

Technical Drawing in Engineering



Lecture 6. Axonometric projection system

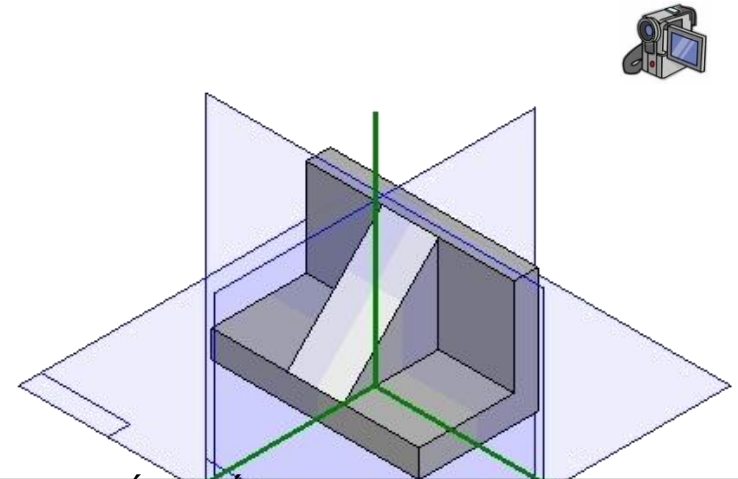
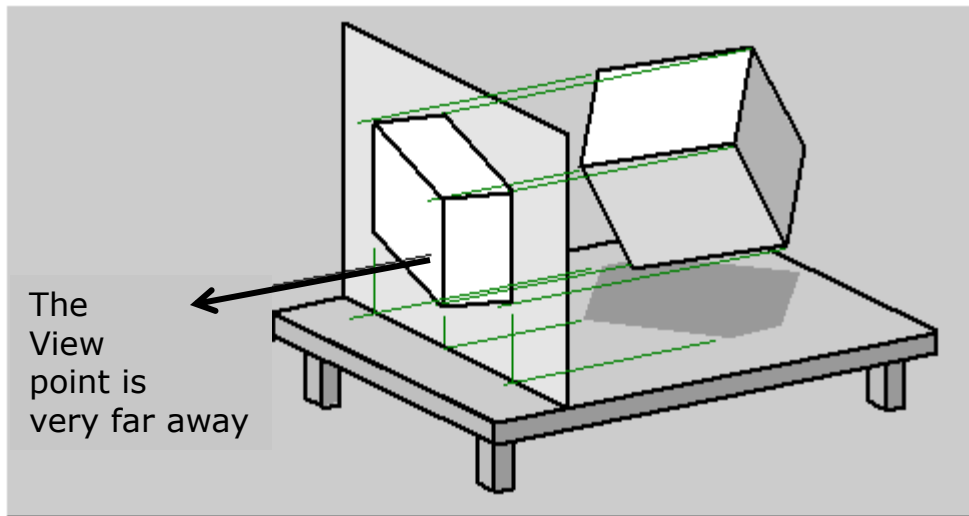
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Basics I

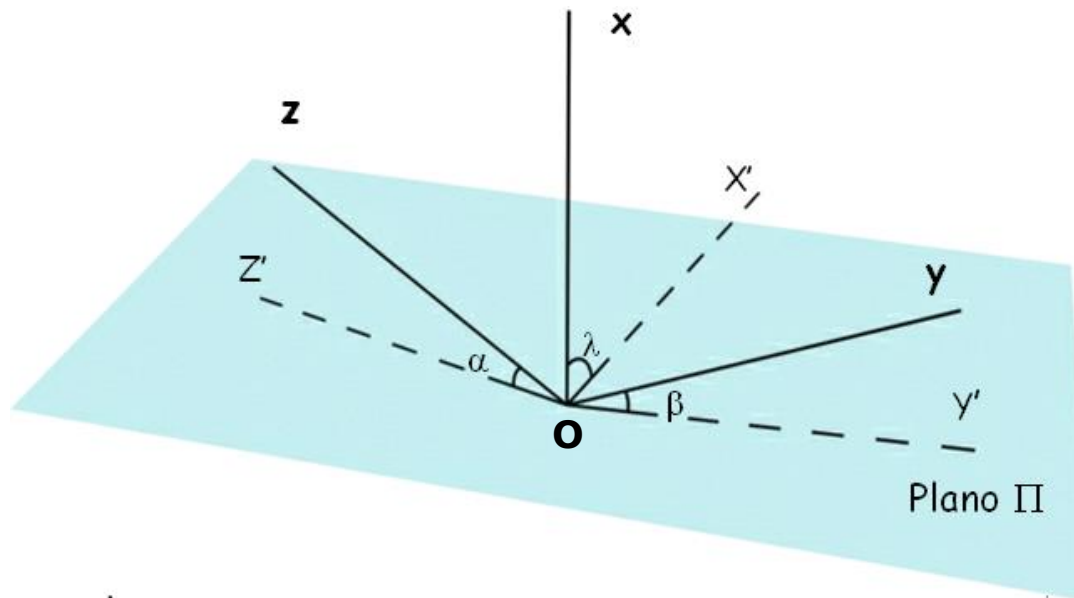


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Basics II



- Plane II: Plane of the paper.
- The projection can be **orthogonal** or oblique.

