1.5 ARCHITECTURAL DRAWING-I

UNIT I

Introduction to the Studio Environment

i) Basics of drafting instruments, starting off
ii) Basics of stationery (Pencils, sharpening, types of sheets, erasers, cutter etc.)
iii) Demonstration by the teacher on holding pencils, fixing parallel bar and handling other tools and equipment used in Architectural Drawing(Demonstration sheet to be put up for better understanding)

UNIT II

Line Work

1. Basic line work, with different pencil thickness & intensities H, HB, 2B, 4B, 6B
   i) Horizontallines
   ii) Vertical lines
   iii) Grid
   iv) Diagonal lines
   v) Composition, pattern making in line work

   (Using different grades of pencils to understand the tonal variation)
2. Lettering using different pencils & pens ,stencils(4 sheets) Different styles, heights &intensities
3. Introduction to Scale (1sheet)

Use of the modular scale - both metric system and FPS

UNIT III

4. Geometric Shapes (Plan, elevation etc.) (2sheets)
i) Simple geometric (cubes, cylinder, cones etc.)
ii) Complex(fusion of the basic shapes (Incorporating he use of scale both feet &metric)
5. Dimensioning (2 Sheets)
i) Elements of dimensioning
ii) Methods of dimensioning
iii) Arrangements of dimensions
iv) Symbols for shape indication

UNIT IV

6. Orthographic Projections (Introduction to Planes) (2sheets)
i) Protection of points
ii) Projections of lines
iii) Projection of solids
7. Section of Solids (4sheets)

Simple geometrical shapes e.g. cube: Elementary building sections highlighting line intensities for sectional and elevation components. (Example: parapet, chajj as in section and elevation behind)

8. Development of surface (1sheet)
Development with an aim to calculate areas if required

UNIT V

9. Isometric Views (3sheets)

Conversion of 2D geometrical shapes into 3D isometric views (30to realize the potential of each

Drawing

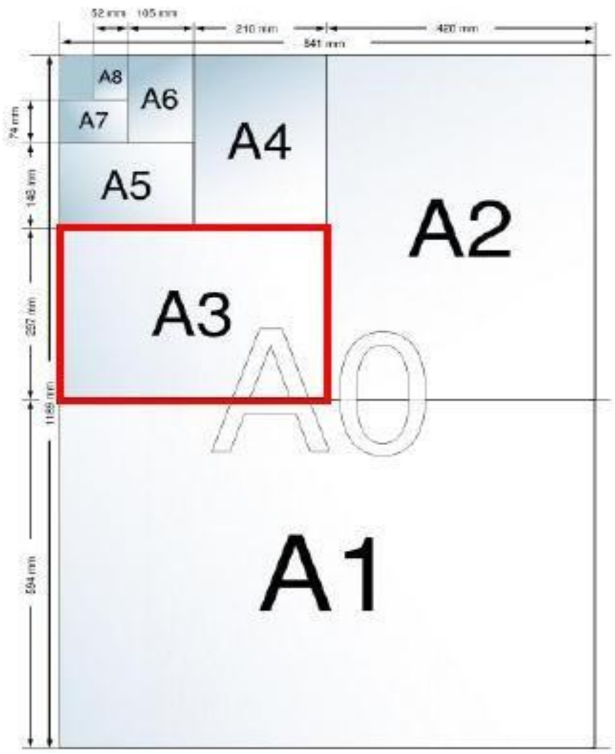
A drawing is a graphic representation of an object, or a part of it, and is the result of creative thought by an engineer or technician. When one person sketches a rough map in giving direction to another, this is graphic communication. Graphic communication involves using visual materials to relate ideas. Drawings, photographs, slides, transparencies, and sketches are all forms of graphic communication. Any medium that uses a graphic image to aid in conveying a message, instructions, or an idea is involved in graphic communication.

Engineering drawing:

The engineering drawing, on the other hand, is not subtle, or abstract. It does not require an understanding of its creator, only an understanding of engineering drawings. An engineering drawing is a means of clearly and concisely communicating all of the information necessary to transform an idea or a concept in to reality. Therefore, an engineering drawing often contains more than just a graphic representation of its subject. It also contains dimensions, notes and specifications.

Drawing Sheets

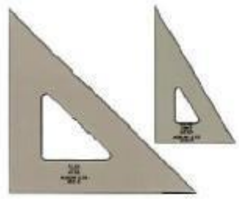
A Series Formats (mm)	
A0	841 × 1189
A1	594 × 841
A2	420 × 594
A3	297 × 420
A4	210 × 297
A5	148 × 210
A6	105 × 148
A7	74 × 105



Drawing Tools:

DRAWING TOOLS

DRAWING TOOLS



1. T-Square

2. Triangles

DRAWING TOOLS

3. Adhesive Tape

4. Pencils

DRAWING TOOLS

5. Sandpaper

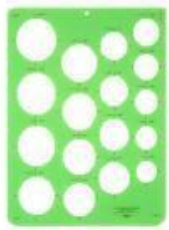
6. Compass

DRAWING TOOLS

7. Pencil Eraser

8. Erasing Shield

DRAWING TOOLS



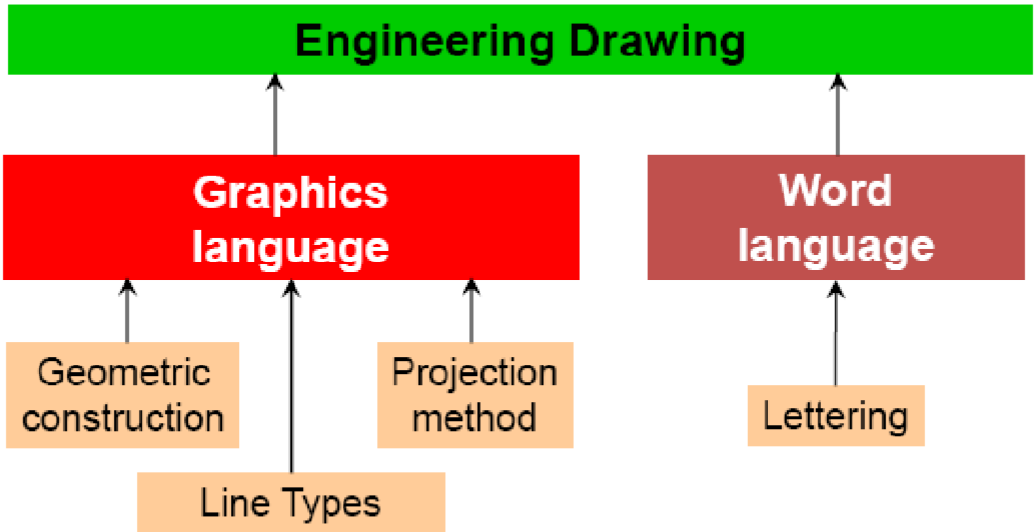
9. Circle Template

10. Tissue paper

DRAWING TOOLS

11. Sharpener

12. Clean paper



Lettering in Engineering Drawing

Lettering is used to provide easy to read and understand information to supplement a drawing in the form of notes and annotations. Lettering is an essential element in both traditional drawing and Computer Aided Design (CAD) drawing. Thus, it must be written with:

Legibility – shape & space between letters and words.
Uniformity – size & line thickness.

Types of Lettering

The two types of lettering are:

1. Double Stroke Lettering: In Double Stroke Lettering the line width is greater than that of
Single Stroke Lettering.
Double Stroke Lettering is further divided into:
a) Double Stroke Vertical Gothic Lettering.
b) Double Stroke Inclined Gothic Lettering.
A stencil is mostly used when hand drawing double stroked letters.

2. Single Stroke Lettering: Thickness in single stroke lettering is obtained by a single stroke of pencil or ink pen. It is further divided into:
(a) Single Stroke Vertical Gothic Lettering.
(b) Single Stroke Inclined Gothic Lettering.

Conventions for Lettering

◎ Use all **CAPITAL LETTERS.**

- Use *even pressure* to draw **precise, clean lines**.
- Use *one stroke* per line.
- **Horizontal Strokes** are drawn *left to right*.
- **Vertical Strokes** are drawn *downward*.
- **Curved strokes** are drawn *top to bottom* in one continuous stroke on each side.
- Use The *Single-stroke, Gothic Style of Lettering*.
- Always *Skip A Space* between **Rows Of Letters**.
- Always Use *Very Light Guide Lines*.
- **Fractions** Are Lettered *Twice the Height Of Normal Letters*.
- **Fraction Bars** Are Always *Drawn Horizontal*.
- Use a *Medium Lead* For *Normal Lettering.*
- Use a *Hard Lead* For Drawing *Guide Lines*.

Placement of Text on Engineering Drawings

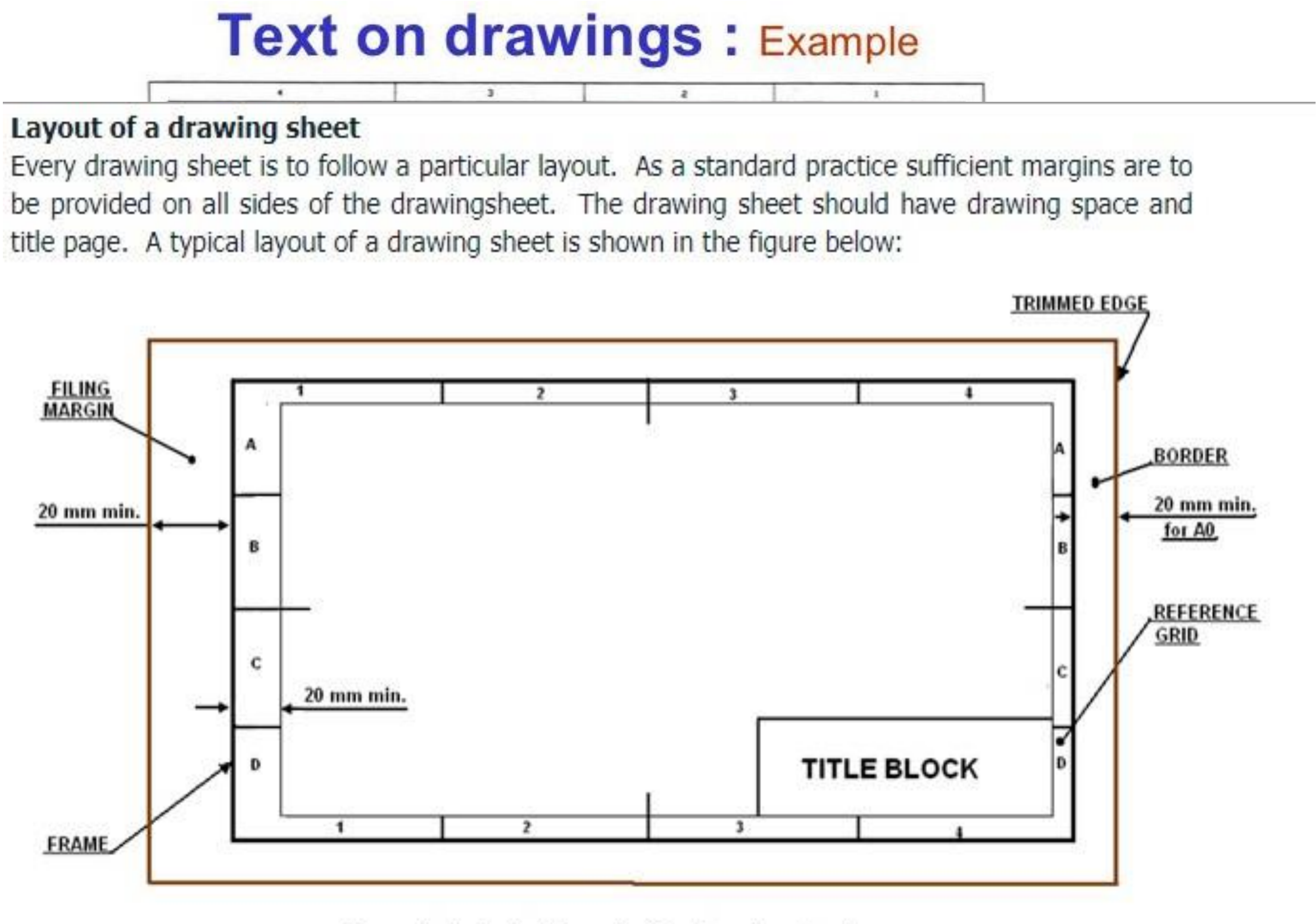
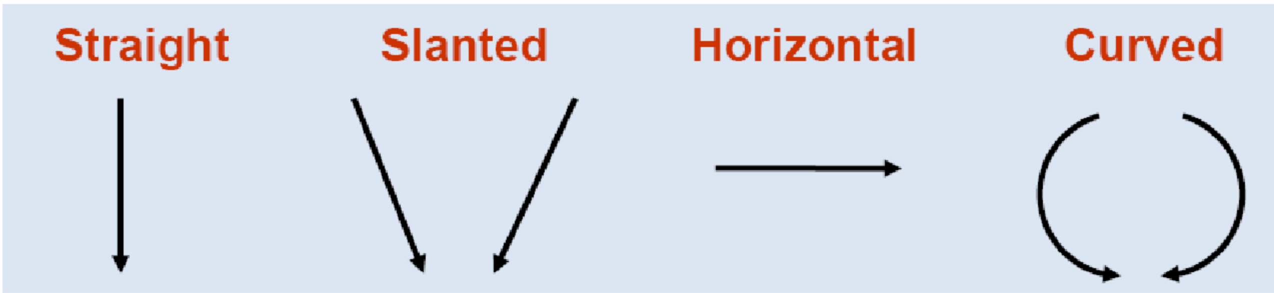
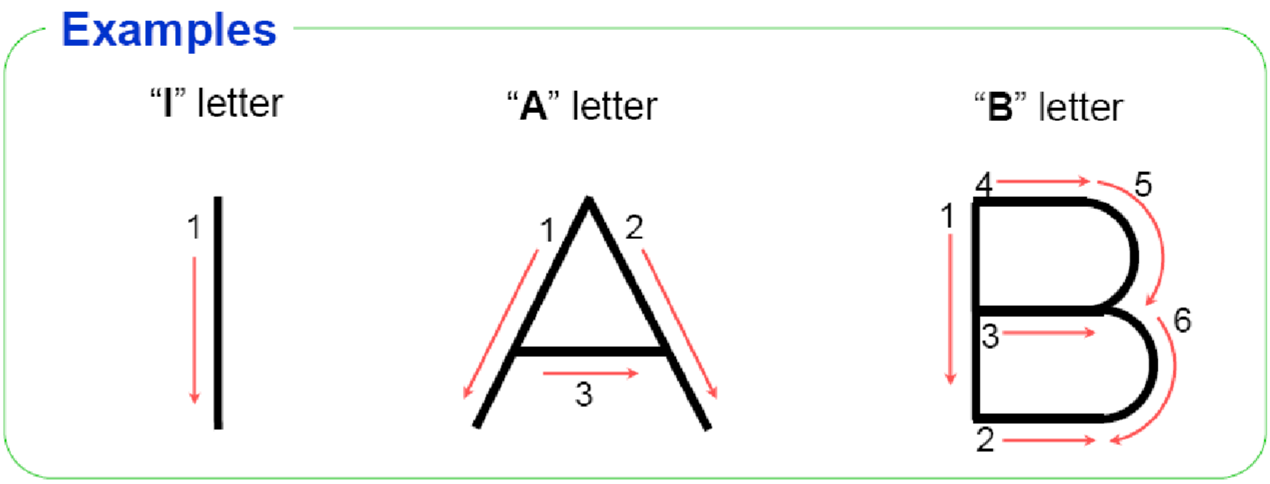


Figure 1. A typical layout of a drawing sheet.

Basics of Single Stroking



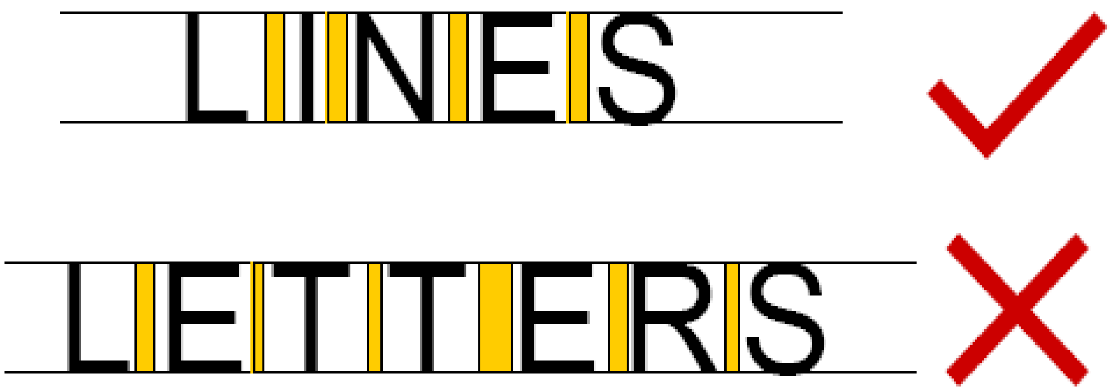


Spacing

Uniformity in spacing of letters is a matter of equalizing spaces by eye.

◎ The background area between letters, not the distance between them, should be approximately equal.

◎ Words are spaced well apart, but letters within words should be spaced closely.



SCALE

A scale is defined as the ratio of the linear dimensions of the object as represented in a drawing to the actual dimensions of the same.

Necessity

- **Drawings drawn with the same size as the objects are called full sized drawing.**

- **It is not convenient, always, to draw drawings of the object to its actual size. e.g. Buildings, Heavy machines, Bridges, Watches, Electronic devices etc.**

- **Hence scales are used to prepare drawing at**
    - **Full size**
    - **Reduced size**
    - **Enlarged size**

BIS Recommended Scales

Reducing scales **1:Y (Y>1)**	**1:2** **1:20** **1:200** **1:2000**	**1:5** **1:50** **1:500** **1:5000**	**1:10** **1:100** **1:1000** **1:10000**
Enlarging scales **X:1 (X>1)**	**50:1** **5:1**	**20:1** **2:1**	**10:1**
Full size scales			**1:1**

Intermediate scales can be used in exceptional cases where recommended scales can not be applied for functional reasons.

Types of Scale

- ***Engineers Scale :***

  The relation between the dimension on the drawing and the actual dimension of the object is mentioned numerically (like 10 mm = 15 m).

- ***Graphical Scale*:**

  Scale is drawn on the drawing itself. This takes care of the shrinkage of the engineer's scale when the drawing becomes old.

Types of Graphical Scale

- **Plain Scale**
- **Diagonal Scale**
- **Vernier Scale**
- **Comparative scale**

Representative fraction (R.F.)

$$R.F. = \frac{\text{Length of an object on the drawing}}{\text{Actual Length of the object}}$$

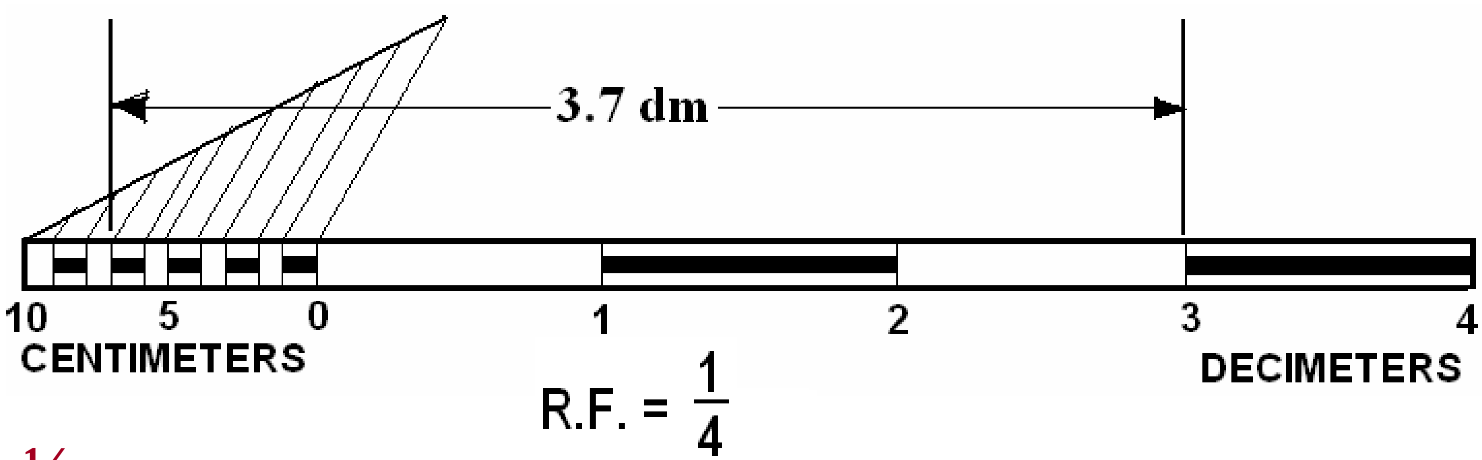
When a 1 cm long line in a drawing represents 1 meter length of the object,

$$R.F = \frac{1cm}{1m} = \frac{1cm}{1x\,100\,cm} = \frac{1}{100}$$

Plain scale

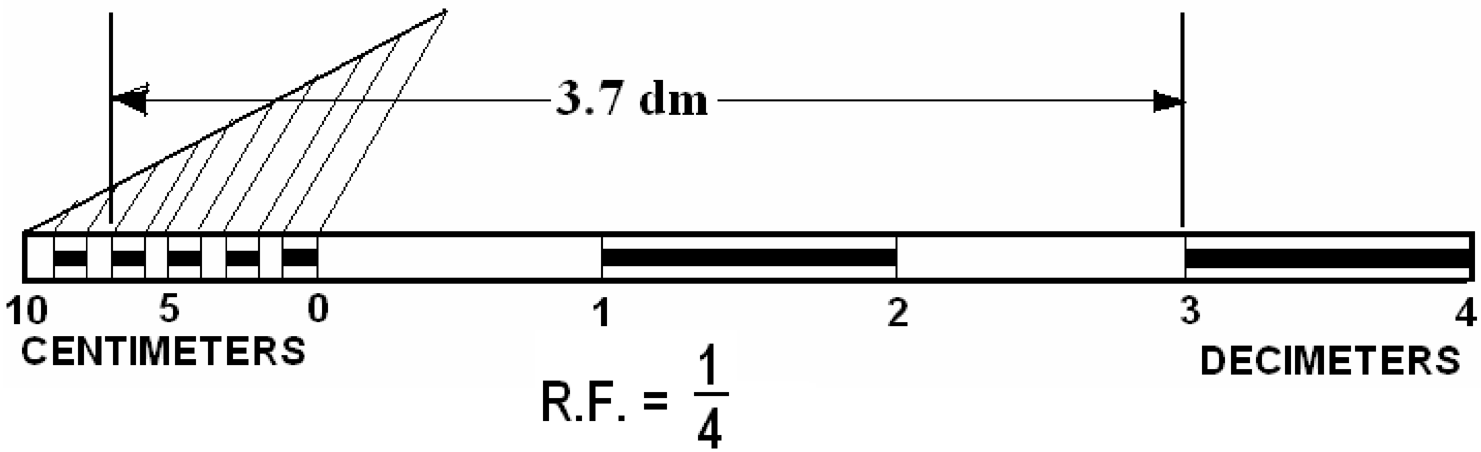
- A plain scale consists of a line divided into suitable number of equal units. The first unit is subdivided into smaller parts.
- The zero should be placed at the end of the 1st main unit.
- From the zero mark, the units should be numbered to the right and the sub-divisions to the left.
- The units and the subdivisions should be labeled clearly.
- The R.F. should be mentioned below the scale.

