CO-TEACHING ACTIVITY PROJECT

A. OVERVIEW

Professor dipl.Eng. ENACHE SILVIA-IOANA, dipl. Eng. BELDIMAN ELENA IULIANA
Lesson for 9th grades, Mechanics
***Subject*: REPRESENTATION OF MECHANICAL PARTS**
Chapter: 3. Representation of constructive forms in view and in section
***Lesson title*: NORMAL PLACEMENT OF PROJECTIONS**
***Lesson type*: Mixed (theory + lab activity)**
***Duration*: 100 minutes**

1. Contents:

Code	Area of knowledge	Items	Operational Obiectives
C1	Elements of projective drawing	2.2.1 - Representation in triple orthogonal projection of geometric bodies	O1
		2.2.2 – Normal placement of projections	O2
		2.2.3 – Determination of the third projection	O3
C2	Representation of constructive forms in view and in section	3.1 – View representation of geometric bodies	O4

2. Operational objectives:

Code	Obiective	Testing conditions	Success criteria
O1	To use the triple orthogonal projection	Spatial representations of some constructive forms are offered	To correctly identify all three views of a given constructive form
O2	To use the normal layout of the projections	The spatial representation of a part, the projection cube unfolded and the projection directions are provided	To correctly identify the position of all projections, according to the projection directions
O3	To determine the third projection		To correctly use all the rules of representation in view
O4	To realize the representation in view of a proposed constructive form		To correctly execute the representation of the proposed constructive form on the projection cube

3. Competences-contents correspondence:

Code	C1	C2
O1	*	
O2	*	
O3	*	
O4		*

4. **Teaching method: JIGSAW**
5. **Teaching resources:** laptops/tablets/smartphones with Internet access, documentation sheets, 3D printer

B. PREPARATION OF THE TEACHING MATERIALS

The teacher divides the subject in 4 parts, and writes a documentation sheet for each part, as in annexes 1 to 4:

Annex 1	Documentation sheet – Triple orthogonal projection
Annex 2	Documentation sheet – Normal placement of projections
Annex 3	Documentation sheet – Determination of the third projection
Annex 4	Documentation sheet – Representation in view of a constructive form

C. TEACHING SCENARIO

1. Organizing students in learning teams (20 min):

The students of a class are divided in teams of 4. Each student of a team receive a documentation sheet, along with the task of studying the respective content. They must become experts in the assigned contents.

2. Establishing of expert groups (30min):

The students that received the same assignment reunite in expert groups for debating the task together. Members of a group cooperate for analysing and synthesizing the specific content. They discuss over the materials offered, add new elements if needed and establish the way of transmitting their "expert" knowledge to the other members of the initial teams.

Experts will receive resources as follows:

- **Laptops/tablets with internet access;**
- **Documentation sheets 1 to 4;**
- **Scratch quiz for updating knowledge – Projection systems, orthogonal projections, representation in view of constructive forms**

https://planet.mblock.cc/project/3475097 (share the link on Google Classroom)

Correct responses to the quiz: 1-projection, 2- line, 3-yes, 4-planes, 5-orthogonal, 6-3, 7-perpendicular, 8-main, 9-points, 10-cube.

3. Learning (25 min):

The experts return to the learning teams and teach their colleagues, and in the same time they learn from the experts in the other contents. Members of the group are encouraged to talk, to ask questions, to draw sketches and to present their own ideas.

4. Evaluation (15 min):

The assimilation of information is checked by making a representation.

Each learning team will receive a mechanical part and will realize the representation in view, in triple orthogonal projection – each student will make the own drawing.

For making the drawing easier, the students will use a 3D printed model of the meachanical part. If the students have difficulties in their activity, they will be helped by the teacher. He supervises the groups in order to ensure that the informations are properly transmitted and assimilated. At the end of the activity each student must be able to explain how he fulfilled the task.

5. Feed-back (10 min):

- Gallery tour: Each learning team presents to the others the representation they realized and explain how it was done, difficulties encountered and solutions found etc. The teacher does an assessment and offers additional information, if needed.

