

University of Gaziantep
Mechanical Engineering Department



Engineering Drawing-I

Lecture 2

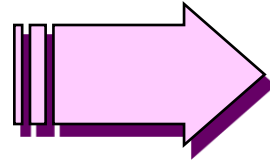
Prepared by:

Asst. Prof. Dr. Hakan ÇANDAR

Function of the Tools

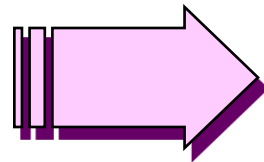
Tools

1. T-square
2. Triangles



Straight line

3. Compass
4. Circle template

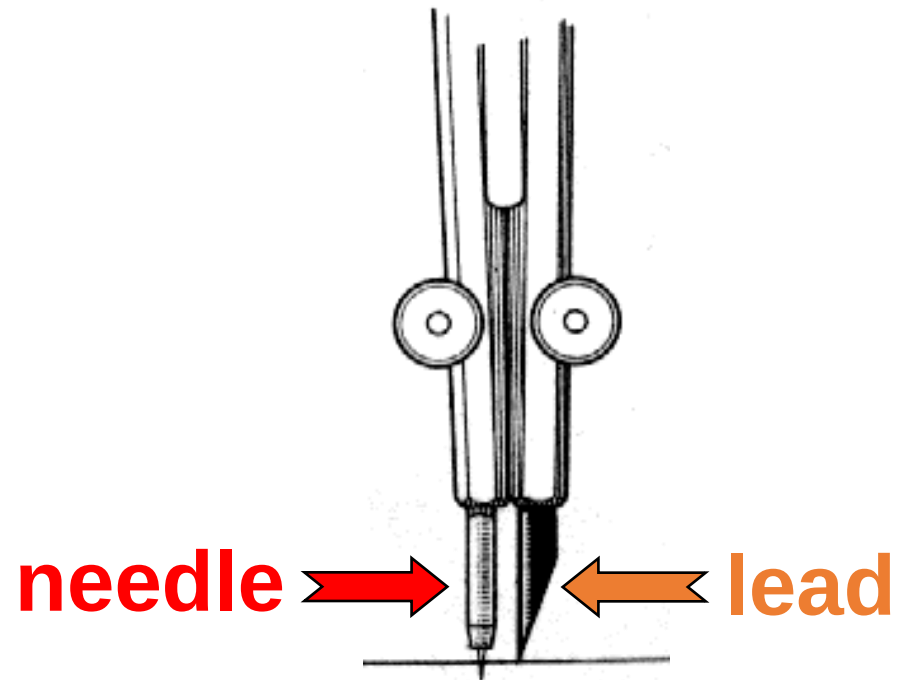
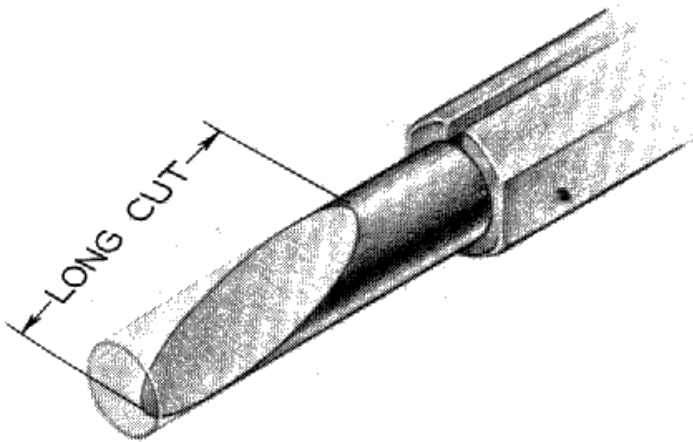


Arc, Circle

Shape to be drawn

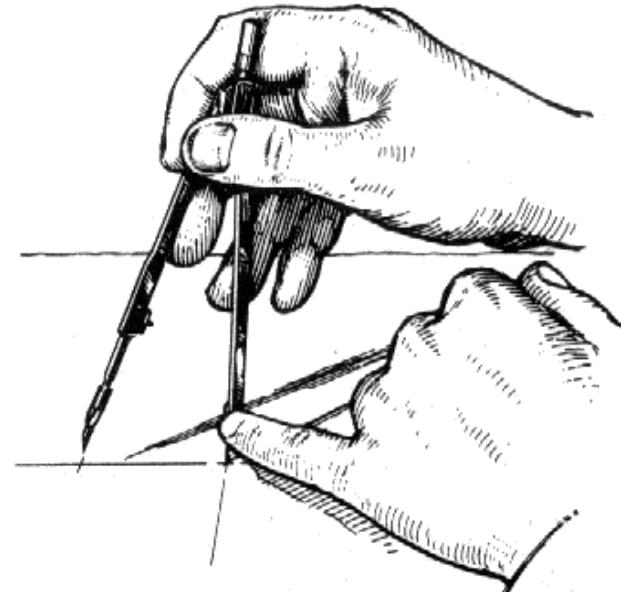
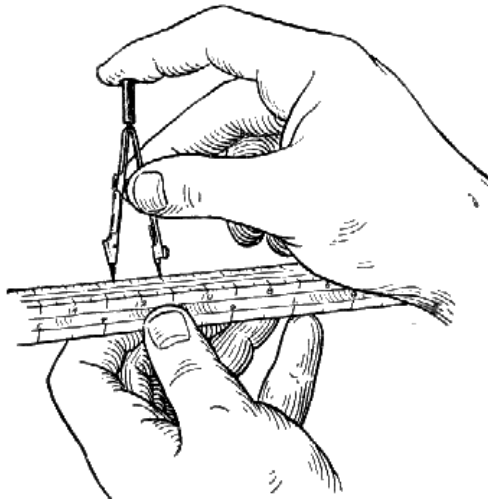
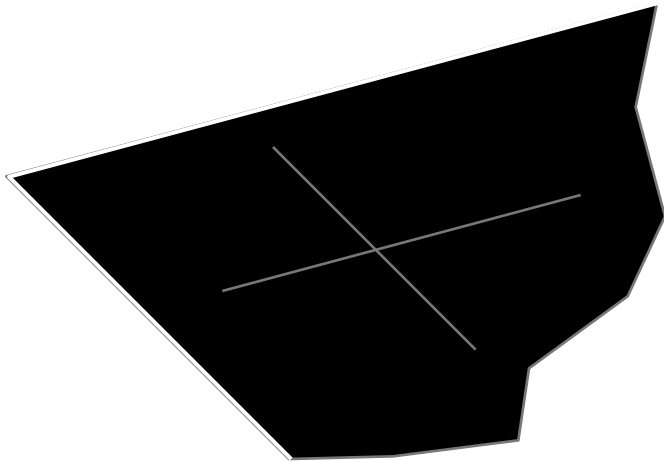
Preparing the Compass

1. Sharpen the lead with a sandpaper.
2. Adjust the **needle** and the **lead** so that the tip of the needle extends slightly more than the lead.



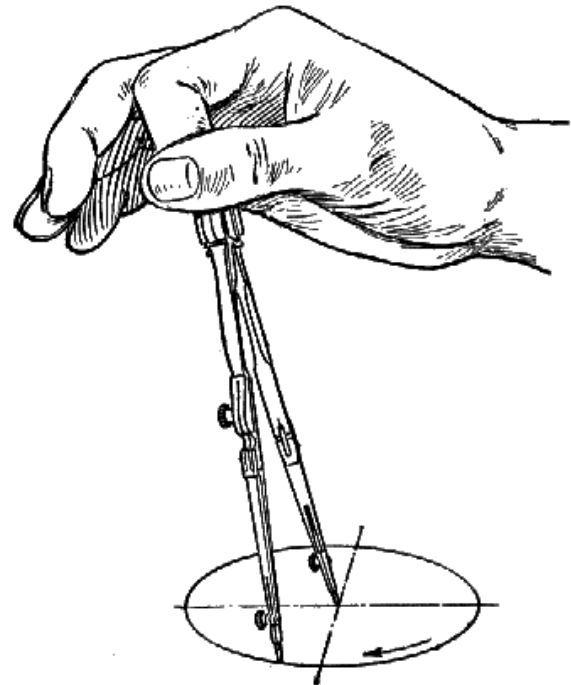
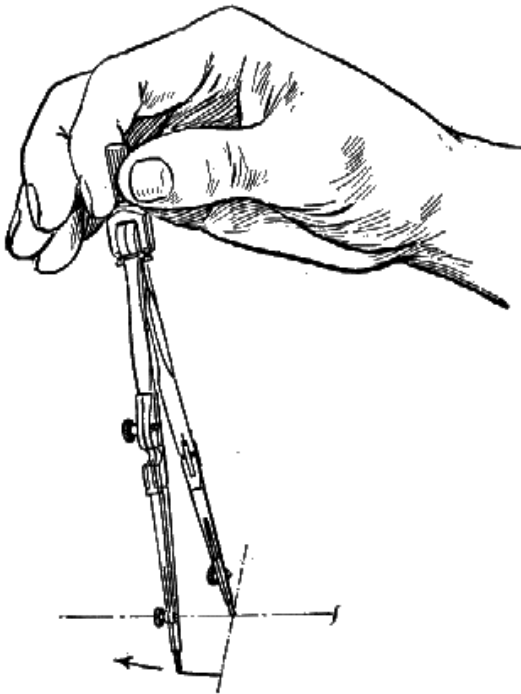
Using the Compass

1. **Locate the center** of the circle by two intersecting lines.
2. Adjust the distance between needle and lead to a distance equal to radius of the circle.
3. Set the needle point at center.



Using the Compass

4. **Start circle.** Apply enough pressure to the needle, holding compass handle between thumb and index fingers.
5. **Complete circle.** Revolve handle clockwise.



Fastening Paper to Drafting Board

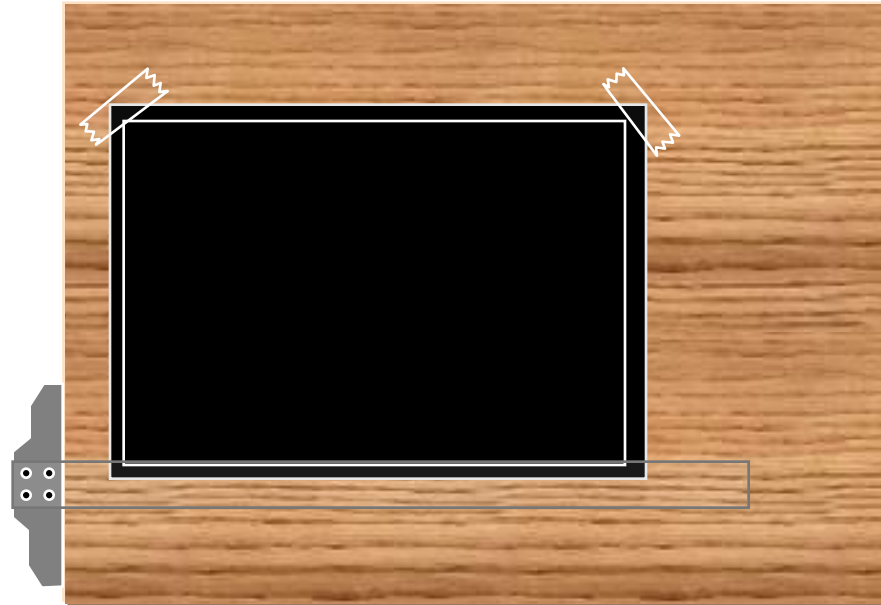
1. Place the paper close to the table's left edge.
2. Move the paper until its lower edge place about the top edge of T-square.



Fastening Paper to Drafting Board

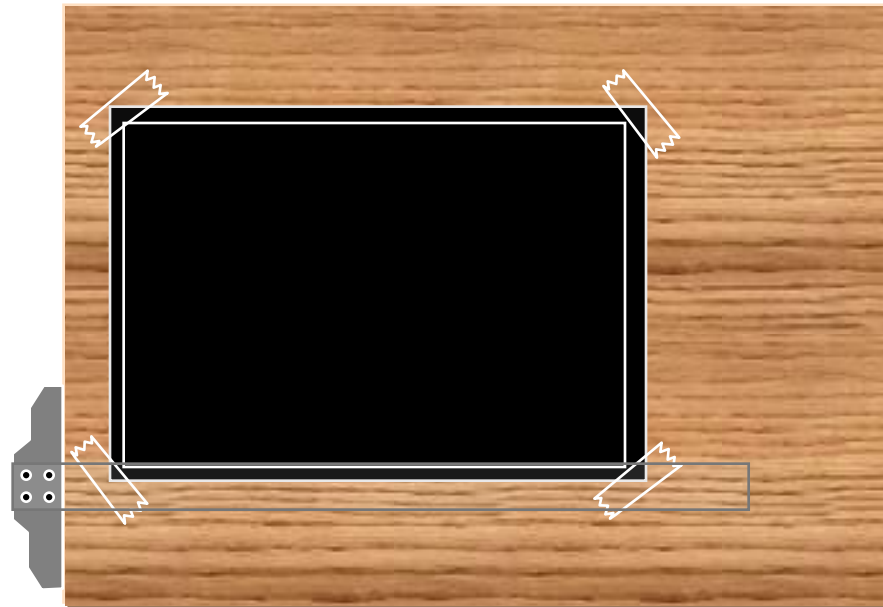
3. Align the top edge of the paper with T-square blade.

