

Engineering Drawing (21011)

1st Semester

Civil Technology

Providan-2022

Presented By

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Maskanda, Mymensingh**

Objectives

- To develop the ability to use various drawing instrument & materials.
- To enable in constructing and using various type of scale in drawing.
- To provide the ability to construct various geometrical figure.
- To enable to adopt various symbols used in drawing.
- To Understand the orthographic and isometric projection.

Contents

- Introduction**
- Classification**
- Drawing Instrument and Materials**
- Lettering Numbering and Title Strip**
- Alphabet of Lines and Dimensioning**
- Construction of Scale**
- Geometrical Construction & Conic Section**
- Symbols**
- Isometric Projection**

Introduction

A drawing is a graphic representation of a real thing ,an idea or a proposed design for construction later.

Classification of drawing

Artistic , free hand or
Model drawing

Engineering
projectile drawing

Geometrical
drawing

Mechanical
engineering drawing

Civil engineering
drawing

Electrical
engineering drawing

Plan Geometrical
drawing

Solid Geometrical
drawing

Architectural
drawing

Structural
drawing

Sheet metal
drawing

Marine
drawing

Air draft
drawing

Cabinet
drawing

Drawing Instrument and Materials

There are different type drawing instrument:

- Pencil
- Drawing Board and stand
- Drawing table and stool
- Drawing sheet
- Tracing paper
- Tracing cloth
- T-square
- Set-square
- Divider

Drawing Instrument and Materials

- Bow pencil or Compass
- Scale
- Diagonal Scale
- French curve or Irregular curves
- Protractor
- Eraser or Rubber
- Board pin
- Board clip
- Scotch tape

Drawing Instrument and Materials

Pencil sharpener

Sand Paper

Duster cloth

Drawing ink

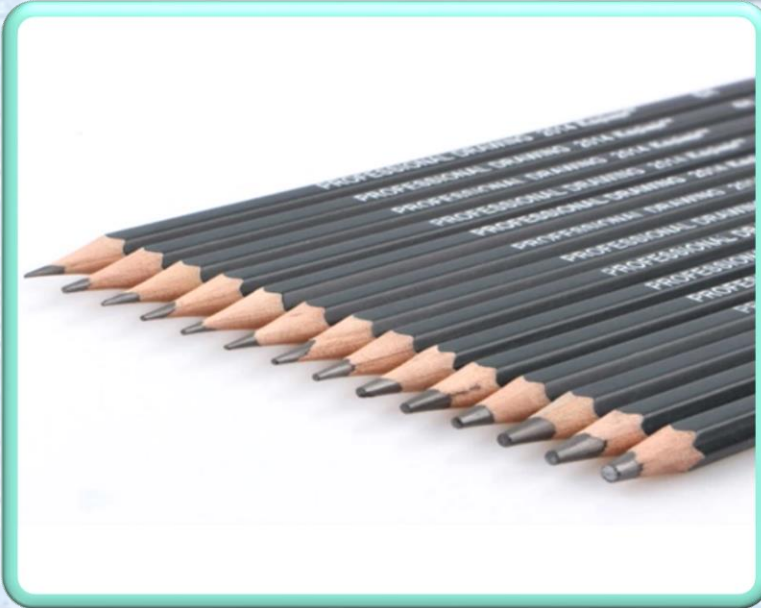
Instrument box

Lining pen

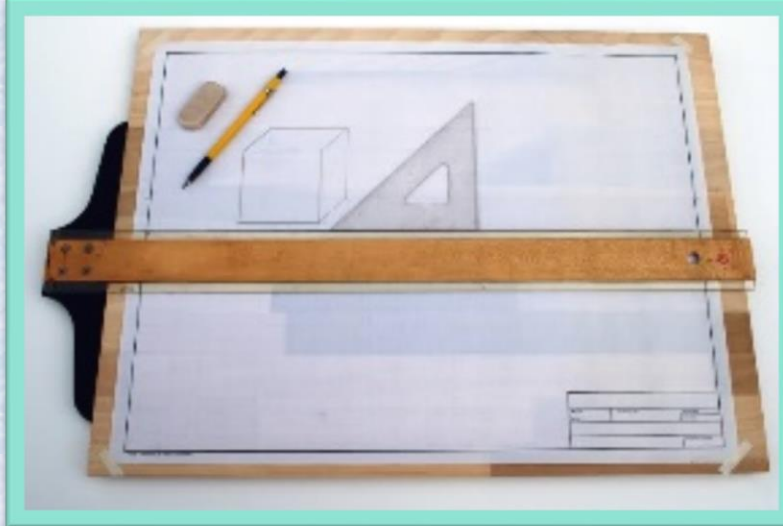
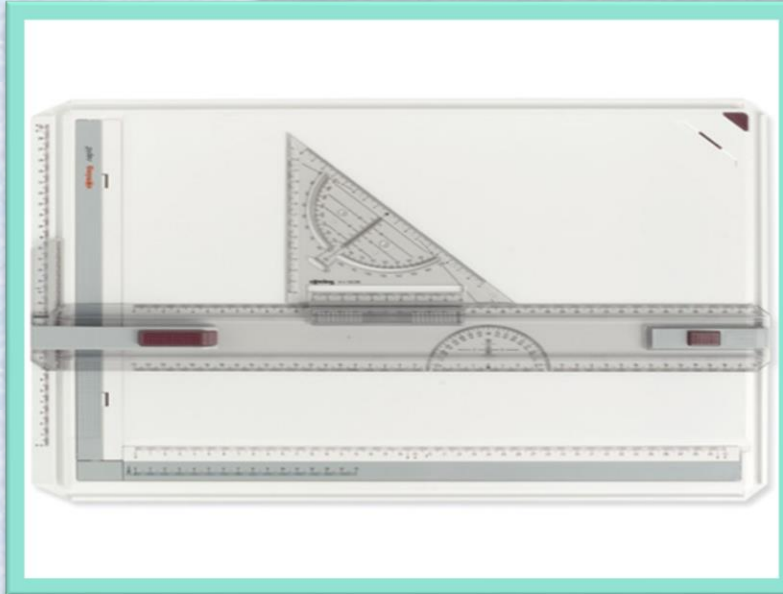
Bow pen

Drafting pen

□ Pencil



□ *Drawing Board and stand*



□ *Drawing Board and stand*




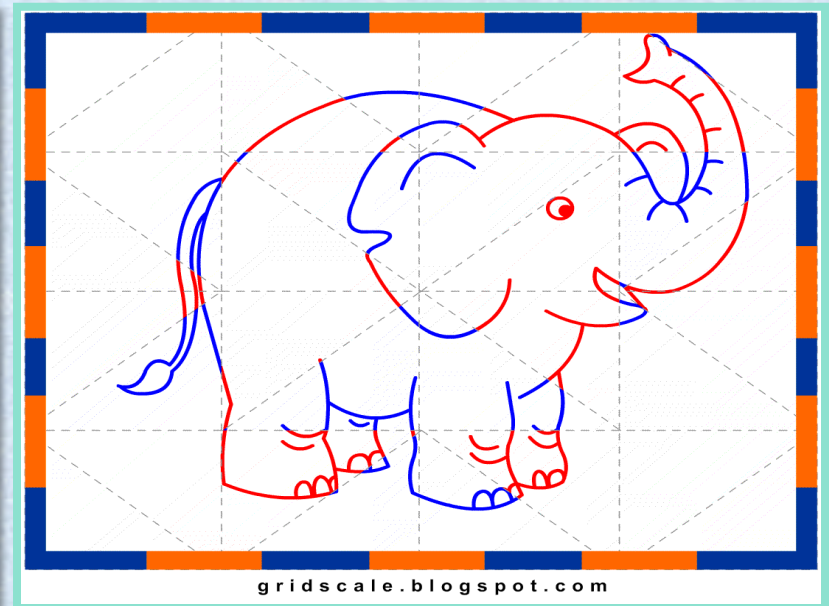
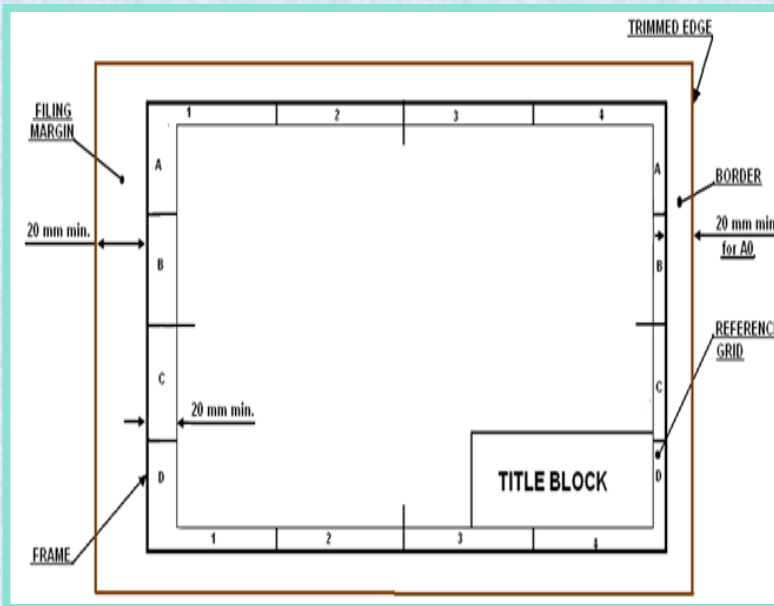
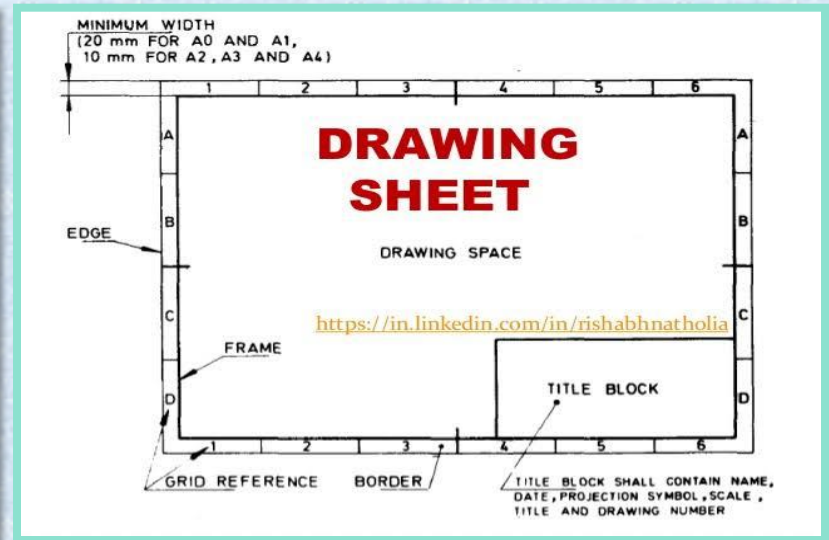
□ Drawing sheet

DO NOT SCALE

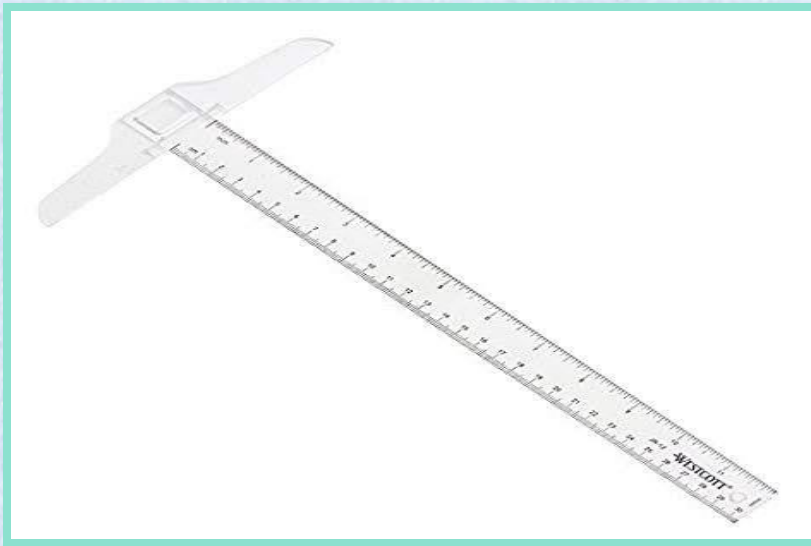
REVISIONS			
SL. NO.	DESCRIPTION	DATE	APPD.
A	M12 WAS 1/2 WHIT.	14-12-78	A.W.B.