- **PADLET –** questionnaire for students, to appreciate the utility and attractiveness of the method and resources

https://padlet.com/enache40/representation-in-view-jig-saw-teaching-method-5tcyc2rxxlgptpw

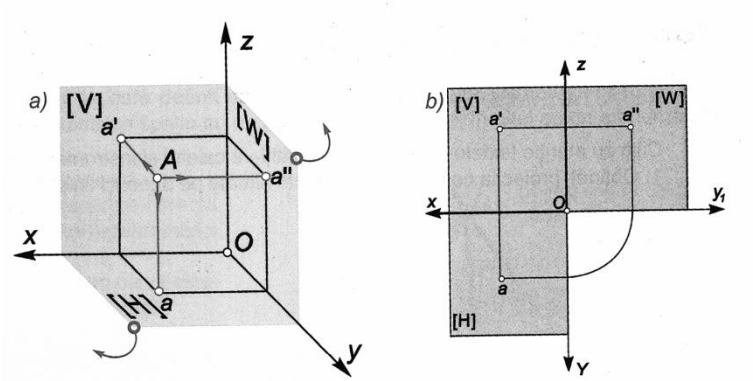
The students will appreciate the day-by-day perception of the representation in view.

Bibliography

1. Mariana Constantin, Aurel Ciocârlea Vasilescu, Olguţa Laura Spornic – REPRESENTATION OF MECHANICAL PARTS, school book for the 9th grade of Technological high-school, Mechanics specialty, CD Press Publishing House - 2019
2. https://education.makeblock.com/resource/
3. https://www.mentimeter.com/education/hybrid-learning

ANNEX 1 – DOCUMENTATION SHEET – TRIPLE ORTHOGONAL PROJECTION

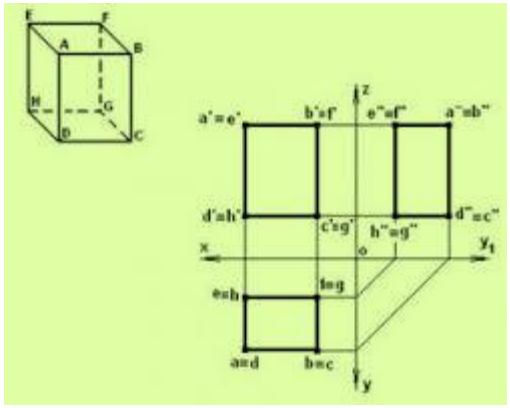
The POINT:



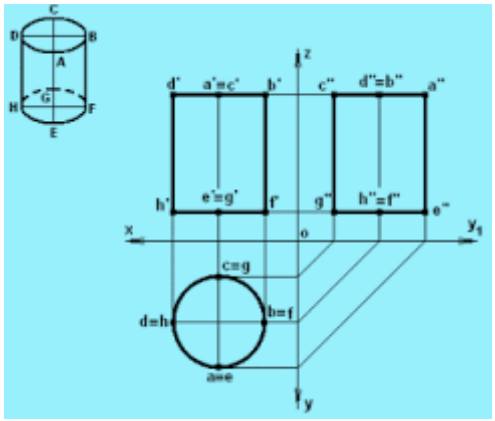
The projections of geometric bodies can also be based on some specific points (base center, peaks, intersection of diagonals etc).

The geometric bodies are positioned with the base parallel to the horizontal plane of the projection system, for simplifying the representation.

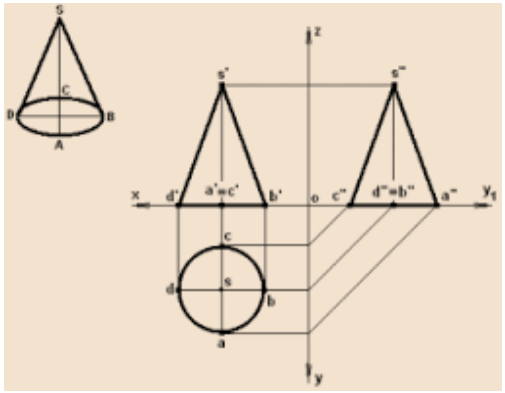
the PRISM:



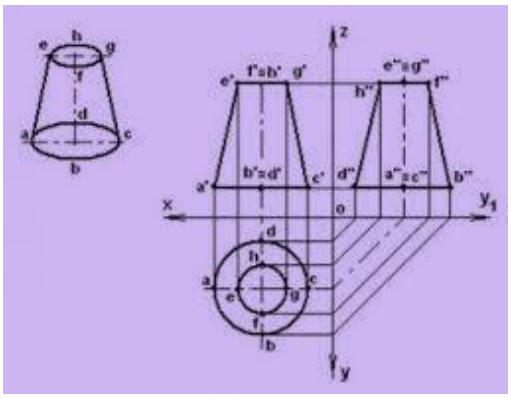
the CYLINDER:



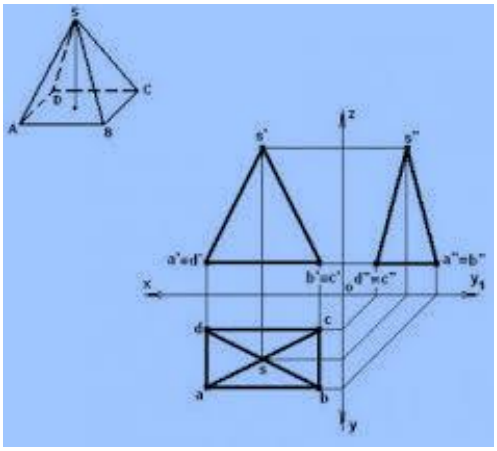
the CONE:



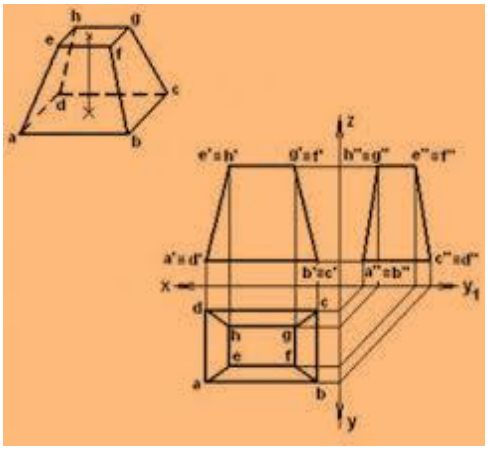
the TRUNCATED CONE:



the PYRAMID:

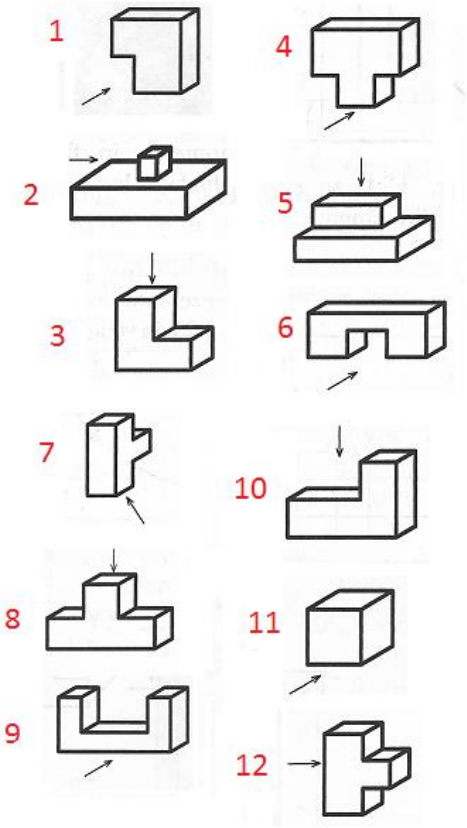


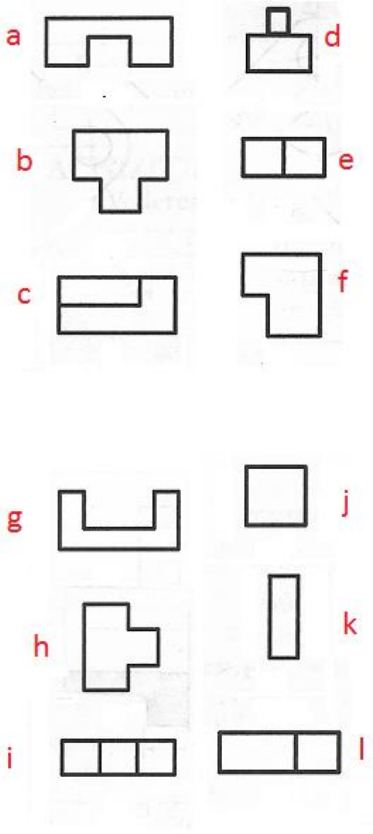
the TRUNCATED PYRAMID:



EXERCISE:

For the parts on the left, please identify the corresponding views on the right, as indicated by the arrow, and fill in the table:

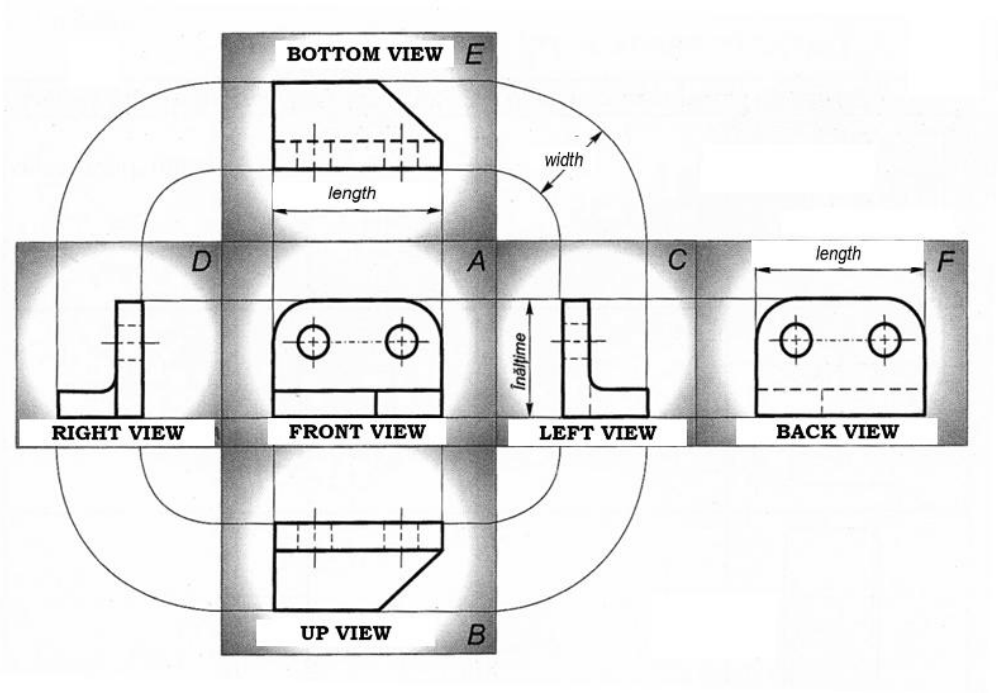


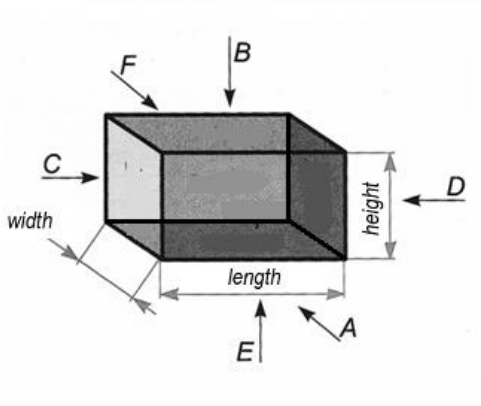


1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

ANNEXA – DOCUMENTATION SHEET – NORMAL PLACEMENT OF PROJECTIONS

For constructing the orthogonal projections we use the projection cube method. We think the object is placed inside an imaginary cube named projection cube, as in the picture below. The projections are placed on the cube inner faces, as to the observing directions, and then they are dragged in the same plane (face A), by successive foldings. The face corresponding to direction A is considered the main projection (front view) and this will be the drawing plane after unfolding.





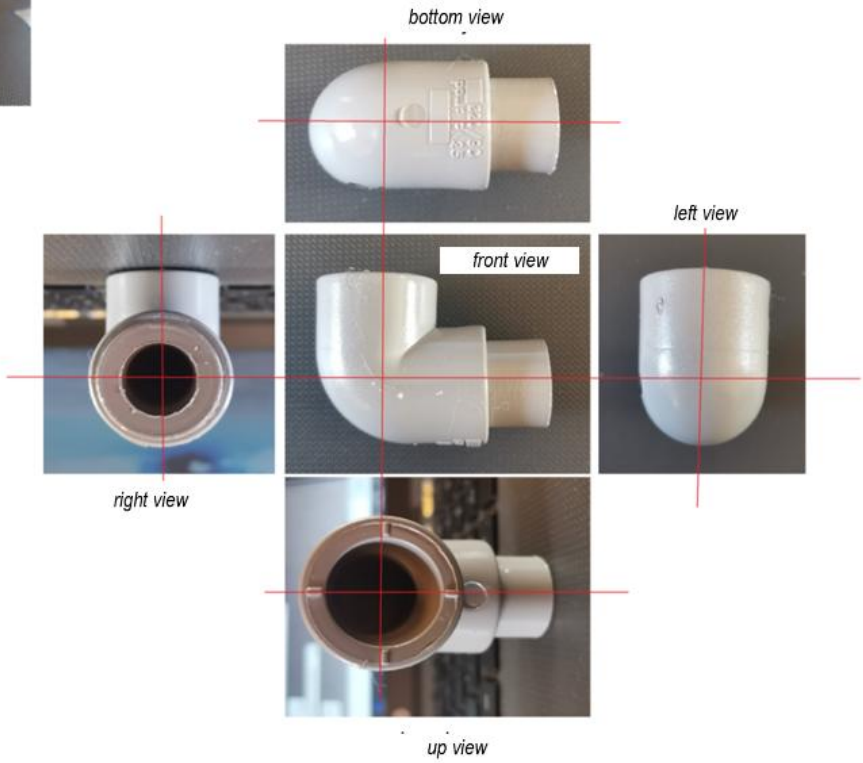
Observing direction	View
A	FRONT
B	UP
C	LEFT
D	RIGHT
E	BOTTOM
F	BACK

Scan the QR code and see the animation of unfolding the projection cube !

