BASED ON LATEST REVISED SYLLABUS
SUB ENGINEER & ASSISTANT –SUB ENGINEER

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ENGINEERING LOKSEWA MENTOR [DRAWING :SUBJECTIVE + OBJECTIVE]

BASED ON LOKSEWA NEW SYALLABUS OF SUB-ENGINEER & ASS.SUB -ENGINEER

संघ | प्रदेश | स्थानीय

FOR COMPETITIVE EXAMINATIONS

- General Awareness and contemporary Issues
- General Ability Test
- Brief Subjective Theories
- Objective Questions & Answers [Including Old Questions]
- Prevailing Acts and Regulations of Nepal

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ENGINEERING AADA72
VIP ENGINEERING LOKSEWA
ENGINEERING LOKSEWA MENTOR

ENGINEERING ADDA 72 / VIP ENGINEERING LOKSEWA
Engineering Drawing
ASSISTANT SUB ENGINEER

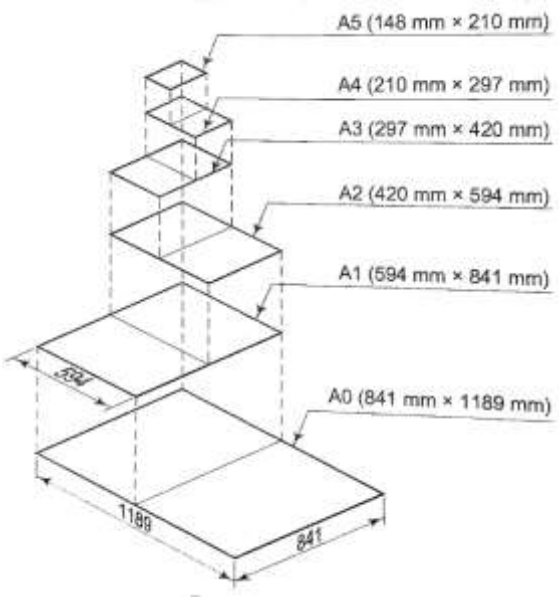
- **Introduction**
  - Art of representation of an object by systematic line on paper.
  - 3D object are represented in 2D drawing sheet.
  - It is graphical universal language of engineers.
  - It is used for effective communication of engineering.
- **Importance of engineering Drawing**
  - To archive (Historical records and documents) the geometric form of design.
  - To act as an analyzing tool.
  - Engineering drawings are used to fully and clearly define the requirements of an engineered item.
  - An engineering drawing communicates what is required
- **Aims**
  - To introduce orthographic projection
  - Introduce isometric drawing
  - Present the 1^{st} angle and 3^{rd} angle projection
- **Objective of engineering Drawing**
  - To know about different types of lines & use of different types of pencils in an Engineering Drawing.
  - To know how to represents letters & numbers in drawing sheet.
  - To know about different types of projection.
  - To know projection of points, straight lines, solids etc.
  - To know development of different types of surfaces.

Generally there are two type of drawing.

- **Artistic Drawing**
  - It is the free hand sketch with no rules, boundaries, dimensions and scale etc.
  - This drawing is drawn and used by non-technical person.
  - It does not convey technical information such as size, scale etc.
  - The person who draws artistic drawing is called artist.
- **Engineering Drawing**
  - It is sketch with fixed rule, boundaries, dimensions and scale etc.
  - This is also called technical drawing or Draughting or Drafting.
  - This person who draws technical Drawing is called draughtsman, draft person or drafter.
  - This is drawn and used by technical person.
  - It conveys technical information such as Size, Scale, etc. so this is called language of engineers.

- **Standard drawing sheet According to ISI**

S.N	Designation	Size (Breadth × Length) mm		Area (m^2)
1	* A_0	841	1189	1
2	A_1	594	841	0.5
3	A_2	420	594	0.25
4	*A_3	297	420	0.125
5	*A_4	210	297	0.0624
6	A_5	148	210	So on
7	A_6	105	148	
8	A_7	74	105	
9	A_8	52	74	
10	A_9	37	52	
11	A_{10}	26	37	



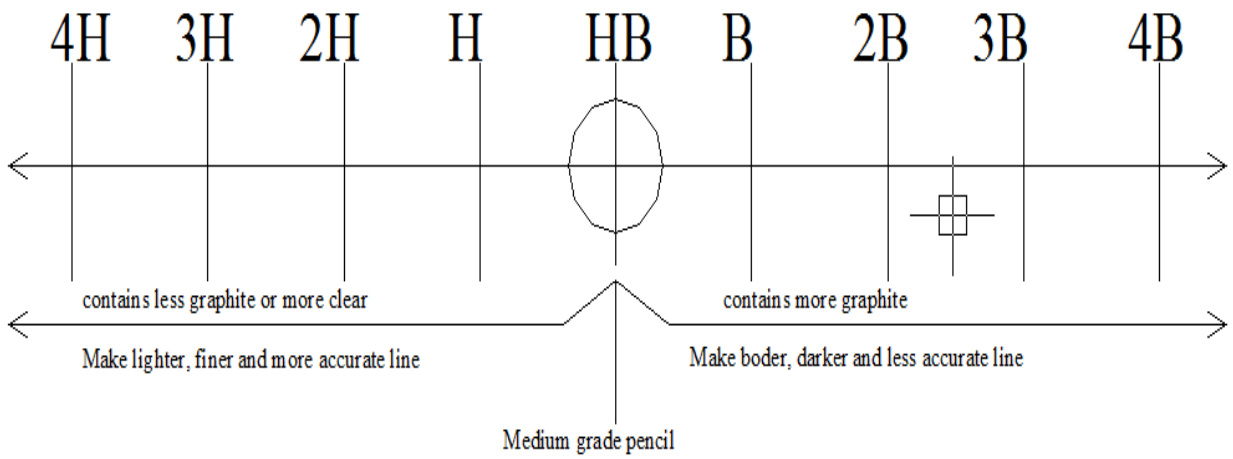
Note: - L=B×√2 Area of drawing sheet is calculated by $A_n = (L*B)$

Note: - Drawing paper has Smooth and rough face.

- **Smooth face** – To draw final and fair drawing using instrument.
- **Rough face** – It is preferred for free hand sketch

- **Drafting tools and materials:**
  - Some tools are as bellow
  - Duster, Pencil, Cello tape, drawing board, Erasing shield, Instrument box, pencil sharpener, Scales, T-squire, Set-square, Tracing paper, clinograph (adjustable set-square), pin etc.
  - **Pencil:**
    - Pencil having standard lead thickness is used
    - Accuracy and appearance largely depends on quality of pencil
    - Usual line width or thickness are 0.8mm, 0.25mm, 0.5mm and 0.7mm.
    - Hardness and softness is denoted by latter **H** and **B.**

H = hard (Hardness)
B = Soft (softness), black

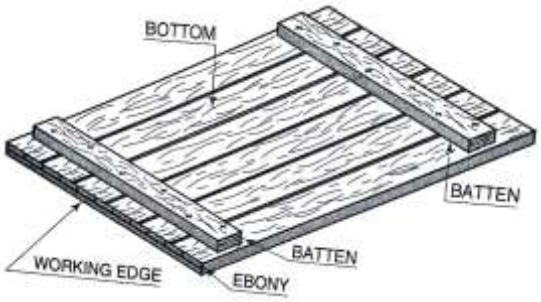


- **Drawing Sheet:**
  - Paper should be enough, tough, uniform thickness, white as possible.
- **Drafting board:**
  - Made of 4-6 strip of well-seasoned soft wood
  - Top surface is smooth and bottom is cleated by two battens to prevent warping.

(Note: - Board size > paper size)

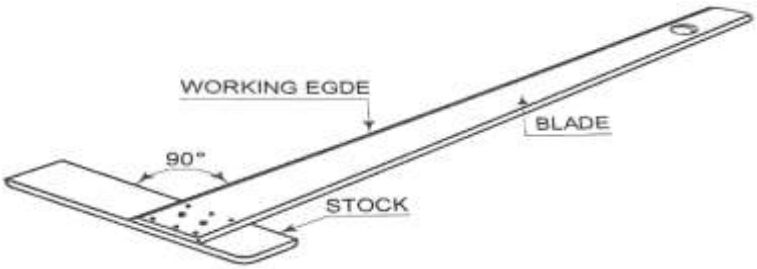
Standard dimension of drawing board as per Indian standard Institution (I.S.I)

Designation	*Size (mm*	*Suitable drawing size*
B_0	1500 × 1000 × 25	A_0
B_1	1000 × 700 × 25	A_1
B_2	700 × 500 × 15	A_2
B_3	500 × 350 × 15	A_3

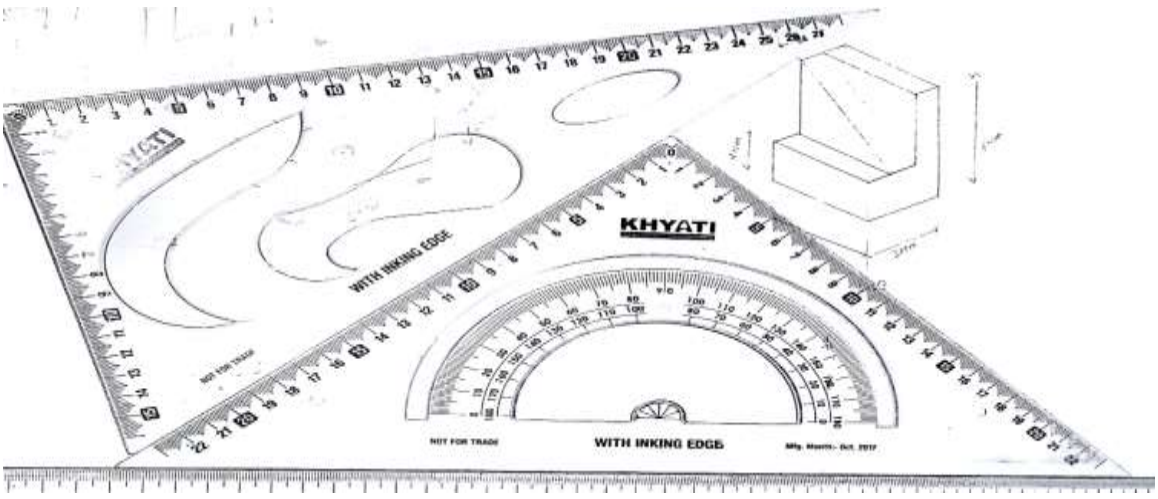


- **T-square:**
  - It is made by hard wood, metal, plastic or celluloid (A thin transparent plastic)
  - Stoke moves along working face of drawing board.
  - Blade acts as base for set-square and used for making horizontal line.

Designation	Size of working edge (mm)
T_0	1500 ± 10
T_1	1000 ± 10
T_2	700 ± 5
T_3	500 ± 5



- **Set-square:**
  - Triangular in shaped and made of **wood**, **tin**, **plastic** or **celluloid**.
  - Used to draw **parallel** and **perpendicular** to any given line
  - We can draw 15°,30°,45°,60°,75°,90° using set square (i.e. multiple of 15°)
  - Circle can be divided into **Four, Six, Eight, Twelve** and **twenty four** equal parts using set-square and T-square.

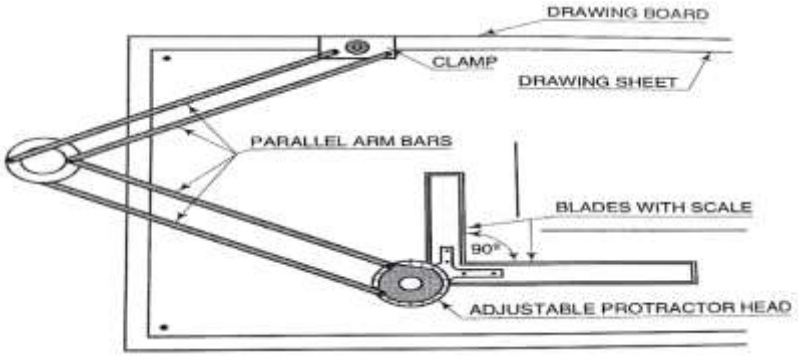


- **Protector:**
  - Triangular in shaped and made of **wood**, **tin**, **plastic** or **celluloid.**
  - It is used to draw and measured angle.
  - Least count of protector is **1°**
  - Diameter of protector is **100mm**
  - Diameter of semi-circle is also called **base of protector.**

- **Scale/ Ruler:**
  - Made of **wood**, **tin**, **plastic** or **celluloid.**
  - Used to draw specific length and measured lines.
  - Least count **(L.C)= 1mm**
  - **Shape of scale is Flat and triangular**

Note:- common uses scale
• **15 cm long scale -2 cm wide**
• **30 cm long scale -3 cm wide**
Thy are 1mm thick usually

- **Drafting machine / Drafter:**
  - Combination of T-square, Set square, protector and scale.
  - Used to draw and measure any length and angle**.**



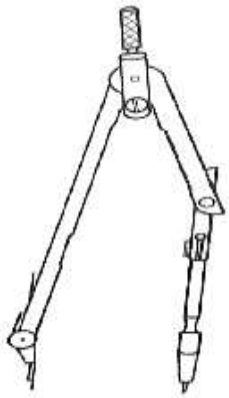


FIG. 1-19

- **French curve:**
  - Made of **wood**, **tin**, **plastic** or **celluloid.**
  - Used to draw **irregular arc, curve** etc.
- **Compass:**
  - The compass is used to drawing arc of circles.
  - If we need draw a circle **up to 120mm**, leg of compass kept at knee joint.

    The two legs of compass perpendicular to the surface of paper.

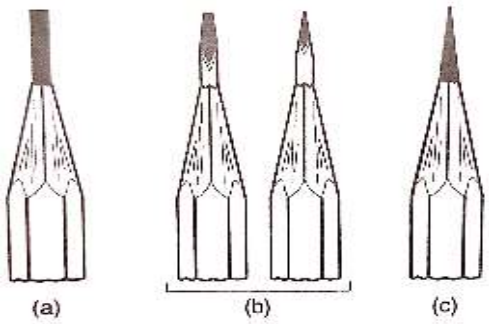


Figure :- conical & chisel edge pencil

i. **Bow compass** = used for drawing small diameter of circle.
ii. **Drop compass** = used to draw very small diameter.

Figure 2 Drop compass

Figure 1 Bow compass

- **Types of pencil according to way of mending (मर्मत)**
  - **Conical edge pencil: -**
    - it is used in sketch work and for lettering
  - **Chisel edge pencil: -**
    - It is papered by rubbing the lead on a send paper block
    - It is used for drawing straight line
    - Used for drawing long thin lines of uniform thickness

Divider:-

- It is a pair of compass, also known as a compass, is a technical

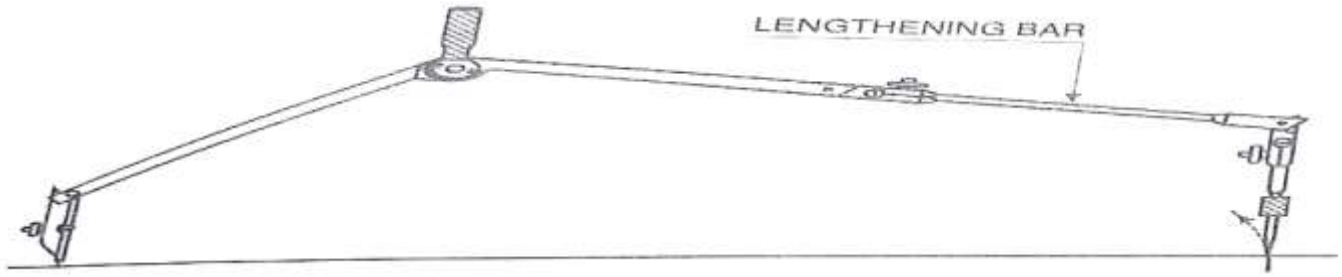
  Drawing instrument.
- Divider has two legs hinged (it means resist horizontal and vertical forces but not moment) at upper end.
- Divider has not knee joint.

USES:

- To divide curved/straight line into desired number of equal parts.
- It is used to transfer dimension from one part to another part of drawing.
- To set-off given distances from the scale to the drawing.

For draw very large radius of arc

-Remove the pencil point from knee joint



-The lengthening bar can be inserted for increase radius of arc.

Note: - It is used to draw circle or arc more than 150mm radius.

- **Inking pen:**
  - Used to draw straight line and non-circular arcs in ink.
  - It consist of pair of steel nibs.
  - Ink Pen is used to draw the blueprints by architects and draftsmen.
- **Tracing paper:**
  - It is also known as drafting vellum
  - Thin, transparent paper that you use for copying a picture by putting it on top of the picture and drawing over its lines.
- **Clinograph**
  - It is an adjustable set-square and used to draw parallel line at any inclination
  - Two sides of clinograph are fixed at 90° and third side can be adjusted at any desired angle
- **Duster**
  - Duster should be preferably be towel cloth larger size than drawing board
  - Before starting work all instruments and materials should be thoroughly cleaned with the duster.
- **Erasing shield**
  - It is used to protect the adjoining lines on the drawing when same parts of line being erased

- **Sand paper block**
  - Wooden block about (150mm×50mm ×12mm) thick
  - It helps to sharpening the pencil lead every few minutes.

- **Drafting techniques and methods in common practice**
  - Line is the combination of at least two points.
  - For details of various object are drawn by different line
  - Each line have definite purpose.

Note: - **Thick line**: - out line edge of the drawing

Thin line: - used in dimension, extension or projection, leader line and hatching line etc.