Construct a scale of 1:4, to show centimeters and long enough to measure up to 5 decimeters.



- R.F. = ¼
- Length of the scale = R.F. × max. length = ¼ × 5 dm = 12.5 cm.
- Draw a line 12.5 cm long and divide it in to 5 equal divisions, each representing 1 dm.
- Mark 0 at the end of the first division and 1, 2, 3 and 4 at the end of each subsequent division to its right.
- Divide the first division into 10 equal sub-divisions, each representing 1 cm.
- Mark cm to the left of 0 as shown.

<u>Question</u>: **Construct a scale of 1:4, to show centimeters and long enough to measure up to 5 decimeters**



Draw the scale as a rectangle of small width (about 3 mm) instead of only a line.

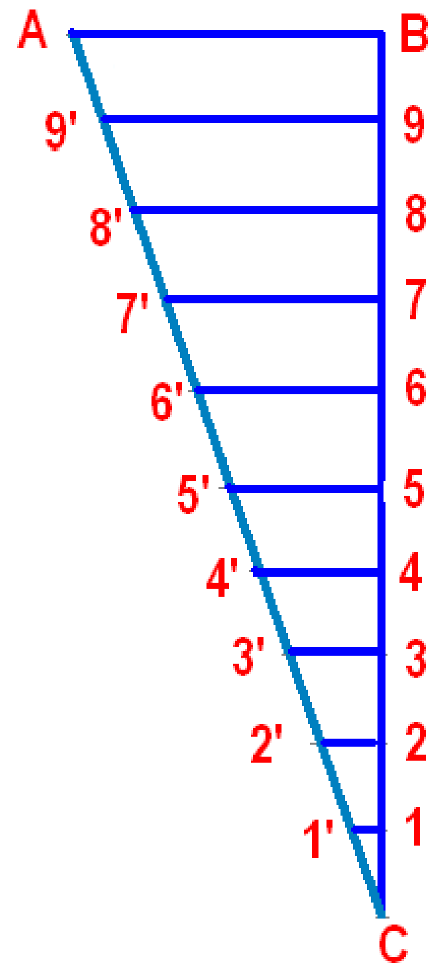
- **Draw the division lines showing decimeters throughout the width of the scale.**
- **Draw thick and dark horizontal lines in the middle of all alternate divisions and sub-divisions.**
- **Below the scale, print DECIMETERS on the right hand side, CENTIMERTERS on the left hand side, and R.F. in the middle.**

Diagonal Scale

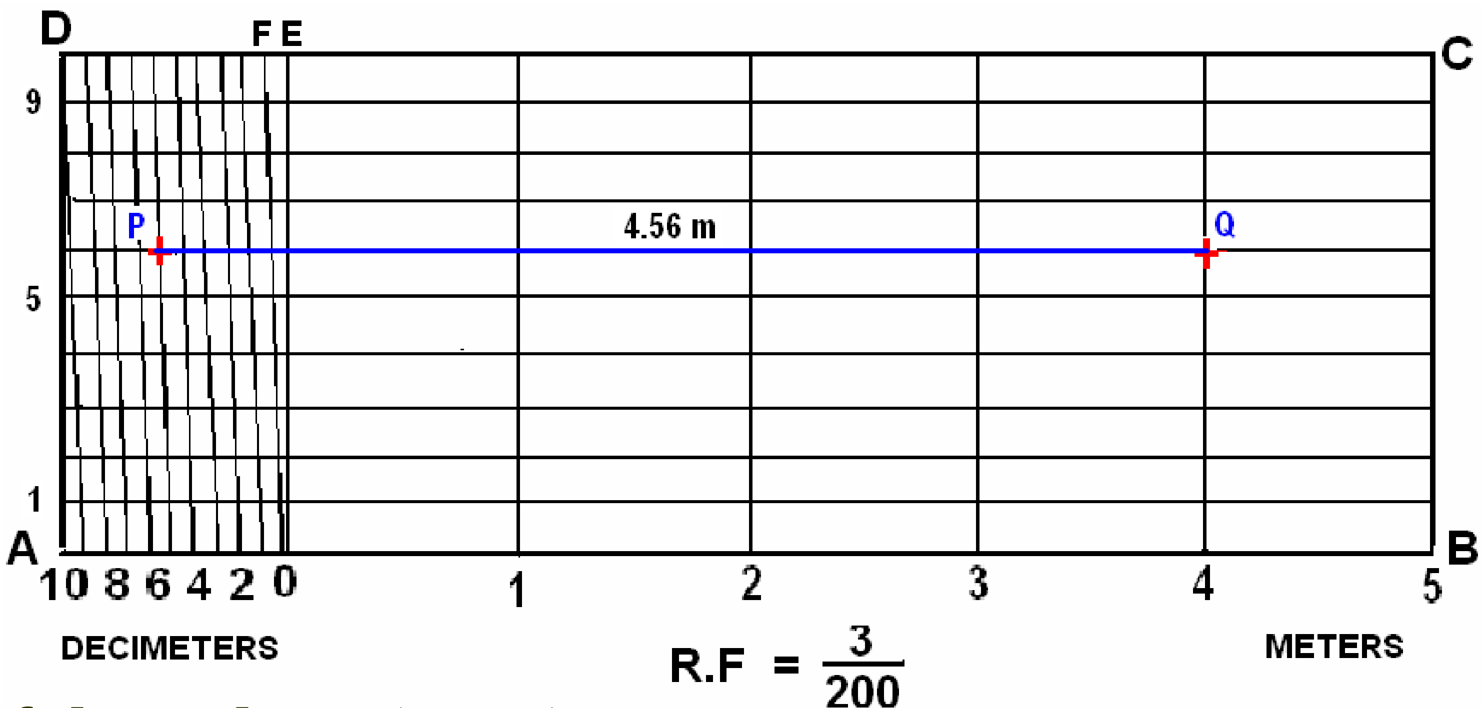
- **Through Diagonal scale, measurements can be up to second decimal (e.g. 4.35).**
- **Diagonal scales are used to measure distances in a unit and its immediate two subdivisions; e.g. *dm*, *cm* & *mm*, or *yard*, *foot* & *inch*.**
- **Diagonal scale can measure more accurately than the plain scale.**

Diagonal scale…..Concept

- At end B of line AB, draw a perpendicular.
- Step-off ten equal divisions of any length along the perpendicular starting from B and ending at C.
- Number the division points 9,8,7,…..1.
- Join A with C.
- Through the points 1, 2, 3, etc., draw lines parallel to AB and cutting AC at 1′, 2′, 3′, etc.
- Since the triangles are similar; 1′1 = 0.1 AB, 2′2 = 0.2AB, …. 9′9 = 0.9AB.
- Gives divisions of a given short line AB in multiples of 1/10 its length, e.g. 0.1AB, 0.2AB, 0.3AB, etc.

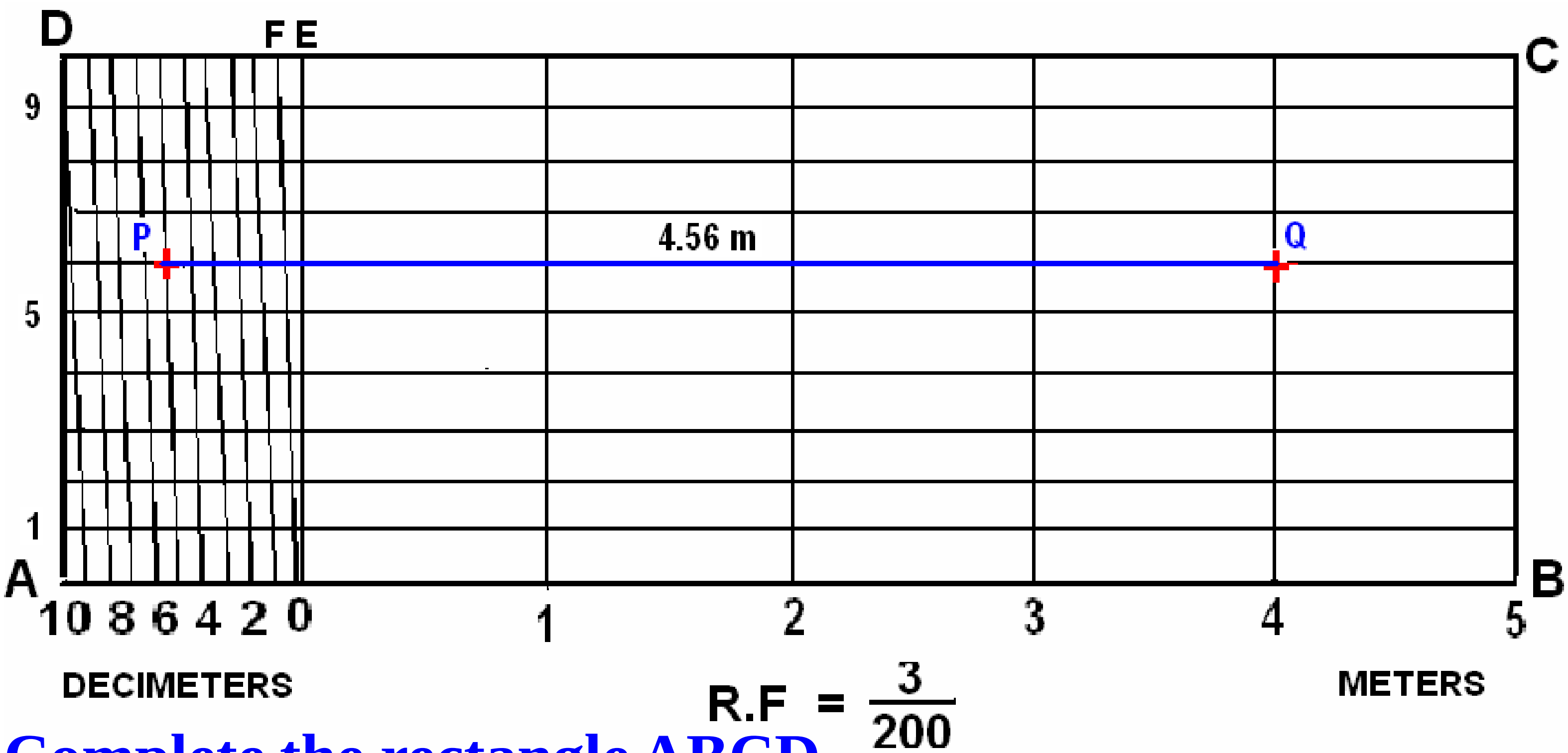


Construct a Diagonal scale of RF = 3:200 (i.e. 1:66 2/3) showing meters, decimeters and centimeters. The scale should measure up to 6 meters. Show a distance of 4.56 meters



- Length of the scale = (3/200) x 6 m = 9 cm
- Draw a line AB = 9 cm . Divide it in to 6 equal parts.
- Divide the first part A0 into 10 equal divisions.
- At A draw a perpendicular and step-off along it 10 equal divisions, ending at D.

Diagonal Scale



- Complete the rectangle ABCD.
- Draw perpendiculars at meter-divisions i.e. 1, 2, 3, and 4.
- Draw horizontal lines through the division points on AD. Join D with the end of the first division along A0 (i.e. 9).
- Through the remaining points i.e. 8, 7, 6, … draw lines // to D9.
- PQ = 4.56 meters

Vernier Scales

- **Similar to Diagonal scale, Vernier scale is used for measuring up to second decimal.**
- **A Vernier scale consists of (i) a primary scale and (ii) a vernier.**
- **The primary scale is a plain scale fully divided in to minor divisions.**
- **The graduations on the vernier are derived from those on the primary scale.**

Least count (LC) is the minimum distance that can be measured.

Forward Vernier Scale :

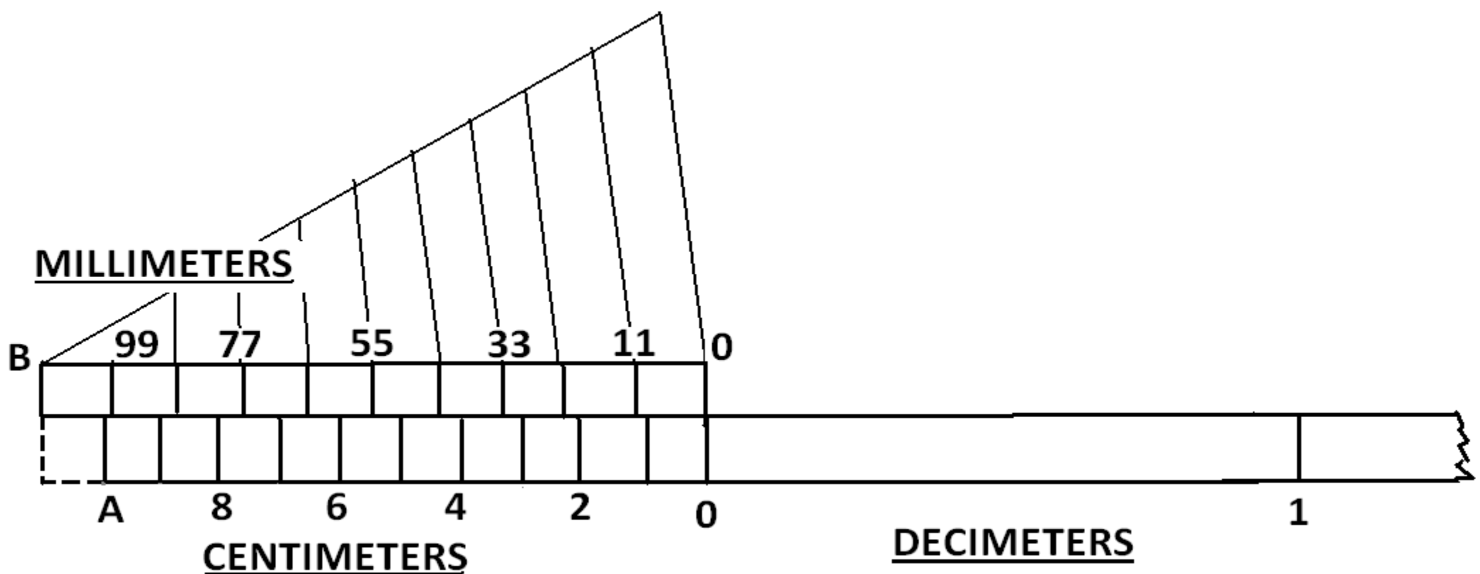
MSD>VSD; LC = MSD-VSD

Backward Vernier scale:

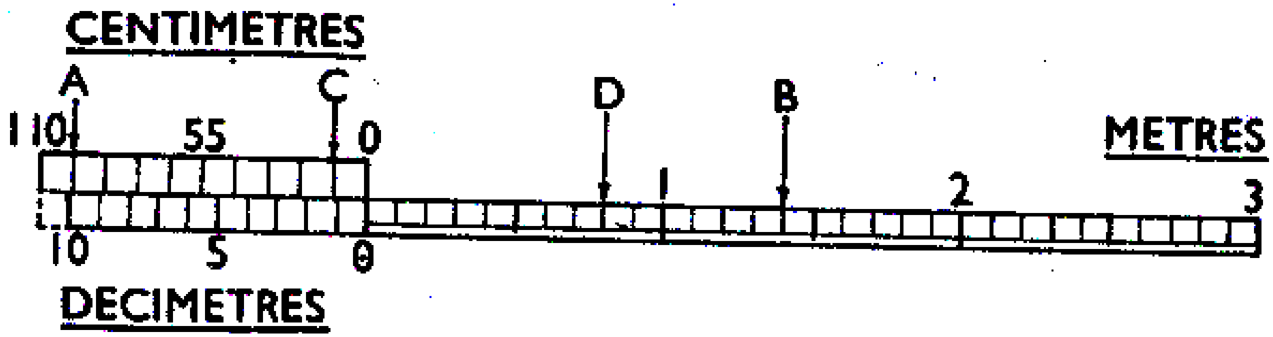
VSD>MSD; LC = VSD - MSD

Vernier scale…. Concept

- **Length A0 represents 10 cm and is divided in to 10 equal parts each representing 1 cm.**
- **B0 = 11 (i.e. 10+1) such equal parts = 11 cm.**
- **Divide B0 into 10 equal divisions. Each division of B0 will be equal to 11/10 = 1.1 cm or 11 mm.**
- **Difference between 1 part of *A0* and one part of *B0* = 1.1 cm -1.0 cm = 0.1cm or 1 mm.**

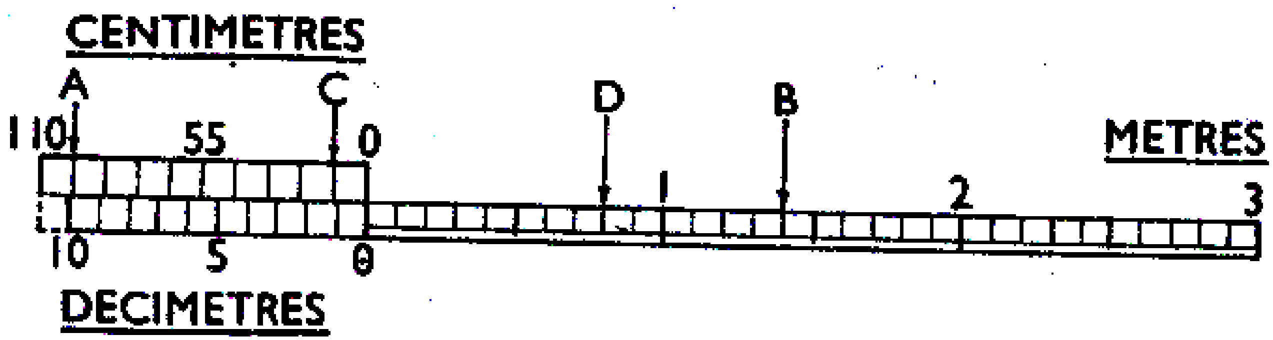


Question: **Draw a Vernier scale of R.F. = 1/25 to read up to 4 meters. On it show lengths 2.39 m and 0.91 m**



- **Length of Scale = (1/25) × (4 × 100) = 16 cm**
- **Draw a 16 cm long line and divide it into 4 equal parts. Each part is 1 meter. Divide each of these parts in to 10 equal parts to show decimeter (10 cm).**
- **Take 11 parts of dm length and divide it in to 10 equal parts. Each of these parts will show a length of 1.1 dm or 11 cm.**
- **To measure 2.39 m, place one leg of the divider at *A* on 99 cm mark and other leg at *B* on 1.4 mark. (0.99 + 1.4 = 2.39).**
- **To measure 0.91 m, place the divider at *C* and *D* (0.8 +0.11 = 0.91).**

Question: **Draw a Vernier scale of R.F. = 1/25 to read up to 4 meters. On it show lengths 2.39 m and 0.91 m**



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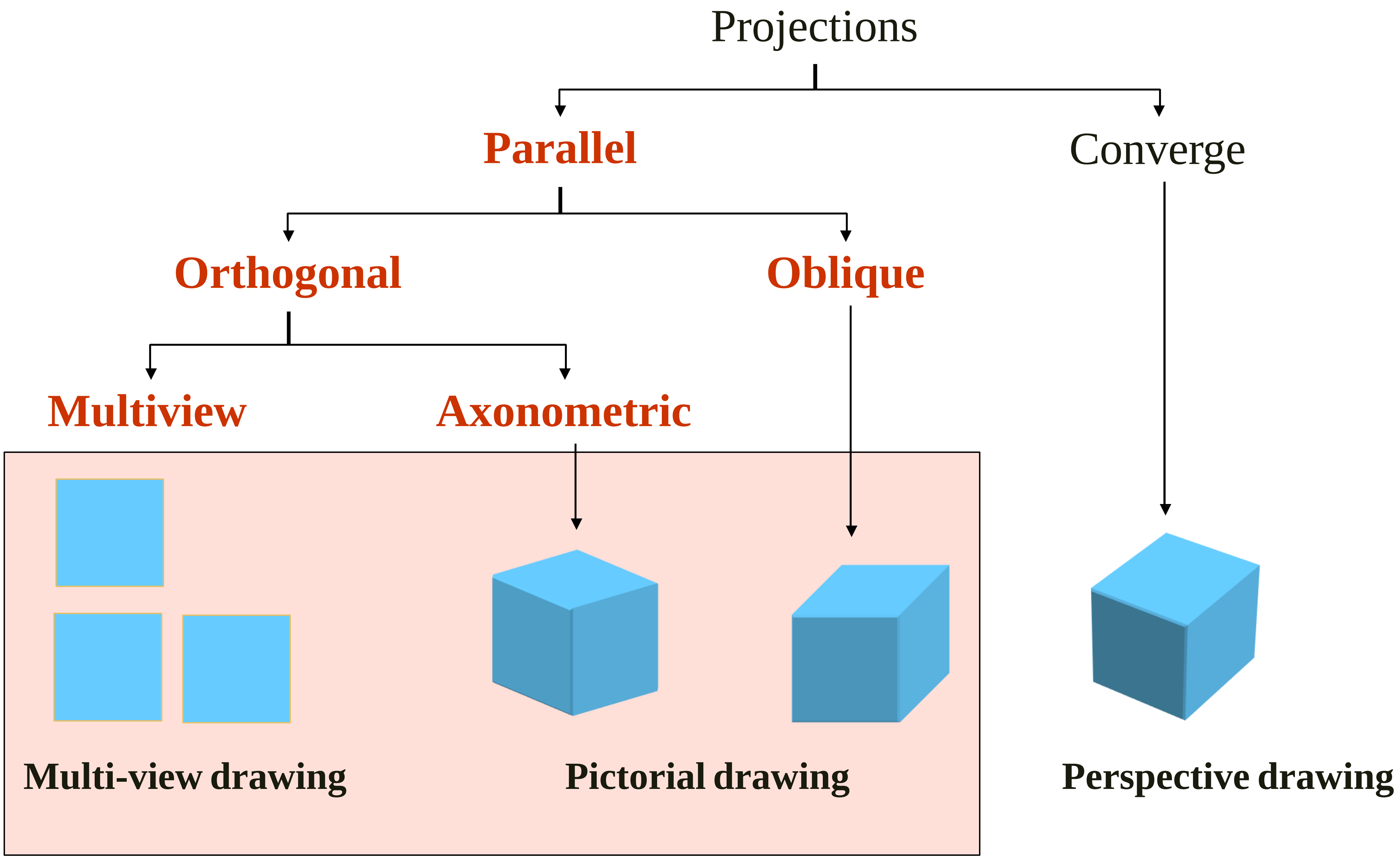
- **Take 11 parts of dm length and divide it in to 10 equal parts. Each of these parts will show a length of 1.1 dm or 11 cm.**
- **To measure 2.39 m, place one leg of the divider at *A* on 99 cm mark and other leg at *B* on 1.4 mark. (0.99 + 1.4 = 2.39).**
- **To measure 0.91 m, place the divider at *C* and *D* (0.8 +0.11 = 0.91).**

