

Computer-Aided Design

Meaning of Line Types and Drawing Papers

1. Drawing Papers
2. Line standards and types
3. Line thickness and usage areas
4. Priority order of lines
5. Computer-Aided Technical Drawing (AUTOCAD)

DRAWING INSTRUMENTS

- **Papers**

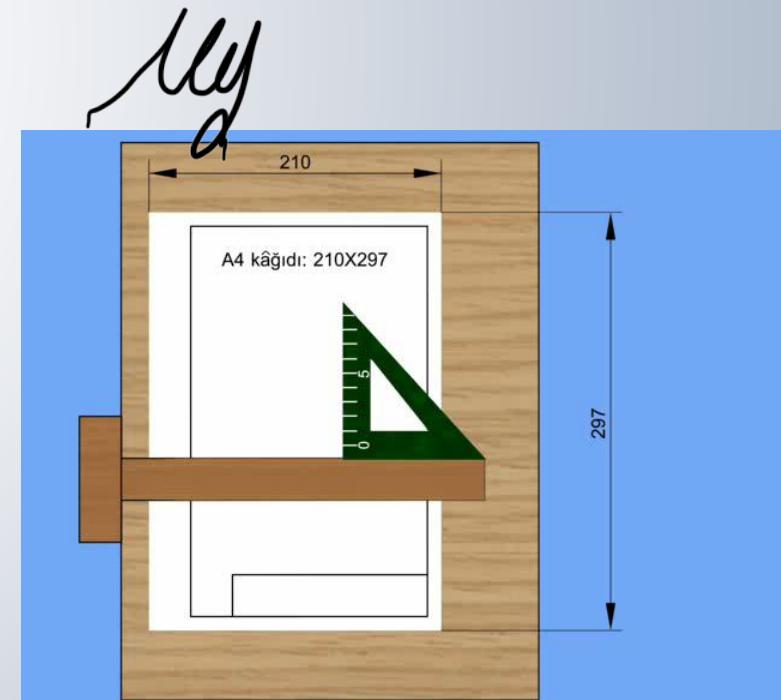
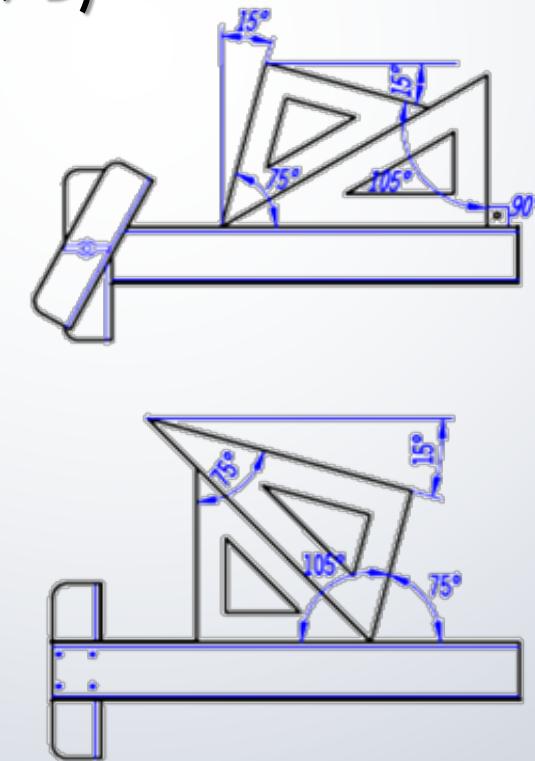
- Drawing papers
- Transparent papers

- **Pens and rubber**

- Pencils (2H ~ 9H, H, HB, B, 2B ~ 7B)
- Rapido Pens

- **Miters and Rulers**

- (45-45-90) miter
- (60-30-90) miter
- T-square
- Flat ruler
- Scale ruler



DRAWING INSTRUMENTS

- Templates
 - Text
 - Shape (circle)
 - Symbol
 - Curves
- Compasses
- Drawing board and table
- Computer
 - Software
 - Equipment

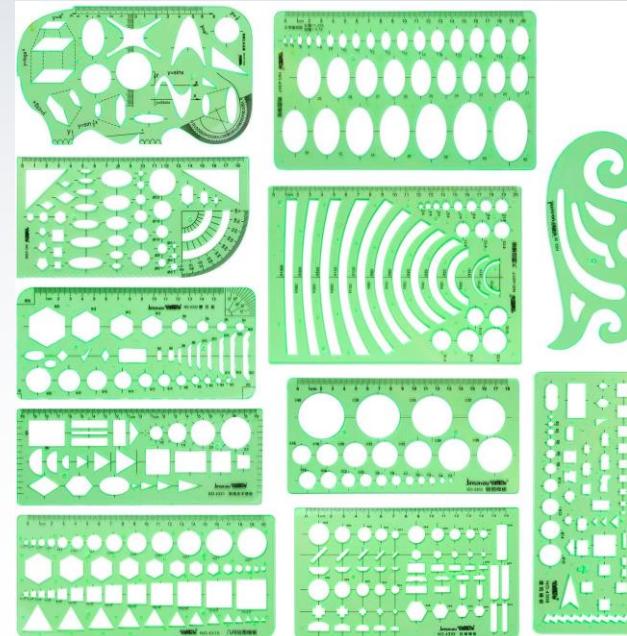
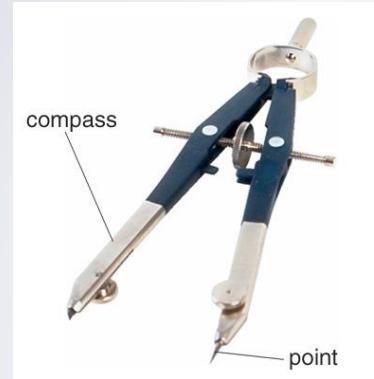
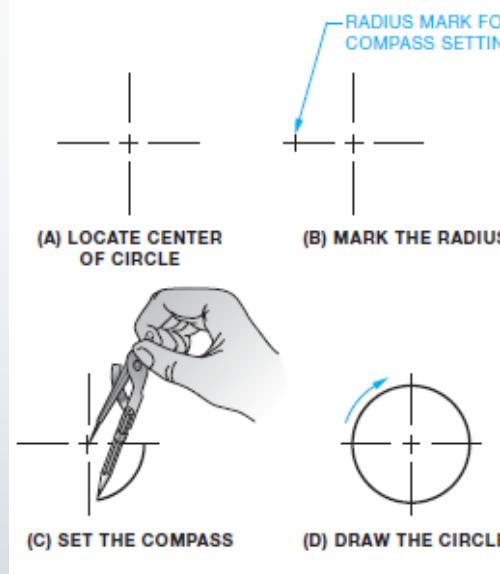


FIGURE 3-4 Drawing a circle using a compass.



DRAWING PAPERS

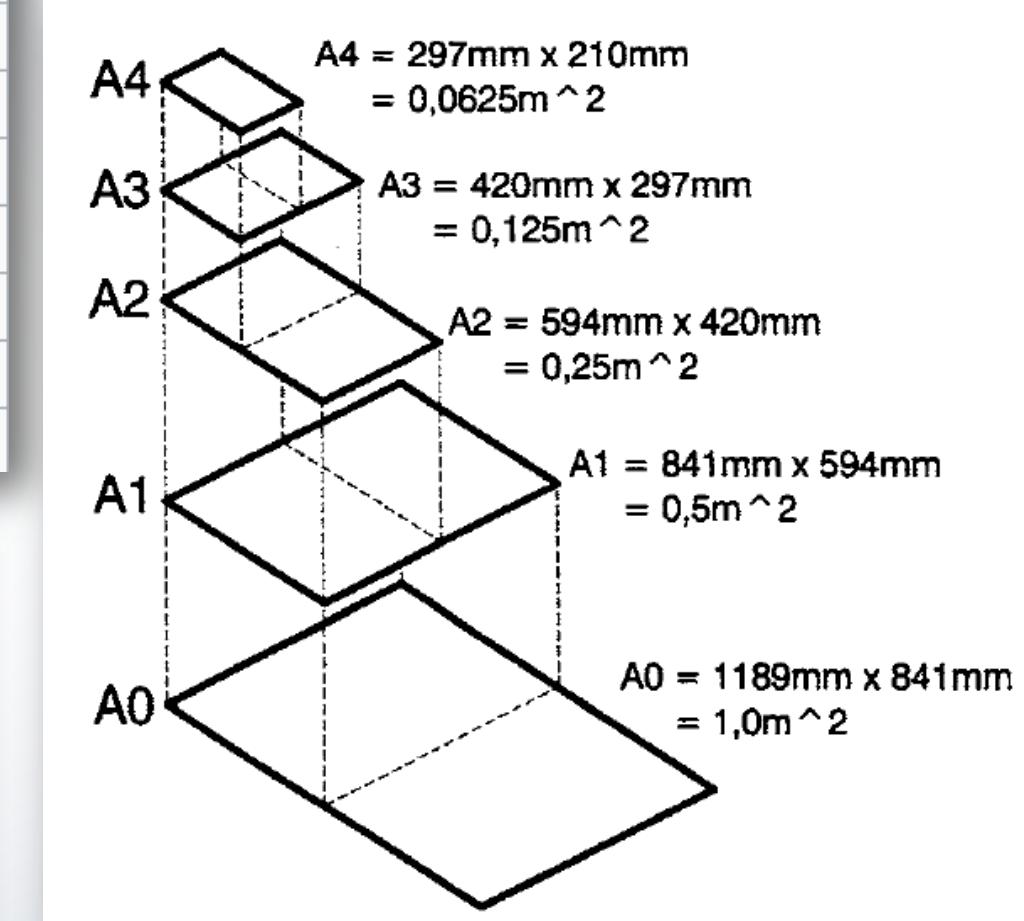
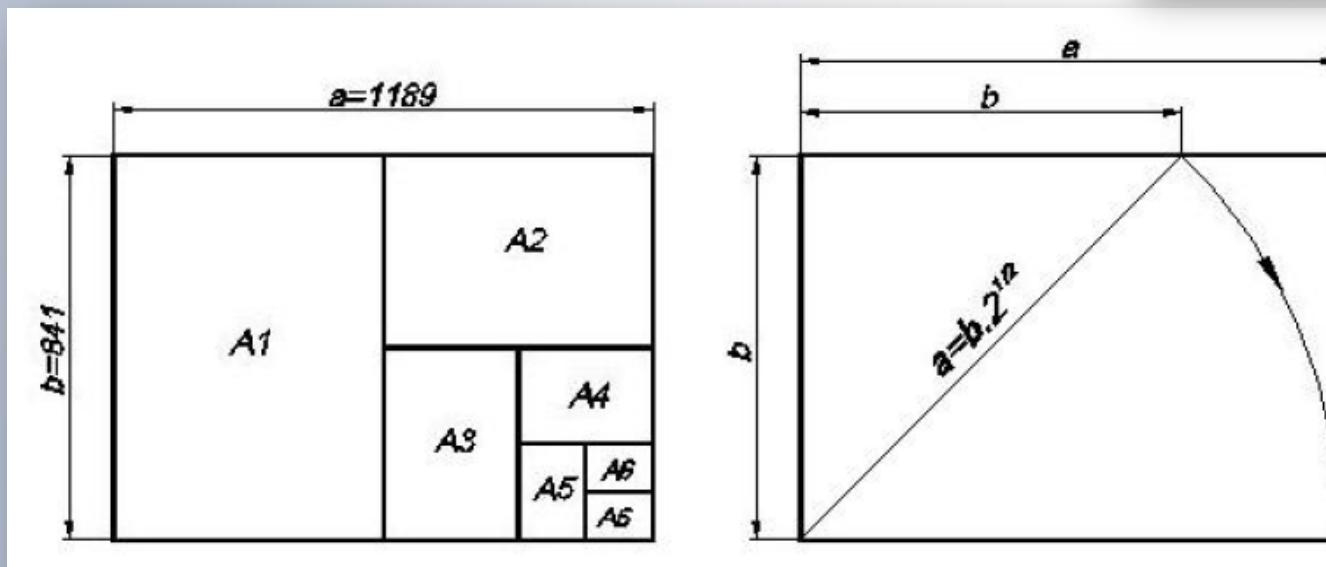
ISO 216 dimensions A series →