4			
3			
2			
1	A7325	VALVE BODY	1
DRG. NO.		DESCRIPTION	QTY
DRG. PART NO.			

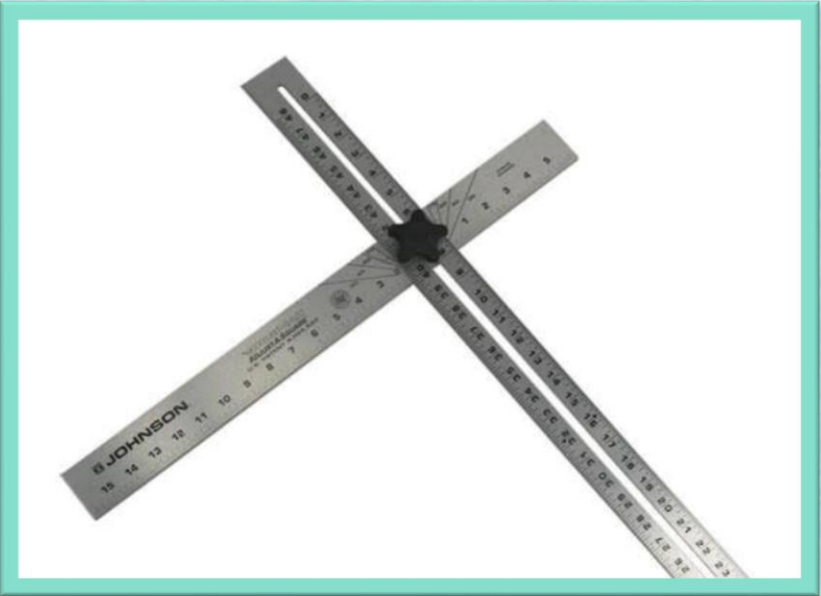
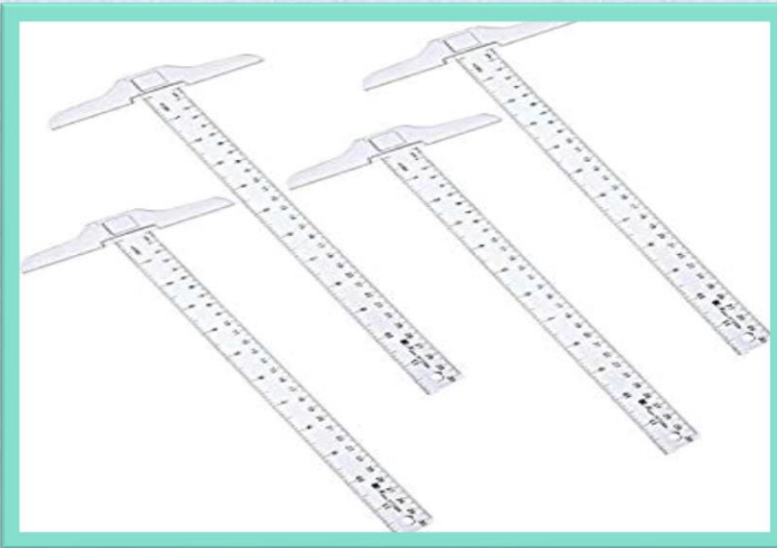
UNLESS OTHERWISE STATED ALL DIMENSIONS IN MILLIMETRES. TOLERANCES: LINEAR: ANGULAR:	 CAST STEEL	DRN 1:1:78 JKL	(NAME OF FIRM)
		CKD 2:1:78 M.J.M.	(TITLE OF DWG.)
		APPD 5:1:78 A.W.B.	
		ISSUED 4:2:78 P.F.P.	
DRAFTING STANDARD A.S. 1100	FINISH AS MACHINED	SIZE A3	DRG No A24481
		SCALE 1:2	SHEET 1 OF 1



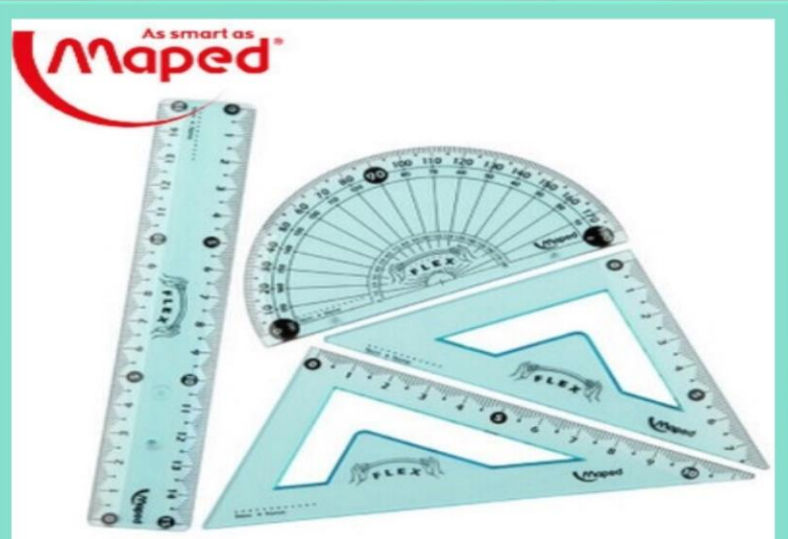
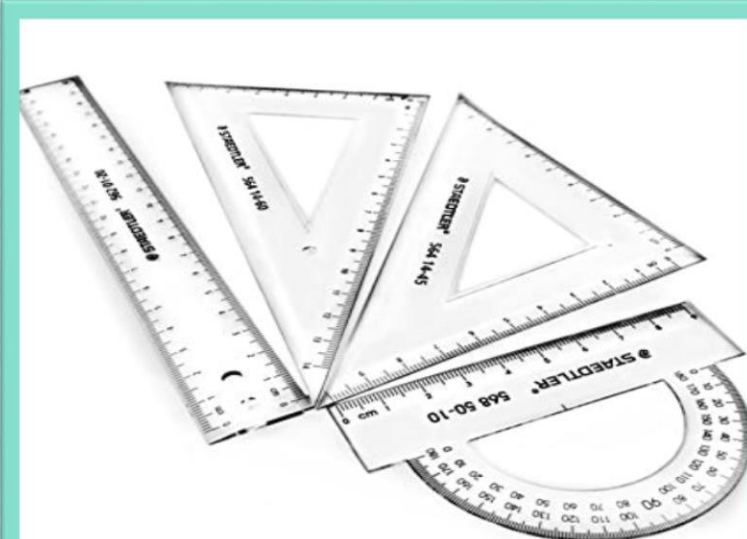
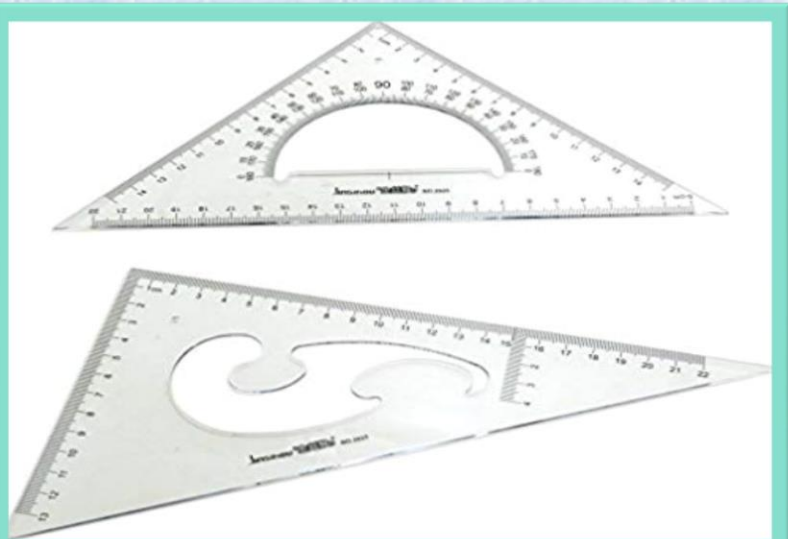
T-square