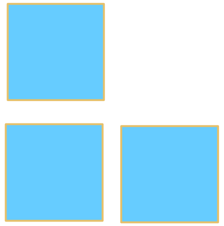
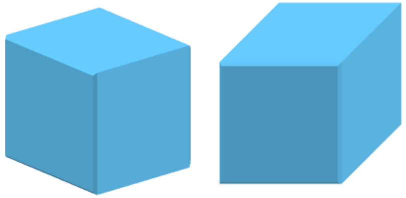
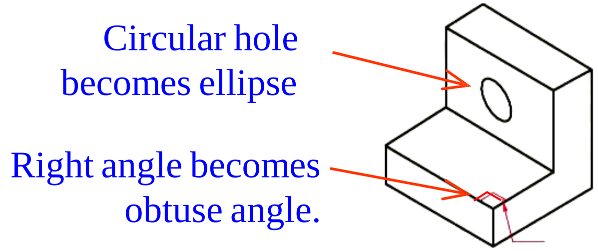
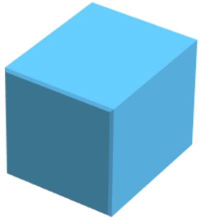
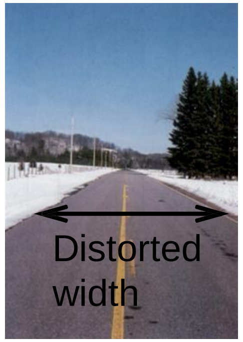
Orthographic Projections

- Orthographic Projections is a technical drawing in which different views of an object are projected on different reference planes observing perpendicular to respective reference plane.
- Different Reference planes are;
  - *Horizontal Plane (HP)*
  - *Vertical Plane (VP)*
  - *Side or Profile Plane (PP)*
- Different views are;
  - *Front View (FV) – Projected on VP*
  - *Top View (TV) – Projected on HP*
  - *Side View (SV) – Projected on PP*

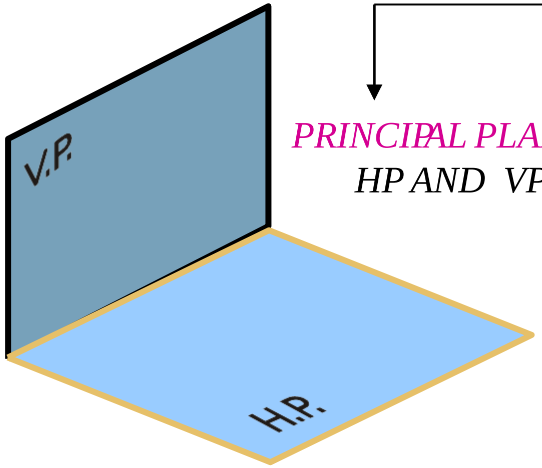
Types of views



View comparison

Type		
Multi-view drawing 	Accurately presents object's details, i.e. size and shape.	Require training to visualization.
Pictorial drawing 	Easy to visualize.	Shape and angle distortion 
Perspective drawing 	Object looks more like what our eyes perceive.	Difficult to create Size and shape distortion 

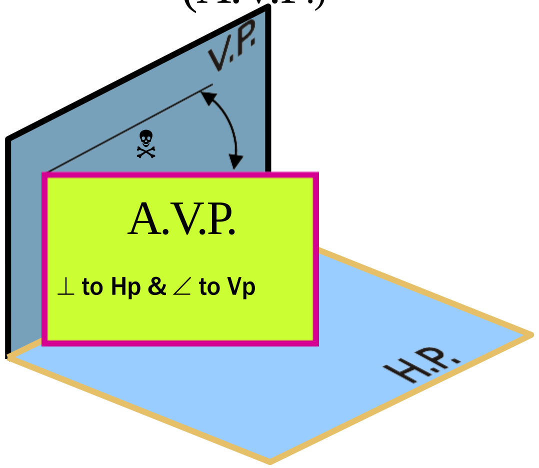
PLANES



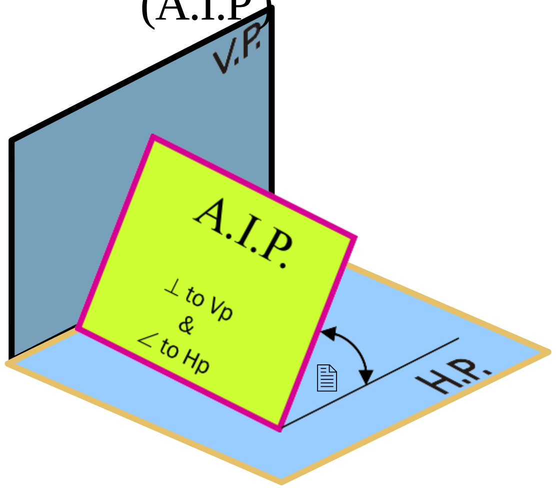
PRINCIPAL PLANES
HP AND VP

AUXILIARY PLANES

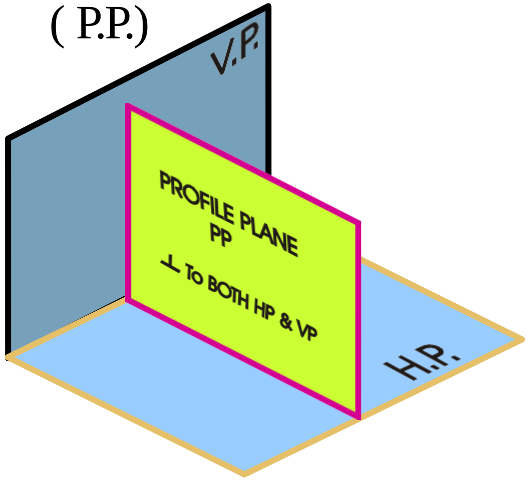
Auxiliary Vertical Plane
(A.V.P.)



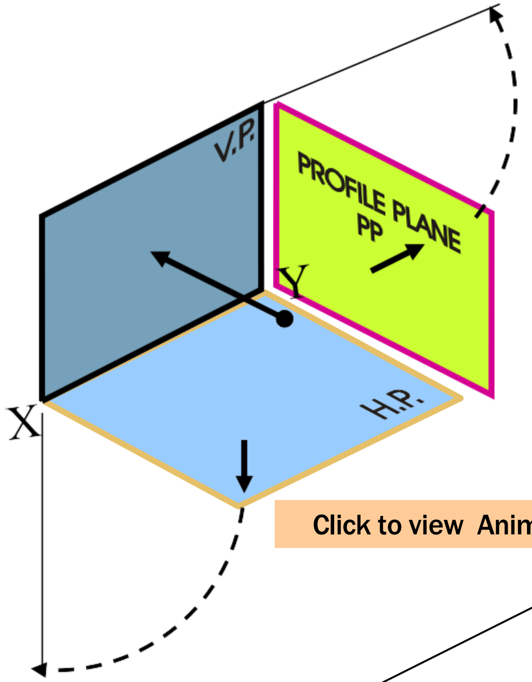
Auxiliary Inclined Plane
(A.I.P.)



Profile Plane
(P.P.)



PATTERN OF PLANES & VIEWS (First Angle Method)



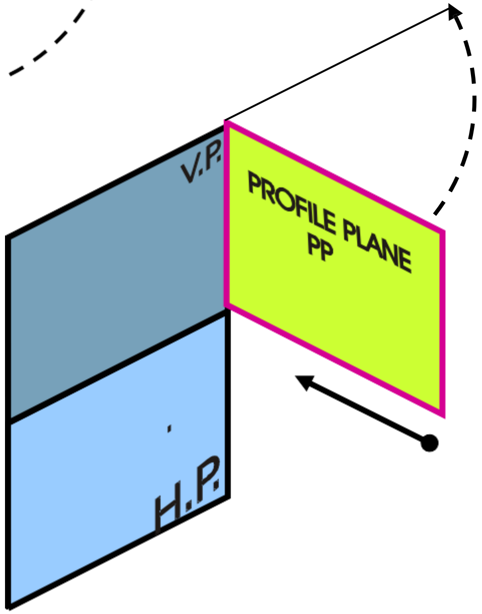
THIS IS A PICTORIAL SET-UP OF ALL THREE PLANES.
ARROW DIRECTION IS A NORMAL WAY OF OBSERVING THE OBJECT. BUT IN THIS DIRECTION ONLY VP AND A VIEW ON IT (FV) CAN BE SEEN. THE OTHER PLANES AND VIEWS ON THOSE CAN NOT BE SEEN.

PROCEDURE TO SOLVE ABOVE PROBLEM:-

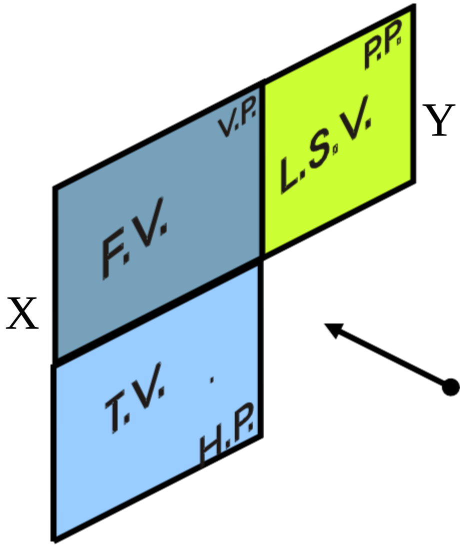
TO MAKE THOSE PLANES ALSO VISIBLE FROM THE ARROW DIRECTION,
A) HP IS ROTATED 90^0 DOUNWARD
B) PP, 90^0 IN RIGHT SIDE DIRECTION.
THIS WAY BOTH PLANES ARE BROUGHT IN THE SAME PLANE CONTAINING VP.

Click to view Animation

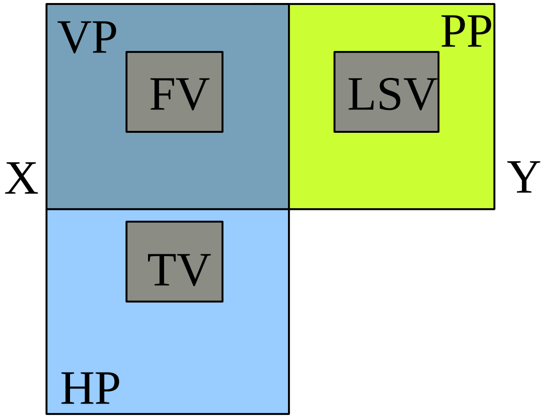
On clicking the button if a warning comes please click YES to continue, this program is safe for your pc.



HP IS ROTATED DOWNWARD 90^0
AND
BROUGHT IN THE PLANE OF VP.



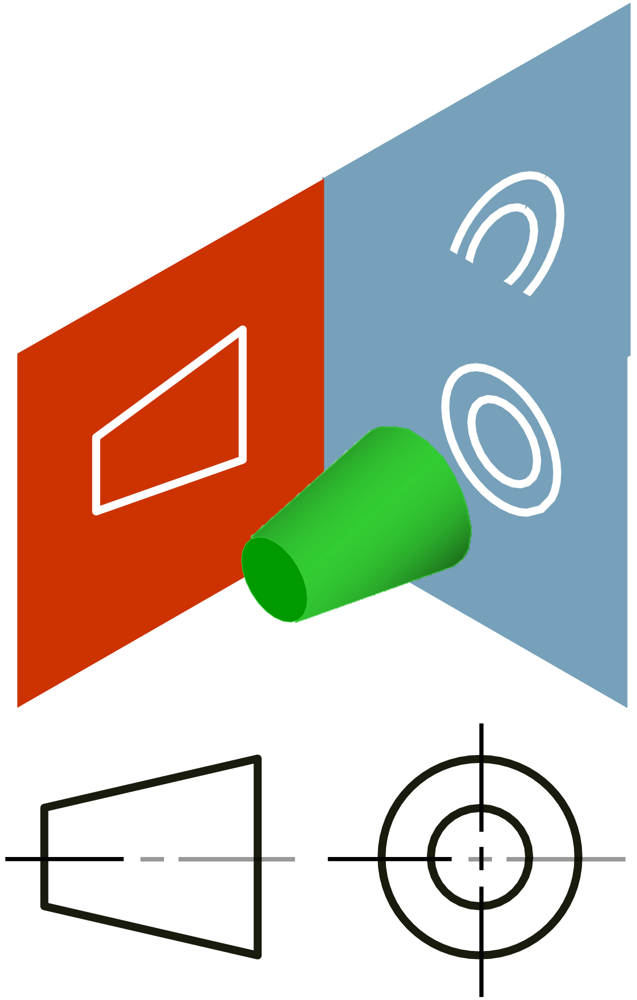
PP IS ROTATED IN RIGHT SIDE 90^0
AND
BROUGHT IN THE PLANE OF VP.



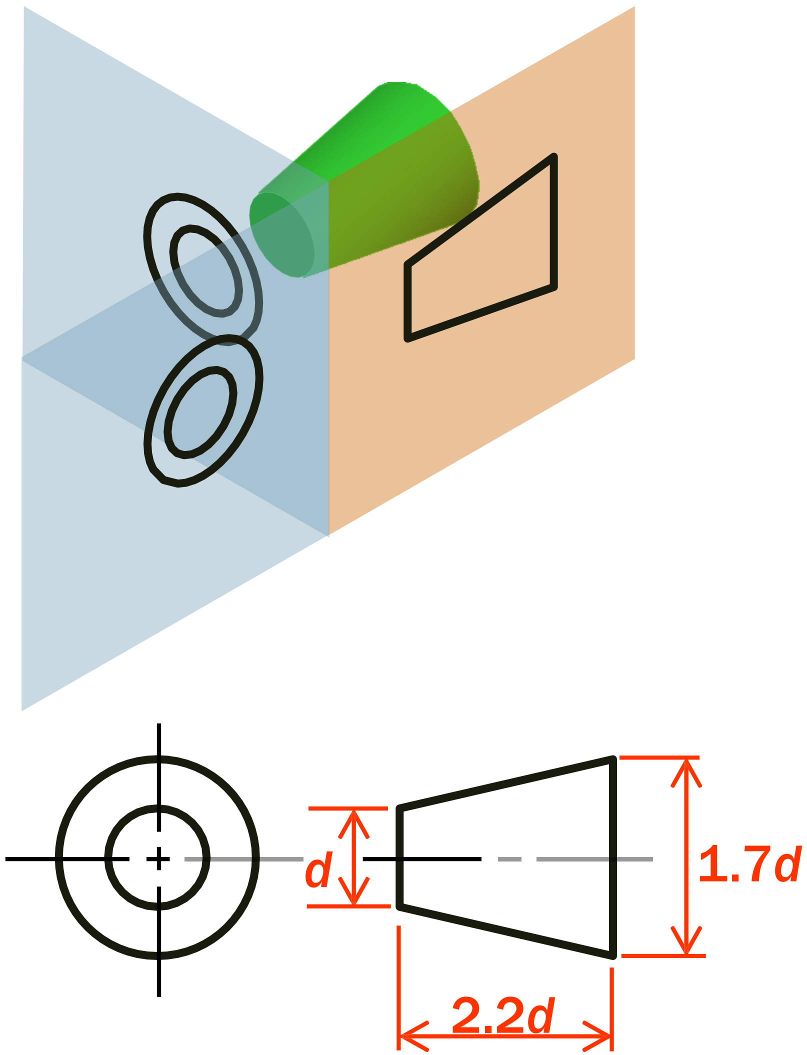
ACTUAL PATTERN OF PLANES & VIEWS
OF ORTHOGRAPHIC PROJECTIONS
DRAWN IN
FIRST ANGLE METHOD OF PROJECTIONS

Projection symbols

1st angle system



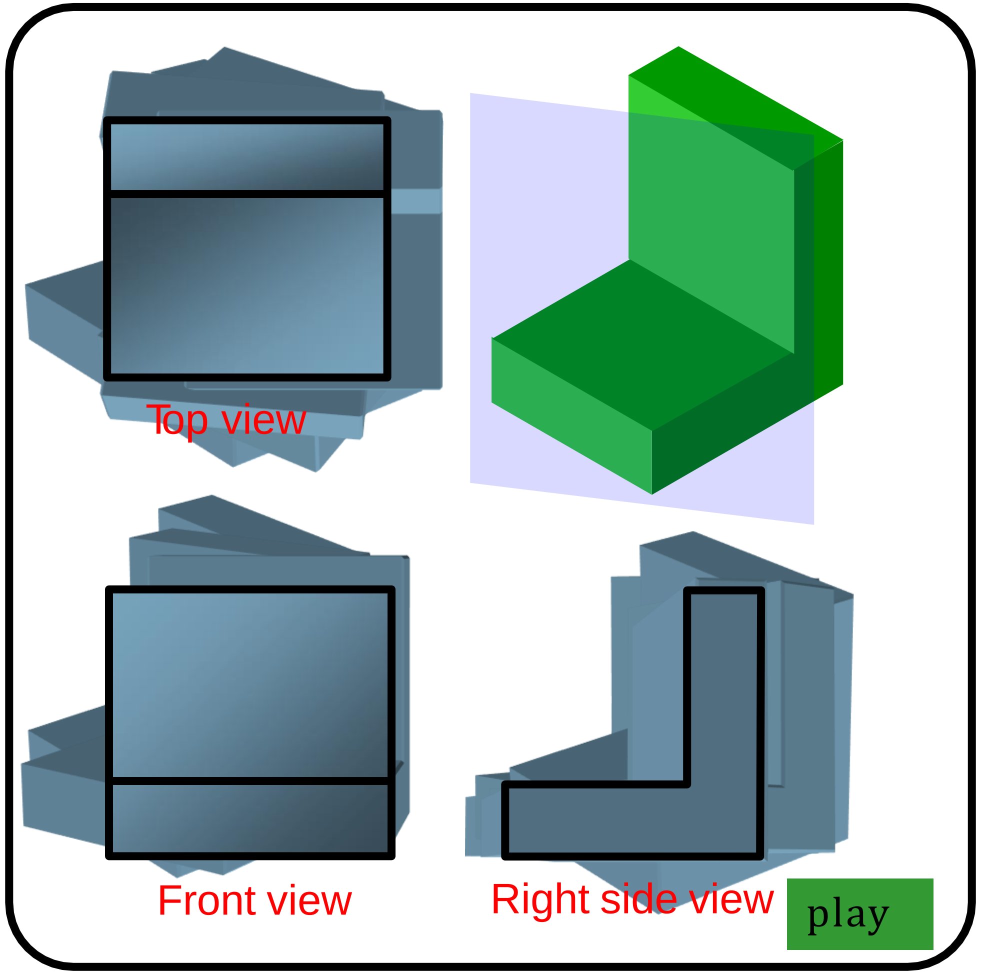
3rd angle system

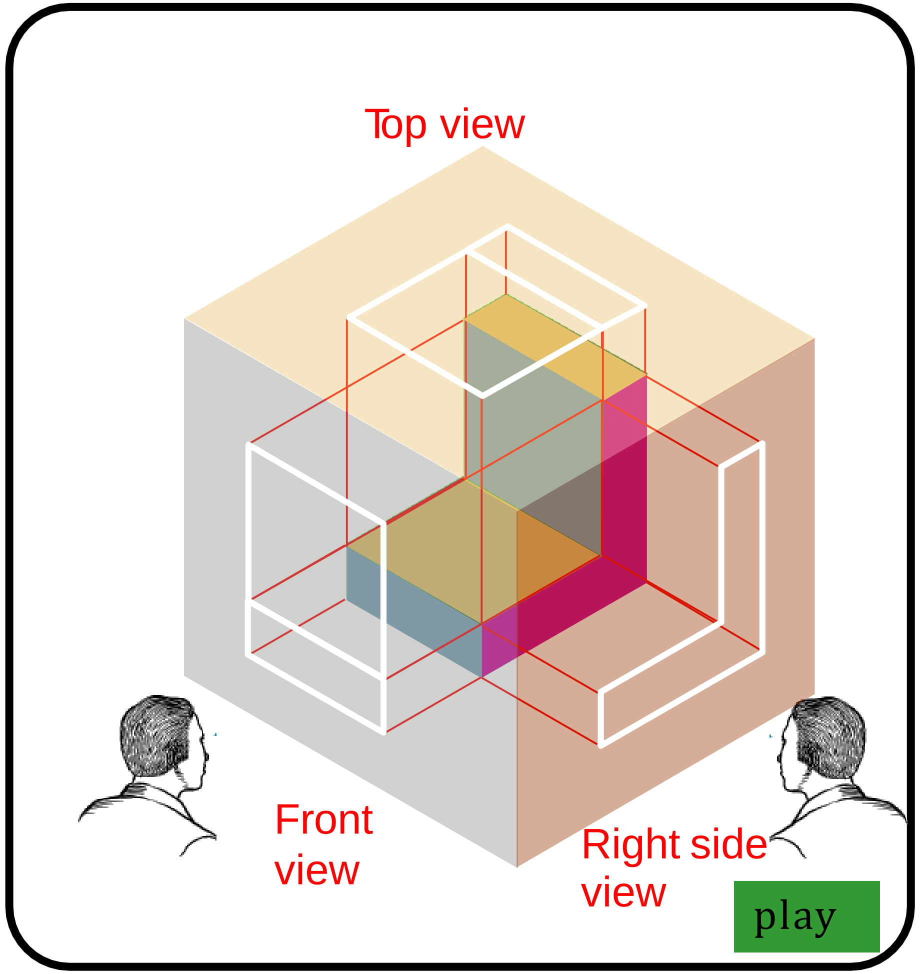


Methods of Orthogonal Projection

1. Natural Method: Revolve the object with respect to observer

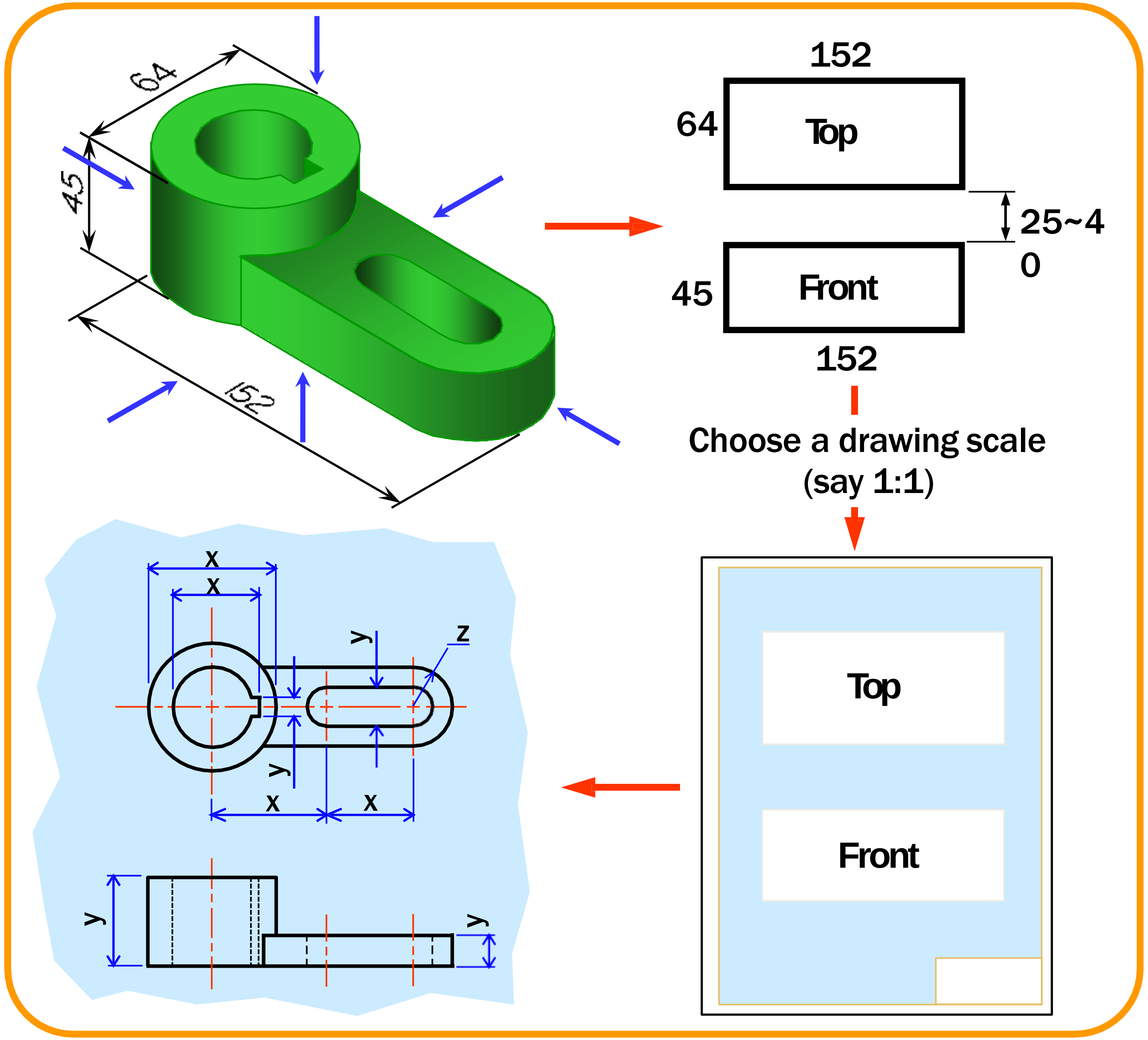
2. Glass box method: The observer moves around the object.