https://en.wikipedia.org/wiki/ISO_216

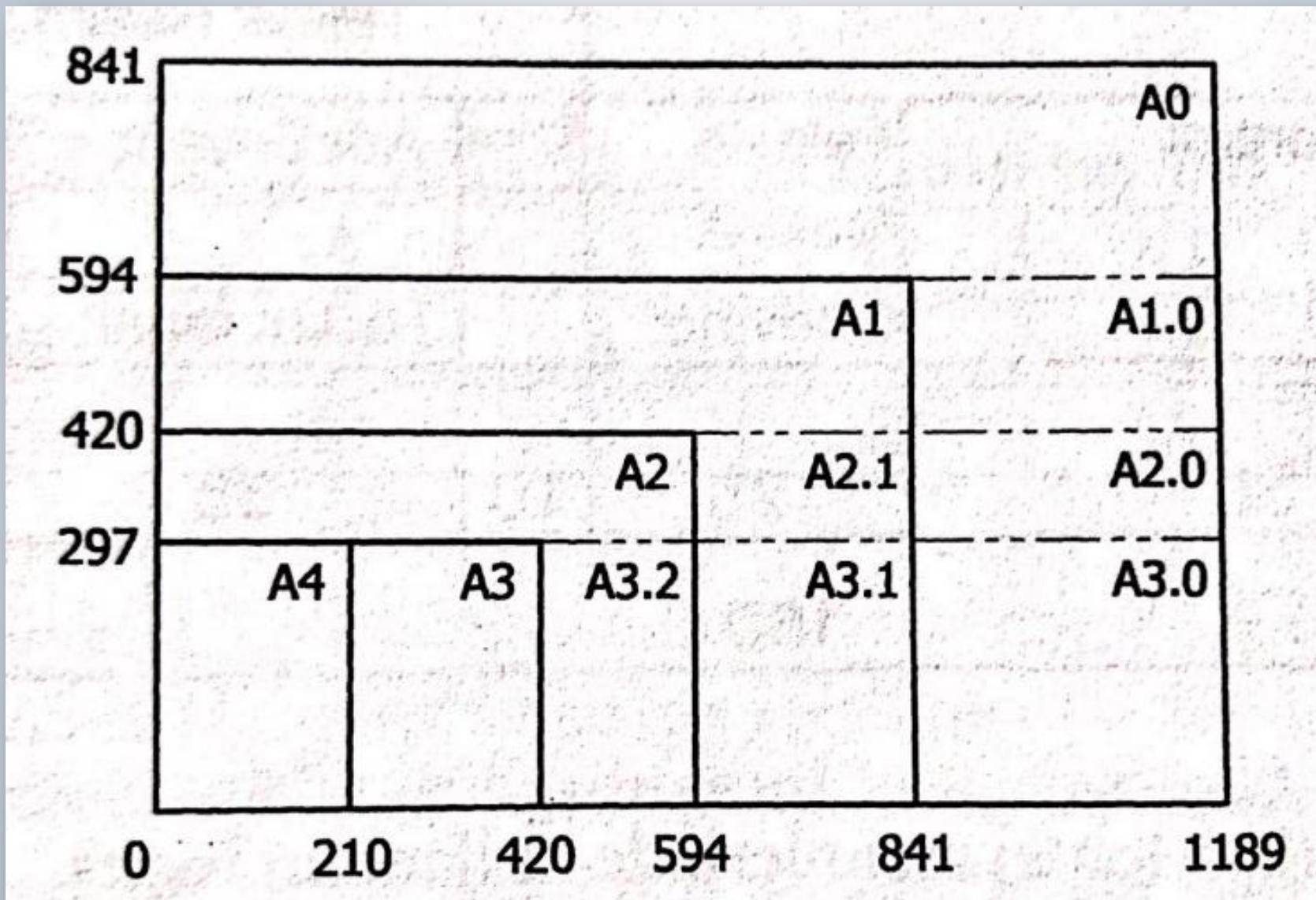
$$A0 \rightarrow a \cdot b = 1 \text{ m}^2$$

$$a = \sqrt{2} \cdot b$$

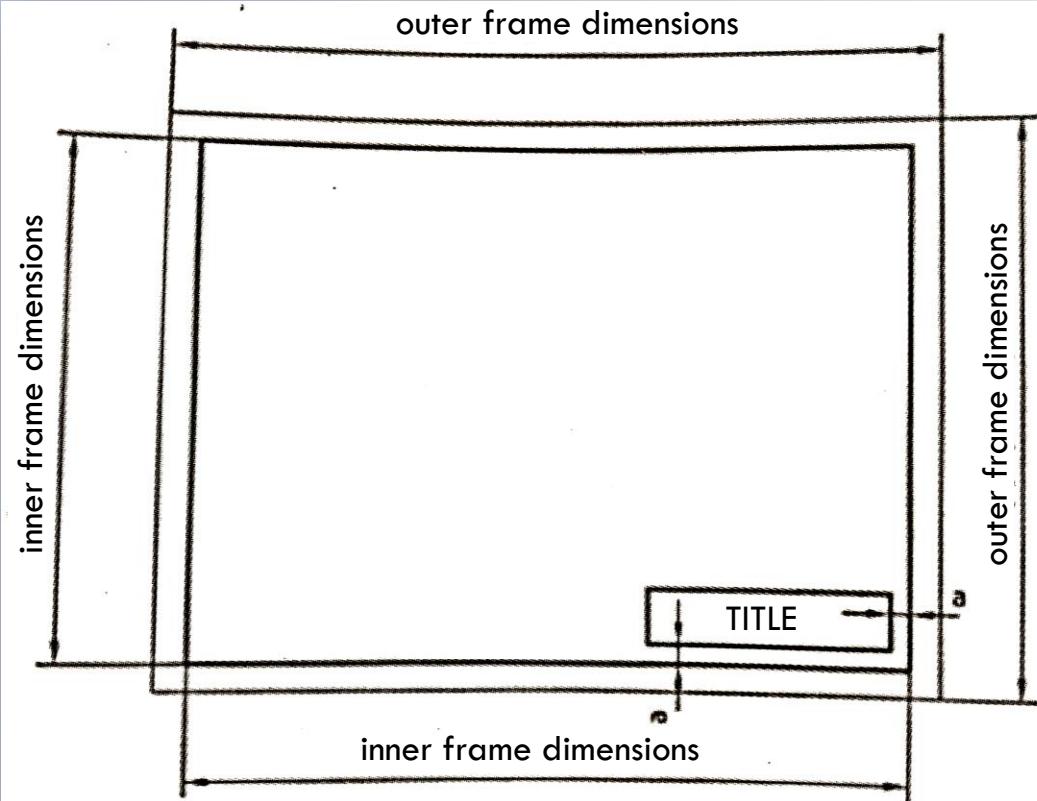
A0	841 × 1189
A1	594 × 841
A2	420 × 594
A3	297 × 420
A4	210 × 297
A5	148 × 210
A6	105 × 148
A7	74 × 105
A8	52 × 74
A9	37 × 52
A10	26 × 37



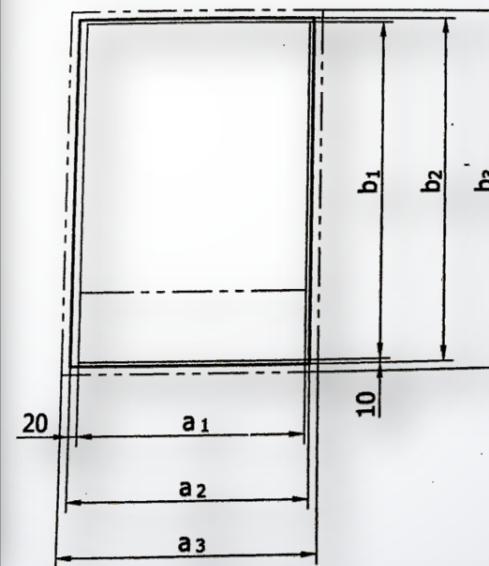
LONG PAPER SIZE SYSTEM



PAPER SIZES

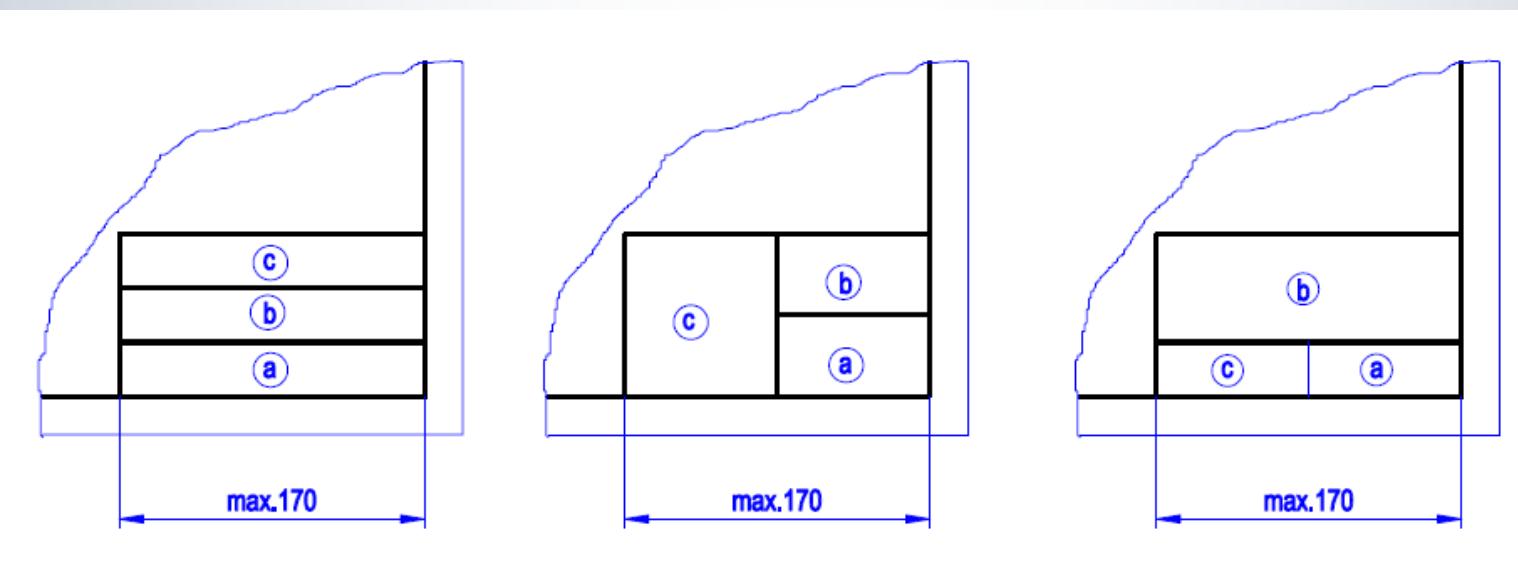
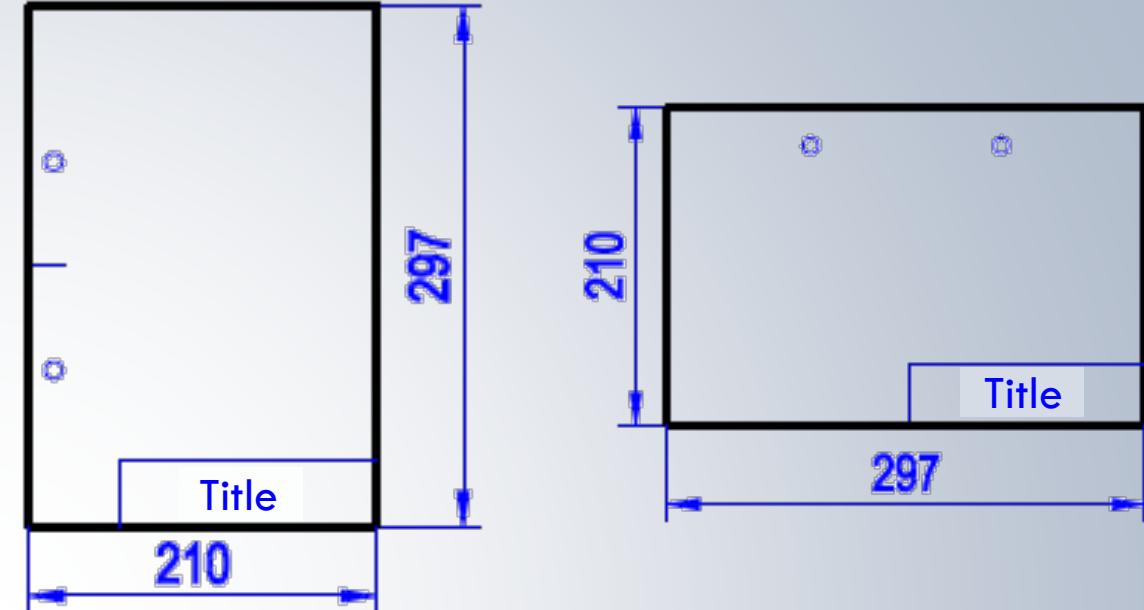