4. Attach the paper's corners with tape.



Fastening Paper to Drafting Board

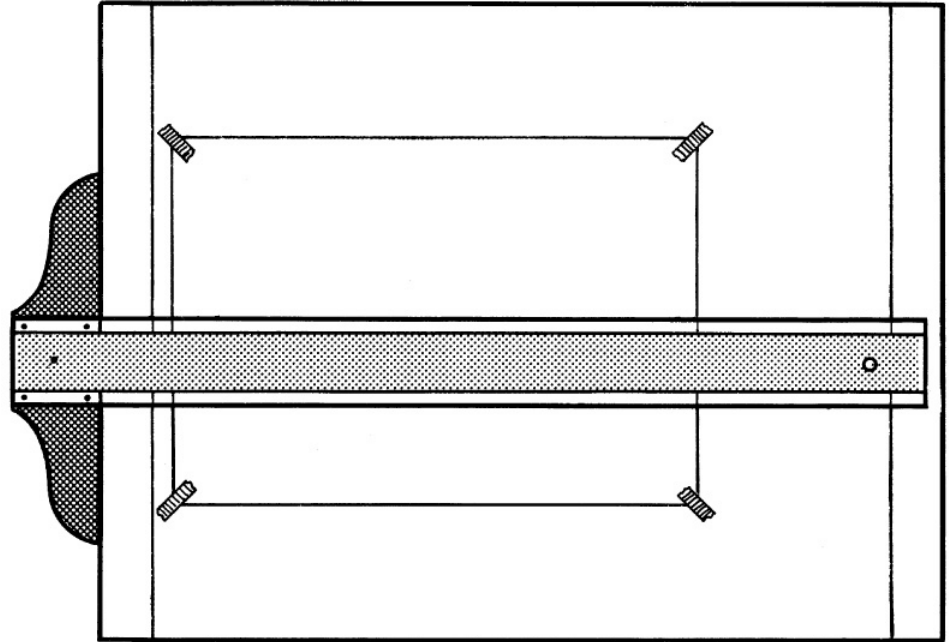
5. Move T-square down to smooth the paper.
6. Attach the remaining paper's corners with tape.



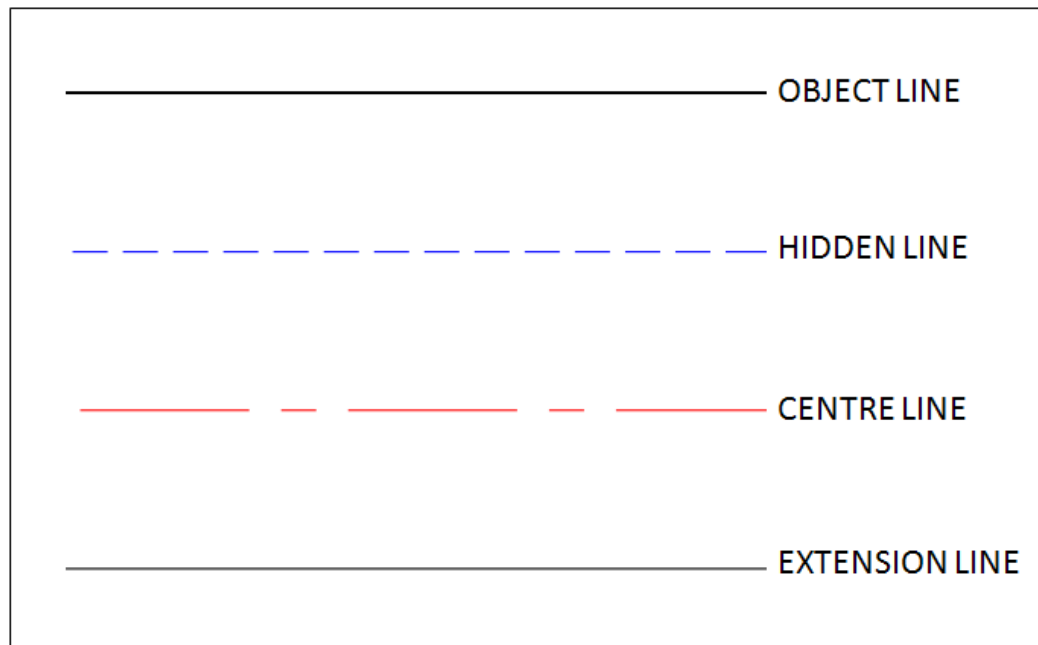
The drawing paper should be placed close to the working edge of the board to reduce any error resulting from the bending of the blade of the T-square.

The paper should also be placed close enough to the upper edge of the board to permit space at the bottom of the sheet for using the T-square.

Drafting tape is used to fasten the drawing paper to the drawing board.



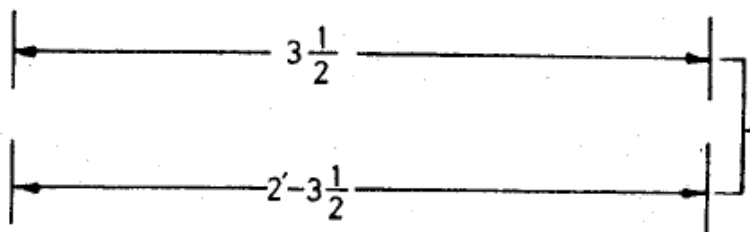
Line styles and application



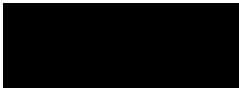
3.3.1 THE ALPHABET OF LINES

As the basis of drawing is the line, a set of conventional symbols covering all the lines needed for different purposes are given in Figs. 1.24, and 25.

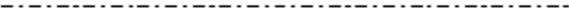
THICKNESSES

THICK	Visible outlines	<u>I</u> 0.5	<u>II</u> 0.7	<u>III</u> 1.0
THIN	Construction and section lines	0.25	0.35	0.5
MEDIUM	Hidden lines	0.35	0.5	0.7
	Center lines	0.25	0.35	0.5
	Dimension and extension lines	0.25	0.35	0.5
	Cutting plane lines			

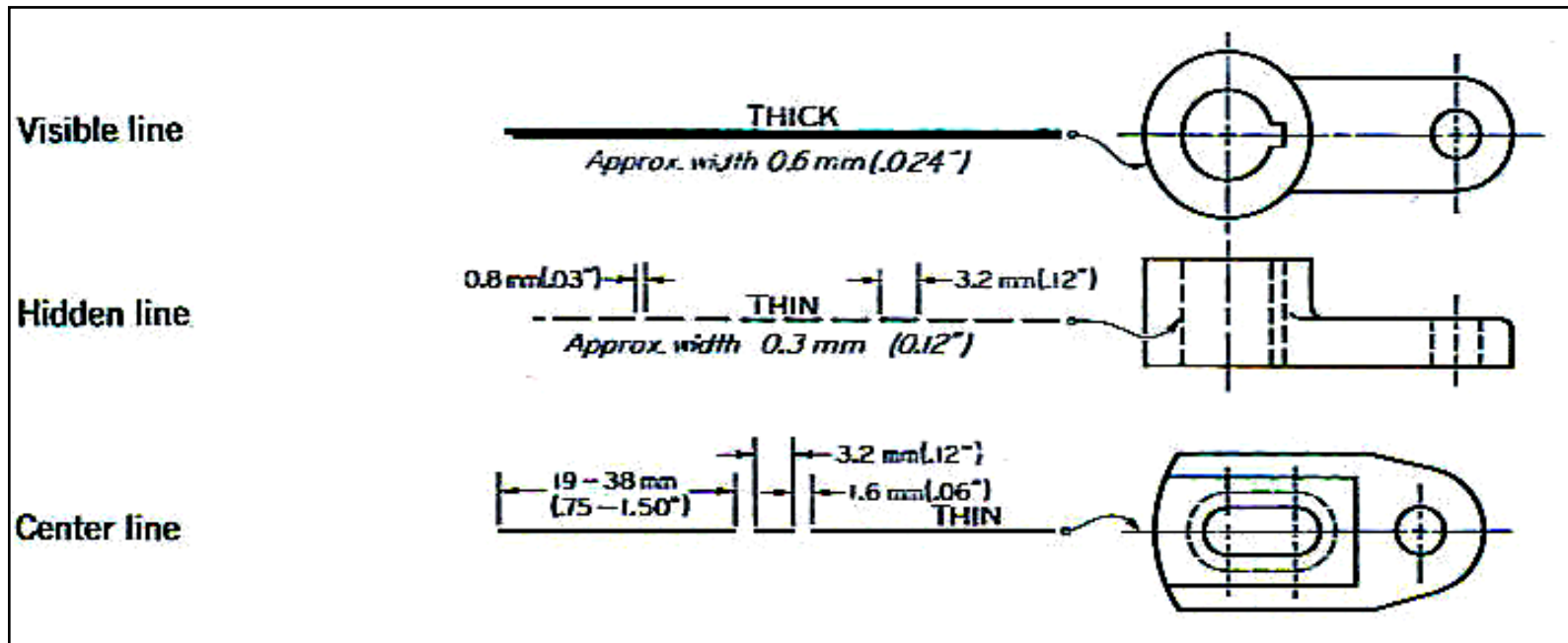
Line types

Illustration	Application	Pencil
Thick 	Outlines, visible edges, surface boundaries of objects, margin lines	
Continuous thin 	Dimension lines, extension lines, section lines leader or pointer lines, construction lines, boarder lines	2H
Continuous thin wavy 	Short break lines or irregular boundary lines – drawn freehand	2H
Continuous thin with zig-zag 	Long break lines	2H
Short dashes, gap 1, length 3 mm 	Invisible or interior surfaces	H

Line types....CONTD

Illustration	Application	Pencil
Short dashes 	Center lines, locus lines Alternate long and short dashes in a proportion of 6:1,	2H
Long chain thick at end and thin elsewhere 	Cutting plane lines	H / 2H
Continuous thick border line 	Border	HB