In technical drawing, simple objects are usually represented in double or triple orthogonal projections. For complex mechanical parts we must draw more projections in order to have a complete image of the object (the number of projections should be enough to see all the constructive elements of a part).

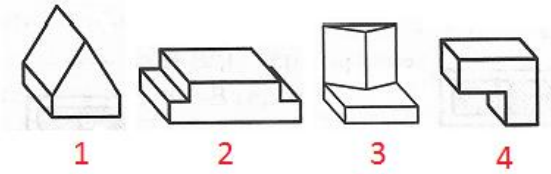
Example:



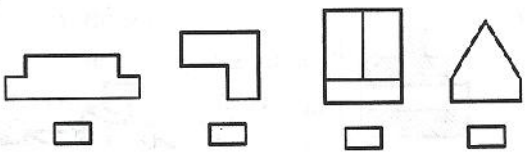


EXERCISE:

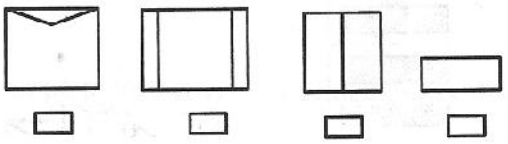
For the constructive forms below, please identify the corresponding views:



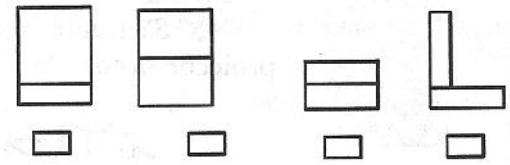
Front view



Up view

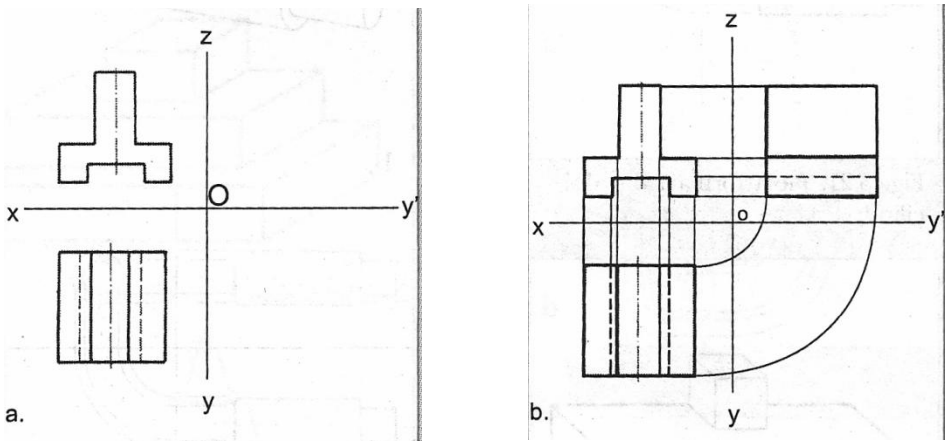


Left view



ANNEX 3 – DOCUMENTATION SHEET – DETERMINIATION OF THE THIRD PROJECTION

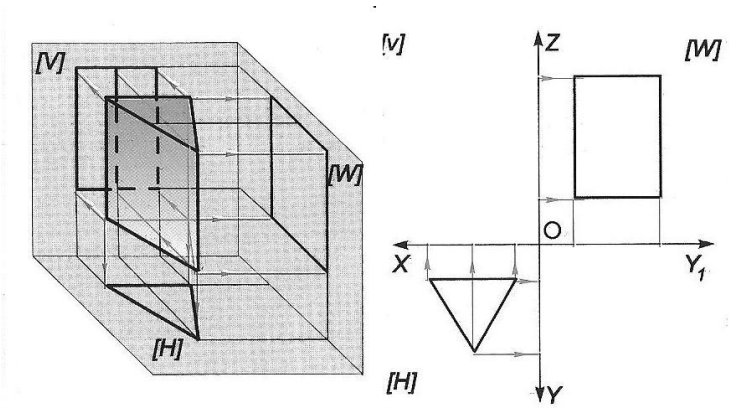
If the part is represented with two projections, the third projection can be easily determined if you draw the projection lines perpendicular to the respective plane and connect the corresponding points.



