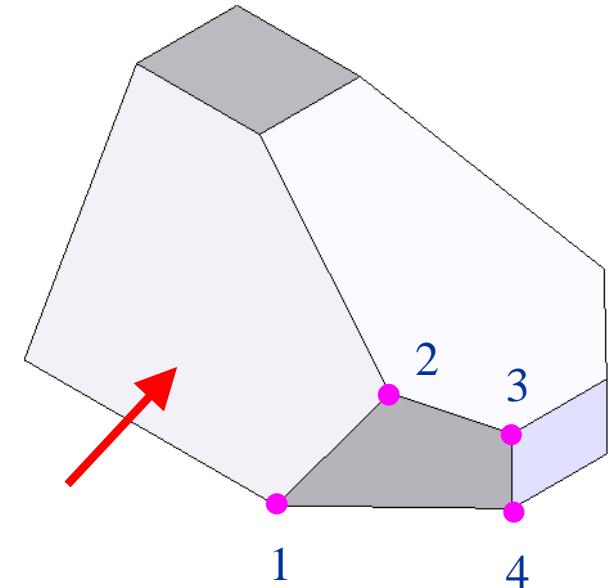
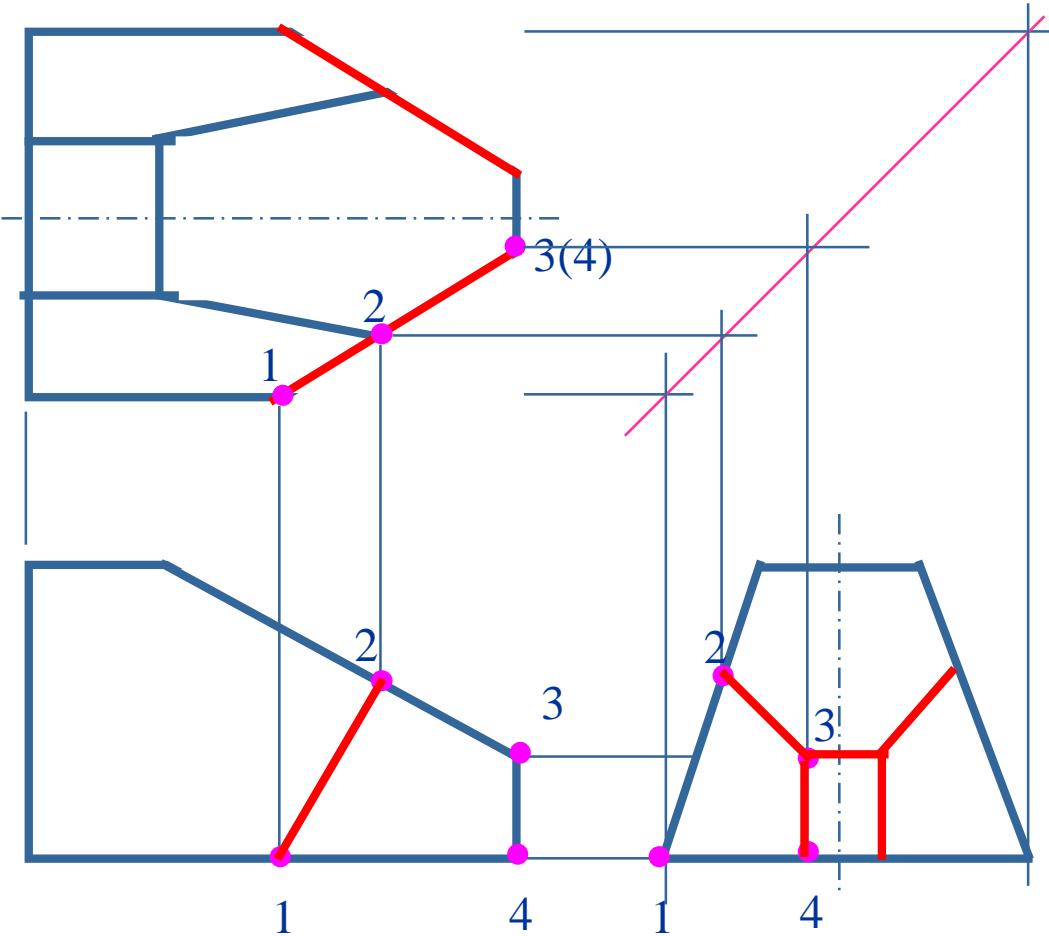
## Example2 Cut trapeziform solid?



## Example2 Cut trapeziform solid?

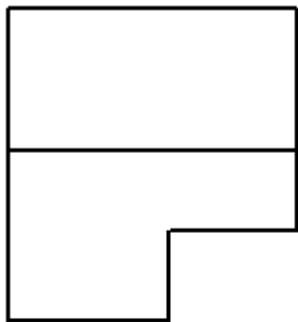


## Example2 Cut trapeziform solid?

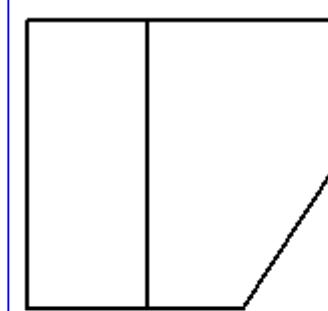
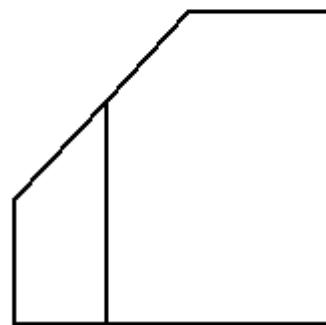