□ *T-square*



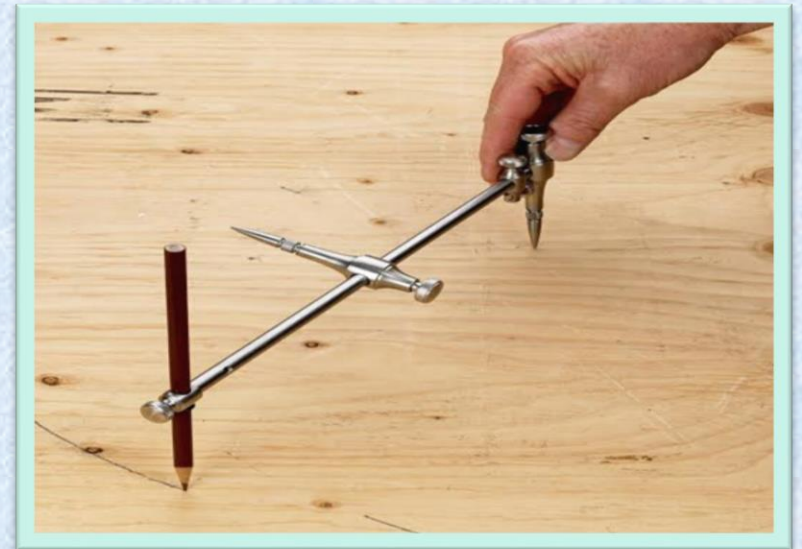
□Set-square



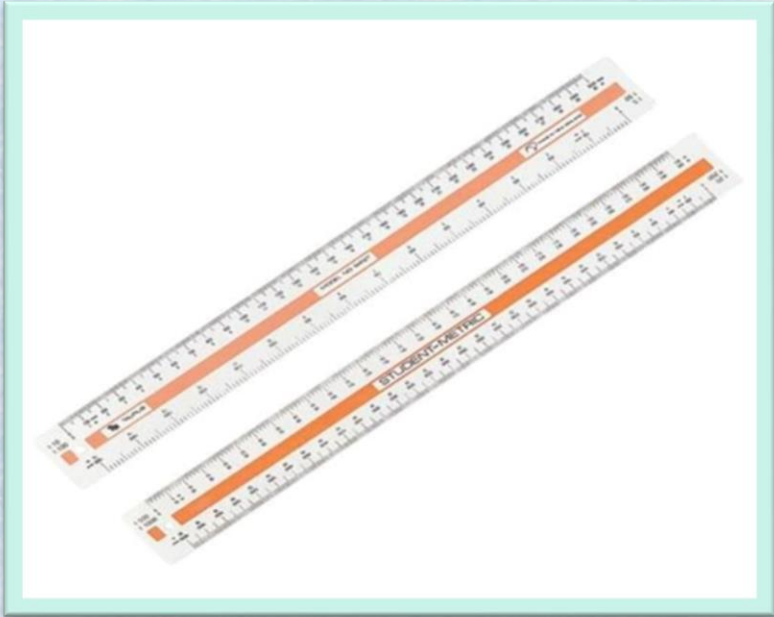
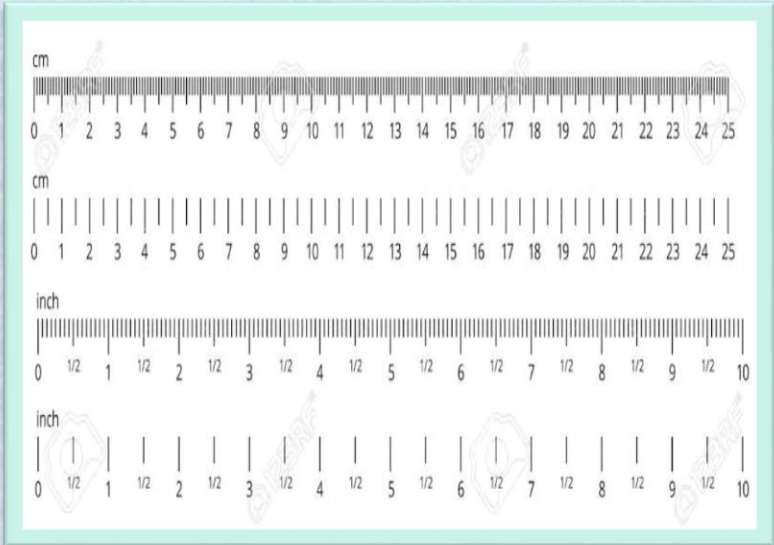
□ *Divider*



□ *Bow pencil or Compass*



Scale



□ Diagonal Scale

Draw the line AC of convenient length at right angles to plain scale AB . Divide it into 10 equal parts. Join BC . From each tenth point on line AC draw lines parallel to AB till they meet line BC . Then line 1-1 represent $\frac{1}{10}$ th of AB , 6-6 represent $\frac{6}{10}$ th of AB and so on. Figure 11.8 shows the construction of diagonal scale with $RF = \frac{1}{500}$ and indicates 62.6 m.

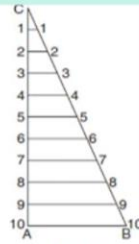


Fig. 11.7

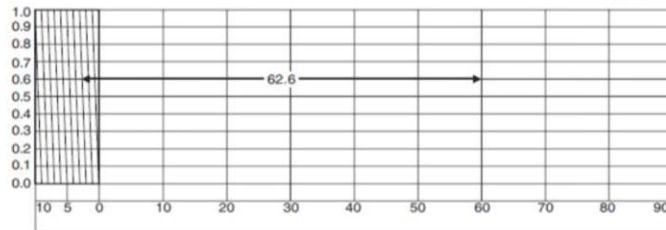


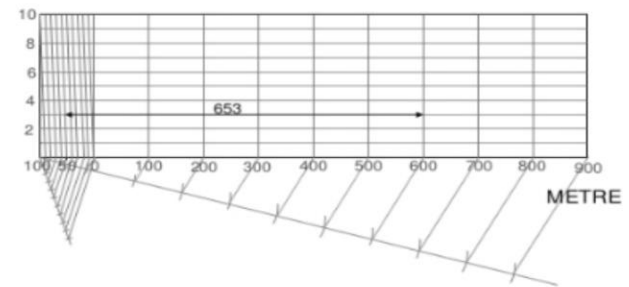
Fig. 11.8. Diagonal scale

Problem 7: Construct a diagonal scale of R.F. = $1/6250$ to read up to 1 kilometre and to read metres on it. Show a length of 653 metre on it.

$$R.F = \frac{1}{6250}, \text{ Max. Length} = 1 \text{ km}$$

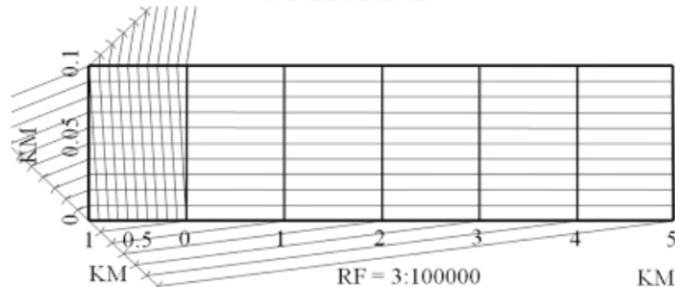
$$L.O.S. = R.F \times \text{Max. Length in cm} = \frac{1}{6250} \times 1 \times 10^5 \text{ cm} = 16 \text{ cm}$$

Hint: As the maximum length is 1 km, the line should be divided in to 10 equal parts, so as to represent a division of 100 m



DIAGONAL SCALES

Problem 5



PROBLEM NO. 4: The distance between Delhi and Agra is 200 km.

In a railway map it is represented by a line 5 cm long. Find its R.F.

Draw a diagonal scale to show single km. And maximum 600 km.

Indicate on it following distances. 1) 222 km 2) 336 km 3) 459 km 4) 569 km

DIAGONAL SCALE

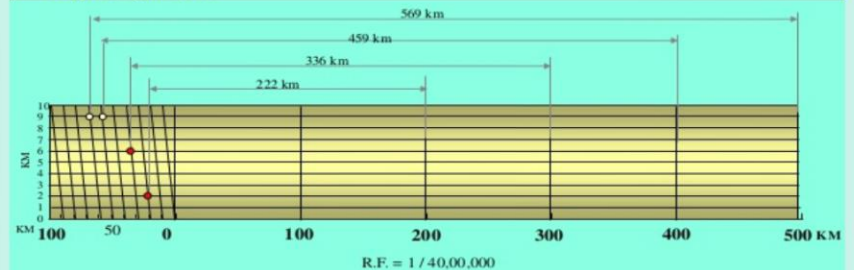
SOLUTION STEPS:

$$R.F = 5 \text{ cm} / 200 \text{ km} = 1 / 40,00,000$$

$$\text{Length of scale} = 1 / 40,00,000 \times 600 \times 10^5 = 15 \text{ cm}$$

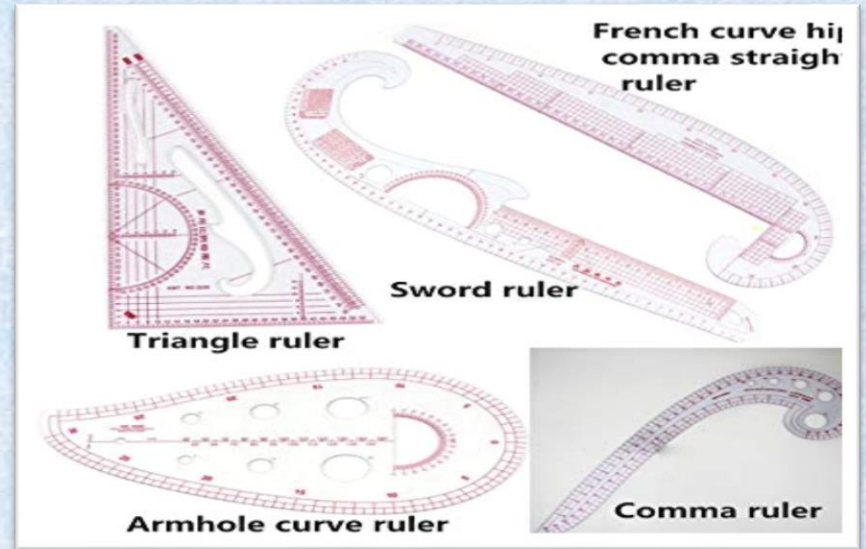
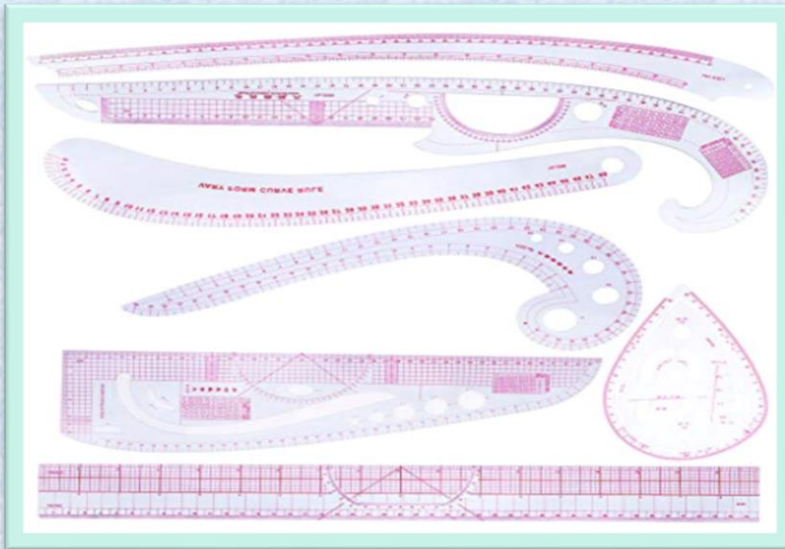
Draw a line 15 cm long. It will represent 600 km. Divide it in six equal parts. (each will represent 100 km.)

Divide first division in ten equal parts. Each will represent 10 km. Draw a line upward from left end and mark 10 parts on it of any distance. Name those parts 0 to 10 as shown. Join 9th sub-division of horizontal scale with 10th division of the vertical divisions. Then draw parallel lines to this line from remaining sub divisions and complete diagonal scale.