- 3 Main Types

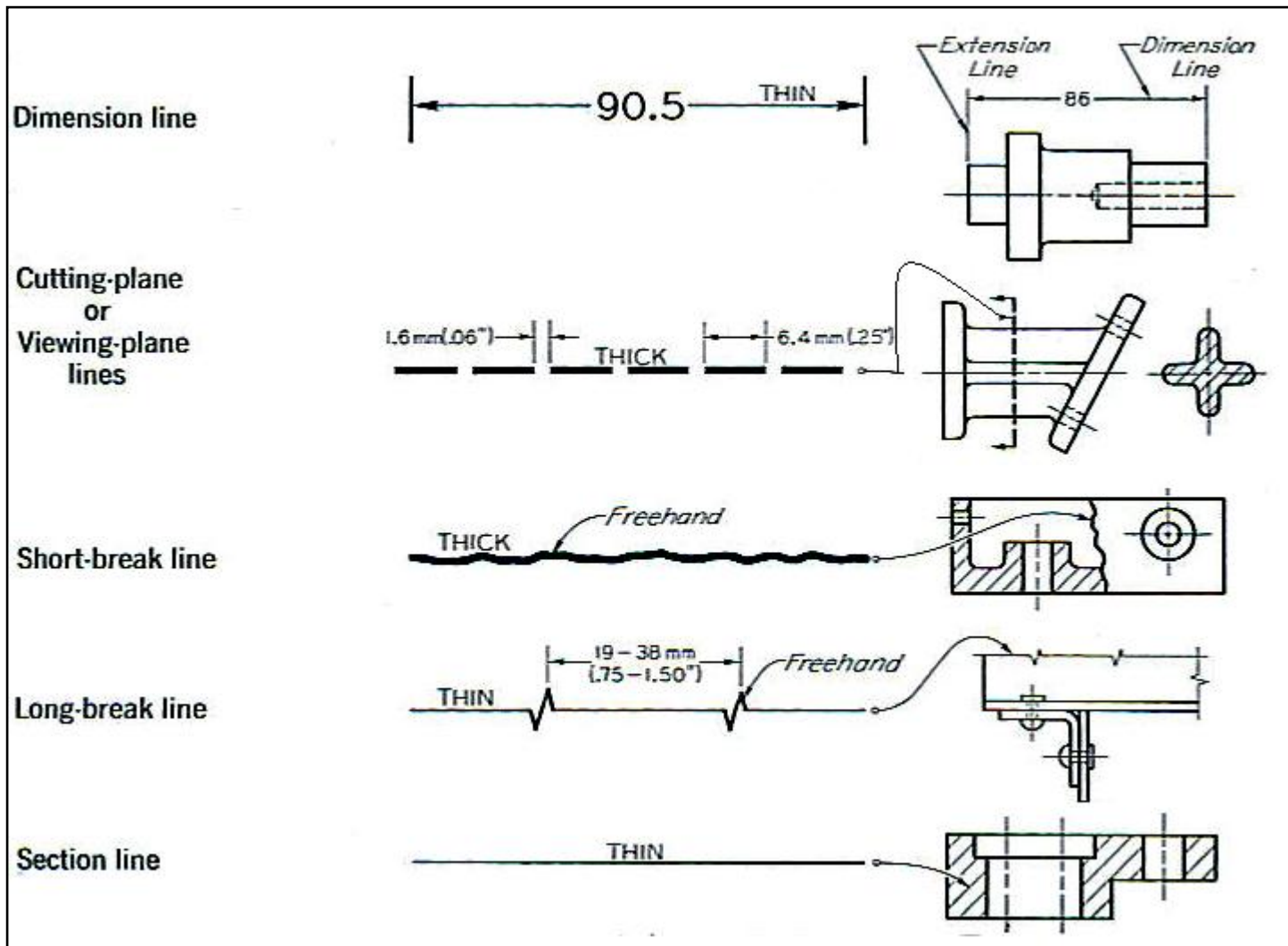


Visible lines represent features that can be seen in the current view

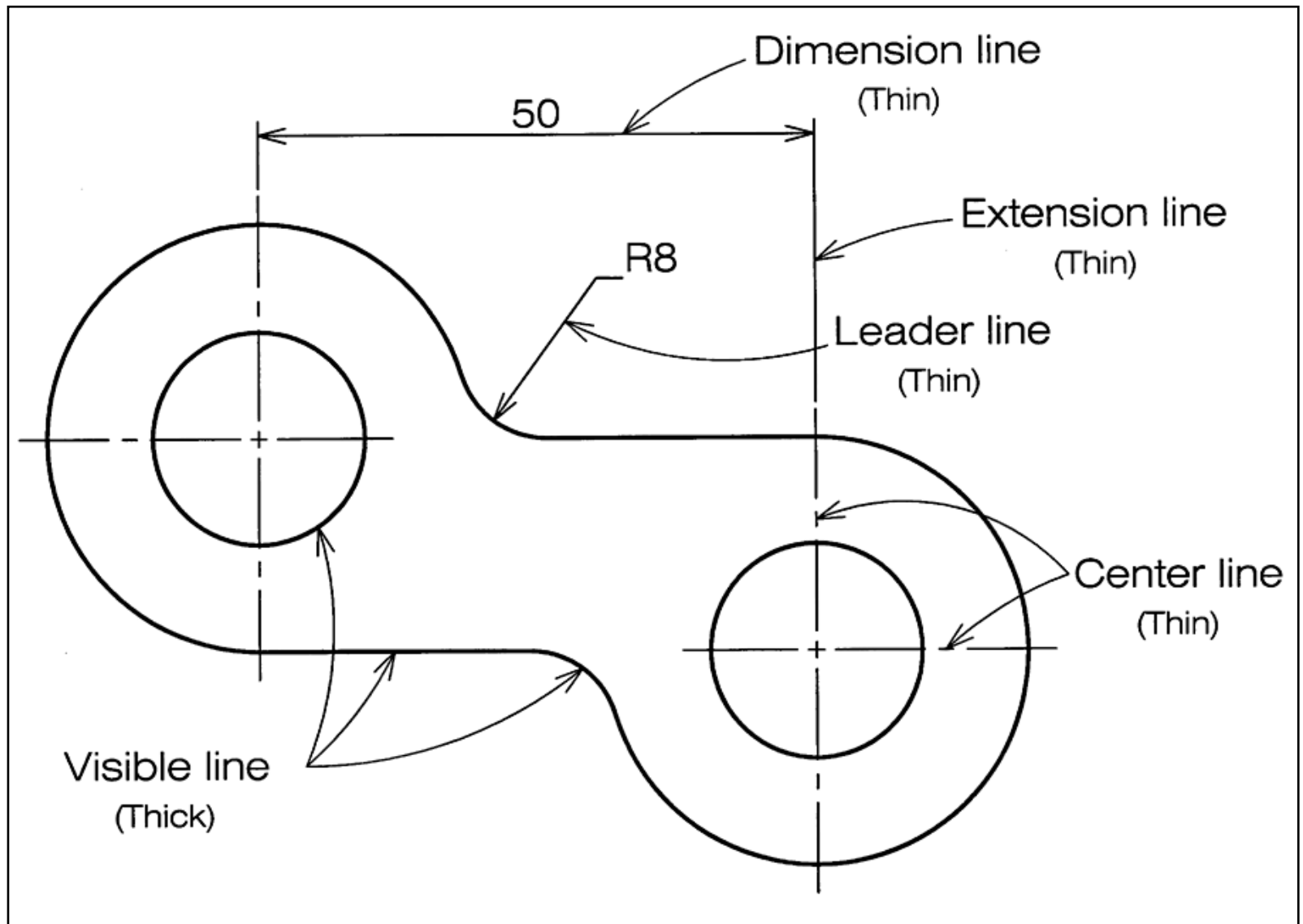
Hidden lines represent features that can not be seen in the current view

Center line represents symmetry, path of motion, centers of circles, axis of symmetrical parts

- EXAMPLES



Example



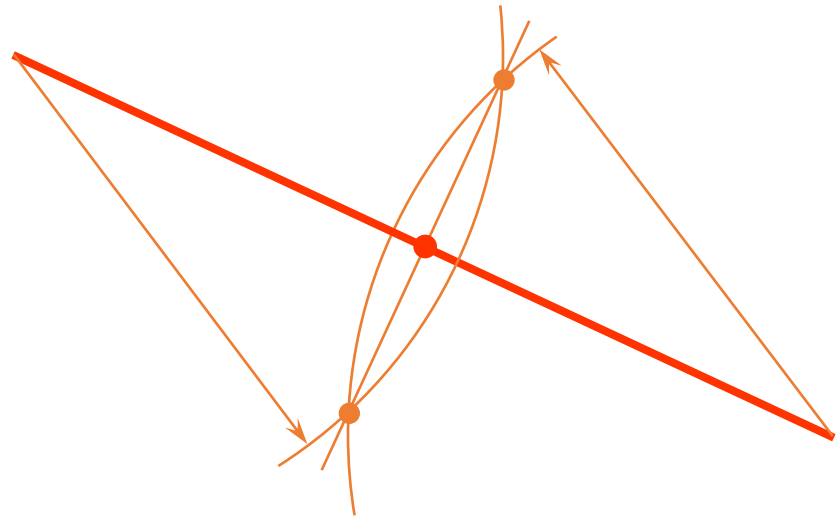
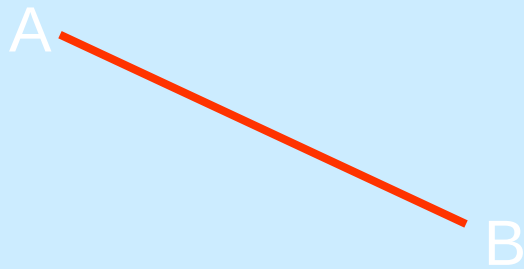


Geometrical Construction

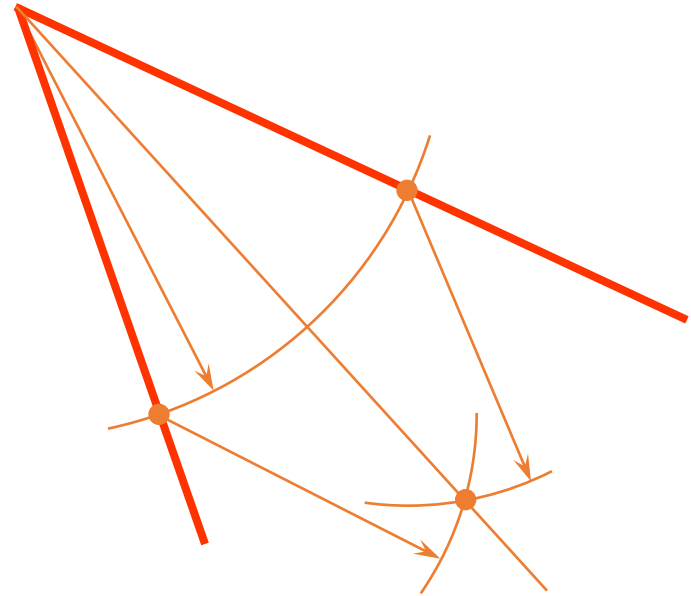
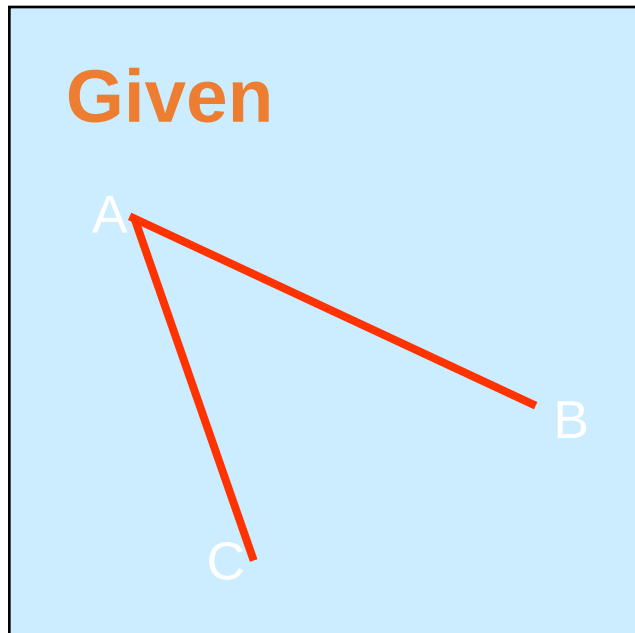


To Bisect a Line

Given

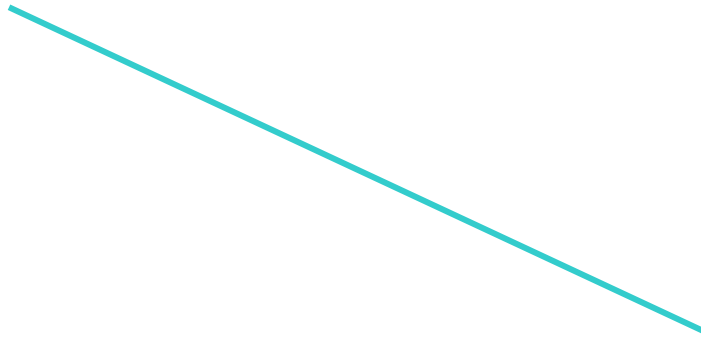


To Bisect an Angle



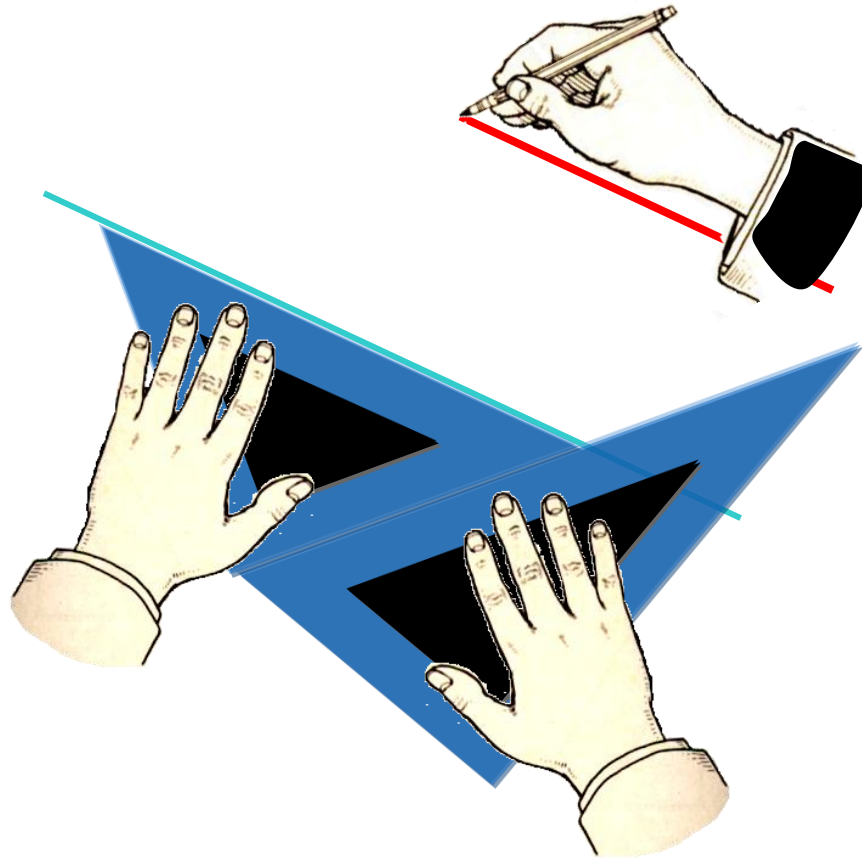
**To draw the line parallel to a given line
and passes through a given point**

Given



To draw the line parallel to a given line and passes through a given point

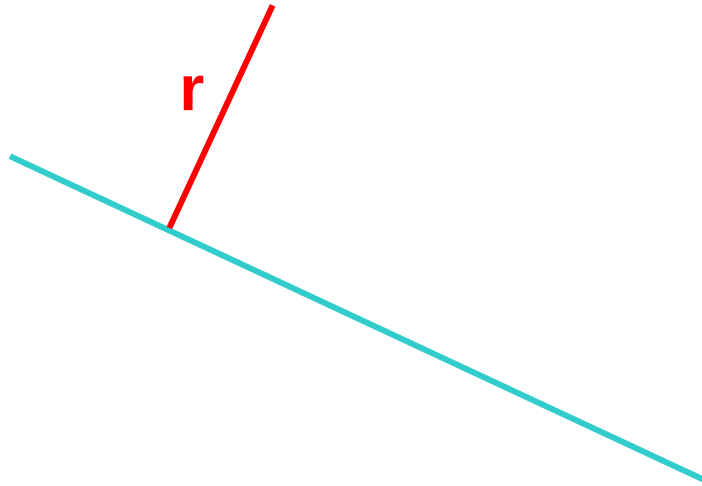
Given



Repeat

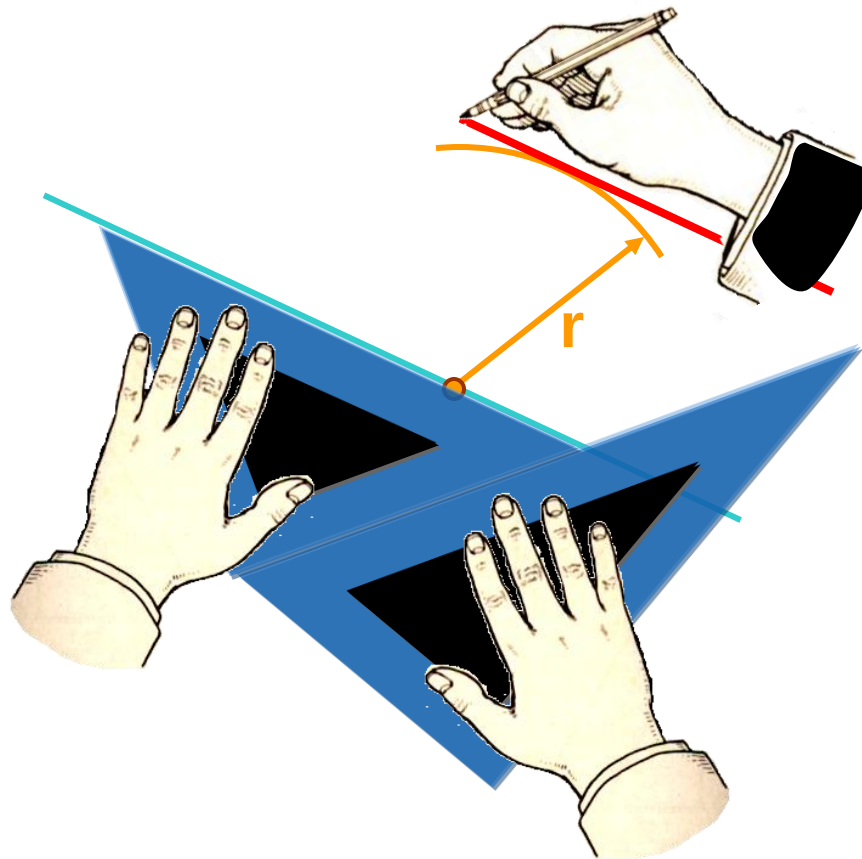
To draw the line parallel to a given line with a specified distance