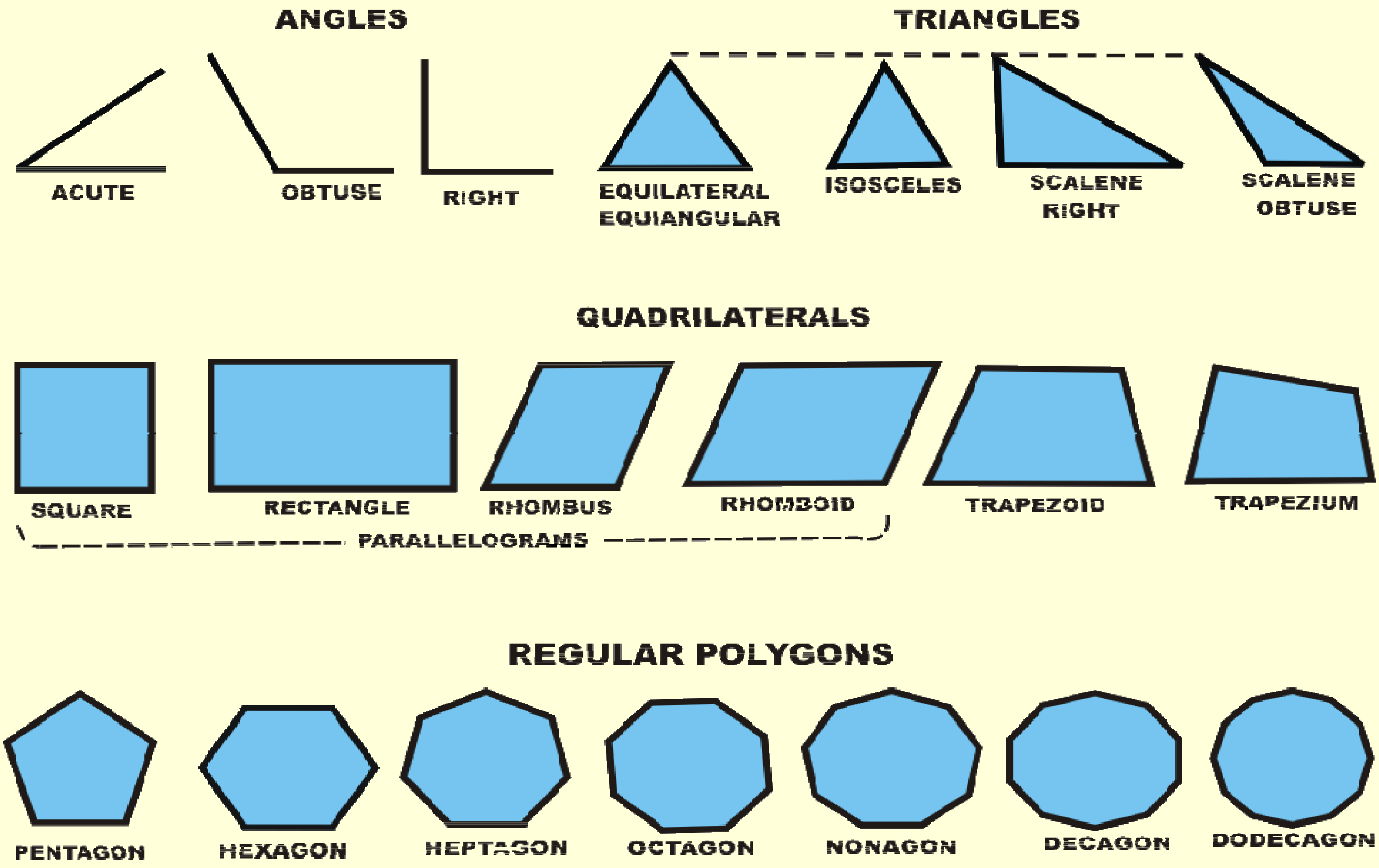


Steps for Orthographic Views

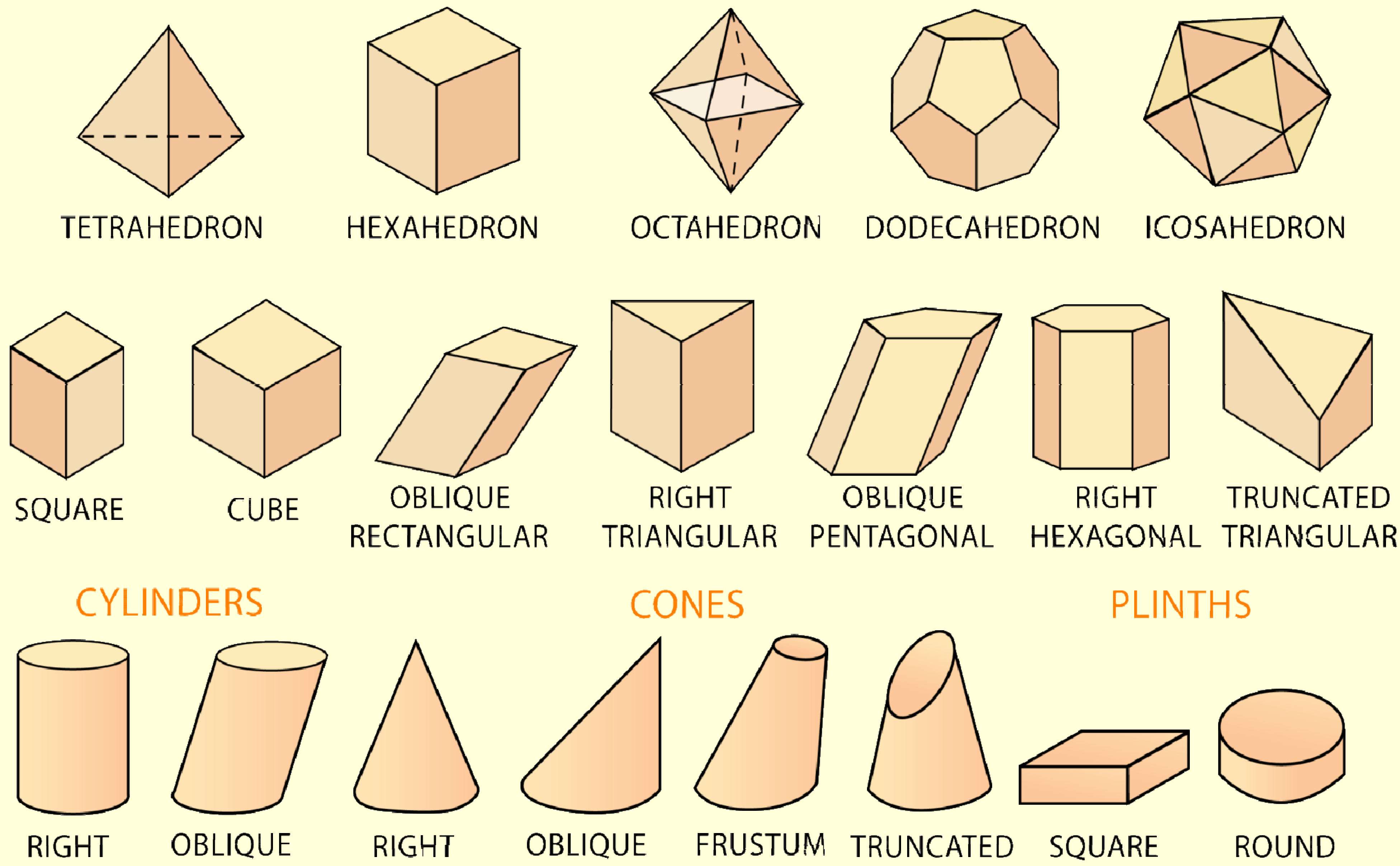
1. Select the necessary views
2. Layout the selected views on a drawing sheet.
3. Complete each selected views.
4. Complete the dimensions and notes.



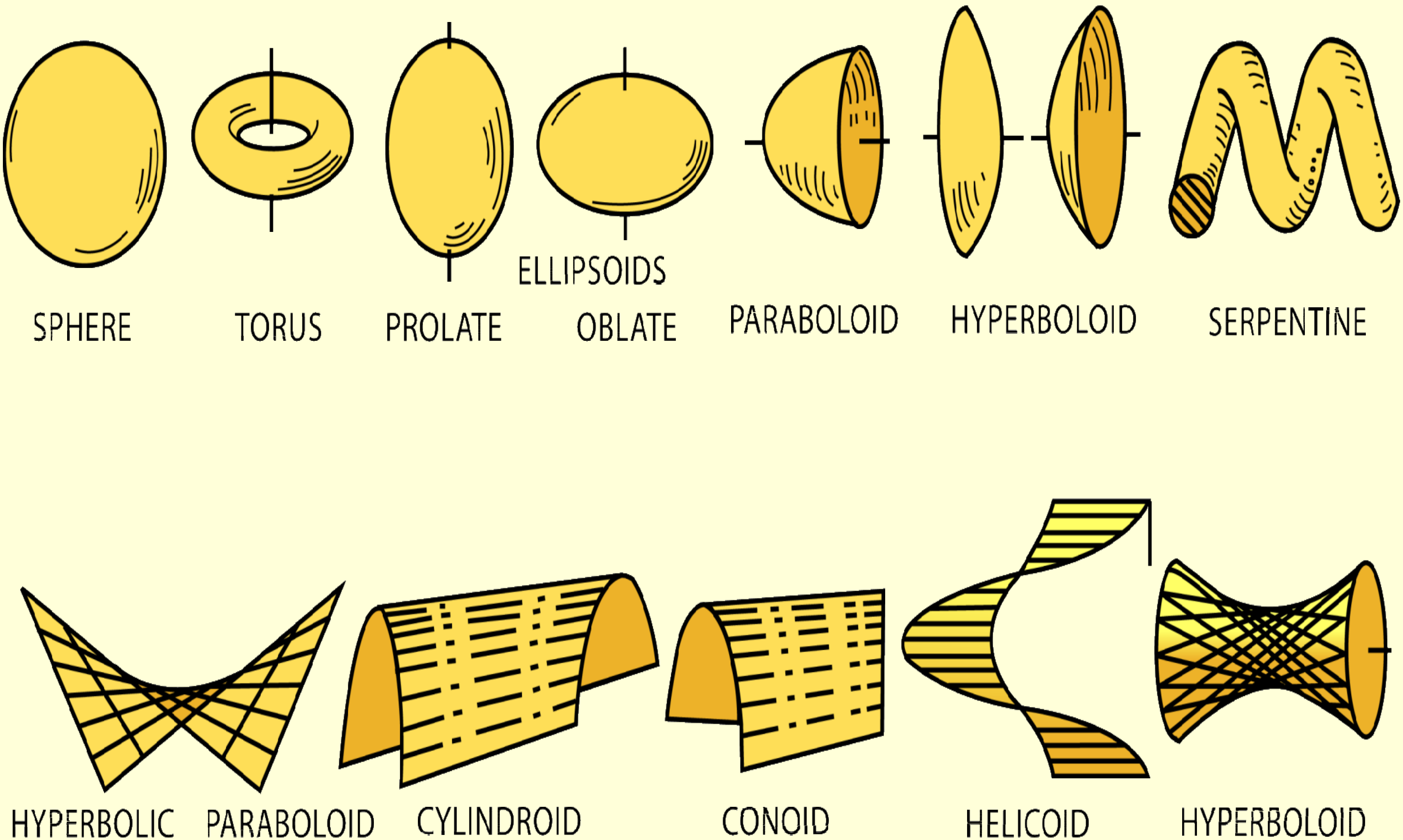
Lines and Planes



Solids


TETRAHEDRON
HEXAHEDRON
OCTAHEDRON
DODECAHEDRON
ICOSAHEDRON
SQUARE
CUBE
OBLIQUE RECTANGULAR
RIGHT TRIANGULAR
OBLIQUE PENTAGONAL
RIGHT HEXAGONAL
TRUNCATED TRIANGULAR
CYLINDERS
CONES
PLINTHS
RIGHT
OBLIQUE
RIGHT
OBLIQUE
FRUSTUM
TRUNCATED
SQUARE
ROUND

Curved surfaces



Primitive geometric forms

- Point
- Line
- Plane
- Solid
- ……etc

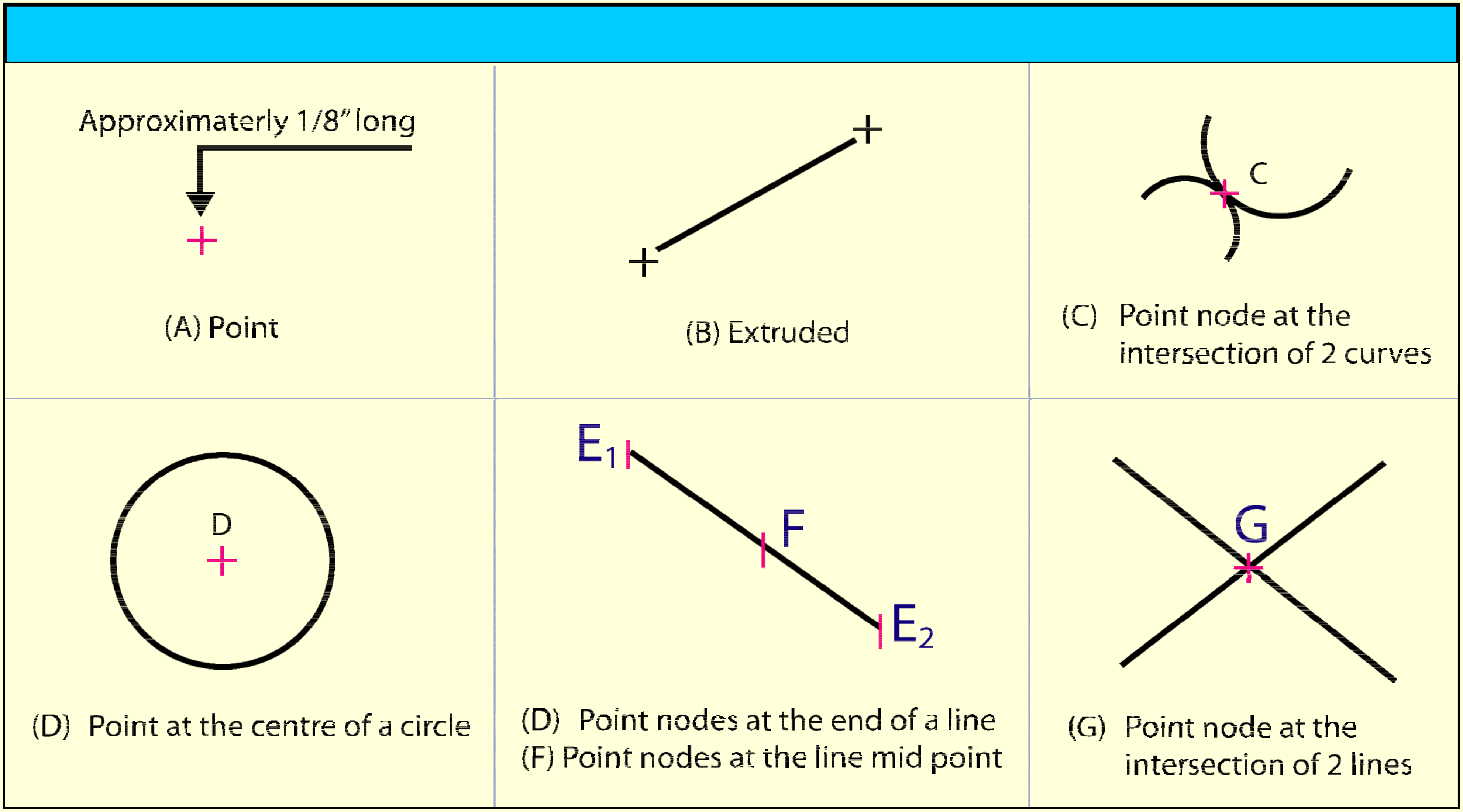
The basic 2-D geometric primitives, from which other more complex geometric forms are derived.

- **Points,**
- **Lines,**
- **Circles, and**
- **Arcs.**

Point

- A theoretical location that has neither width, height, nor depth.
- Describes exact location in space.
- A point is represented in technical drawing as a *small cross* made of dashes that are approximately *3 mm long*.

A point is used to mark the locations of centers and loci, the intersection ends, middle of entities.