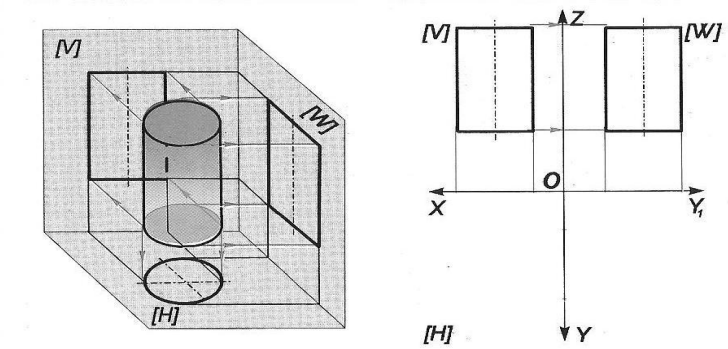
EXERCISE:

Using the tridimensional representation on the left, please complete the unfolded drawings on the right with the missing projections:

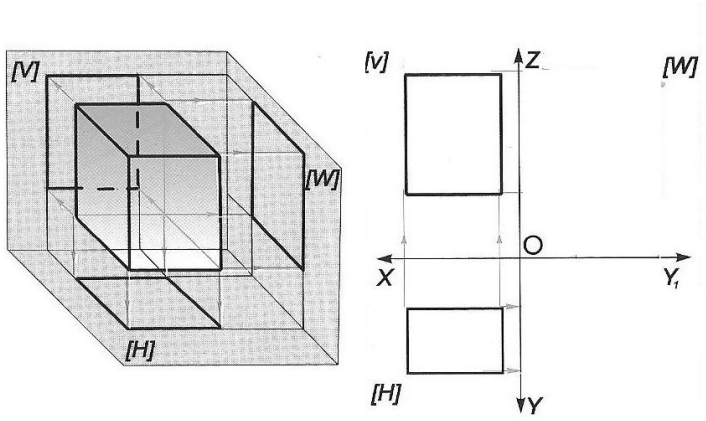
1. **The TRIANGULAR PRISM:**



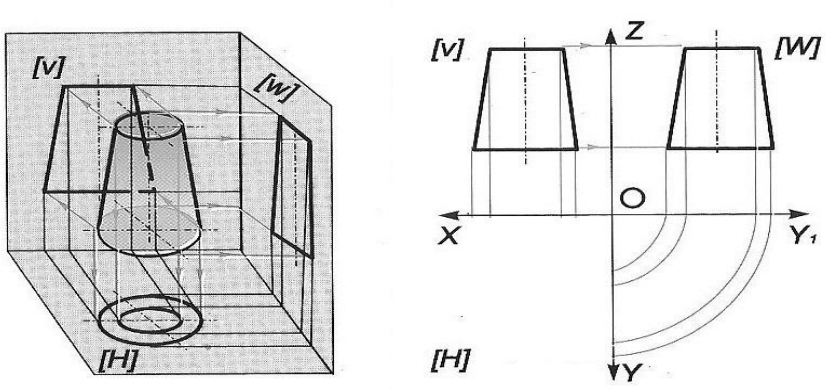
2. **The CYLINDER:**



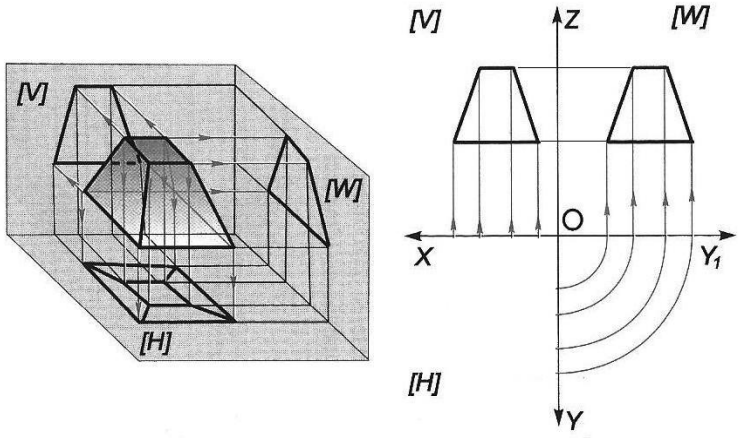