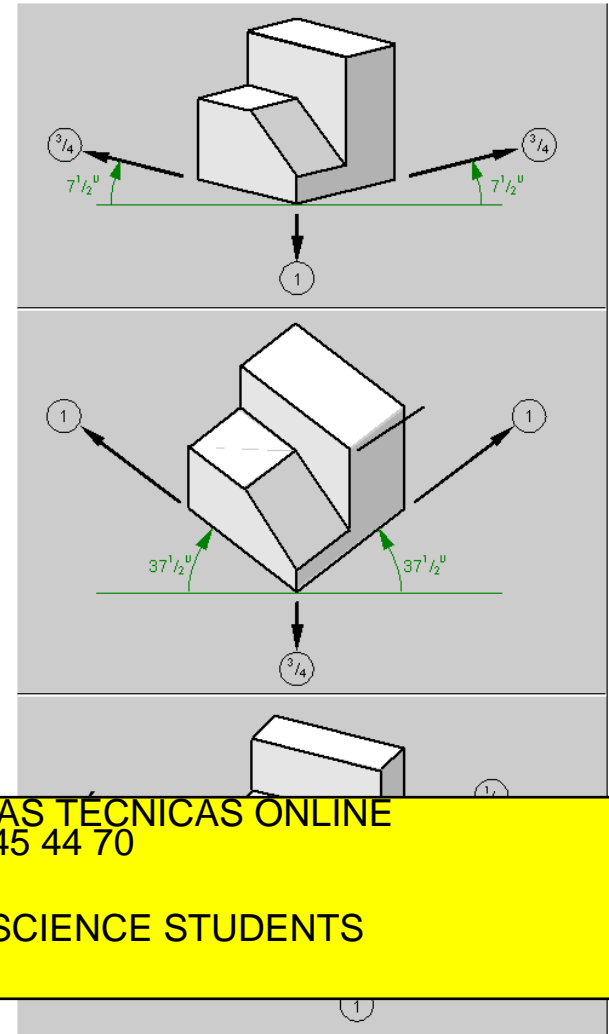
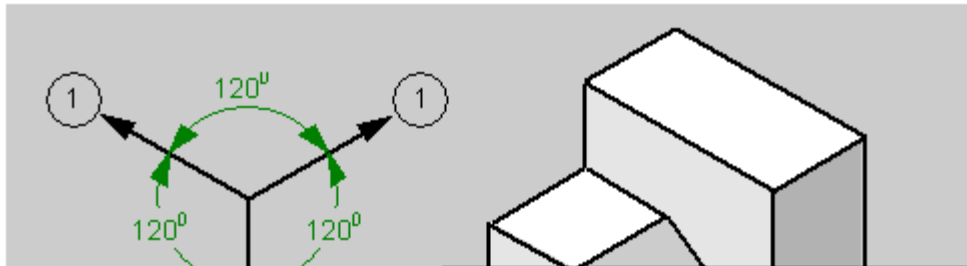
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Axonometric orthogonal projection

- Trimetric system:
 $\alpha \neq \beta \neq \lambda$
- Dimetric system:
 $\alpha = \beta \neq \lambda / \alpha \neq \beta = \lambda / \alpha = \lambda \neq \beta$
- Isometric system:
 $\alpha = \beta = \lambda$



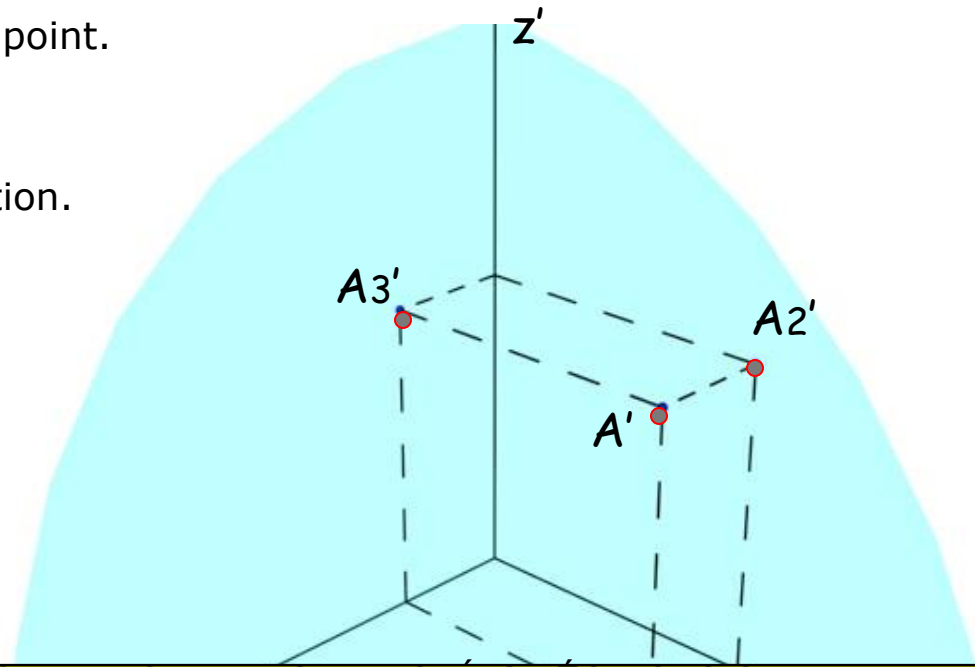
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Representation of a point

- To define the position of a point only 2 of its 4 projections are required.
 - A' Direct projection of the point.
 - A'_1 Horizontal projection.
 - A'_2 Vertical projection
 - A'_3 Second vertical projection.



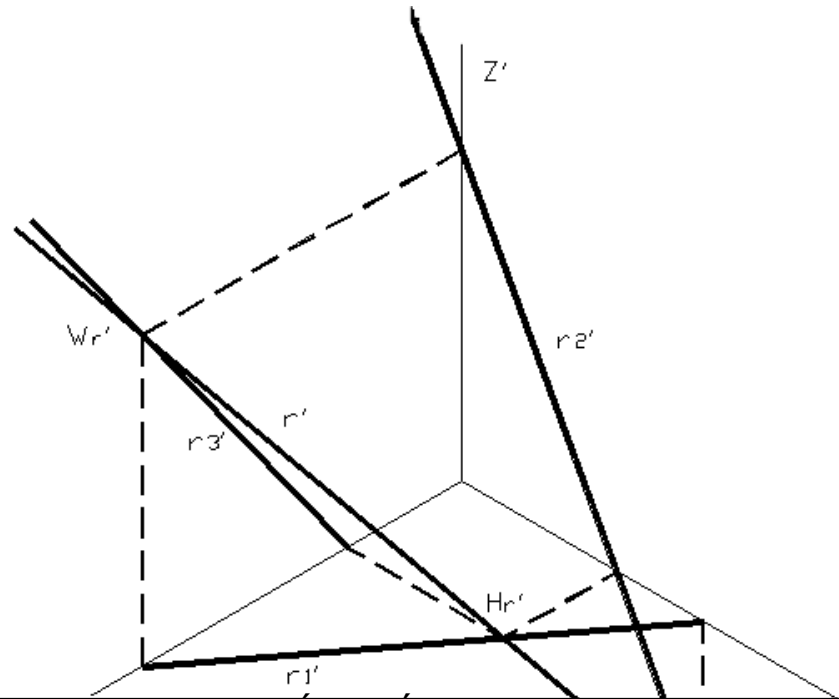
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Representation of a line

- Line r' is defined by 2 of its projections, the other 2 can be obtained from these.
 - Data: r' y $r'1$.
 - Find $r'2$ and $r'3$.
- The traces are the intersections of the direct projection (r') and the horizontal (H), vertical (V) and second vertical (W).
 - Hr' intersection of lines r' and $r'1$.
 - Vr' intersection of r' and $r'2$.
 - Wr' intersection of r' and $r'3$.