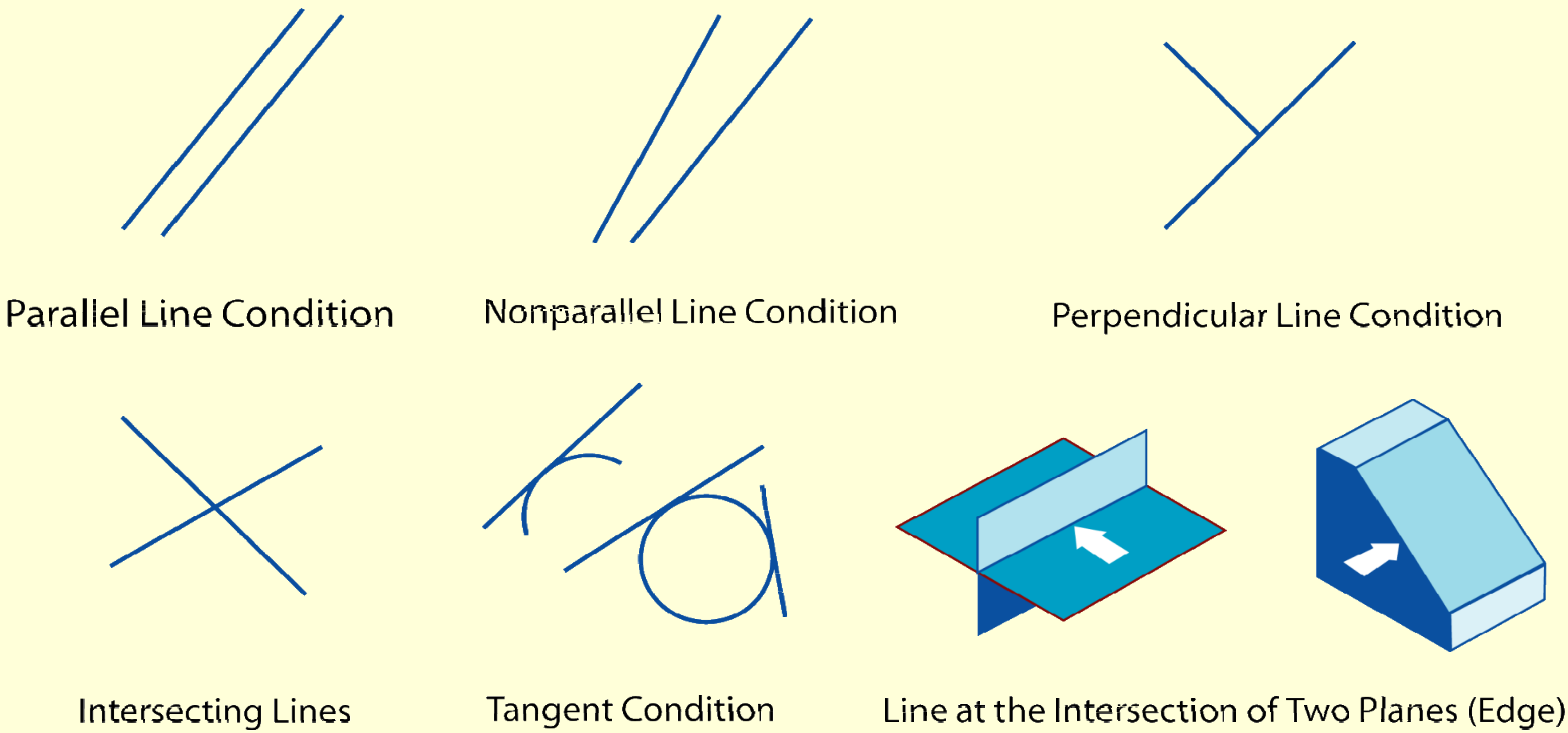


Line

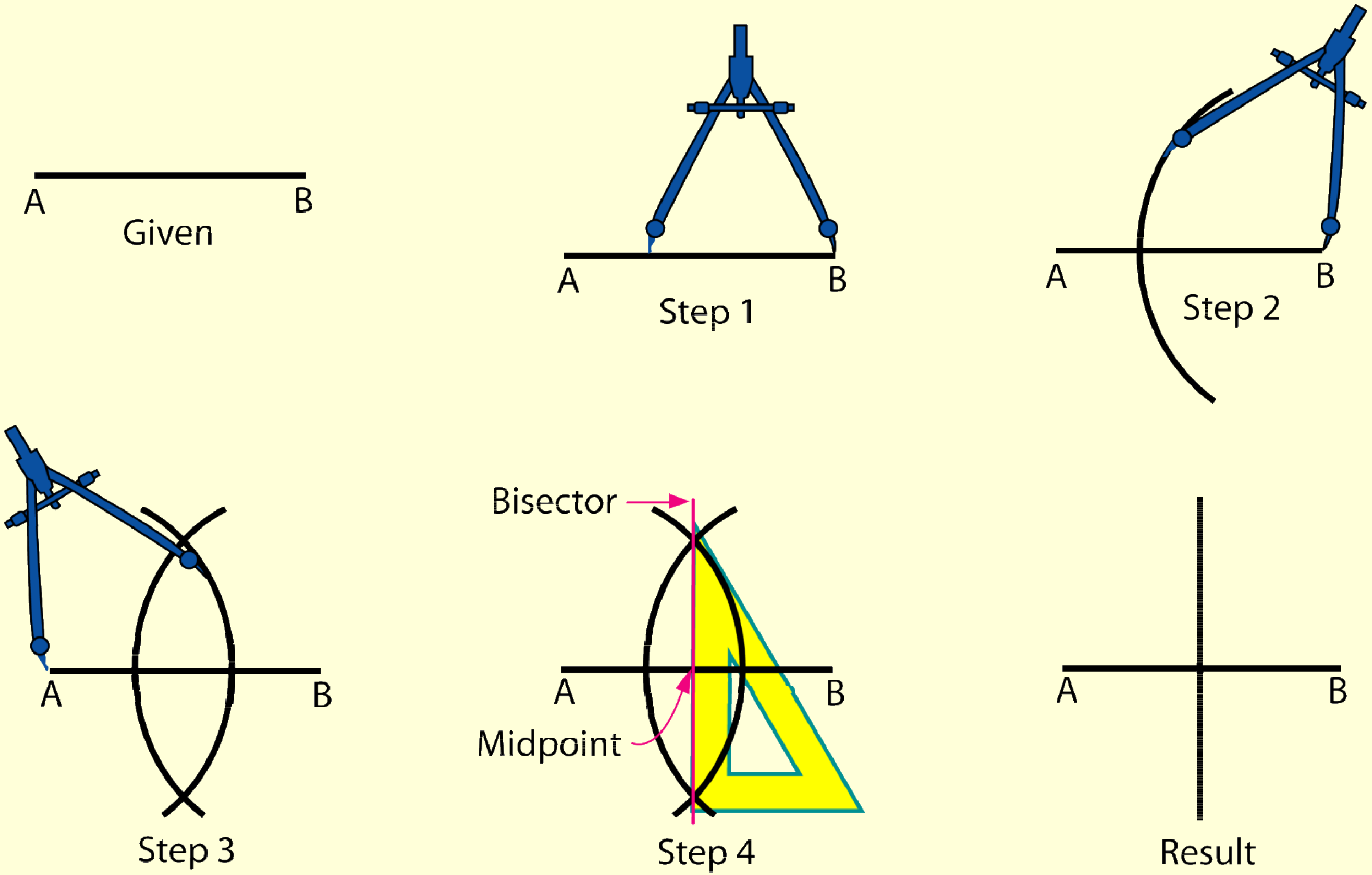
- A geometric primitive that has length and direction, but no thickness.
- It may be straight, curved or a combination of these.
-

  conditions, such as parallel, intersecting, and tangent.
- Lines – specific length and non-specific length.
- Ray – Straight line that extends to infinity from a specified point.

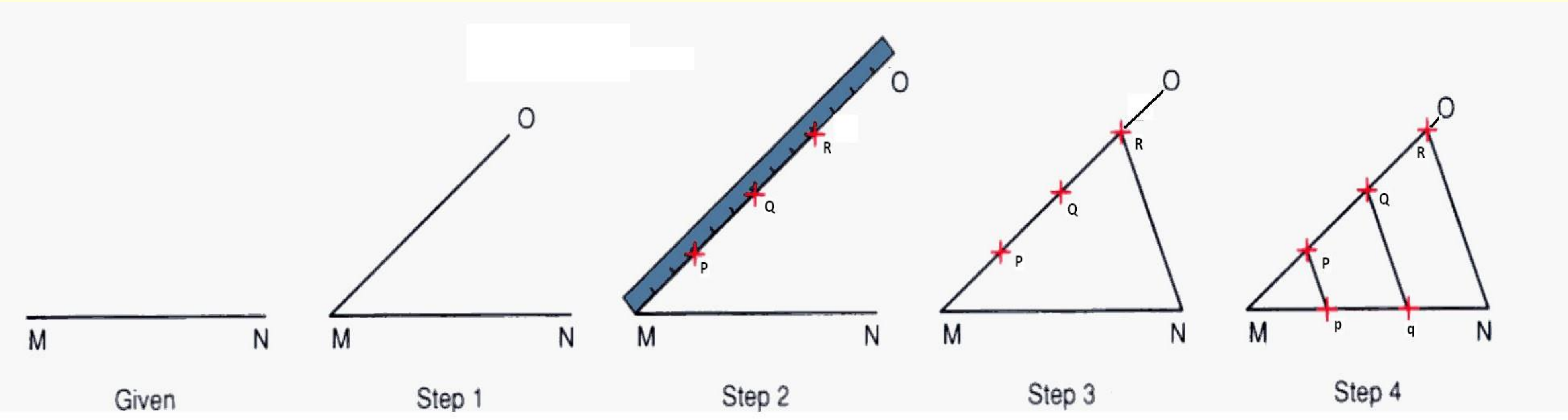
Relationship of one line to another line or arc



Bisecting a line

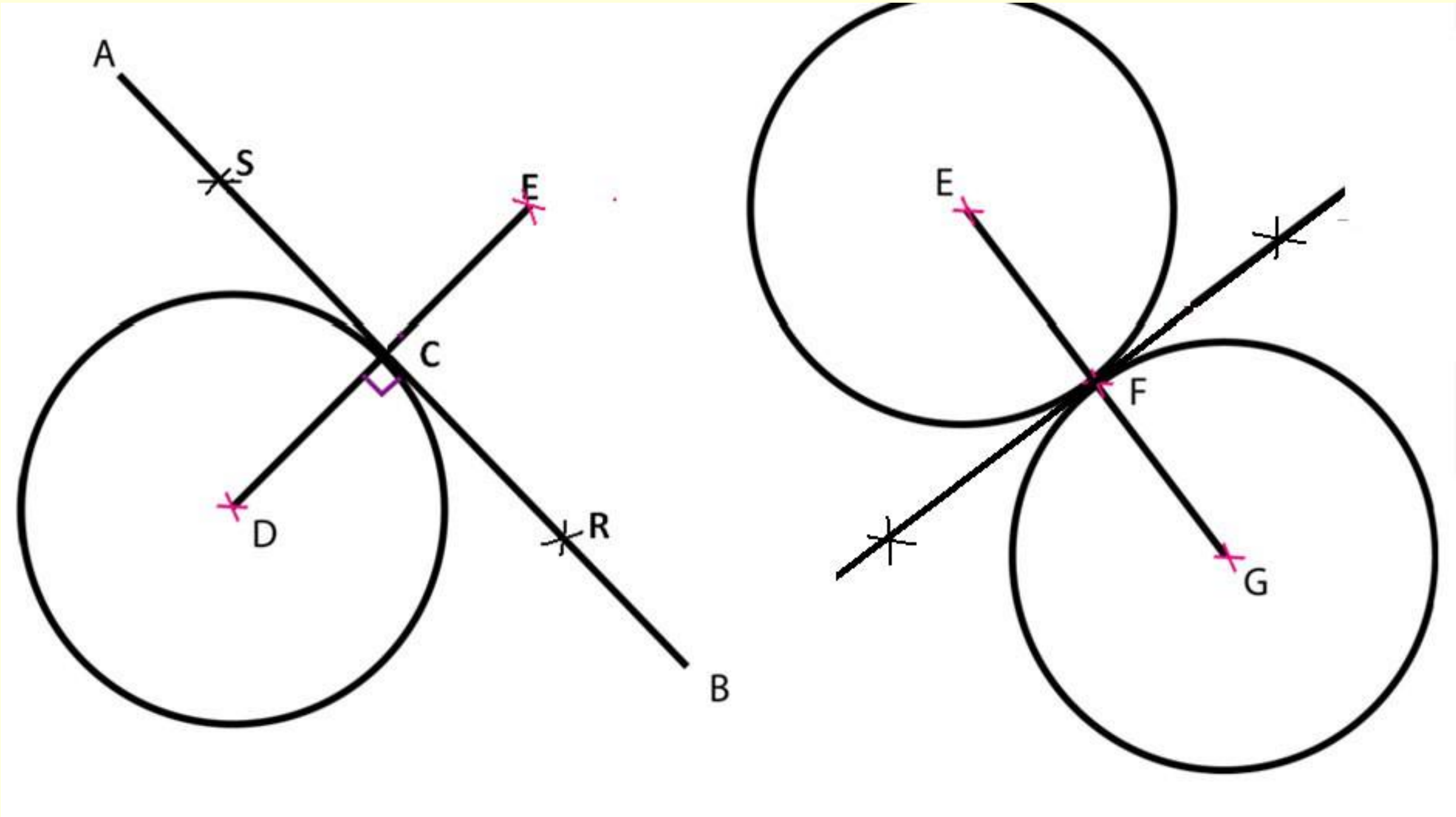


Dividing a line into equal parts

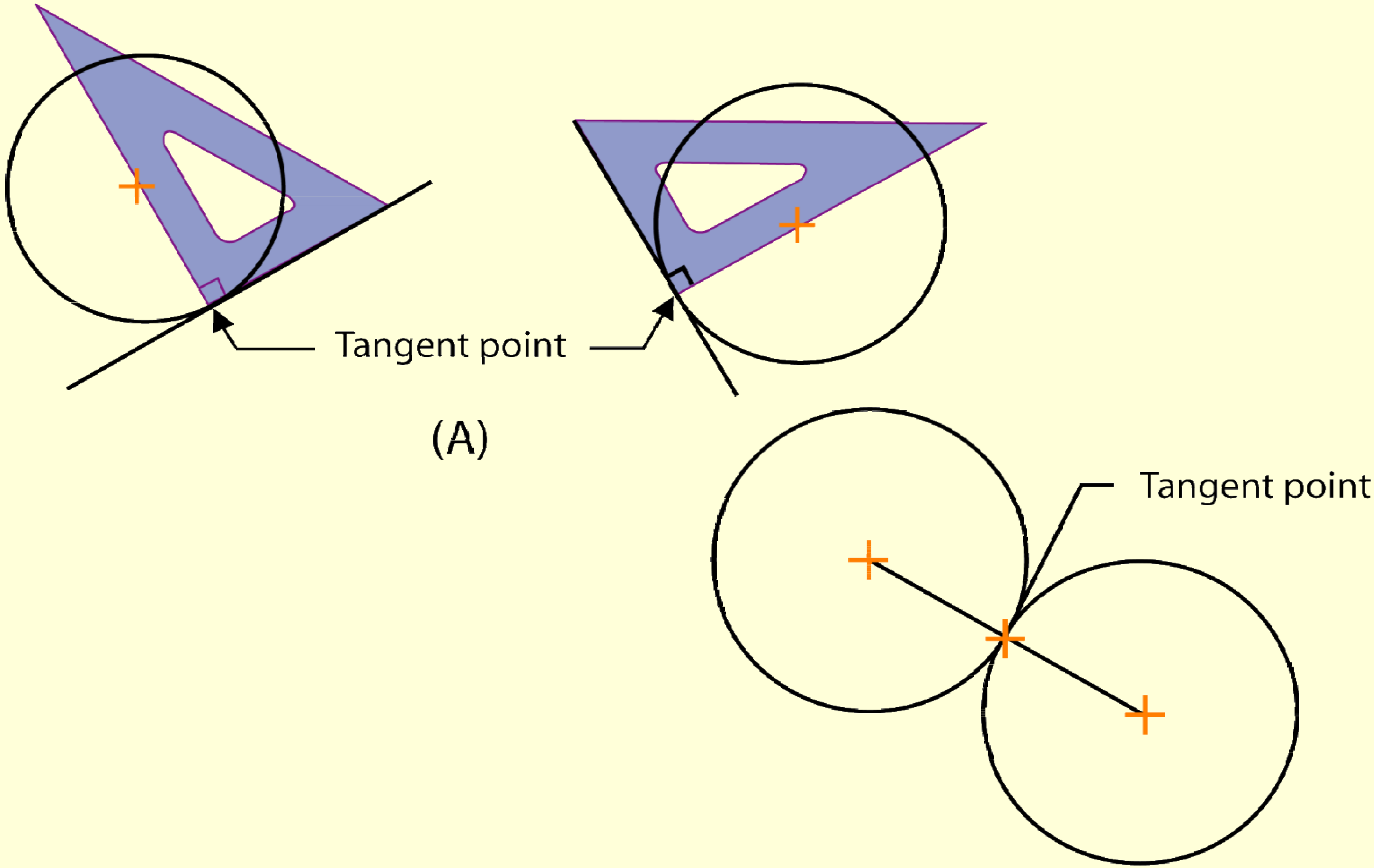


- **Draw a line MO at any convenient angle (preferably an acute angle) from point M.**
- **From M and along MO, cut off with a divider equal divisions (say three) of any convenient length.**
- **Draw a line joining RN.**
- **Draw lines parallel to RN through the remaining points on line MO. The intersection of these lines with line MN will divide the line into (three) equal parts.**

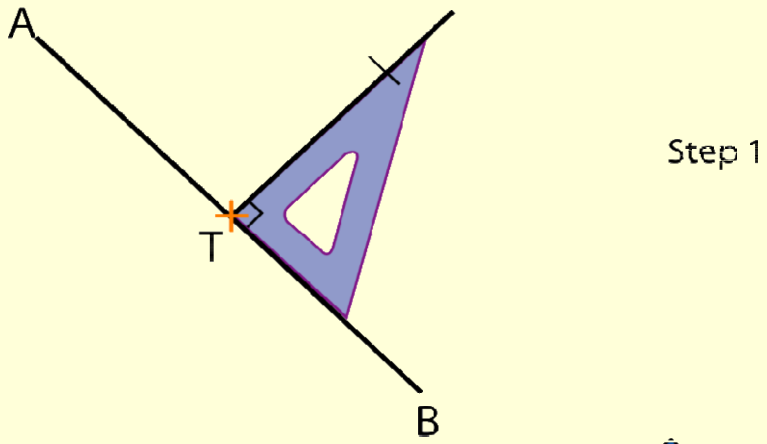
Planar tangent condition exists when two geometric forms meet at a single point and do not intersect.

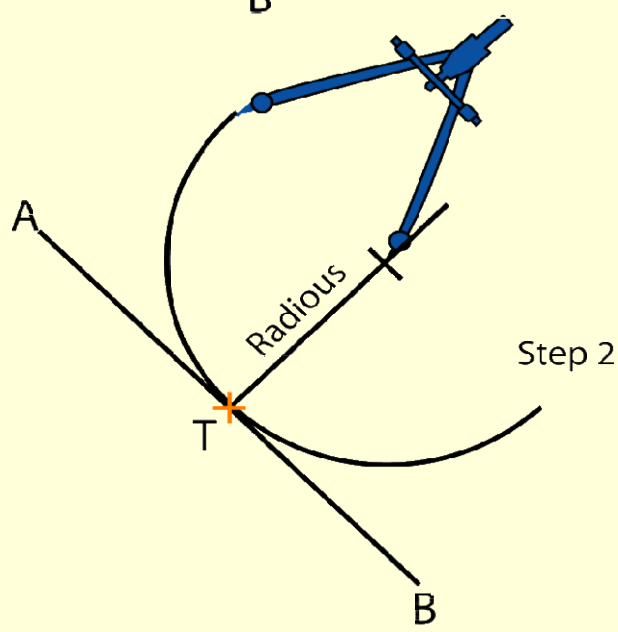


Locating tangent points on circle and arcs



Drawing an arc tangent to a given point on the line



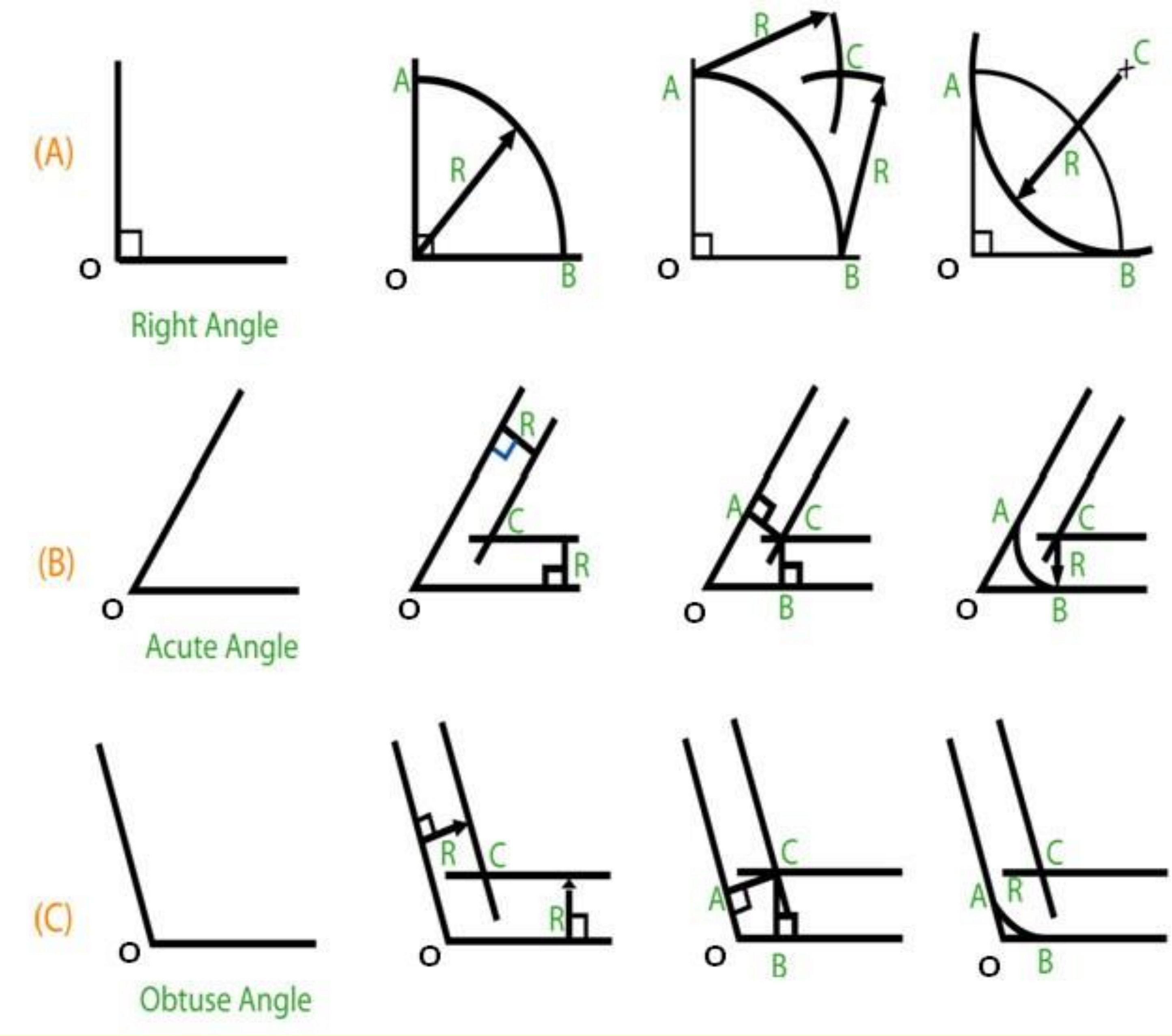


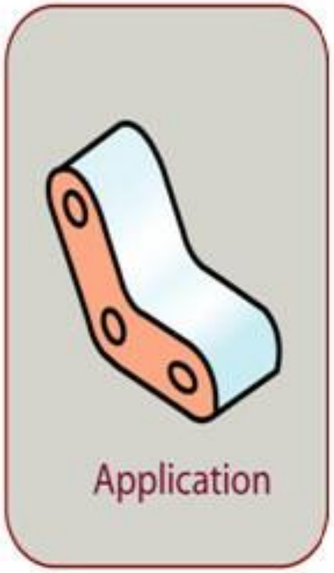
Steps

- **Given line AB and tangent point T. Construct a line perpendicular to line AB and through point T.**

- **Locate the center of the arc by making the radius on the perpendicular line. Put the point of the compass at the center of the arc, set the compass for the radius of the arc, and draw the arc which will be tangent to the line through the point T.**