	Uncut paper	Cut paper	Drawing area			
	a_3	b_3	a_2	b_2	a_1	b_1
A0	880	1230	841	1189	821	1159
A1	625	880	594	841	574	811
A2	450	625	420	594	400	564
A3	330	450	297	420	277	390
A4	240	330	210	297	180	277



TITLE BLOCK

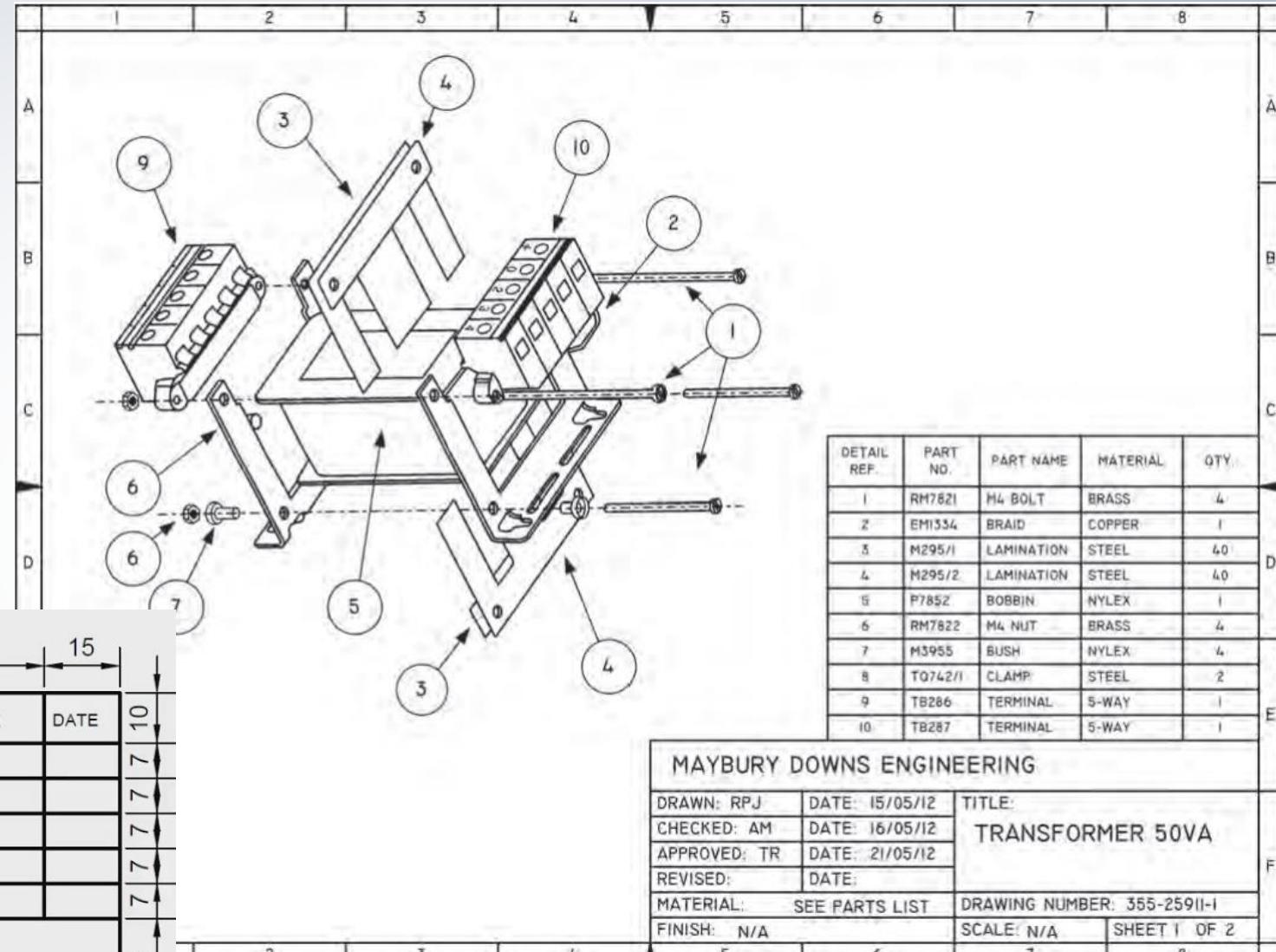
- ISO 7200
- A0-A3
 - Used horizontally
 - Title block at bottom right
- A4
 - Used vertical
 - Title block at short edge (bottom)



TITLE BLOCK

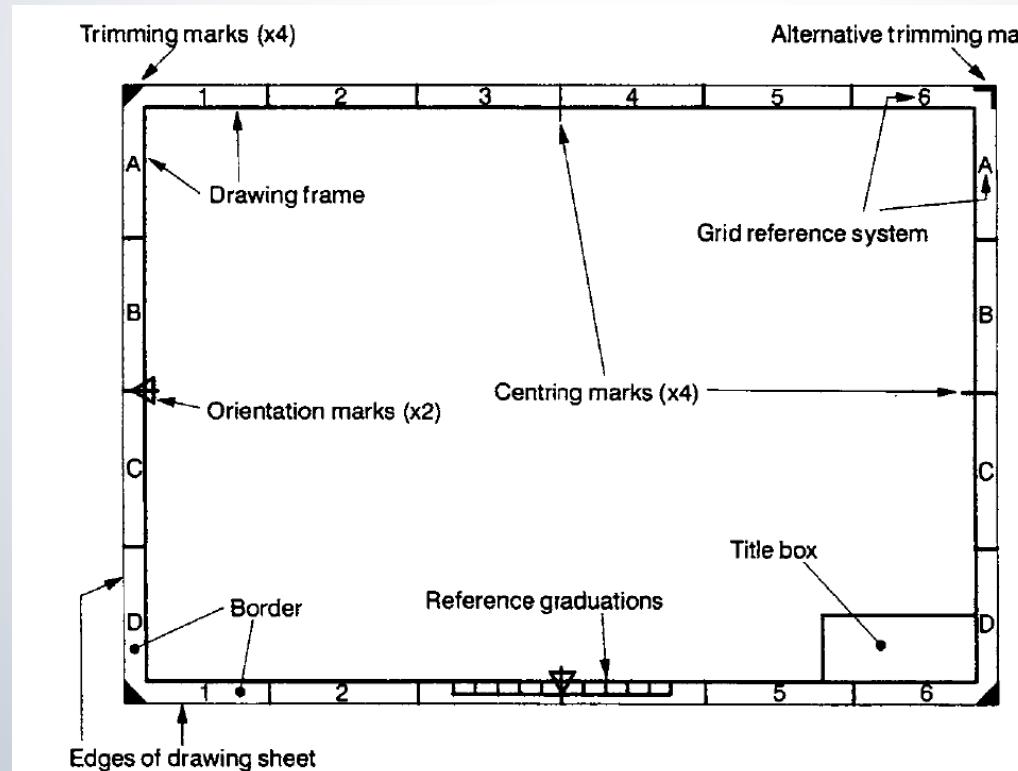
- ISO 7200
- A0-A3
 - Used horizontally
 - Title block at bottom right
- A4
 - Used vertical.
 - Title block at short edge (bottom)

NAME OF THE FIRM		20	25	15	10	7	7	10	7	7	10
DESIGNED											
DRAWN											
CHECKED											
STANDARD											
APPROVED											
SCALE	TITLE	DRAWING NO.									
		SHEET 1 OF 1									
		20									
		190									
		25									



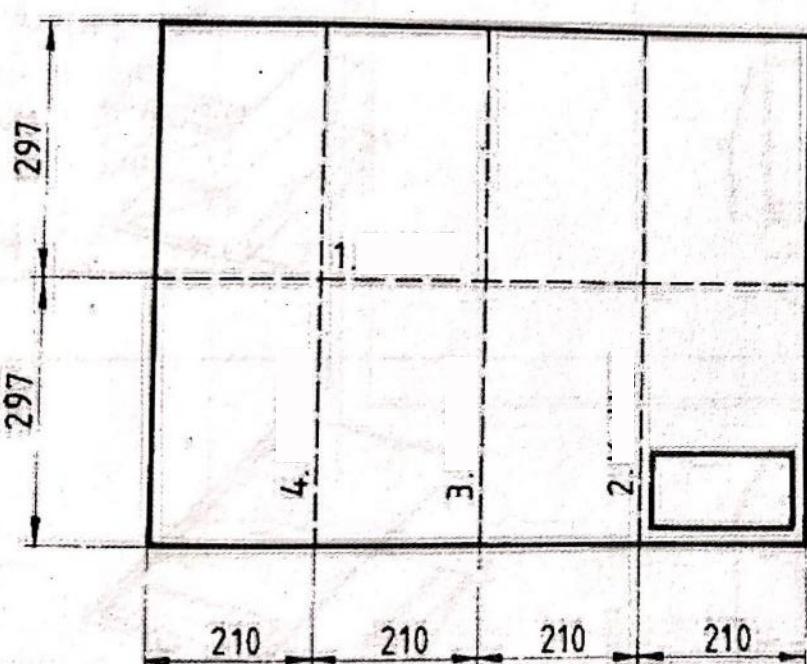
PAPER BORDERS AND FRAMES

- Continuous lines with 0.7 thickness for the frames around drawing area
- The paper border for filing should be 20 mm from the left edge including the frame. Other borders should be 10 mm wide.