# *PRACTICE*

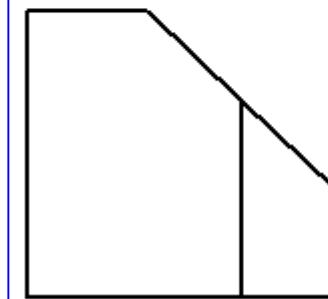
Missing view & isometric sketching

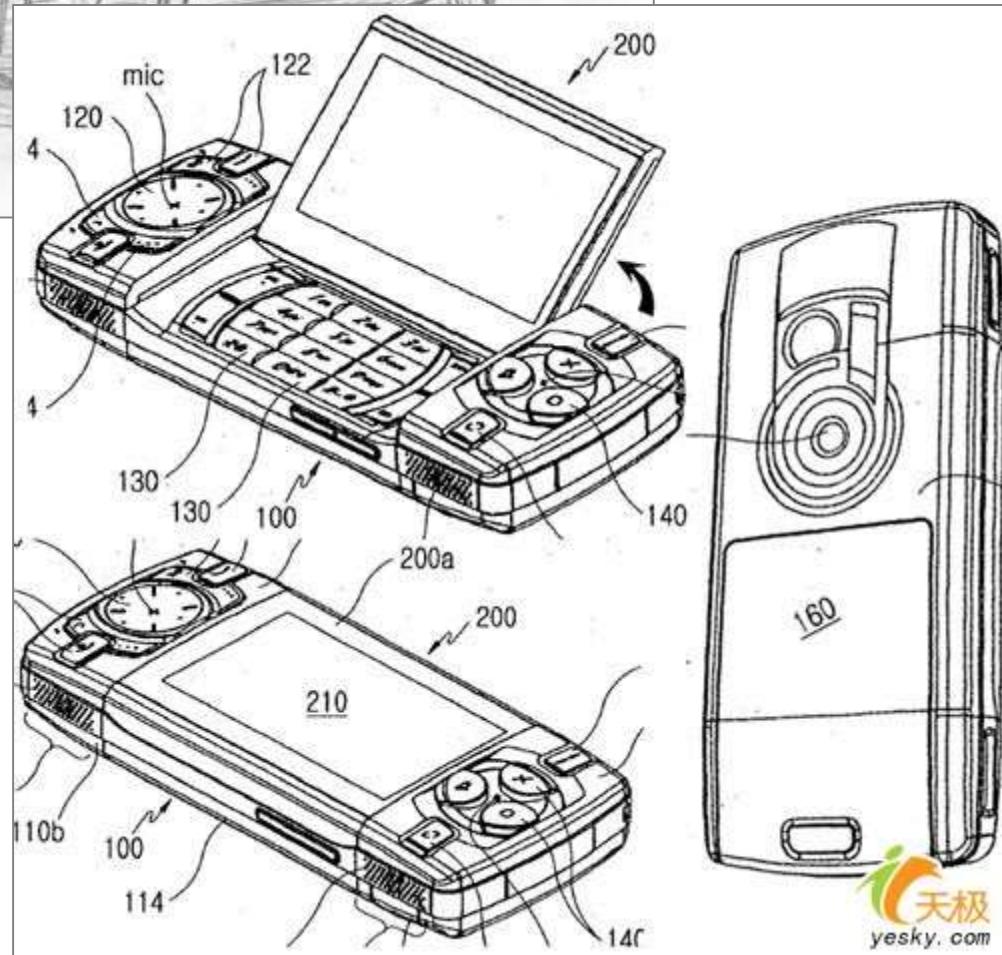
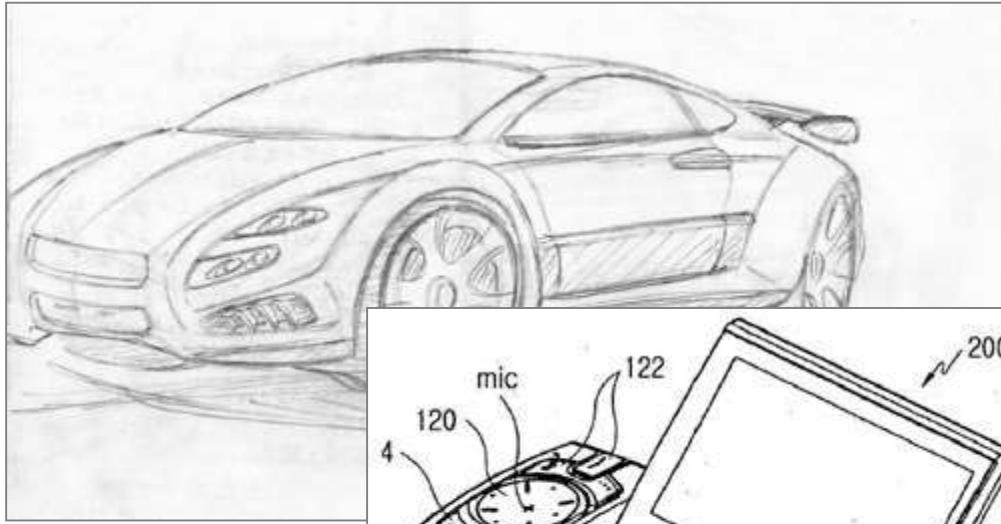


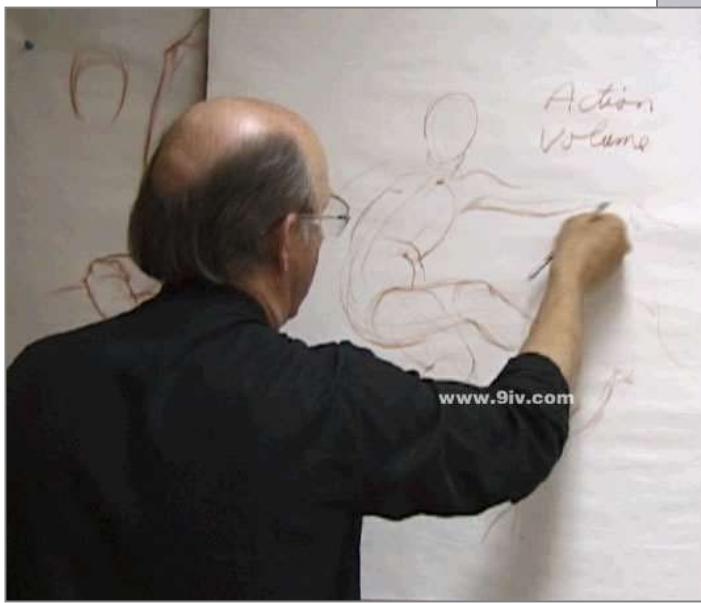
(Front view)



(right view)