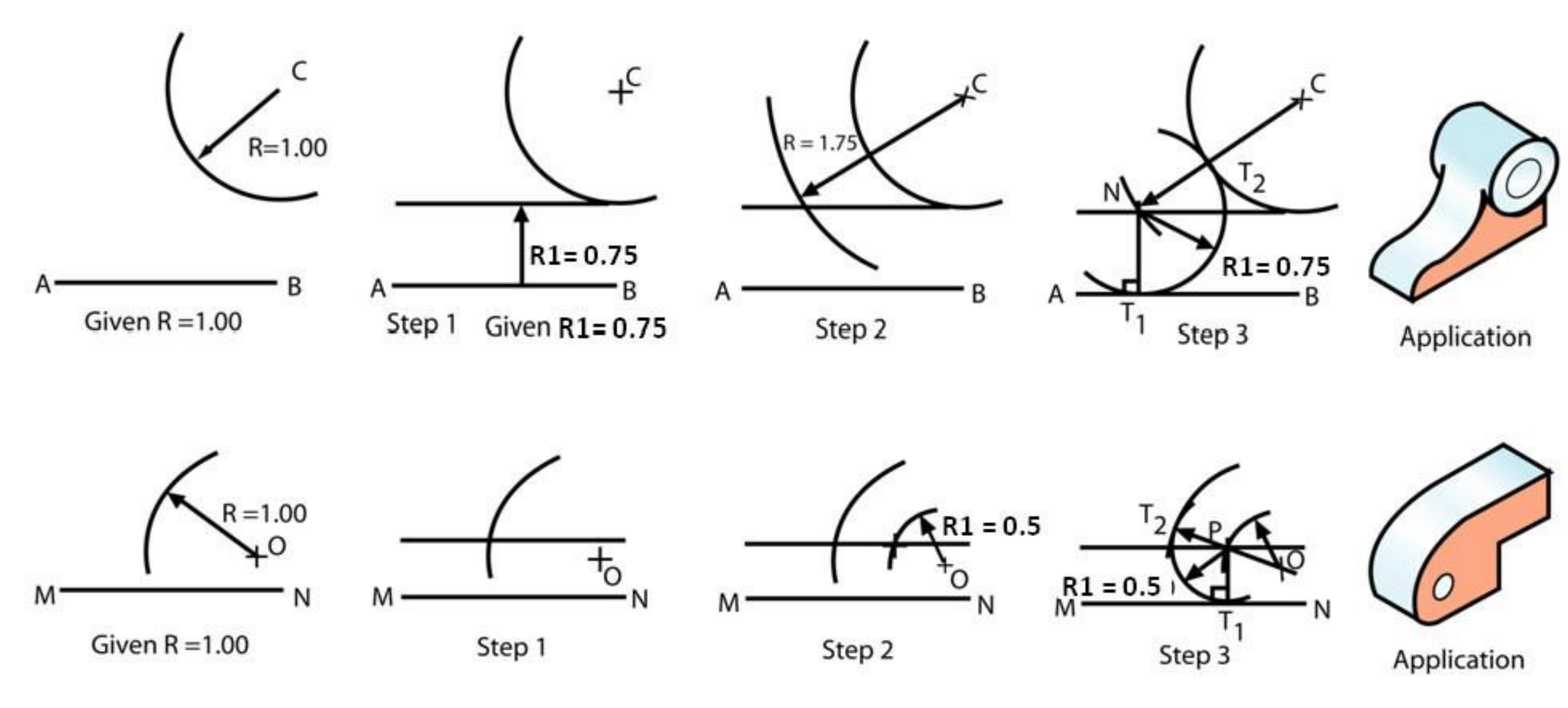
Drawing an arc, tangent to two lines



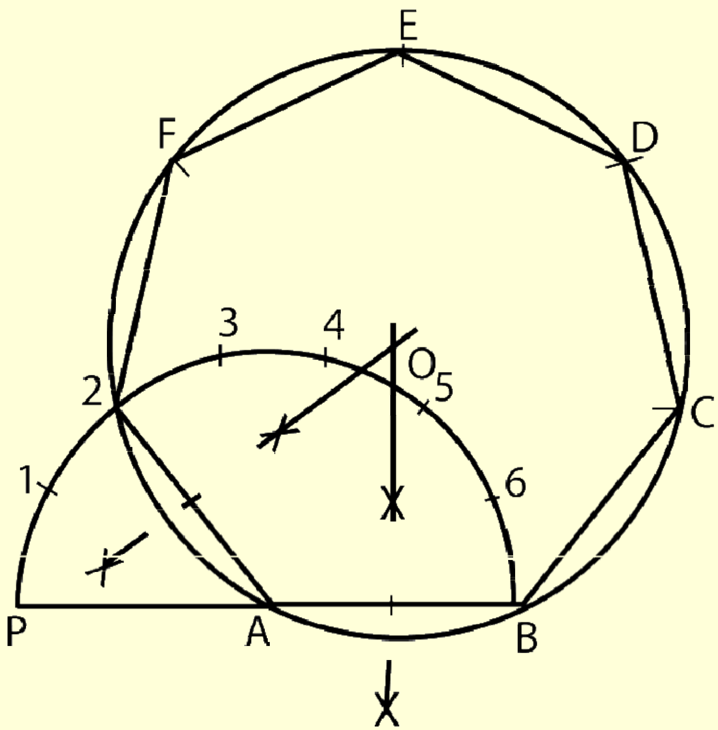


Drawing an arc, tangent to a line and an arc

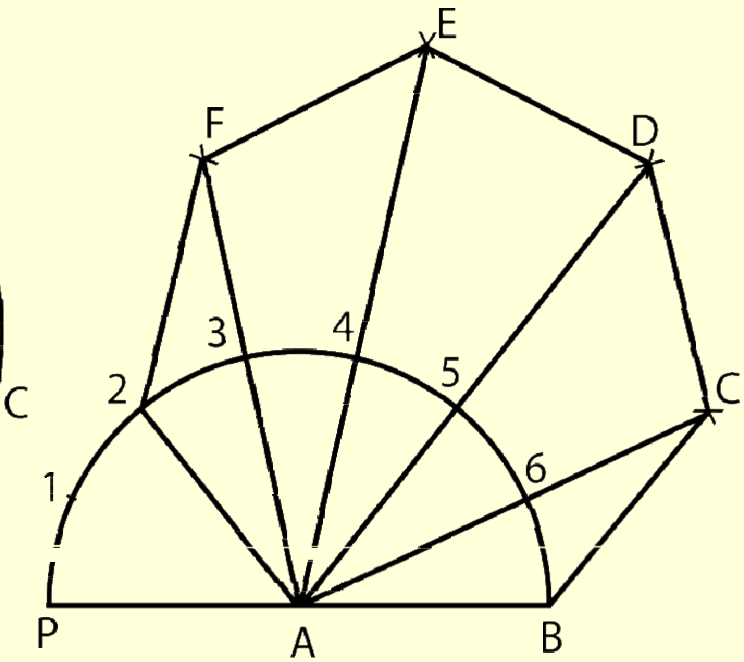
(a) that do not intersect (b) that intersect



Construction of Regular Polygon of given length AB



(A)



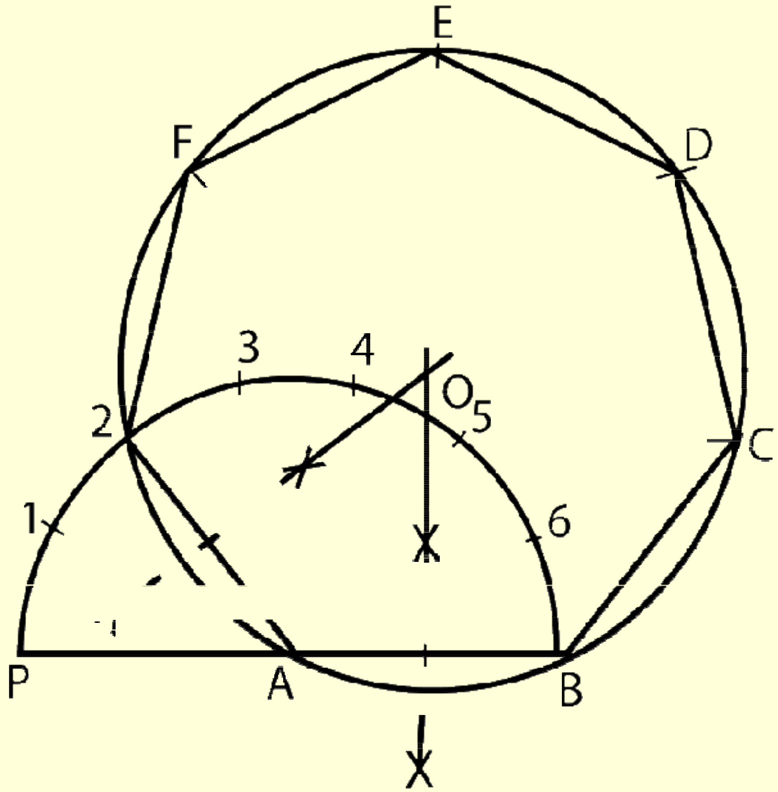
(B)

Draw a line of length AB. With A as centre and radius AB, draw a semicircle.

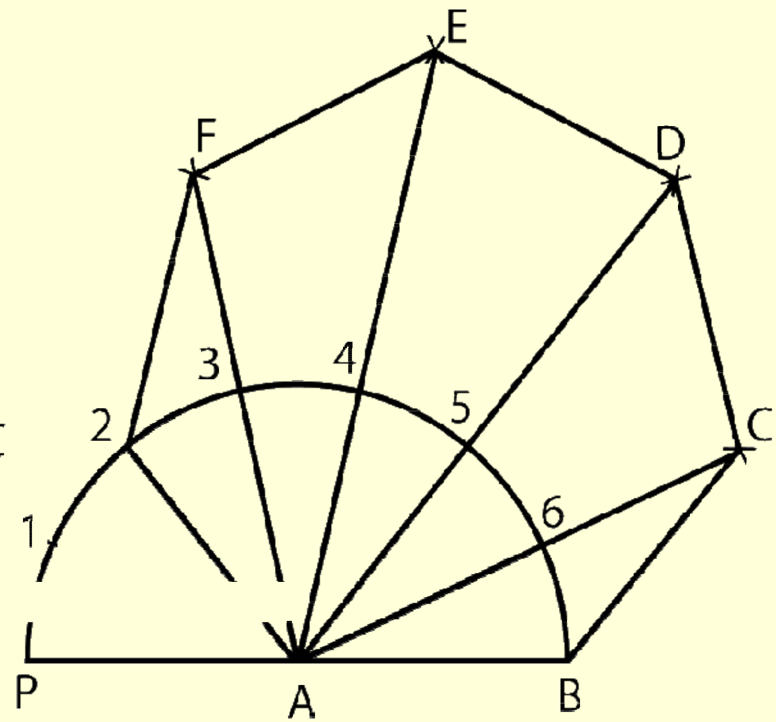
With the divider, divide the semicircle into the number of sides of the polygon.

Draw a line joining A with the second division-point 2.

Construction of Regular Polygon of given length AB……



(A)



(B)

The perpendicular bisectors of A2 and AB meet at O. Draw a circle with centre O and radius OA. With length A2, mark points F, E, D & C on the circumferences starting from 2 (*Inscribe circle method*)

With centre B and radius AB draw an arc cutting the line A6 produced at C. Repeat this for other points D, E & F (*Arc method*)

General method of drawing any polygon

Draw AB = given length of polygon

At B, Draw BP perpendicular & = AB

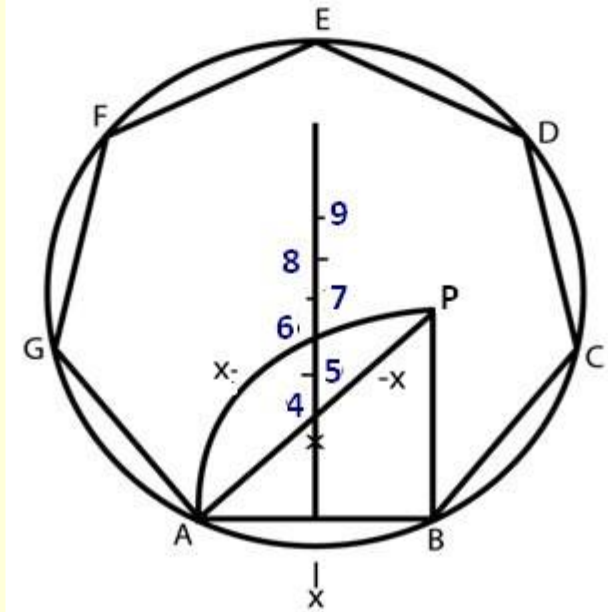
Draw Straight line AP

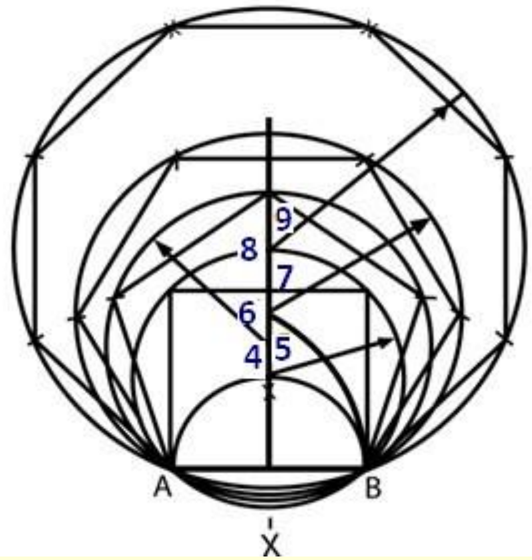
With center B and radius AB, draw arc AP.

The perpendicular bisector of AB meets st. line AP and arc AP in 4 and 6 respectively.

Draw circles with centers as 4, 5,&6 and radii as 4B, 5B, & 6B and inscribe a square, pentagon, & hexagon in the respective circles.

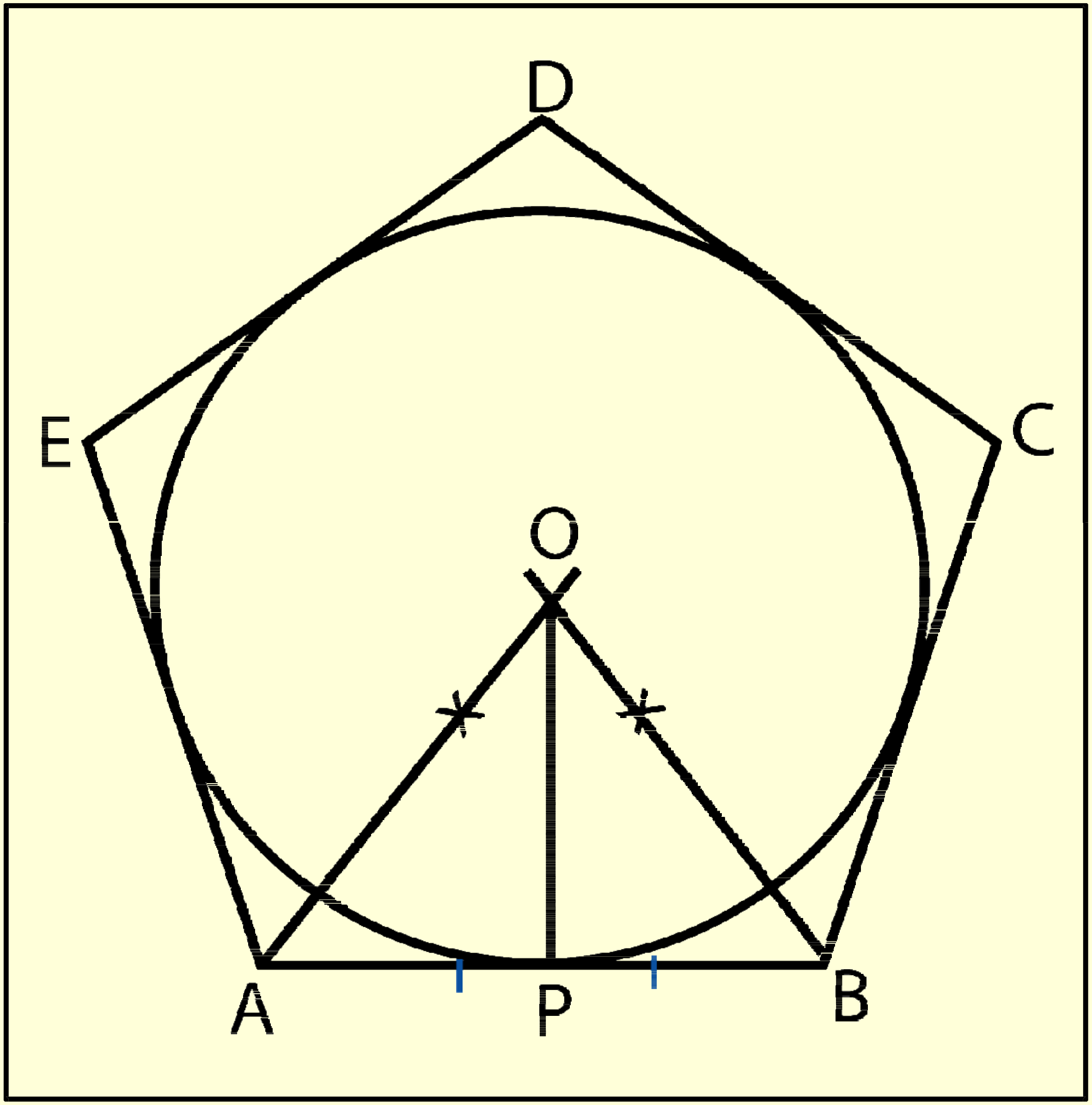
Mark point 7, 8, etc with 6-7,7-8,etc. = 4-5 to get the centers of circles of heptagon and octagon, etc.





Inscribe a circle inside a regular polygon

- Bisect any two adjacent internal angles of the polygon.
- From the intersection of these lines, draw a perpendicular to any one side of the polygon (say OP).
- With OP as radius, draw the circle with O as center.



Inscribe a regular polygon of any number of sides (say n = 5), in a circle

Draw the circle with diameter AB.

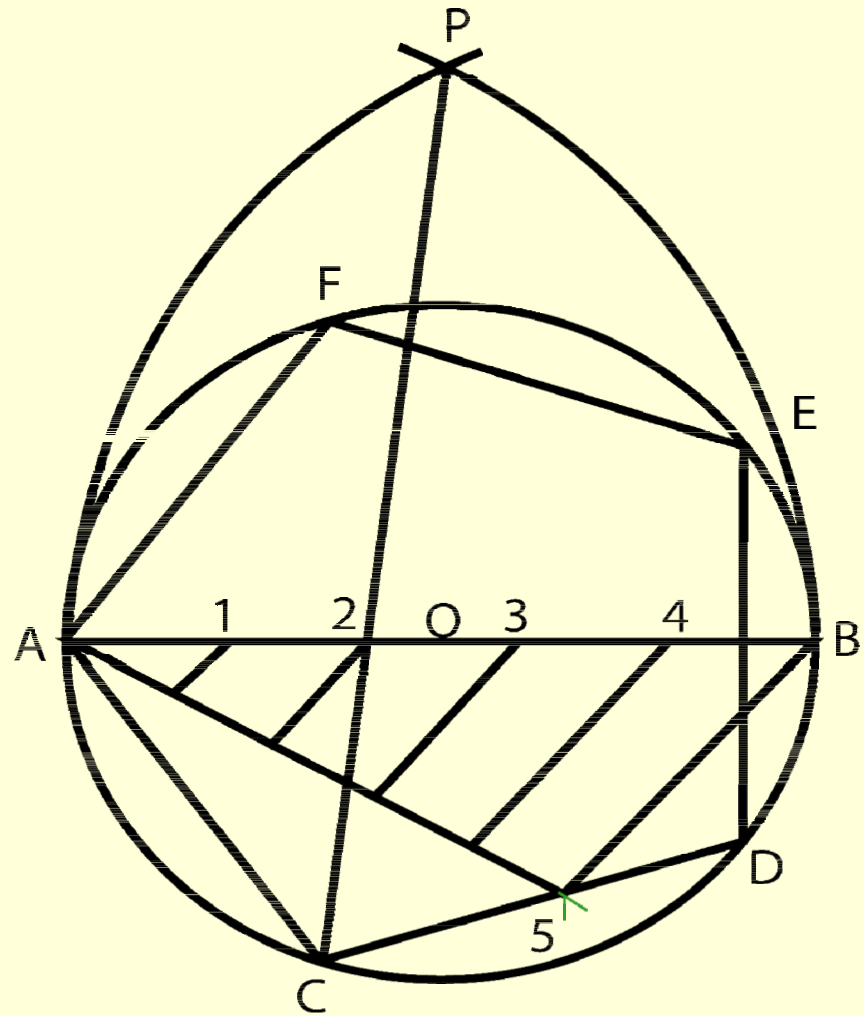
Divide AB in to “n” equal parts

Number them.

With center A & B and radius AB, draw arcs to intersect at P.

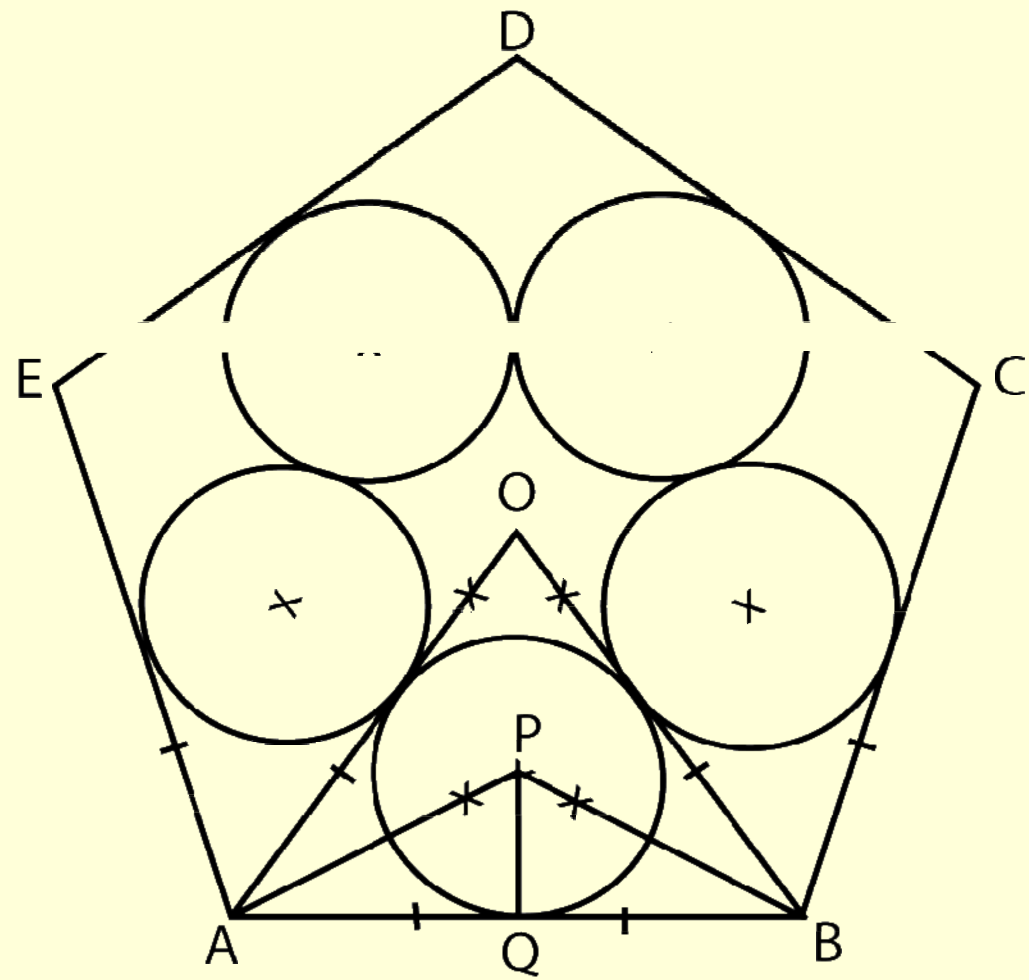
Draw line P2 and produce it to meet the circle at C.

AC is the length of the side of the polygon.