FOLDING DRAWING PAPERS

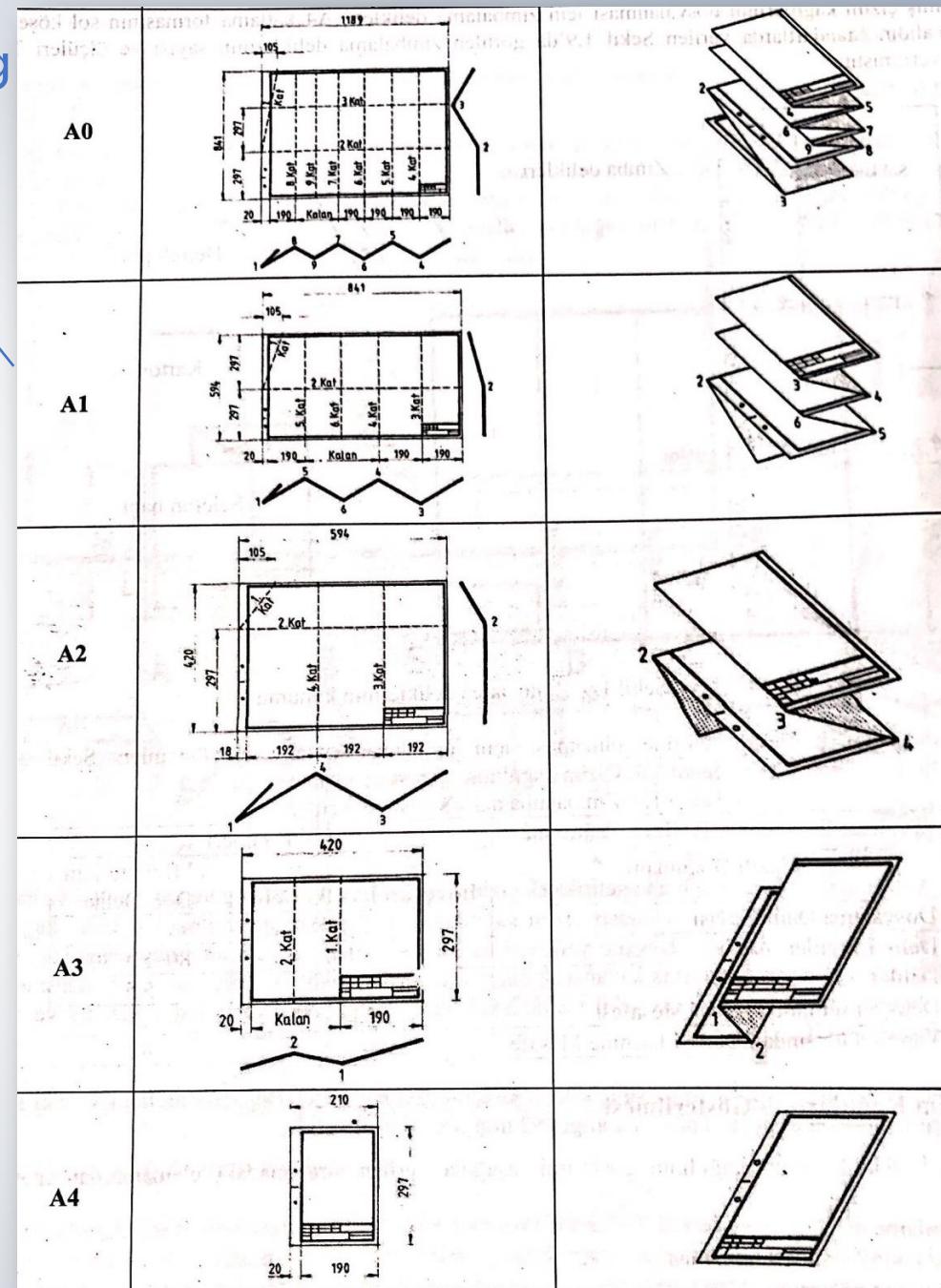
- The aim is to bring it to A4 form with the title on top.



Free folding

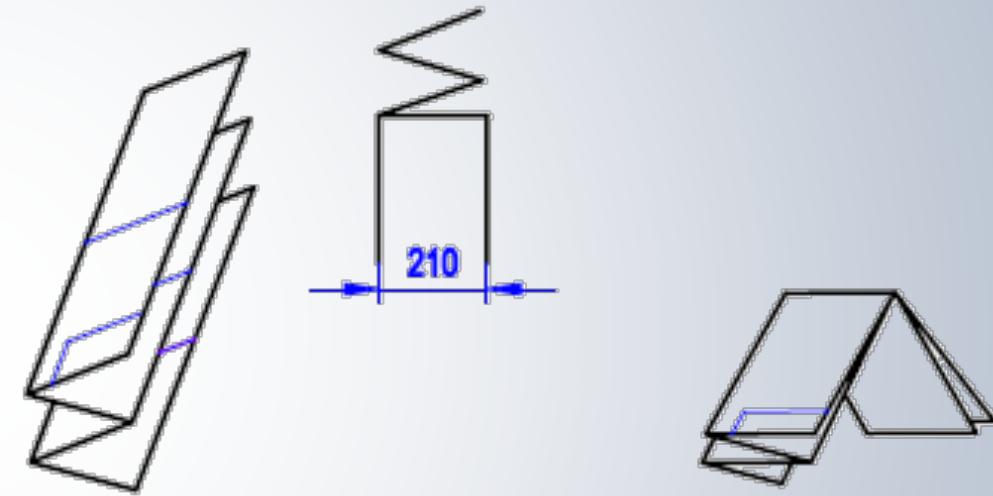
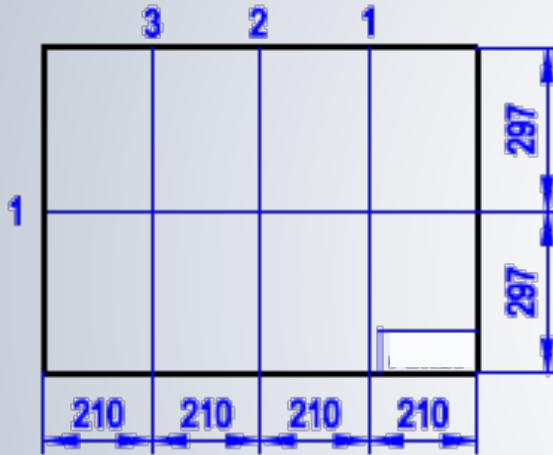


For filing purpose

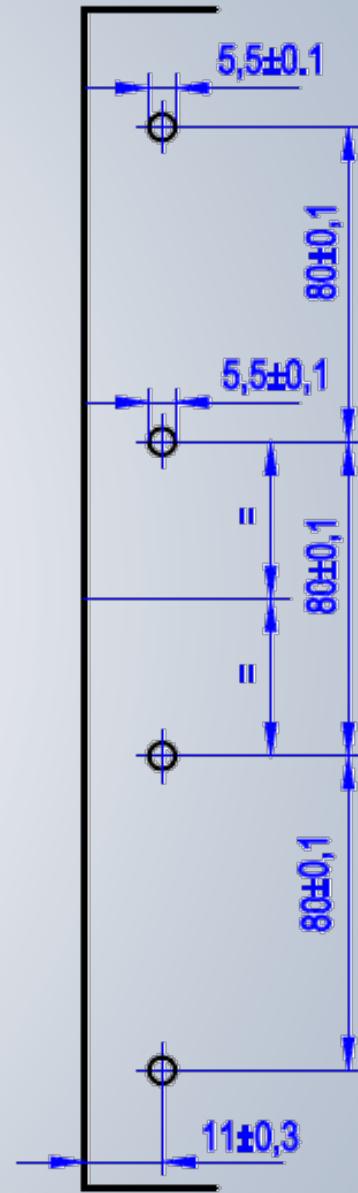
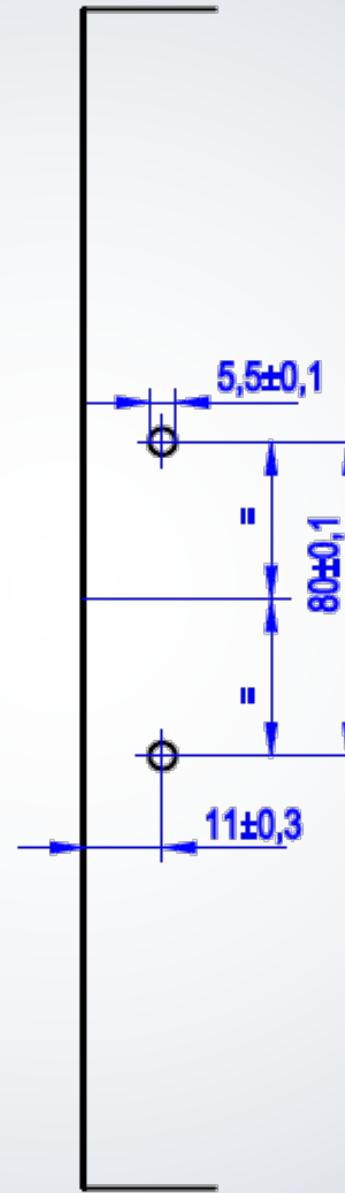
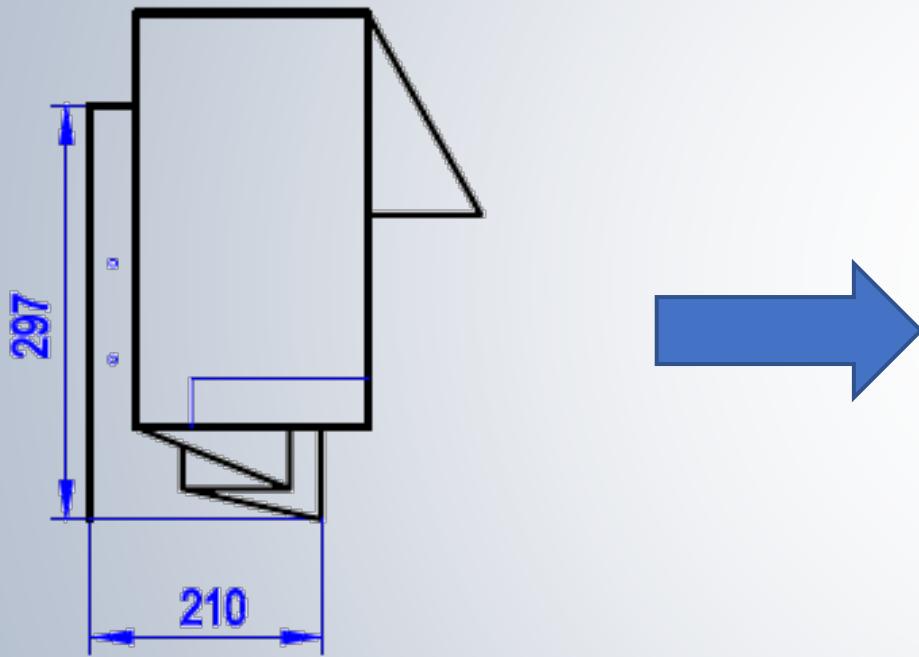


FOLDING UNFILED PAPERS

A1

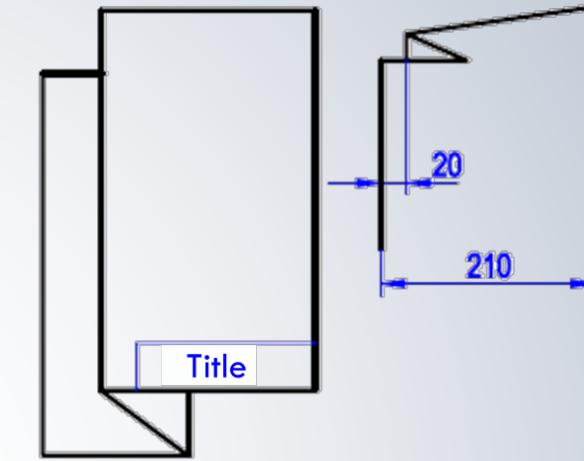
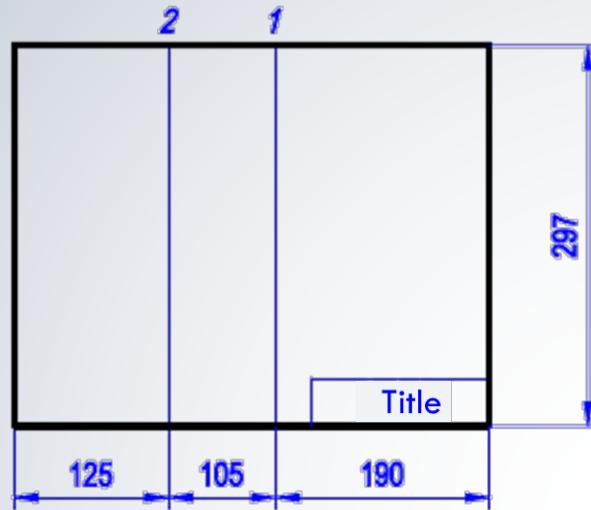