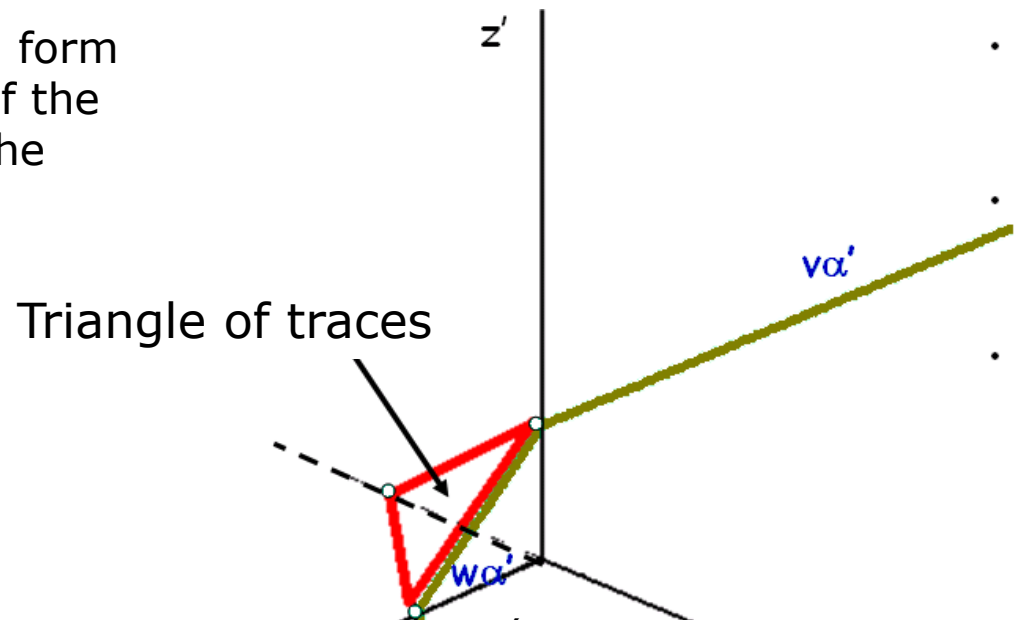
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Representation of a plane

- It is represented by its traces.
- The 3 traces cut in the axes in pairs.
- These traces, when enlarged, form the Triangle of traces. Each of the vertex of the triangle are in the axes.



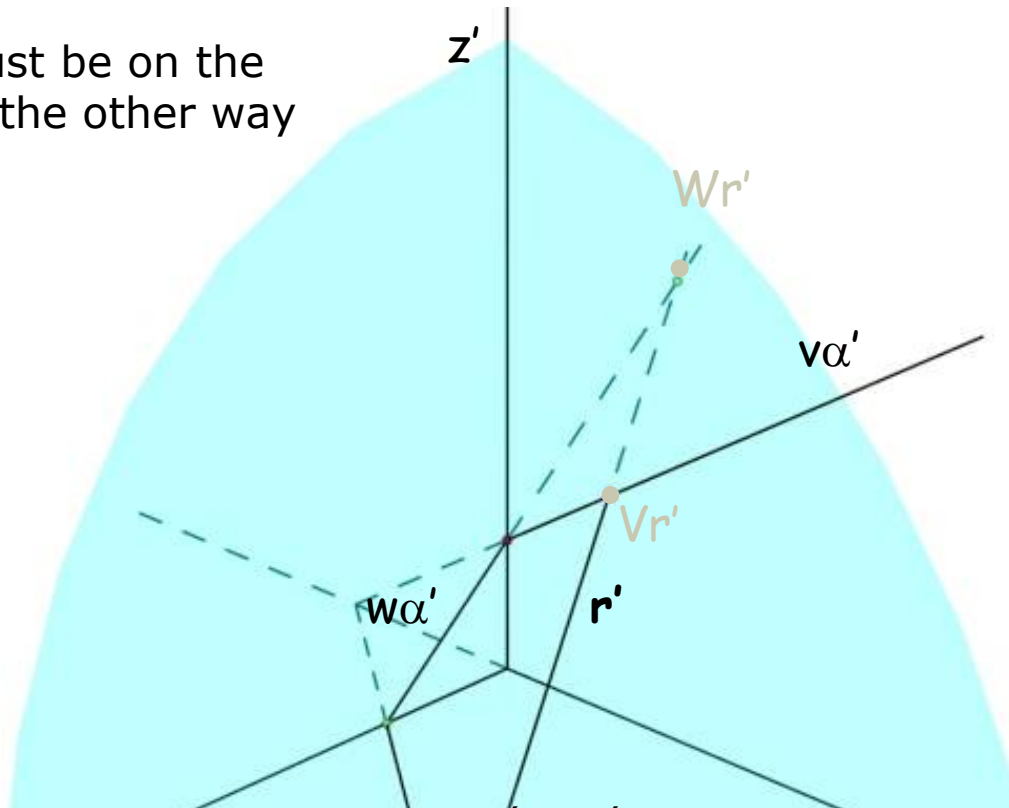
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Membership: Line and plane

- The traces of the line must be on the traces of the plane (and the other way round):
 - Vr' over $v\alpha'$
 - Hr' over $h\alpha'$
 - Wr' over $w\alpha'$