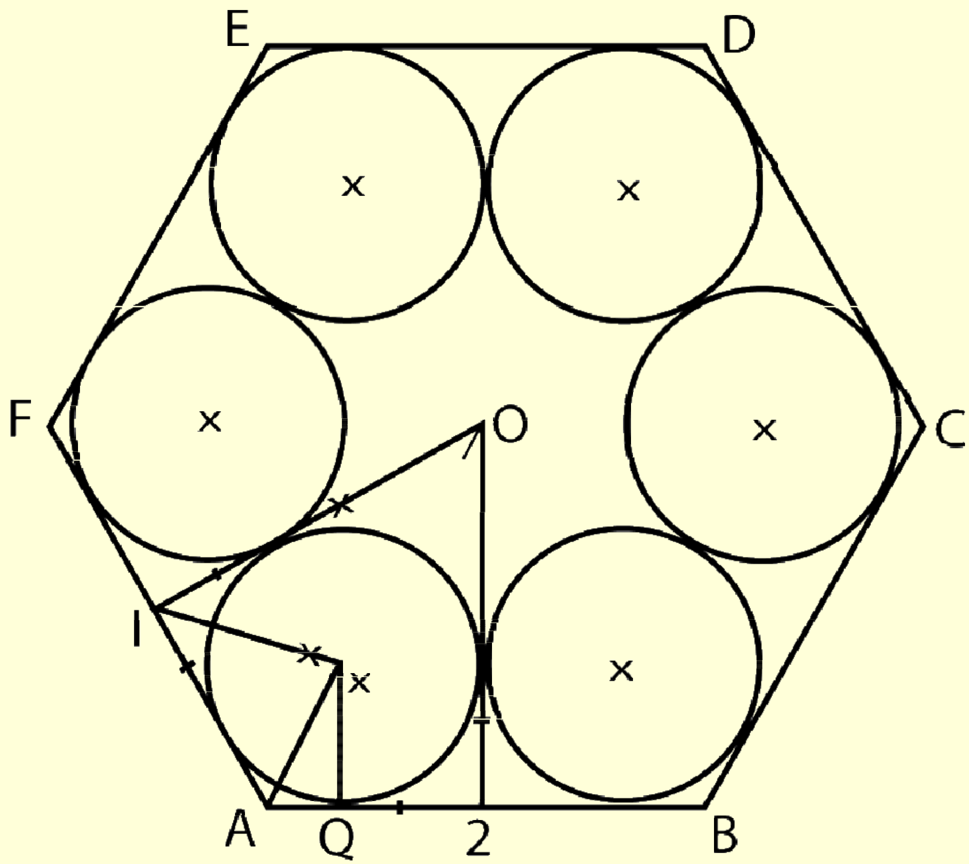
Inside a regular polygon, draw the same number of equal circles as the side of the polygon, each circle touching one side of the polygon and two of the other circles.

- **Draw bisectors of all the angles of the polygon, meeting at O, thus dividing the polygon into the same number of triangles.**
- **In each triangle inscribe a circle.**



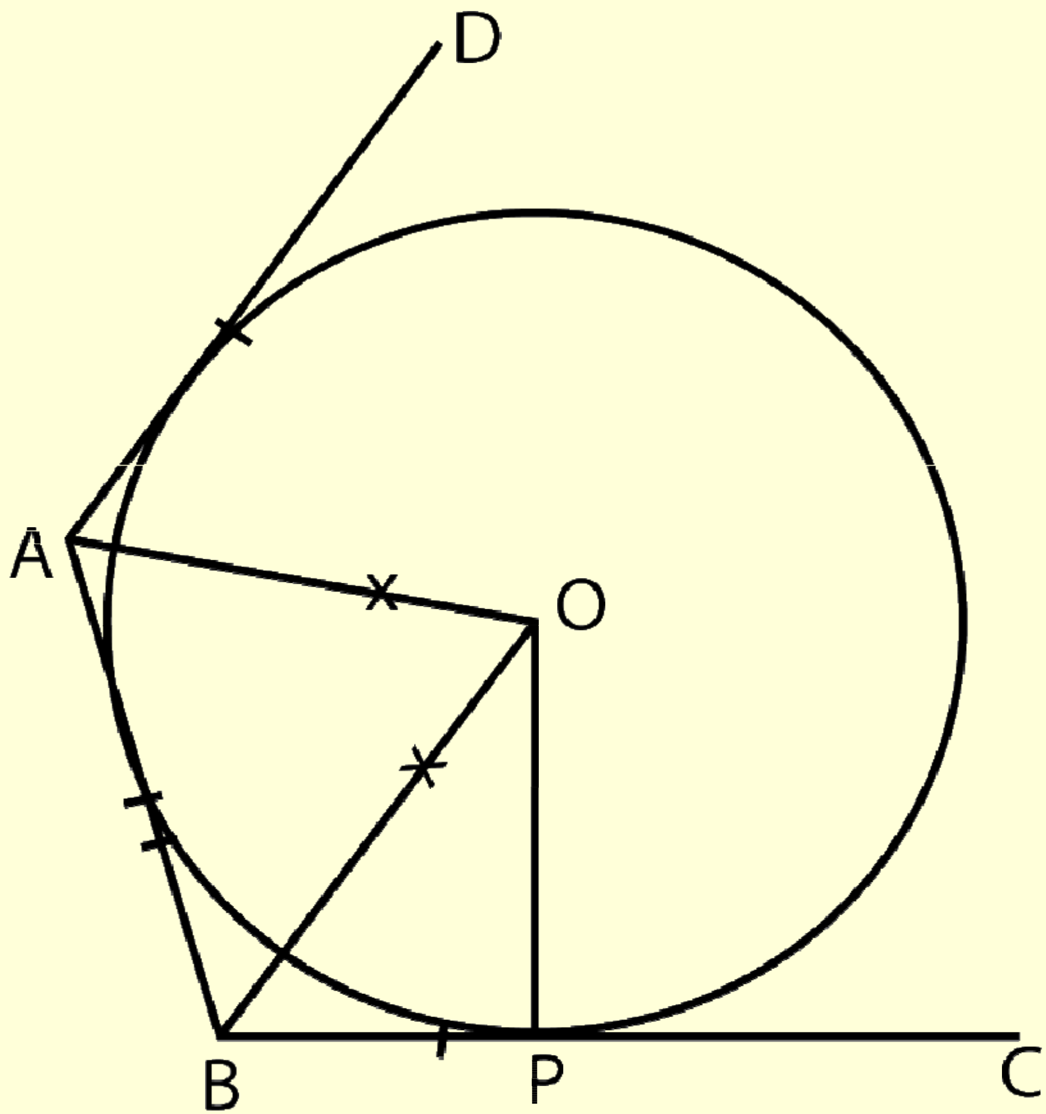
Inside a regular polygon, draw the same number of equal circles as the side of the polygon, each circle touching two adjacent sides of the polygon and two of the other circles.

- **Draw the perpendicular bisectors of the sides of the polygon to obtain same number of quadrilaterals as the number of sides of the polygon.**
- **Inscribe a circle inside each quadrilateral.**



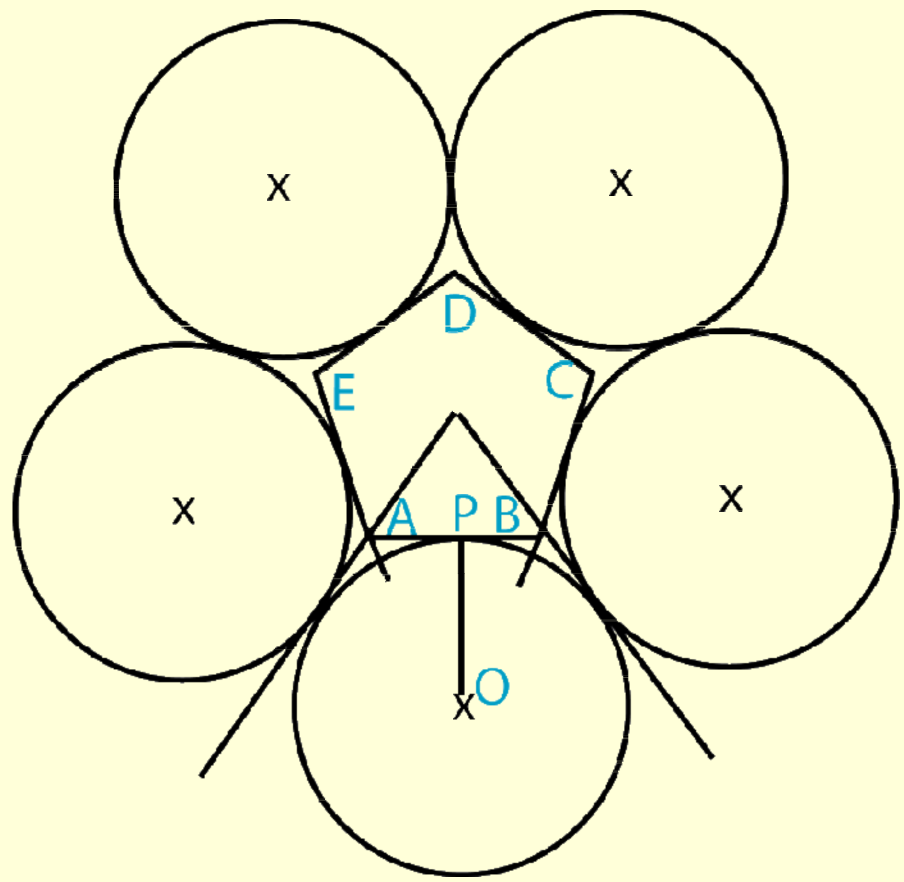
To draw a circle touching three lines inclined to each other but not forming a triangle.

- Let AB, BC, and AD be the lines.
- Draw bisectors of the two angles, intersecting at O.
- From O draw a perpendicular to any one line intersecting it at P.
- With O as center and OP as radius draw the desired circle.



Outside a regular polygon, draw the same number of equal circles as the side of the polygon, each circle touching one side of the polygon and two of the other circles.

- **Draw bisectors of two adjacent angles and produce them outside the polygon.**
- **Draw a circle touching the extended bisectors and the side AB (in this case) and repeat the same for other sides.**



Construction of an arc tangent of given radius to two given arcs

- **Given - Arcs of radii M and N. Draw an arc of radius AB units which is tangent to both the given arcs. Centers of the given arcs are inside the required tangent arc.**

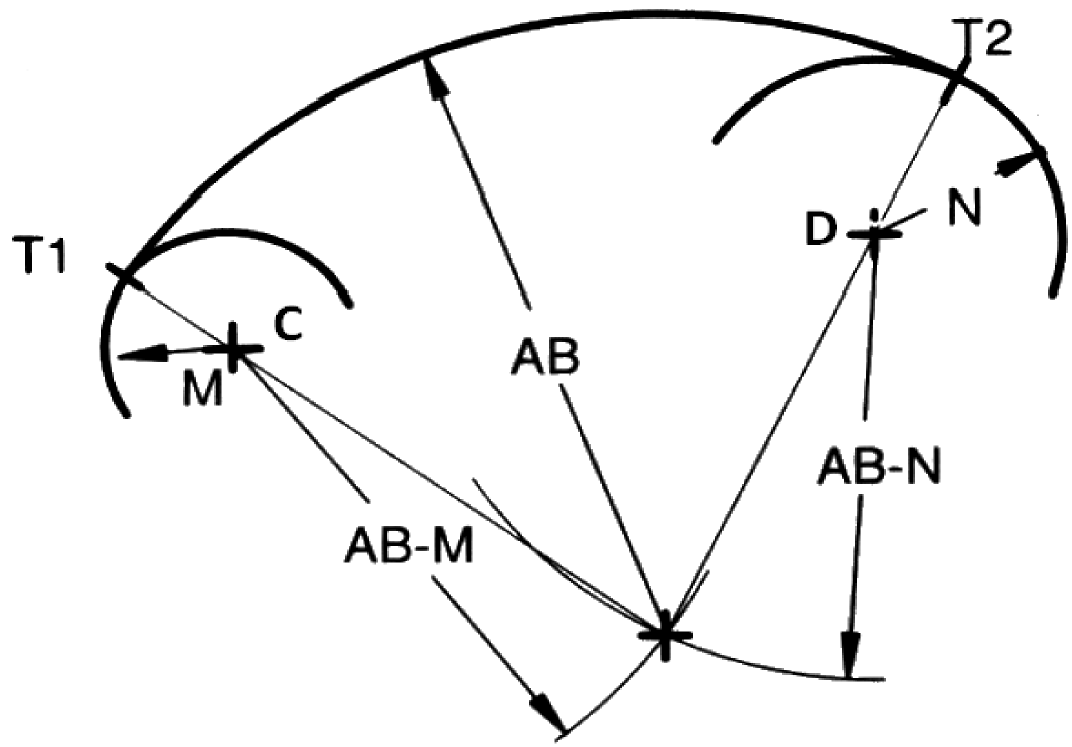
Steps:

From centers C and D of the given arcs, draw construction arcs of radii (AB – M) and (AB N), respectively.

With the intersection point as the center, draw an arc of radius AB.

This arc will be tangent to the two given arcs.

Locate the tangent points T1 and T2.



Construction of line tangents to two circles (Open belt)

Given: Circles of radii R1 and R with centers O and P, respectively.

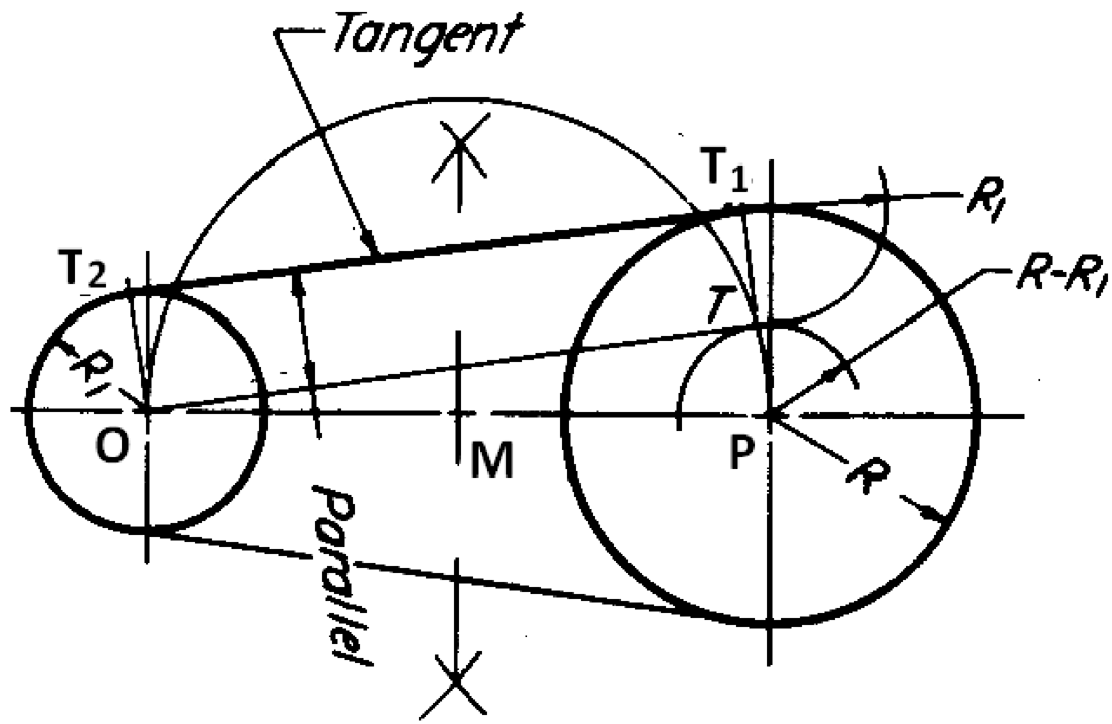
Steps:

With P as center and a radius equal to **(R-R1)** draw an arc.

Locate the midpoint of **OP** as perpendicular bisector of **OP** as "**M**".

With as centre and as radius draw a semicircle.

Locate the intersection point **T** between the semicircle and the circle with radius (**R-R1**).



draw a line **PT** and extend it to locate **T1**.

Draw **OT2** parallel to **PT1**.

The line **T1** to **T2** is the required tangent

Construction of line tangents to two circles (crossed belt)

Given: Two circles of radii R1 and R with centers O and P, respectively.

Steps:

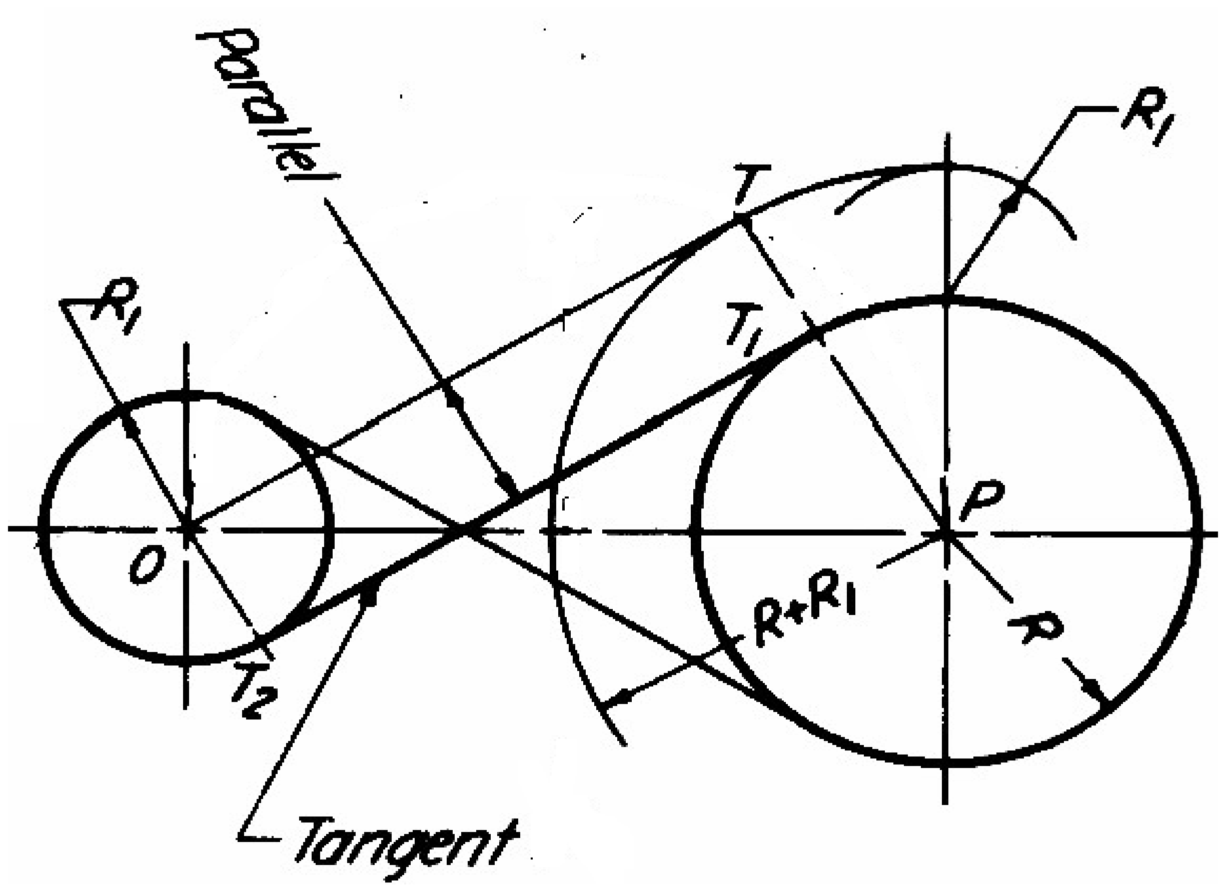
Using **P** as a center and a radius equal to **(R+ R1)** draw an arc.

Through **O** draw a tangent to this arc.

Draw a line PT cutting the circle at T_1

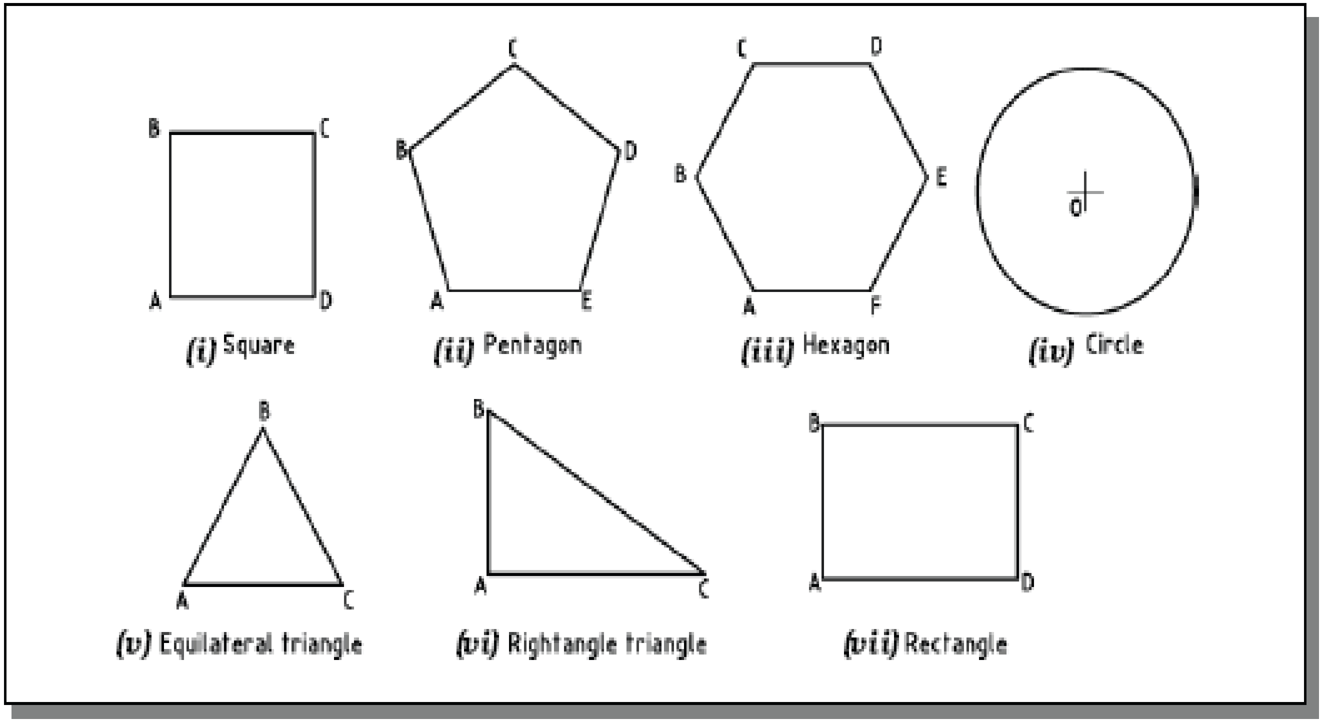
Through O draw a line OT_2 parallel to PT_1.

The line $\mathbf{T_1T_2}$ is the required tangent.



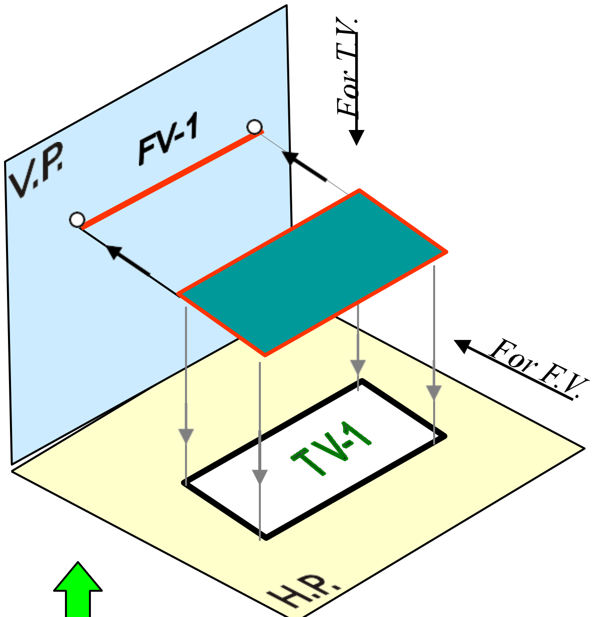
PROJECTIONS OF PLANES

A plane is a two dimensional object having length and breadth only. Its thickness is always neglected. Various shapes of plane figures are considered such as square, rectangle, circle, pentagon, hexagon, etc.