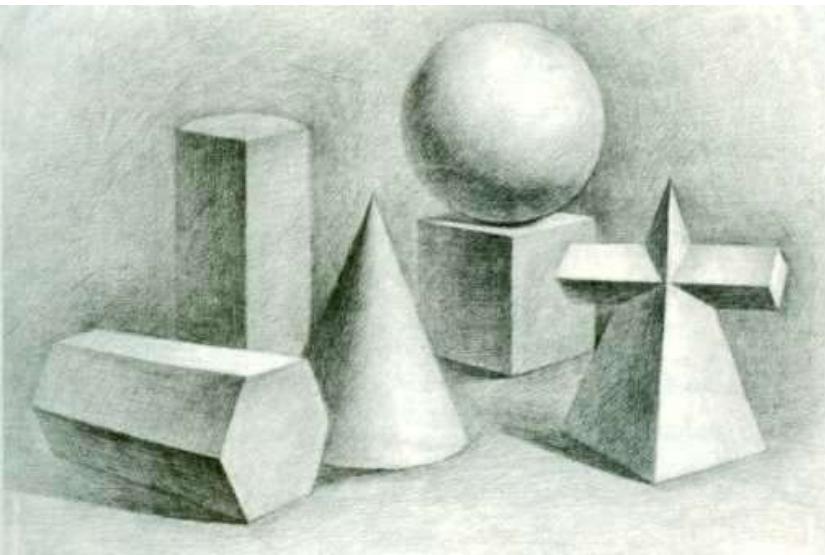






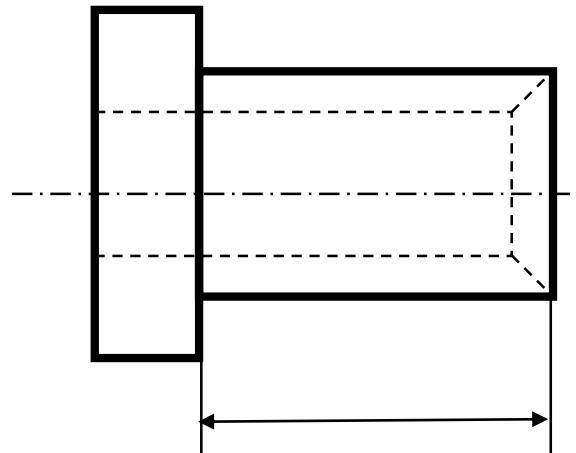
# Technical Sketching and Shape Description

1. Sketching is a quick way to communicate ideas with other members to the design team.
2. Sketching is an excellent way of learning how to represent three-dimensional objects on a two-dimensional surface.