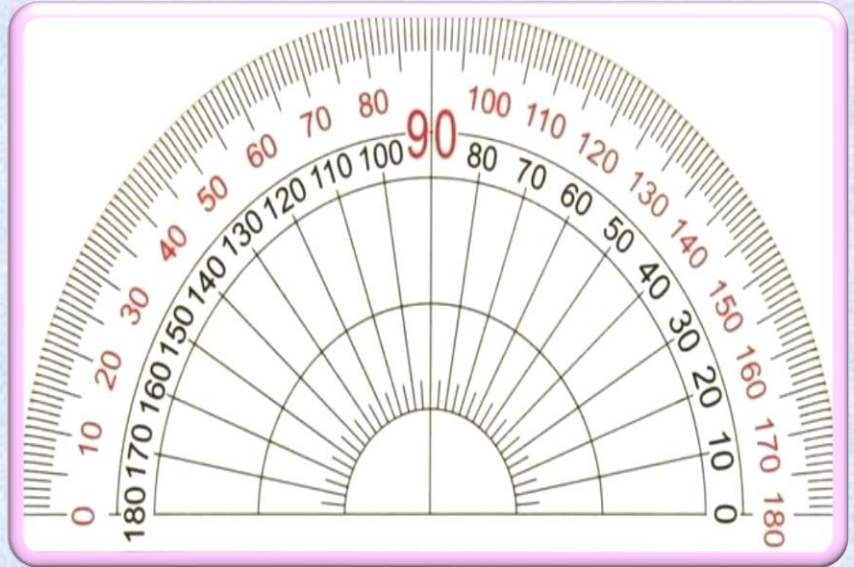
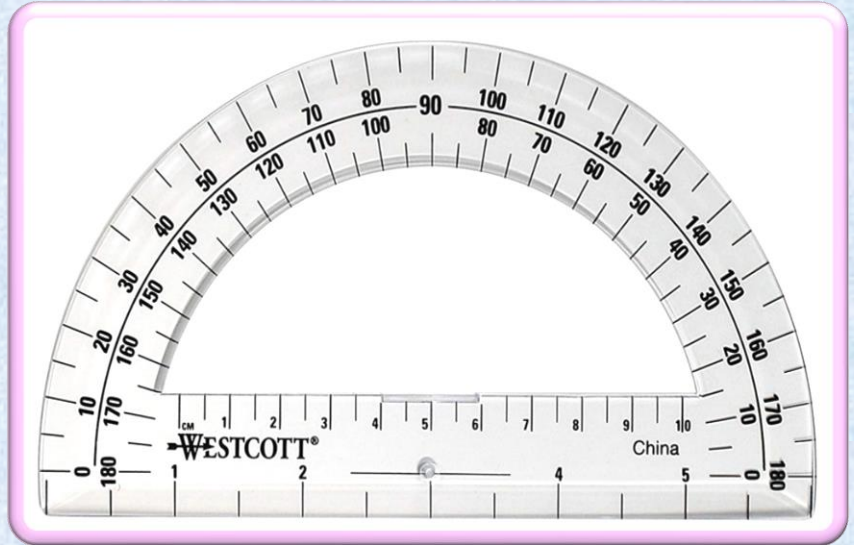
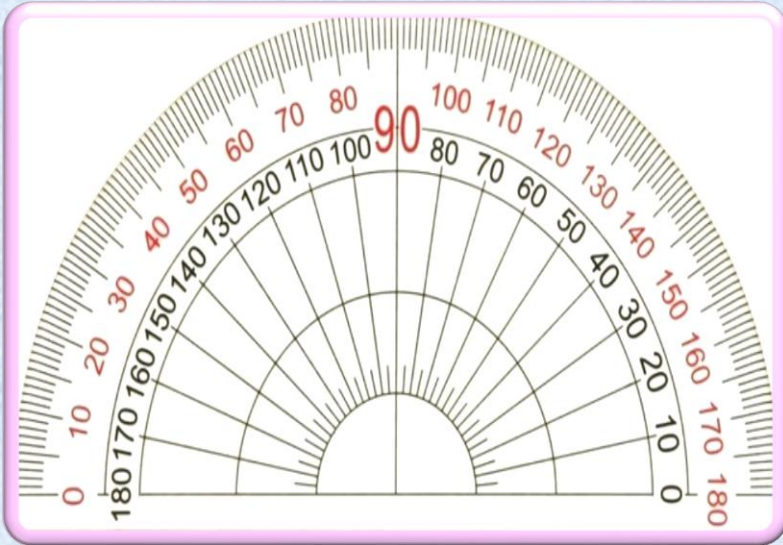


DIAGONAL SCALE SHOWING KILOMETERS.

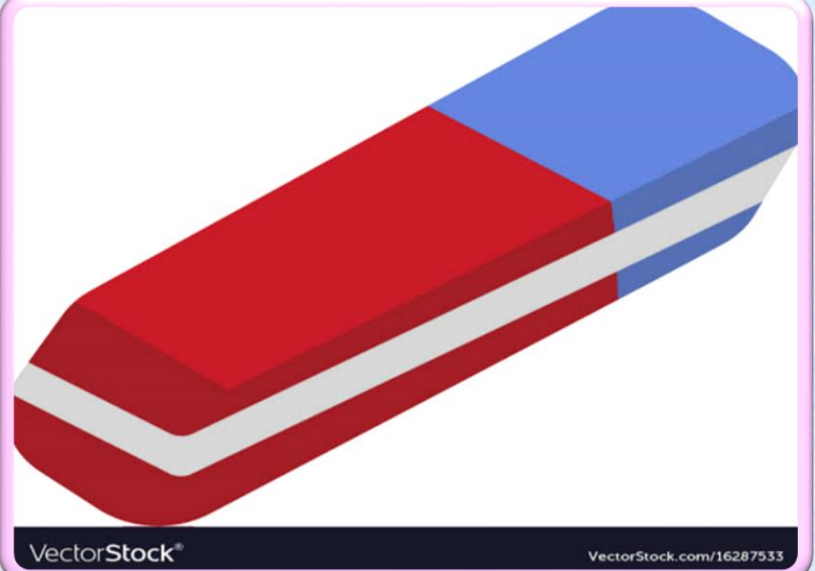
□ French curve or Irregular curves



□ Protractor



Eraser or Rubber



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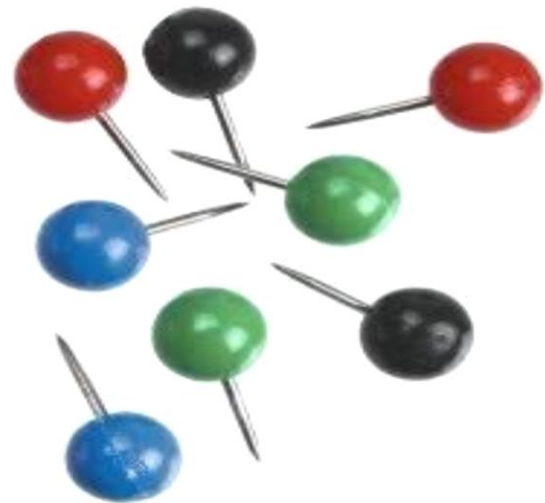
VectorStock.com/16287533



□ Board pin



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□ Scotch tape



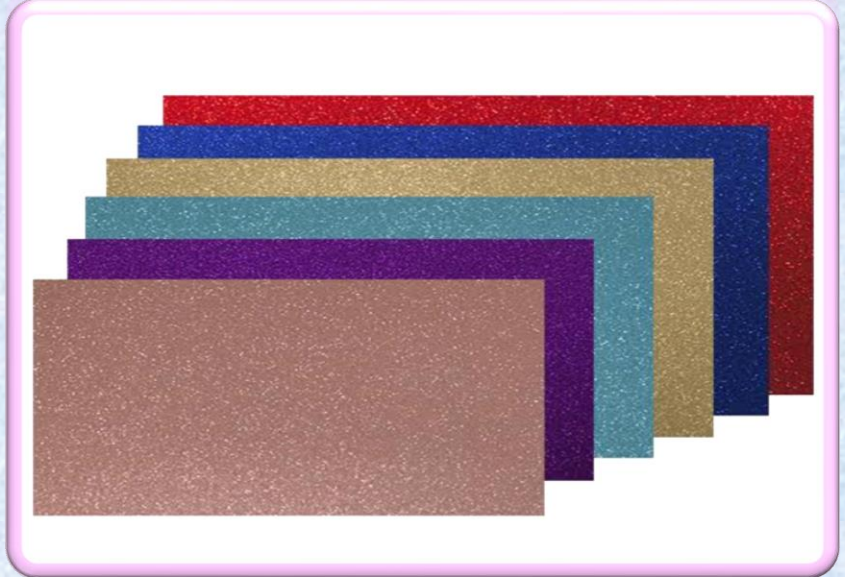
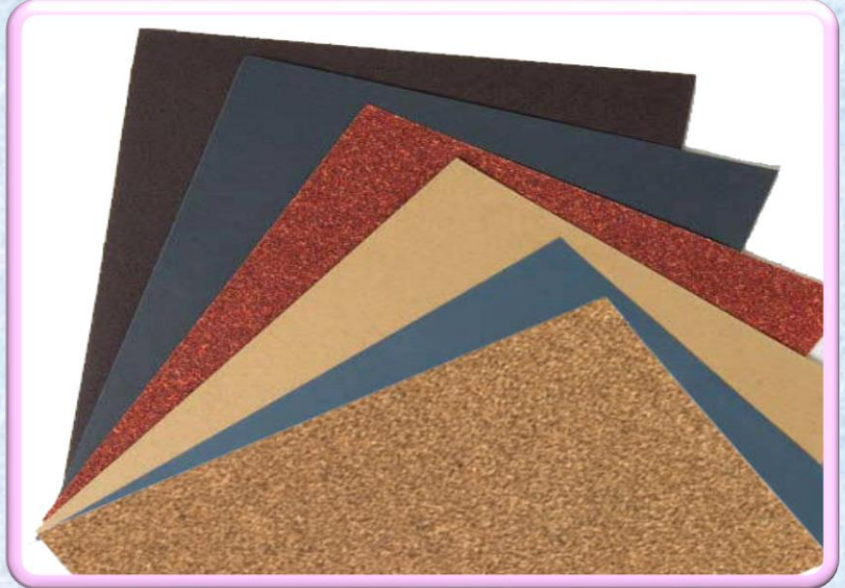
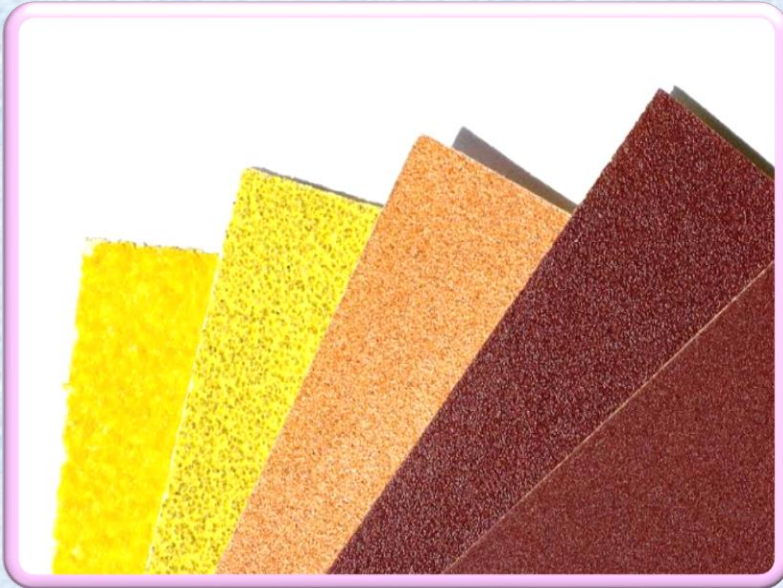
□ Scotch tape



□ Pencil sharpener



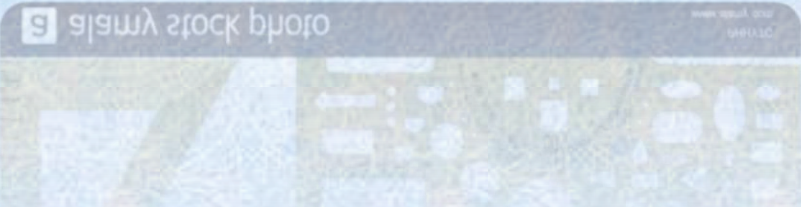
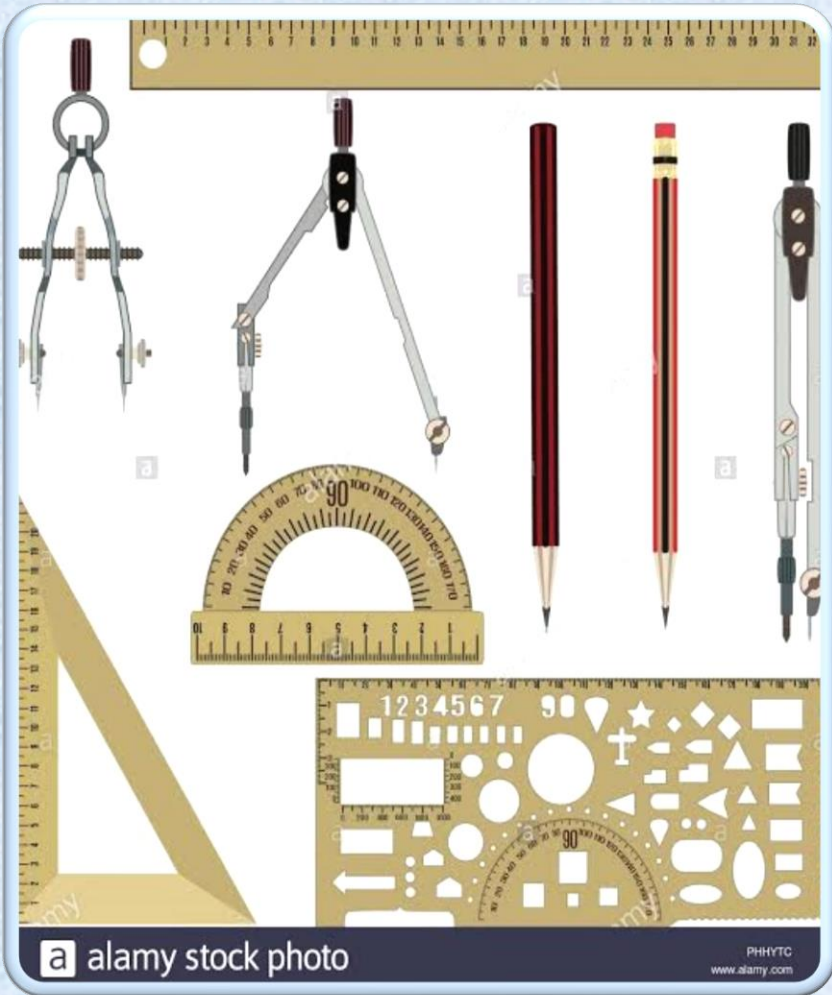
□ Sand Paper