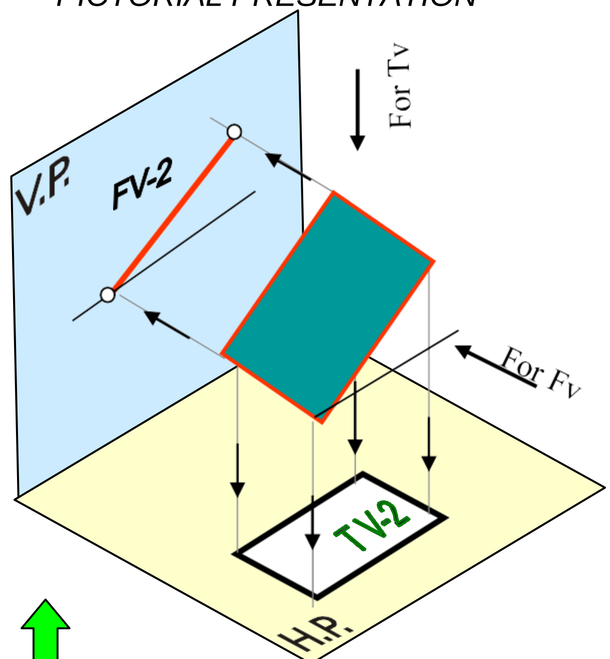


CASE OF A RECTANGLE – OBSERVE AND NOTE ALL STEPS.

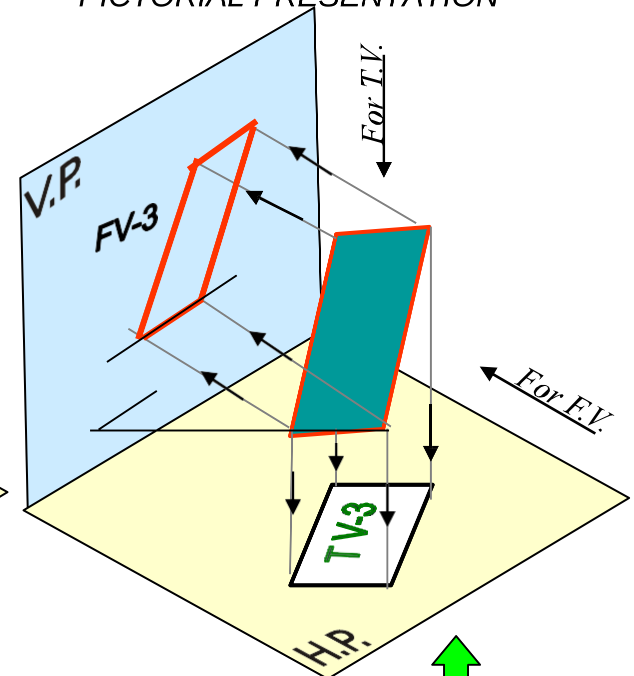
SURFACE **PARALLEL** TO HP
PICTORIAL PRESENTATION



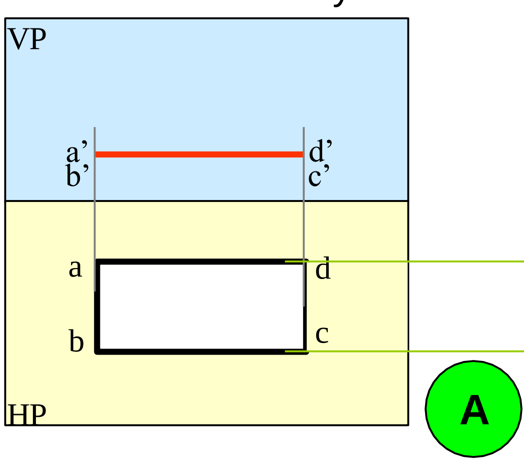
SURFACE **INCLINED** TO HP
PICTORIAL PRESENTATION



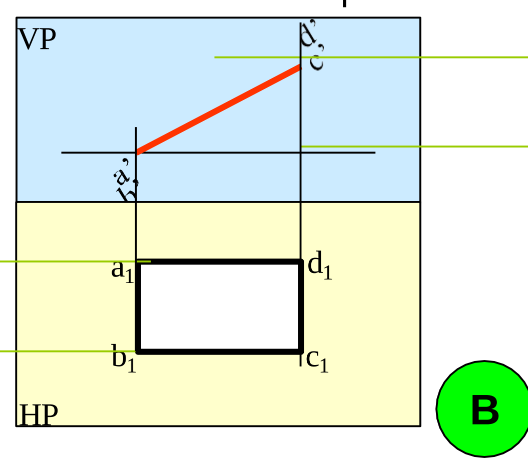
ONE SMALL SIDE INCLINED TO VP
PICTORIAL PRESENTATION



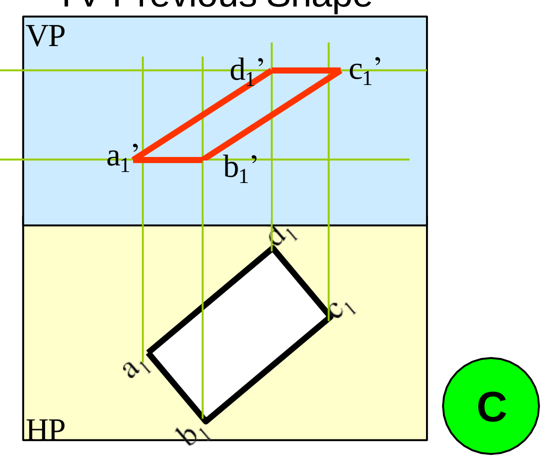
ORTHOGRAPHIC
TV-True Shape
FV- Line // to xy



ORTHOGRAPHIC
FV- Inclined to XY
TV- Reduced Shape



ORTHOGRAPHIC
FV- Apparent Shape
TV-Previous Shape



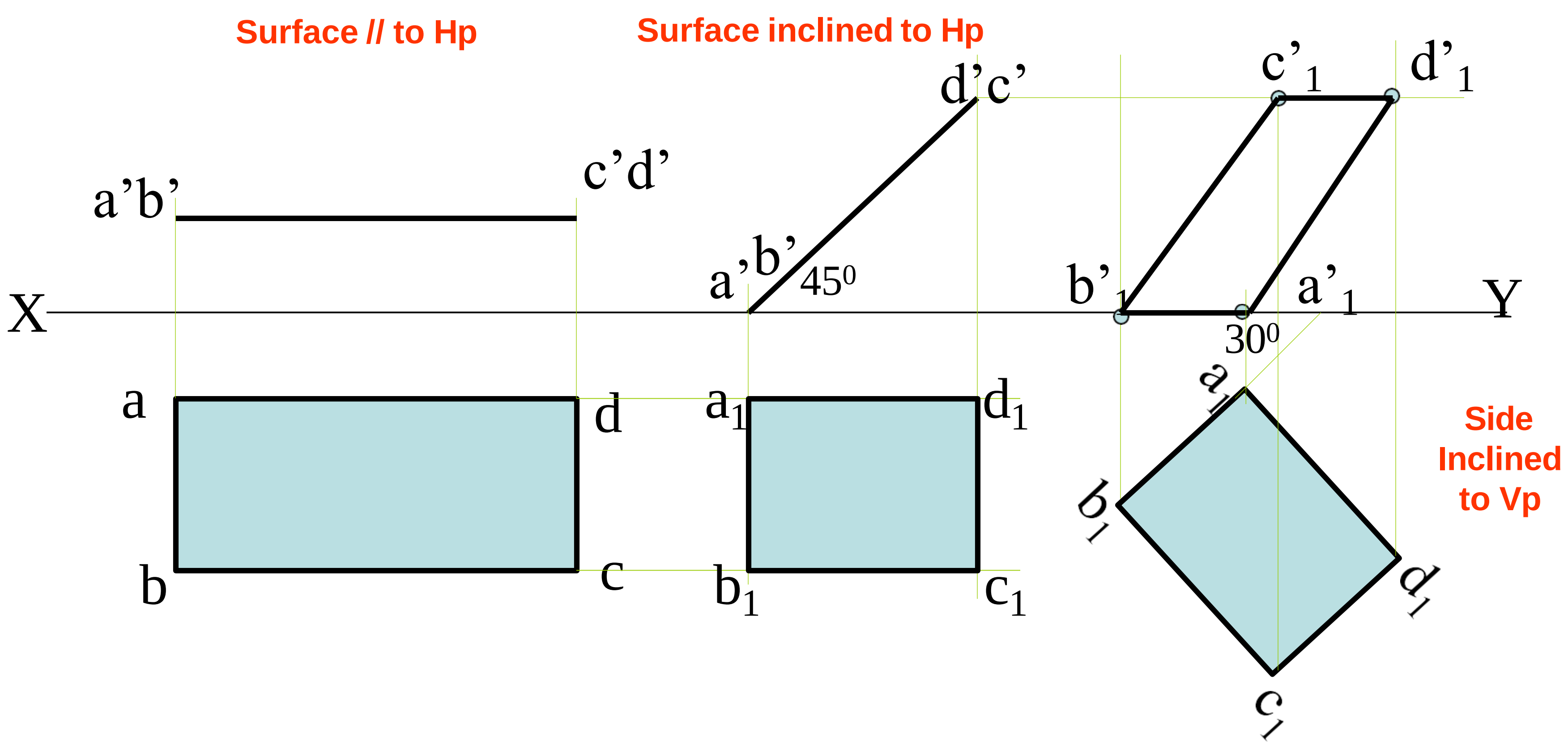
Problem 1:

Rectangle 30mm and 50mm sides is resting on HP on one small side which is 30^0 inclined to VP,while the surface of the plane makes 45^0 inclination with HP. Draw it's projections.

Read problem and answer following questions

1. Surface inclined to which plane? ------- HP
2. Assumption for initial position? ------// to HP
3. So which view will show True shape? --- TV
4. Which side will be vertical? ---One small side.

Hence begin with TV, draw rectangle below X-Y drawing one small side vertical.

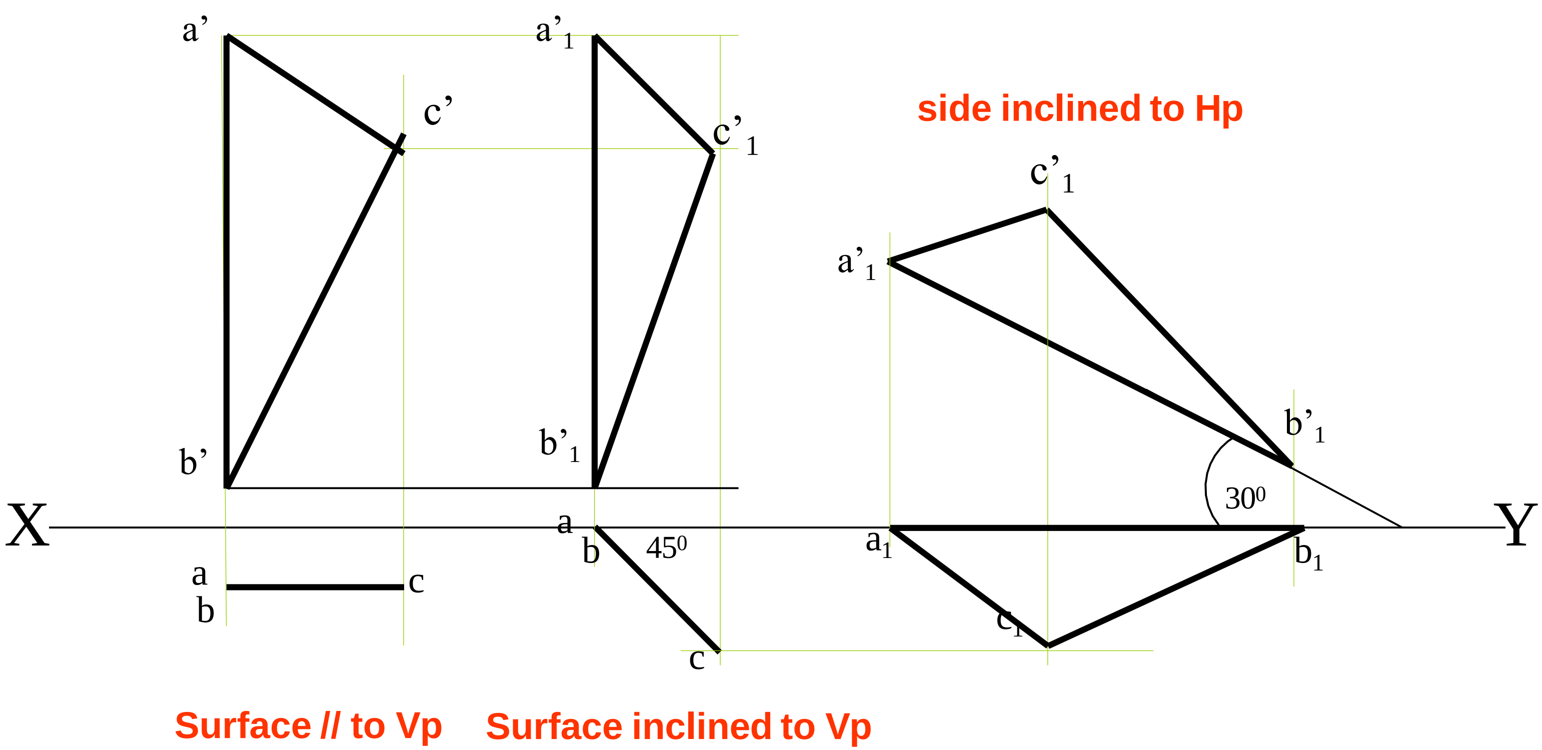


Problem 2:
A 30⁰ – 60⁰ set square of longest side 100 mm long, is in VP and 30⁰ inclined to HP while it's surface is 45⁰ inclined to VP.Draw it's projections

(Surface & Side inclinations directly given)

Read problem and answer following questions
1 .Surface inclined to which plane? ------- VP
2. Assumption for initial position? ------// to VP
3. So which view will show True shape? --- FV
4. Which side will be vertical? ------longest side.

Hence begin with FV, draw triangle above X-Y keeping longest side vertical.



Problem 3:

A $30^0 - 60^0$ set square of longest side 100 mm long is in VP and it's surface 45^0 inclined to VP. One end of longest side is 10 mm and other end is 35 mm above HP. Draw it's projections

(Surface inclination directly given. Side inclination indirectly given)

Read problem and answer following questions

1 .Surface inclined to which plane? ------- VP

2. Assumption for initial position? ------// to VP

3. So which view will show True shape? --- FV

4. Which side will be vertical? ------longest side.

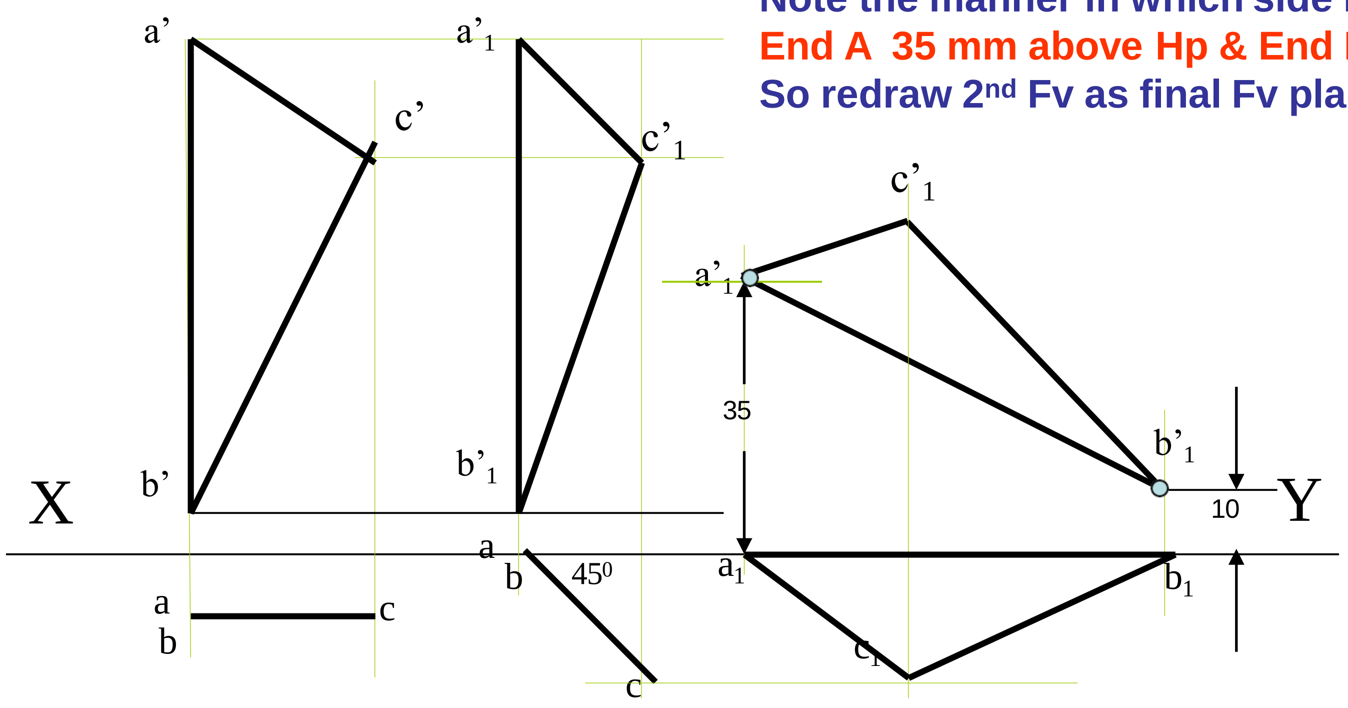
Hence begin with FV, draw triangle above X-Y keeping longest side vertical.

First TWO steps are similar to previous problem.

Note the manner in which side inclination is given.

End A 35 mm above Hp & End B is 10 mm above Hp.

So redraw 2nd Fv as final Fv placing these ends as said.



Problem 4:

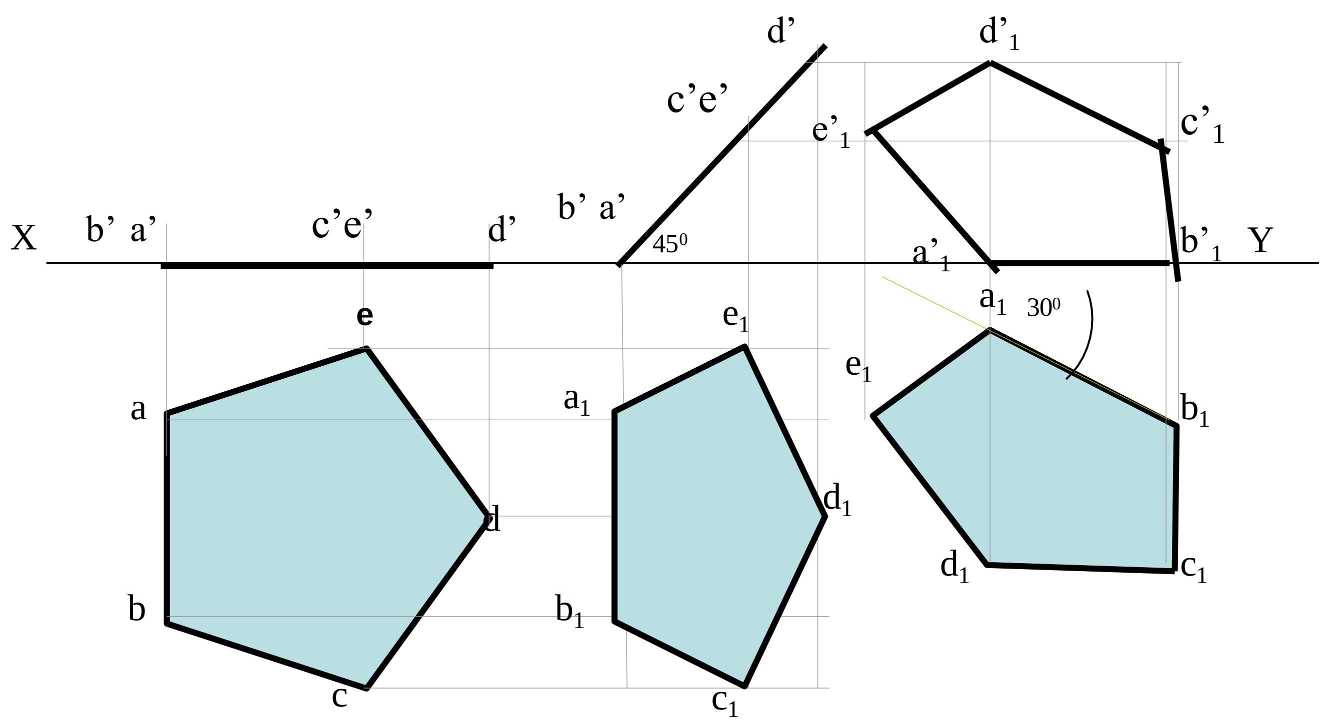
A regular pentagon of 30 mm sides is resting on HP on one of it's sides with it's surface 45^0 inclined to HP.
Draw it's projections when the side in HP makes 30^0 angle with VP

SURFACE AND SIDE INCLINATIONS ARE DIRECTLY GIVEN.

Read problem and answer following questions

1. Surface inclined to which plane? ------- ***HP***
2. Assumption for initial position? ------ ***// to HP***
3. So which view will show True shape? --- ***TV***
4. Which side will be vertical? -------- ***any side.***

Hence begin with TV,draw pentagon below X-Y line, taking one side vertical.



Problem 5:

A regular pentagon of 30 mm sides is resting on HP on one of it's sides while it's opposite vertex (corner) is 30 mm above HP.
Draw projections when side in HP is 30^0 inclined to VP.

Read problem and answer following questions

1. Surface inclined to which plane? ------- ***HP***
2. Assumption for initial position? ------ ***// to HP***
3. So which view will show True shape? --- ***TV***
4. Which side will be vertical? --------***any side.***

Hence begin with TV,draw pentagon below X-Y line, taking one side vertical.

SURFACE INCLINATION INDIRECTLY GIVEN
SIDE INCLINATION DIRECTLY GIVEN:

ONLY CHANGE is
the manner in which surface inclination is described:
One side on Hp & it's opposite corner 30 mm above Hp.
Hence redraw 1st Fv as a 2nd Fv making above arrangement.
Keep a'b' on xy & d' 30 mm above xy.