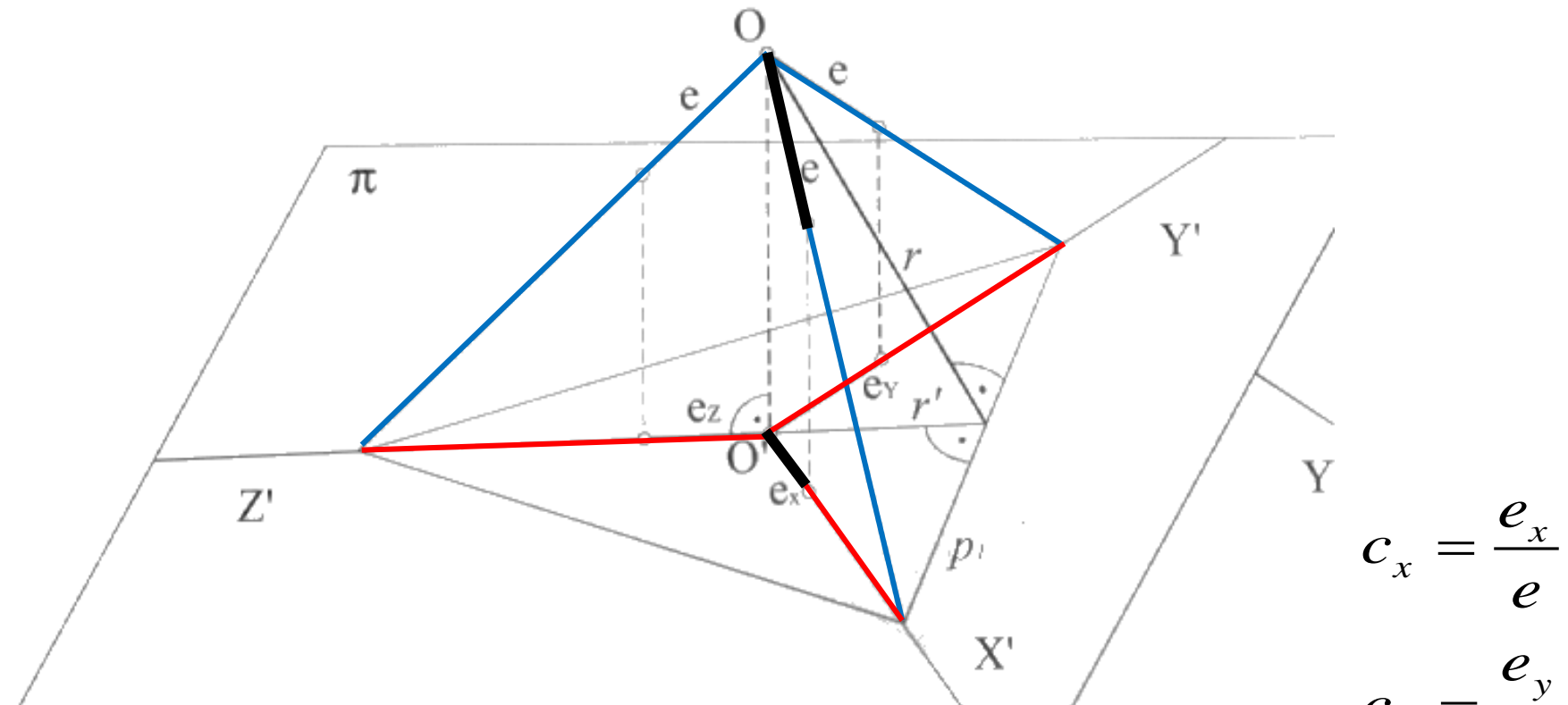


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Reduction coefficients I



$$c_x = \frac{e_x}{e}$$

$$c_y = \frac{e_y}{e}$$

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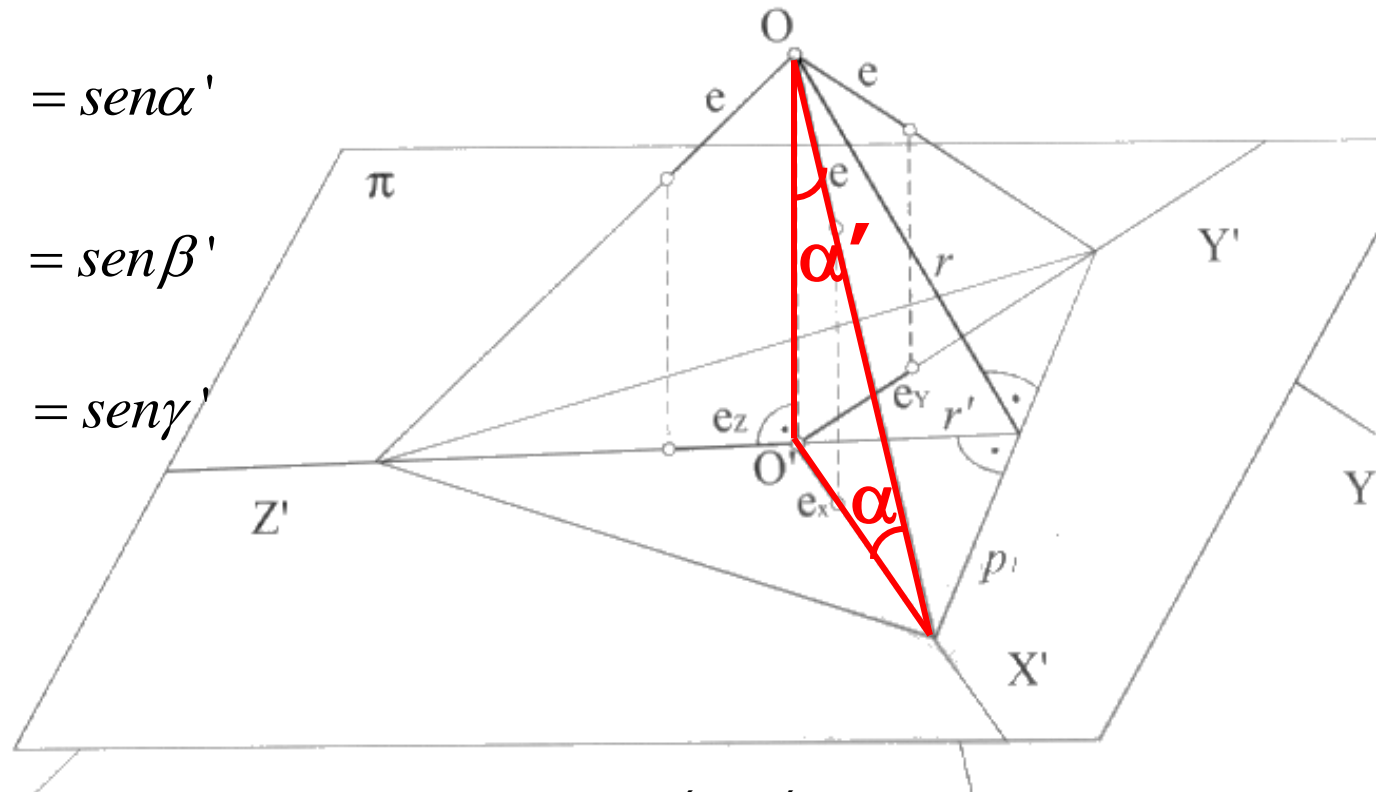
e

