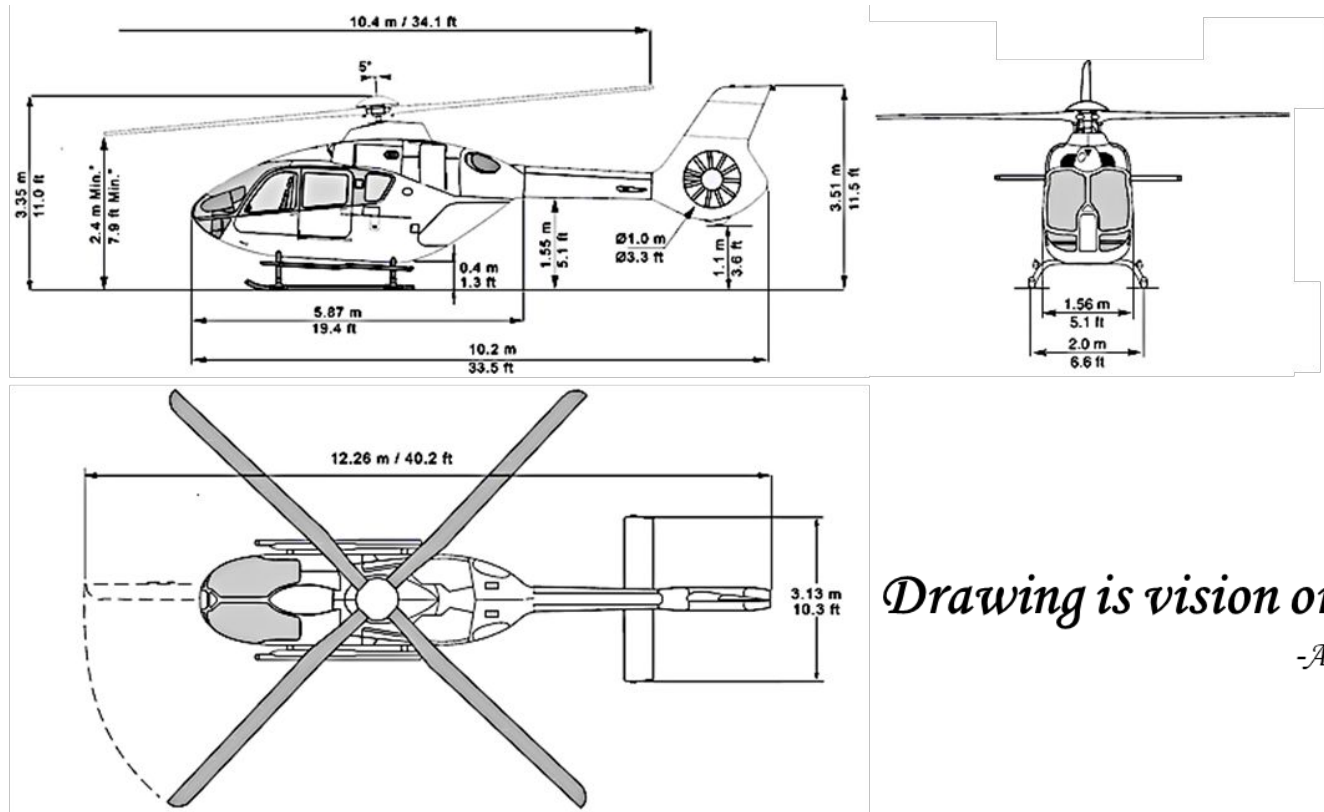


ES 101: Engineering Graphics



Drawing is vision on paper

-Andrew Loomis

https://www.aiut-alpin-dolomites.com/english/technical_details.html

Class#3 – 11th September 2024

Sameer Patel

Assistant Professor

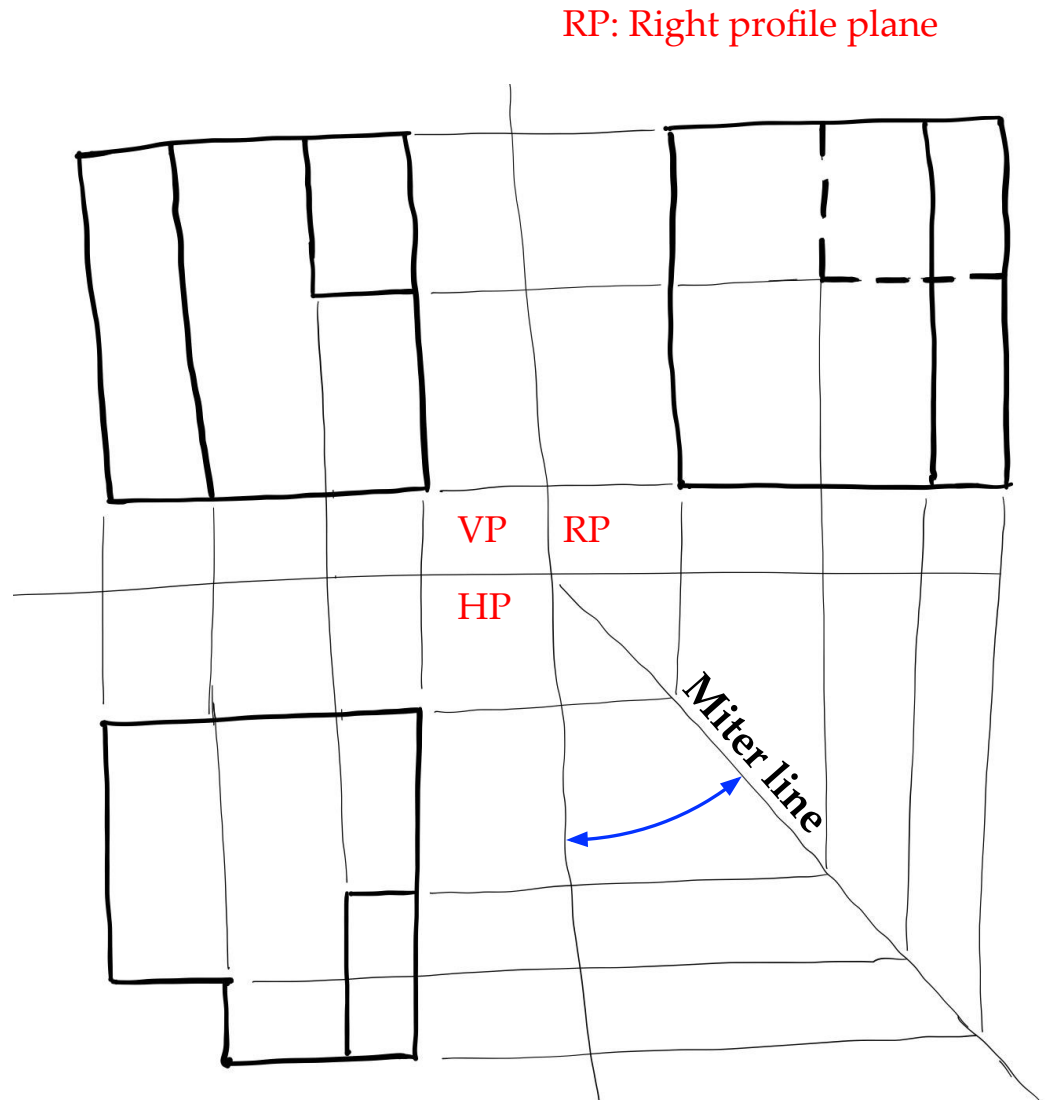
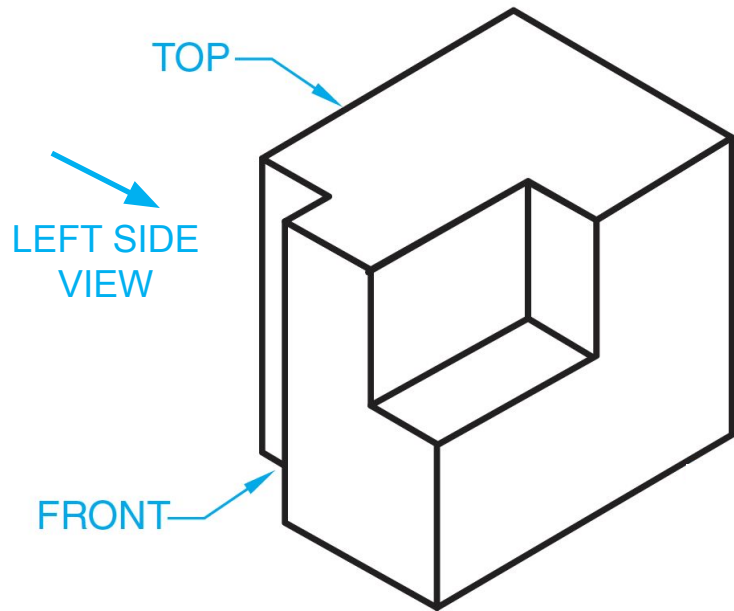
Civil Engineering & Chemical Engineering

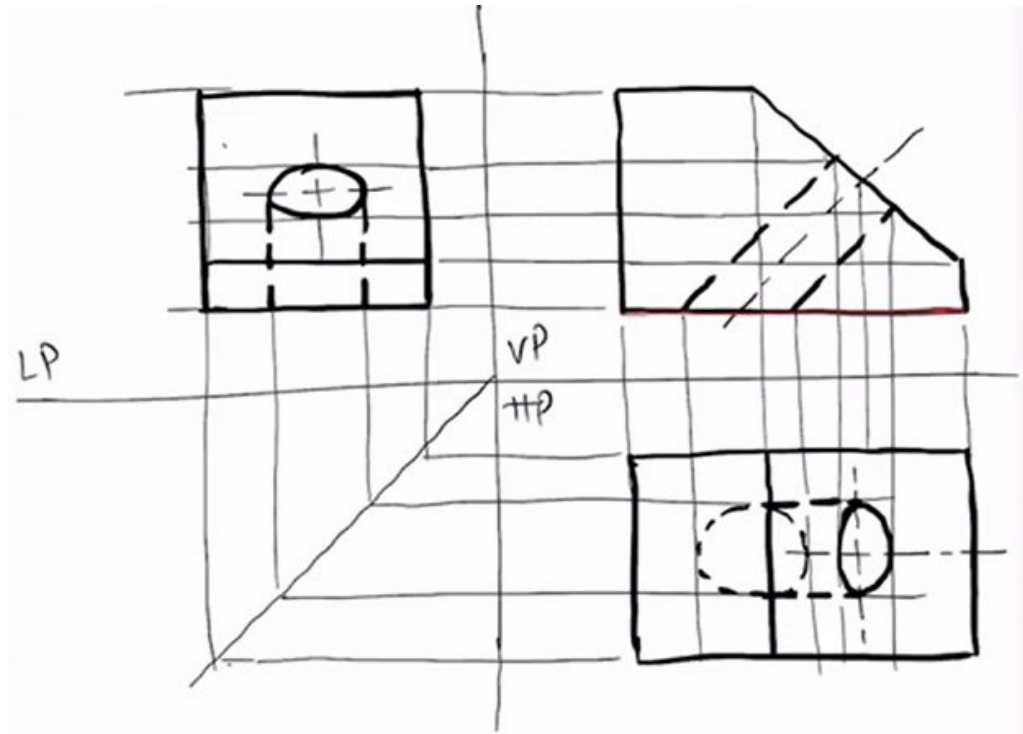
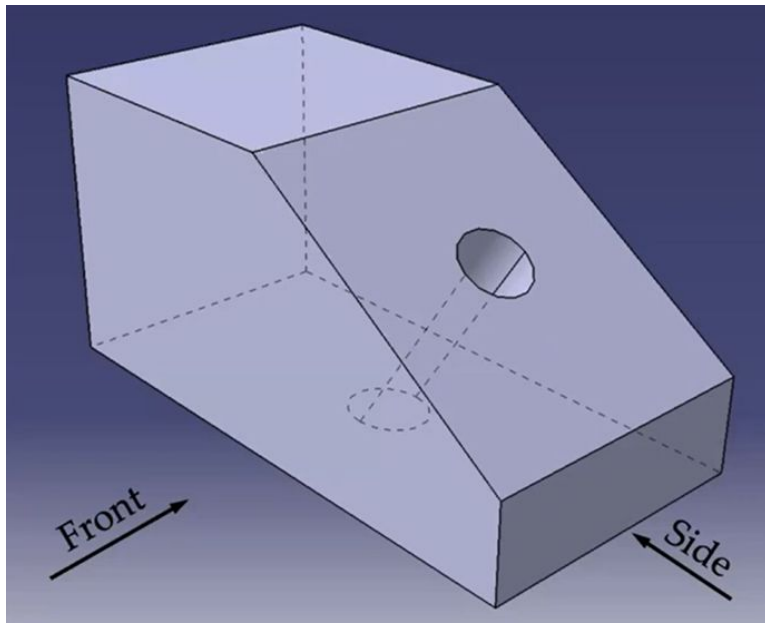
IIT Gandhinagar

Announcements

- Lab 5 (first drawing lab) – next week
- Bring all tools and stationary items for remaining lab sessions
- Discussing with your neighbours is okay as long as you are not disturbing others
- You can refer to the lecture slides during the lab sessions
- Sheets with incomplete or no identifying information will not be graded