Given distance = r



To draw the line parallel to a given line with a specified distance

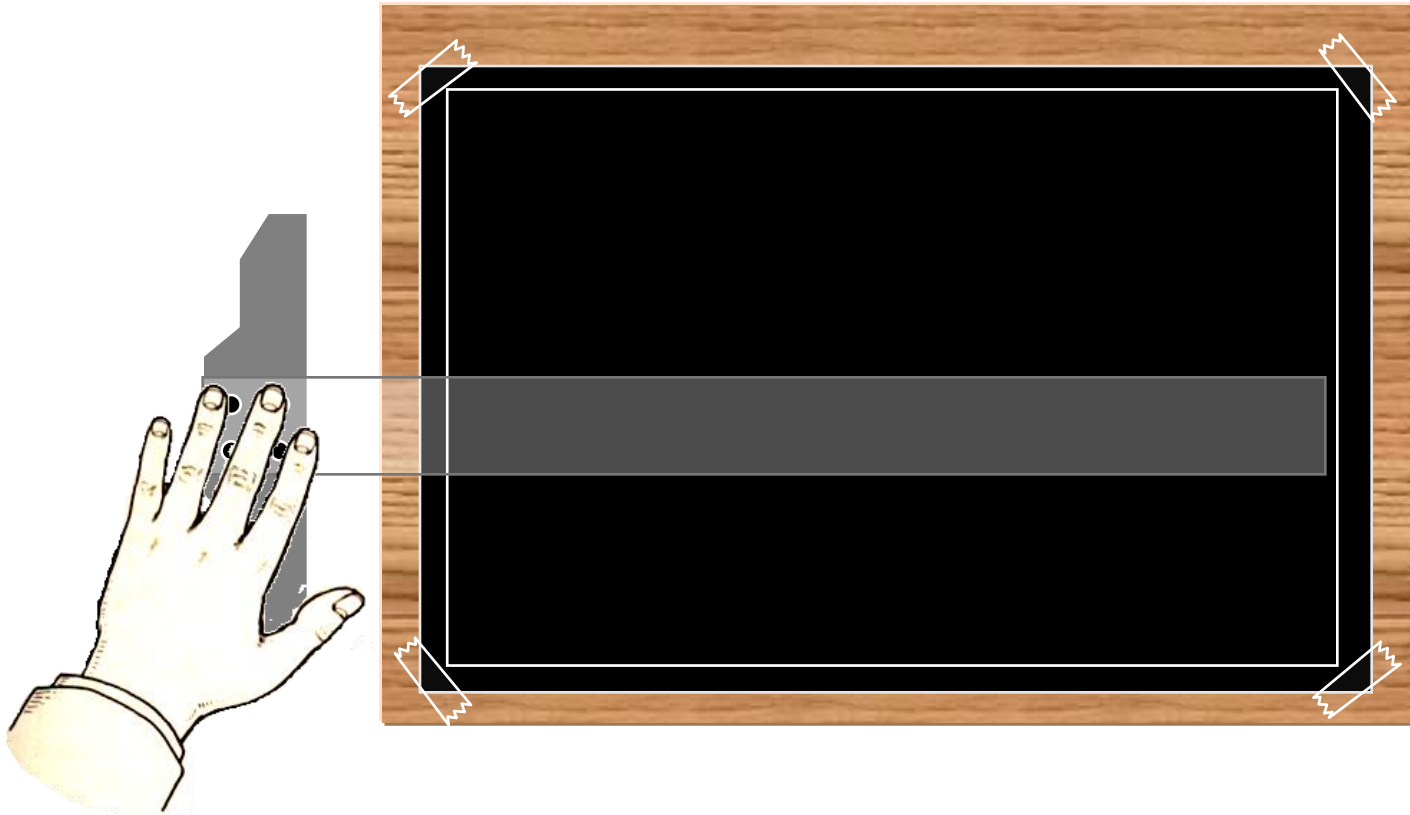
Given distance = r



Repeat

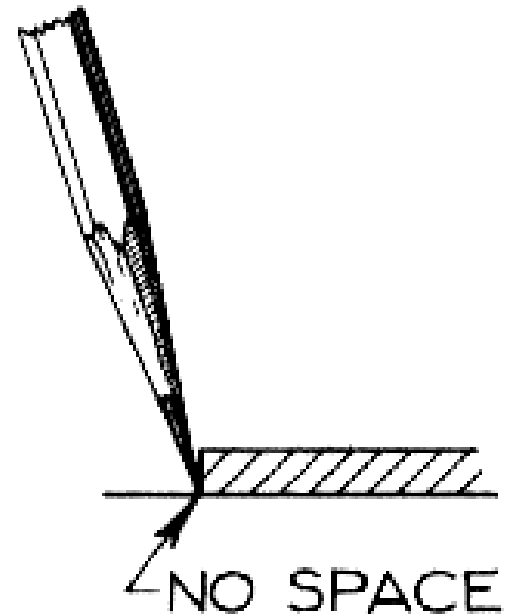
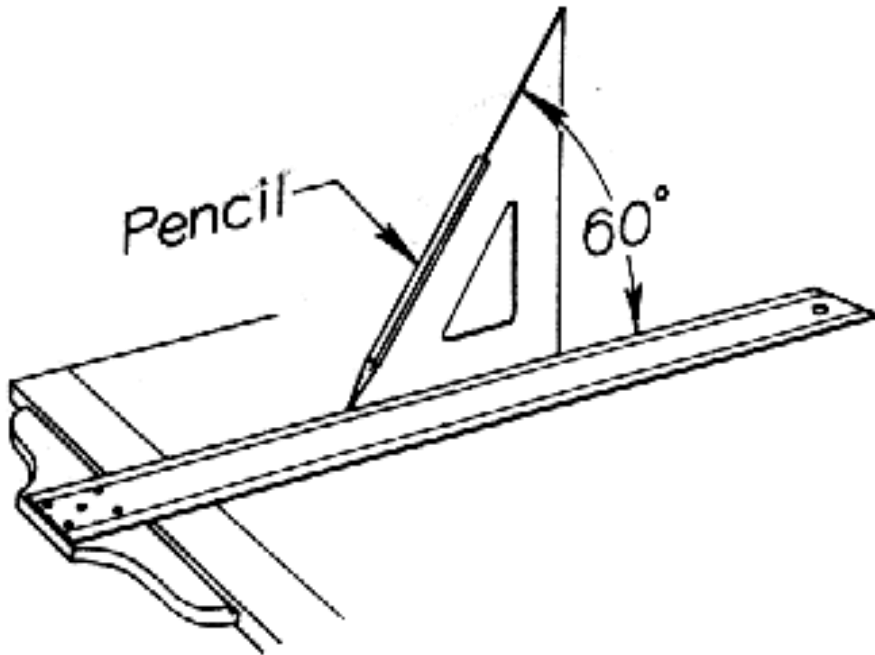
Draw a Horizontal Line

1. Press the T-square head against the left edge of the table.
2. Smooth the blade to the right.



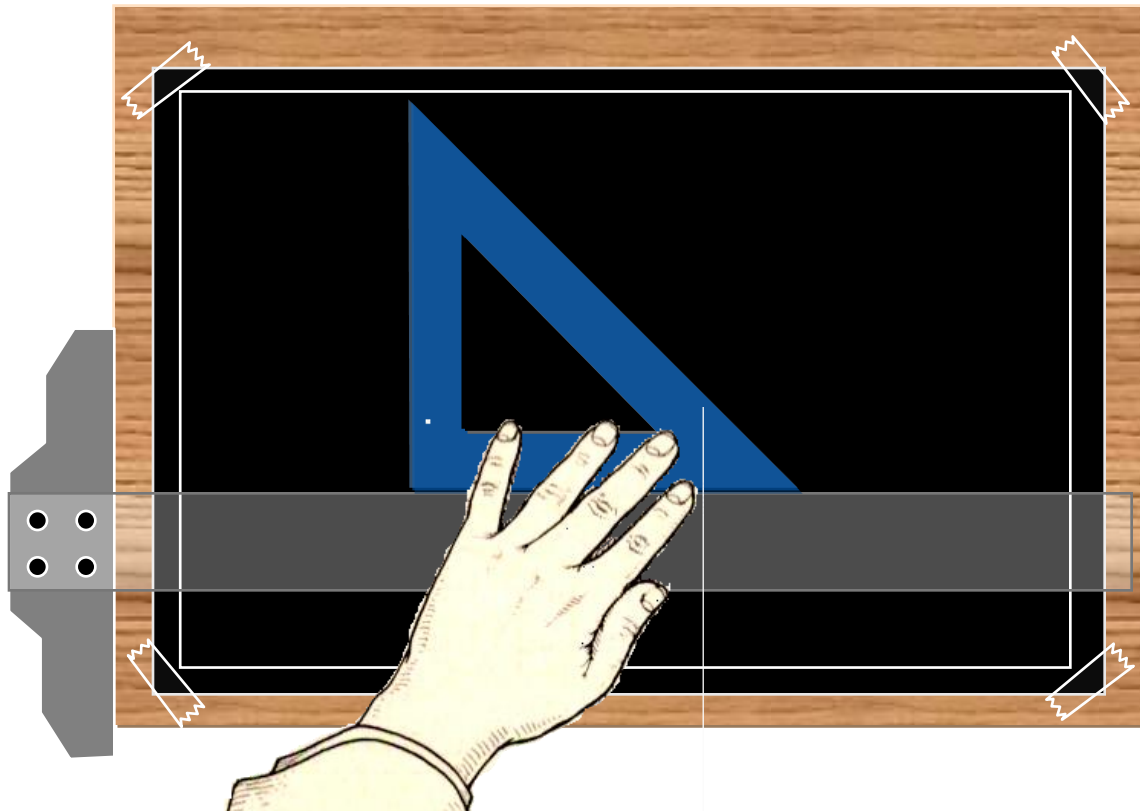
Draw a Horizontal Line

3. Lean the pencil at an angle about 60° with the paper in the direction of the line and slightly “toed in”.
4. Draw the line from left to right while **rotating the pencil slowly**.



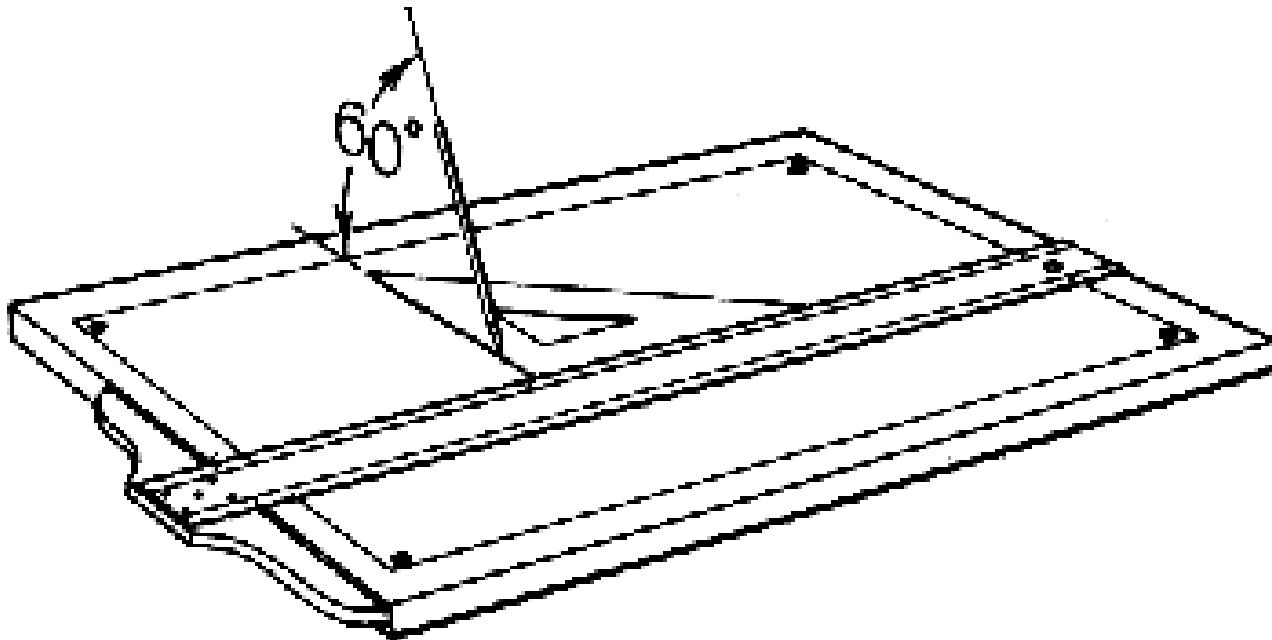
Draw a Vertical Line

1. Set T-square as before. Place any triangle on T-square edge.
2. Slide your left hand to hold both T-square and triangle in position.