# 1. Sketching straight lines

**Visible Line**



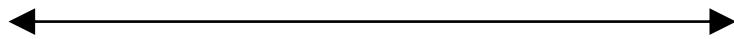
**Thin Line**



**Hidden Line**



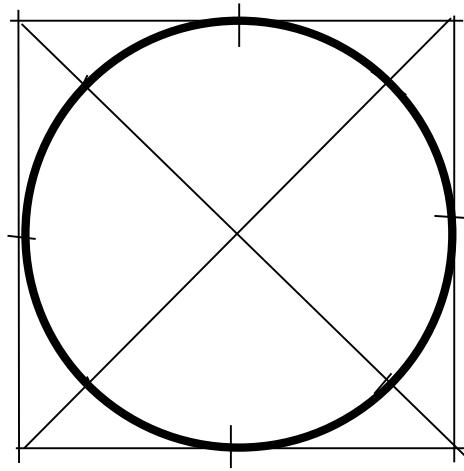
**Dimension Line**



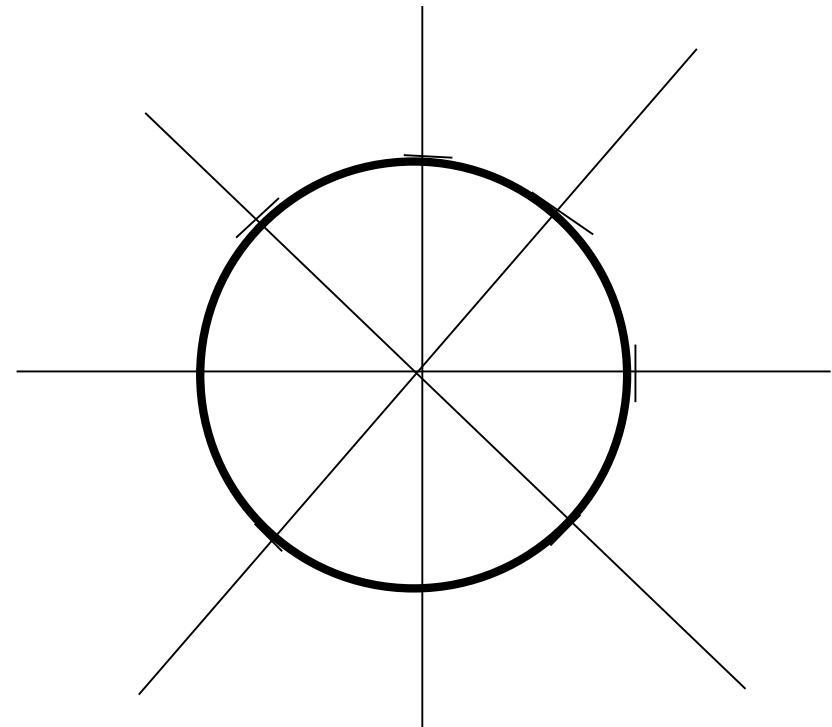
**Center Line**



## 2. Sketching circles & arcs

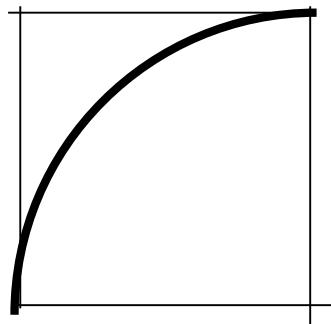


Method 1

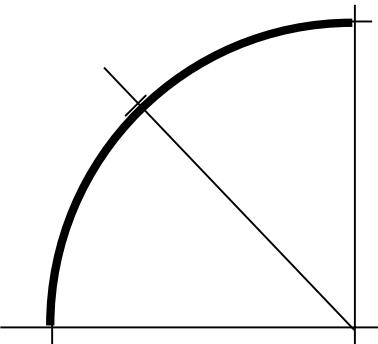


Method 2

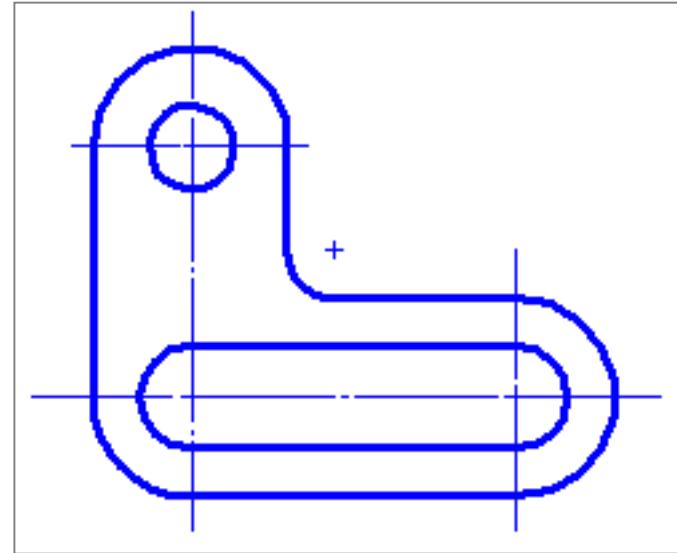
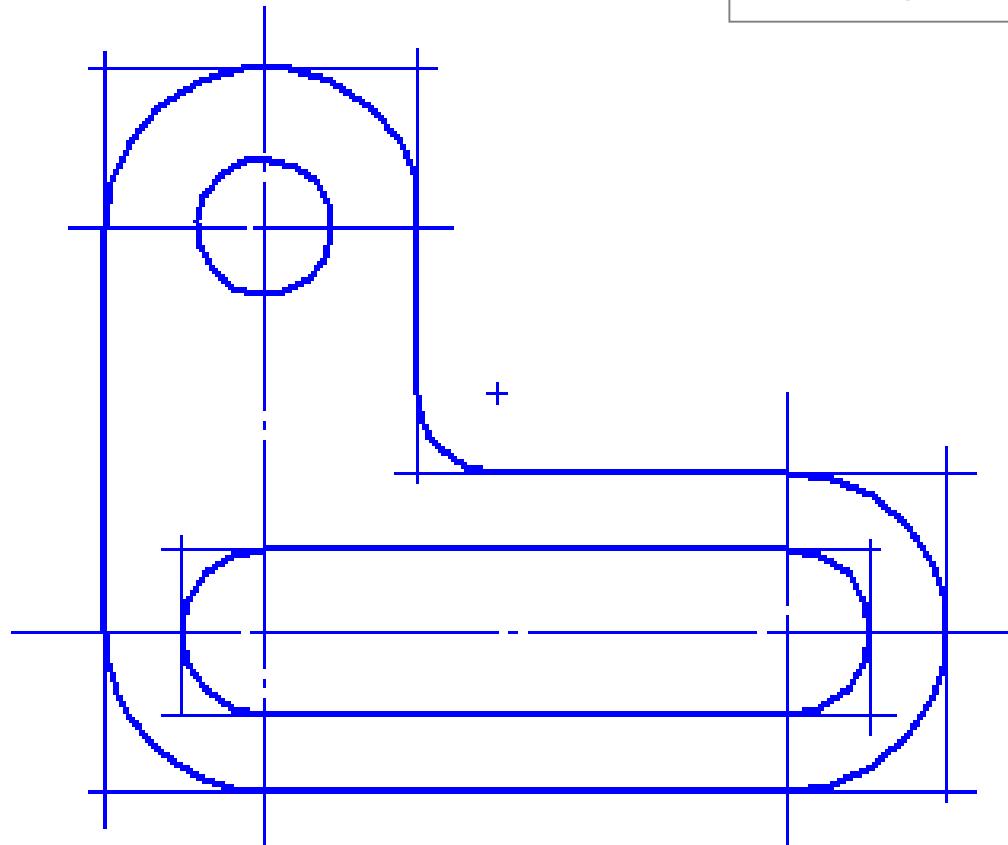
## 2. Sketching circles & arcs



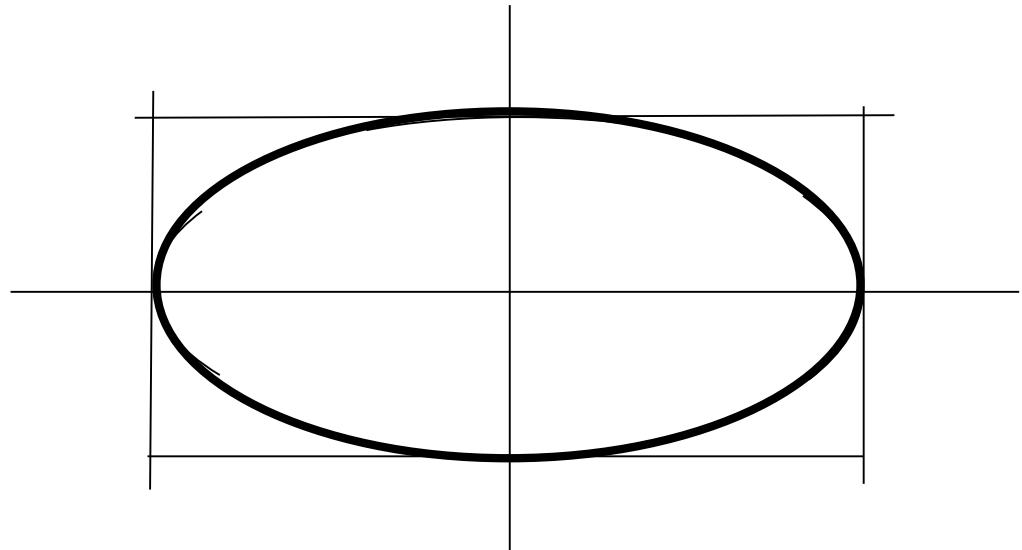
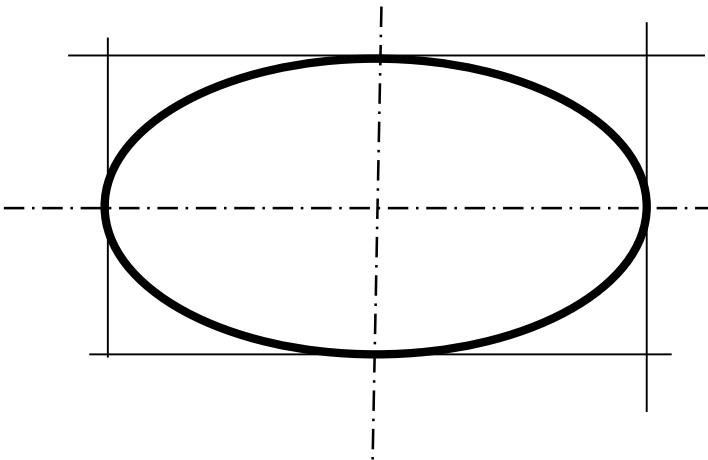
Method 1