PUNCHING HOLES

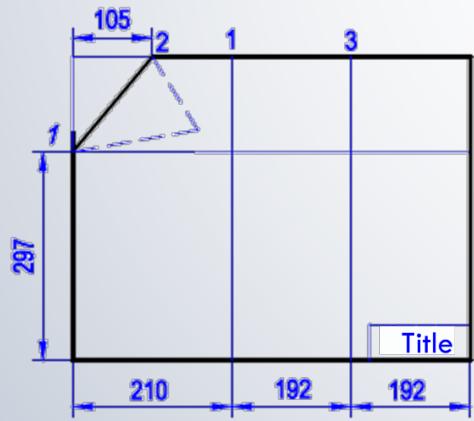


A3 – A2 FOLDING

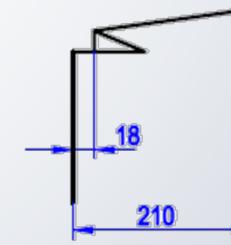
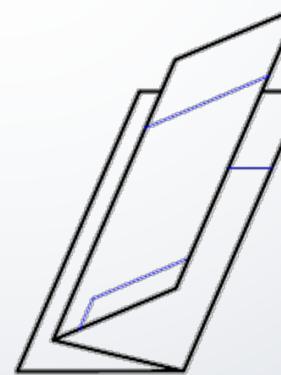
A3 folding



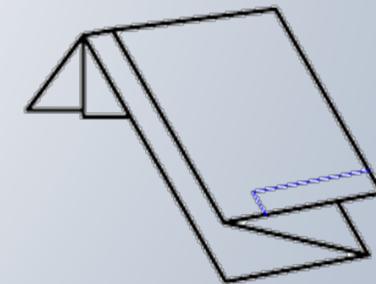
A2 folding



Longitudinal folding

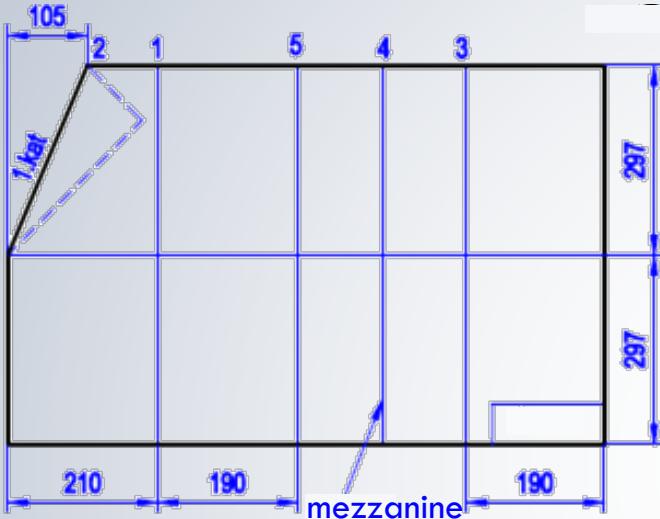


Transverse folding

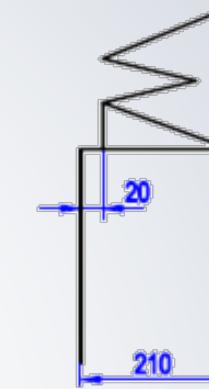
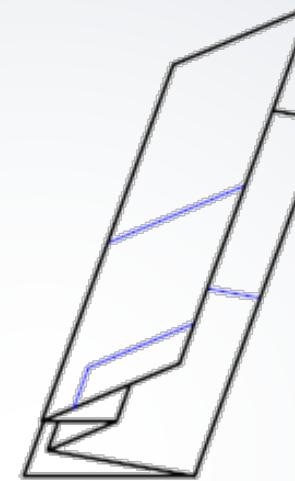


A1-A0 FOLDING

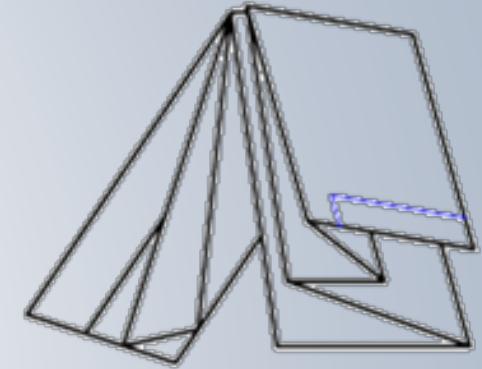
A1 folding



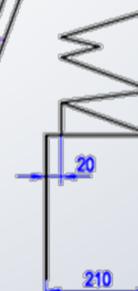
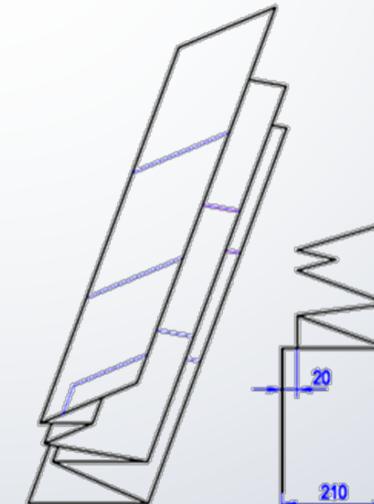
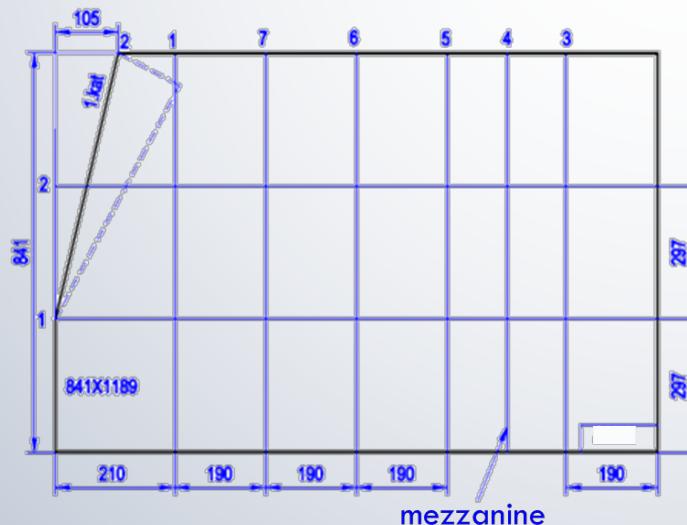
Longitudinal folding



Transverse folding



A0 folding



DESCRIBING PAPERS

1. Definition
2. TS ISO 5457 / A1 standard number
3. Paper size representation
4. Cut (T) or uncut (U) information
5. Material type
6. Usage information on printed front (F) or back (R)
7. Text area according to (TBL) template if applicable

Example: Display of a pre-printed technical drawing paper on 112.5 g/m^2 tracing paper, cut in A1 size in accordance with TS EN ISO 5457/A1 standard, with a printed back side and a writing area prepared according to the template:

Technical Drawing Paper TS EN ISO 5457/A1 – A1T – TP 112.5 – R – TBL

1

2

3

4

5

6

7

STANDARD LINES

annotation → thin

Line thicknesses: 0.13 – 0.18 – 0.25 –
0.35 – 0.50 – 0.70 – 1.0 – 1.4 – 2.0

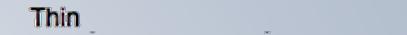
4 main categories for thick lines:
0.35 – 0.50 – 0.70 – 1.0

Line

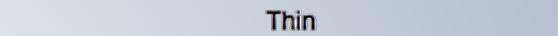
group	Thick lines	Thin lines	Letter thickness
0,25	0,25	0,13	0,18
0,35	0,35	0,18	0,25
0,5	0,5	0,25	0,35
0,7	0,7	0,35	0,5
1,0	1,0	0,5	0,7
1,4	1,4	0,7	1,0
2,0	2,0	1,0	1,4



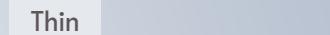
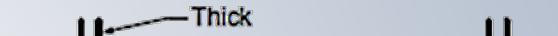
VISIBLE LINE



CENTER LINE



SYMMETRY LINE



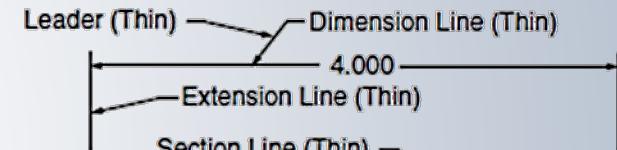
FREEHAND BREAK LINE



LONG BREAK LINE



DIMENSION LINE
EXTENSION LINE
LEADER

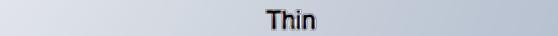


SECTION LINE

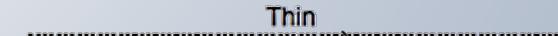
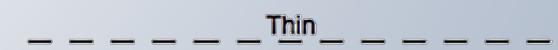
CUTTING-PLANE LINE
or
VIEWING-PLANE LINE



PHANTOM LINE or
REFERENCE LINE



HIDDEN LINE



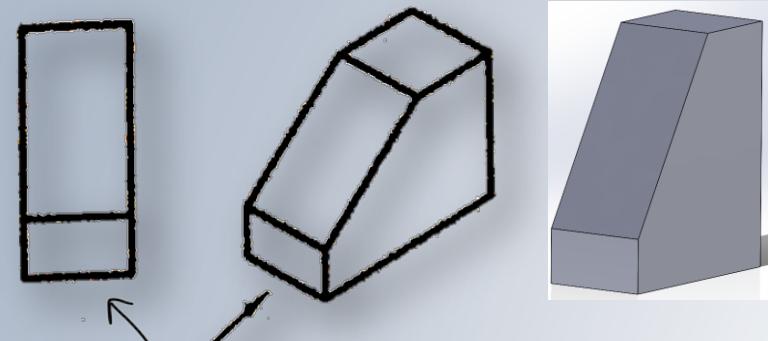
CHAIN LINE



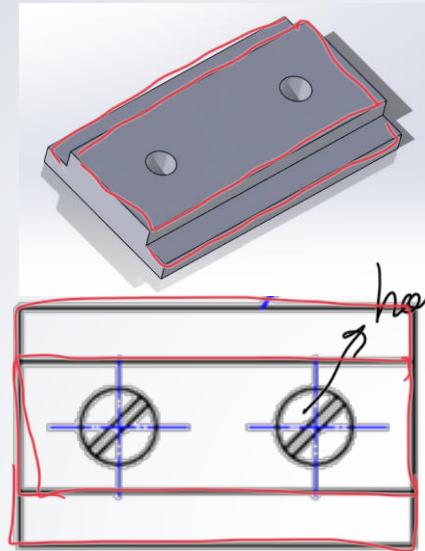
VISIBLE LINES

(continuous thick lines)