Reduction coefficients II

$$c_x = \frac{e_x}{e} = \cos \alpha = \text{sen} \alpha'$$

$$c_y = \frac{e_y}{e} = \cos \beta = \text{sen} \beta'$$

$$c_z = \frac{e_z}{e} = \cos \gamma = \text{sen} \gamma'$$



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Reduction coefficients III

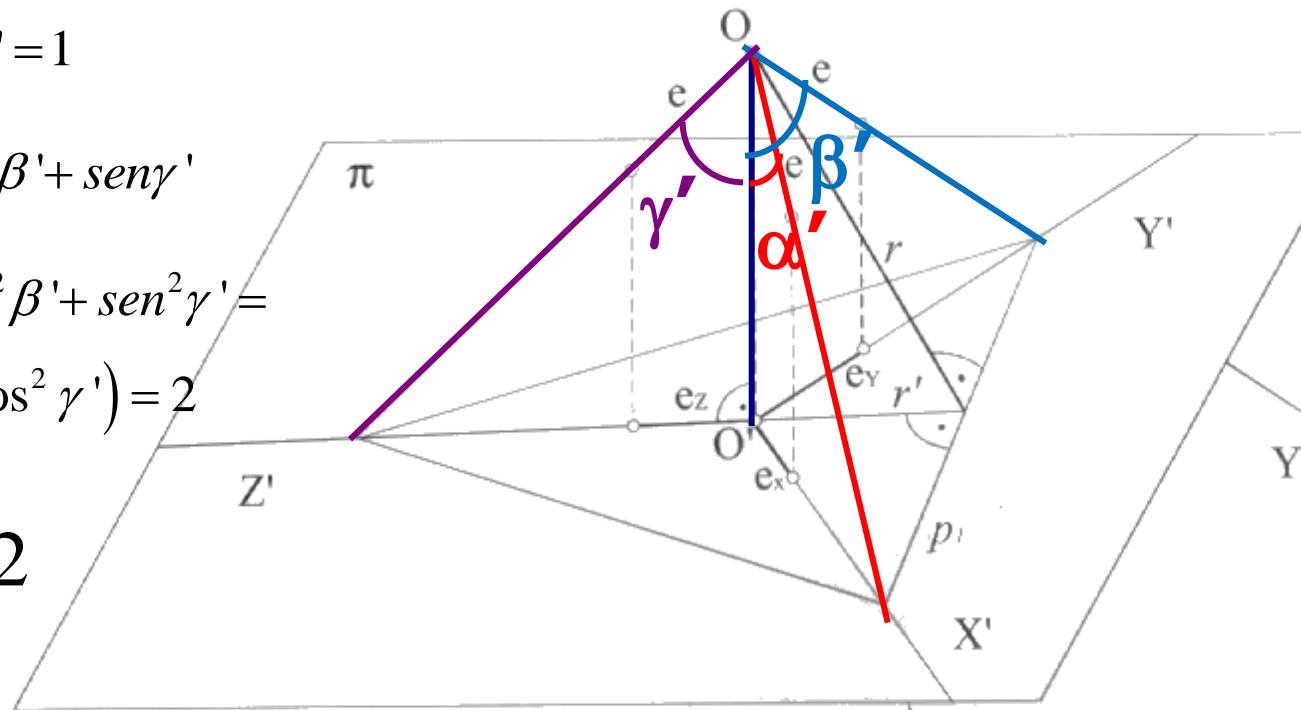
$$\cos^2 \alpha' + \cos^2 \beta' + \cos^2 \gamma' = 1$$

$$c_x + c_y + c_z = \operatorname{sen} \alpha' + \operatorname{sen} \beta' + \operatorname{sen} \gamma'$$

$$c_x^2 + c_y^2 + c_z^2 = \operatorname{sen}^2 \alpha' + \operatorname{sen}^2 \beta' + \operatorname{sen}^2 \gamma' =$$