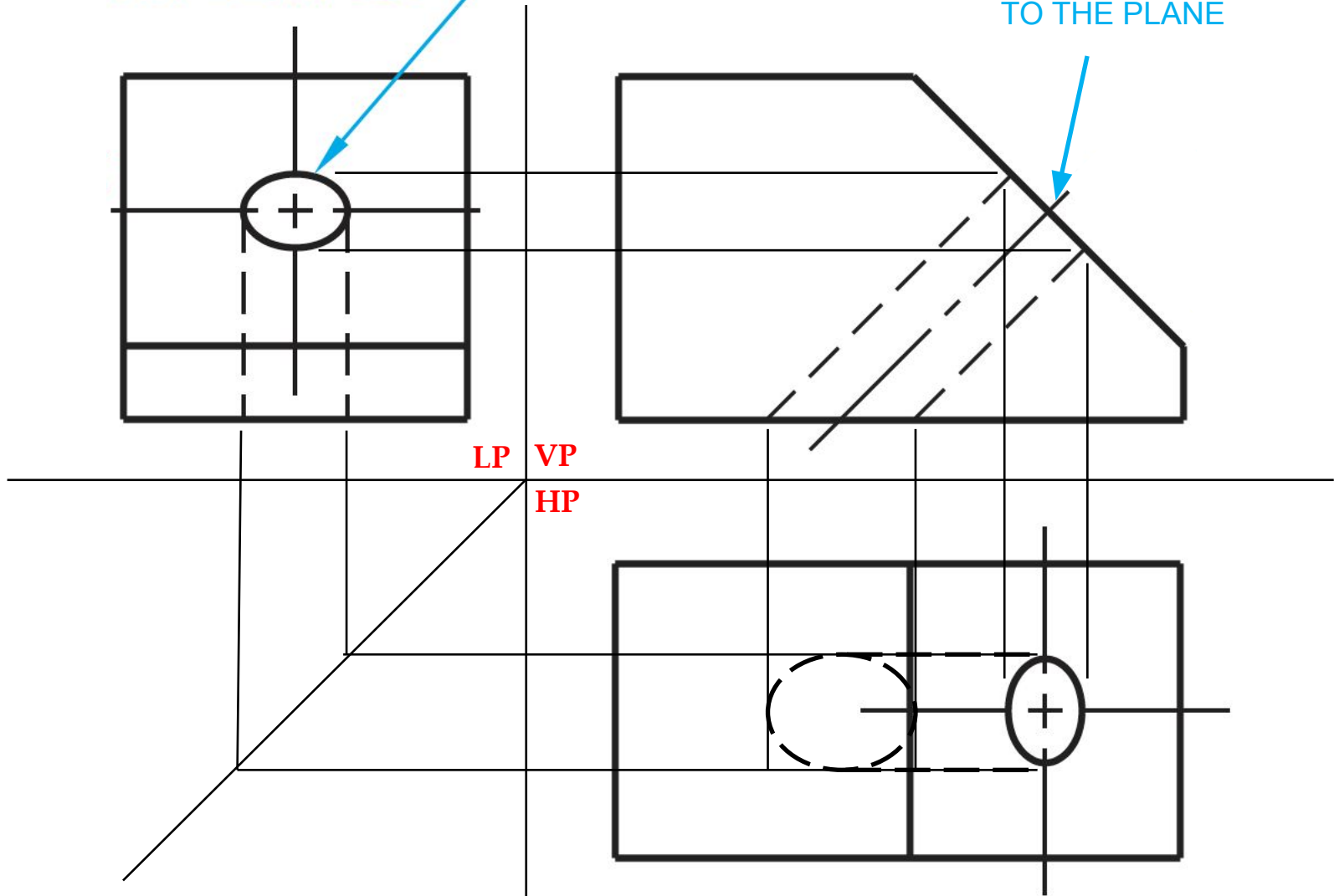
Lab 5	19th Sep (Thursday) 5:00-6:20 PM	Group 1-9 AB1/101 Tutor: Nishchaya Kumar Mishra and Vaibhav Lawange	Group 10-18 AB1/102 Tutor: S. R. Gandhi and Mayank Makwana	Group 19-24 AB10/201 Tutor: Sameer Patel	Group 25-30 AB10/202 Tutor: Baddi Prasad	Group 31-35 AB7/208 Tutor: Kaustubh Rane	Group 36-39 AB7/209 Tutor: Uddipta Ghosh
Lab 6	26th Sep (Thursday) 5:00-6:20 PM						
Lab 7	17th Oct (Thursday) 5:00-6:20 PM						
Lab 8	24th Oct (Thursday) 5:00-6:20 PM						
Lab 9	7th Nov (Thursday) 5:00-6:20 PM						
Lab 10	14th Nov (Thursday) 5:00-6:20 PM						
Lab 11	21st Nov (Thursday) 5:00-6:20 PM						

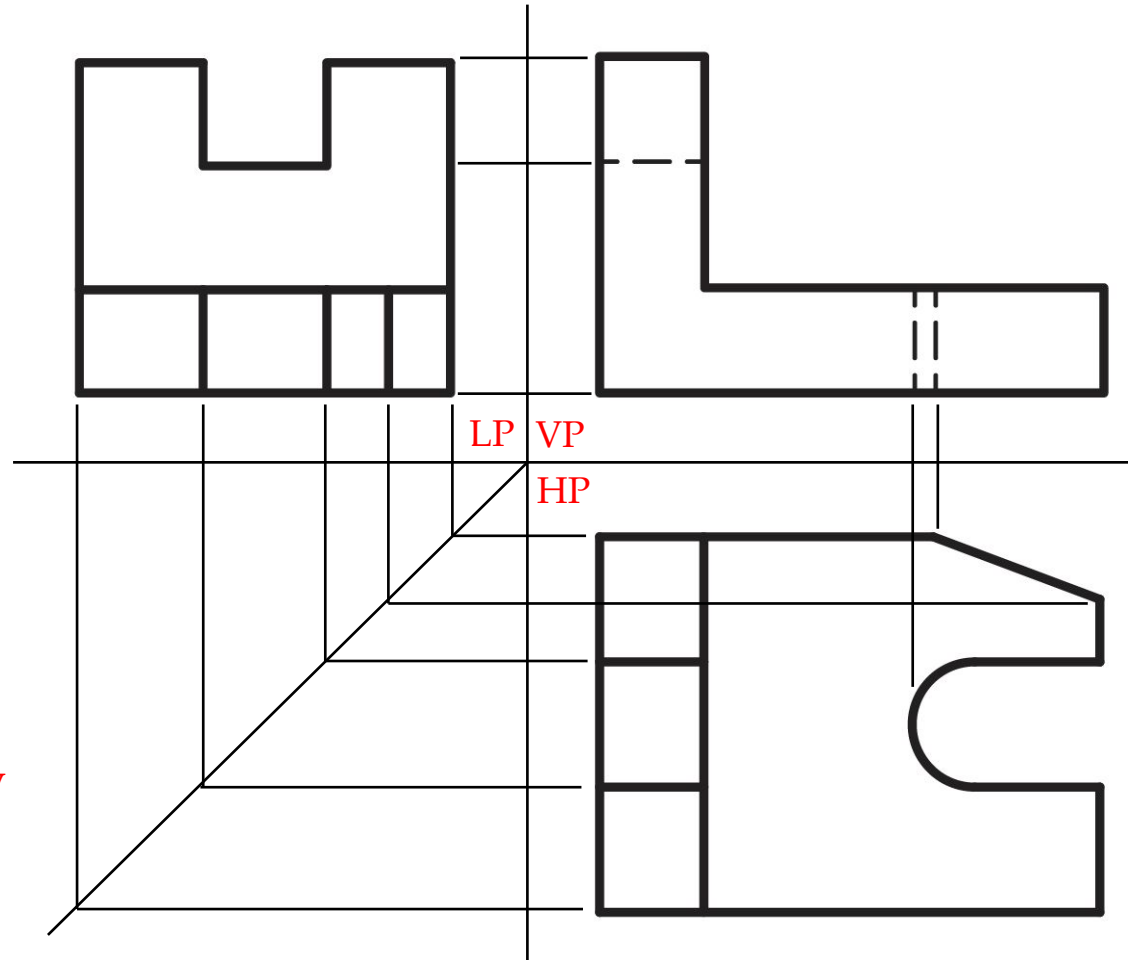
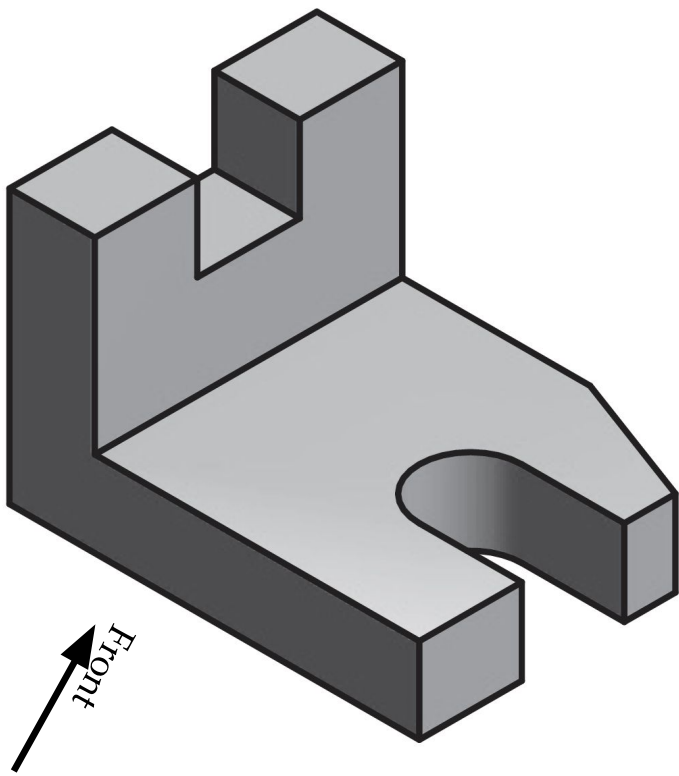




HOLE AS
AN ELLIPSE

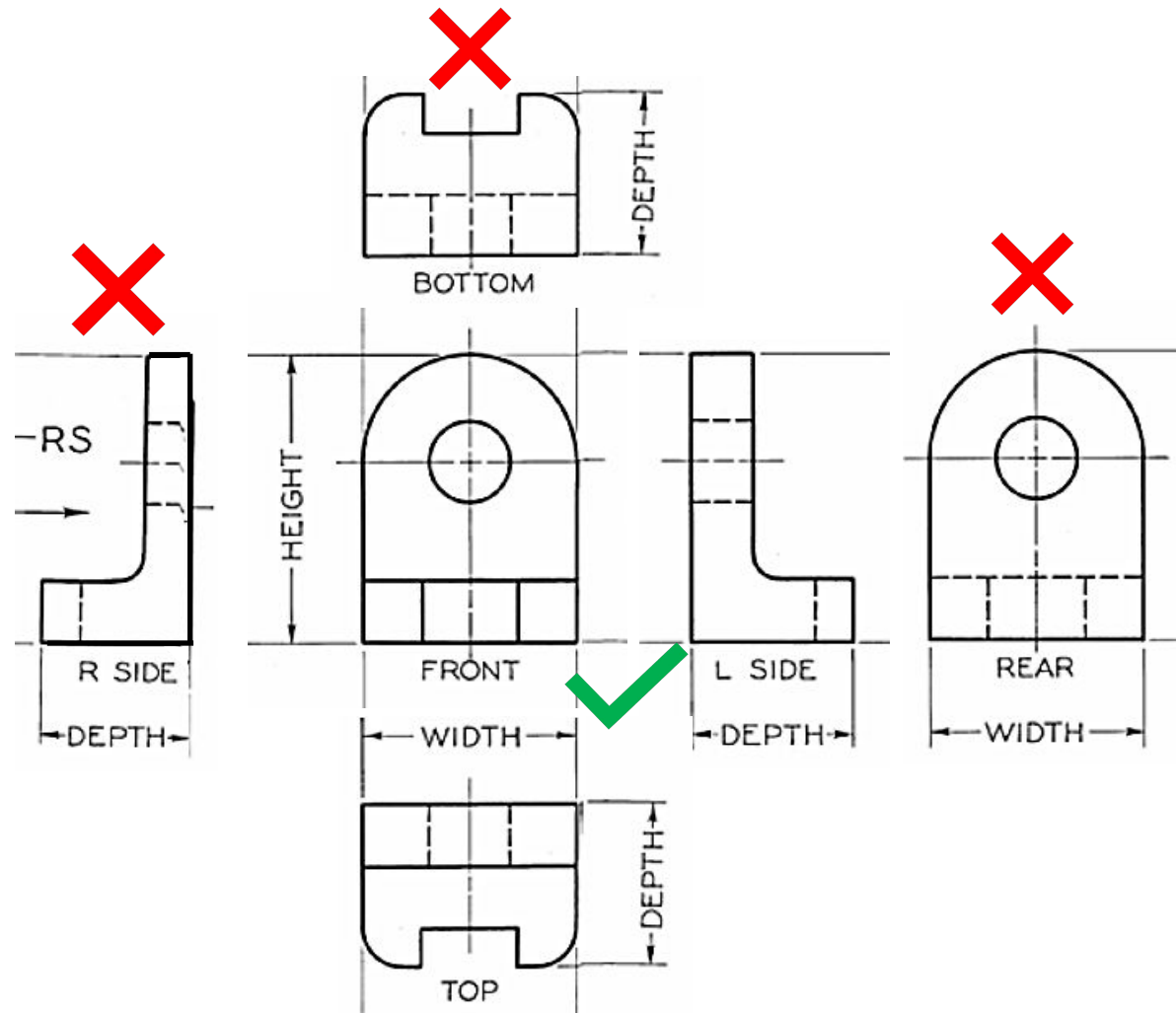
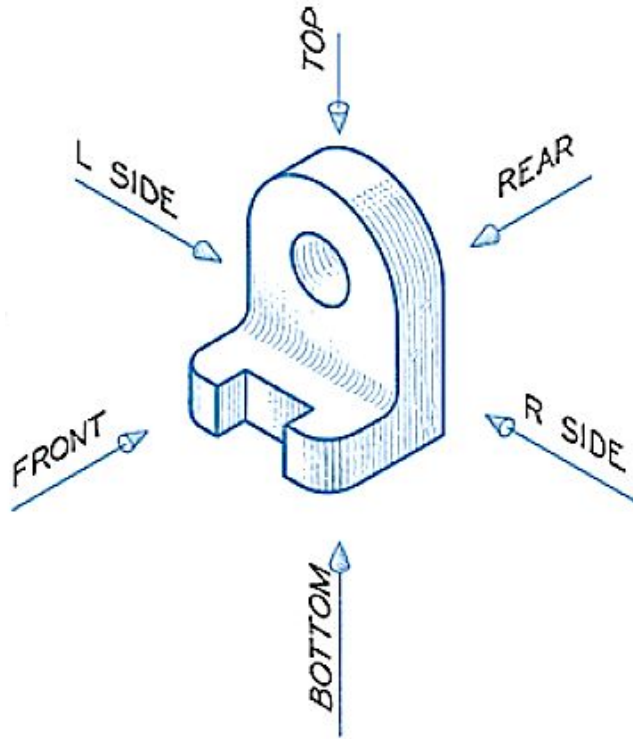
AXIS PERPENDICULAR
TO THE PLANE