3. **The CUBOID:**



4. **The TRUNCATED CONE:**



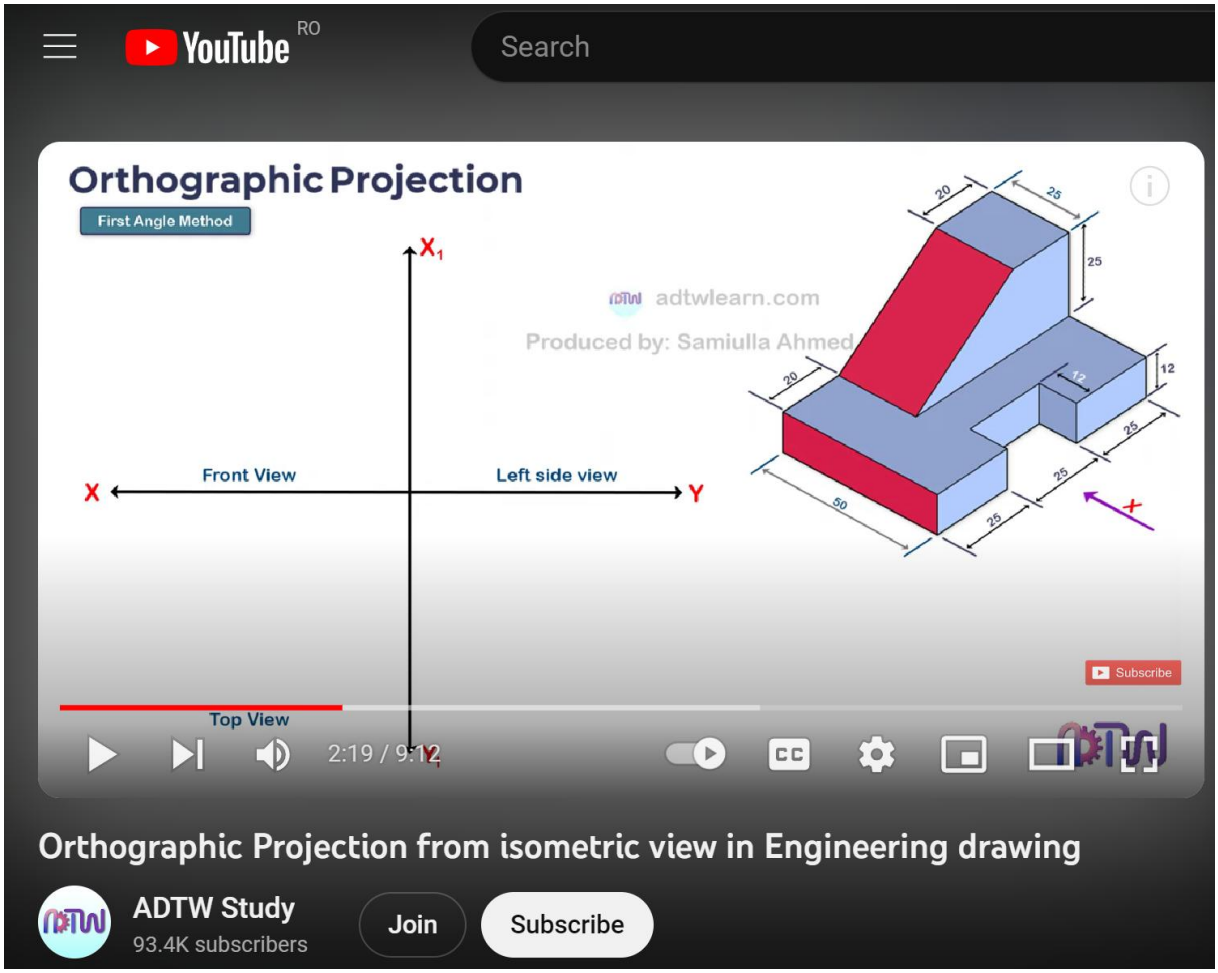
5. The TRUNCATED PYRAMID:



ANNEX 4 – DOCUMENTATION SHEET –REPRESENTATION IN VIEW OF A CONSTRUCTIVE FORM

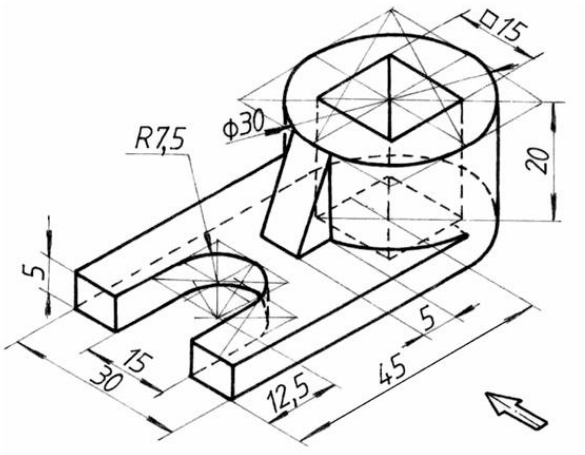
See the tutorial at https://www.youtube.com/watch?v=dKNnTxwSS-Q for representing in view based on the 3D image of an object .