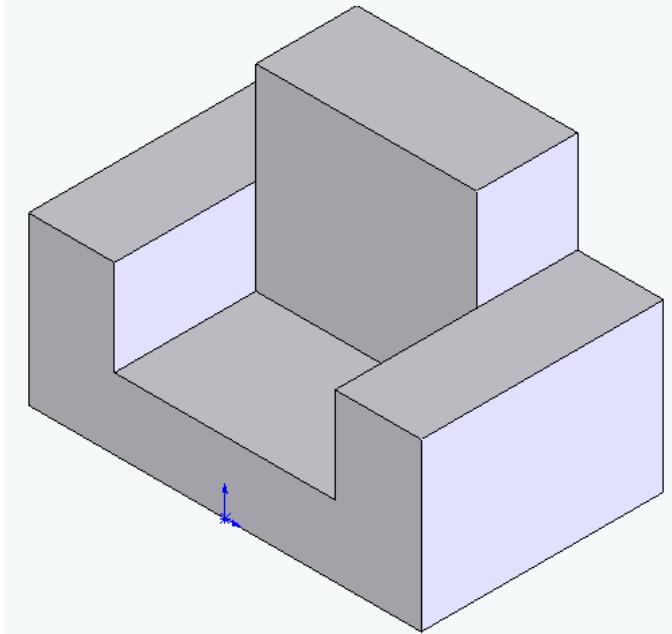
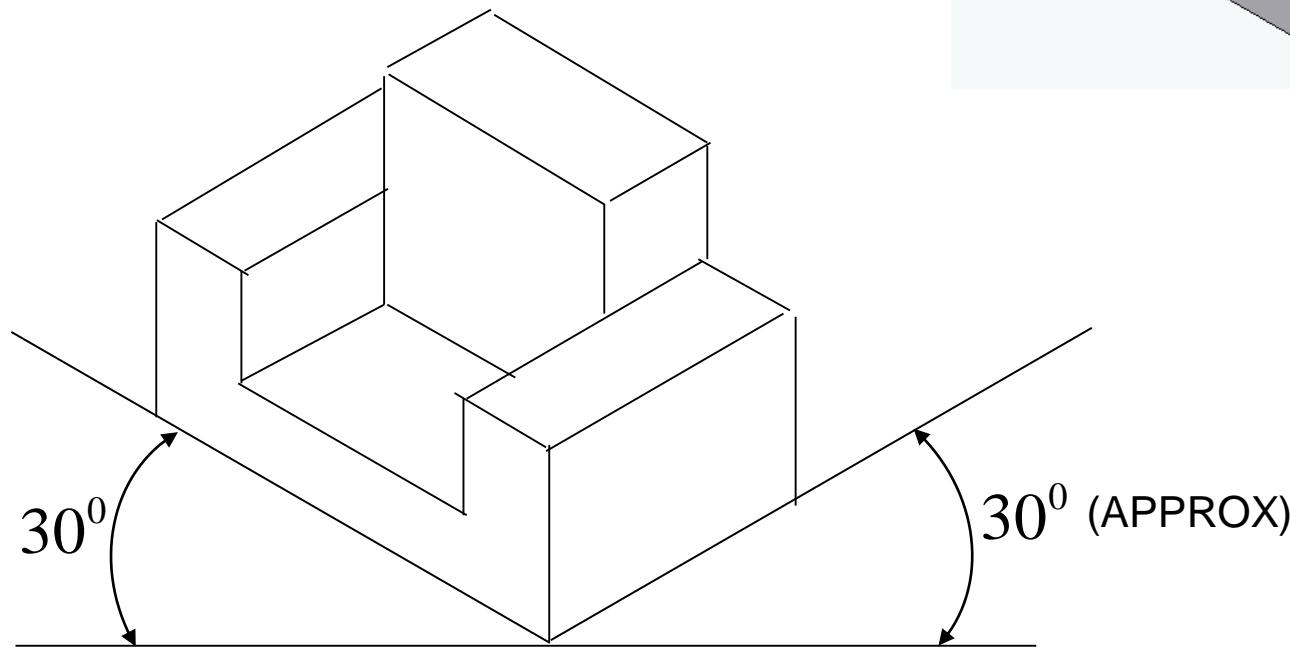
Method 2