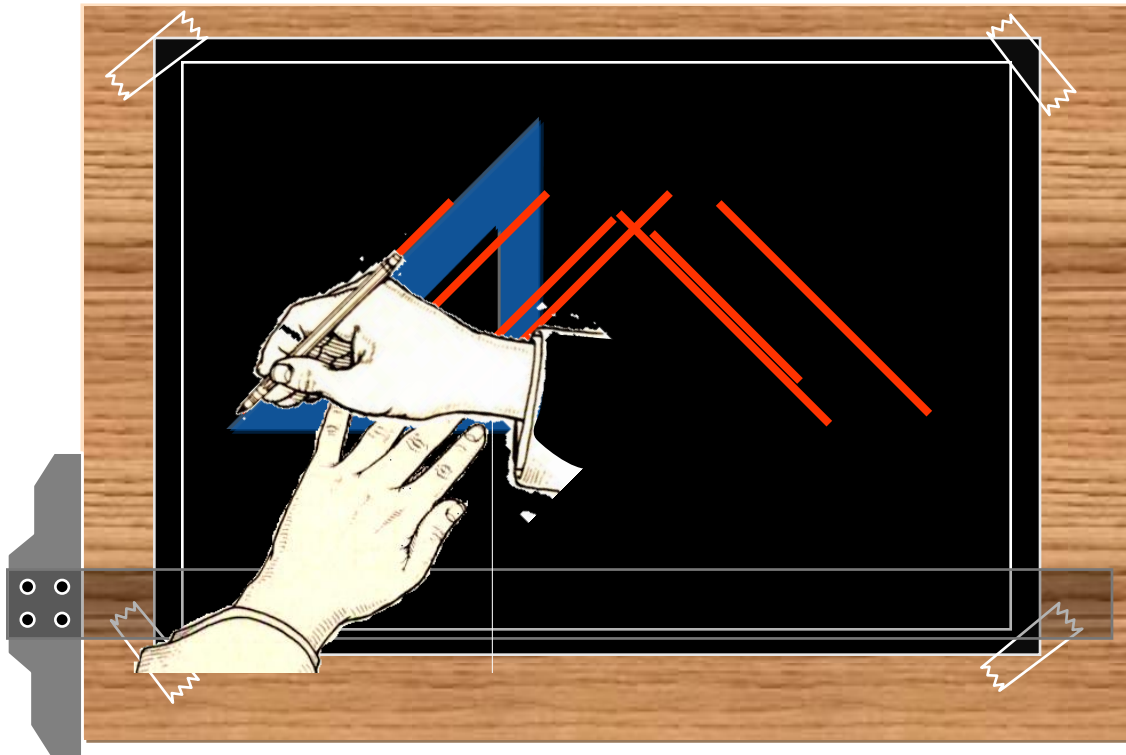
Draw a Vertical Line

3. Lean the pencil to the triangle.
4. Draw the line upward while rotating the pencil slowly.



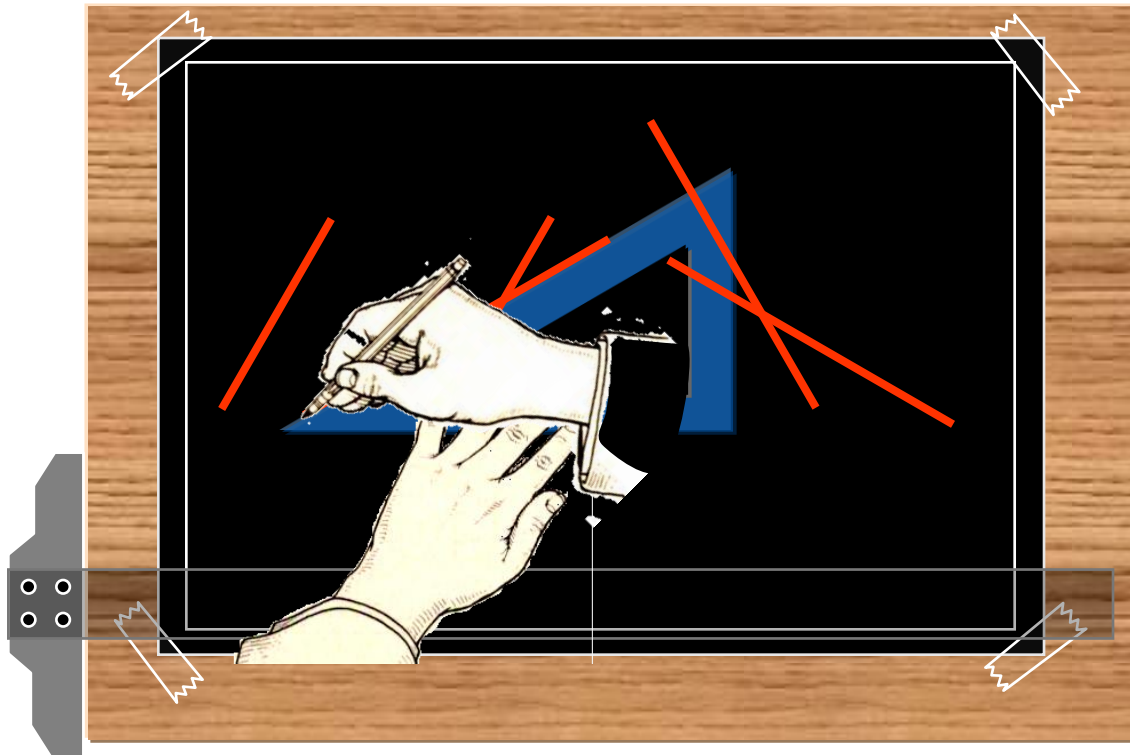
Draw a line at 45° with horizontal

1. Place 45° triangle on the T-square edge and press them firmly against the paper.
2. Draw the line in the direction as shown below.



Draw a line at angle 30° and 60°

1. Place 30°-60° triangle on the T-square edge and press them firmly against the paper.
2. Draw the line in the direction as shown below.



Draw the lines at 15° increment

0 deg.

15 deg. = $-30 + 45$ deg

30 deg.

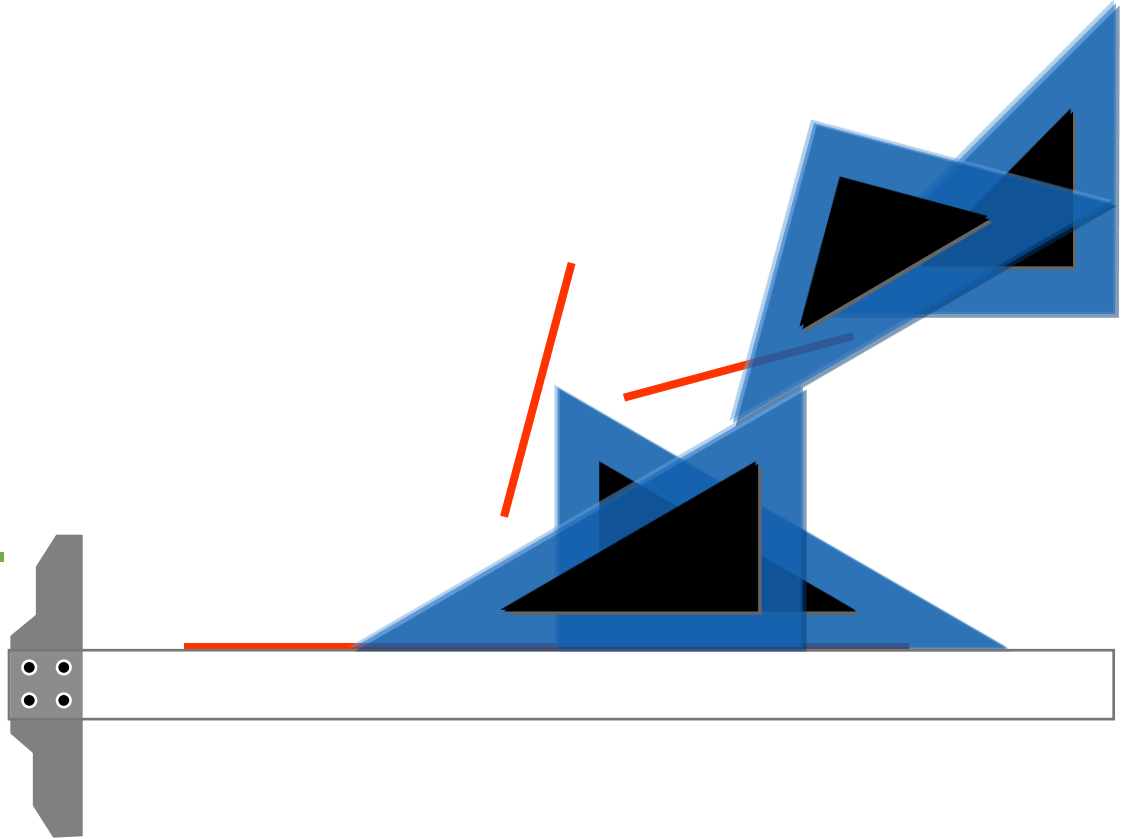
45 deg.

60 deg.

} Already
demonstrated.

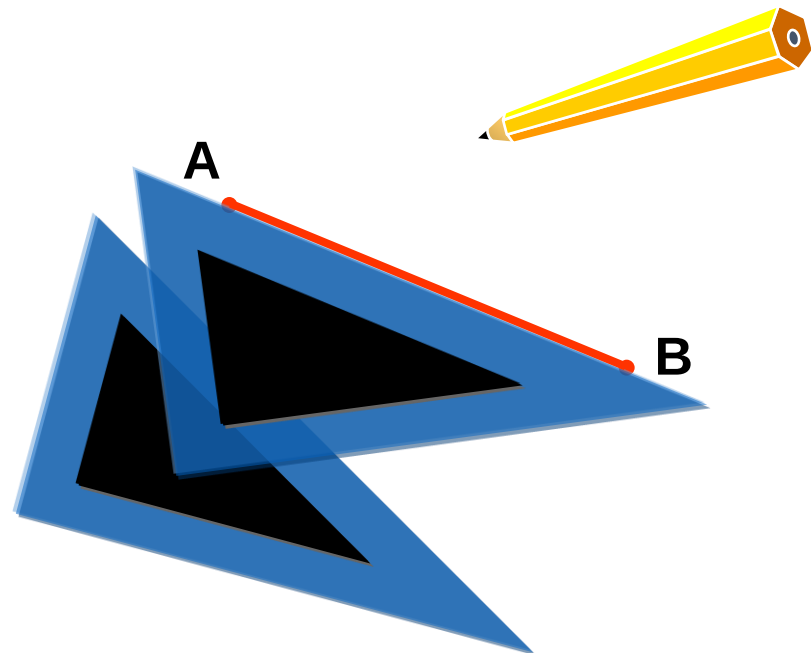
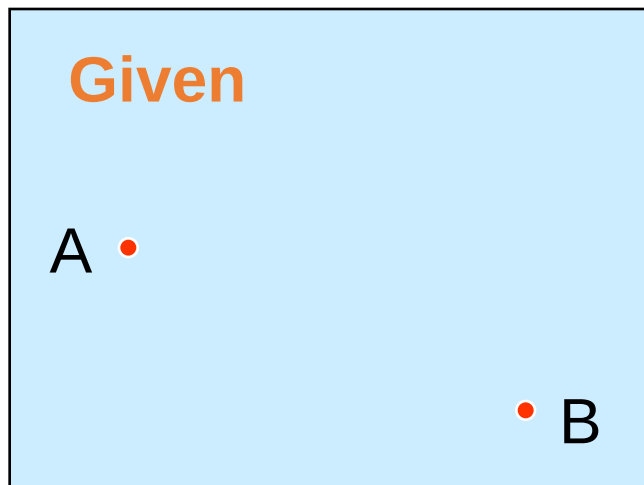
75 deg. = $30 + 45$ deg

90 deg. Already
demonstrated.



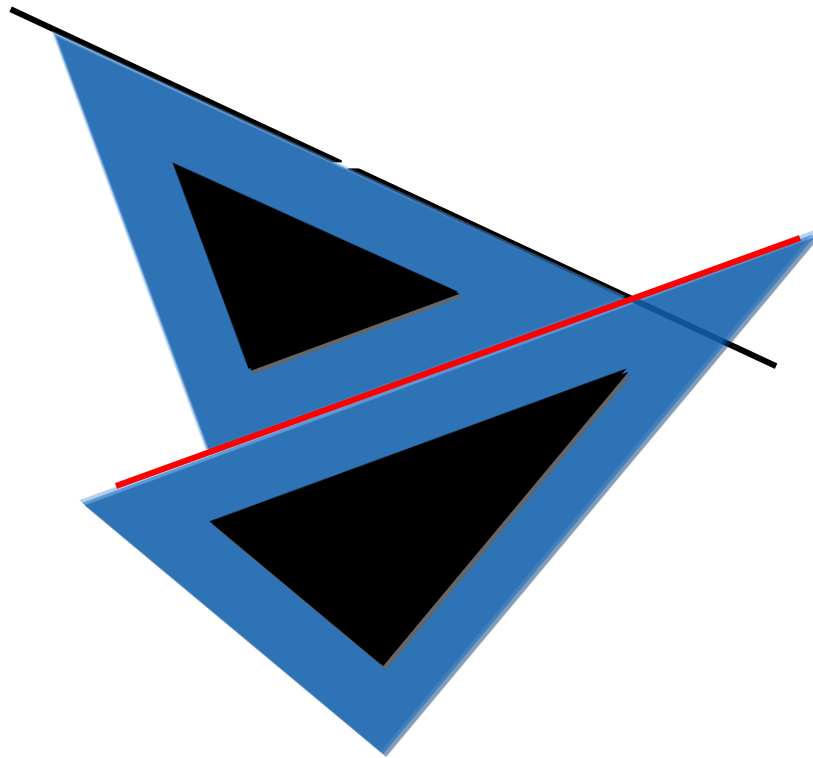
Draw the line passing through two given points

1. Place the pencil tip at one of the points.
2. Place the triangle against the pencil tip.
3. Swing the triangle around the pencil tip until its edge align with the second point.
4. Draw a line.



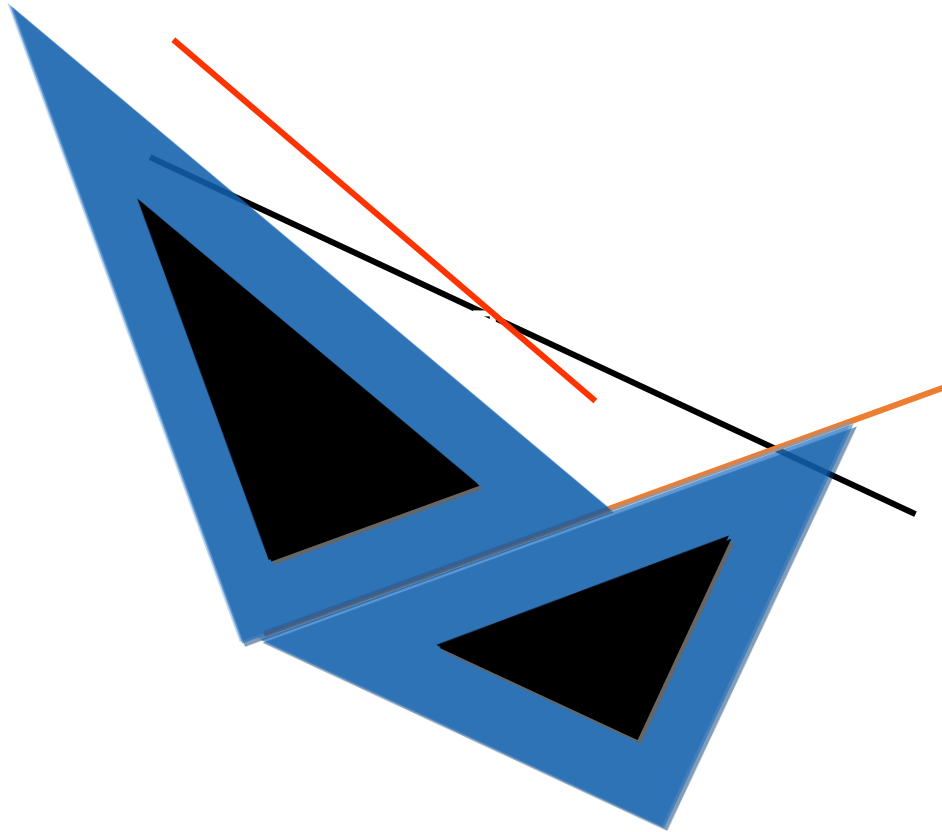
To draw a line making 15° with a given line and pass through a given point.