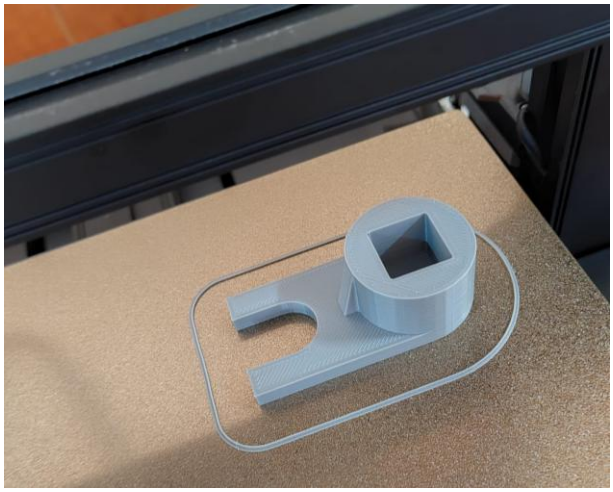
Write down the important aspects in order to present them to your classmates.

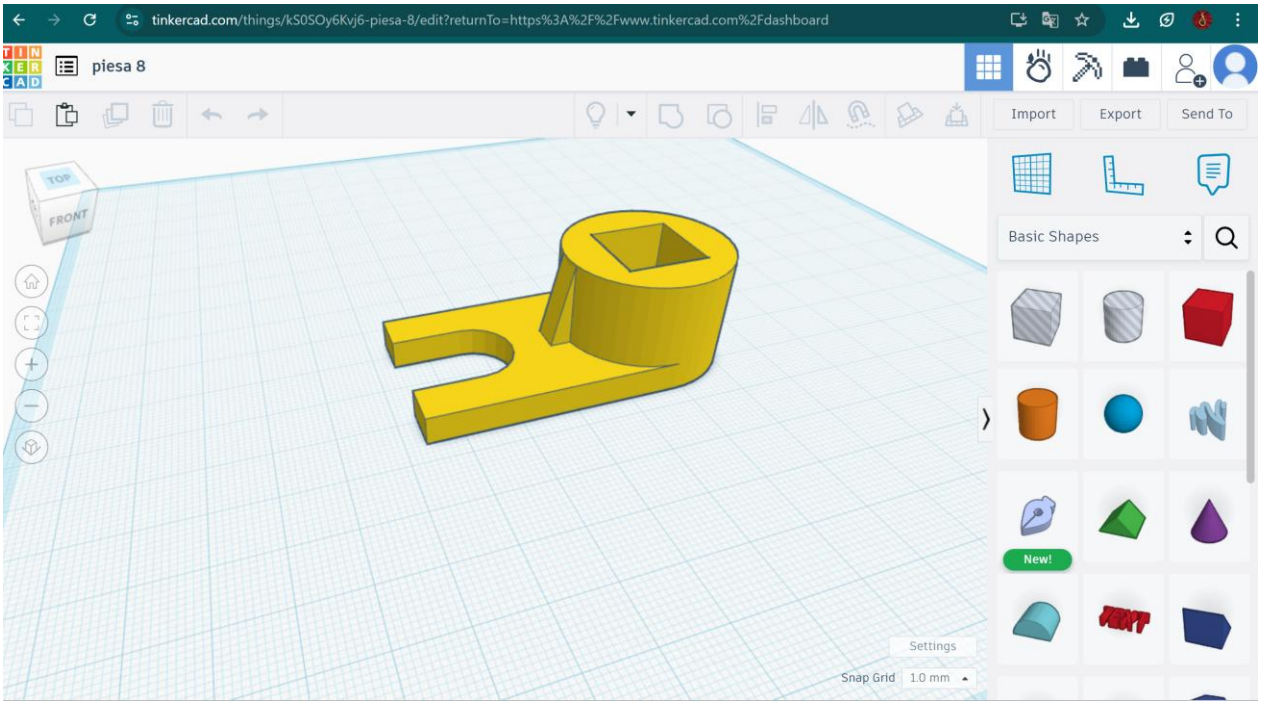


EXERCISE:

Work in group – for the object below, draw a representation in view**. Use the 3D printed model for reference.**






tinkercad.com/things/kS0SOy6Kvj6-piesa-8/edit?returnTo=https%3A%2F%2Fwww.tinkercad.com%2Fdashboard
piesa 8
Import
Export
Send To
TOP
FRONT
Basic Shapes
New!
Settings
Snap Grid
1.0 mm