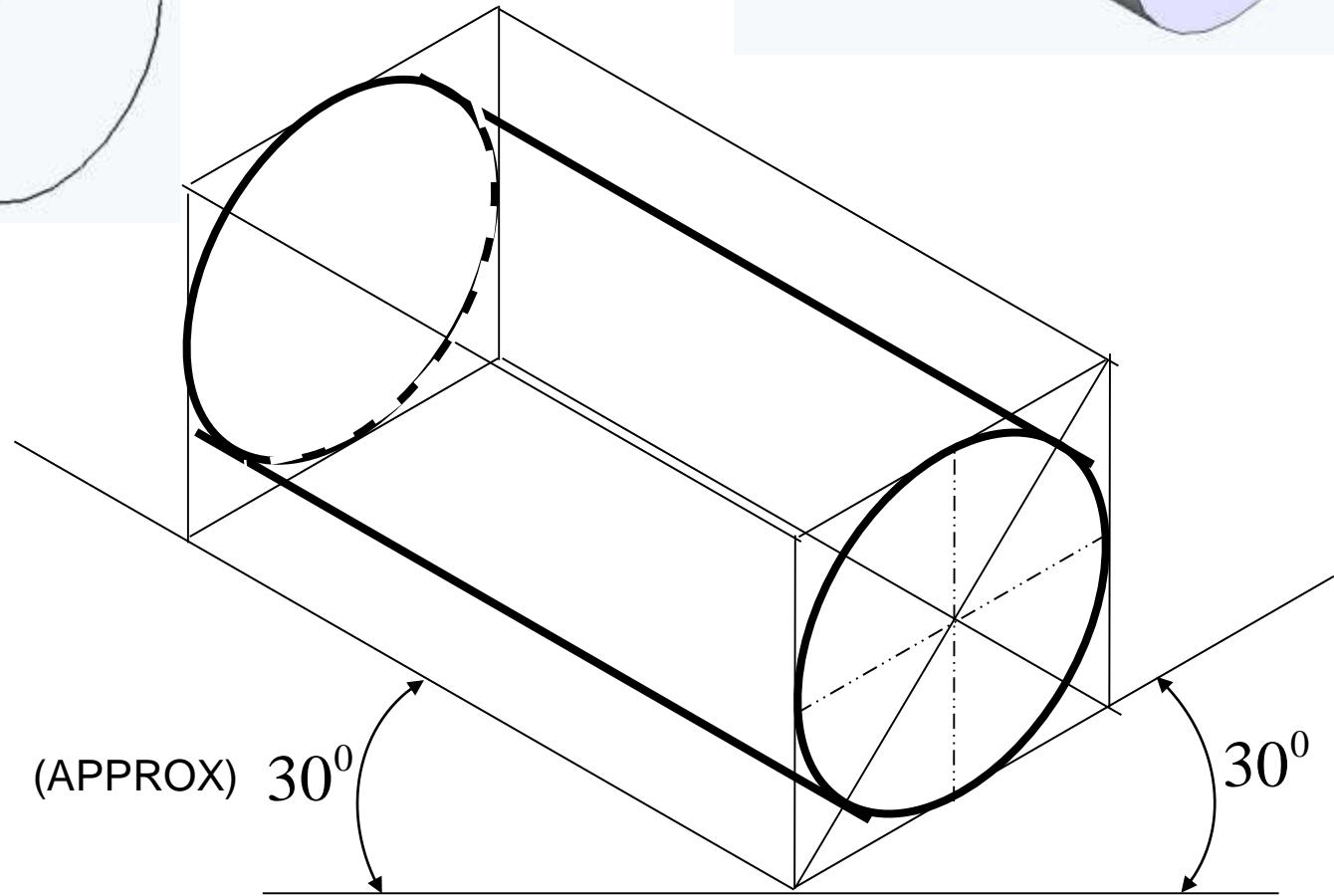
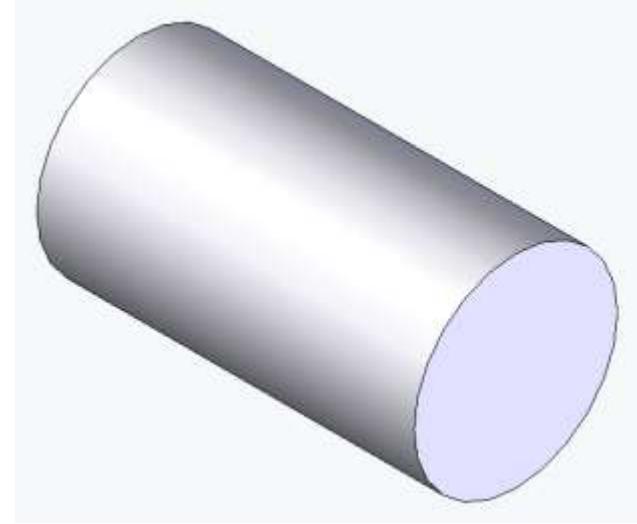
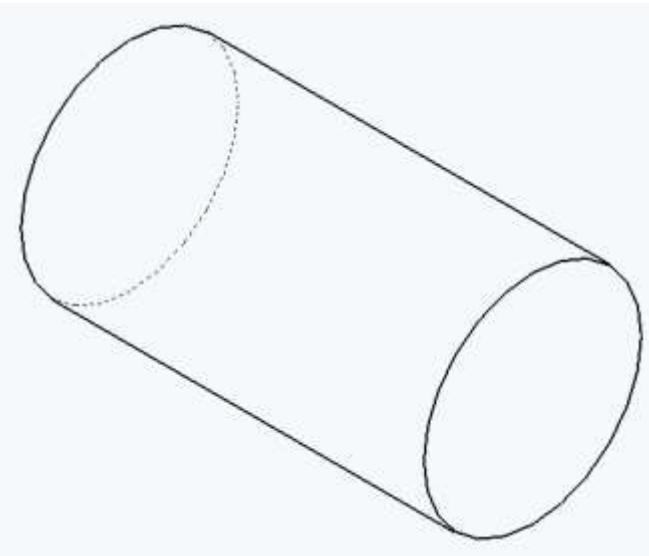
### 3. Sketching ellipses