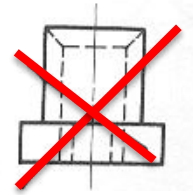
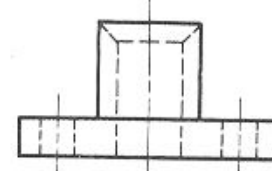
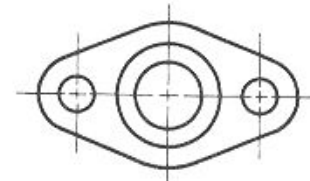
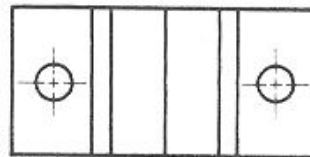
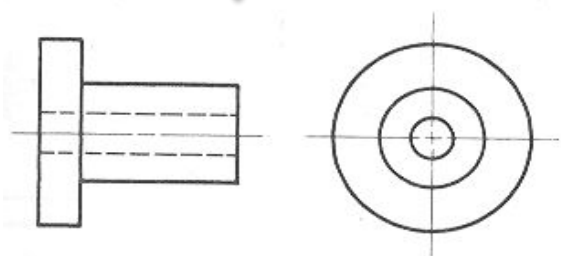
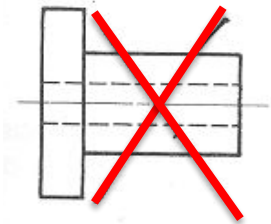
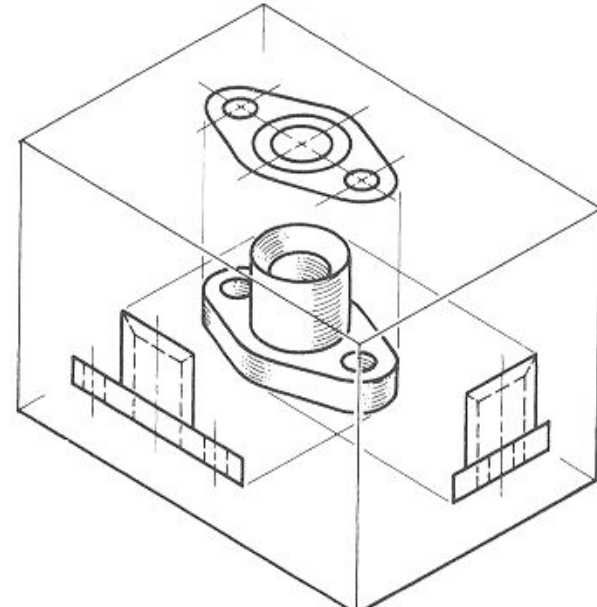
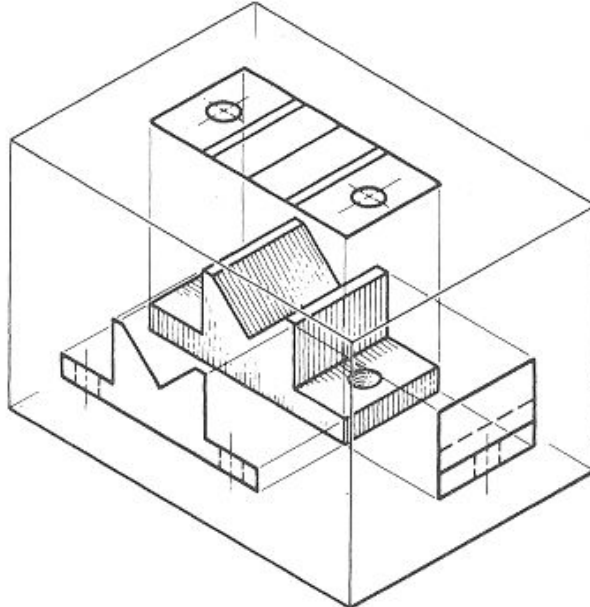
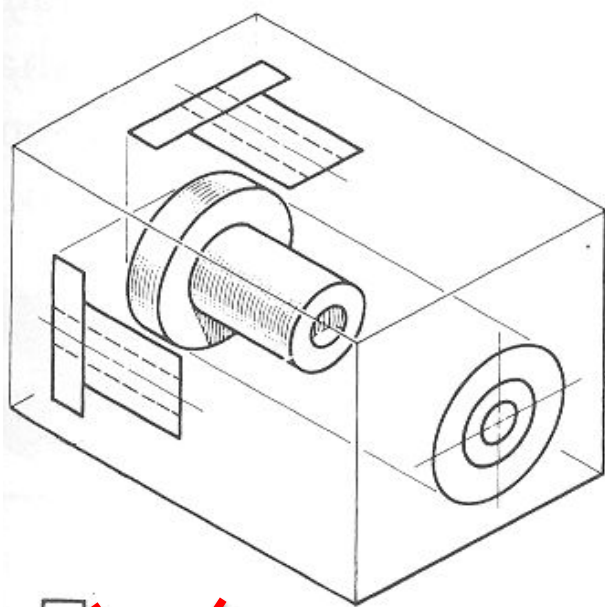


HP: Horizontal plane - Front view
 VP: Vertical plane – Top view
 LP: Left profile plane – Right side view

Necessary views



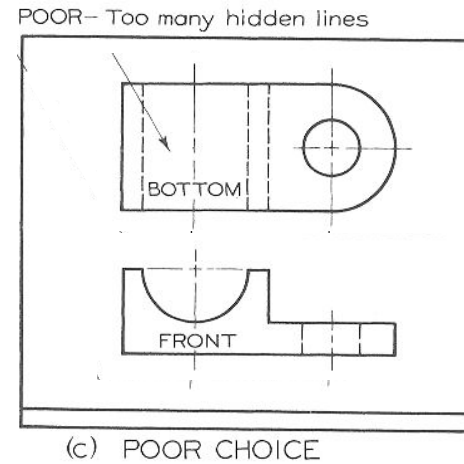
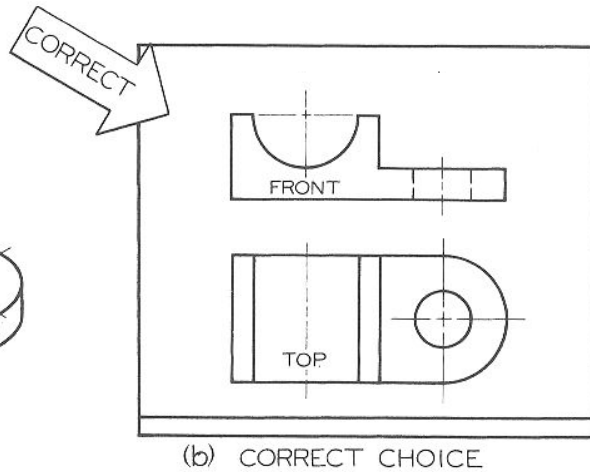
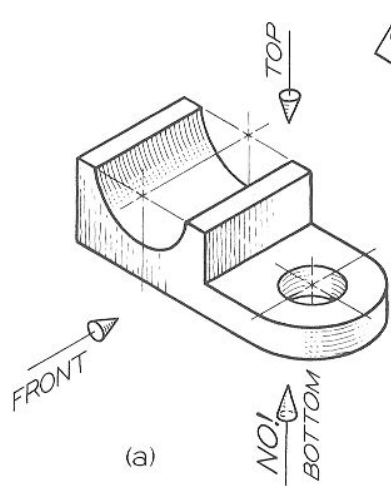
Necessary views



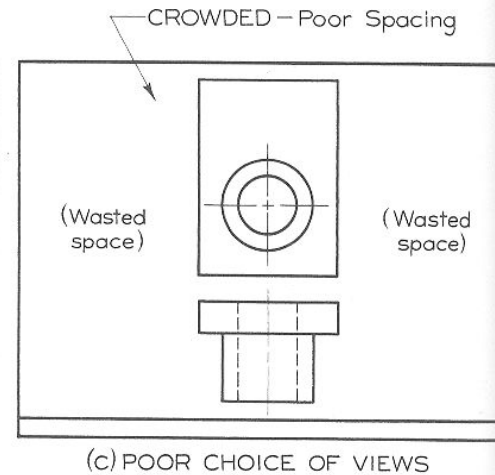
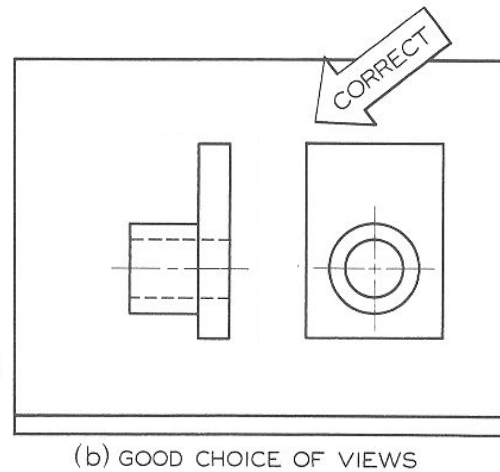
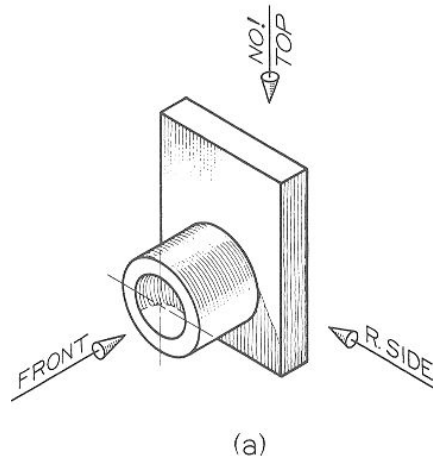
Note: The shown views are third angle projections

Selecting views

Select the views with fewer hidden lines



Select the views that fit better on the drawing sheet



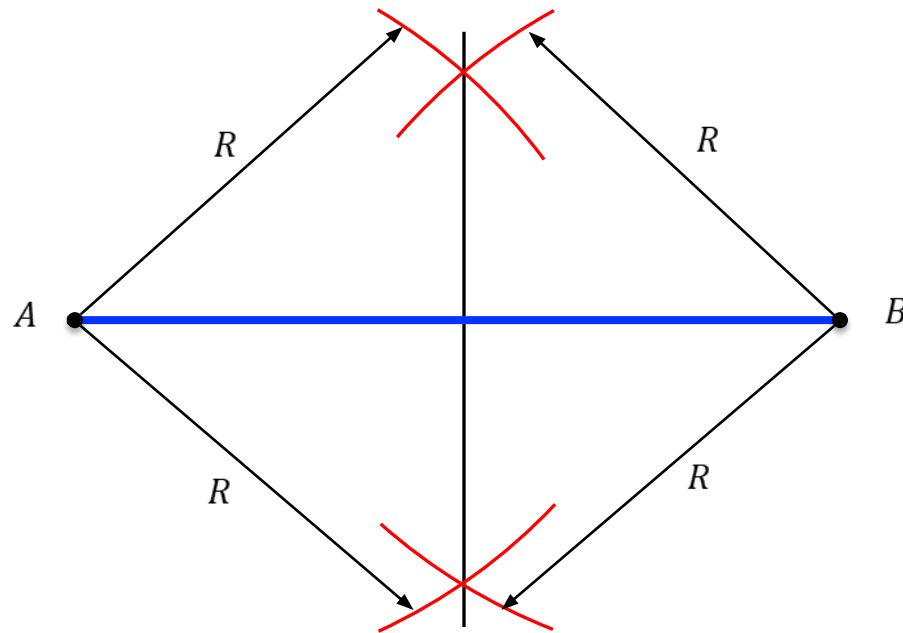
Geometric constructions

- Parallel lines
 1. From a point outside the line
 2. Given the perpendicular distance between lines
- Dividing a segment into equal parts
- Tangents to the circles
 1. From an external point
 2. External tangents to two circles
 3. Internal tangents to two circles
- Ellipse
 1. Inside rectangle
 2. Concentric circles method
- Parabola
 1. Given the directrix and the focus
 2. Given the span and height
- Logarithmic spiral, involute and cycloid

Common Constructions

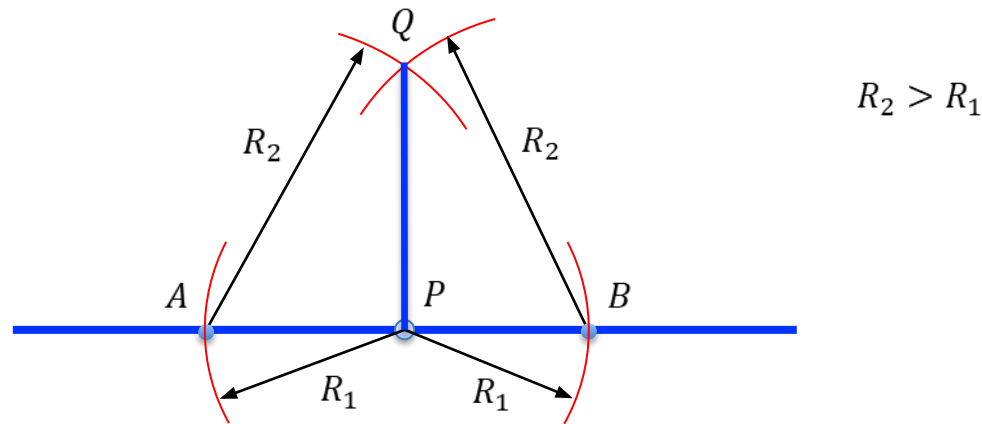
Bisect a line

$$\frac{AB}{2} < R < AB$$

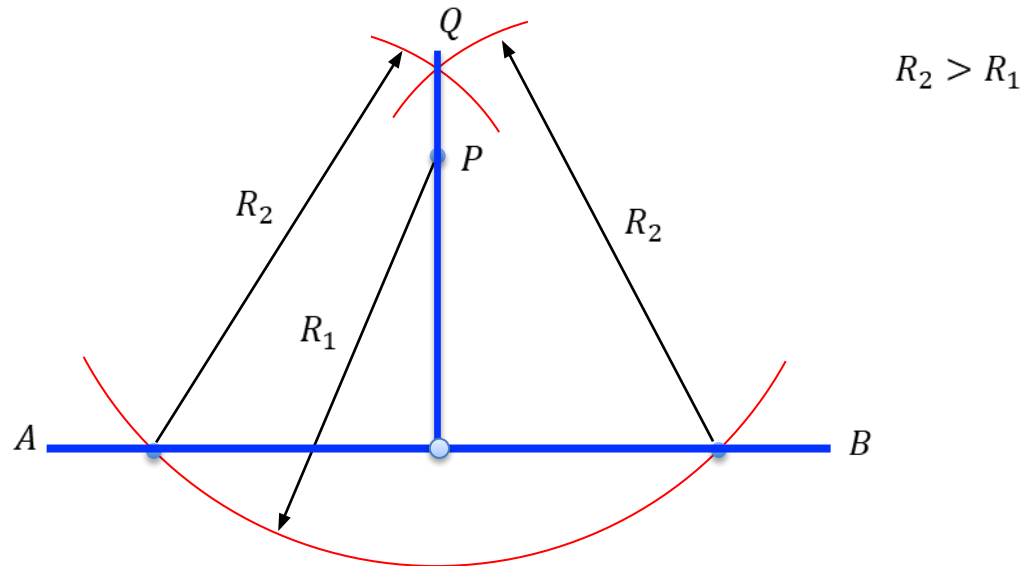


Common Constructions

Perpendicular from a point (P) on a line (AB)