Different types of lines and effect

Line	Description	General applications
A	Continuous thick or Continuous wide	Visible outlines, visible edges; crests of screw threads; limits of length of full deph thread,lines of cuts and section arrows; parting lines of moulds in views; main representations in diagrams, maps, flow charts; system lines(structural metal engg.)
B	Continuous thin (narrow) (straight or curved)	Imaginary lines of intersection; grid, dimension, extension, projection, short centre, leader, reference lines; hatching; outlines of revolved sections; root of screw threads; interpretation lines of tapered features; framing of details; indication of repetitiv details;
C	Continuous thin (narrow) freehand	Limits of partial or interrupted views and sections, if the limit is not a chain thin line
D	Continuous thin (narrow) with zigzags (straight)	Long-break line
E	Dashed thick (wide)	Line showing permissible of surface treatment
F	Dashed thin (narrow)	Hidden outlines; hidden edges
G	Chain thin Long-dashed dotted (narrow)	Centre line; lines of symmetry; trajectories; pitch circle of gears, pitch circle of holes,
H THICK THIN THICK	Chain thin (narrow) with thick (wide) at the ends and at changing of position	Cutting planes
J	Chain thick or Long-dashed dotted (wide)	Indication of lines or surfaces to which a special requirement applies
K	Chain thin double-dashed or long-dashed double-dotted (narrow)	Outlines of adjacent parts Alternative and extreme positions of movable parts Centroidal lines Initial outlines prior to forming Parts situated in front of the cutting plane

Line Type	Uses and effects
Center line (G)	It draw to indicate the axis of cylindrical, conical or spherical object
Construction line (B)	They are used to constructing object. **These are continuous thin light line**
Out line (A)/margin line	Visible line draw represent edge boundary, continuous thick or wide, principle line

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Extension or projection line (B)	It is continuous thin lines. they extend beyond the 3mm the dimension line
Dimension line (B)	It is continuous thin lines. Arrow head is about three times of its width
Hatching or section line (B)	They are at an angle 45° spaced between two line about 1mm-2mm apart
leader or pointer line (B)	It draw to connect a note with the feature
Short break line (C)	Continuous, thin and wavy, drawn by free hand, used to show short break or irregular boundaries.
long break line (D)	Thin ruled lines with short zigzags within them, it show long break
Hidden or dot lines (E or F)	It also dot line (it is 2mm long and 1mm spaced between them)
Horizontal line	Zero slope, parallel to horizon, all points have same coordinate
Vertical line	Parallel to y-axis, No slope, all point have same x-coordinate
Inclined line	Deviating from X and Y coordinate, triangle used to draw 30°, 45° and 60°

Note:-

Out line, dotted line, cutting plane line	**0.2mm** (medium)	**Lines and used pencil**
Dimension line, Centre line Sectional line, Extension line Construction lie, leader line Short break line Long break line	**0.1mm** (Thin)	• Initial work or construction lines -- **H** pencil is used • Outline, dotted lines, section plane lines, dimension lines, arrowheads – **2H** • Center lines and section lines – **3H OR 4H** **-Center line –long dashes are 9 to 12 mm and dot and long spaced is 1mm apart.**

- **Representation of different materials: stone, timber, glass, metal, brick, concrete, sand, earth, tile, plaster**

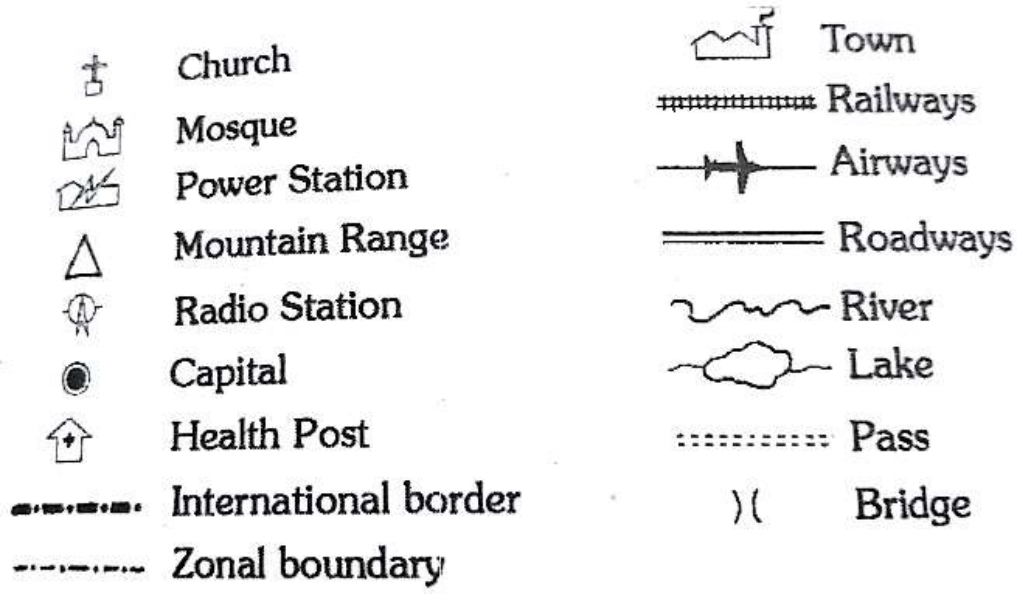


Fig:6.2. Symbols for various features

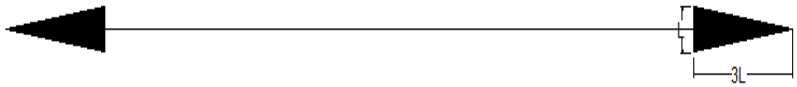
S.No.	Materials	Convention
1	steel, Cast Iron Copper Aluminium and its Alloys etc	
2	Lead, Zinc, Tin, White Metal etc.	
3	Brass, Bronze, Gun Metal etc.	
4	Glass	
5	Procelain, Stone Ware, Marble, Slate etc	
6	Asbestos, Felt, Paper, Meca, Cork, Rubber, LeatyherWax, Insulating-Materials	
7	Wood, Plywood etc.	
8	Earth	
9	Brick Work, Masonty, Fire Bricks etc.	
10	Concrete	
11	Water, Oil, Petrol, Kerosine etc.	

- **<u>Dimensioning: element to element, Centre to Centre and overall dimensioning</u>**
    - Dimensioning is the process of measuring either the area or the volume that an object occupies.

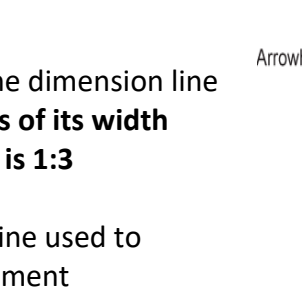
- Placing numbers (MEASUREMENTS) on a drawing.
- Those number shows **SIZE** and **LOCATION.**
- SIZE shows how big or small (like Length, breath, diameter etc.)
- LOCATION show exactly <u>where.</u>

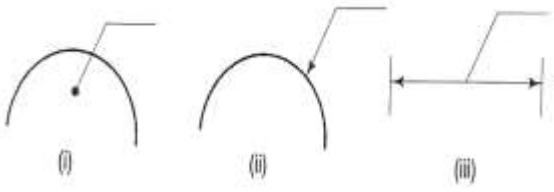
- Notation of dimension
- System of dimension
- Theory of dimension
- General rule of dimension

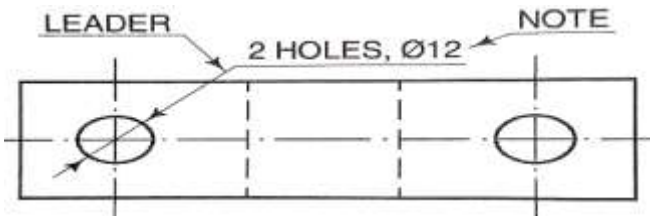
- **<u>Notation of dimension</u>**



- It consist of
  - Arrow heads:
    - Used to terminate the dimension line
    - **Length is three times of its width**
    - **Ratio of arrow head is 1:3**
  - Dimension line:
    - It is thin continuous line used to indicate the measurement
  - Dimension text:
    - It indicates the size of particular features of an object
  - Extension line :
    - It is connect to dimension line
    - It extending beyond the outline of object
    - It should extend 3mm beyond the dimension line
  - Leader:
    - It is thin continuous line connecting a note or a dimension
    - One end of leader is terminated by dot or arrowhead and other is horizontal line
    - Leader never drawn vertical or horizontal or curved
    - It is not less than 30° (usually 30°,45° and 60°)







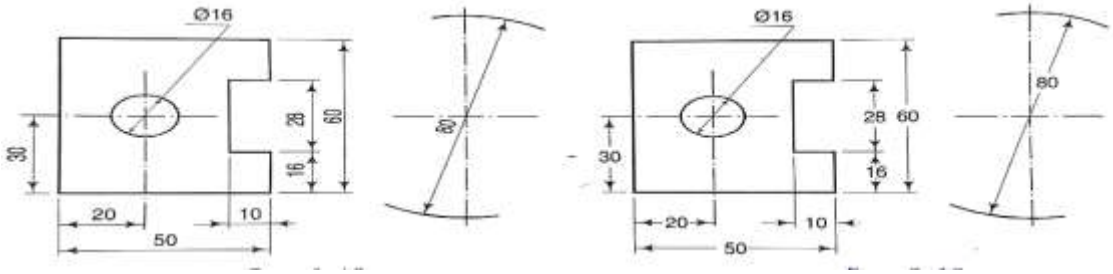
- **<u>System of dimension</u>**

The two system of placing dimensions are

- **<u>Aligned system</u>:**

- It may be read from the bottom edge or the right hand edge of the drawing sheet
- It is placed near the middle and above
- Commonly used in engineering drawing

- **<u>Unidirectional system</u>:**
  - It only read from the bottom edge of the drawing sheet.
  - It is placed by broken, dimension line in the mid
  - Used on large drawing –like aircrafts, automobiles etc.



General Rules for Dimensioning.

- Dimension lines should be placed uniformly throughout the drawing
- Dimension line never cross each other (it means not cross other dimension line)
- Dimension line should correct functioning each and every part represent in the drawing
- Every dimension must be given but should not repeated
- It should be placed on the view where its use is shown more clearly
- It should be placed outside the view
- Dimension of hidden line should be avoided
- Dimension should be one unit, prefer in mm
- Aligned system of dimensioning is recommended
- Dimension should be placed at **least 8mm apart form out lies and from one another**
- Arc of circles should given dimension in term of radius**H** and **HB** pencil are more suitable for dimensioning and lettering

- **<u>Element to element dimensioning</u>**
  - The dimension from one edge to another edge of the object
- **<u>Center to center dimensioning (c.t.c)</u>**
  - The dimension from center of one element to center of another element

- It is also called **on-center pacing**, **heart distance** and **pitch**

- **Overall dimension:**
    - It represent in 3D view
    - It include Length, Breadth, Height and inclination etc.

- **Measured Drawing**
    - The existing building object, site or details that is accurately drawn to scale on the basis of field measurement, is known as measured drawing.

- **Method of Measurement of Horizontal and Vertical Dimensions**
    - Measurement horizontal dimension
        - It is measured by following way
            - **Left to right** (across the page) – Right handed person
            - **Right to left** (across the page) - Left handed person
        - All point have the Same y-coordinate
    - Measurement vertical dimension
        - It is measured by following way
            - It is measured by straight up and down on the vertical surface
            - Parallel to y-axis
            - All point have the same x-coordinate

- **Sectional measurements**
    - A section or subdivision of large whole element is called section.
    - It is obtained by cutting perpendicular, parallel, tangential, inclined of its axis
    - **Overall Length:-**Total measurement of both the right arm or left arm showing full
    - **Overall width: -** Total measurement of all the components along back of element.

- **Scales: choice, use and conversion**
    - A scale is defined as the ratio of the linear dimensions of the object as represented to the actual dimensions of the element of the object itself.
    - The proportion by which we either reduce or increase the actual size of the object on a drawing is known as scale.

- Scale = $\frac{Dimension\ in\ drawing}{Actual\ Dimension}$

I.e. Scale = **drawing: object**

- The scale generally used for general engineering drawing are as below
  - **Full Size Scale (1:1):-**
    - The actual size is drawn in the drawing paper is called full size scale
      - It is normally used by Electrical engineers.
  - **Reducing Scale (1:2):-**
    - The actual size of object is reduced by some proportion is called reducing scale
      - It is used by civil engineers.
      - Some standard proportion are

1:2	1:5	1:10
1:20	1:50	1:100
1:200	1:500	1:1000
1:2000	1:5000	1:10000

  - **Enlarge Scale (2:1):-**
    - The actual size of the object is increased by some proportion is called enlarged scale
      - It is used by Mechanical/electronic engineers.
      - Some standard proportion are

2:1	5:1	10:1
20:1	50:1	

- **Suitability of scale**
  - **Topographical maps:**
    - **1cm = 2.5 km** **1:250000**
    - **1cm = 1 km** **1:100000**
    - **1cm = 0.5 km** **1:50000**
  - **Town survey**
    - **1cm = 0.5 km** **1:50000**
    - **1cm = 0.25 km** **1:25000**
    - **1cm = 0.1 km** **1:10000**
    - **1cm = 50m** **1:5000**
  - **Large scale survey and layout**

- **1cm = 20m** **1:2000**
- **1cm = 10 m** **1:1000**
- **1cm = 5m** **1:500**

- **Sketch Drawing**
  - **1cm = 5m** **1:500**
  - **1cm = 2m** **1:200**
  - **1cm = 1m** **1:100**
- **Working drawing, planes, Elevation and Sections**
  - **1cm = 2m** **1:200**
  - **1cm = 1m** **1:100**
  - **1cm = 50cm** **1:50**
- **Large Scale drawing**
  - **1cm = 20cm** **1:20**
  - **1cm = 10cm** **1:10**

Note:-

Road = 1:2500
Irrigation = 1:250
Bridges = 1:200
Buildings = 1:250 (same as irrigation)
Typical Details = 1:50 to 1:100
Foundations = 1:100 to 1:200
Drainage = 1:50 to 1:100

Note: - Municipalities drawing scale is: 1''=8'0''

- **Representative fraction (R.F):-**
  - It is the ratio of length of the drawing to the actual length of object
  - **i.e. R.F=** $\frac{Dimension\ in\ drawing}{Actual\ Dimension}$
  -
  - **Example:-** find the R.F 1cm long line in a drawing 1m length of the object (i.e. 1cm=1m)

    We know,

R.F= = (1:100) = (Reducing scale)

Example 2: find the R.F 1cm long line in a drawing 2 mm length of the object (i.e. 1cm=2mm)

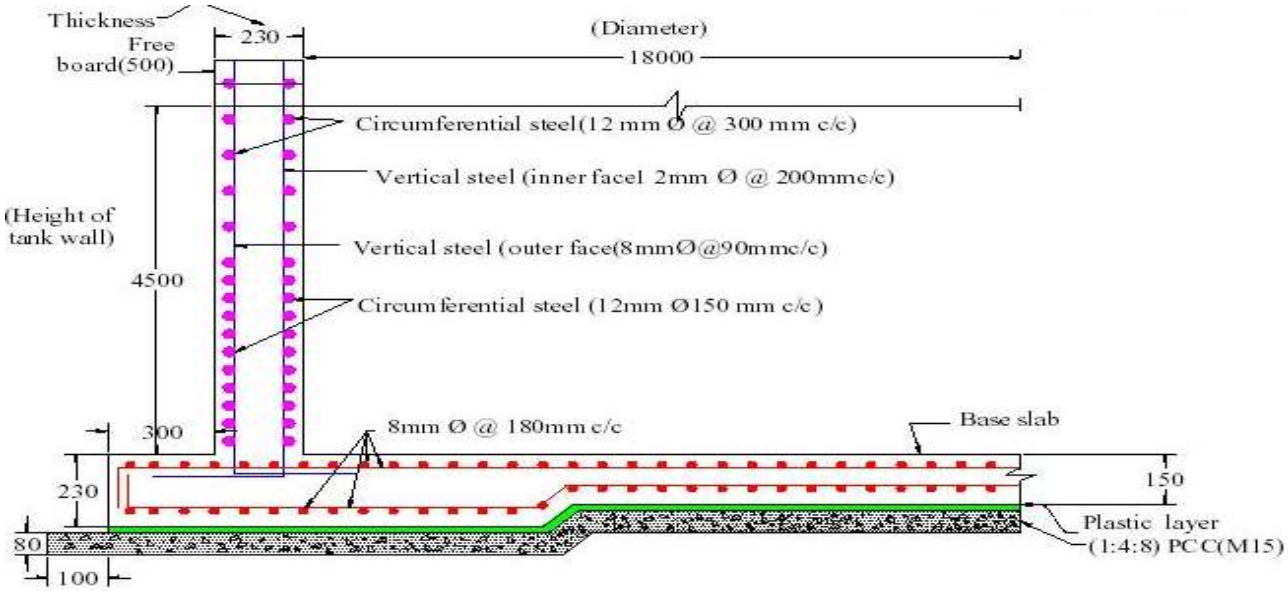
We know,

R.F=

R.F= = (5:1) = (Enlarged scale)

- **Working Drawing**
    - Blueprint or drawing that have complete clarifications, complete with enough plane, section, views (with dimension, details, and notes) to enable the depicted (चित्रित) items construction without additional information is called working drawing.
    - **Working Drawing for private and Public Building, Sanitary Installation and Electrification:**
        - After awarding the tender, agreement is done between client and contactor.
        - After agreement (सम्झौता) mobilization (गतिशीलता) as well as drawing is provided to contactor to start the work this type of drawing called working drawing.
        - Working drawing helps to layout for construction of structure.
        - Working drawing include different items of work like sanitary, electrical, structure etc.
    - **Structural working drawings and structural detail: column, beam, slab, foundation, and other structural elements :**
        - A structural drawing, a type of Engineering drawing
        - which guide contractors in detailing, fabricating, and installing parts of the structure
        - It also used for the preparation of the reinforcement drawing.
            - Following information include in structural drawing
                - North point
                - Setting out dimension for the concrete structure on the site

- Plans, section and elevation showing layout, dimensions and levels of all concrete members within (भित्र) the structure.
- Location of all holes and others conceting work.
- Provide detail information about layout and sectional information like length, shape and number of each type of reinforcing bar.



- **Other topics:**
  - **Title box:**
    - It gives the information about drawing
    - It located at the bottom right hand corner.
    - Standard size of block is 185mm 65mm.