## 4. Isometric Sketching



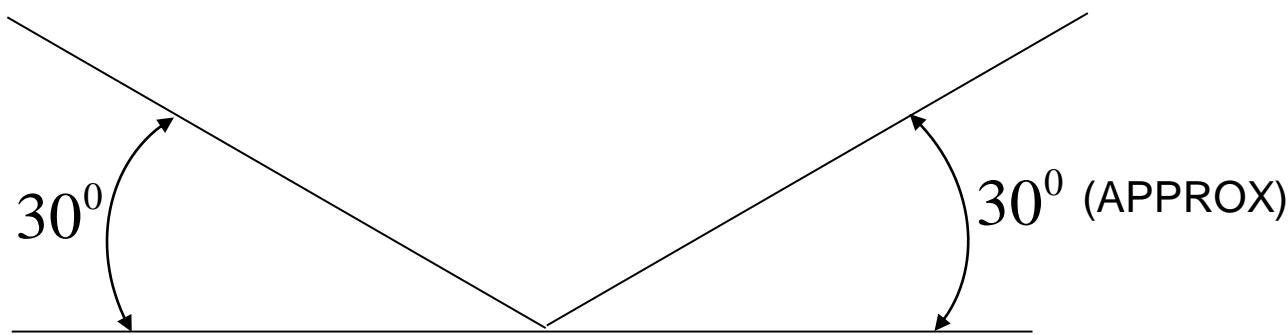
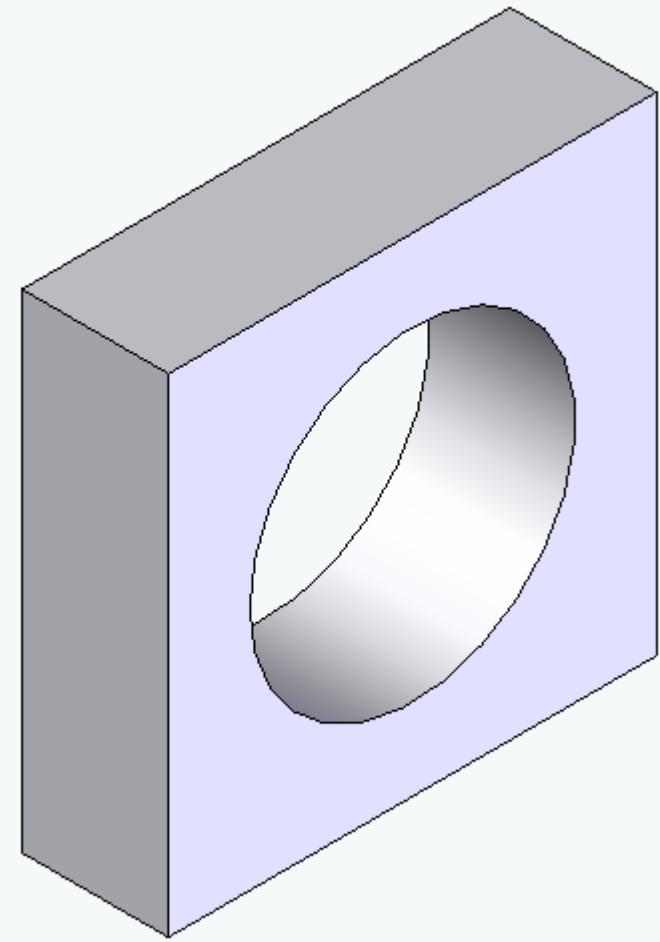
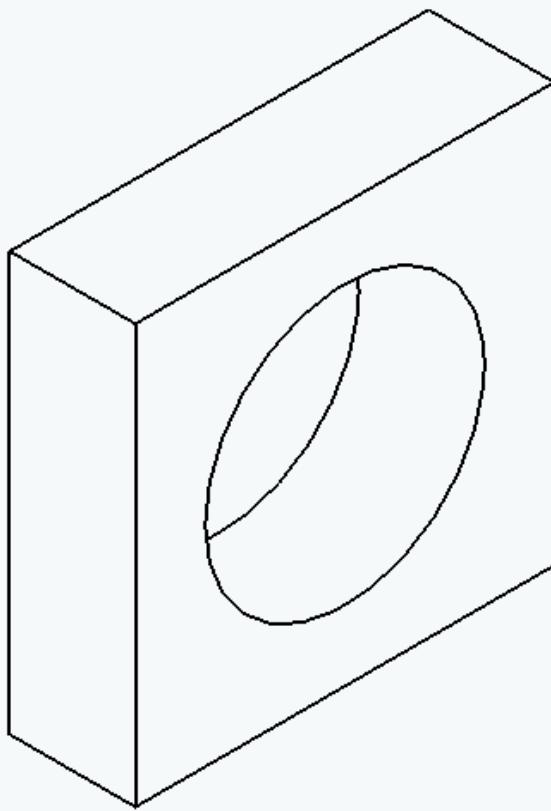
## 5. Isometric ellipses



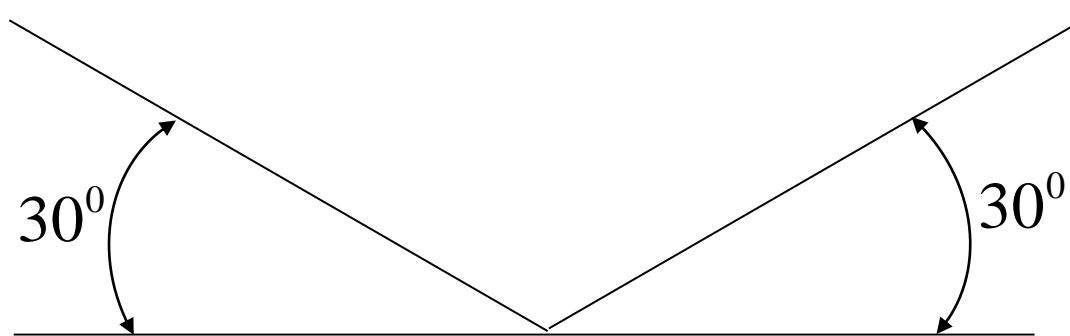
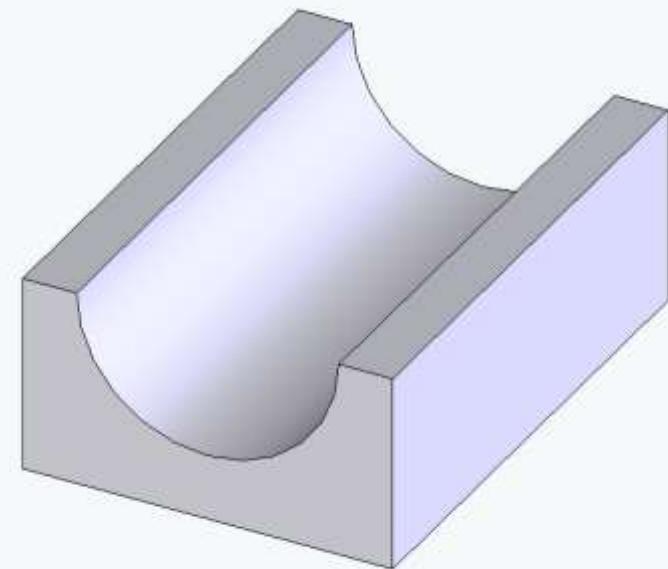
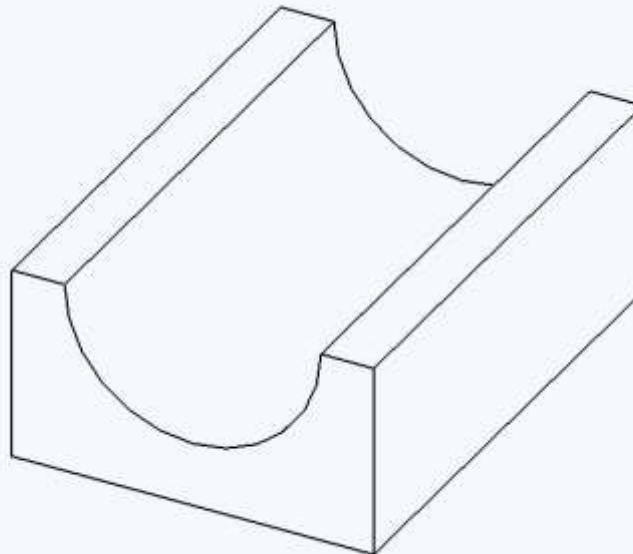
(APPROX)  $30^{\circ}$