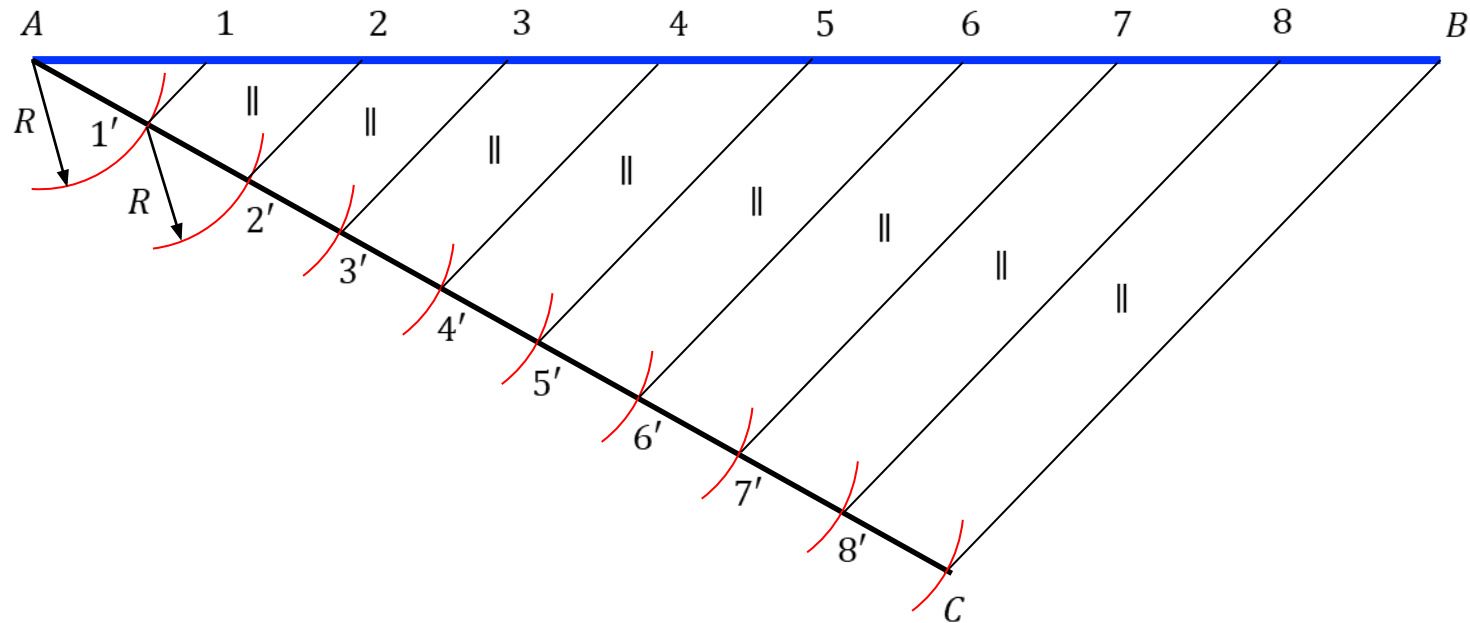


Perpendicular from a point (P) to a line (AB)



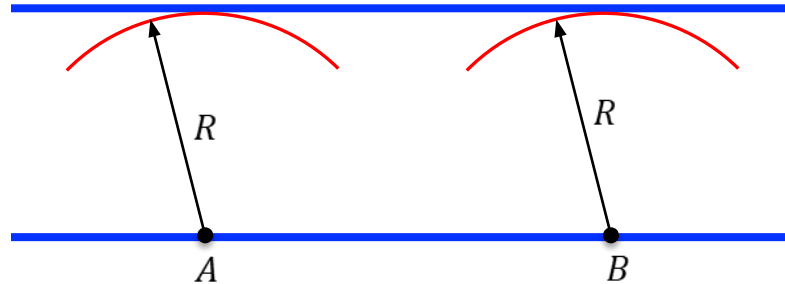
Common Constructions

Divide a line (AB) into (n) equal parts ($n=9$ in this example)

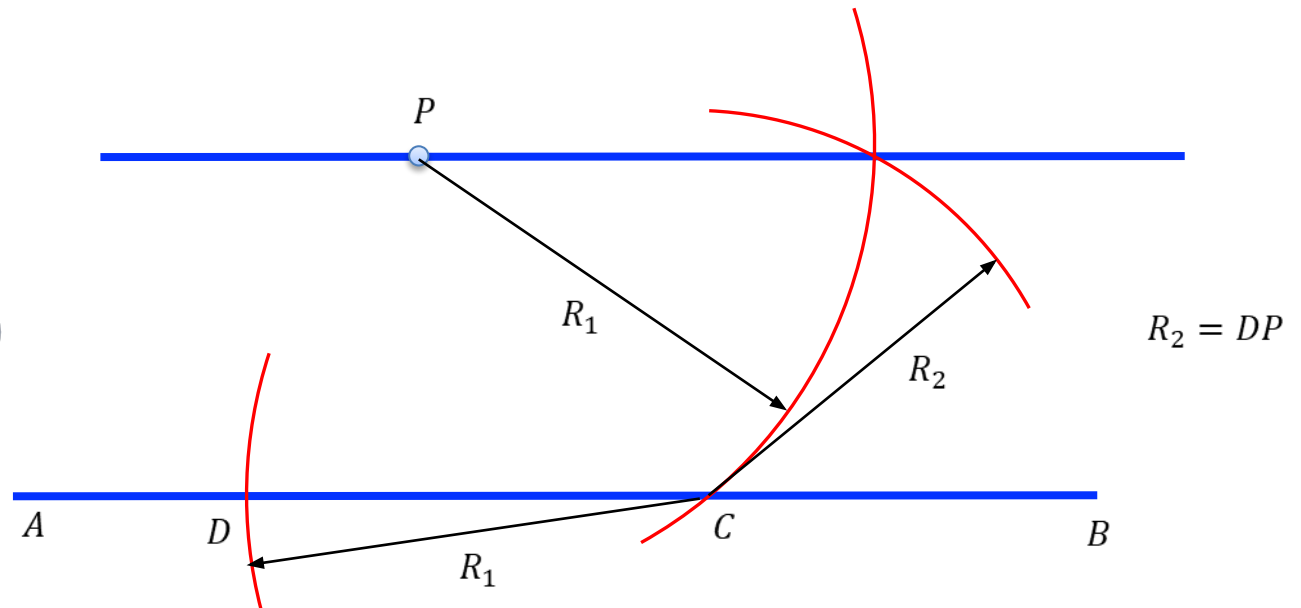


Common Constructions

Parallel line with given
perpendicular distance (R)

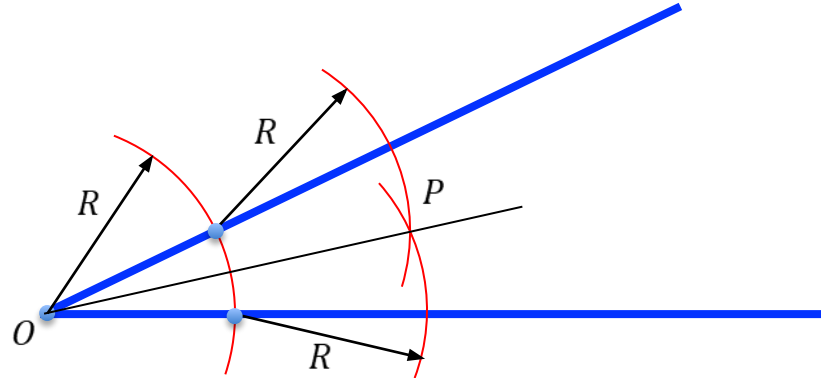


Parallel line
through a point (P)