      The title box gives at least following information:
      - Title of the drawing
      - Drawing number
      - Scale
      - Symbol denoting the method of projection
      - Name of institute

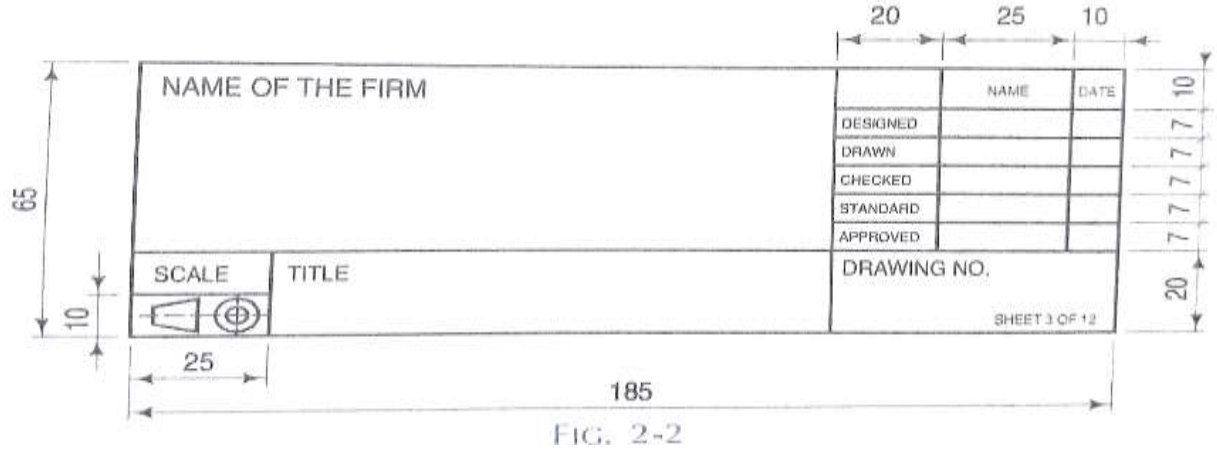
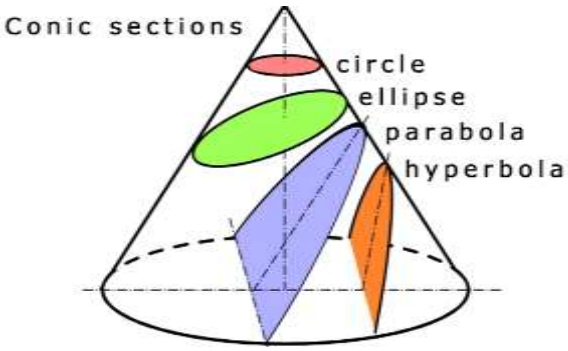
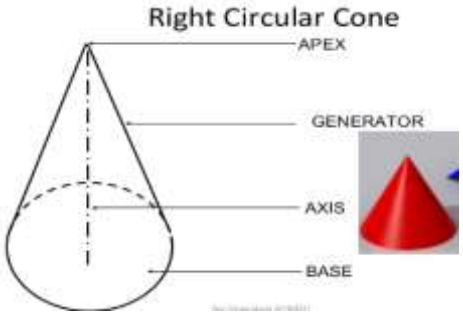


FIG. 2-2

- **Conic Section:**
  - The intersection of a plane and a circular cone





Conic Sections: Eccentricity

If $e = 1$, the conic is a **parabola**.
If $e = 0$, the conic is a **circle.**
If $e < 1$, the conic is an **ellipse**.
If $e > 1$, the conic is a **hyperbola.**

  - Top point **– apex**
  - Join apex and center of base **–Axis**
  - Line from apex join the circumference of a base circle **–Generator**
  - Generator Size of base circle of cone
  - Size of base circle of cone base circle of cone
- Type of conic section:
  - **Ellipse:**
    - Cut the axis and all generators of cone by inclined we get ellipse
    - Ellipse is a closed curve of conic section.
  - **Parabola:**

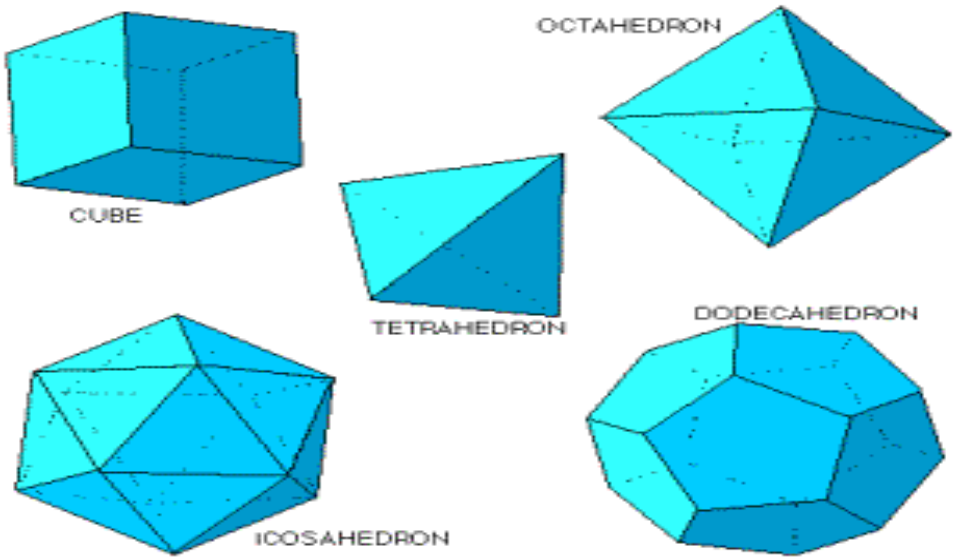
- cut the cone and its axis but it's one generator parallel to it
- parabola is an open curve of conic section

- **Hyperbola:**
  - Section obtained when the section plane makes smaller angle with its axis than that of the angle made by the generator of the cone is called hyperbola
  - hyperbola is an open curve of conic section
- **Rectangular hyperbola:**
  - The section obtained when the section plane is parallel to the axis of a cone then the section obtained is known as rectangular hyperbola.
- **Circle:**
  - It is obtained by the cut cone horizontally i.e. parallel to the base of cone
- **Triangle:-**
  - It is obtained when section plane passes through apex of cone in such a way that it is perpendicular to the base is called a triangle
- Loci point
  - A **locus** is a set of **points** satisfying a certain condition. For example, the **locus of points** that are 1cm from the origin is a circle of radius 1cm centered on the origin, since all **points** on this circle are 1cm from the origin.
  - The paths traced out by points when they move in space under given conditions are known as loci of points
  - Circle-The locus of a point, when move in a plane in such way that its distance from fixed point is constant
  - Straight line- The locus of a point, when move in a plane in such way that its distance from fixed line is always constant
  - Crank pin in a slander crank mechanism is circle.
  - **The locus of center of curvature is called evolute.**
- **Solid:- An object having three dimension called solid**

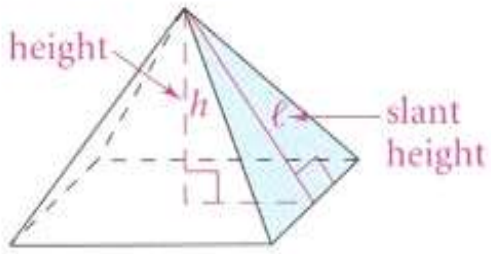
- **<u>Polyhedral and solid of revolution</u>**

- The main solids of revolution are: cylinder, cone and sphere.
- Solid bounded by plane surface is called polyhedral

- Regular Polyhedron:-
  - All face are same/similar and equal
  - Angle between the faces are equal to one another
  - Ex:-



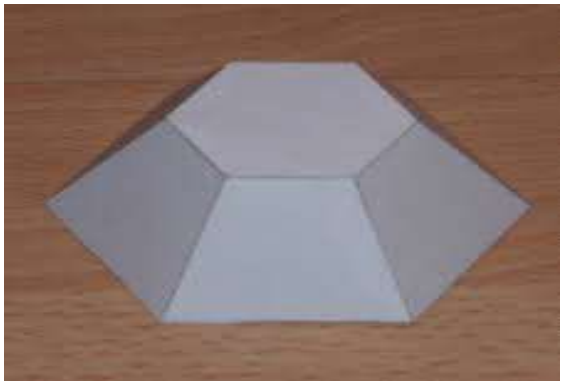
- Pyramid
  - A polyhedron that has a polygon for the base and the lateral faces are triangles.

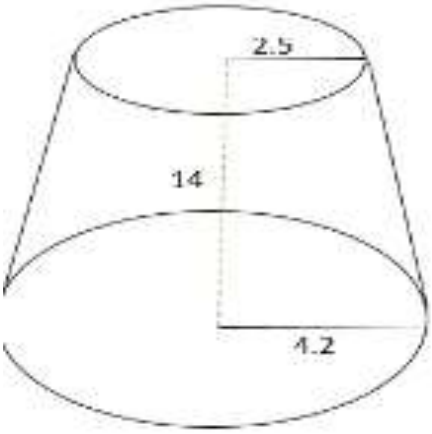


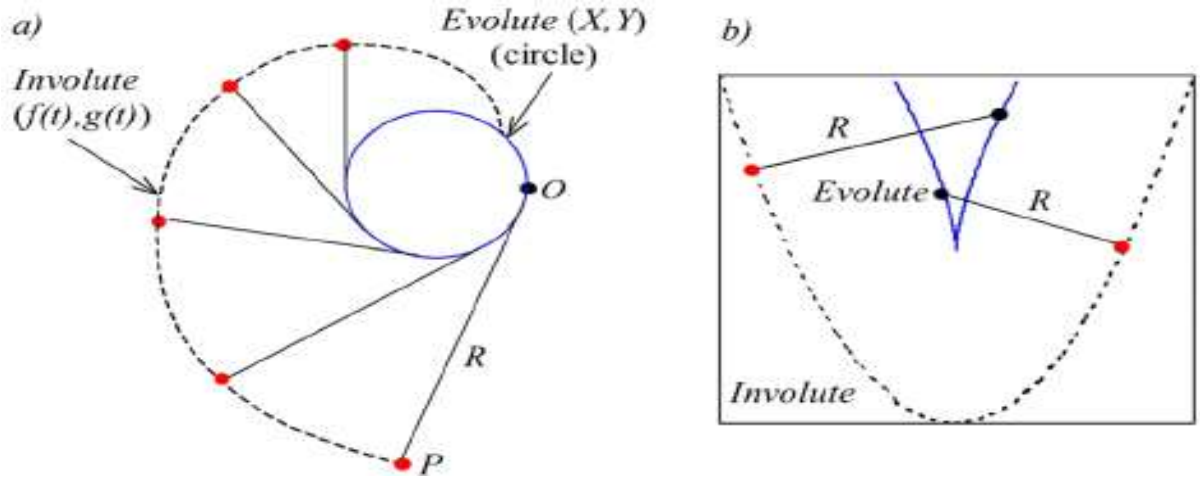
- **Prism**:-having two equal and similar end bases parallel to each other and are joined by other faces which may be
- **Pyramid:-** The polyhedral having plane base and equal number of isosceles triangular faces meat at a point.

  - That mitting point is called as apex or vertex.

  - slat height=
- **Solid of Revolution**
  - **Cylinder:-**
    - Solid generated by the revolution of a rectangle about one of its sides which remains fixed called a cone
  - **Sphere:-**solid generated by the revolution of semi-circle having fixed diameter
  - **Cone:-**It is generated by right angle triangle, perpendicular side remains constant
  - **Frustum:-**it is obtained by cutting cone or pyramid by a plane parallel to its base
  - **Truncated:-**it is obtained by cutting solid by a plane which is not parallel to the base
  - **Oblique solid:-**The solid which axis is inclined to its base.







Unit:-

- unit is defined as it is a fixed quantity, That is used is used as a standard measurement
- a unit of time/length/weight
- In other word units are standards for measurement of physical quantities that need clear definitions to be useful
    - SI Unit = System International Unit
- Types of unit
    - Fundamental unit
    - Derived unit
    - Practical unit
- **Dimension and their conversion with special reference to SI system**
    - **Length**
        - 1cm = 10mm = 0.3937inch = 0.01m = 0.0328ft
        - 1m = 100 cm =39.37 inch = 3.281 ft. = 1000mm
        - 1 km = 1000m = 39370 inch = 0.6214 mile = 1094 yard
        - *1 metre = 3.28 feet
        - *1 mile = 1.6093 km = 8 furlong
        - 1 feet = 12 inch = 30.48 cm
        - *1 inch = 2.54 cm = 25.4 mm

- 1 litre = 0.2642 gallon (US system)
- *1 gallon = 3.785 litre (US system)
- 1 litre = 0.230 gallon (British system)
- *1 gallon = 4.546 litre (British system)
- 1 kilogram = 2.2 pound
- 1 pound = 0.45 kilogram
- 1 tonne = 1000 kg = 10 quintal
- 1 quintal = 100 kg
- *1 HP = 736 watt (Metric system)
- *1 HP = 746 watt (Mechanical system)
- 1 ropani = 16 aana = 500 m^2
- *1 ropani = 5476 ft^2 = 74 ft * 74 ft
- 1 paisa = 4 dam = 342.25 ft^2
- 1 paisa = 4 dam = 85.56 ft^2
- 1 hand = 1.5 ft
- 1 kg(f) = 10 N
- 1 finger = 3 cm
- *1 hector = 10,000 m^2 = 20 ropani
- *1 ropani = 1.502 kaththa
- *1 bigha = 13 ropani = 20 kaththa
- 1 yard = 3 feet
- 1 nautical mile = 1.852 km
- *1 dharni = 2.393 kg = 12 pau
- *1 kaththa = 20 dhur = 3645 ft^2

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❖ **Polygon**

- Magnitude of any internal angle = $\frac{(2n-4)*90}{n}$
- No. of Diagonal in polygon = $\frac{n(n-3)}{2}$
- Radius of out scribing circle = $\frac{s}{2Sin\frac{\pi}{n}}$

Where, n= No. of sides
S= Length of each sides

❖ **Name of Polygon**

S.N	No. of sides	Name of polygon
1	3	Triangle or Trigon
2	4	Tetragon or Quadrilateral
3	5	Pentagon
4	6	Hexagon
5	7	Heptagon
6	8	Octagon
7	9	Nonagon or Enneagon
8	10	Decagon
9	11	Hendecagon
10	12	Dodecagon
12	13	Triskaidecagon or Tridecagon
13	14	Tetrakaidecagon or Tetradecagon
14	15	Pentadecagon
15	16	Hexadecagon
16	17	Heptadecagon
17	18	Octadecagon
18	19	Enneadecagon
19	20	Isosagon
20	30	Triacontagon etc.

❖ **Pencil uses guide line of various lines**

Pencil/Lead	Used
3H,2H	Border lines, Construction Lines, Guide Lines
2H,H	Dimensions lines, Center Lines, Phantom lines, Long Break line, Leaders, Hidden Lines, Cross Hatching lines, Extension lines
H,F,HB	Visible line, Cutting Plane lines, Short Break line, Lettering

Note: - Generally HB, H and 2H pencil is used in technical drawing.

❖ **Projection**

- In Engineering 3D object and structures are represented graphically on a 2D
- The image of an object is known as “projection”.
- The image obtained by projection is known as “View”.

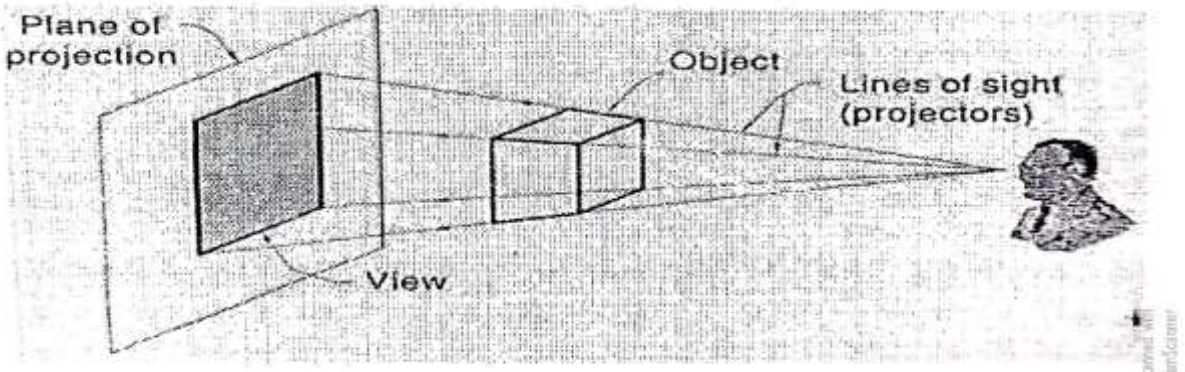


Figure 3: A Simple Projection System

- All projection theory are based on two variables they are
  1. **Line of Sight/Projector**
     - The lines or rays drawn from the observer to object and to the plane are called line of sight or projector
  2. **Plane of projection**
     - In effect 3D object is transformed into a 2D representation, also called projections.
- **<u>Projection Techniques</u>**

  Generally two types of technique are used while projected any object
  1. **Parallel**
     - All lines of sight are parallel and observer is assumed to be infinite distance from object.
     - Most of case parallel projection is used.
  2. **Perspective**
     - In this technique, the observer is assumed to be finite distance from the object.
     - The height of the object appears to be reducing as we move away from the observer.
     - In this projection all points are starts at a single point.

Perspective Projection	Parallel Projection
• Observer is finite distance from object.	• Observer is infinite distance from object.
• Projectors are not parallel	• Projectors are parallel.