Given



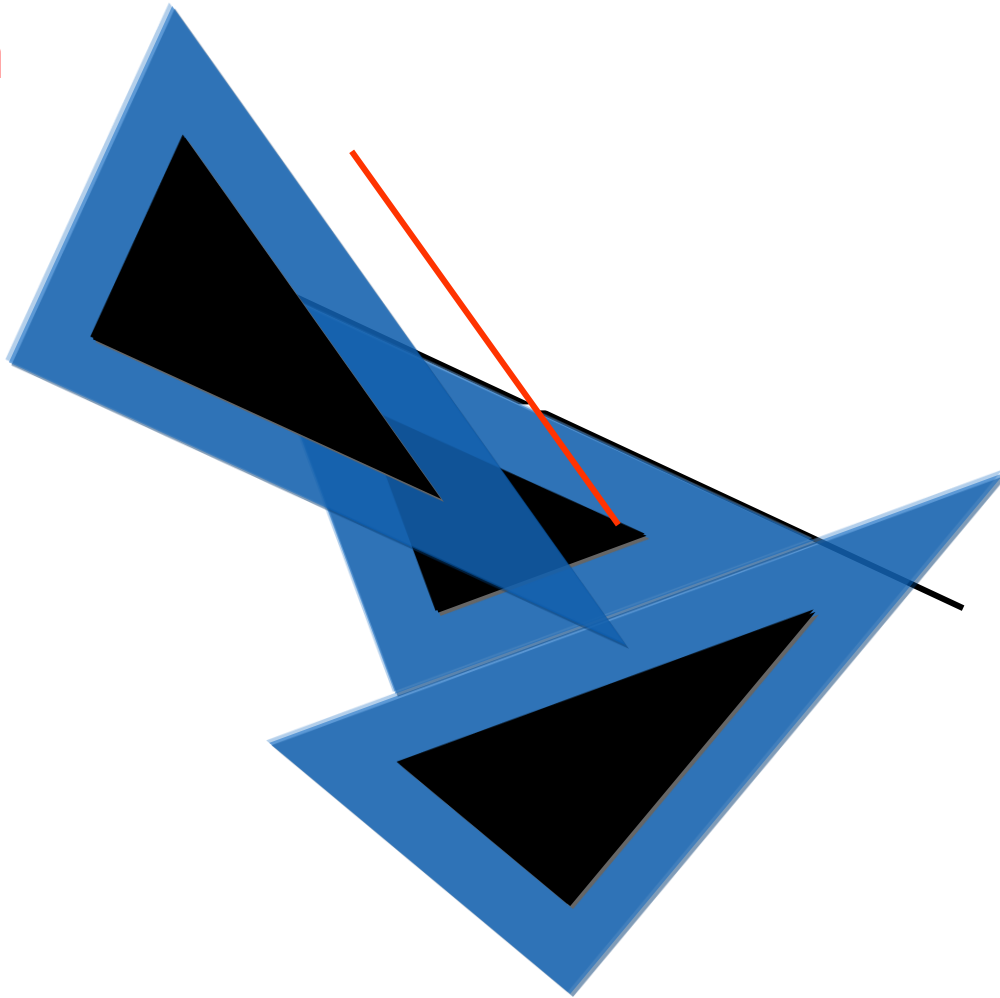
To draw a line making 15° with a given line and pass through a given point.

Given



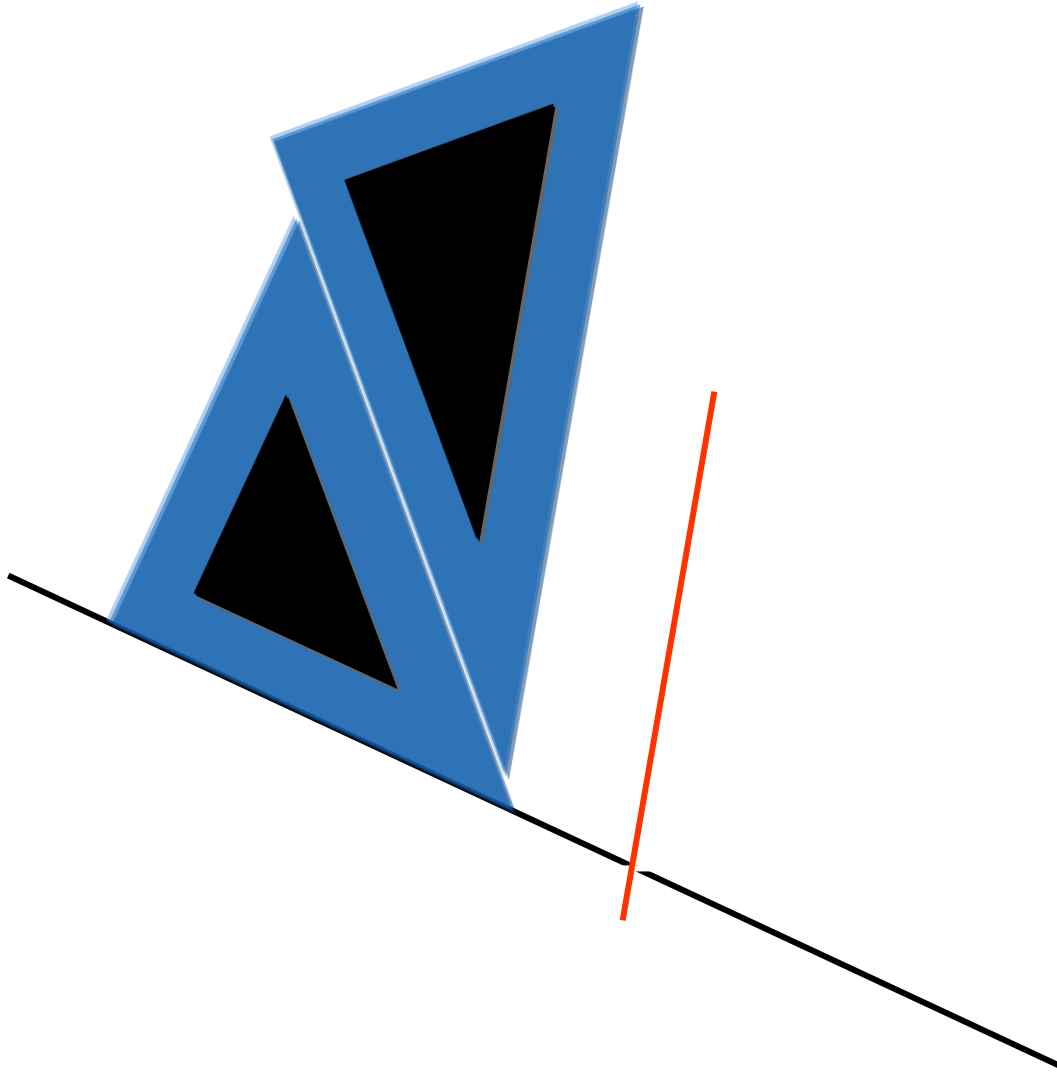
To draw a line making 30° with a given line and pass through a given point.

Given



To draw a line making 75° with a given line and pass through a given point.

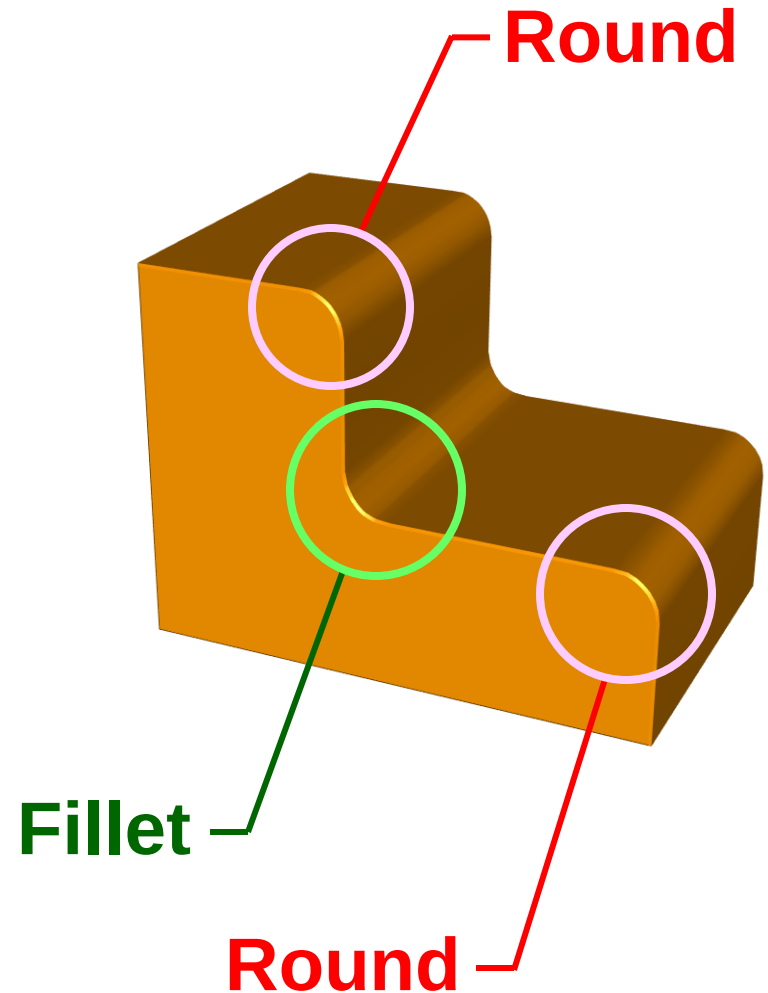
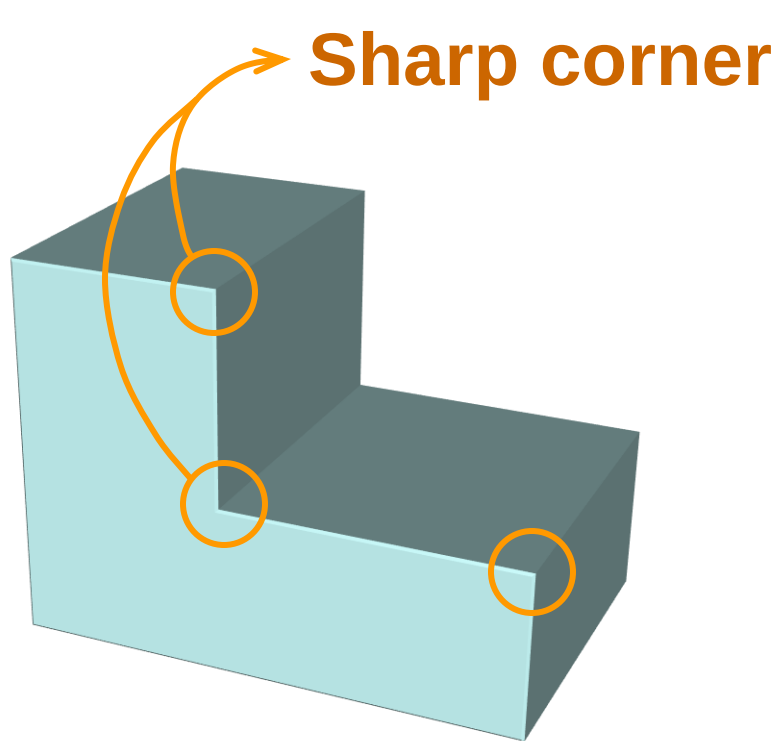
Given