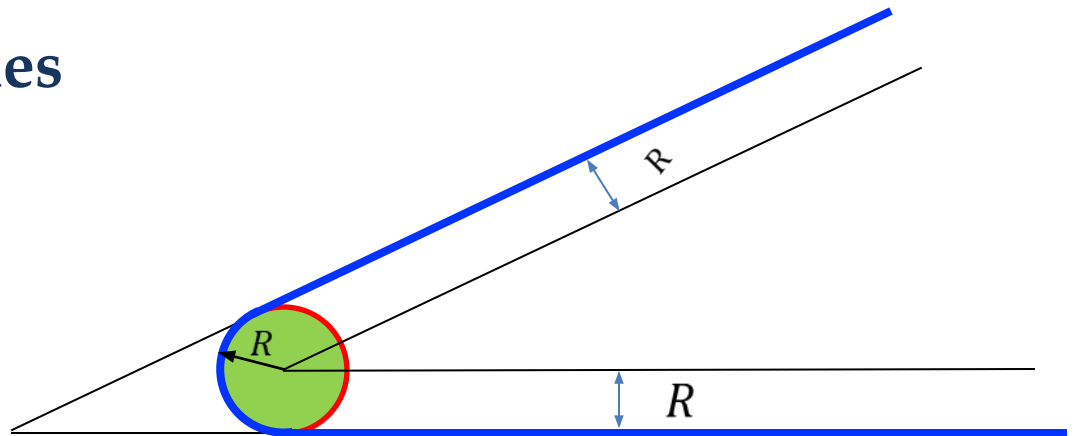


Common Constructions

Bisect an angle

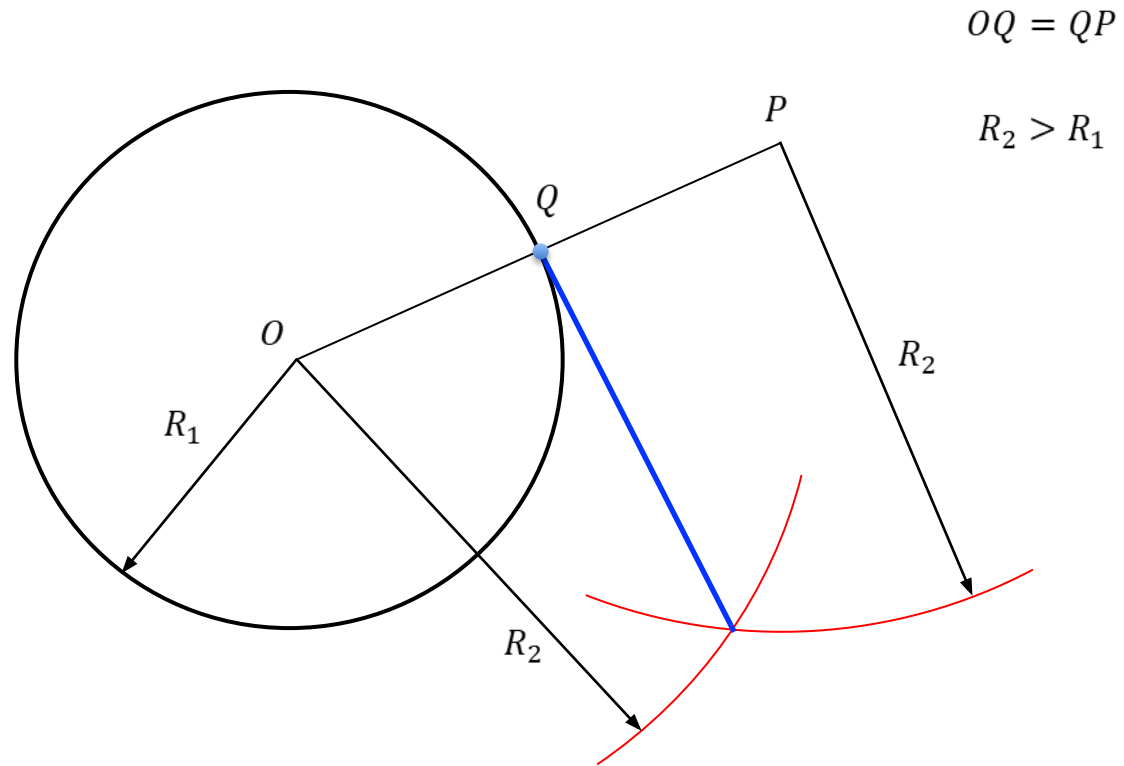


Curve tangent to two lines



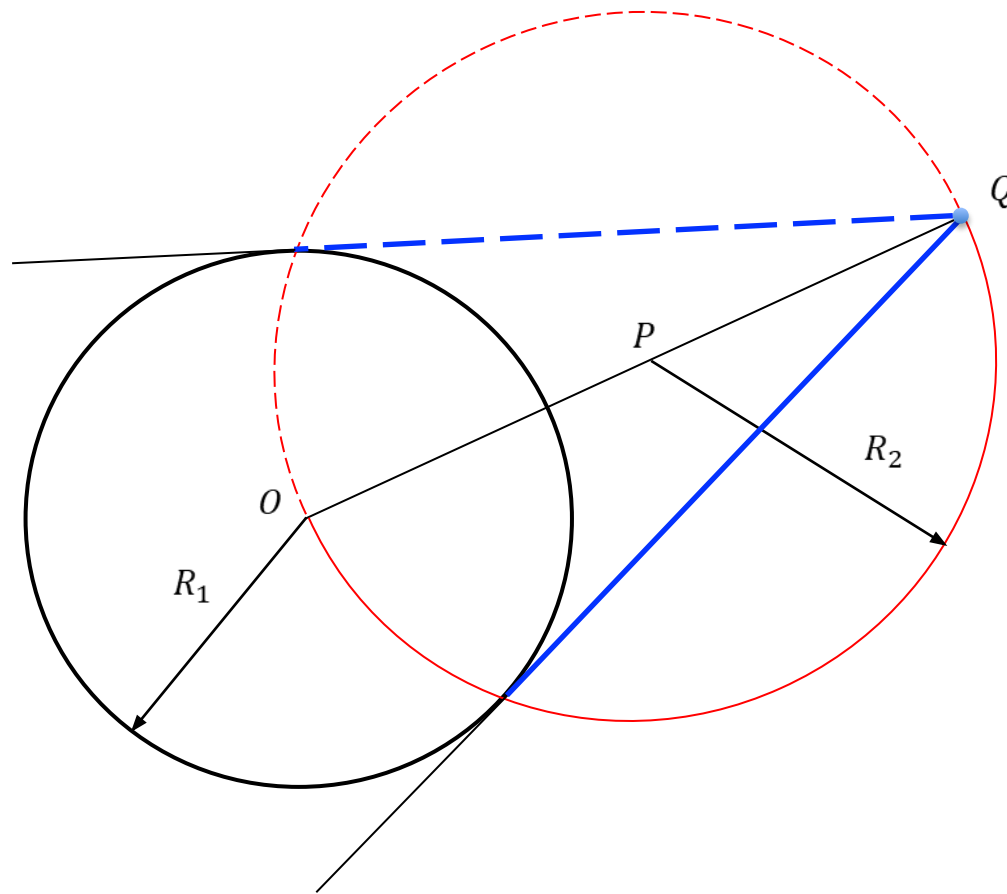
Common Constructions

Tangent to a circle at a point (Q) on it



Common Constructions

Tangent to a circle from a point (Q) outside it

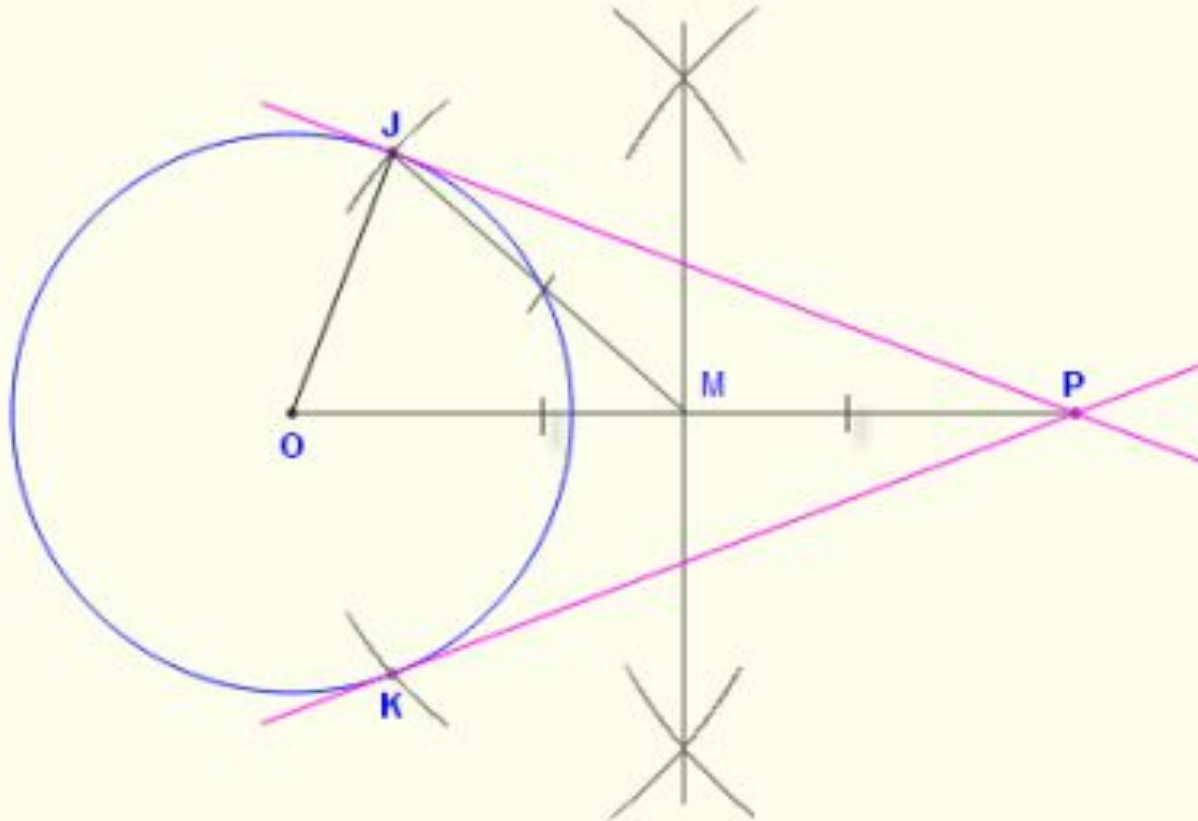


$$OP = PQ$$

$$R_2 = OP$$

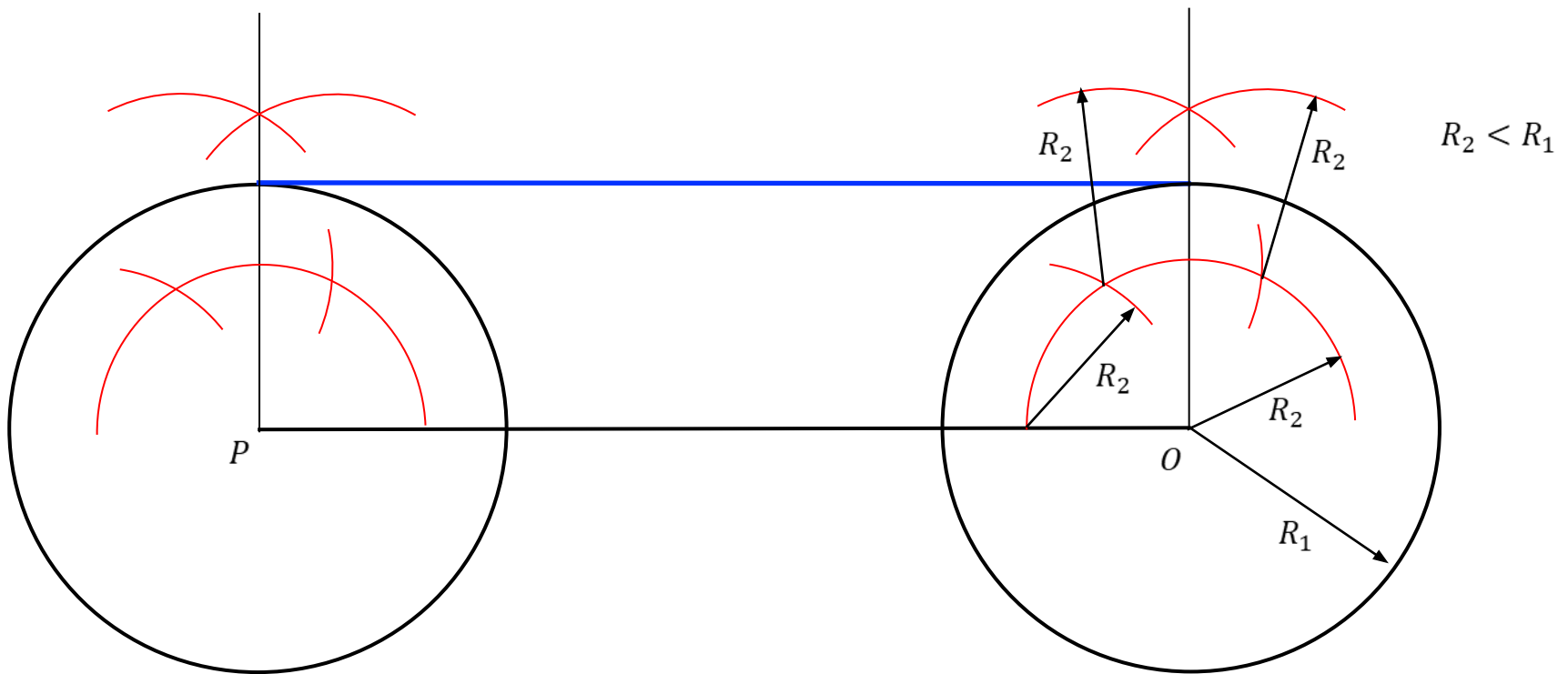
Common Constructions

Tangent to a circle from a point (Q) outside it



Common Constructions

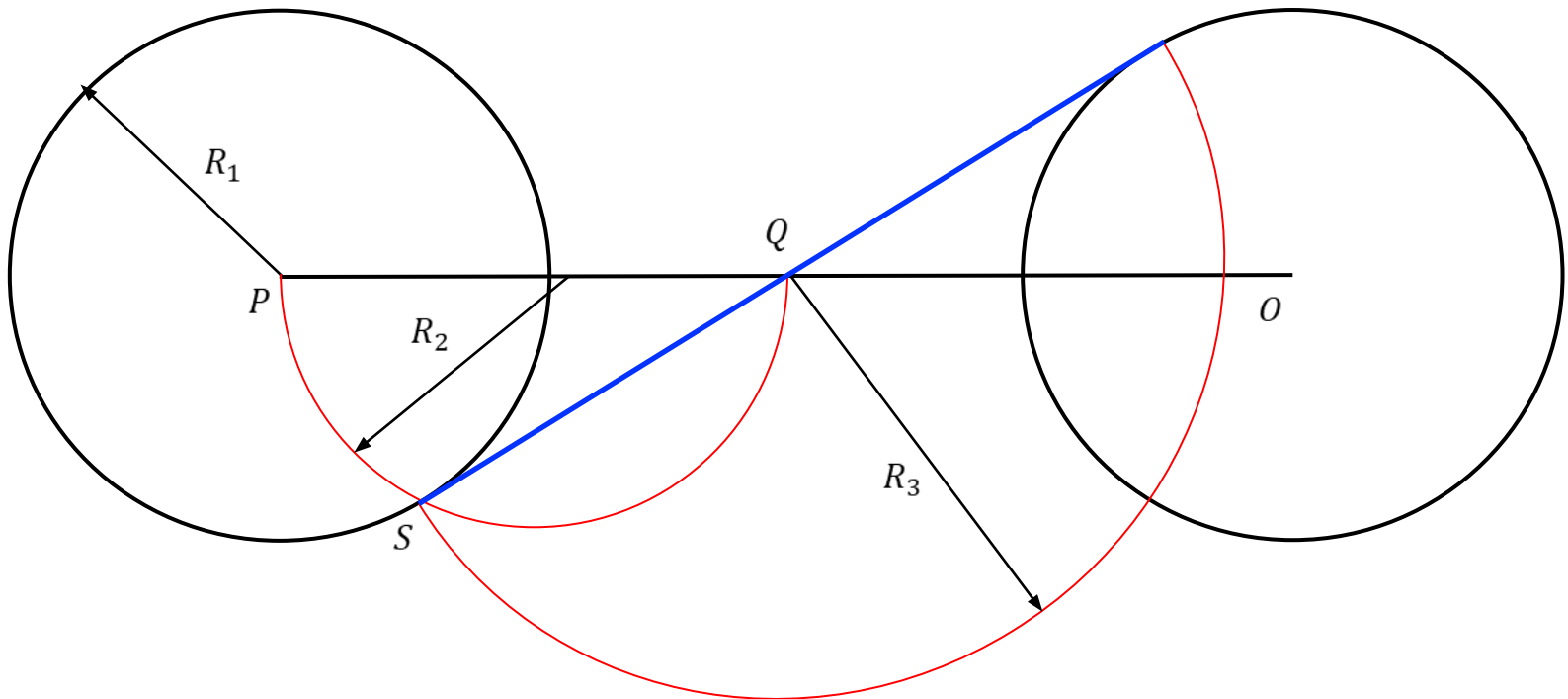
Common tangent between two equal radii circles



Common Constructions

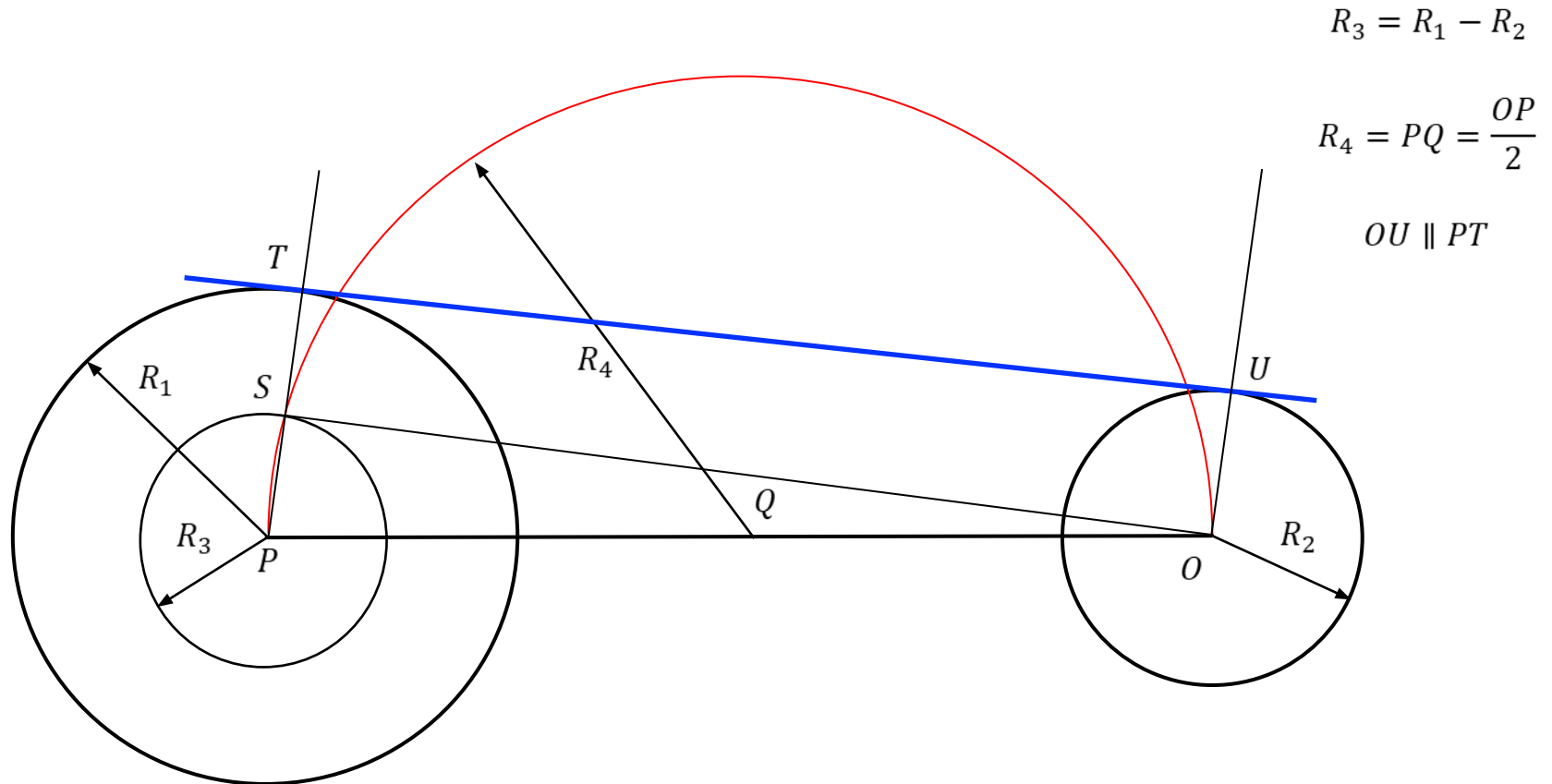
Common tangent between two equal radii circles