$$= 3 - (\cos^2 \alpha' + \cos^2 \beta' + \cos^2 \gamma') = 2$$

$$c_x^2 + c_y^2 + c_z^2 = 2$$



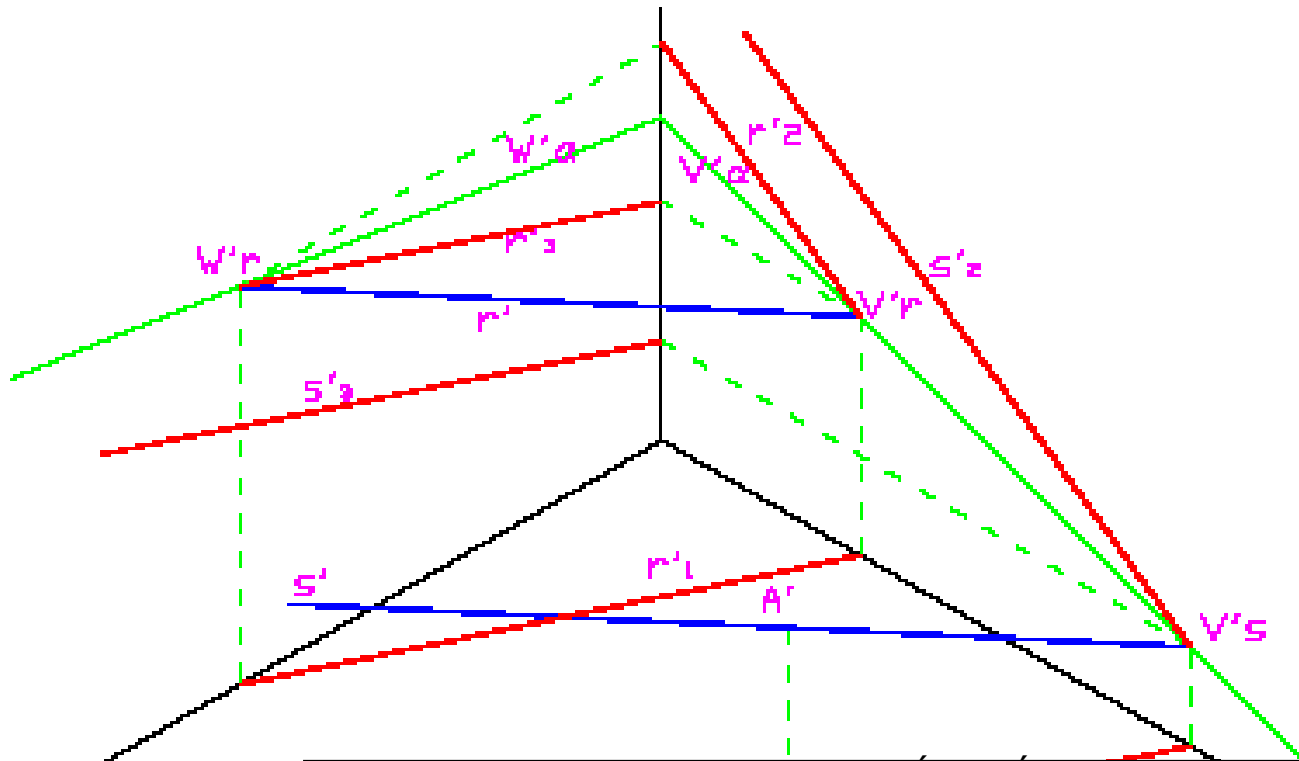
□ **Isometric system:**

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Parallelism and perpendicularity

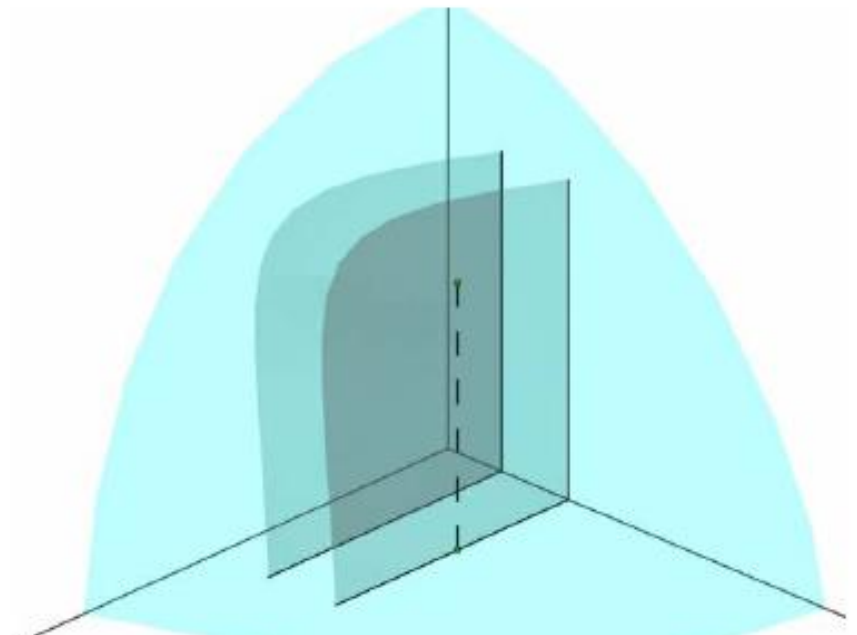
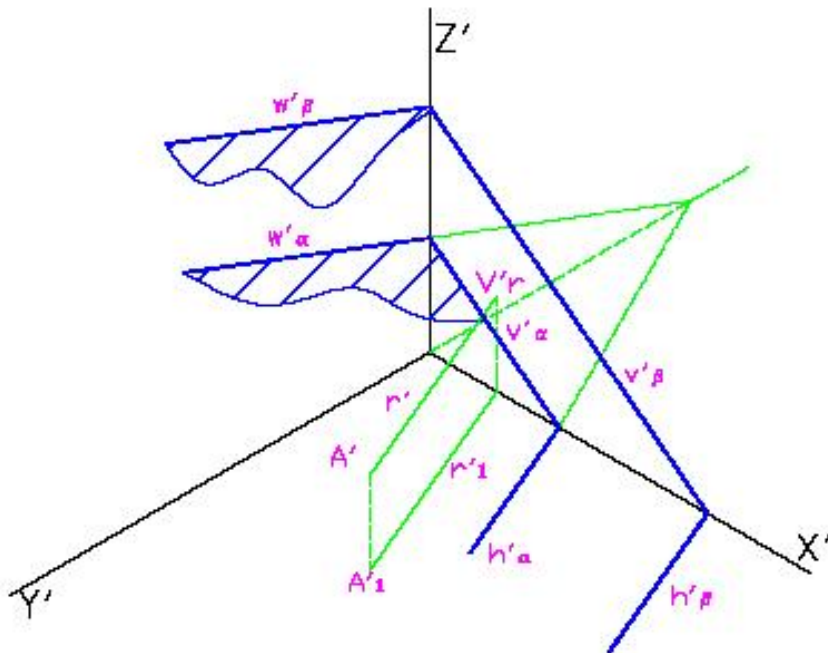


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Parallelism and perpendicularity