$30^{\circ}$

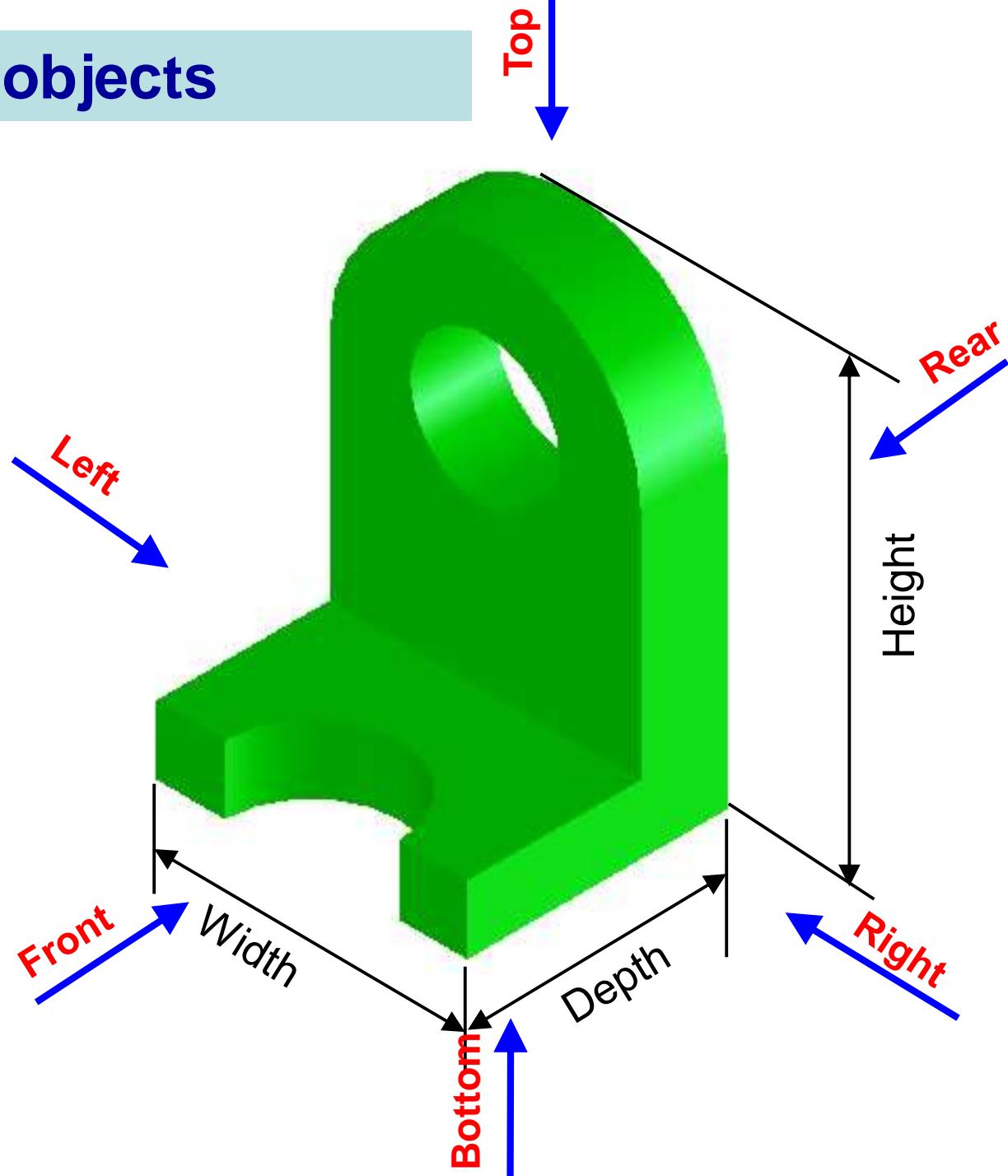
## 5. Isometric ellipses



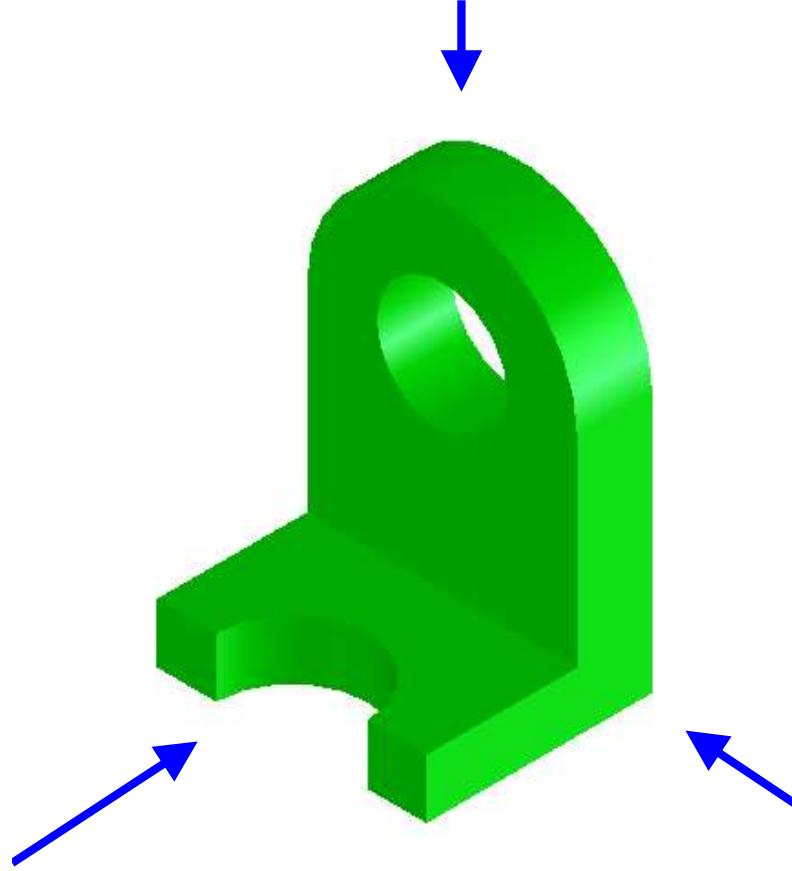
## 5. Isometric ellipses



## 6. Views of objects



## 6. Views of objects



## 6. Views of objects