$$R_2 = \frac{PQ}{2}$$



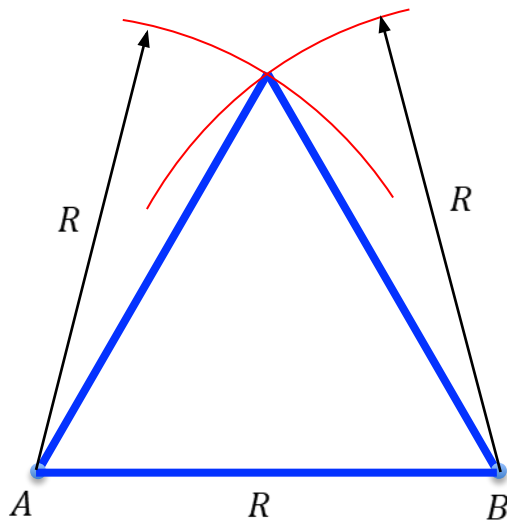
Common Constructions

Common tangent between two unequal radii circles

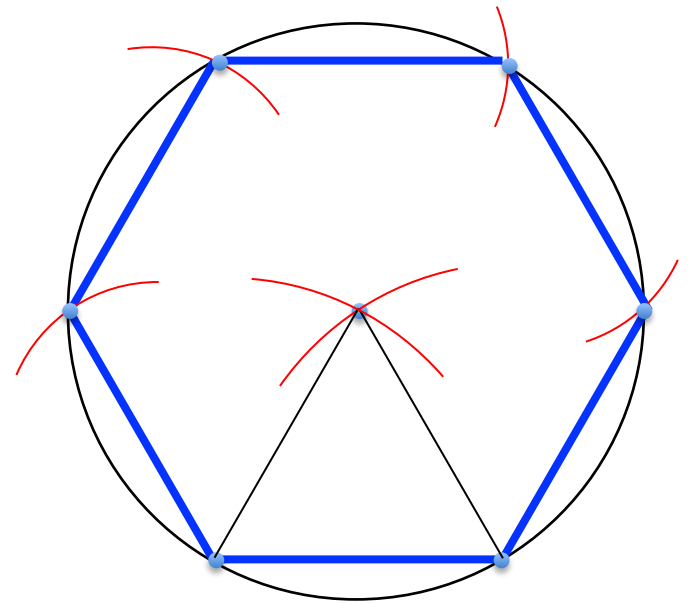


Common Constructions

Equilateral triangle

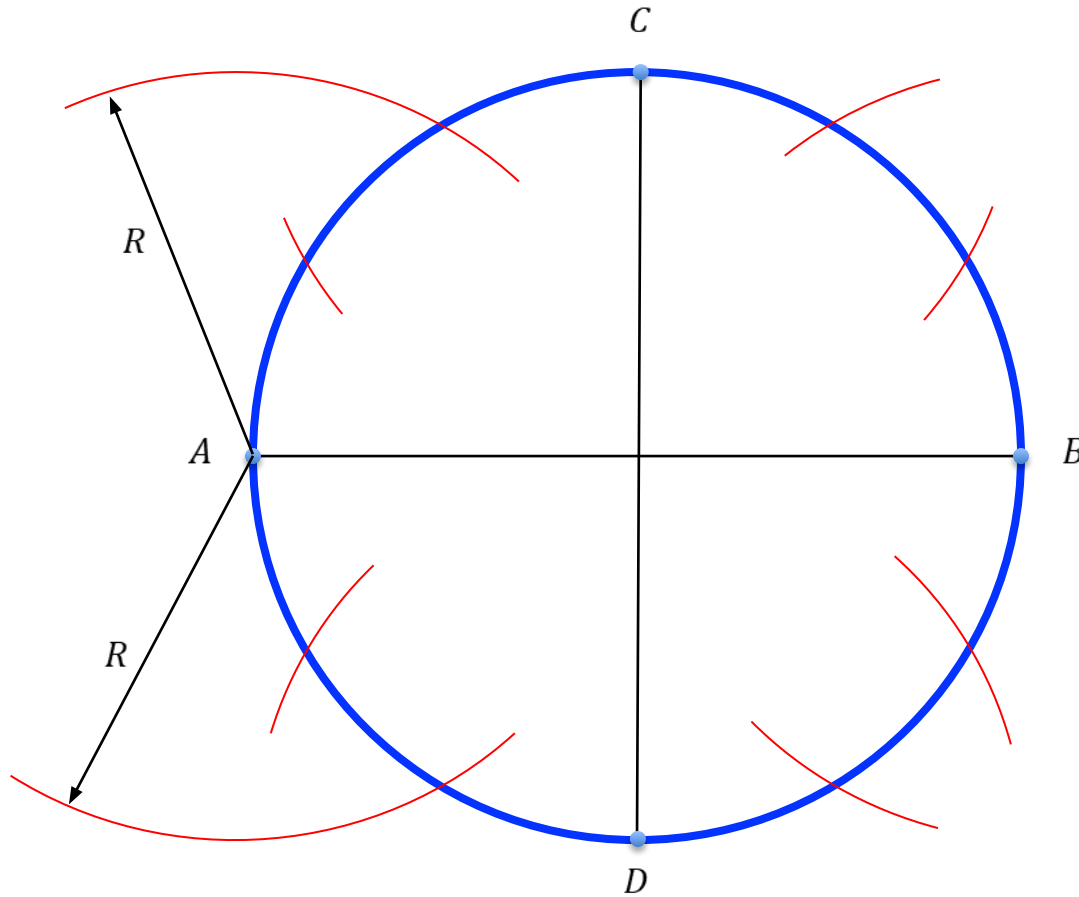


Hexagon

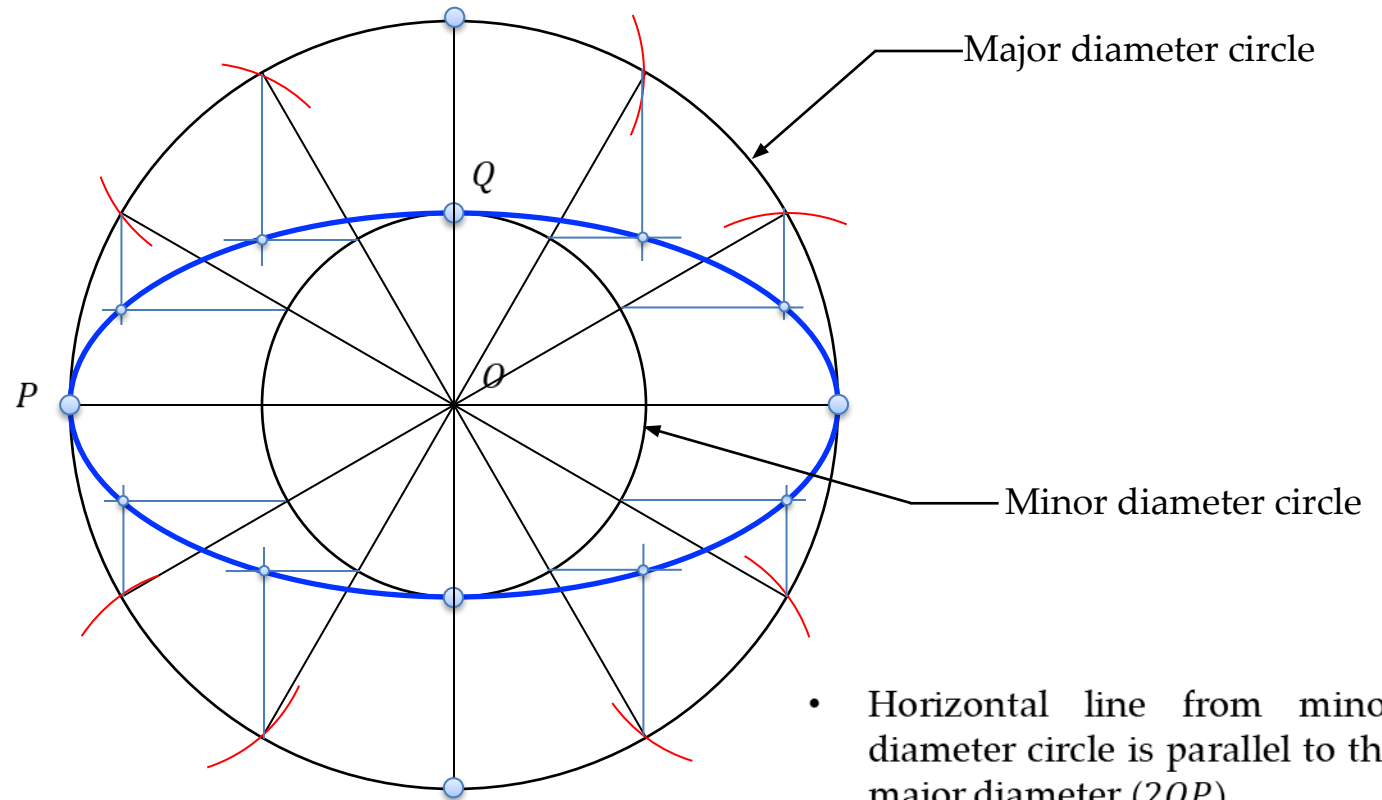


Common Constructions

Dividing a circle into 12 equal segments

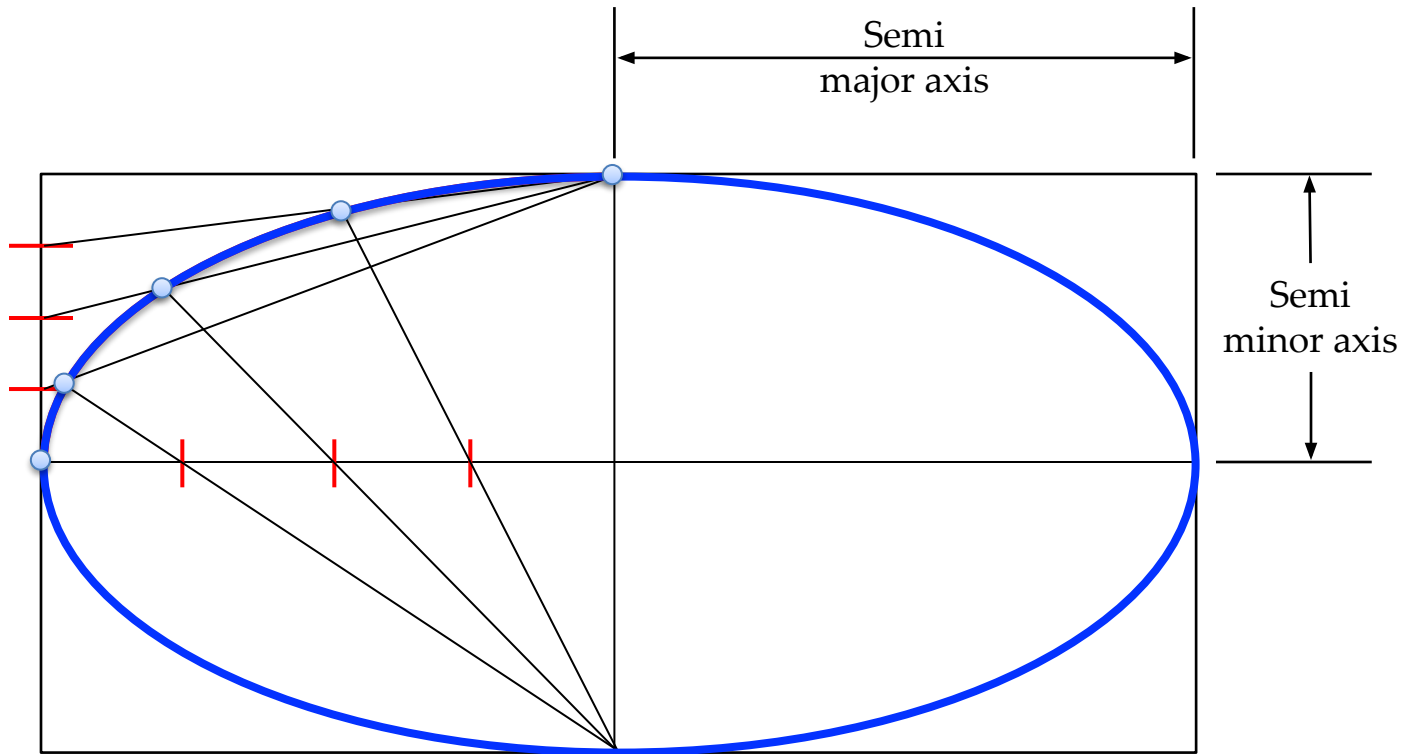


Ellipse – Concentric circles method

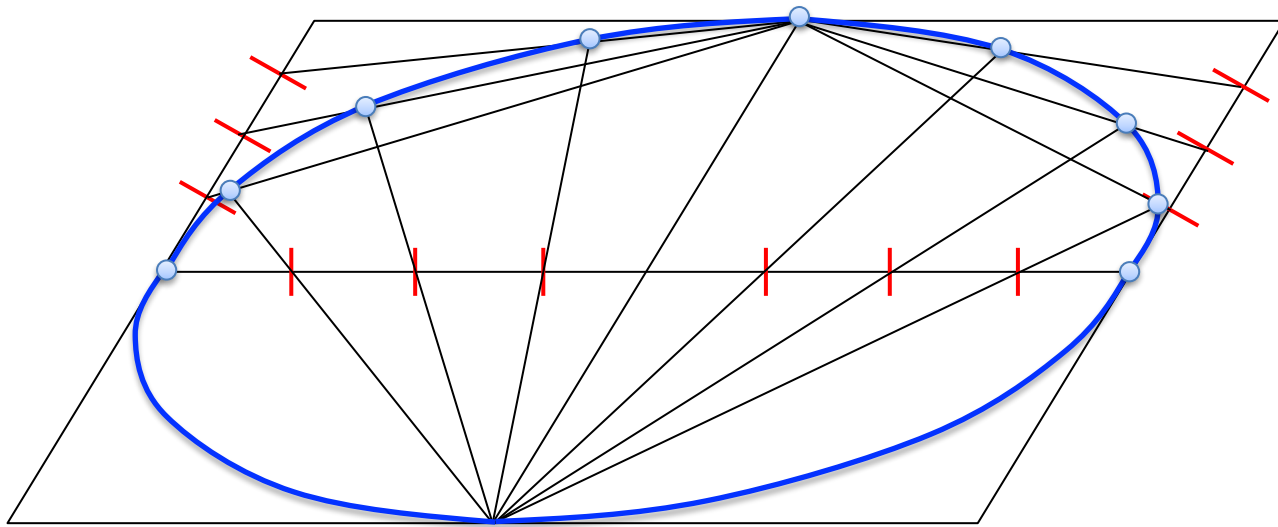


- Horizontal line from minor diameter circle is parallel to the major diameter (OP)
- Vertical line from the major diameter circle is parallel to the minor diameter (OQ)