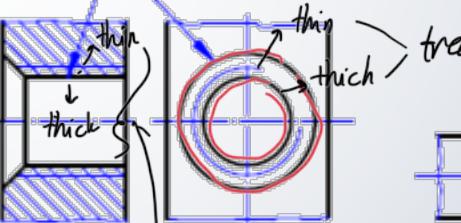
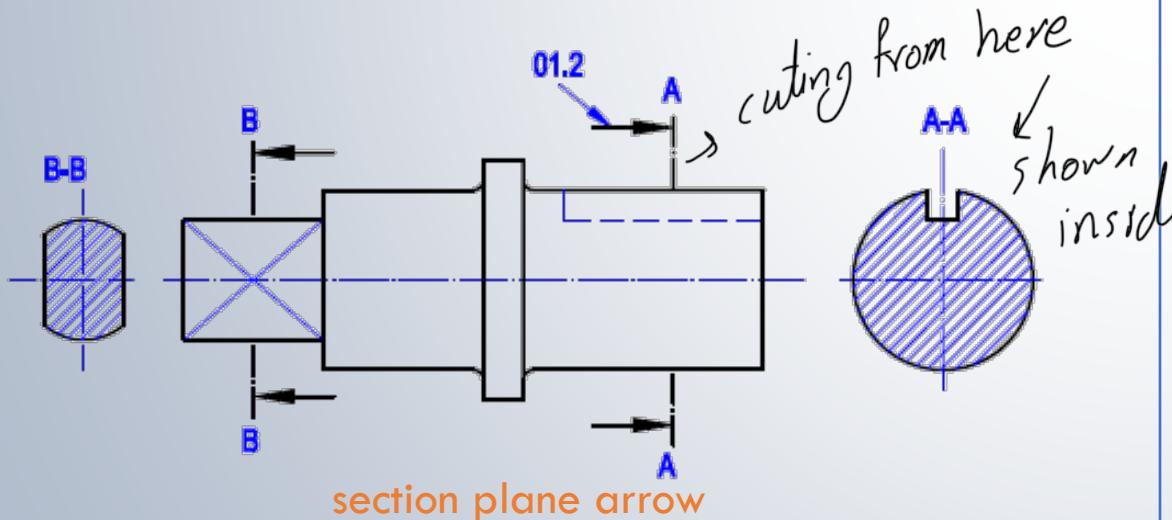
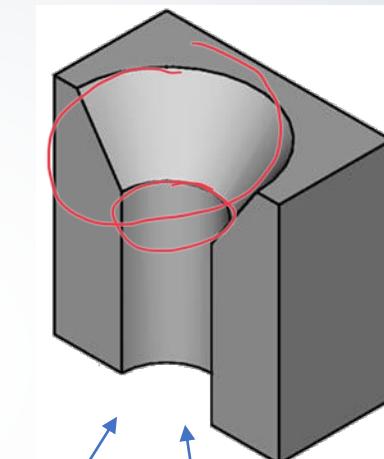
→ must be continuous



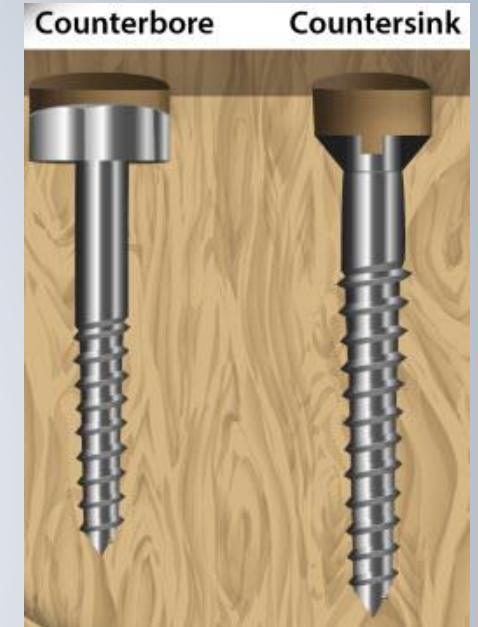
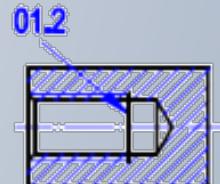
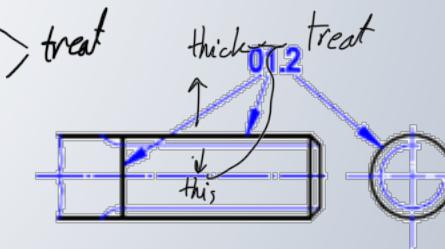
all visible lines
all contour lines



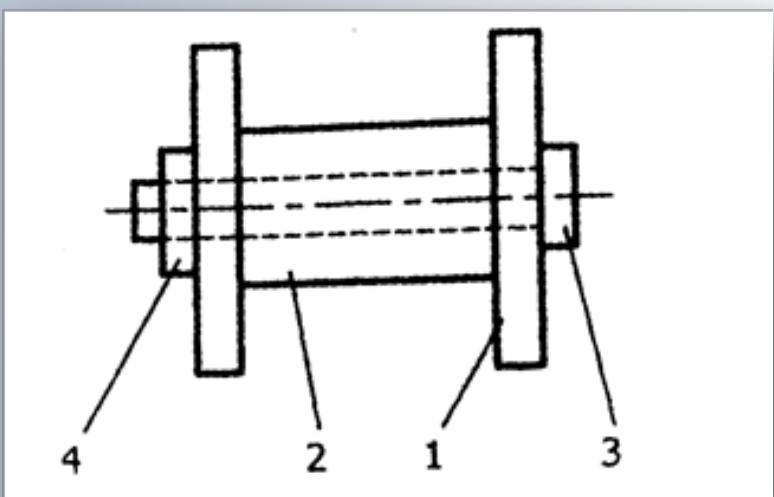
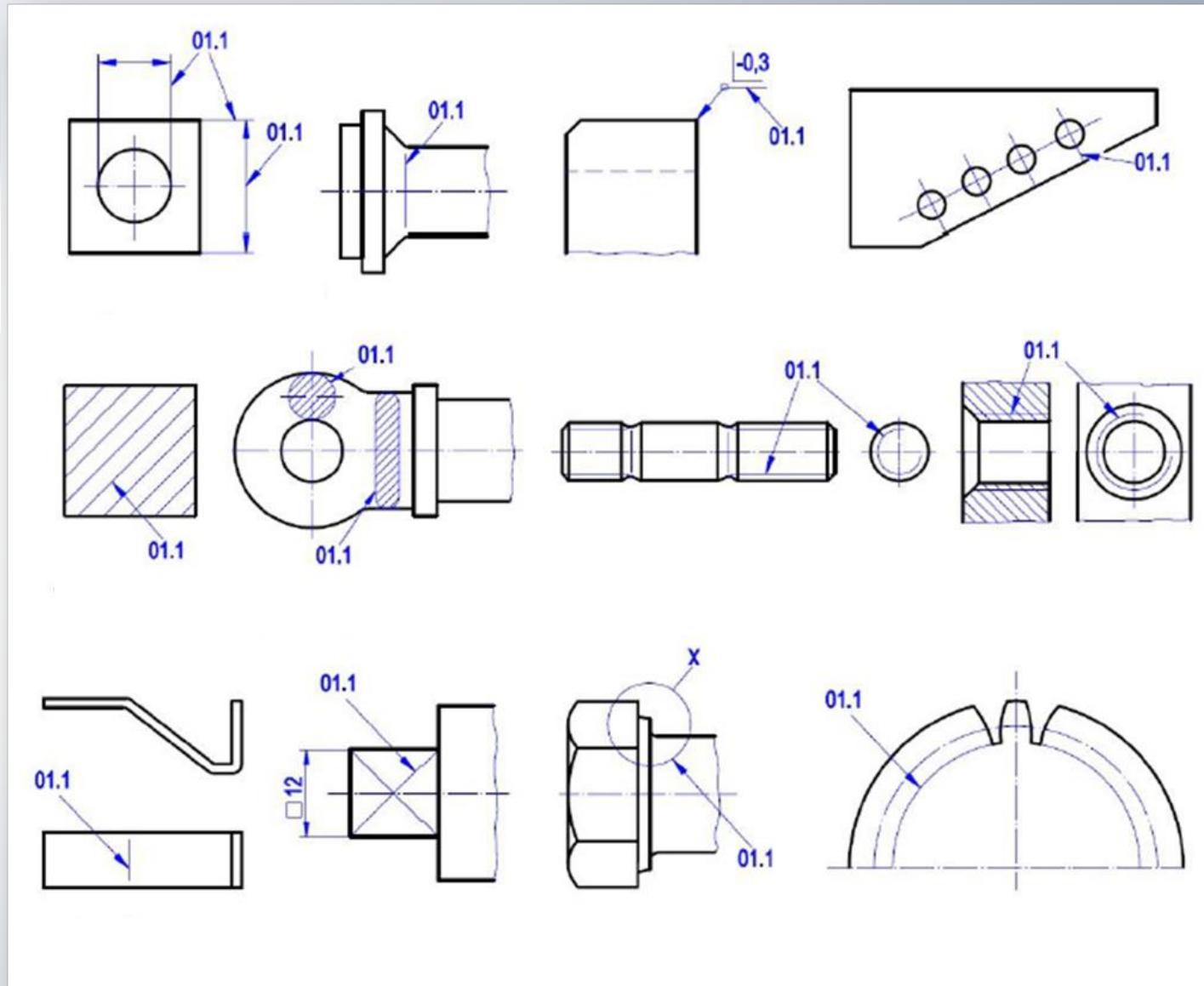
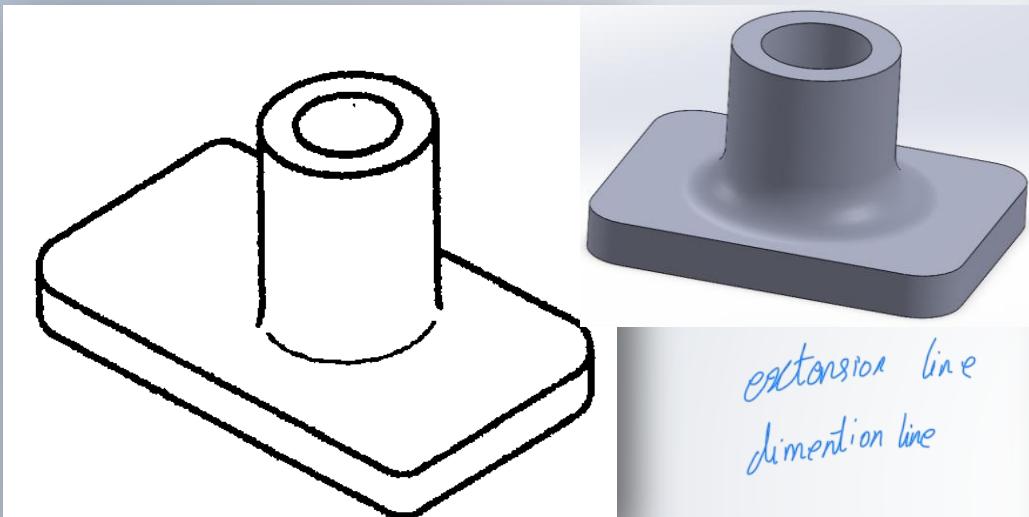
all visible lines