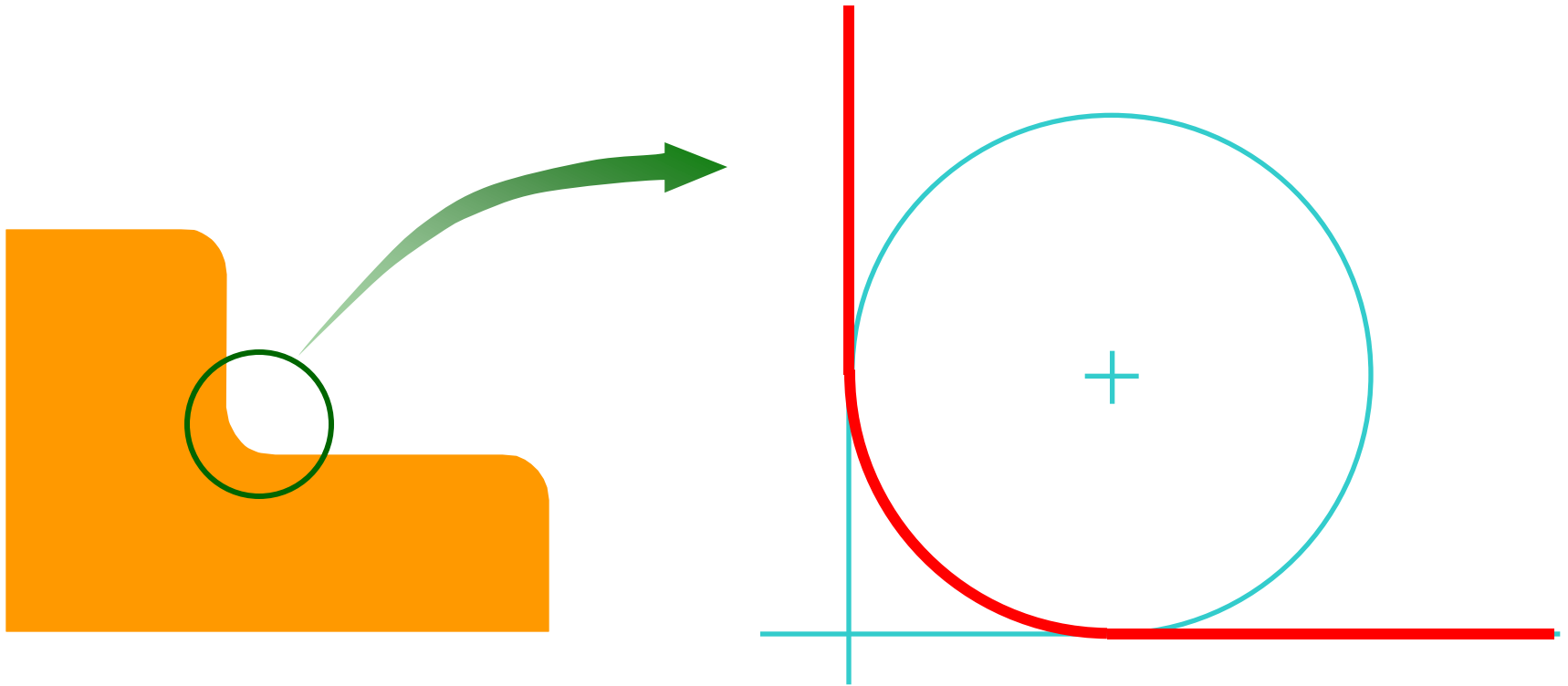
Geometric constructions



FILLET AND ROUND



FILLET AND ROUND

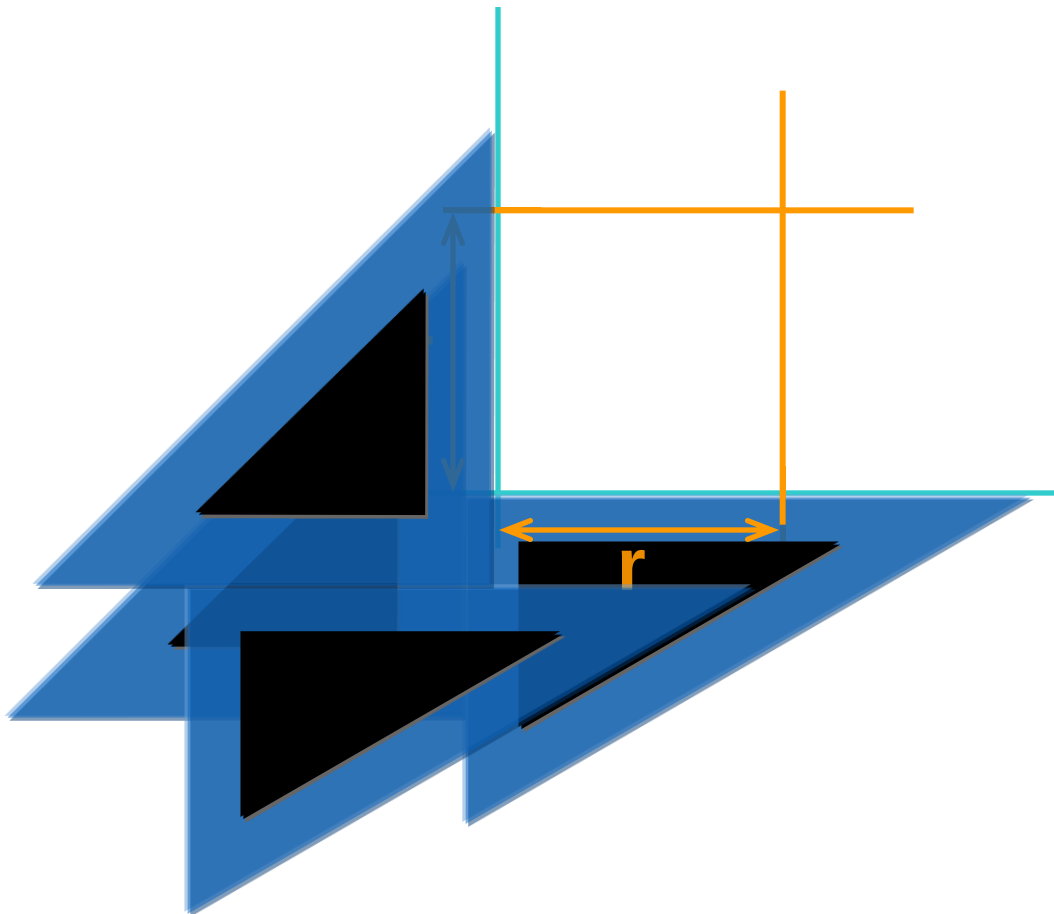


To draw the arc, we must find the location of the center of that arc.

How do we find the center of the arc?

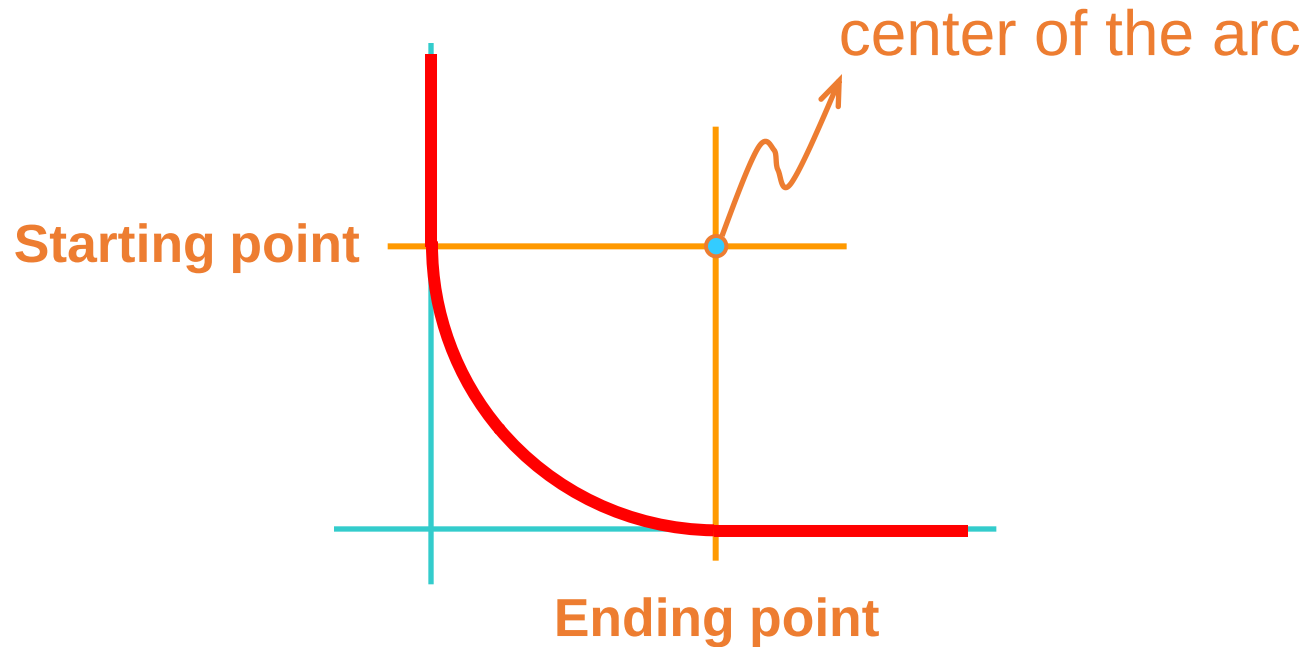
To draw an arc of given radius tangent to two perpendicular lines

Given arc radius r



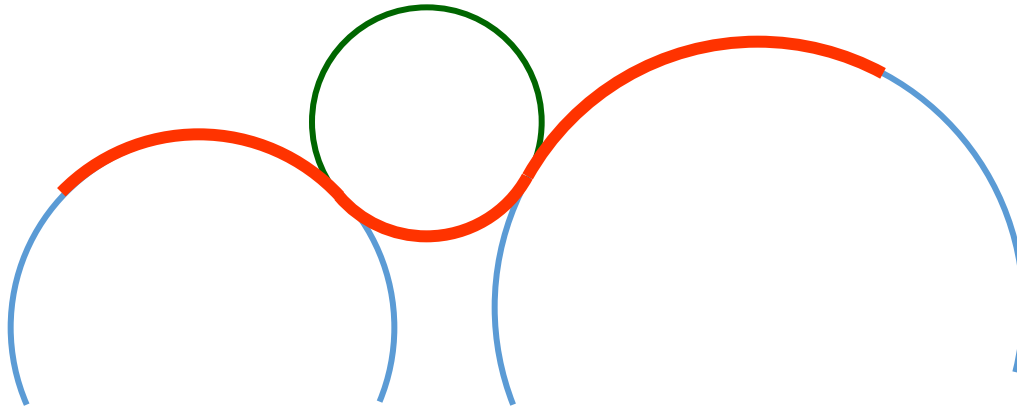
To draw an arc of given radius tangent to two perpendicular lines