- **<u>Types of Projection</u>**

1) **Pictorial Projection** (3D-projection, which have length, breadth and height)
   a) **Axonometric Projection**
      i) **Isometric projection**
      ii) **Diametric projection**
      iii) **Trimetric projection**

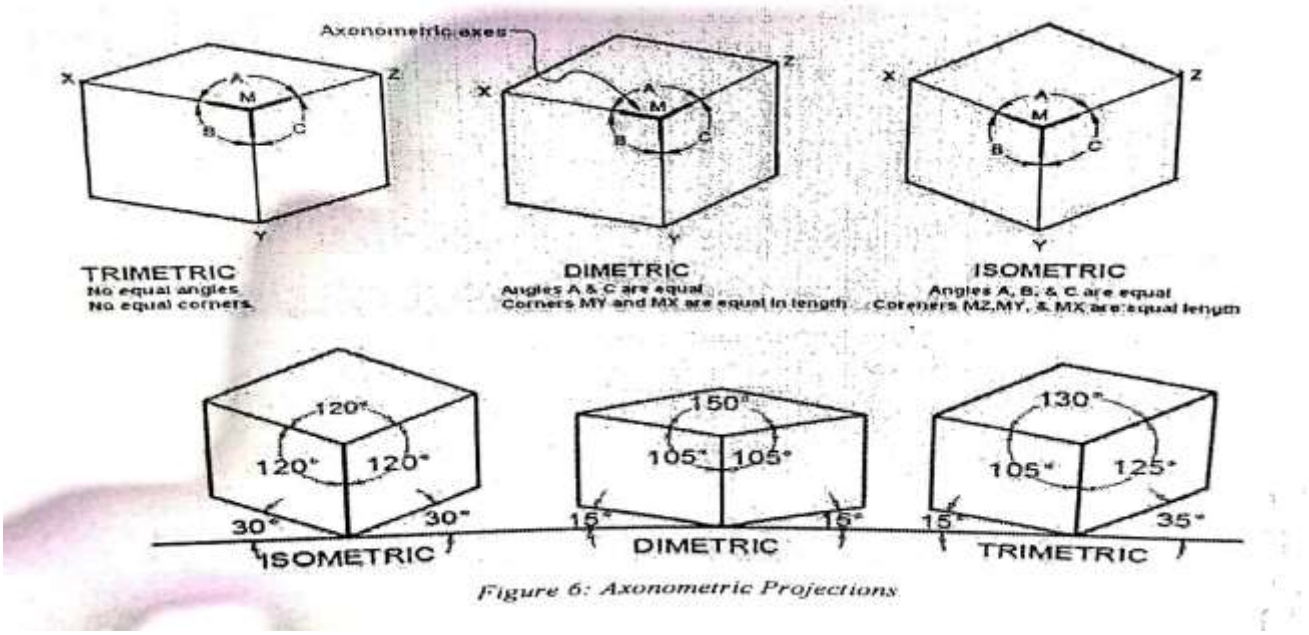
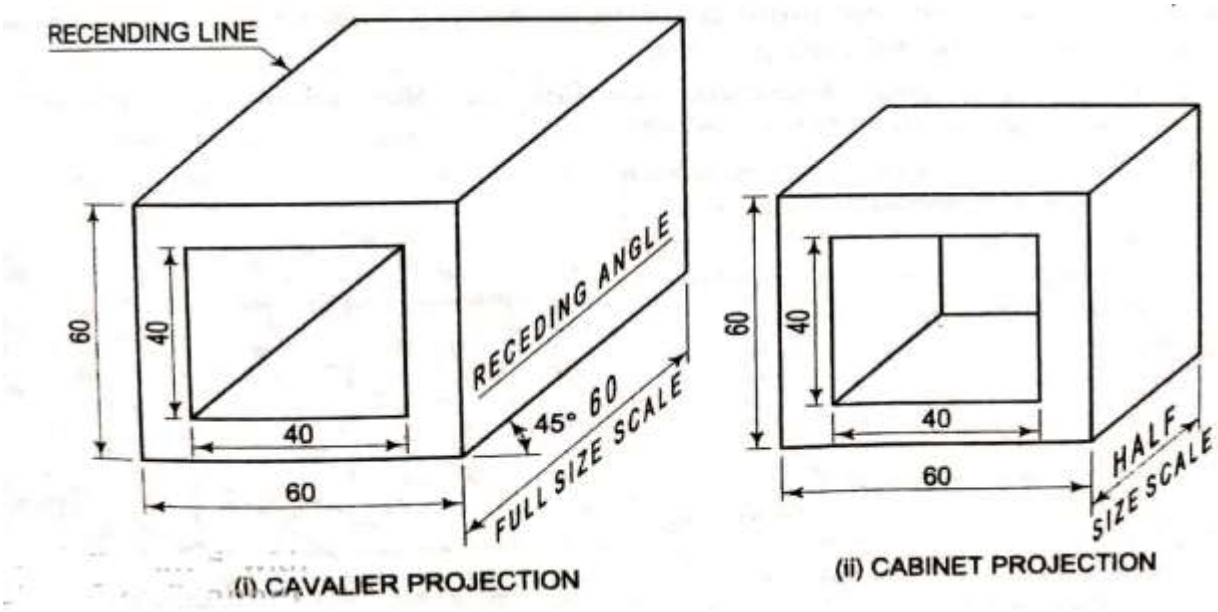


Figure 6: Axonometric Projections

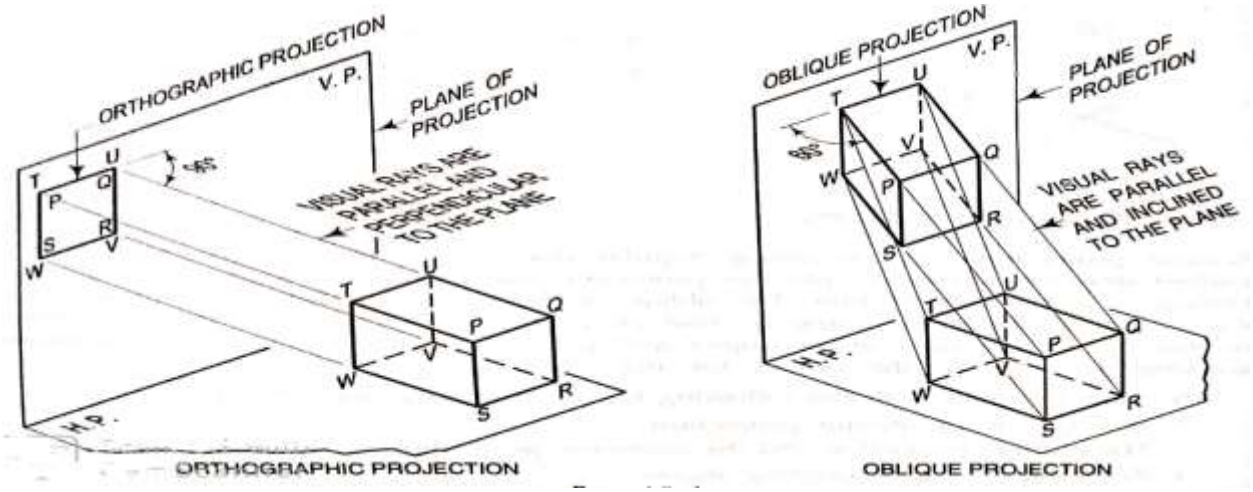
b) **Oblique Projection**
   i) **Cavalier**
   ii) **Cabinet**
   iii) **Celinographic /general oblique**



c) **Perspective projection**
   i) **Parallel or one point**
   ii) **Angular or two point**
   iii) **Oblique or three point**

Note: - these all pictorial projection are one plane projection

2) **Orthographic Projection**



a) **Axonometric Projection (A.P)**

- Type of pictorial projection
- The projection in which the description of the object is completely understood is one view is known as pictorial projection.
- A.P is type of parallel pictorial projection.
- **It is special type of orthographic projection.**

i) **Isometric**

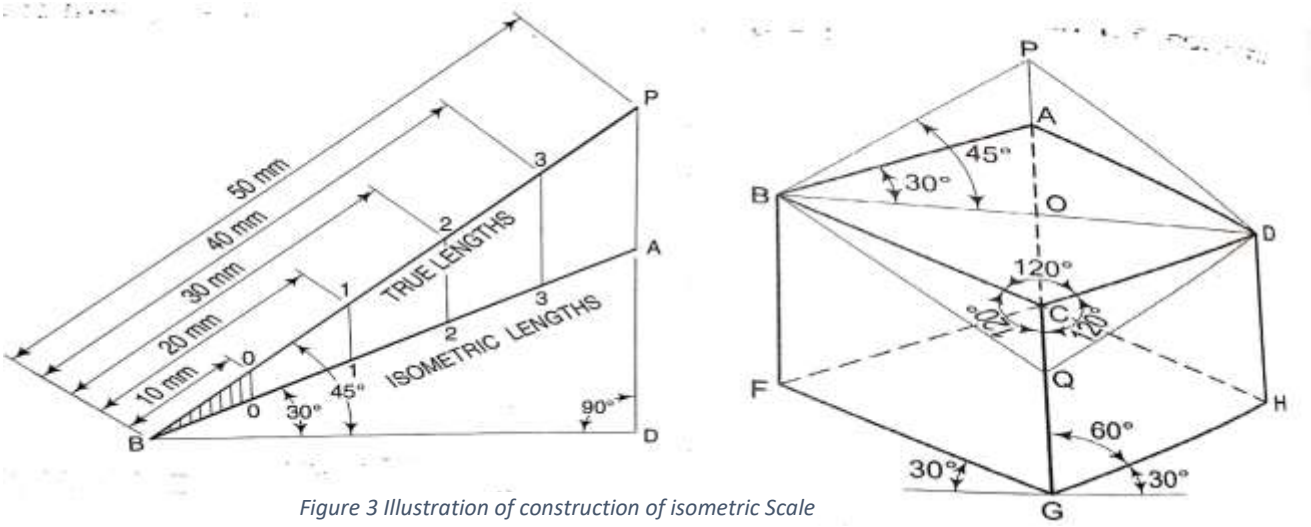


Figure 3 Illustration of construction of isometric Scale

- There angle and corners are equals.
- Length of projected lines are equal to 35°16', or 0.8165 times the true length

$$\text{Isometric Scale} = \frac{Isomertic\ length}{True\ length}$$

$$= \frac{Cos45}{cos30} = 0.8165 \text{ or } \frac{9}{11} \text{ (Approx.)}$$

- Isometric length = 82% of true length (approximately)
- Isometric projection is reduced in the ratio $\sqrt{2}:\sqrt{3}$
- The isometric length are 0.815 of the true length.

I.e. The isometric length of the edge of the cube is obtained by –Multiplying actual length by 0.815

- The angle between isometric axes is 120°

- **Standard Shape**
  - The isometric view of circle = Ellipse
  - The isometric view of sphere = Circle
  - The isometric view of square = Rhombus
  - The isometric view of Rectangle = Parallelogram.

b) **Oblique projection**

- It is a type of parallel pictorial projection in which projectors are parallel to each other but they are not perpendicular to picture plane.
- The angle is usually kept 15-45 degree.
- Mostly used angle is 45 degree

i) **Cavalier-** In this case, the dimensions along all the axes are plotted in full scale

ii) **Cabinet-** In this case, the dimension along the diagonal axis are plotted by reducing it to half of the actual value.

Dimension along other axes are plotted in full scale.

c) **Perspective projection**

- Projectors are not parallel to each other.
- In case of perspective projection observer is considered to be at finite distance
- Where in case of other type of projection observer is considered to be at infinite.
- Perspective projection is used manufacturing in marketing.
- Perspective projection is used to represent **natural view of object**
- Perspective drawing is done for **Show details of market prodects.**
- It is also known as **convergent projection.**
- The plane on which perspective is formed is called **picture plane**

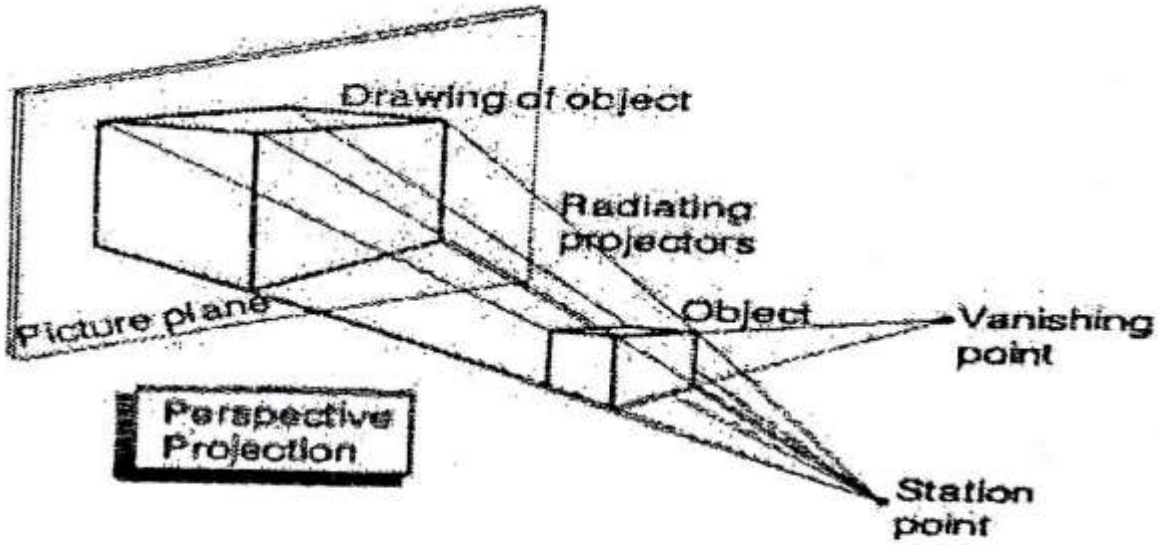
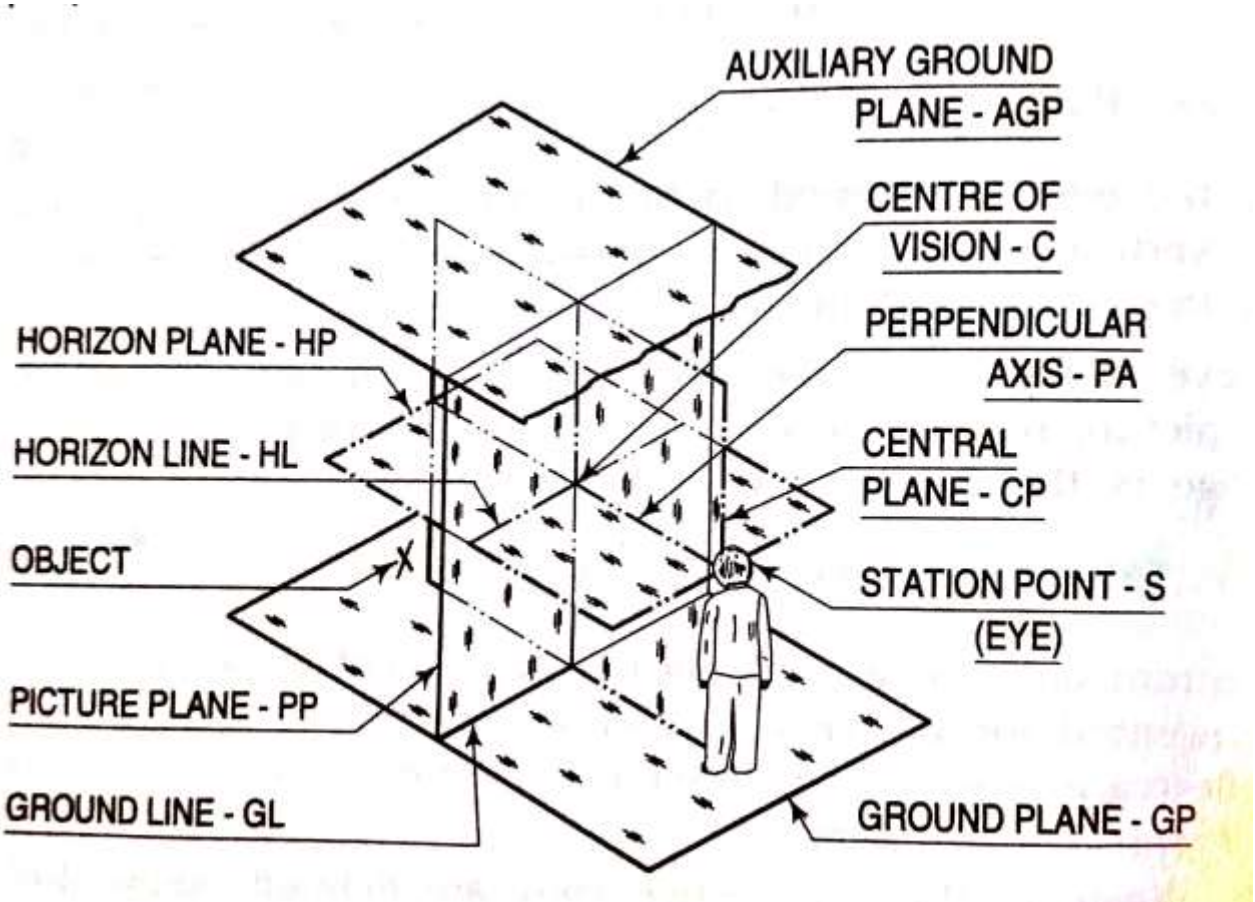
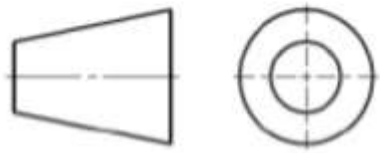
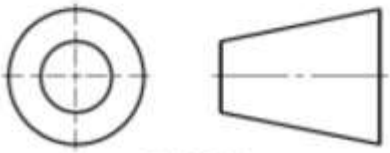
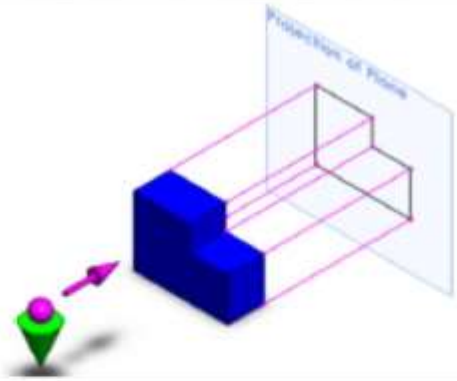
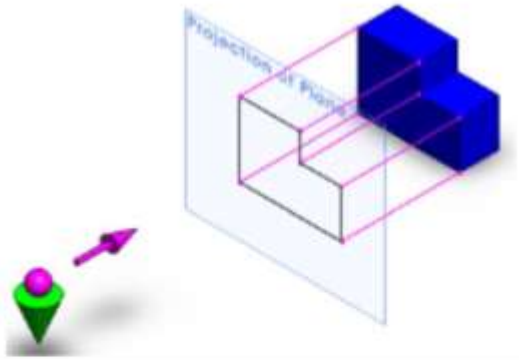
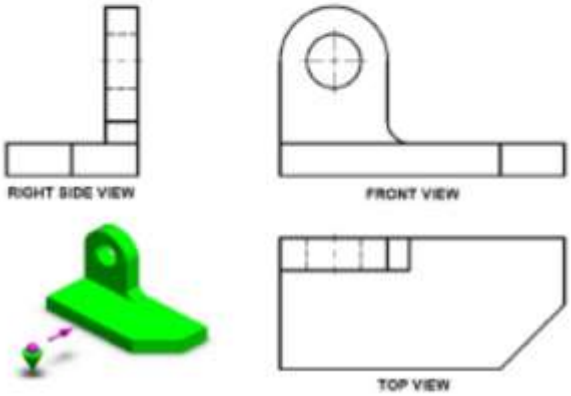
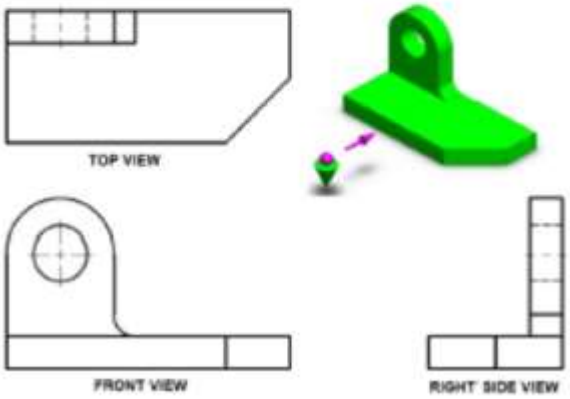