treat → G₁ G₂
inner and outer screw-top diameters and screw ends



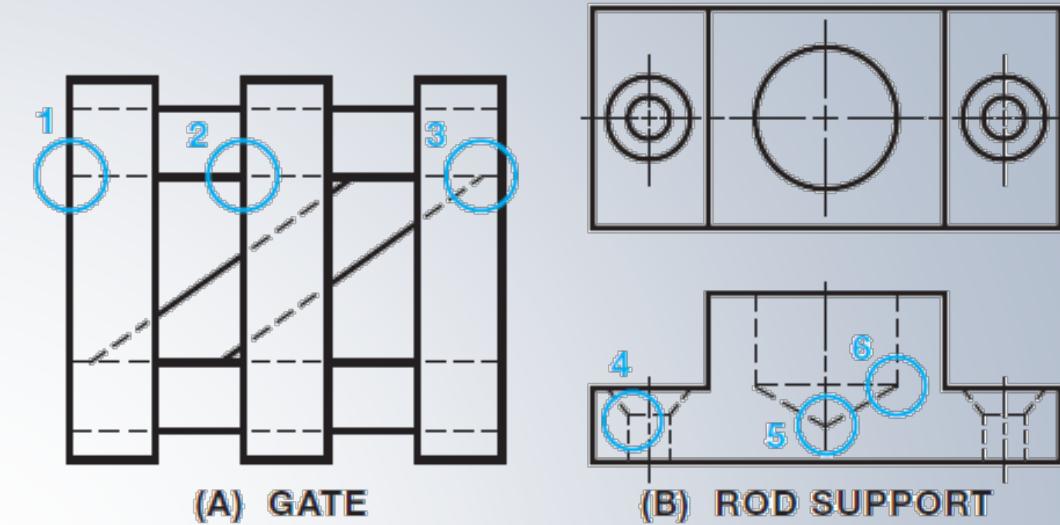
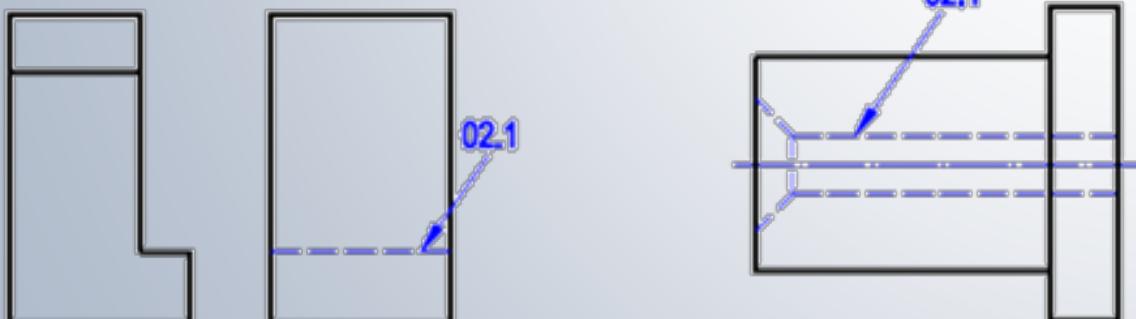
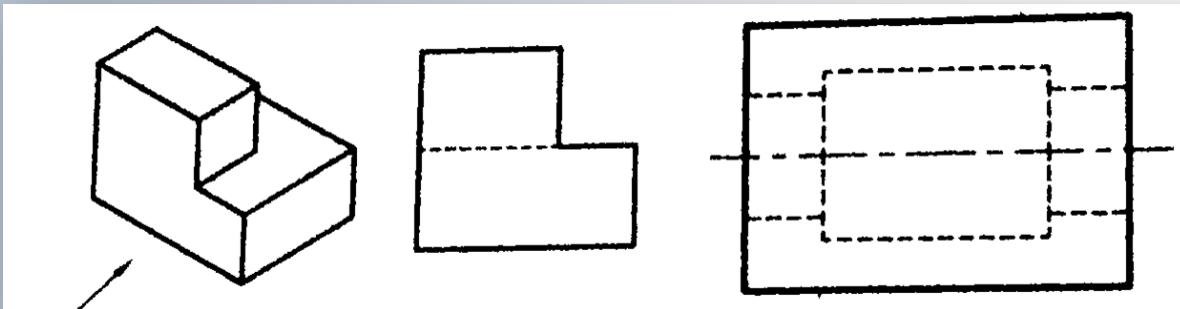
CONTINUOUS THIN LINES



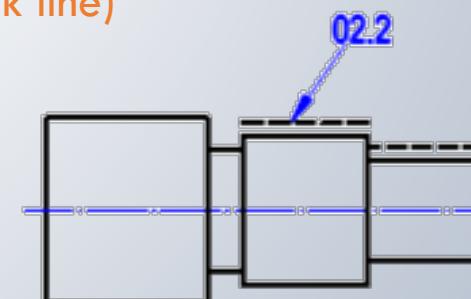
HIDDEN LINES

Dashed lines

- invisible contour lines and edges
(thin)

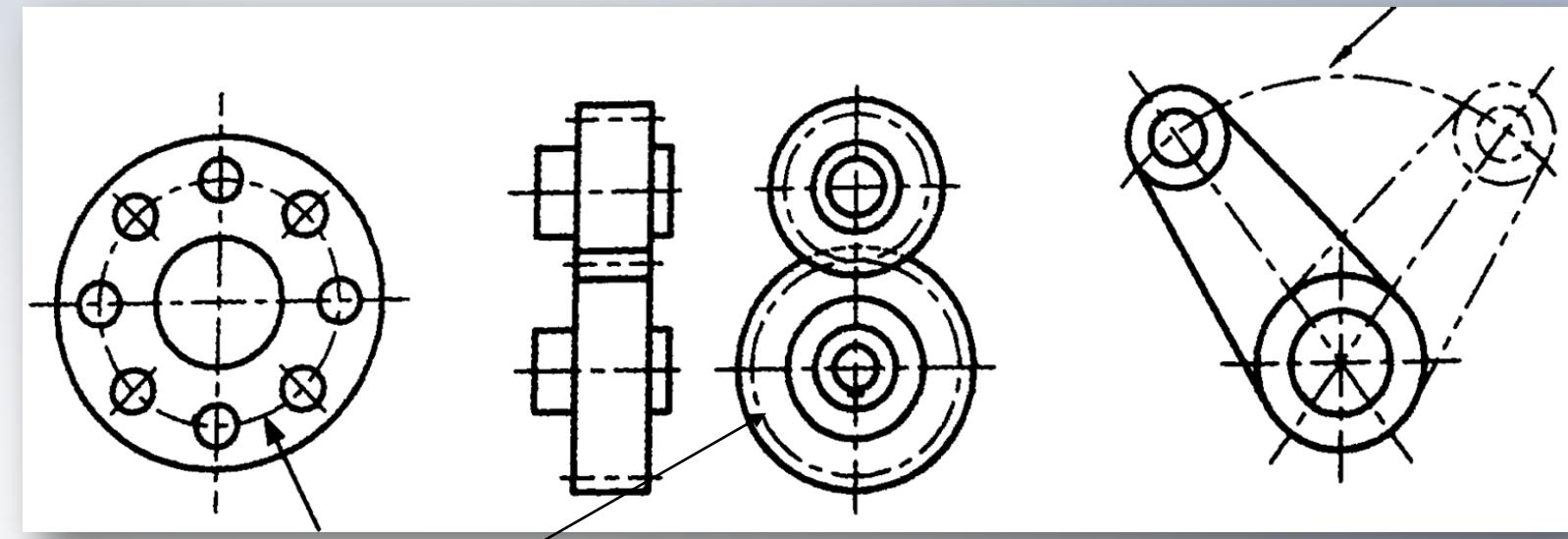
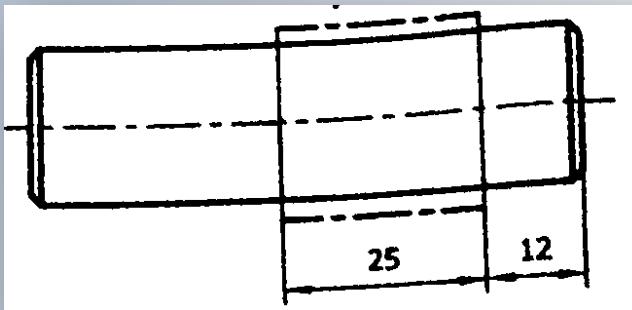


Machined surface boundaries
(thick line)

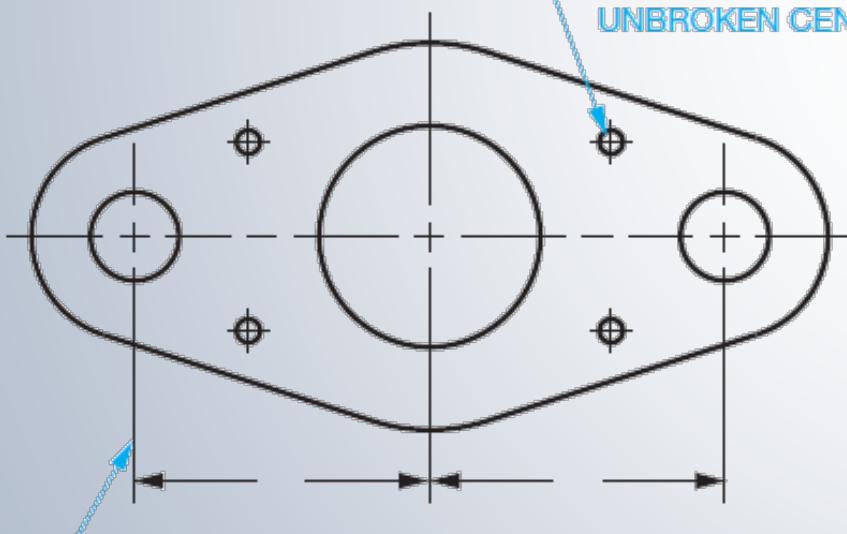


CENTER LINES

places where additional surface processing is required

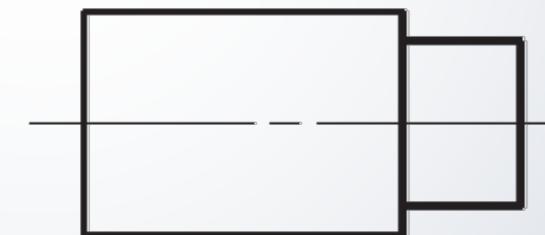


Division circle



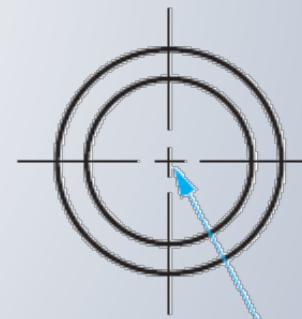
CENTER LINE SHOULD NOT BE BROKEN
WHEN IT ENDS BEYOND THE OBJECT LINE

EXAMPLE 1

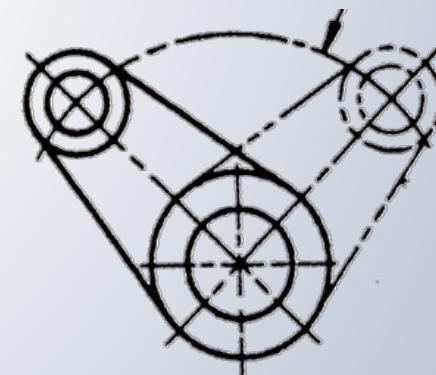
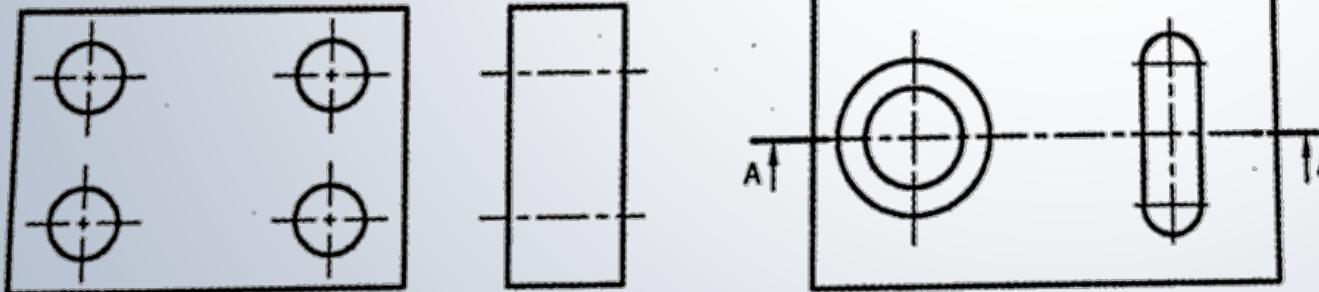
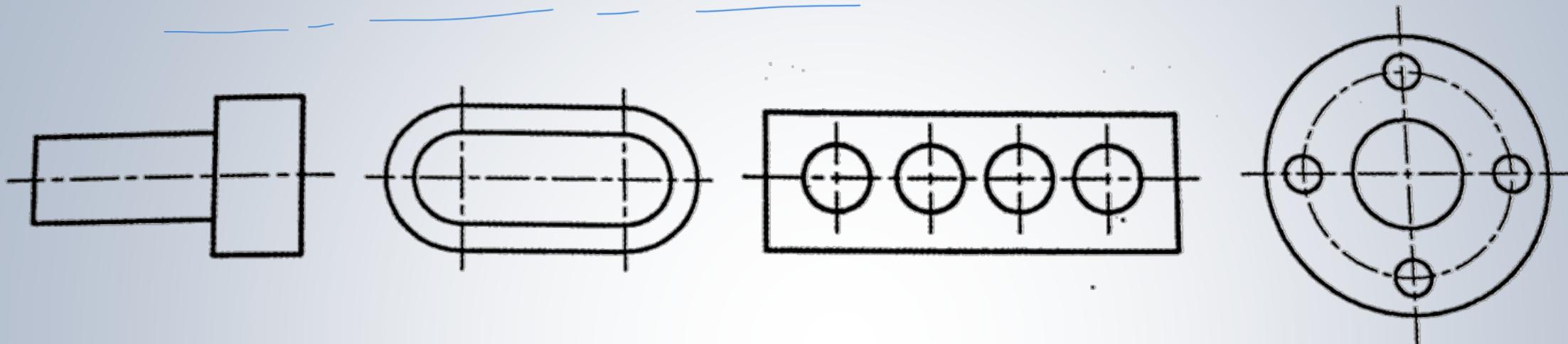