☐ Duster cloth



Instrument box



mechcadcam.com

□ Lining pen



□ Drafting pen



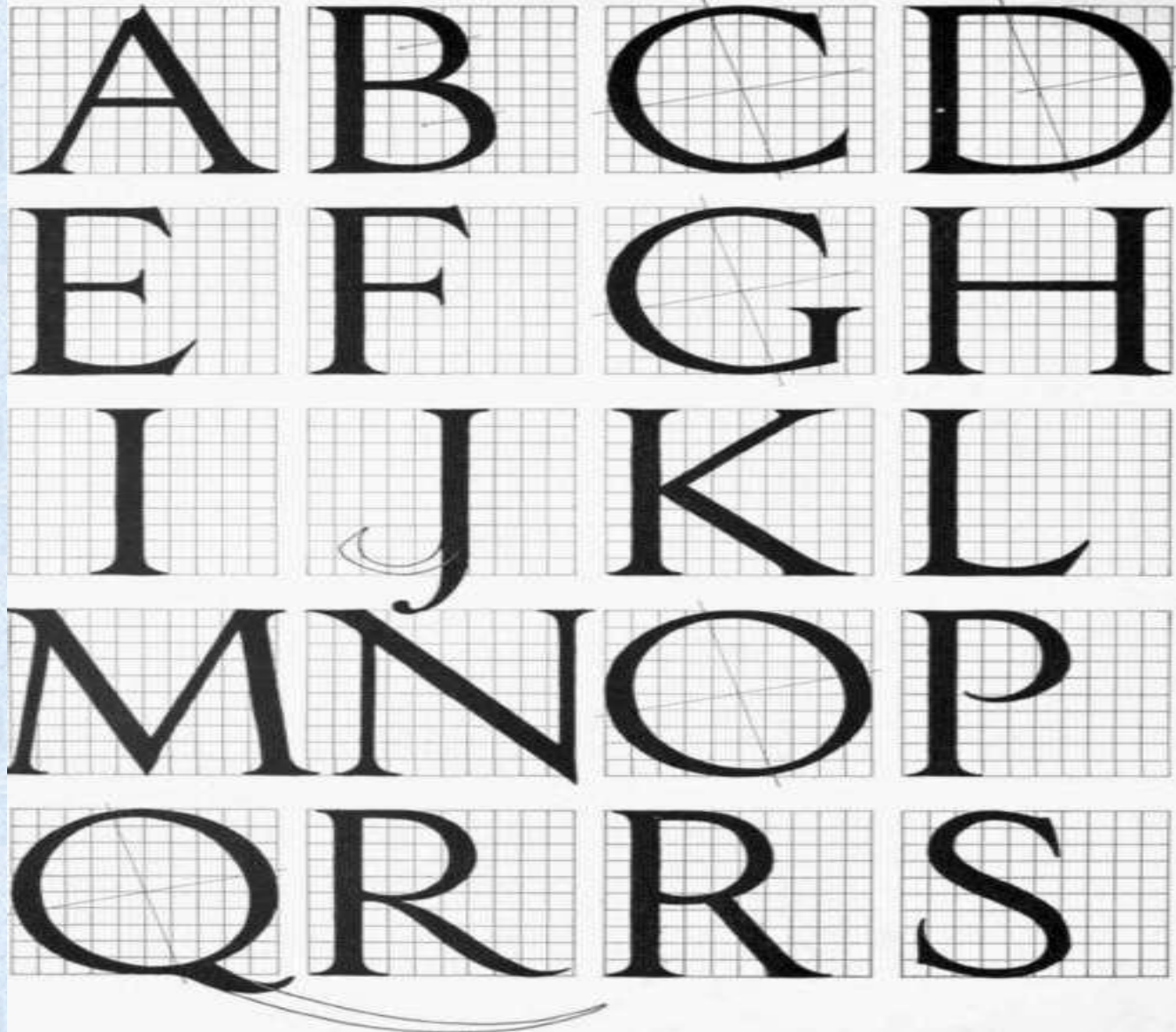
□ Lettering Numbering and Title Strip

Gothic Letters:

ABCDEFGHIJ
KLMNOPQRST
UVWXYZ

ABCDEFGHIJ
KLMNOPQRST
UVWXYZ-1
2345678
9 MODIFIED
COMMERCIAL
GOTHIC

Old Roman Letters:



□ Alphabet of Lines and Dimensioning

Alphabet of Lines

Visible Line

Invisible Line

Dimension Line

Cutting Plane Line

Center Line

Section Line

Long Break Line

Short Break Line

Border Line

- (1) Visible outline.
- (2) Invisible outline.
- (3) Center line.
- (3a) Center line, in pencil.
- (4) Dimension line. $2\frac{1}{4}''$
- (5) Extension line.
- (6) Alternate position.
- (7) Line of motion.
- (8) Cutting plane.
- (9) "Ditto" or repeat line
- (10) Broken material.
- (11) Limiting break.
- (12) Cross-hatching line.


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□ Alphabet of Lines and Dimensioning



(A)	 EX. HEAVY	BORDER LINES
(B)	 HEAVY	VISIBLE OUTLINES
(C)	 HEAVY	INVISIBLE OUTLINES (HIDDEN LINES)
(D)	 LIGHT	DIMENSION, EXTENSION, PROJECTION AND SECTION LINES
(E)	 LIGHT	CENTER LINES
(F)	 HEAVY	BREAK LINES (SHORT)
(G)	 LIGHT	BREAK LINES (LONG)
(H)	 HEAVY	CUTTING PLANE LINES
(I)	 LIGHT	PHANTOM LINES

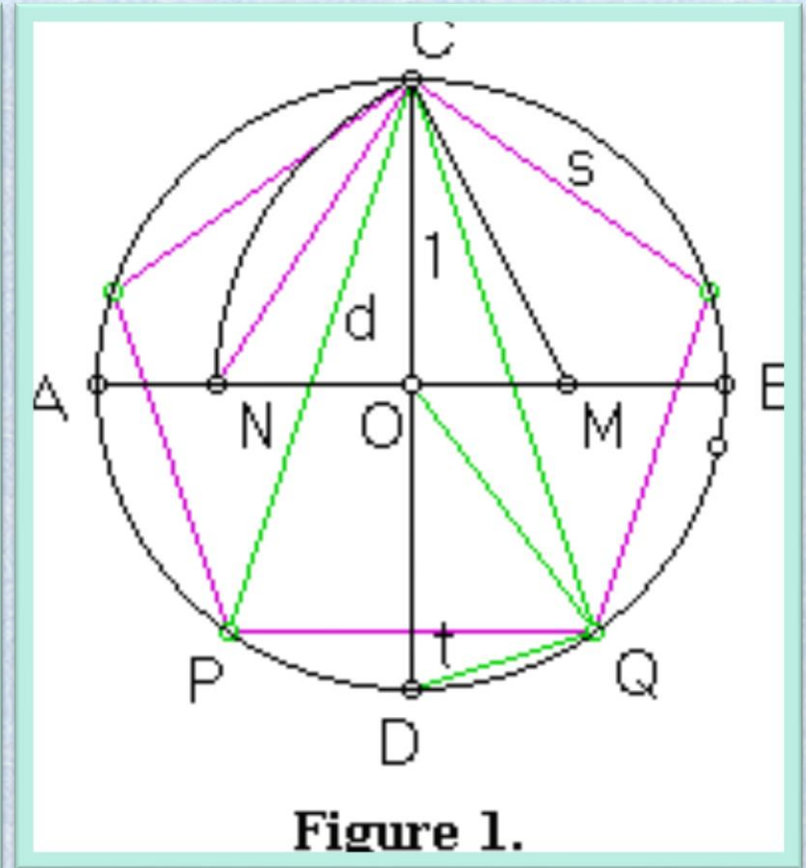
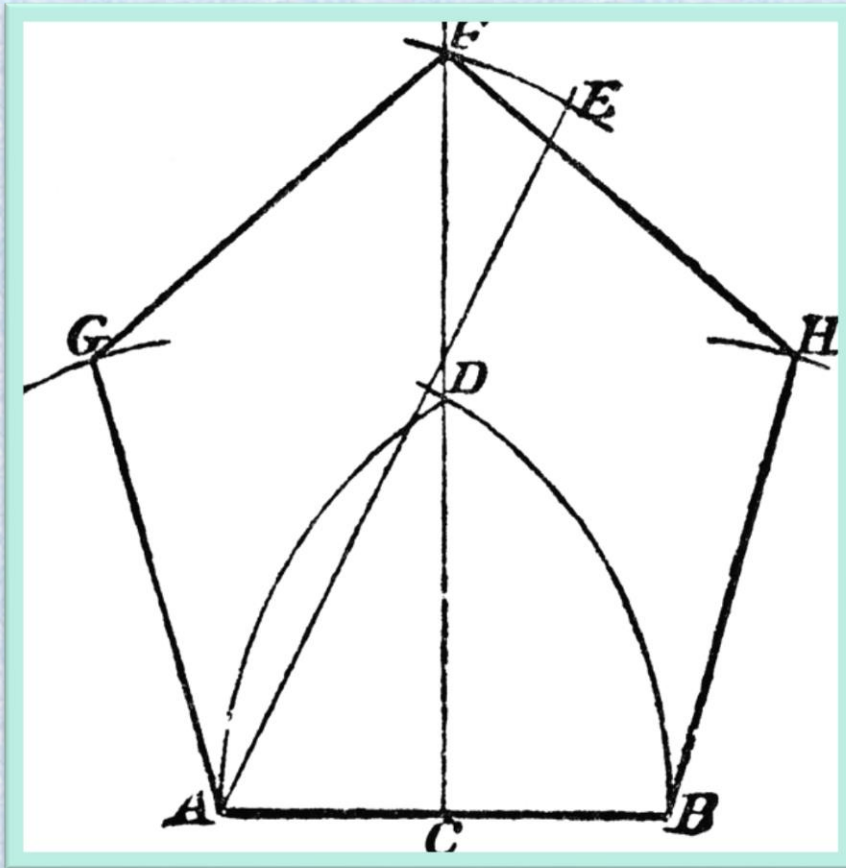
□ Description of Lines