Given arc radius r

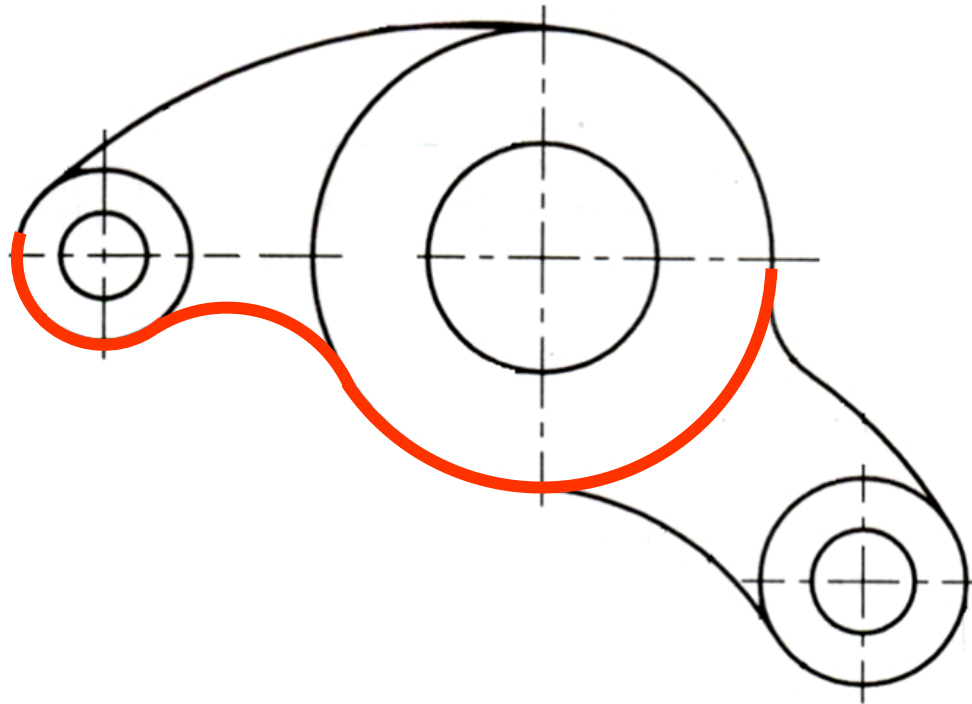


To draw a circle tangent to two circles I

Given

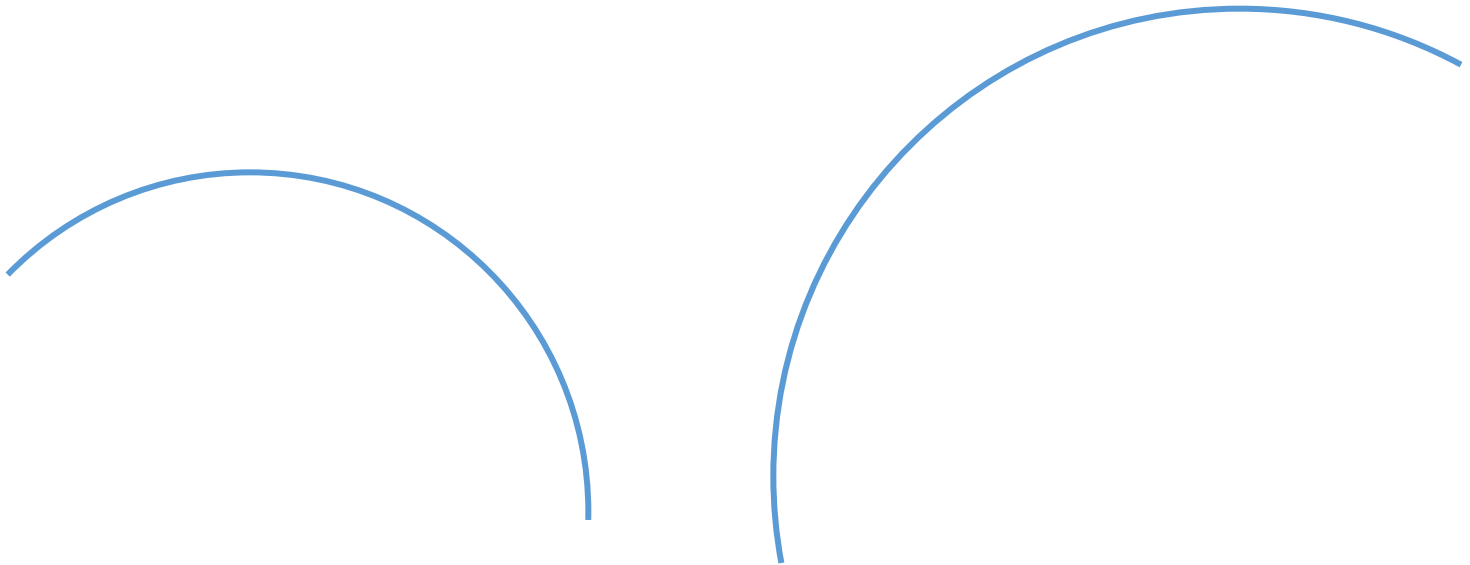


Example



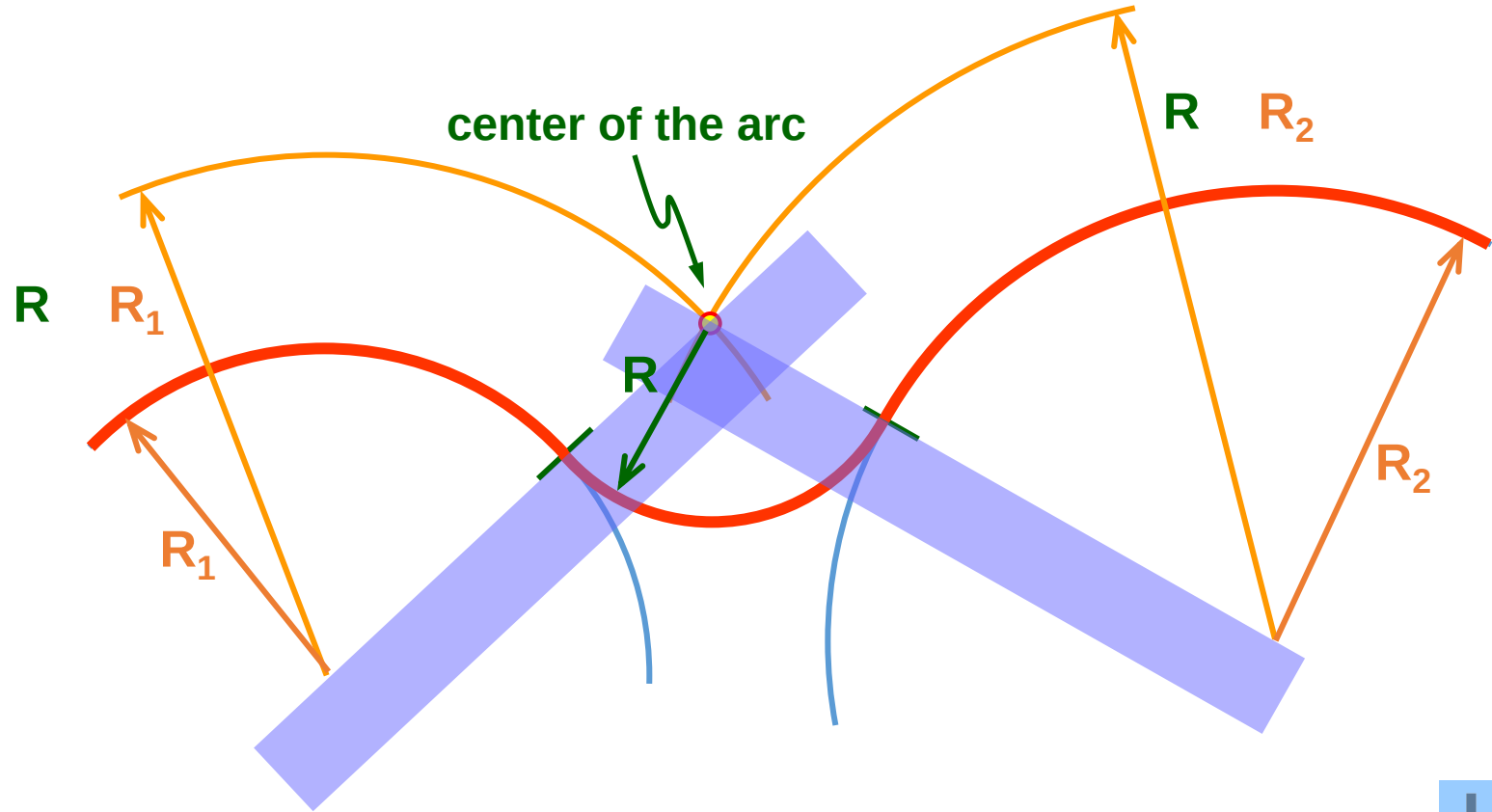
To draw a circle tangent to two circles I

Given Two circles and the radius of the third circle = R



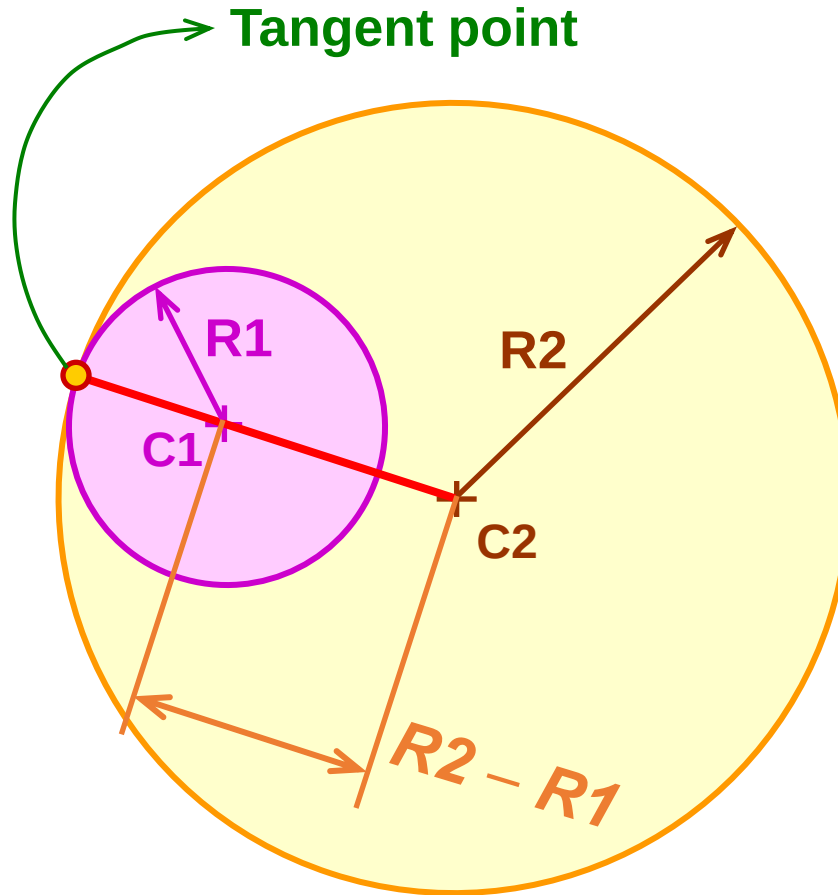
To draw a circle tangent to two circles I

Given Two circles and the radius of the third circle = R



Repeat

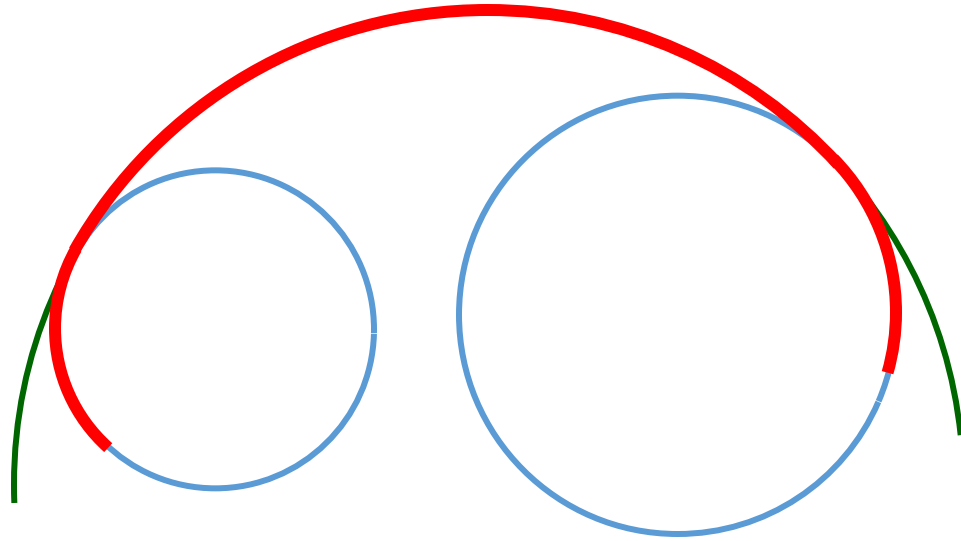
When circle tangent to other circle



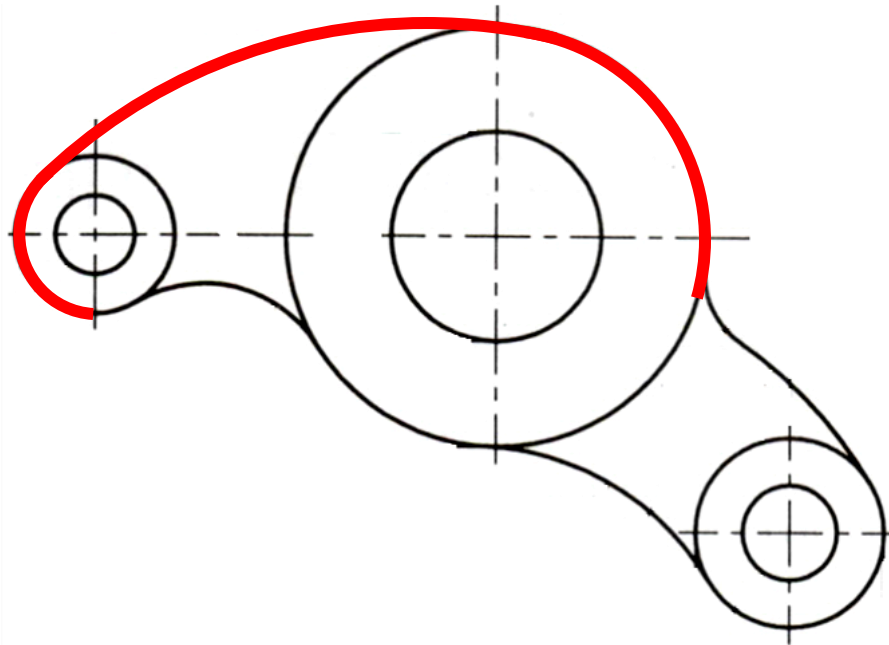
The center of two circles and tangent point must lie on the same straight line !!!

To draw a circle tangent to two circles II

Given

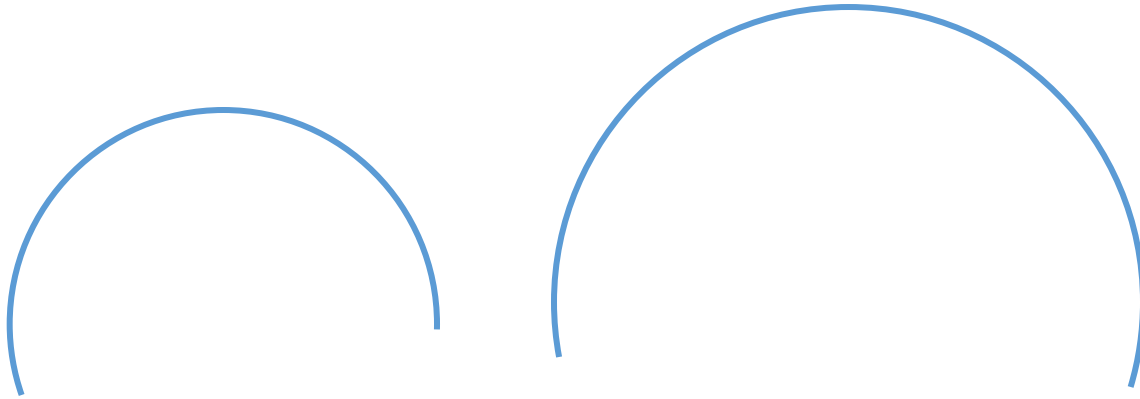


Example



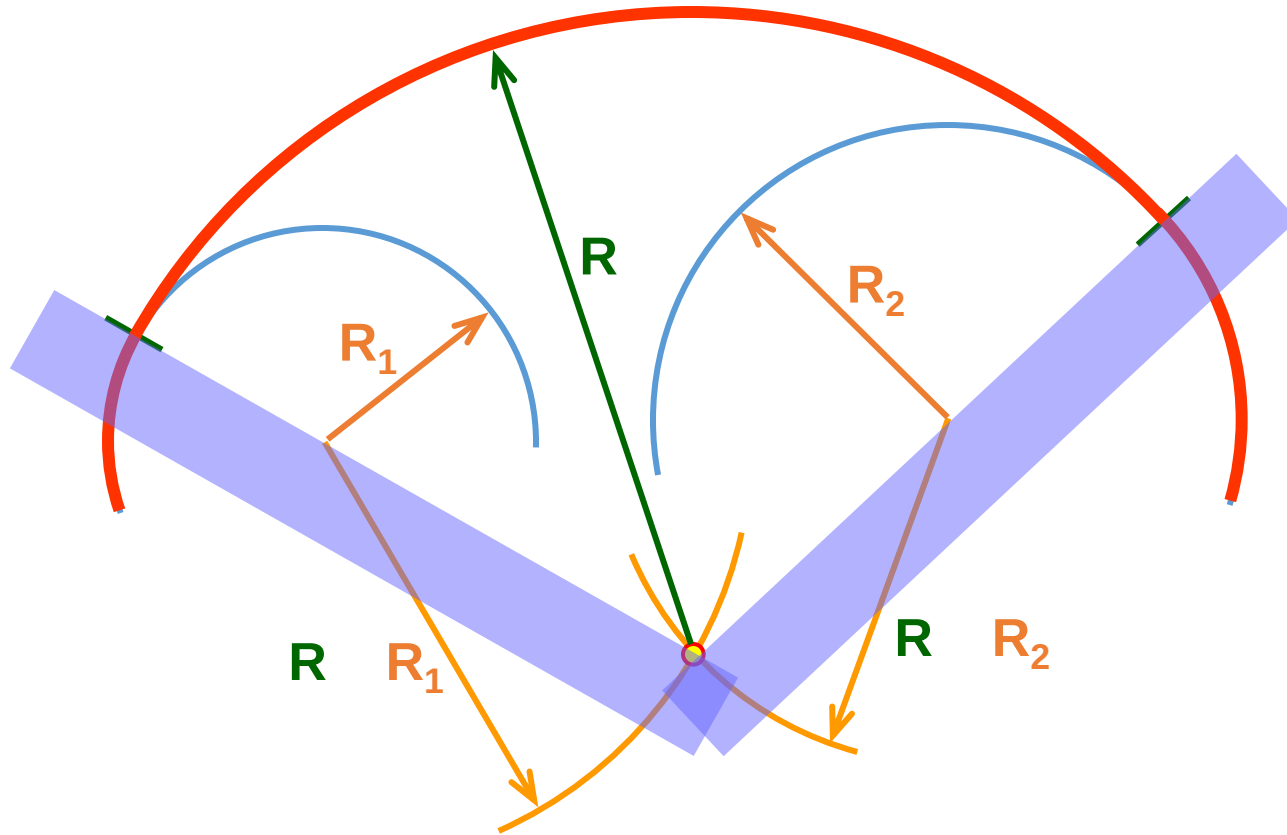
To draw a circle tangent to two circles II

Given Two circles and the radius of the third circle = R



To draw a circle tangent to two circles II

Given Two circles and the radius of the third circle = R



Repeat

To draw a circle tangent to two circles III

Given Two circles and the radius of the third circle = R