USE TWO SHORT DASHES AT THE
POINT OF INTERSECTION

EXAMPLE 2

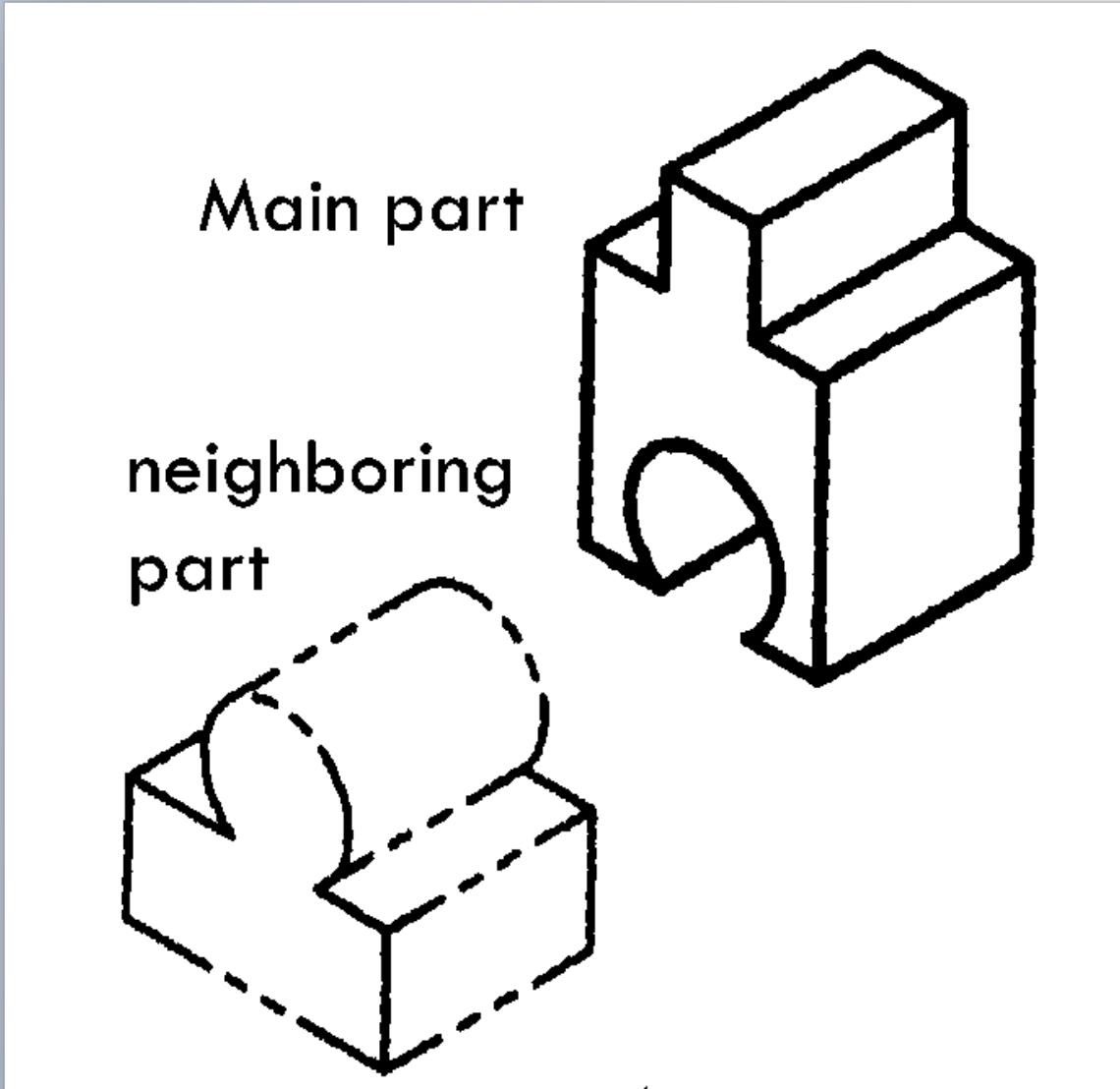


CENTER LINES

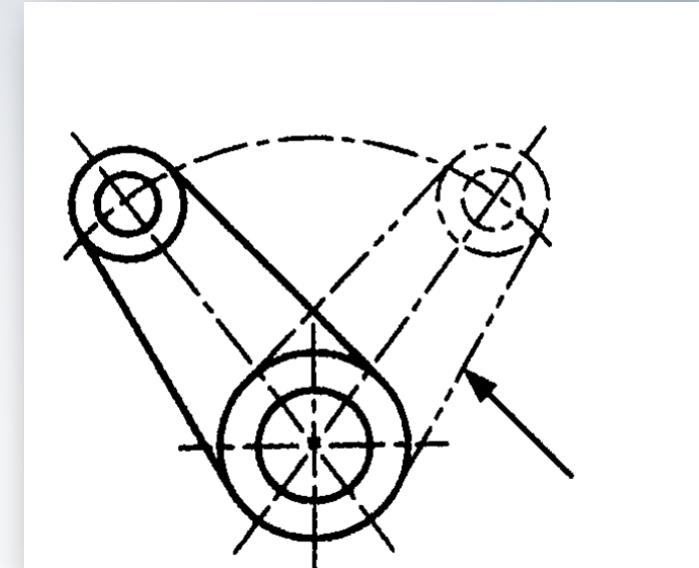


PHANTOM LINES

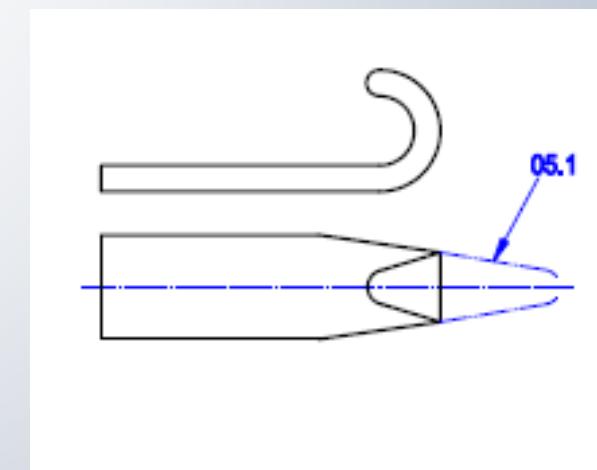
edges of neighboring parts



Moveable part location

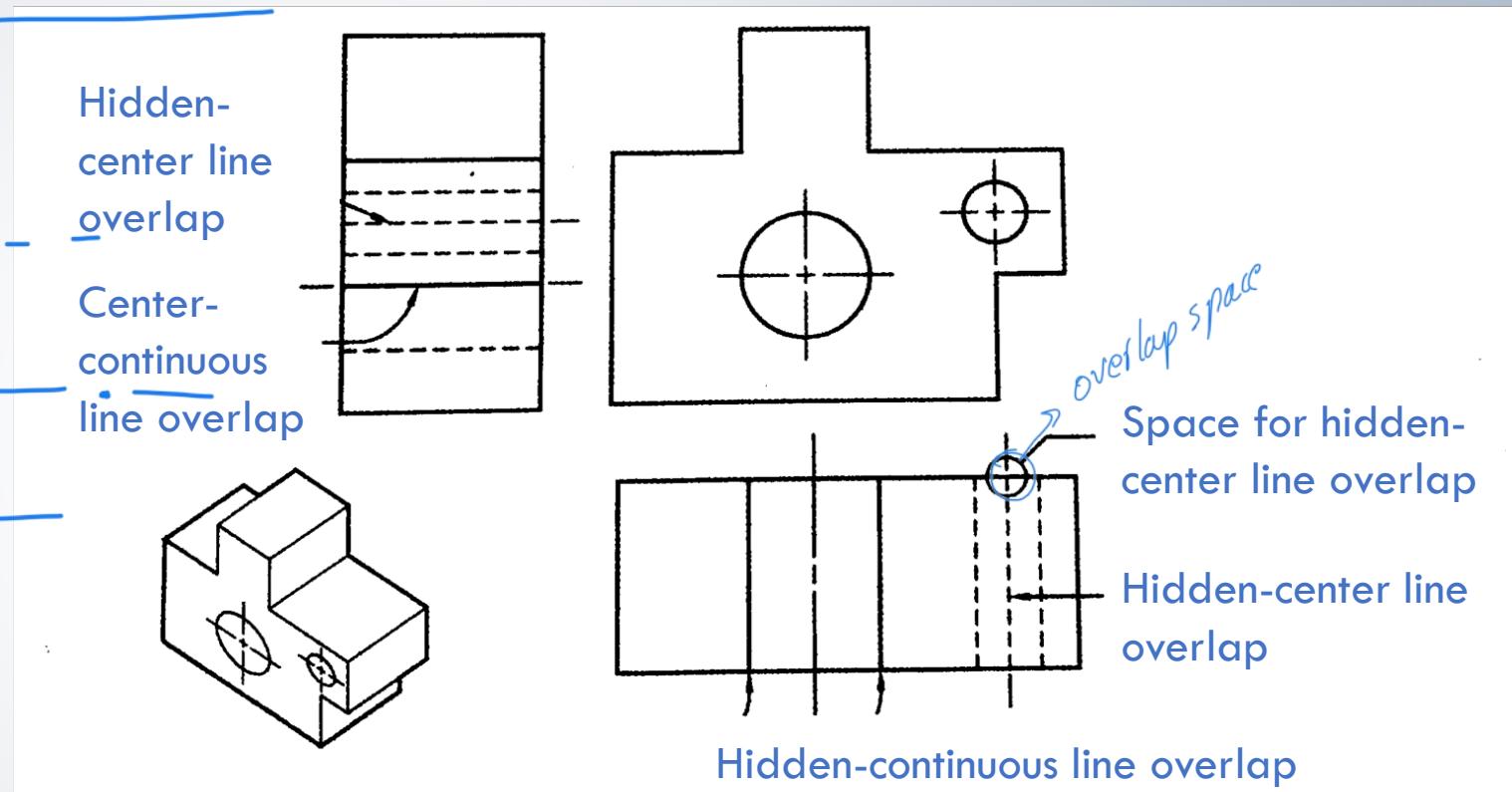


Shape before forming



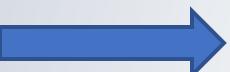
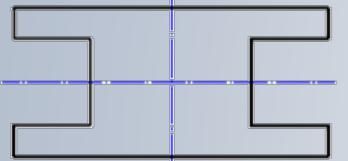
PRIORITY OF LINES

1. Visible (continuous) lines
2. Hidden lines
3. Cutting plane lines
4. Center lines
5. Center of gravity and its lines
6. Annotation lines

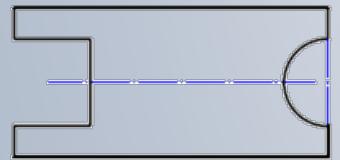
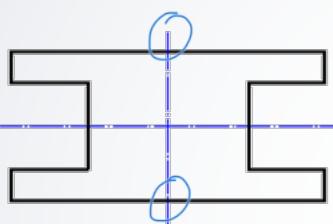


TRUE-FALSE COMPARISON

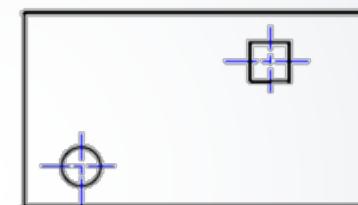
FALSE



TRUE



FALSE



TRUE
(continuous)