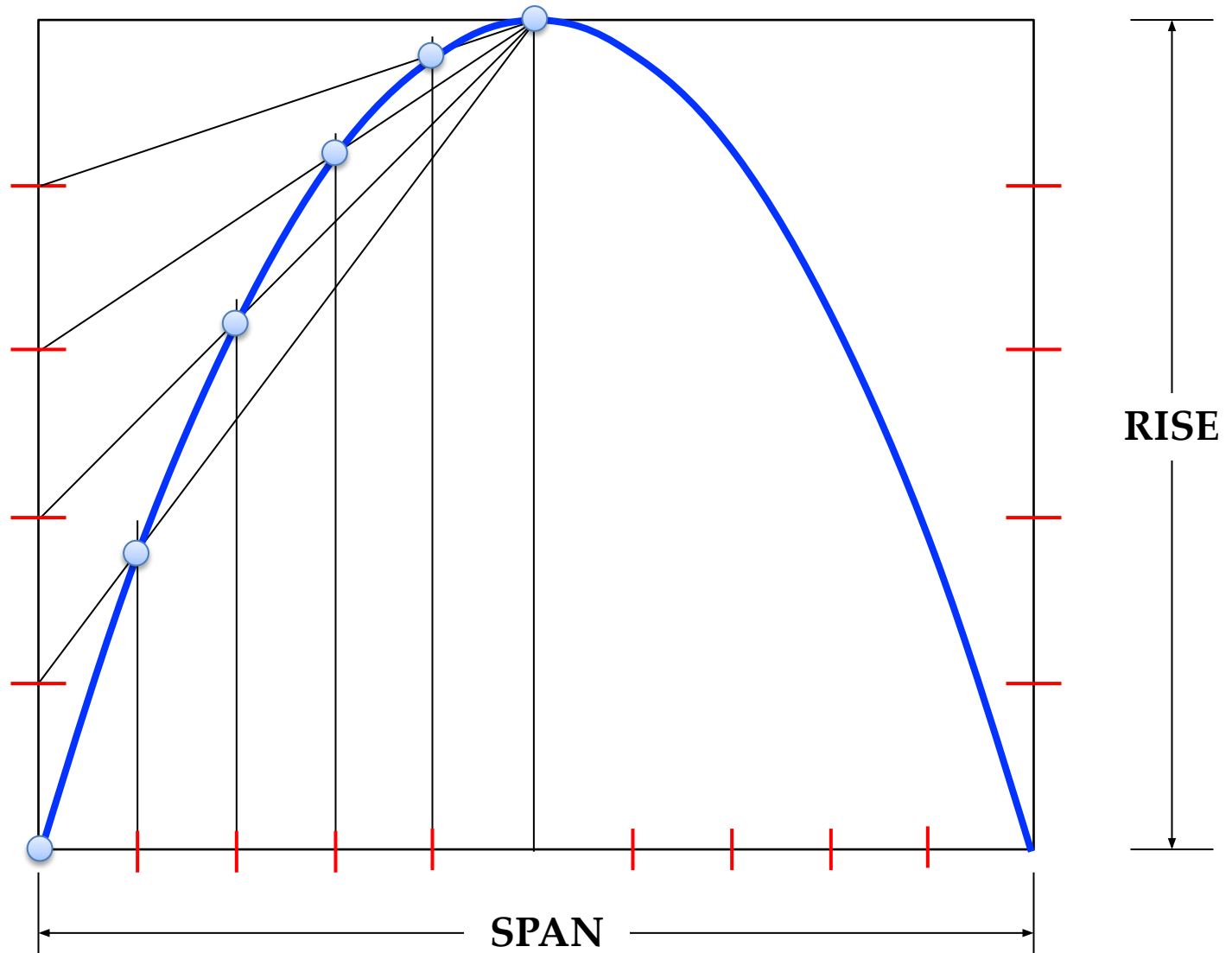
Ellipse – Rectangle method



Ellipse – Parallelogram method

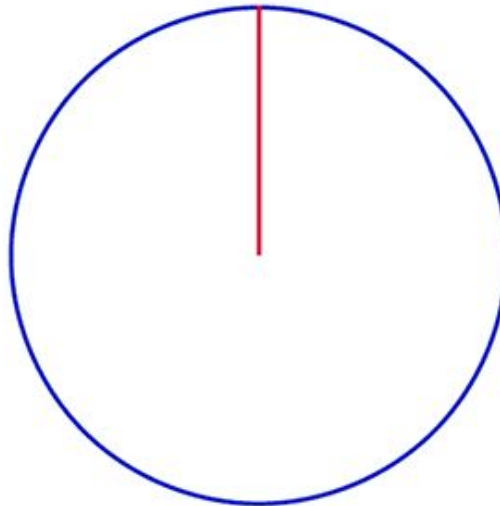


Parabola – Rectangle method



Involute

- Involute is a type of curve that is dependent on another shape or a curve. The name was coined by Christiaan Huygens
- An involute is a locus of a point on a taut (inextensible) string as the string is either wrapped or unwrapped around the curve