Figure 9: Perspective Projection

- **Element of perspective**
  - **Picture plane (p.P)**
    - P.P is vertical and transparent
    - P.P is placed between eye and object.
  - **Station point (S.P)**
    - It is the point where the eye of the observer is located while viewing the object.
  - **Vanishing point (V.P)**
    - The point in space, where parallel lines meet are called vanishing point.
  - **Auxiliary ground plane**
    - It is a horizontal plane placed above the horizon plane.
    - The top view of the object and of the perspective elements is projected on this plane



First Angle Projection	Third Angle Projection
The object is imagined to be in first quadrant.	The object is imagined to be in third quadrant.
The object is lies between the observer and plane of projection.	The plane of projection lies between the observer and object.
The plane of projection is assumed to be non transparent.	The plane of projection is assumed to be transparent.
When view are drawn in their relative position Top view comes below Front view, Right side view drawn to the left side of elevation.	When view are drawn in their relative position Top view comes above Front view, Right side view drawn to the right side of elevation.
 SYMBOL	 SYMBOL
	
	

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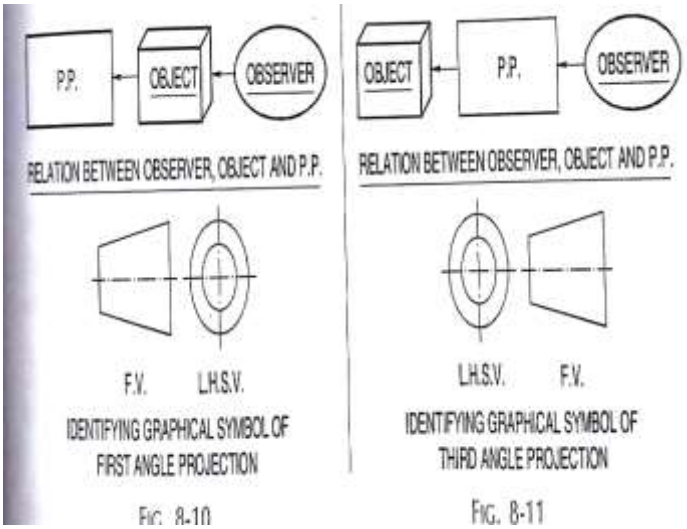
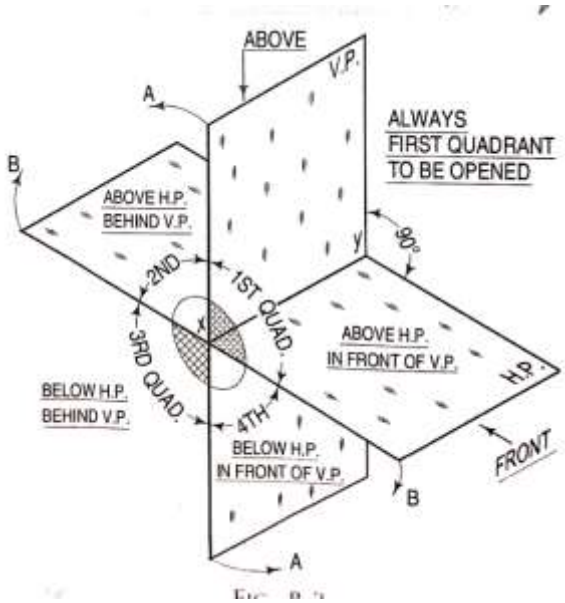
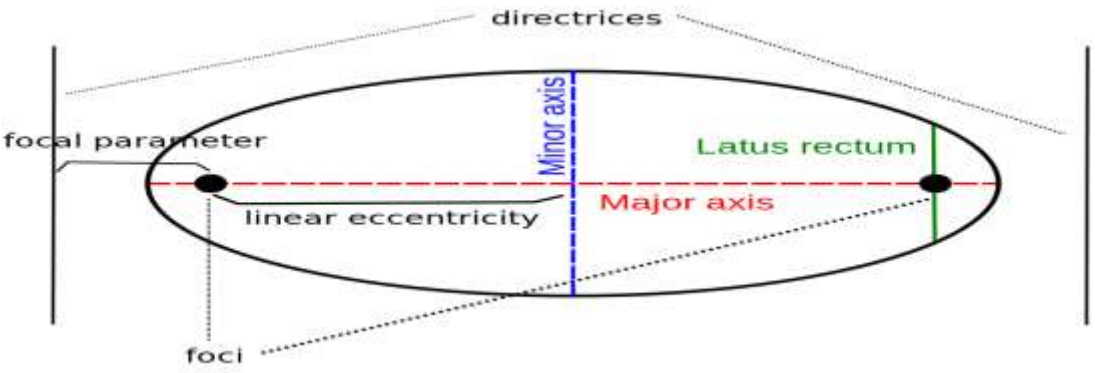
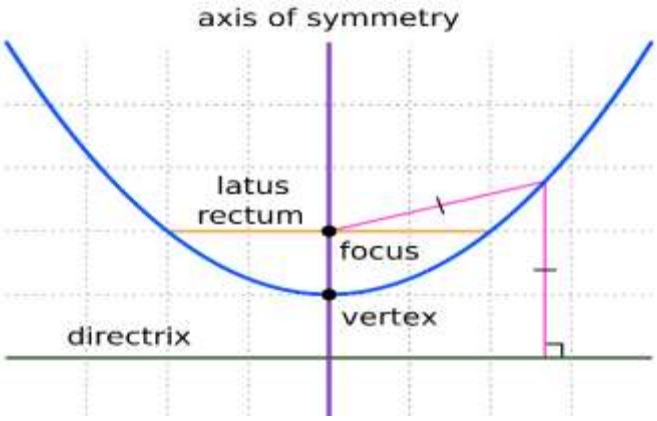


FIG. 8-10 FIG. 8-11







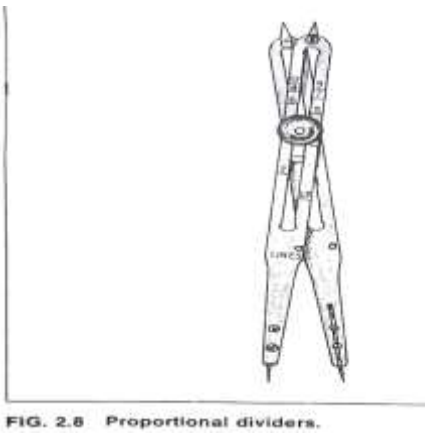
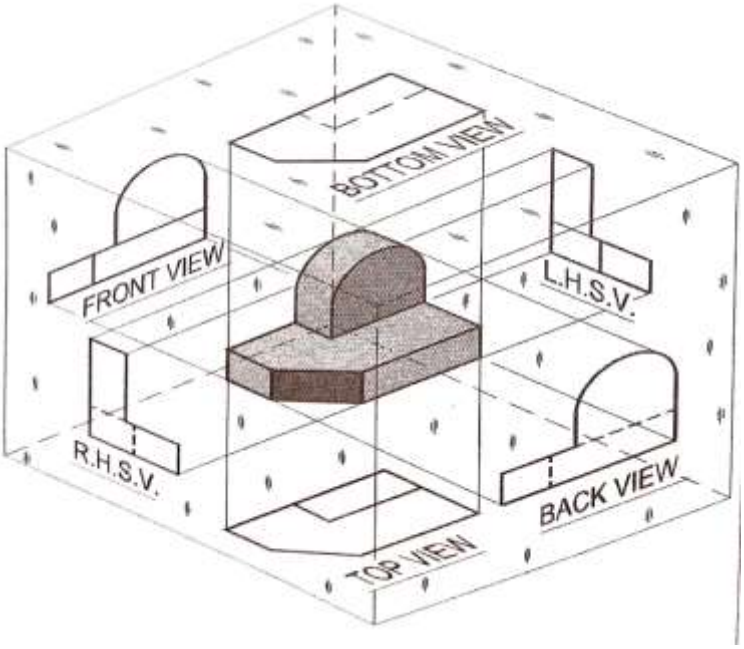


FIG. 2.8 Proportional dividers.



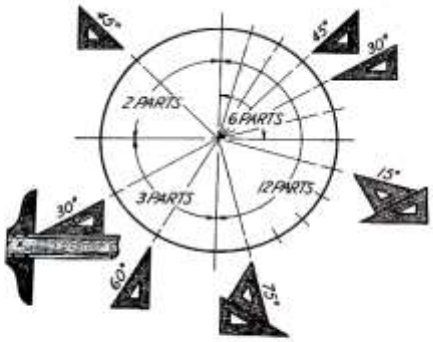
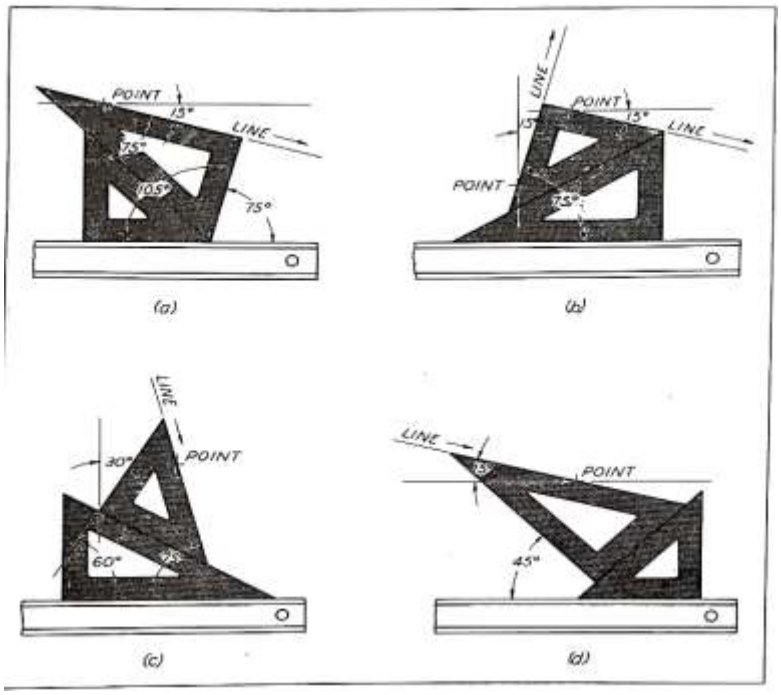
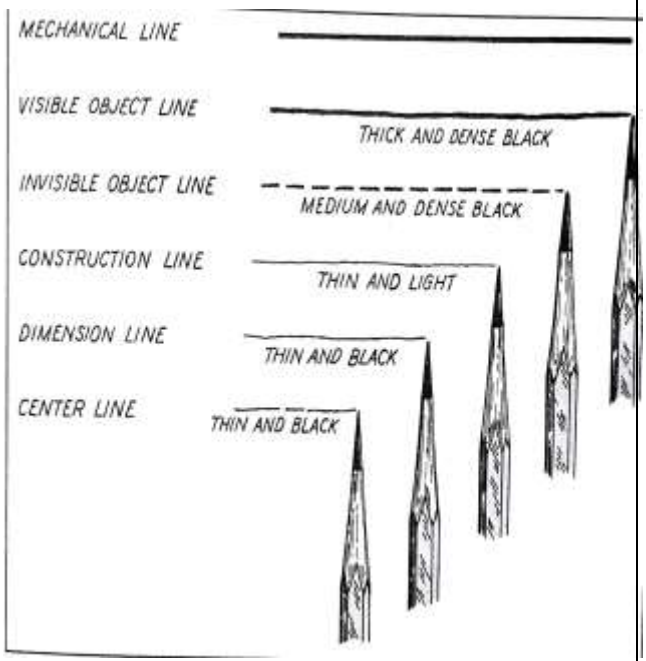


FIG. 2.29 To divide a circle into 4, 6, 8, 12, or 24 equal parts.





Engineering Drawing

1. Drawing is
    A. Language of engineer
    B. Tool of engineer
    C. Machine of engineer
    D. All of the above
2. The art of representation of an object by systematic line on paper is called
    A. Profession
    B. Art
    C. Dimension
    D. Drawing
3. ..... is used to communicate the engineers
    A. Drawing
    B. Detailed specification
    C. Estimate
    D. All of above
4. Drawing helps in
    A. Idea communication
    B. Cost estimation
    C. Preparing BOQ
    D. All of the above
5. Free hand sketch is normally used for
    A. Concept
    B. Final
    C. Discussion
    D. None of the above
6. Free hand drawing is done for
    A. Generate new idea
    B. To make correction
    C. Both a and b
    D. None of the above
7. In engineering field free hand drawing is mostly used for
    A. Shape
    B. Size
    C. To express easily to client
    D. To express dimension
8. The techniques for free hand sketch to drawing straight line is
    A. Fixing two end points
    B. Fixing length of line
    C. Fixing the center line
    D. All of these
9. The techniques for free hand sketch to drawing circle is
    A. Fixing a fixed point and arc
    B. Fixing the perimeter
    C. Fixing the radius only
    D. None of these
10. Free hand sketching can be done only when, one has
    A. Proper proficiency (उचित दक्षता)
    B. Good practice
    C. Proper patience (उचित धैर्य)
    D. All of the above

11. Sketching is usually done
    A. With French curve
    B. Free hand
    C. With drafting machine
    D. With protector
12. Engineering drawing Contains
    A. Information
    B. Shape and size
    C. Manufacturing method
    D. All of the above
13. Which angle cannot be drawn using set square ?
    A. 15 degree
    B. 75 degree
    C. 60 degree
    D. 80 degree
14. The drawing which does not convey technical information such as size, scale etc. called
    A. Artistic drawing
    B. Engineering drawing
    C. Mechanical drawing
    D. All of above.
15. The drawing which is used technical person called
    A. Artistic drawing
    B. Engineering drawing
    C. Both a and b
    D. None of them
16. The Engineering drawing is also known as
    A. Technical drawing
    B. None technical drawing
    C. Both
    D. None of these
17. The most important material for drawing is
    A. Pencil and eraser
    B. Pencil and paper
    C. Eraser and compass
    D. None of these
18. During draw a drawing we start from
    A. Top to bottom of drawing paper
    B. Bottom to top of drawing paper
    C. Right to left of the drawing paper
    D. Left to right of drawing paper
    E. Both a and d
19. The paper size of A_2 is
    A. 420 × 594
    B. 210 × 297
    C. 420 × 840
    D. 594 × 841
20. The A_4 size paper is
    A. 210 × 297
    B. 297 × 420
    C. 420 × 594
    D. 594 × 841
21. The breath of A_2 size paper is multiplied by $1/\sqrt{2}$we get
    A. Length of A_2 paper
    B. Length of A_1 paper

C. Length of A_3 paper
D. Length of A_4 paper

22. The areas of the two subsequent sizes of drawing sheet are in the ratio
A. 1:5
B. 1:4
C. 1:2
D. 1:10

23. The surface area of drawing sheet is one half square meter
A. A_0
B. A_1
C. A_2
D. None of them

24. Two sheets of standard A4 size papers added together is equal to a standard size of :
A. A_3
B. A_I
C. A_2
D. A_O

25. The area occupied by A_0 size paper is …… times the area occupied by A_1 size paper
A. 2
B. 4
C. 8
D. 16

26. The area occupied by A_0 size paper is …… times the area occupied by A_4 size paper
A. 2
B. 4
C. 8
D. 16

27. The width of the standard drawing A-series drawing paper such as A_4, A_3, $A_{2..}$ is
A. $\frac{1}{3}$ times the length of the paper
B. $\frac{1}{\sqrt{2}}$ times the length of the paper
C. $\frac{1}{2}$ times the length of the paper
D. $\frac{1}{\sqrt{3}}$ times the length of the paper

28. Paper size 'A0' has an area of
A. 1 m^2
B. 0.75 m^2
C. 0.5 m^2
D. 0.25 m^2

29. To draw final drawing …. is used
A. Smooth face
B. Rough face
C. Both
D. None

30. To draw rough drawing …. is used
A. Smooth face
B. Rough face
C. Both
D. None

31. When only one drawing is to be made then its position should be
A. Left side of paper
B. Right side of paper
C. Center of paper

D. Upper side of paper

32. Working/drawing space on the paper is determined by
    A. Working line
    B. Drawing line
    C. Border line
    D. Deader line
33. Drawing pins/cello tapes are used to
    A. For drawing
    B. Fixed drawing
    C. Replace drawing
    D. None of these
34. 4H pencil is … than 3H pencil
    A. Softer
    B. harder
    C. medium
    D. all of above

35. Accuracy and appearance largely depends on
    A. quality of pencil
    B. shape of pencil
    C. size of pencil
    D. both a and b
36. To draw very light line which pencil is used
    A. B
    B. H
    C. HB
    D. 2H
37. Which of the following pencil leads is hardest?
    A. HB
    B. H
    C. B
    D. F
38. To draw very dark line which pencil is used
    A. B
    B. H
    C. HB
    D. 2B
39. Which of the following pencil leads is the hardest? (Psc province 1)
    A. B
    B. H
    C. 4B
    D. 4H
40. Drawing pencils are graded according to increase in relative
    A. Diameter
    B. Sharpness
    C. Length
    D. Hardness
41. For dimensioning and lettering, which pencil is used.
    A. H and HB
    B. 2H and HB
    C. H and 2HB
    D. 2H and 2HB
42. For drawing thin lines of uniform thickness the pencil should be sharpened in the form of …