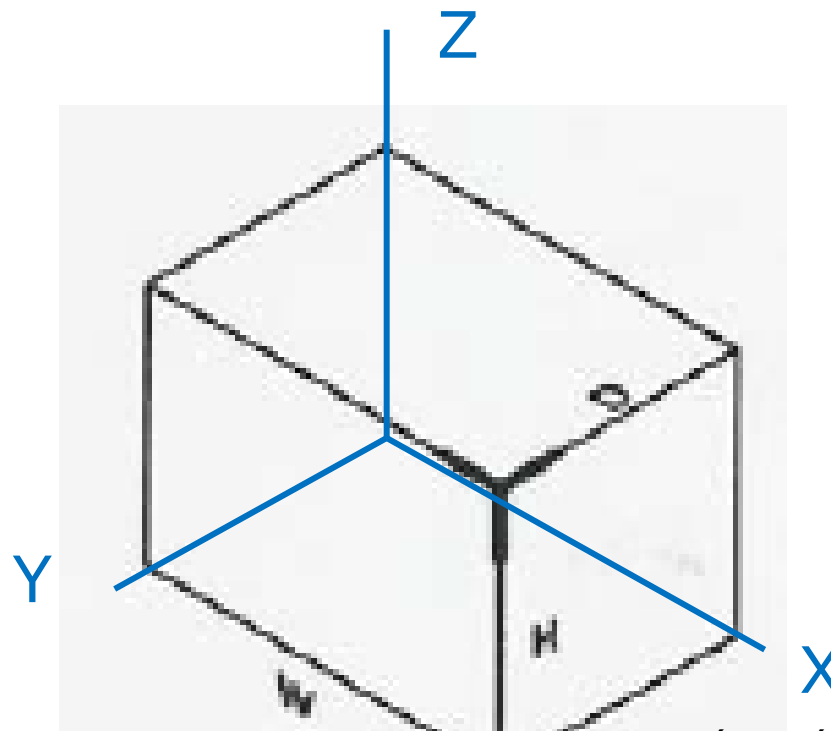


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Construction of an isometric drawing I



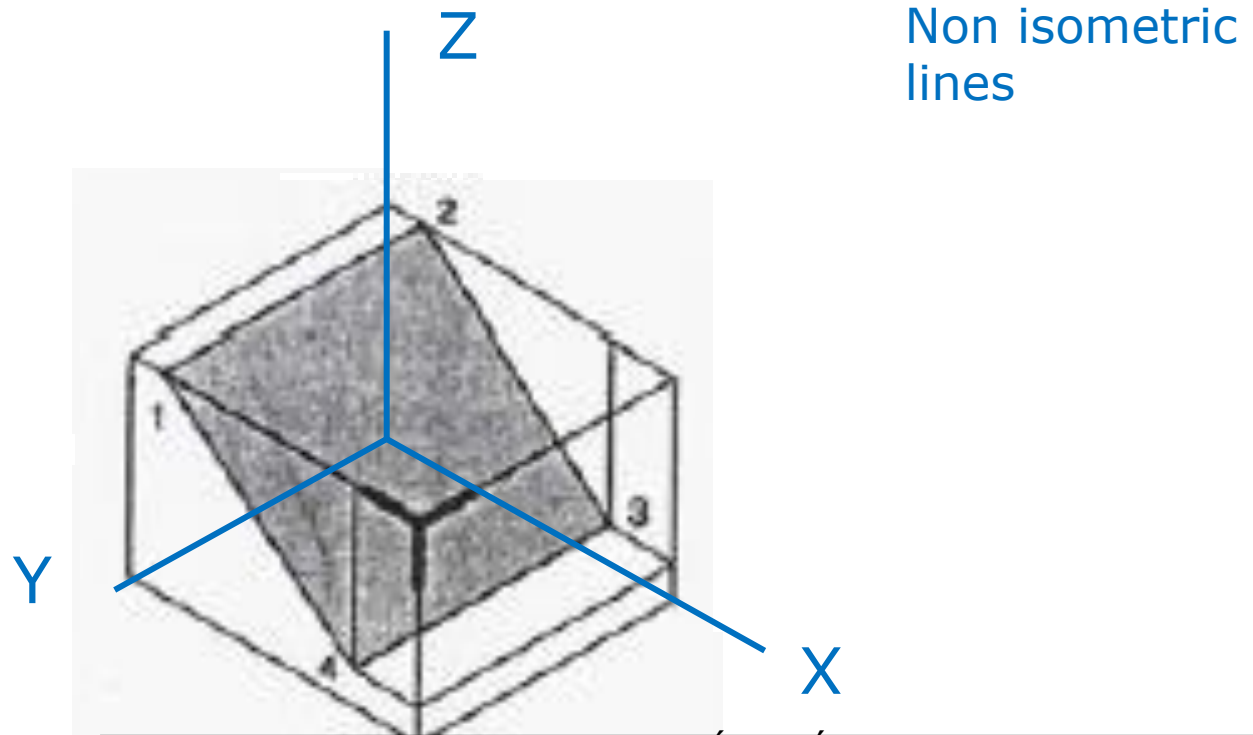
Draw in the
axes direction

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Construction of an isometric drawing II