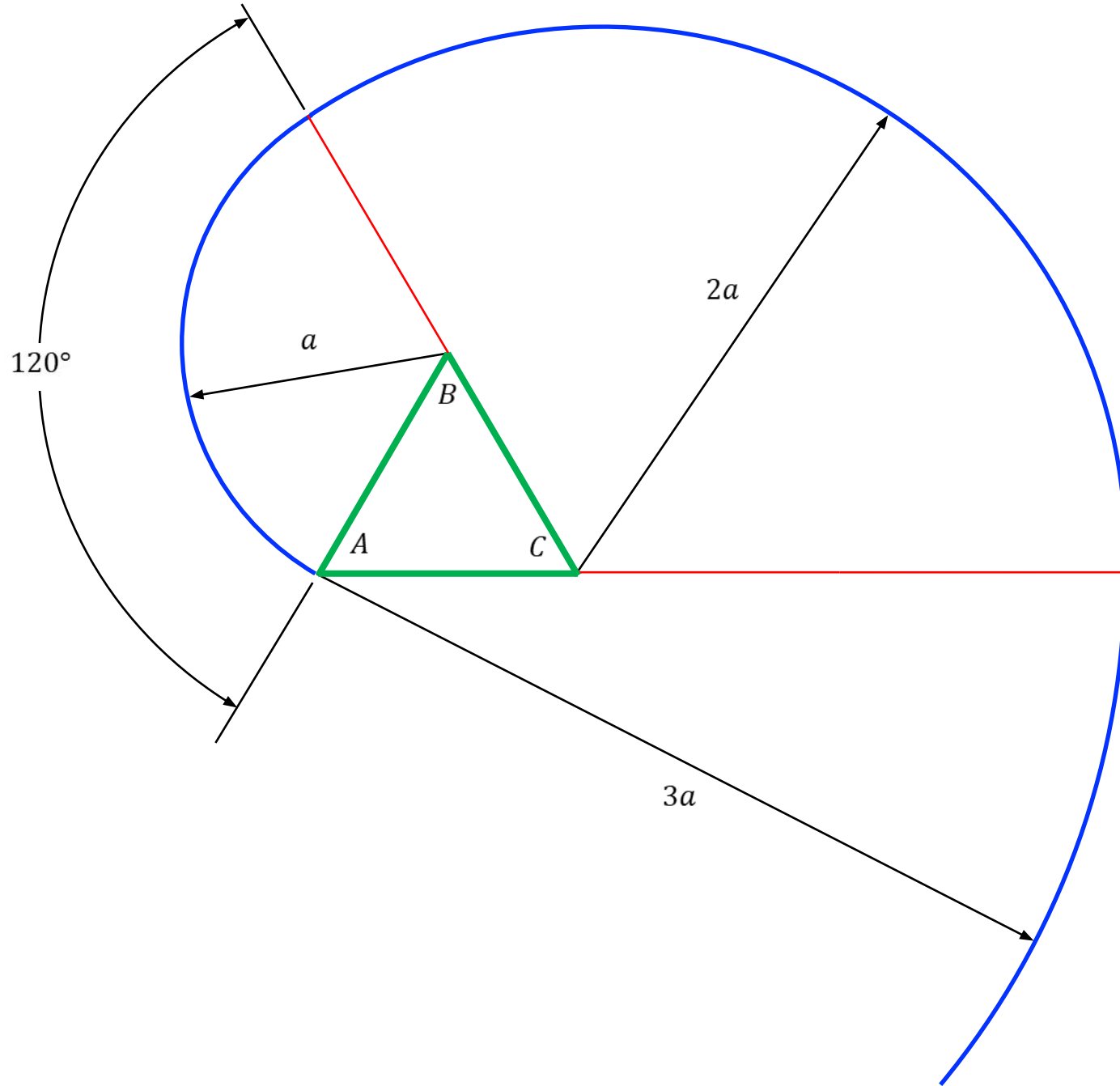


Involute

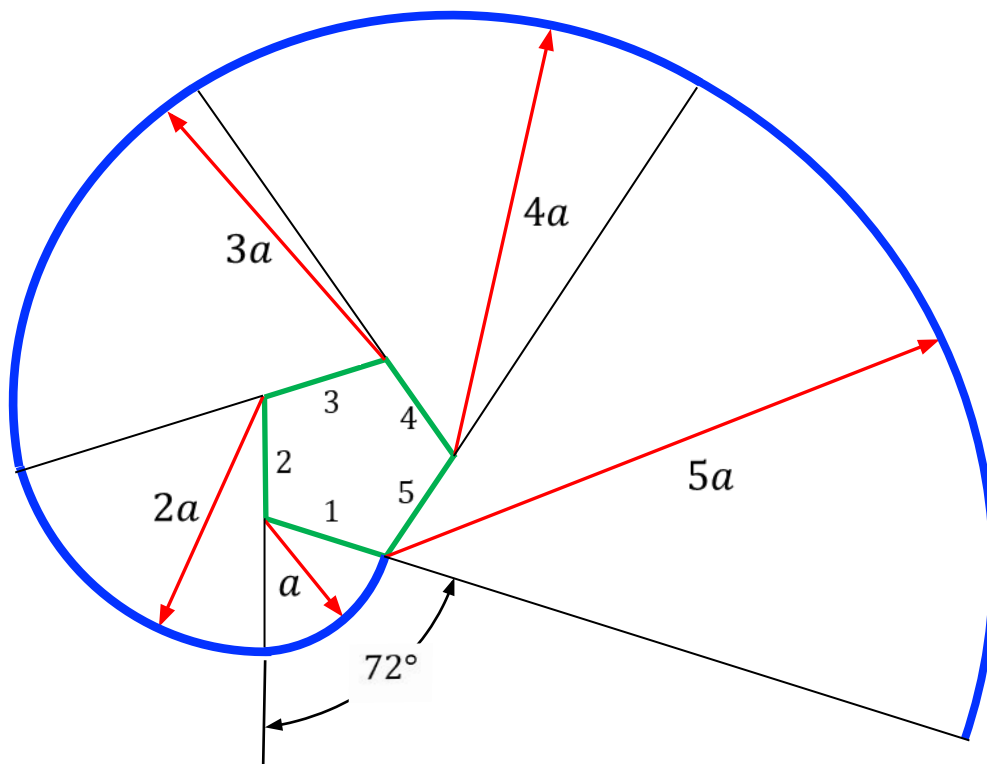


<https://www.youtube.com/watch?v=r96r6IJEYKo>

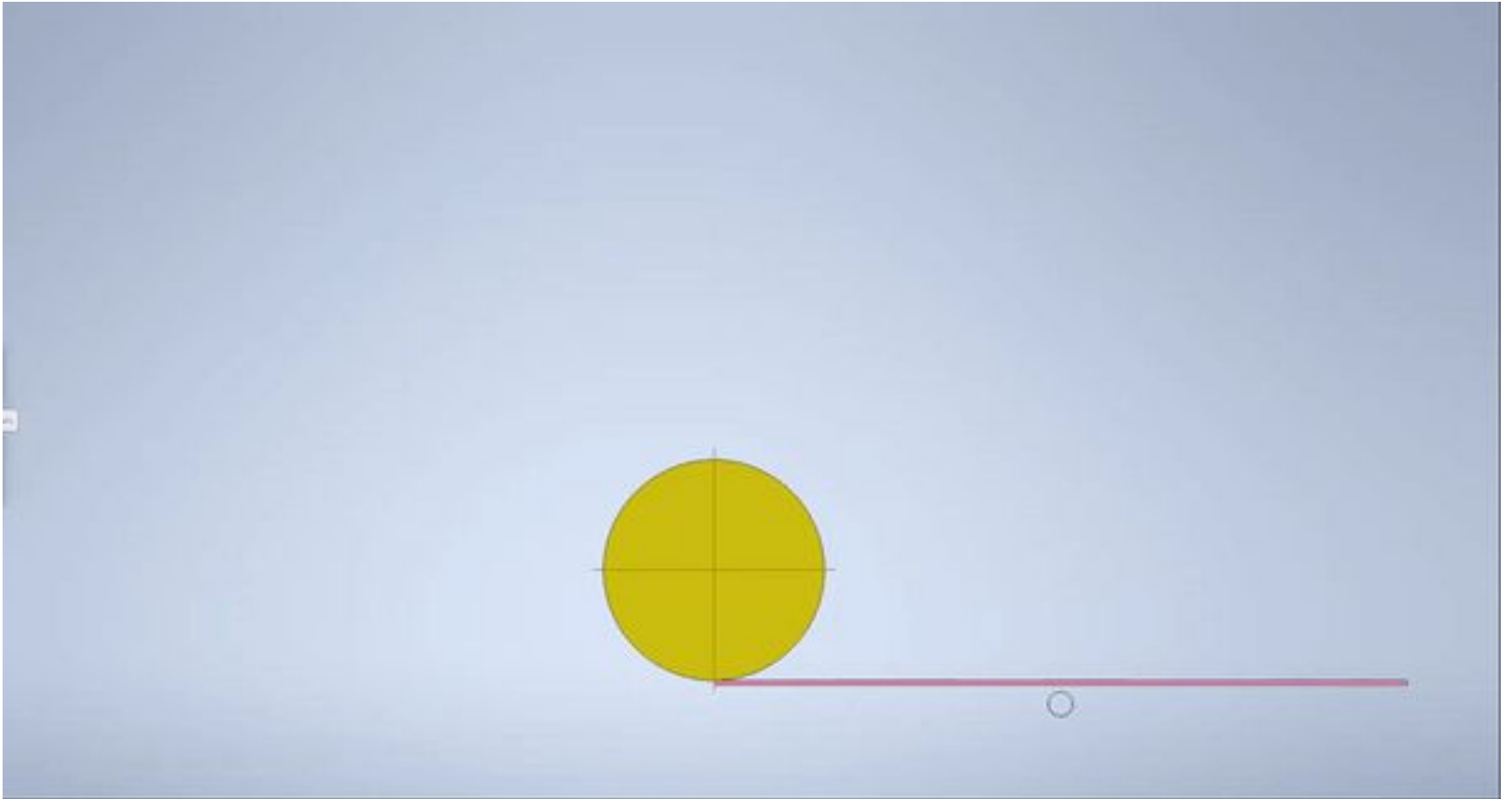
Involute



Involute

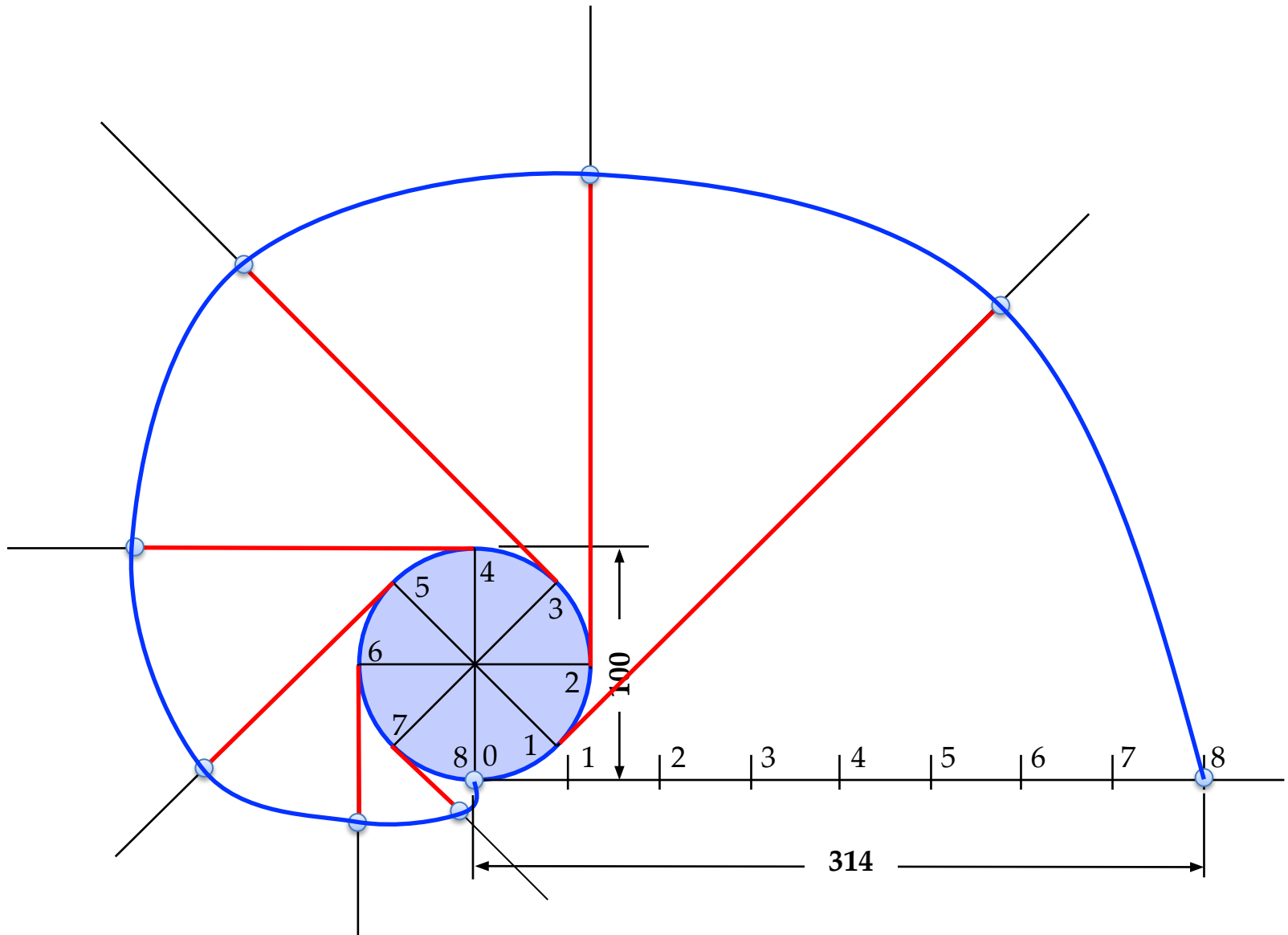


Involute

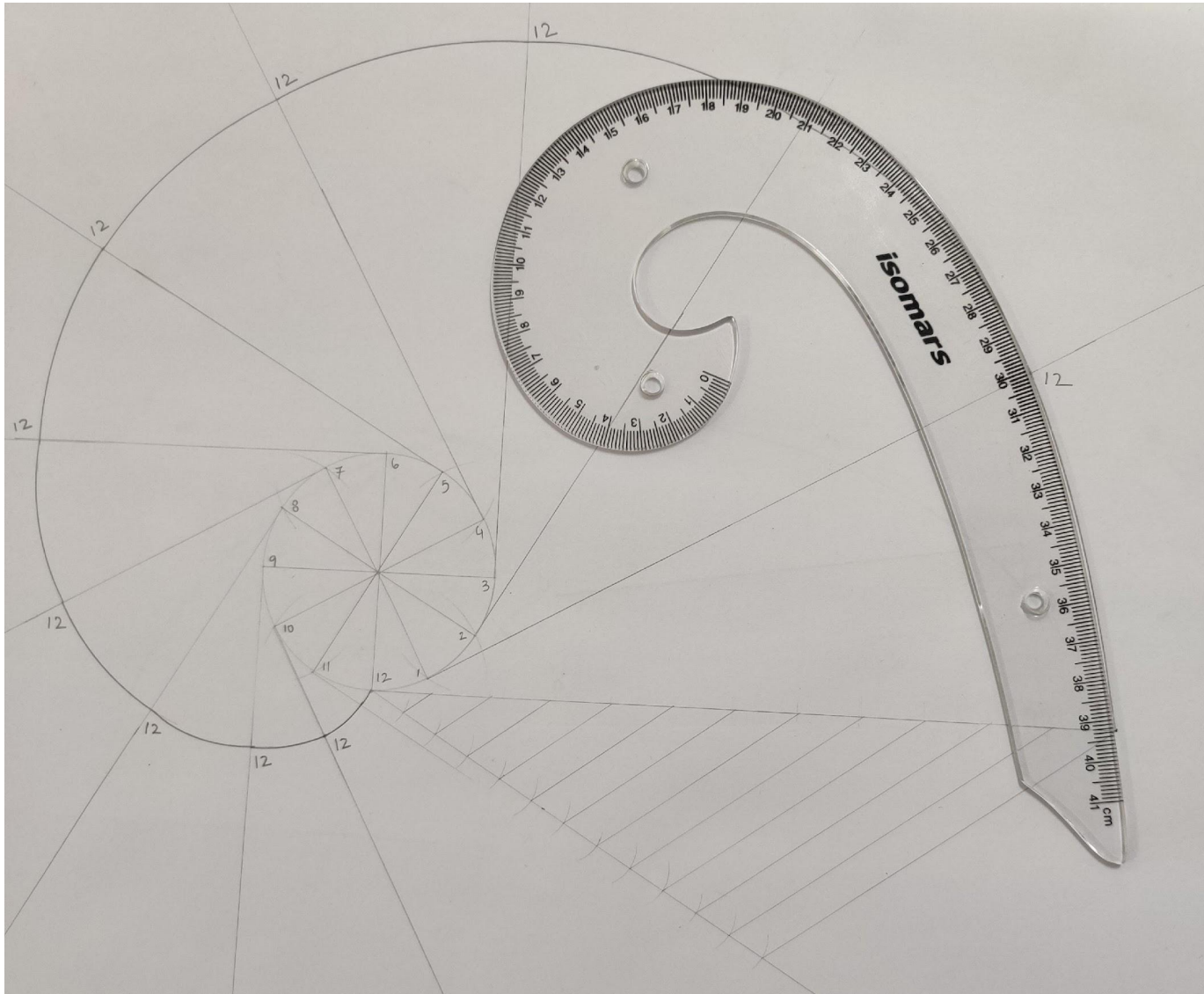


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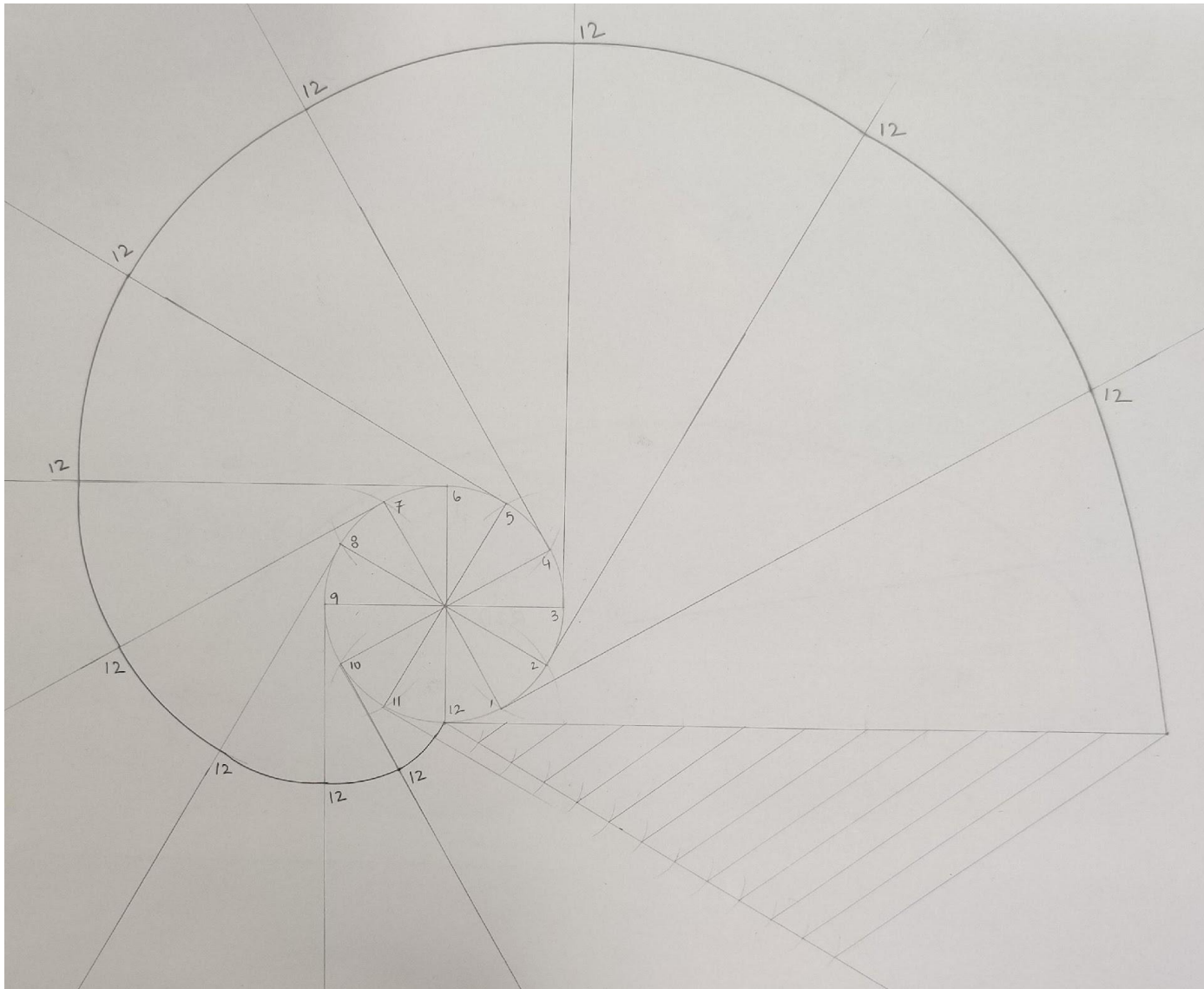
Involute

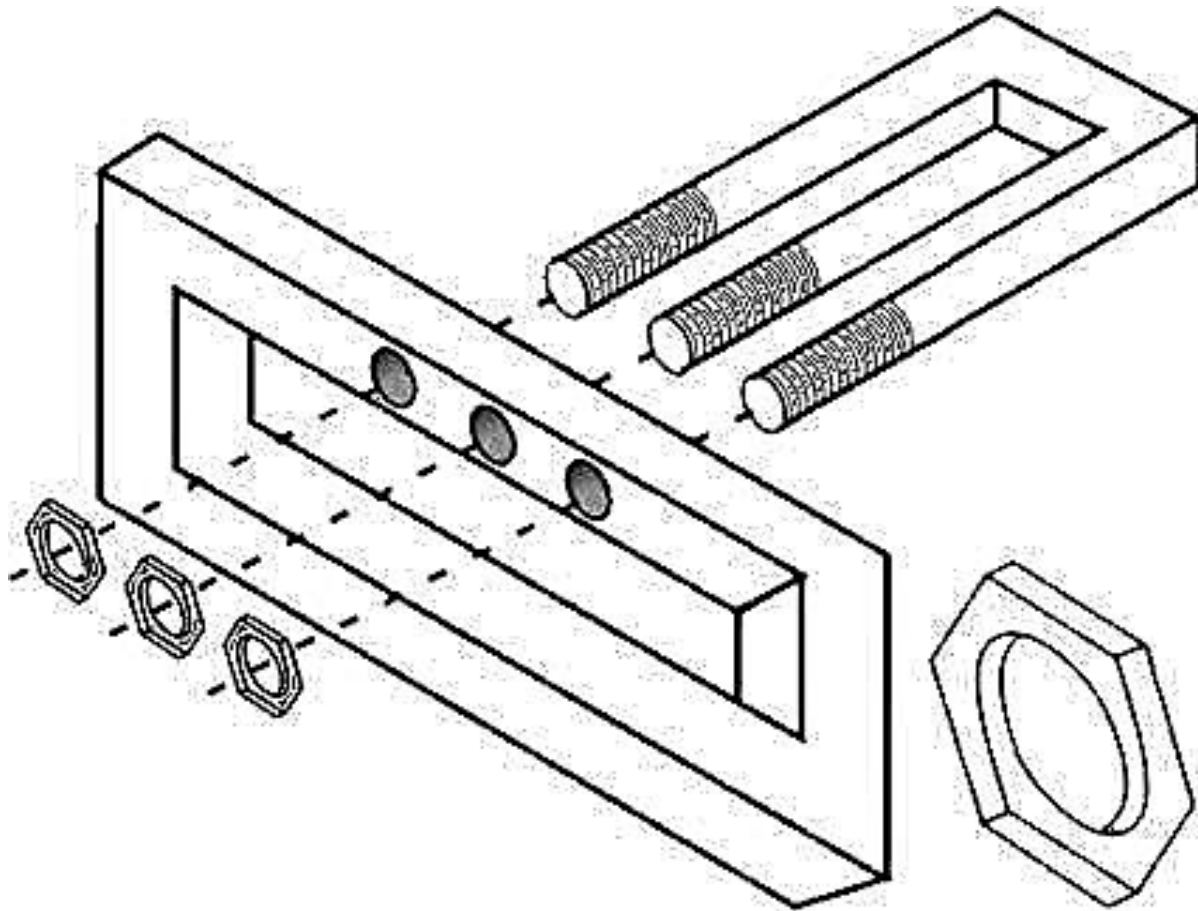


Involute



Involute





Thank you

<https://www.goillusions.com/>