A. Conical edge
B. Chisel edge
C. Pointed
D. Circular

43. For sketching and lettering work which pencil is used
A. Conical edge
B. Chisel edge
C. Both
D. None

44. Drawing board is made by
A. Well-seasoned hard wood
B. Well-seasoned soft wood
C. Moisted soft wood
D. All of above

45. The purpose of making the drawing board with seasoned soft wood
A. Easy to carry
B. To match the T-square
C. For fixing paper with the help of pin
D. All of them

46. As per ISI not recommended size of drawing board is
A. 1500 × 1000
B. 1000 × 700
C. 800 × 500
D. 500 × 350

47. According to the Indian Standard Institute (ISI), which among the following designation has the size 1000 x 700 (in mm)?
A. B_0
B. B_1
C. B_2
D. B_3

48. Working edge of drawing board is kept
A. Right of the user
B. Left of the user
C. Ahead
D. None of the above

49. The edge of the board on which T-square is made to slide is called its …
A. Working edge
B. Straight edge
C. Chisel edge
D. None of them

50. To prevent warping of the board … are cleated at its back
A. Wooden block
B. Packings
C. Battens
D. None

51. T-square is used to draw
A. Horizontal line
B. Vertical line
C. Inclined line
D. All of above

52. During drawing the stoke of T-square is placed (psc local level)
A. Adjoining the working edge of the drawing board
B. Adjoining the sliding edge of the drawing board

C. Surface of the drawing board
D. None of above

53. The two parts of the T-square are …… and …..
    A. Straight edge
    B. Stoke
    C. Blade
    D. Both b and c
54. Edge of T-square used to
    A. Draw horizontal line
    B. As a base of set square
    C. Draw horizontal parallel line
    D. all of the above
55. Working edge of T-square is helps
    A. Draw inclined line
    B. Base of the set square
    C. Draw parallel line with horizontal surface
    D. B and C
56. Set square is used
    A. To draw parallel line
    B. To draw vertical line
    C. Both A and B
    D. None of above
57. Set squares are not used to draw
    A. Straight line
    B. Vertical line with T-square
    C. Horizontal line
    D. All of these
58. Set square can't divided the circle in to…….. Equal parts.
    A. 6
    B. 12
    C. 8
    D. 15
59. Set square can draw the multiple of angle ….. degree with the help of T-square is
    A. 30°
    B. 15°
    C. 20°
    D. 5°
60. Set-squares can draw lines with precision, inclined with the horizontal at an angle in multiples of
    A. 5 degrees
    B. 10 degrees
    C. 15 degrees
    D. 20 degrees
61. Protector is used to
    A. Measured the angle
    B. Measured the dimension
    C. Measured the length
62. All of above Least count of the protector is
    A. 2 °
    B. 1°
    C. 5°
    D. 3°
63. To draw or measured the angles …… is used
    A. T-square

B. Set-square
C. protector
D. All of the above

64. Diameter of the semi-circle is called
A. Base of the protector
B. Length of the protector
C. Diameter of protector
D. None of the above

65. A half-moon protractor is divided into how many degrees?
A. 360
B. 180
C. 270
D. 310

66. Scale is used
A. Draw circle
B. Measured angle
C. Measured line
D. All of above

67. The scale should never be used as a ….. for drawing straight lines
A. Set square
B. Working edge
C. Straight edge
D. None of them

68. The shape of scales are
A. Flat and triangular
B. Flat and rectangular
C. Flat and square
D. All of the above

69. Which instrument is not used during drawing
A. Pencil
B. T-square
C. Set-square
D. None of above

70. The combination of T-square, set-square, protector and scale is called
A. compass
B. set-square
C. drafting machine or drafter
D. both A and B

71. A device which combines the functions of a T-square, set square, protractor and scale is called
A. fasteners
B. mini drafter
C. templates
D. combination set

72. The mini drafter serves the purpose of everything except
A. Scales
B. Set square
C. Protractor
D. Compass

73. A drafter helps in drawing
A. parallel and perpendicular lines
B. concentric circles
C. smooth curves
D. All the these

74. In which component is not considered in the drafting machine
    A. Set-square
    B. T-scale
    C. scale
    D. Leveling machine
75. Which one is not drafting equipment
    A. scale
    B. protector
    C. pencil
    D. None of the above
76. The French curve is used to draw
    A. Parallel line
    B. Irregular arc and curve
    C. Both A) and B)
    D. None of the above
77. …….. is used to draw arc or curve which can't be drawn by compass
    A. Bow compass
    B. Drop compass
    C. French curve
    D. Protector
78. Parallel lines can be drawn with the help of
    A. mini drafter
    B. T-square
    C. pair of set-squares
    D. All of these
79. Which tool can be used to draw a 90 degree angle?
    A. 30/60 triangle
    B. protractor
    C. Drafting machine
    D. all of the above
80. Compass is used to draw
    A. arc
    B. Circle
    C. Both a and b
    D. None of them
81. For draw a circle up to 120mm with the help of
    A. Leg of Compass kept at knee joint
    B. Bow compass
    C. Drop compass
    D. Leg of compass kept no any joint
82. Bow compass is used to draw
    A. Small diameter circle
    B. Large diameter circle
    C. Very small diameter circle
    D. All of the above
83. Circles of small radii are drawn by means of a …..
    A. Lengthening bar
    B. Bow compass
    C. Bow divider
    D. None of these
84. Drop compass is used to draw
    A. Small diameter circle
    B. Large diameter circle

C. Very small diameter circle
D. All of the above

85. Which is the most common tool used for drawing circles?
A. Mini – drafter
B. French curve
C. Compass
D. Divider

86. Divider is
A. Pair of compass
B. Drawing instrument
C. Both A and B
D. None of above

87. Divider is used for
A. Divide curve
B. Divide straight line
C. Transfer dimension
D. All of above

88. Measurements from the scale to the drawing are transferred with the aid of a …
A. Scale
B. Compass
C. Divider
D. All of these

89. Which is used for setting of short equal distance
A. Scale
B. Bow divider
C. Compass
D. Lengthening bar

90. In a compass, lengthening bar is used to
A. draw circles of large diameters
B. draw circle of uniform thickness
C. increase the overall height
D. grip firmly while drawing circles

91. Lengthening bar is used
A. Draw circle
B. Draw circle (>150mm radius)
C. Draw straight line
D. All of the above

92. For draw large size of circle (>150mm radius) we need to join the
A. Lengthening bar
B. Drop compass
C. Bow compass
D. None of the above

93. For drawing large size circles,…… is attached to the compass
A. Straight bar
B. Knee joint
C. Lengthening bar
D. Bow compass

94. Measurement from scale to the drawing are transferred by using
A. compass
B. scale
C. divider
D. All of the above

95. Bisecting a line means

A. Divide line 2 equal parts
B. Divide line 3 equal parts
C. Divide line 4 equal parts
D. None of the above

96. Inking pen is used
A. Writing
B. Curve
C. Straight line
D. All of the above

97. The angle between two perpendicular line is
A. 0°
B. 35°
C. 90°
D. 180°

98. The angle between two perpendicular line is
A. 0°
B. 180°
C. Both a and b
D. None of the above

99. Which is the instrument used to draw parallel lines fast?
A. Set square
B. Ruler scale
C. Protractor
D. Roll-n-draw

100. The lines which are drawn to represent visible edges and surface boundaries of objects are called
A. Outlines
B. Principle lines
C. Both a and b
D. None of these

101. Center lines are used to locate or represent the centers of …..
A. Arcs
B. Circles
C. hidden round features
D. all of the above

102. Centre lines are drawn as
A. continuous narrow lines
B. dashed narrow line
C. long-dashed dotted narrow line
D. long-dashed double dotted narrow line

103. Long-dashed dotted narrow line is used to represent
A. line of symmetry
B. Centre lines
C. pitch circle of gears and holes
D. All of these

104. What is the length of the short dashes of the Centre lines?
A. 5mm
B. 2mm
C. 1mm
D. 3mm

105. Which of the following lines are used to show that the object is cut and then viewed?
A. Hidden lines
B. Leader lines
C. Centre lines

D. Hatching Lines

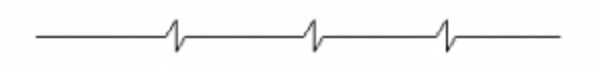
106. Hidden lines are drawn as
   A. dashed narrow line
   B. dashed wide line
   C. long-dashed dotted narrow line
   D. long-dashed dotted wide line

107. The hidden line is
   A. Represent the hidden part of the object
   B. Represent the front part of the object
   C. Represent the side part of the object
   D. All of the above

108. The dotted line represents? (PSC Bagmati)
   A. Hidden line
   B. Projection line
   C. Center line
   D. Hatching line

109. The unseen/inner edge of an object is represent in drawing by
   A. Hatching line
   B. Solid line
   C. Dotted line
   D. All of these

110. The line given below is used for_____



   A. Long-break line
   B. cutting planes
   C. Censorial lines
   D. Outlines of adjacent parts

111. The line given below is used for

   A. Hidden outlines
   B. Cutting planes
   C. Hidden edges
   D. Dimension lines

112. Dashed thick (wide) line is represented by
   A.
   B.
   C.
   D.

113. In normal practice Centre line in drawing is denoted by
   A. .....
   B. ___ _ _ ___ _ _ ___
   C. _____
   D. __ _ __ _ __ _ __ _ __

114. The section plane are represented by (PSC local level)
   A. continuous thick line
   B. continuous thin line
   C. chain thin line
   D. chain thin line having thick edges

115. The following line is used for visible outlines
   A. Continuous thick

B. Continuous thin
C. Chain thin line
D. Short zigzag thin

116. The following line is used for dimension line (PSC local level)
A. continuous thick
B. continuous thin
C. chain thin line
D. short zigzag line

117. Hatching line is a line which makes an angle of 45 degree with the(PSC Bagmati)
A. Main line of the section
B. Horizontal line
C. Vertical line
D. All of the above

118. Working space on the drawing paper is determine by? (PSC Bagmati)
A. Working line
B. Border line
C. Drawing line
D. All of the above

119. Medium thickness, line-group of 0.2mm are not used for
A. out lines
B. dotted lines
C. cutting plane -lines
D. dimension lines

120. An outline or a Centre line should be used as a dimension line.
A. Used as a dimension line
B. Not used as a dimension line
C. Used as a extension line
D. None of the above

121. Horizontal lines are drawn
A. Left to right
B. Right to left
C. Both a and b
D. None of the above

122. Vertical lines are drawn
A. Top to bottom
B. Bottom to top
C. Both a and b
D. None of the above

123. In horizontal line
A. Same y-cordinate
B. 180°
C. Both a and b
D. None of the above

124. Mechanical lines are types of
A. Mechanical drawing
B. Line of drawn with free hand
C. Line drawn with drawing equipment
D. None of the above

125. Dimension shows the
A. Location
B. Size
C. Both a and b
D. None of the above

126. Dimensioning doesn't represent
    A. height
    B. length
    C. depth
    D. material
127. Dimension indicates that
    A. Size of particular features
    B. Location of particular features
    C. Both a and b
    D. None of the above
128. Dimension text indicates that
    A. The size of particular features
    B. Length of objects
    C. Breadth of objects
    D. All of the above
129. The arts of writing the various sizes or measurements on the finished drawing of an object is known as(Psc province 1)
    A. Measuring
    B. Lettering
    C. Scaling
    D. Dimensioning
130. Arrow head should be
    A. 3 times of its width
    B. 3 times of its breadth
    C. Equal to its breadth
    D. All of the above
131. What is the standard length and width of the arrowhead of dimension lines?
    A. 2mm and 2mm
    B. 3mm and 1mm
    C. 4mm and 2mm
    D. 3mm and 2mm
132. The ratio of height to length of an arrow in dimensioning is
    A. 1:2
    B. 1:3
    C. 1:4
    D. 1:1.5
133. The length-to-height ratio of a closed filled arrow head is
    A. 1:3
    B. 3:1
    C. 1:2
    D. 2:1
134. In engineering drawing, which type of arrowhead is used?
    A. Open (90˚)
    B. Small open circle
    C. Closed and filled
    D. Oblique stroke
135. Extension line is
    A. 3mm beyond the dimension line
    B. 5mm beyond the dimension line
    C. 8mm beyond the dimension line
    D. None of the above
136. Which type of line is part of dimension in drawing? (psc province -1)
    A. Extension line

B. Phantom lines
C. Break lines
D. Cutting plane lines

137. The inclined line connecting to horizontal line with note is called a
A. dimension line
B. projection line
C. leader
D. arrowheads

138. What does dimensioning of a circle depend upon?
A. Shape
B. Length
C. Size
D. unit

139. A Plane surface has ….. Dimension.
A. 0
B. 1
C. 2
D. 3

140. Which are the two systems of placing dimensions?
A. Aligned system
B. Break system
C. Unidirectional system
D. Both a) and c)

141. The two recommended systems of placing the dimensions are
A. unidirectional and aligned systems
B. vertical and inclined systems
C. unidirectional and inclined systems
D. vertical and aligned systems

142. In which system of dimensioning the figures can read from the bottom as well as right hand side of the drawing?
A. Aligned system
B. Unidirectional system
C. Nonaligned multidirectional system
D. Parallel system

143. In aligned system of dimensioning, the dimensions may be read from
A. Bottom or right hand edges
B. Bottom or left hand edges
C. Only from bottom
D. Only from left side

144. In which system is inconvenient to read dimensions from the right-hand side.
A. Aligned system
B. Unidirectional system
C. Both a and b
D. None of the above

145. From unidirectional system, it is
A. Convenient to read dimensions from the bottom edge
B. Convenient to read dimensions from the right-hand edge
C. Convenient to read dimensions from the right-hand edge
D. Convenient to read dimensions from the top edge

146. Unidirectional system is used for drawing of
A. Air craft
B. Auto mobiles
C. Both a and b

D. None of the above

147. In aligned system the dimensions are
   A. Placed parallel to the dimension line
   B. Placed perpendicular to the dimension line
   C. Placed left side of the dimension line
   D. Placed right side of the dimension line

148. In unidirectional system the dimensions are
   A. Placed above the dimension lines
   B. Placed below the dimension lines
   C. Placed by breaking the dimension line in the middle
   D. Placed left side of the dimension line

149. In which of the following type of dimensioning, the dimensions are arranged only in a straight line?
   A. Parallel dimension
   B. Chain Dimension
   C. Combined dimension
   D. Aligned dimension

150. In chain dimension, the dimensions are arranged in
   A. Parallel to each other.
   B. Point to point
   C. Both
   D. None of the above

151. When dimensions are specified from a common origin and paced parallel to one another, it is called
   A. chain dimensioning
   B. parallel dimensioning
   C. superimposed running dimensioning
   D. coordinate dimensioning

152. All dimensions are shown from a common base line called
   A. Chain or series dimension
   B. Parallel dimension
   C. Combined dimension
   D. None of them

153. Cumulative error is avoided by in which method of dimension
   A. Chain dimension
   B. Parallel dimension
   C. Combined dimension
   D. All of the above

154. Dimension lines should make as far as possible.
   A. Intersect each other
   B. Repeated
   C. 8mm apart from edge
   D. None of the above

155. Dimension lines should be drawn at least....mm away from the outlines and from each other.
   A. 5mm
   B. 6mm
   C. 7mm
   D. 8mm

156. Writing of titles, dimension value, notes and other particulars on a drawing is called
   A. Lettering
   B. Dimensioning
   C. Projectioning
   D. None of these

157. The main objective of writing letters/alphabets on the drawing is to make the drawing
   A. More informative

B. More fantastic
C. More expensive
D. All of these

158. The lower-case letters are usually used in
A. Architectural drawings.
B. Mechanical drawing
C. Structural drawing
D. Electrical drawing

159. The space between two sentences should be left equal to
A. Height of letter
B. Twice the height of letter
C. 1.5 times height of letter
D. None of these

160. The most of the texture can be drawn with the help of drawing pen with line thickness
A. O.1mm
B. 0.5mm
C. 0.8mm
D. 1.0mm

161. The inclined letters should have inclination of
A. 75° towards right
B. 75° towards left
C. 60° towards right
D. 60° towards left

162. What is the height if the dimension figures written on the dimension line?
A. 7mm to 9mm
B. 2mm to 3mm
C. 6mm to 8mm
D. 3mm to 5mm

163. The horizontal lines of letters should be drawn from
A. Left to right
B. Top to bottom
C. Both a and b
D. None of these

164. Vertical or inclined lines of letters should be drawn from
A. Left to right
B. Top to bottom
C. Bot a and b
D. None of these

165. The existing building object, site or details that is accurately drawn to scale on the basis of field measurement, is known as
A. Measured drawing
B. Working drawing
C. Architectural drawing
D. All of the above

166. As built drawing is normally constructed……the construction
A. Before construction
B. Simultaneously with construction
C. After construction
D. All of the above

167. The main purpose of as built drawing is
A. Maintenance of service work
B. Dimensioning
C. Profession

D. To award tender

168. Horizontal lines are drawn
   A. Left to right
   B. Right to left
   C. Both a and b
   D. None of the above

169. Vertical lines are drawn
   A. Top to bottom
   B. Bottom to top
   C. Both a and b
   D. None of the above

170. Total measurement of both the right arm or left arm
   A. Overall length
   B. Overall width
   C. Both a and b
   D. None of the above

171. A section obtained by
   A. cutting perpendicular
   B. cutting parallel
   C. cutting inclined
   D. cutting tangential
   E. all of the above

172. The number of tangents that can be drawn to a circle from a point outside is
   A. 1
   B. 2
   C. 3
   D. 4

173. The number of common tangents that can be drawn to two circles which touch each other externally?
   A. 1
   B. 2
   C. 3
   D. 4

174. In full sectional view, the object is imagined to be cut off
   A. One third
   B. One half
   C. One fourth
   D. One fifth

175. The section view drawing in which one fourth of an object has been marked for removal is known as a .....Section.
   A. full
   B. half
   C. quarter
   D. none of the above