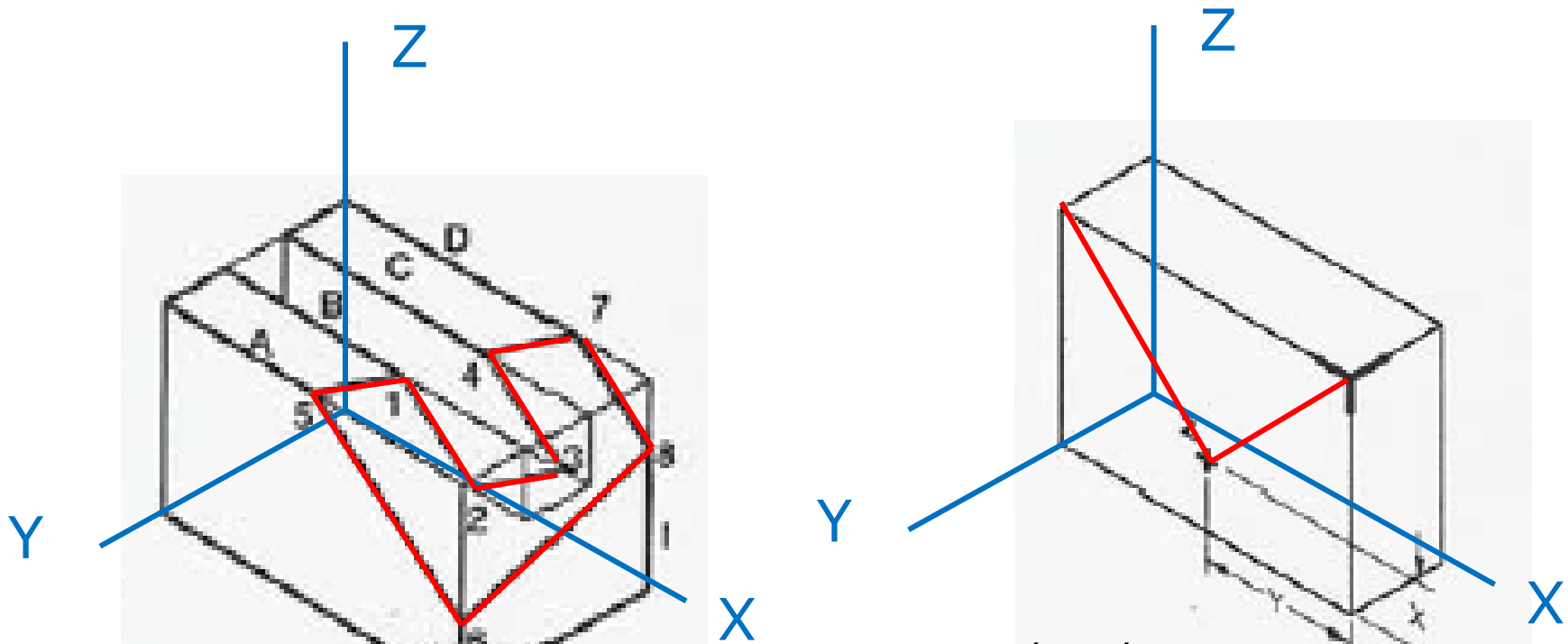


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Construction of an isometric drawing II

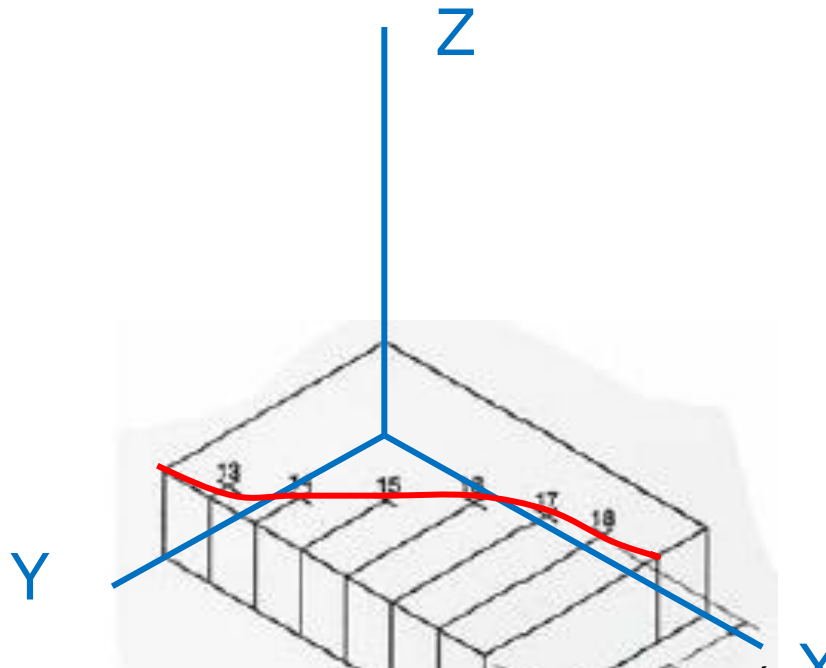


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Construction of an isometric drawing III

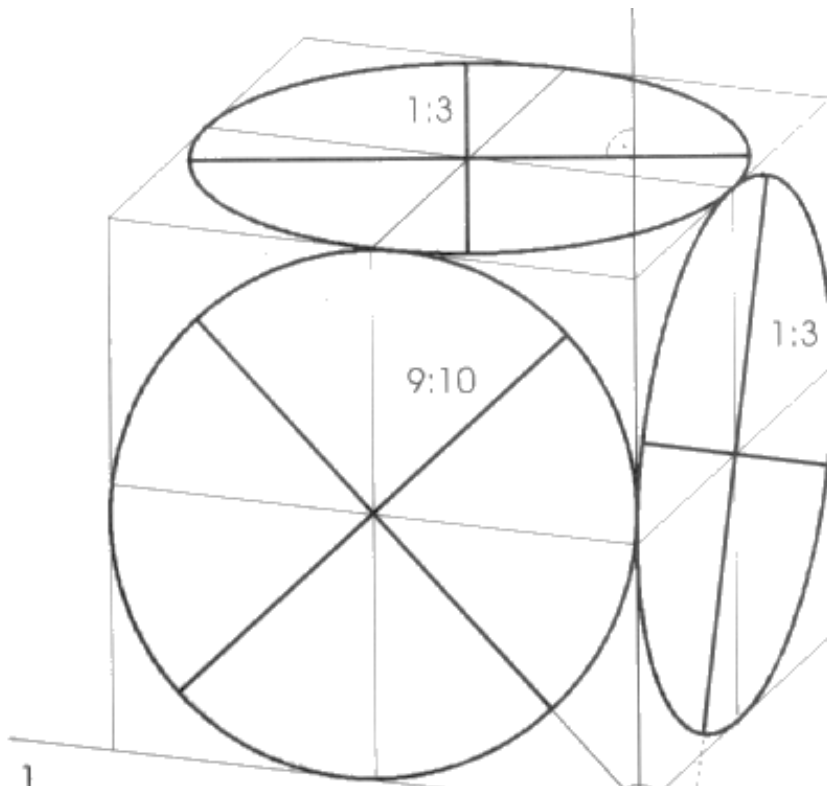


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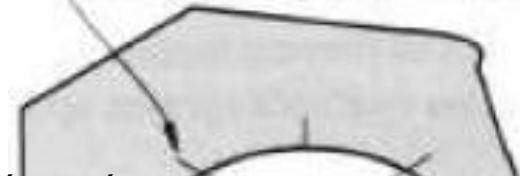
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Construction of an isometric drawing IV



U.5

Marcas de alineación de la plantilla con las líneas de eje al momento de trazar la elipse con un lápiz



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