176. The purpose of sectional view is to show the
   A. Surface of the object
   B. Internal of the object
   C. Shape of the object
   D. None of these

177. The approval of design, drawing before the construction of building in city area of Nepal is done by :
   A. Village Development Committee
   B. District Development Committee
   C. Municipality
   D. None of the above

178. Following is full scale
   A. 1:1
   B. 1:2
   C. 2:1
   D. 3:1
179. For scale, which one is not correct
   A. 1:2
   B. 1:20
   C. 1:1/2
   D. 1/2
180. When the drawing are drawn smaller than the actual size of object then scale is known as
   A. Reduced scale
   B. Enlarged scale
   C. Full scale
   D. None of these
181. Drawing of a building can be made on A_0 size drawing sheet using
   A. reduction scale
   B. full size scale
   C. enlargement scale
   D. None of these
182. Which of the following represent reducing scale?
   A. 1:1
   B. 1:2
   C. 2:1
   D. 10:1
183. If the drawing size is smaller than the actual size of project, it is called (PSC local level)
   A. reducing scale
   B. enlarging scale
   C. full scale
   D. none of above
184. If the 10m length is represented as 1 mm on the map then representative fraction is
   A. 1/100
   B. 1/1000
   C. 1/10
   D. None of these
185. For drawing the components of a wrist watch, the scale used is
   A. reduction scale
   B. full size scale
   C. enlargement scale
   D. Any of these
186. For drawing of small instruments, watches etc. the scale used is
   A. Reduced scale
   B. Full scale
   C. Enlarged scale
   D. None of these
187. Following is an enlarged scale
   A. 1:1
   B. 1:2
   C. 1:3
   D. 2:1
188. Extremely small sized components are drawn with
   A. reduced scale
   B. enlarged scale

C. full scale
D. any of the above

189. An engineer's scale would be used to measure lines on a drawing where the scale factor reads
A. 1/4" = 1'-0"
B. 1/8" = 1'-0"
C. 1" = 100'
D. 3/4" = 1'-0"

190. A scale which is numerically represented on the drawing sheet is called as
A. Graphical scale
B. Engineer's scale
C. Reducing scale
D. Full size scale

191. Which of the following scale is used in survey maps?
A. Engineer's scale
B. Diagonal scale
C. Graphical scale
D. Venire scale

192. Two interconnected units are shown by
A. Plain scale
B. Diagonal scale
C. Vernier scale
D. All of the above

193. When measurements are required in three consecutive units, the appropriate scale is
A. plain scale
B. diagonal scale
C. isometric scale
D. scales of chords

194. For measurement of fraction used by
A. Set square
B. Diagonal scale
C. Both a and b
D. None of these

195. Following scale is used three interconnected units
A. Diagonal scale
B. Vernier scale
C. Both (A) and (B)
D. Plain scale

196. The diagonal scale is most suitable to take a measurement of
A. diameter of a circle
B. diagonal of a square
C. side of a pentagon
D. All of these

197. The scale used for measuring in two systems of units is
A. plain scale
B. diagonal scale
C. comparative scale
D. vernier scale

198. Scales having same representative fraction but graduated to read different units are known as
A. Simple scales
B. Diagonal scales
C. Vernier scales
D. Comparative scales

199. The diagonal of a square can be measured by

A. plain scale
B. diagonal scale
C. vernier scale
D. All of these

200. An angle can be set off and measured with the help of
A. plane scale
B. diagonal scale
C. comparative scale
D. scale of chords

201. Representative fraction is defined by
A. ratio of the length in drawing to the actual length
B. ratio of the actual length to the length in drawing
C. reciprocal of actual length
D. square of the length in drawing

202. The full form of R.F. is
A. reduction fraction
B. representative fraction
C. reduction factor
D. representative factor

203. What is the formula for calculating the length of the scale?
A. Minimum length to be measured x R.F.
B. Minimum length to be measured ÷ R.F.
C. Maximum length to be measured ÷ R.F.
D. Maximum length to be measured x R.F.

204. The unit of R.F. is
A. cubic centimetre
B. square centimetre
C. centimetre
D. None of these

205. Comparative scale is a pair of scale having a common
A. units
B. R.F.
C. length of scale
D. least count

206. The R.F. is always
A. less than 1
B. equal to 1
C. greater than 1
D. Any of these

207. The R.F. of the scale on a mini-drafter is
A. 0
B. 1
C. 10
D. none of these

208. Find the RF for scale 1cm=25km
A. 1/250
B. 1/2500
C. 1/25000
D. 1/2500000

209. The length of scale with R.F. 1/40 to measure up to 6 m will be
A. 10 cm
B. 12 cm
C. 15 cm

D. 20 cm

210. The scale of a drawing is given as 15:1. What is the representative fraction?
   A. 15
   B. 0.15
   C. 1.5
   D. 1/15

211. The actual length is 1m. The length of the drawing is 5cm. Find the representative factor1/5
   A. 20
   B. 1/20
   C. 5

R.F= $\frac{\boldsymbol{Legth\ of\ the\ drawing}}{\boldsymbol{Actual\ length\ of\ object}}$ R.F= $\frac{\boldsymbol{5cm}}{\boldsymbol{(1\times100)cm}}$

212. The representative factor is 4. The actual length is 20 mm. Find the length of the drawing.
   A. 5 cm
   B. 5 mm
   C. 0.2 mm
   D. 8 cm

213. What is the representative factor if the length of the drawing is 15mm and the actual length of the object is 3m?
   A. 1:2
   B. 1:0.2
   C. 1:200
   D. 1:20

214. Which of the following is not a valid representative factor?
   A. 1:2
   B. 1:3
   C. 2:5
   D. 0:4

215. A map of 10 cm * 8 cm represents an area of 50000 sq. m of a field. The R.F. of the scale is
   A. 1/25
   B. 1/625
   C. 1/2500
   D. 1/6250000

216. An area of 36 sq. km is represented by 144 square centimeters on a map. The R.F. is
   A. 1/4
   B. 1/2
   C. 1/5000
   D. 1/50000

217. The scale of a drawing is given as 1:20. What is the representative fraction?
   A. 20
   B. 1/20
   C. 0.5
   D. 0.02

218. A line of 1 meter is shown by 1cm on a scale. Its Representative fraction (RF) is
   A. 1
   B. 100
   C. 1/100
   D. 1/50

219. Topographic map is used to represent the
   A. Artificial detail
   B. Natural detail
   C. Construction detail
   D. All of the above

220. These drawings are given to contractors to perform work or manufacture individual parts:
   A. Assembly details
   B. 3D drawings
   C. Working drawings
   D. Skeleton assemblies

221. After agreement mobilization as well as drawing is provided to contactor to start the work this type of drawing called.
   A. Measured drawing
   B. Working drawing
   C. Architectural drawing
   D. All of the above.

222. Layout for construction of structure with the help of.
   A. Measured drawing
   B. Working drawing
   C. Architectural drawing
   D. All of the above

223. Working drawing are prepared not for (PSC local level)
   A. bill of quantities
   B. estimation
   C. layout
   D. specification

224. Working drawings
   A. Must provide complete information to produce the object
   B. Need not provide complete information
   C. Should be supplemented by further details
   D. Should be supplemented by specification

225. Concept drawing is normally provided for the work of
   A. Tender
   B. Construction
   C. Revise estimate
   D. All of the above

226. Size of the title box is
   A. 185 mm × 65 mm
   B. 185 mm × 60 mm
   C. 180 mm × 65 mm
   D. 185 mm × 85 mm

227. The following is not included in title block of drawing sheet.
   A. Sheet No
   B. Scale
   C. Method of Projection
   D. Size of sheet

228. A title block does not provide which of the following information?
   A. Name of the legal owner
   B. Drawing sheet number
   C. Angle of projection used
   D. Explanation of symbols used

229. Which of the following statements is preferred containing the statement “All dimensions are in millimeters unless otherwise specified”?
   A. Frames and borders
   B. Title block
   C. Item list
   D. Revision table

230. An item list on a drawing sheet provides which of the following information?

A. Name of the company, title of the drawing, scale and angle of projection
B. Item, description, quantity and material
C. Explanation of special symbols, abbreviations and units of dimensions
D. All the above

231. In general structural drawings should typically include following information
A. North point
B. Plan, section and elevation
C. Notes on specification
D. All of these

232. The site plan is a
A. Structural plan
B. Architectural plan
C. Sectional plan
D. None of the above

233. The sections cut by a plane on a right circular cone are called as …
A. Parabolic sections
B. Conic sections
C. Elliptical sections
D. Hyperbolic sections

234. Which of the following is not a conic section?
A. Apex
B. Hyperbola
C. Ellipse
D. Parabola

235. Straight lines drawn from the apex to the circumference of the base-circle are all equal and are called.
A. edges
B. connecting lines
C. projectors
D. generators

236. The section obtain when the section plane passes parallel to the base of a cone is called
A. An ellipse
B. A parabola
C. A hyperbola
D. A circle

237. Name the curve which has zero eccentricity
A. ellipse
B. parabola
C. hyperbola
D. circle

238. Which of the following is a conic section?
A. Circle
B. Rectangle
C. Triangle
D. Square

239. Which of the following curves obeys the Boyle's law?
A. Ellipse
B. Parabola
C. Hyperbola
D. Circle

240. The section obtained when the section plane is inclined to the axis of cone and cuts all the generators on either side of the apex, is called

A. An ellipse
B. A parabola
C. A hyperbola
D. A circle

241. When a right circular cone is cut which meets its axis at an angle greater than the semi-apex angle, the curve obtained is
A. ellipse
B. parabola
C. hyperbola
D. triangle

242. Which of the following has an eccentricity less than one?
A. Circle
B. Parabola
C. Hyperbola
D. Ellipse

243. If the distance from the focus is 10 units and the distance from the directrix is 30 units, then what is the eccentricity?
A. 0.3333
B. 0.8333
C. 1.6667
D. 0.0333

244. The section obtained when the section plane is inclined to the axis of cone, but parallel to one of the generators of a cone is called
A. An ellipse
B. A parabola
C. A hyperbola
D. A circle

245. A right circular cone when cut by a plane parallel to its generator, the curve obtained is a
A. ellipse
B. parabola
C. hyperbola
D. circle

246. If the plane cuts at an angle to the axis but does not cut all the generators then what is the name of the conics formed?
A. Ellipse
B. Hyperbola
C. Circle
D. Parabola

247. What type of curve is created by the intersection of a plane parallel to the side of cone?
A. parabola
B. hyperbola
C. ellipse
D. roulette

248. Which of the following conics has an eccentricity of unity?
A. Circle
B. Parabola
C. Hyperbola
D. Ellipse

249. If the distance from the focus is 3 units and the distance from the directrix is 3 units, then how much is the eccentricity?

A. Infinity
B. Zero
C. Unity
D. Less than one

250. The section obtained when the section plane makes a smaller angle with its axis than that of the angle made by the generator of a cone is called
A. An ellipse
B. A parabola
C. A hyperbola
D. A circle

251. When a right circular cone is cut which meets its axis at an angle less than the semi-apex angle, the curve obtained is
A. ellipse
B. parabola
C. hyperbola
D. triangle

252. When the plane cuts the cone at angle parallel to the axis of the cone, then …is formed.
A. Hyperbola
B. Parabola
C. Circle
D. Ellipse

253. The eccentricity of which of the following curve is greater than one?
A. Ellipse
B. Parabola
C. Hyperbola
D. All of these

254. If the distance from the focus is 2 mm and the distance from the directrix is 0.5 mm then what is the name of the conic section?
A. Circle
B. Ellipse
C. Parabola
D. Hyperbola

255. The angle between the asymptotes of a rectangular hyperbola is
A. 30°
B. 45°
C. 60°
D. 90°

256. Which of the following applications hyperbolic curve is used?
A. Solar collector
B. Cooling tower
C. Lamp reflectors
D. Monuments

257. The section obtained when the section plane passes through the apex of the cone in such a way that it is perpendicular to the base is called
A. A triangle
B. A parabola
C. A hyperbola
D. A circle

258. When a right circular cone is cut by a plane passing through its apex, the curve obtained is
A. ellipse
B. parabola

C. hyperbola
D. triangle

259. The polyhedral having two equal and similar end bases, parallel to each other and are joined by other faces which may be rectangle or parallelogram is called
A. A prism
B. A pyramid
C. A cylinder
D. A cone

260. Among the following solids, a regular polyhedron is
A. square prism
B. square pyramid
C. cube
D. sphere

261. A solid having minimum number of faces is
A. tetrahedron
B. triangular prism
C. square pyramid
D. cube

262. Number of faces in a dodecahedron are
A. 4
B. 8
C. 12
D. 20

263. The polyhedral having a plane figure for its base and equal number of isosceles triangular faces meeting at a point is called a…….
A. A prism
B. A pyramid
C. A cylinder
D. A cone

264. The solid which is generated by the revolution of rectangle about one of its sides which remains fixed is called……
A. A prism
B. A pyramid
C. A cylinder
D. A cone

265. The following are the polyhedron except
A. Prism
B. Pyramid
C. Cube
D. Cylinder

266. The solid which is generated by the revolution of a right angle triangle about one of its perpendicular sides which remains fixed is called…….
A. A prism
B. A pyramid
C. A cylinder
D. A cone

267. If front view and side view of a solid is rectangle of equal size than its top view will be
A. Rectangle
B. Square
C. Triangle
D. Pentagon

268. Name the solid formed by four equilateral triangle
A. Square pyramid

B. Triangular pyramid
C. Tetrahedron
D. Square prism

269. When a pyramid or cone is cut by a cutting plane parallel to its base, the remaining portion thus obtained after removing the top portion is called……
A. An ellipse
B. frustum
C. A cylinder
D. A cone

270. The locus of center of curvature is called
A. Involute
B. Evolute
C. Cycloid
D. None of these

271. The curve traced by a point on a straight line which rolls on a circle, without slipping is called
A. cycloid
B. epicycloids
C. hypocycloid
D. involute

272. Involute curve is used in
A. chains
B. gears
C. cams
D. pulleys

273. An involute of a circle is popularly used in
A. projectile trajectory
B. support of bridges
C. teeth profile of gears
D. All of these

274. In a four bar mechanism the arm which rotates is called
A. frame
B. follower
C. crank
D. coupler

275. Surface development of pentagon is
A. Circle
B. Triangle
C. Ellipse
D. All of the above

276. The length of the rectangle representing the development of the lateral surface of a right circular cylinder is equal to
A. Circumference of the circular base
B. Twice the circumference of circular base
C. Diameter of the circular base
D. Radius of the circular base

277. The reference standard used for the measurement of a physical quantity is called:
A. Constant
B. Dimension
C. Unit
D. None of them

278. The physical quantities which don't depend on any other quantities for its measurement are called
A. fundamental physical quantities
B. Derived physical quantities

C. mathematical quantities
D. chemical quantities

279. The physical quantities which depend on any other quantities for their measurement are called
A. fundamental quantities
B. Derived physical quantities
C. mathematical quantities
D. chemical quantities

280. The unit of fundamental physical quantity is called
A. fundamental unit
B. Derived unit
C. magnitude
D. quantity

281. The unit of Derived physical quantity is called
A. Derived unit
B. fundamental unit
C. magnitude
D. quantity

282. Length, mass, time are… quantities
A. Derived physical quantities
B. mathematical quantities
C. chemical quantities
D. fundamental physical quantities

283. How many base units are in the international system of units? (Psc provence -1)
A. 3
B. 4
C. 5
D. 7

284. Unit of Mass in SI system is
A. Kg
B. Sec
C. N
D. All of them

285. The standard unit of length in the SI system is
A. Cubit.
B. Centimeter.
C. Meter.
D. Handspun.

286. The primary unit of engineering drawing in civil engineering is the? (PSC Bagmati)
A. Millimeter
B. Meter
C. Foot
D. All of the above

287. The primary unit of engineering drawing in mechanical engineering is the
A. Meter
B. Foot
C. Millimeter
D. All of the above

288. Unit of area in SI system
A. Sq.m
B. m
C. cm
D. tesla

289. The units of length, mass and time are centimeter, gram and second which are used in

A. C.G.S.
B. M.K.S.
C. F.P.S.
D. S.I.

290. How many kilograms make one metric ton?
A. 10
B. 100
C. 1000
D. 40

291. To decide dimensions of a physical quantity, the unit of time is expressed by
A. 'S'
B. 'L'
C. 'M'
D. 'T'

292. Dimensional formula for 'area' is
A. $[L^2M^0T^0]$
B. $[L^2M^{-1}T^0]$
C. $[L^0M^2T^1]$
D. $[L^0M^0T^2]$

293. Out of the following which physical quantity has dimensional formula $[LMT^{-2}]$?
A. force
B. acceleration
C. velocity
D. work

294. The Dimensional formula for velocity
A. $[L^1M^0T^{-1}]$
B. $[L^2M^{-1}T^0]$
C. $[L^0M^2T^1]$
D. $[L^0M^0T^2]$

295. To ensure that everyone understands what the symbols represent it is customary to include a... on the drawing sheet (Psc province 1)
A. List
B. Part number
C. Legend
D. Layer

296. To insure that everyone understands what the electrical symbols represent it is customary to include a ….. On the electrical sheet.
A. List
B. Part number
C. Electrical legend
D. Electrical layer

297. Maximum possible exterior angle in a regular polygon is
A. 60°
B. 90°
C. 120°
D. 135^0

298. Internal angle of hexagon is
A. 108^0
B. 120^0
C. 128^0
D. None of them

299. Number of diagonal that a hexagon can have
A. 3

B. 6
C. 9
D. 12

300. The included angle of a pentagon is
A. 68°
B. 72°
C. 108°
D. 112°

301. How many diagonals can draw in heptagon
A. 5
B. 9
C. 14
D. 12

302. The name of the polygon having nine equal sides
A. Heptagon
B. Nonagon
C. Enneagon
D. Both b and c

303. A ten-sided polygon is referred as
A. hexagon
B. octagon
C. decagon
D. dodecagon

304. A polygon having the sum of the measures of the interior angles equal the sum of the measures of the exterior angles is
A. triangle
B. quadrilateral
C. hexagon
D. octagon

305. The top view and front view projections are different plane in case of
A. One plane projection
B. Two plane projection
C. Isometric projection

306. Perspective projection One plane projections are
A. Pictorial projection
B. Multiview projection
C. Both a and b
D. None of the above

307. A point which is 10mm above H.P and 15mm in-front of V.P, the true shape is obtained in
A. H.P
B. V.P
C. Both a and b
D. None of them

308. A point which is 10mm above H.P and 15mm in-front of V.P, the 10mm dimension is seen after projection.
A. H.P
B. V.P
C. Both a and b
D. None of them

309. A 30mm long line which is 10mm above H.P and 15mm in-front of V.P, the line is parallel to the V.P and inclined to the H.P then the true shape is obtained in
A. H.P
B. V.P
C. Both a and b

D. None of them

310. If a line is parallel to both H.P. and V.P., its true length will be seen in
   A. front view
   B. top view
   C. side view
   D. Both front and top views

311. plane is parallel to the plane of projection, it appears:
   A. True size
   B. As a line or edge
   C. Foreshortened
   D. As an oblique surface

312. If a line is parallel to V.P., its top view will be …. to XY line.
   A. Perpendicular
   B. Parallel
   C. Inclined
   D. None of the above

313. If top view of a line is a point, its front view is
   A. parallel to xy and of true length
   B. parallel to xy and of apparent length
   C. perpendicular to xy and of true length
   D. perpendicular to xy and of apparent length

314. Which of the following position is not possible for a plane?
   A. Perpendicular to both HP and VP
   B. Parallel to both HP and VP
   C. Perpendicular to HP and parallel to VP
   D. Perpendicular to VP and parallel to HP

315. A plate of negligible thickness of circular shape is placed parallel to horizontal plane the front view will be
   A. line
   B. circle
   C. rectangle
   D. ellipse

316. A square plane is inclined to V.P. & perpendicular to H.P. its top view appears as
   A. Rhombus
   B. Square
   C. Straight line
   D. Rectangle

317. A circle is placed perpendicular to vertical plane and inclined to horizontal which of the following is true?
   A. Front view-line, top view- circle
   B. Front view- circle, top view- circle
   C. Front view –line, top view-line
   D. Top view- ellipse, side view- ellipse

318. A Square is placed perpendicular to vertical plane and inclined to horizontal which of the following is true?
   A. Front view-line, top view- square
   B. Front view- line, top view- rectangle
   C. Front view –line, top view-line
   D. Top view-line, side view- rectangle

319. A triangle is placed perpendicular to horizontal plane and inclined to vertical which of the following is true?
   A. Front view-line, top view- triangle
   B. Front view- triangle, top view- line
   C. Front view –line, top view-line
   D. Top view-line, side view- line

320. A hexagon is placed parallel to vertical plane which of the following projection is true?

A. Front view-line, top view- hexagon
B. Front view- hexagon, top view-line
C. Front view –line, top view-line
D. Top view- hexagon, side view- line

321. If a thin set-square is kept perpendicular to both the horizontal and vertical planes, its true shape is seen in
A. horizontal plane
B. vertical plane
C. auxiliary inclined plane
D. profile plane

322. Planes which are inclined to both the horizontal and vertical planes are called
A. oblique planes
B. profile planes
C. auxiliary planes
D. None of these

323. The line joining the front and top views of a point is called
A. reference line
B. projector
C. connector
D. locus

324. What type of sketch incorporates convergence?
A. isometric
B. perspective
C. oblique
D. multiview

325. The following is (are) the method(s) of projecting the pictorial views.
A. Axonometric projection
B. Oblique projection
C. Perspective projection
D. All of the above

326. Pictorial views are obtained by
A. isometric projection
B. oblique projection
C. perspective projection
D. All of these

327. Axonometric projection is a special types of
A. Orthographic projection
B. Perspective projection
C. Isometric projection
D. All of the above

328. Axonometric drawings are those drawings (Psc Province-1)
A. In which the object is drawn in three dimensions
B. Which are used extensively in artistic drawing
C. Which has complete description of its shape
D. All of the above

329. Axonometric drawing is a drawing like
A. Parallel to the plane
B. Perpendicular to the plane
C. Inclined to the plane
D. All of the above

330. An axonometric drawing which has two axes divided by equal angles is:
A. Diametric
B. trimetric
C. orthographic

D. isometric

331. In case of diametric projection
   A. Two sides are not equally inclined
   B. Two sides are equally inclined
   C. Two side are parallel
   D. Two sides are equal

332. The free hand drawing of a ordinary room is generally
   A. One point perspective
   B. two point perspective
   C. three point perspective
   D. All of the above

333. Two-point perspective is also known as:
   A. Two-view perspective
   B. Regular perspective
   C. Parallel perspective
   D. Angular perspective

334. *Isometric projection is
   A. An orthographic projection of pictorial type
   B. An oblique projection
   C. Both A and B
   D. None of the above

335. The isometric length of the edge of the cube is
   A. More than actual length
   B. Equal to actual length
   C. Less than actual length
   D. All of the above

336. The angle between isometric axis is
   A. 30^0
   B. 60^0
   C. 90^0
   D. 120^0

337. The angle that isometric lines make with each other is
   A. 45°
   B. 60°
   C. 90°
   D. 120°

338. The isometric length of the edge of the cube is obtained by
   A. Adding 0.815 in actual length
   B. Dividing actual length by 0.815
   C. Multiplying actual length by 0.815
   D. None of the above

339. Length of a line 'L' in isometric drawing or view will be
   A. 0.707 L
   B. 0.815 L
   C. 0.866 L
   D. equal to length L

340. In isometric projection, all distances are approximately this percentage of their true size:
   A. 120 percent
   B. 80 percent
   C. 50 percent
   D. 20 percent

341. The ratio of true length and isometric length is
   A. $\sqrt{3}:\sqrt{2}$

B. $\sqrt{2}:\sqrt{3}$
C. $\sqrt{1}:\sqrt{3}$
D. $\sqrt{2}:\sqrt{1}$

342. The exact value of R.F. of an isometric scale is
A. 9/11
B. 0.815
C. 0.8165
D. $\sqrt{2}/\sqrt{3}$

343. The value of the ratio of isometric length to true length is
A. 0.141
B. 0.372
C. 0.815
D. 0.642

344. The true length of the line is 30 cm and isometric view is drawn, how much length will be reduced?
A. 24.45 cm
B. 25.98 cm
C. 4.01 cm
D. 5.55 cm

345. A circle will appear on an isometric drawing as
A. ellipse
B. cycloid
C. circle
D. parabola

346. Isometric view of isosceles triangle will be ____
A. equilateral triangle
B. scalene triangle
C. isosceles triangle
D. right angled triangle

347. Isometric view of right angled triangle will be
A. equilateral triangle
B. scalene triangle
C. isosceles triangle
D. right angled triangle

348. Isometric view of rectangle will become
A. parallelogram
B. rhombus
C. rectangle
D. square

349. Isometric view of square will become.
A. Rhombus
B. rectangle
C. triangle
D. None of the above

350. A square lamina in isometric projection appears as
A. Rhombus
B. Rectangle
C. Trapezium
D. Parallelogram

351. If the top view of a plane is a rhombus the object may be
A. square
B. parallelogram
C. octagon

D. Any of these

352. Isometric projection of a sphere is a circle having diameter
   A. Equal to that of sphere
   B. Less than that sphere
   C. More than that sphere
   D. None of them

353. The object we see in our surrounding usually without drawing came under which projection?
   A. Perspective projection
   B. Oblique projection
   C. Isometric projection
   D. Orthographic projection

354. The form of drawing similar to the view of objects as perceived by human eye is
   A. perspective
   B. oblique
   C. axonometric
   D. isometric

355. Perspective projection are mostly used in
   A. Architecture drawing
   B. Advertising drawing
   C. Artistic drawing
   D. All of the above

356. Perspective drawing is done for
   A. Not for civil engineers
   B. Show details of market products
   C. Both a and b
   D. None of these

357. Why perspective drawing is done by manufacturer?
   A. It is easy to express in the market
   B. Shape is confirmed
   C. Exact size is not measured
   D. All of these

358. Perspective projection are drawn by
   A. Single vanishing point method
   B. Double vanishing point method
   C. Triple vanishing point method
   D. All of the above

359. *perspective projection is used to represent
   A. Real exact size of the objective
   B. Real exact shape of the object
   C. Natural view of the object
   D. All of the above

360. Two point perspective is also known as
   A. parallel perspective
   B. angular perspective
   C. oblique perspective
   D. atmospheric perspective

361. The illusion of depth in paintings is depicting by
   A. one-point perspective
   B. two-point perspective
   C. three-point perspective
   D. aerial perspective

362. As the distance of an object from the observer increases, its size in the perspective view
   A. remains constant

B. increases
C. decreases
D. Any of these

363. Picture plane is
A. Transparent
B. Semi transparent
C. Opaque
D. All of the above

364. The ground plane is
A. H.P
B. V.P
C. Inclined plane
D. None of the above

365. In perspective drawings this is placed between the observer and the object:
A. Vanishing point / horizon
B. Station point
C. Ground line
D. Plane of projection / picture plane

366. In case of prospective projection, picture plane is placed (PSC local level)
A. between eye and object
B. outside of eye towards eye
C. outside of object towards object
D. all of above

367. In perspective projection, the horizontal plane in which the object is assumed to be situated is called
A. horizontal plane
B. picture plane
C. ground plane
D. auxiliary ground plane

368. The imaginary vertical plane passing through the observer's eye is called
A. ground plane
B. horizon plane
C. central plane
D. picture plane

369. The imaginary horizontal plane passing through the observer's eye is called
A. ground plane
B. horizon plane
C. central plane
D. picture plane

370. The line joining any point on the object to the station point is known as
A. axis of vision
B. visual ray
C. centre line
D. horizon line

371. What type of sketch shows the front in true shape?
A. isometric
B. perspective
C. oblique
D. axonometric

372. The face of an object containing circles, irregular shapes, etc., is kept parallel to the plane of projection is known as
A. isometric projection
B. perspective projection
C. oblique projection

D. None of these

373. In an oblique projection, the front surface of the object is kept at an angle with respect to plane of projection is
   A. perpendicular
   B. parallel
   C. 45°
   D. either 30º or 60º

374. The drawings in which the receding lines are drawn to half the scale are called
   A. isometric
   B. cavalier
   C. cabinet
   D. perspective

375. In the cavalier projection, an angle at which the projectors meet the plane of projection is
   A. 30^0
   B. 45^0
   C. 63º26'
   D. None of these

376. in the cabinet projection, an angle at which the projectors meet the plane of projection is
   A. 30º
   B. 45º
   C. 63º26'
   D. None of these

377. In the general oblique projection, an angle at which the projectors meet the plane of projection is
   A. 45º
   B. 63º26'
   C. 90º
   D. None of these

378. In oblique projections, the receding lines meet the plane of projection at an angle
   A. 0º
   B. 30º
   C. 90º
   D. <90º

379. To emphasise the features on the side of an object, the receding lines are drawn at the following angle to the plane of projection, which is
   A. 45°
   B. 60°
   C. >45°
   D. <45°

380. In oblique projections, a semi-circle parallel to the plane of projection appears as
   A. semicircle
   B. semi-ellipse
   C. cycloid
   D. partial ellipse

381. The projectors in oblique projections are
   A. converging at plane of projection
   B. parallel to plane of projection
   C. inclined to plane of projection
   D. perpendicular to plane of projection

382. While making cavalier projections, the ellipse is preferably drawn by
   A. four-centre approximate method
   B. oblong method
   C. concentric circles method
   D. parallelogram method

383. A regular cone is rested on base on horizontal plane the front view will be
   A. circle
   B. scalene triangle
   C. equilateral triangle
   D. isosceles triangle
384. An object shown by more than one views in a drawing is called
   A. perspective drawing
   B. isometric drawing
   C. oblique drawing
   D. multi-view drawing
385. Which of the following describes the theory of orthographic projections?
   A. Projectors are parallel to each other and perpendicular to the plane of projection.
   B. Projectors are parallel to each other and parallel to the plane of projection.
   C. Projectors are parallel to each other and oblique to the plane of projection.
   D. Projectors are perpendicular to each other and parallel to the plane of projection.
386. In orthographic projections, the visual rays are assumed to
   A. diverge from station point
   B. converge from station point
   C. be parallel
   D. None of these
387. In orthographic projection projector lines are
   A. Vertical lines
   B. Horizontal lines
   C. Inclined lines
   D. None of these
388. To represent the object on paper by orthographic projection the horizontal plane (H.P) should be placed in which way?
   A. The H.P is turned in a clockwise direction up to 90 degrees
   B. The H.P is turned in anti-clockwise direction up to 90 degrees
   C. H.P plane is placed to left side of vertical plane parallel to it
   D. H.P plane is placed to right side of vertical plane parallel to it
389. In orthographic projections, the xy is known as
   A. horizontal line
   B. horizontal trace
   C. reference line
   D. All of these
390. The orthographic axis are at….. to each other.
   A. 120°
   B. 180°
   C. 90°
   D. 0°
391. In 1st angle projection is recommended by
   A. USA
   B. ISI
   C. Bureau of Indian Standards
   D. ASME
392. 3rd angle projection is recommended by
   A. USA
   B. ISI
   C. Bureau of Indian Standards
   D. IS
393. Which is not a principal view?
   A. front

B. bottom
C. auxiliary
D. left side

394. The front view of an object is projected on the
A. horizontal plane
B. vertical plane
C. profile plane
D. auxiliary plane

395. The top view of an object is projected on the
A. horizontal plane
B. vertical plane
C. profile plane
D. auxiliary plane

396. The top view of a rectangular shaped room will show
A. length and height
B. length and width
C. width and height
D. height only

397. The side view of an object is obtained on the
A. horizontal plane
B. vertical plane
C. profile plane
D. auxiliary plane

398. True shape of the inclined surface of an object can be obtained on the
A. horizontal plane
B. vertical plane
C. profile plane
D. auxiliary plane

399. Principal planes in an orthographic projections are
A. front, top, profile
B. front, top, side
C. normal, perpendicular, profile
D. vertical, horizontal, profile

400. In case of orthographic projection the number of view generally used are
A. 2
B. 4
C. 6
D. 8

401. The principle views associated with orthographic projection are ...
A. Front view
B. Right side view
C. Top view
D. All of the above

402. The top view of an object should be drawn exactly
A. below or above the front view
B. right or left of the front view
C. below or right of the front view
D. above or left of the front view

403. In orthographic views, the height dimension on an object is seen in
A. front and top
B. front and side
C. top and left side
D. front, top and side

404. Minimum number of orthographic views necessary to show length, depth and height of an object are
   A. two
   B. three
   C. four
   D. six
405. In orthographic views, the depth dimension on an object is seen in
   A. front and
   B. front and side
   C. top and left side
   D. front, top and side
406. A sphere can be described in how many views?
   A. 4
   B. 3
   C. 2
   D. 1
407. In orthographic projection which one have all three views same
   A. Cube
   B. Circle
   C. Sphere
   D. Both a) and c) of above
408. View of circle in orthographic is
   A. Ellipse
   B. Circle
   C. Ellipse and circle
   D. Triangle
409. An orthographic view of a hemisphere may appear as
   A. circle
   B. ellipse
   C. parabola
   D. hyperbola
410. A point 'P' is above Horizontal Plane (HP) and in front of Vertical Plane (VP). The point is in
   A. First quadrant
   B. Second quadrant
   C. Third quadrant
   D. Fourth quadrant
411. Circular shapes appear in this fashion when viewed at an angle other than 90 degrees:
   A. Circular
   B. Elliptical
   C. Lengthened
   D. Angular
412. In 1st angle projection the object is kept in
   A. 1st quadrant
   B. 2nd quadrant
   C. 3rd quadrant
   D. 4th quadrant
413. In first angle projection method, the relative positions of the object, plane and observers are
   A. object is placed in between
   B. plane is placed in between
   C. observer is placed in between
   D. may be placed in any order
414. A point 'P' is above Horizontal Plane (HP) and in front of Vertical Plane (VP). The point is in
   A. First quadrant
   B. Second quadrant

C. Third quadrant
D. Fourth quadrant

415. In 2nd angle projection the object is kept in
A. 1st quadrant
B. 2nd quadrant
C. 3rd quadrant
D. 4th quadrant

416. In 3rd angle projection the object is kept in
A. 1st quadrant
B. 2nd quadrant
C. 3rd quadrant
D. 4th quadrant

417. If the object lies in the fourth quadrant, its position with respect to reference plane will be
A. In front of V.P. and above H.P. ,
B. Behind V.P. and below H.P.
C. In front of V.P. and below H.P.,
D. Behind V.P. and above H.P

418. Fourth angle projection is not used because
A. Front view is above reference line and top view is below reference line
B. Top view is above reference line and front view is below reference line
C. Front view and top view both overlap on each other and below reference line
D. Front view and top view both overlap on each other and above the reference line

419. In 1st angle projection the positions of front and top views are
A. top view lies above the front view
B. front view lies above the top view
C. front view lie left side to top view
D. top view lie left side to front view

420. In first angle projection system the front view will be.
A. in right hand side of its LHSV
B. above its top view
C. in left hand side of its RHSV
D. below its top view

421. In first angle projection system, the right hand side view of an object is drawn exactly
A. above of the front view
B. below of the front view
C. left of the front view
D. right of the front view

422. In the first angle projection method, the view seen from left is placed on
A. Above Front View
B. Right of Front View
C. Above Top View
D. Below Front View

423. In 3rd angle projection, the positions of front view and top views are?
A. Top view lies above the front view
B. Front view lies above the top view
C. Front view lie left side to top view
D. Top view lie left side to front view

424. In the third angle projection method, the view seen from left is placed on
A. Left of the Front View
B. Right of Front View
C. Right of Top View
D. Below Front View

425. For the third angle projection method, which of the following is correct?

A. Observer - Object – Plane
B. Observer – Plane – Object
C. (a) and (b) both
D. None of above

426. The site plane illustrates? (PSC Bagmati)
A. Floor plane
B. Where the house sites on the property
C. Roof plane
D. Garage and open space

427. Engineers prefer to make … sketches then to pictorial sketches to clear the shape of an object.
A. Orthographic
B. Perspective
C. Auto CAD
D. All of the above