Alphabet of Lines Test Review Key

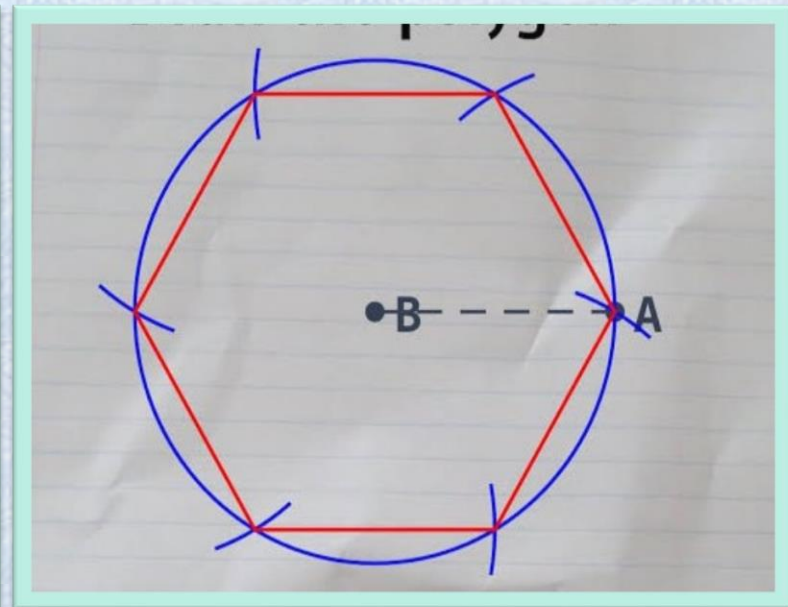
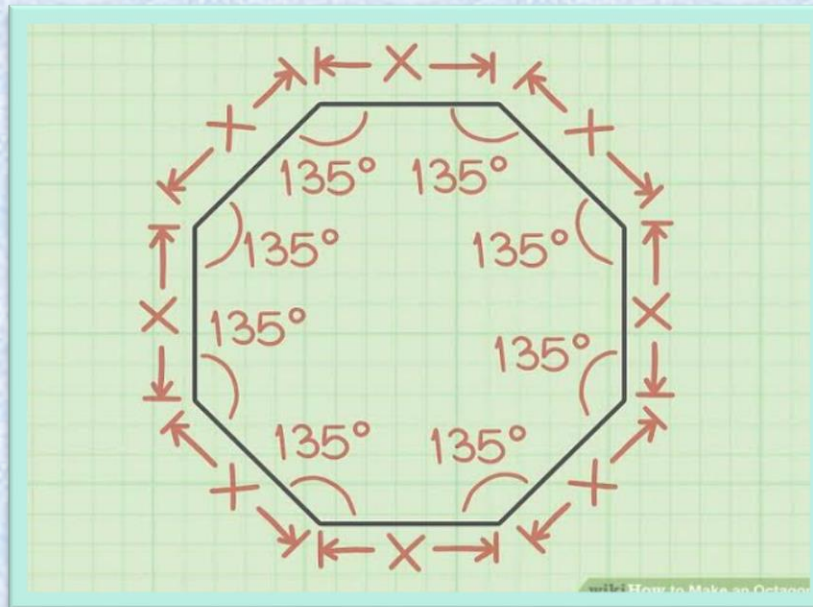
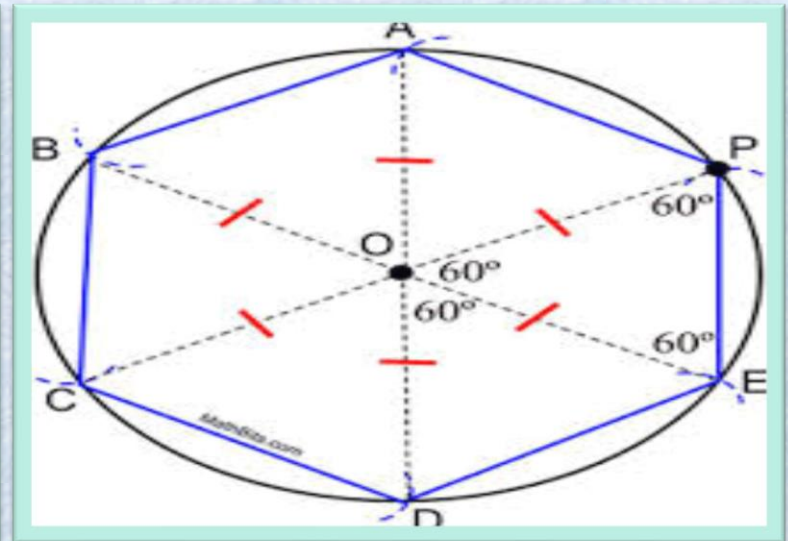
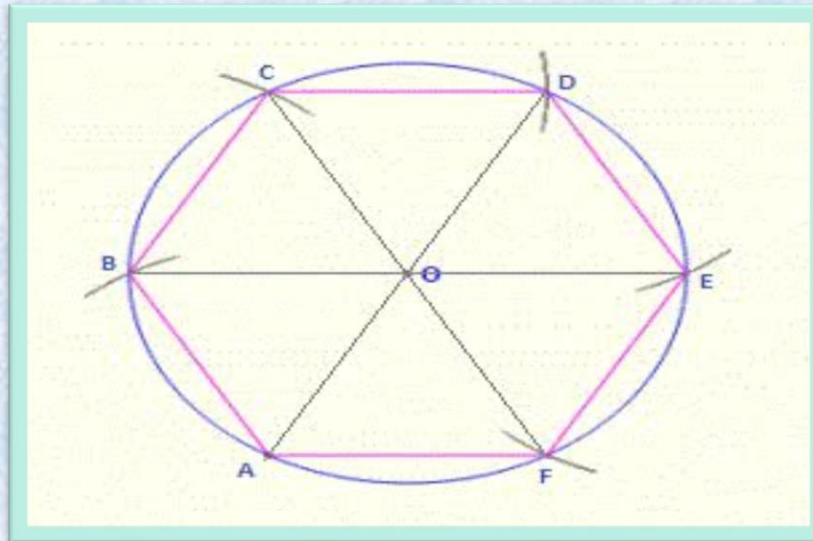
1. **Hidden** lines represent an invisible edge on an object and are shown as thin, dark dashed lines.
2. What size lead (pencil) is used to draw a **section** line? **.3mm**
3. **Dimension** lines show the length, width, and height of the features of an object and are shown as dark, thin lines.
4. What size lead (pencil) is used to draw an **object/visible** line? **.7mm**
5. What size lead (pencil) is used to draw a **leader** line? **.3mm**
6. **Section** lines symbolize different parts of an object or different materials from which an object is manufactured and are shown as thin "cross hatching" lines drawn at 45 degree angles.
7. **Extension** lines show the starting and stopping points of a dimensions and are shown as dark, thin lines.
8. What size lead (pencil) is used to draw a **center** line? **.3mm**
9. **Cutting plane** lines indicate where an imaginary cutting plane passes through an object, for viewing or sectioning purposes and are shown as thick, broken lines.
10. What size lead (pencil) is used to draw a **cutting plane** line? **.7mm**
11. **Object or Visible** lines show the outline and shape of an object and are show as thick, dark solid lines.
12. What size lead (pencil) is used to draw a **hidden** line? **.5mm**
13. What size lead (pencil) is used to draw an **extension** line? **.3mm**
14. **Center** lines show the middle of holes, slots, paths of rotation, circles, radius, and symmetrical objects and are shown as a thin line consisting of long and short dashes.
15. Phantom lines indicate alternate positions of moving parts, lines of motion, adjacent parts, and repetitive details and are shown as thin lines made up of long dashes alternating with pairs of short dashes.
16. What size lead (pencil) is used to draw a **break** line? **.7mm** (short) or **.5mm** (long)
17. **Leader** lines are used to point to a place on an object to note specific locations like diameters and fillets and are shown as thin lines with arrows at the end.
18. What size lead (pencil) is used to draw a **dimension** line? **.3mm**
19. **Break** lines are used to shorten a view, or eliminate repetitive details when an entire view is not necessary and are shown as either thick wavy freehand lines (short) or thin straight zig-zags (long).
20. What size lead (pencil) is used to draw a **phantom** line? **.5mm**

□ Geometrical Construction & Conic Section

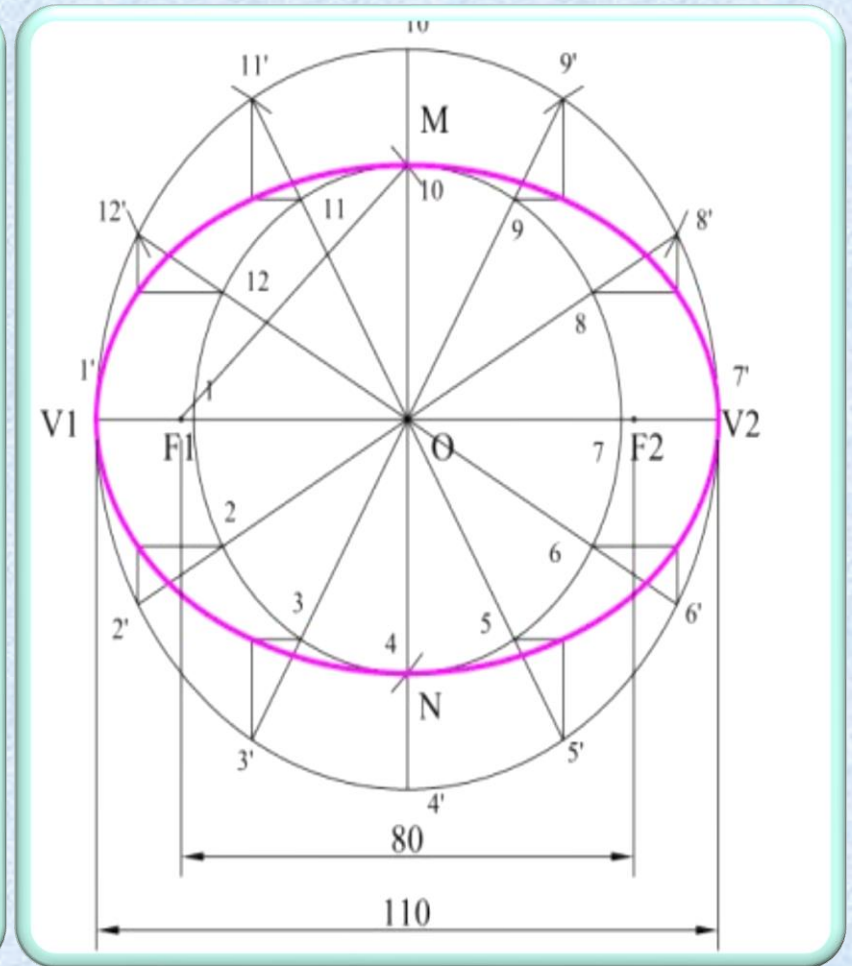
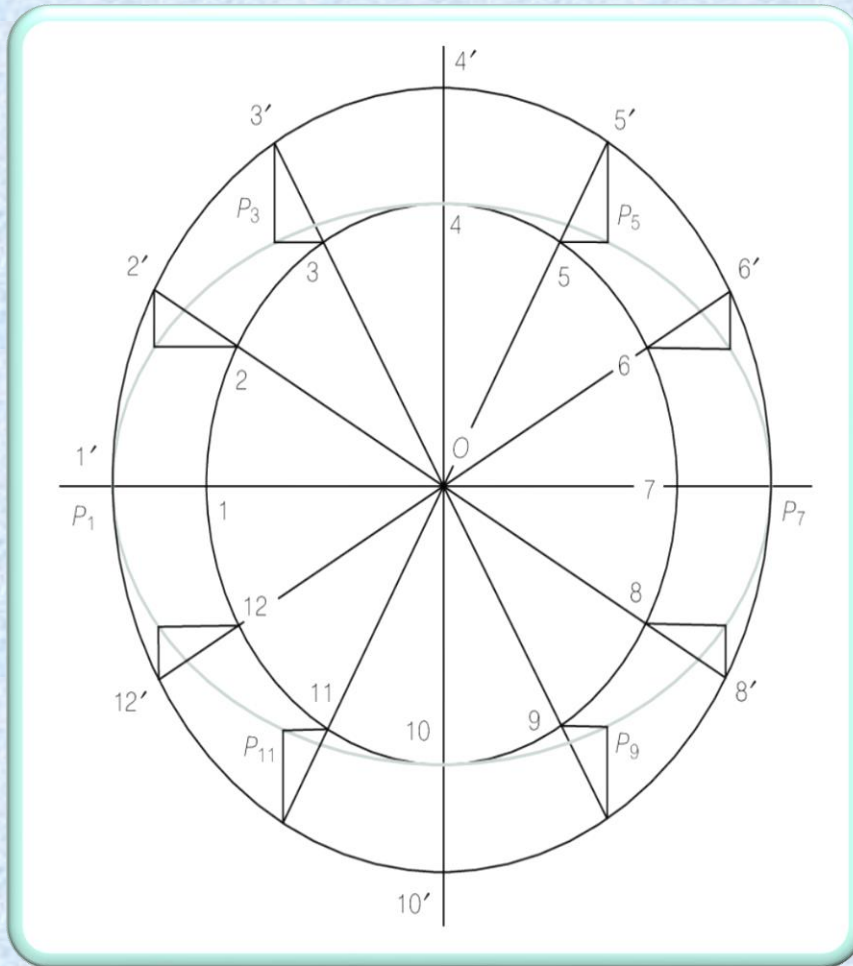
To Construct a regular pentagon:



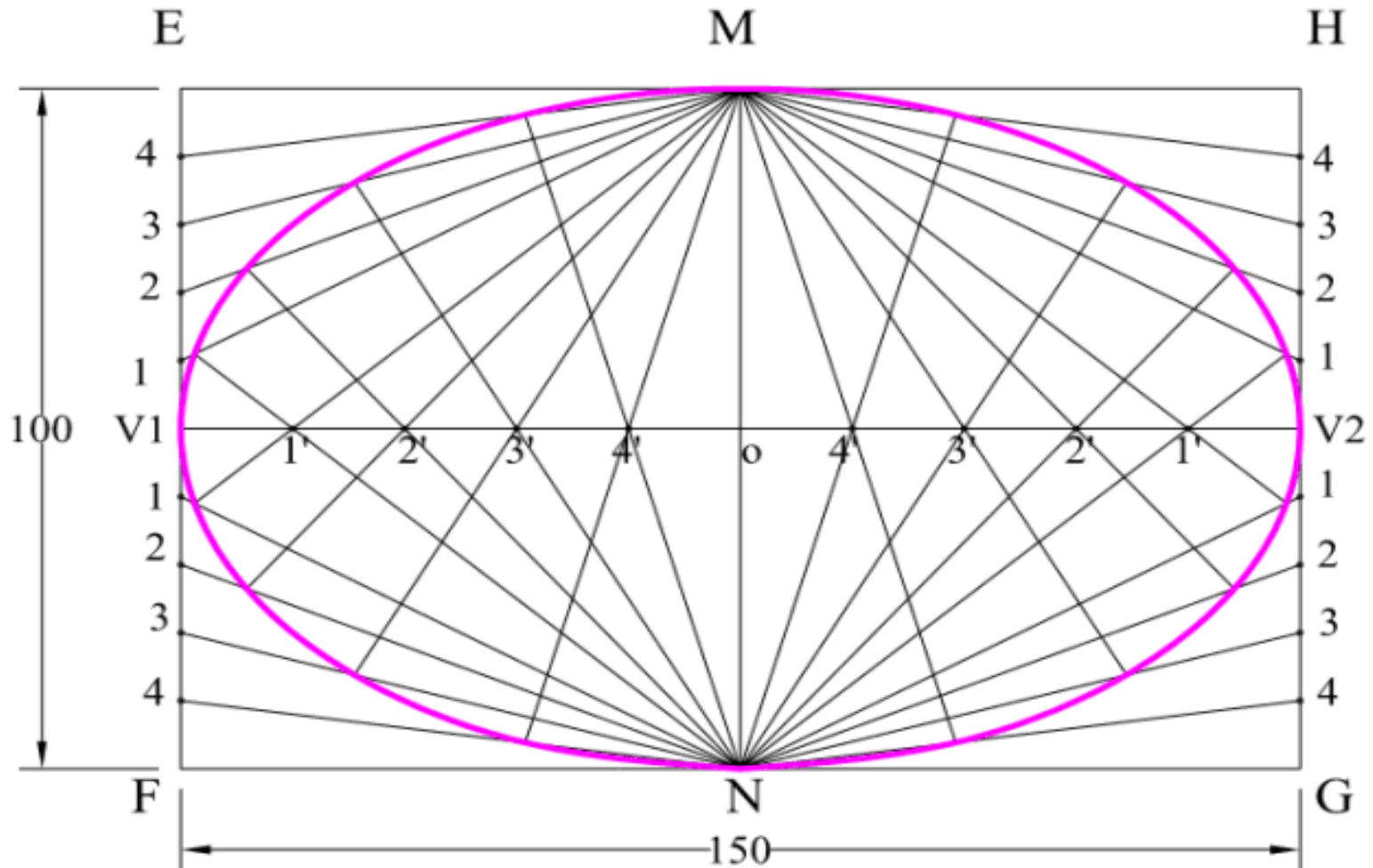
To Construct a regular hexagon:



To draw an ellipse by circle method, the major and minor axes being given:



To draw an ellipse by parallelogram method, the major and minor axes being given:



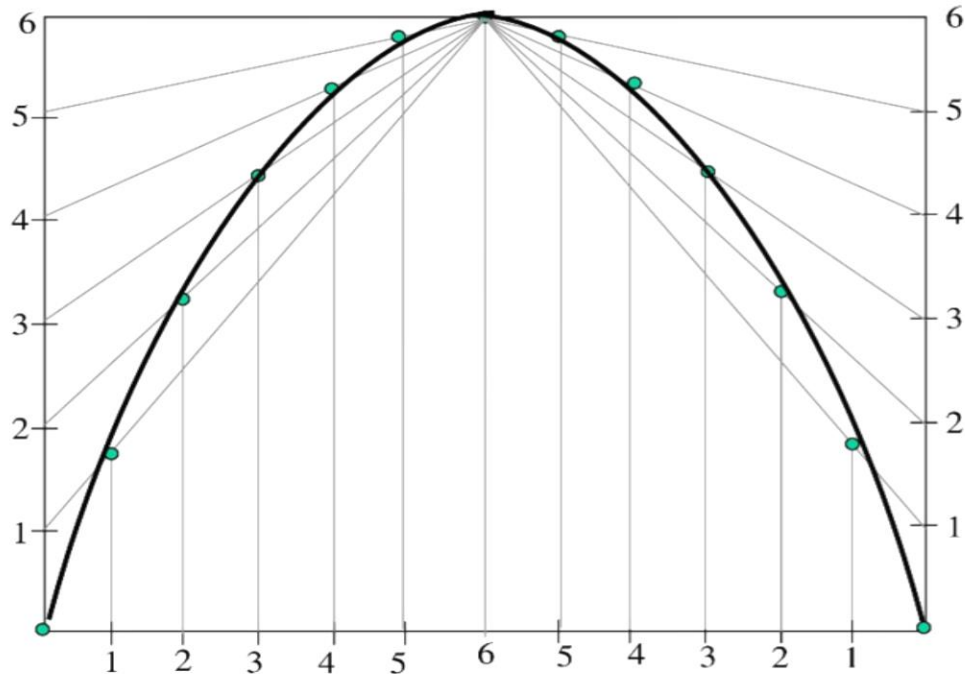
To draw a parabola, the abscissa and ordinate being given:

PROBLEM 7: A BALL THROWN IN AIR ATTAINS 100 M HEIGHT AND COVERS HORIZONTAL DISTANCE 150 M ON GROUND.
Draw the path of the ball (projectile)-

PARABOLA RECTANGLE METHOD

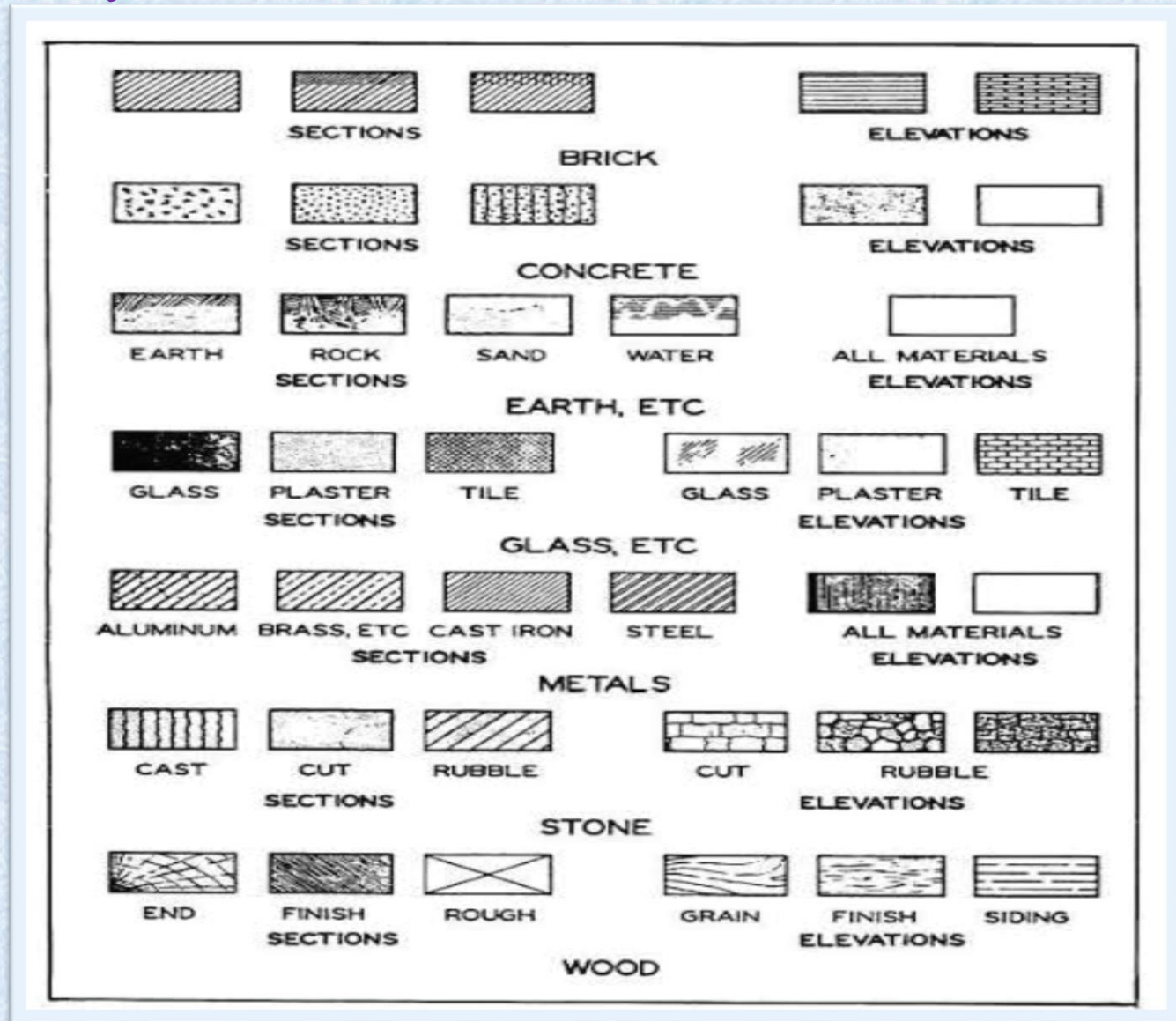
STEPS:

1. Draw rectangle of above size and divide it in two equal vertical parts
2. Consider left part for construction. Divide height and length in equal number of parts and name those 1,2,3,4,5 & 6
3. Join vertical 1,2,3,4,5 & 6 to the top center of rectangle
4. Similarly draw upward vertical lines from horizontal 1,2,3,4,5. And wherever these lines intersect previously drawn inclined lines in sequence Mark those points and further join in smooth possible curve.
5. Repeat the construction on right side rectangle also. Join all in sequence. **This locus is Parabola.**



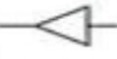






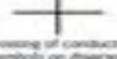

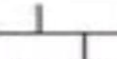

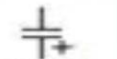



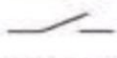
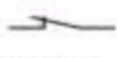

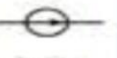

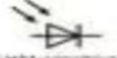




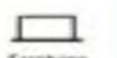





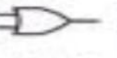


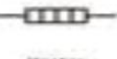
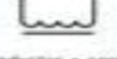
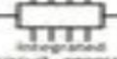


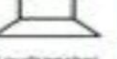









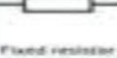









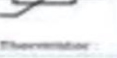







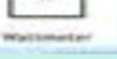


□ Symbols



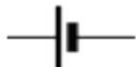
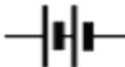
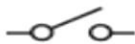

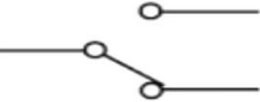





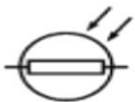







Architectural symbols:



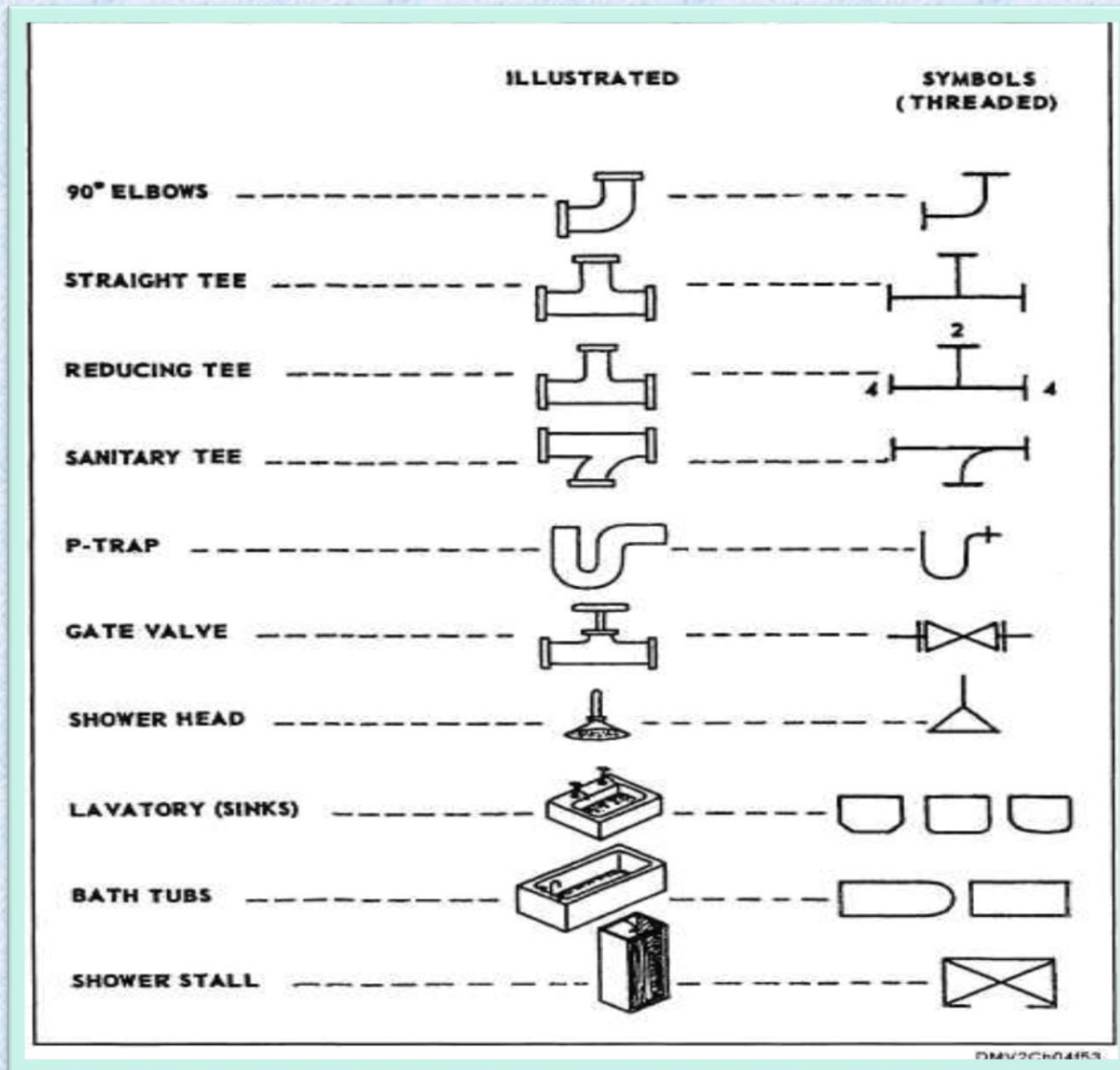
Electrical symbols:

Electrical Symbols							15
							
Aerial (antenna)	Ammeter	Amplifier	Battery of primary or secondary cells	Battery, Solar	Direct current or steady voltage	Alternating Current	
							
Primary or secondary cell	Circuit breaker	Crossing of conductor symbols on diagram in electrical connection	Junction of conductors	Double junction of conductors	Capacitor, general symbol	Capacitor, Polarized	
							
Capacitor, Polarized electrolytic	Capacitor with preset adjustment	Clock (ant slave clock)	Make contact normally open	Break contact normally closed	Break contact unit	Source, constant-current	
							
PN diode	Light-sensitive PN diode	Light-emitting diode (LED)	Zener diode	Earth	Electric bell	Earphone (receiver)	
							
Fuse	Galvanometer	NAND gate	NOR gate	NOT gate	OR gate	AND gate	
							
Generator	Heater	Inductor + core	Integrated circuit, general	Signal lamp	Filament lamp	Loudspeaker	
							
Neon Lamp	Motor	Microphone	Oscilloscope	Positive polarity	Negative polarity	Plug (male)	
							
Potentiometer	Rectifier	Fixed resistor	Variable resistor	Resistor with moving contact	Relay make contact unit	Light-Dependent Resistor (LDR)	
							
Relay coil and switch	Rheostat	Socket (female)	Source, constant-voltage	Signal generator	Thermistor	Transformer	
							
PNP transistor	NPN transistor	Variability	Voltage divider with moving contact	Voltmeter	Winding	Wattmeter	

Electrical symbols:

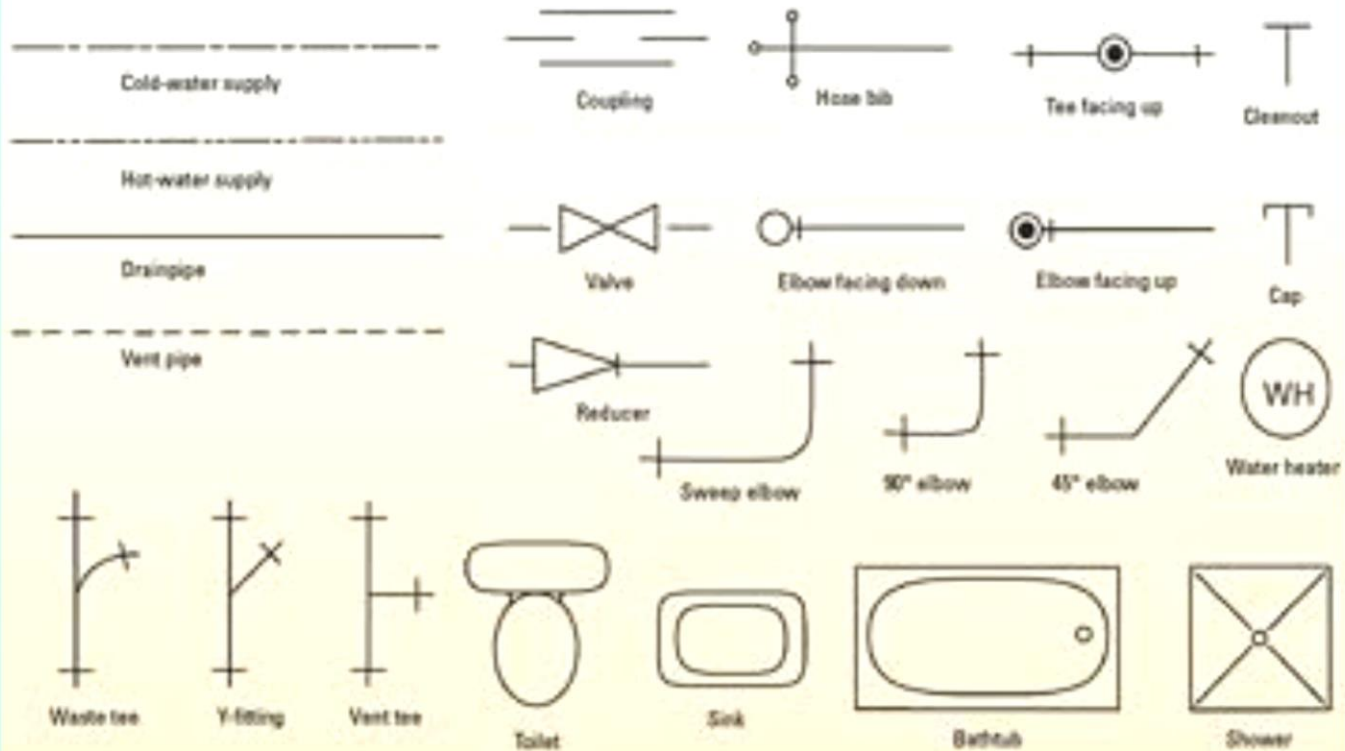
Bulb		Indicator	
Cell		Battery with two cells	
Switch		Push switch	
Two way switch		Fuse	
Buzzer		Motor	
Resistor		Variable resistor	
Light dependent resistor (LDR)		Thermistor	
Diode		Light emitting diode (LED)	
Electromagnet			
Ammeter		Voltmeter	
Loudspeaker			

Plumbing symbols:



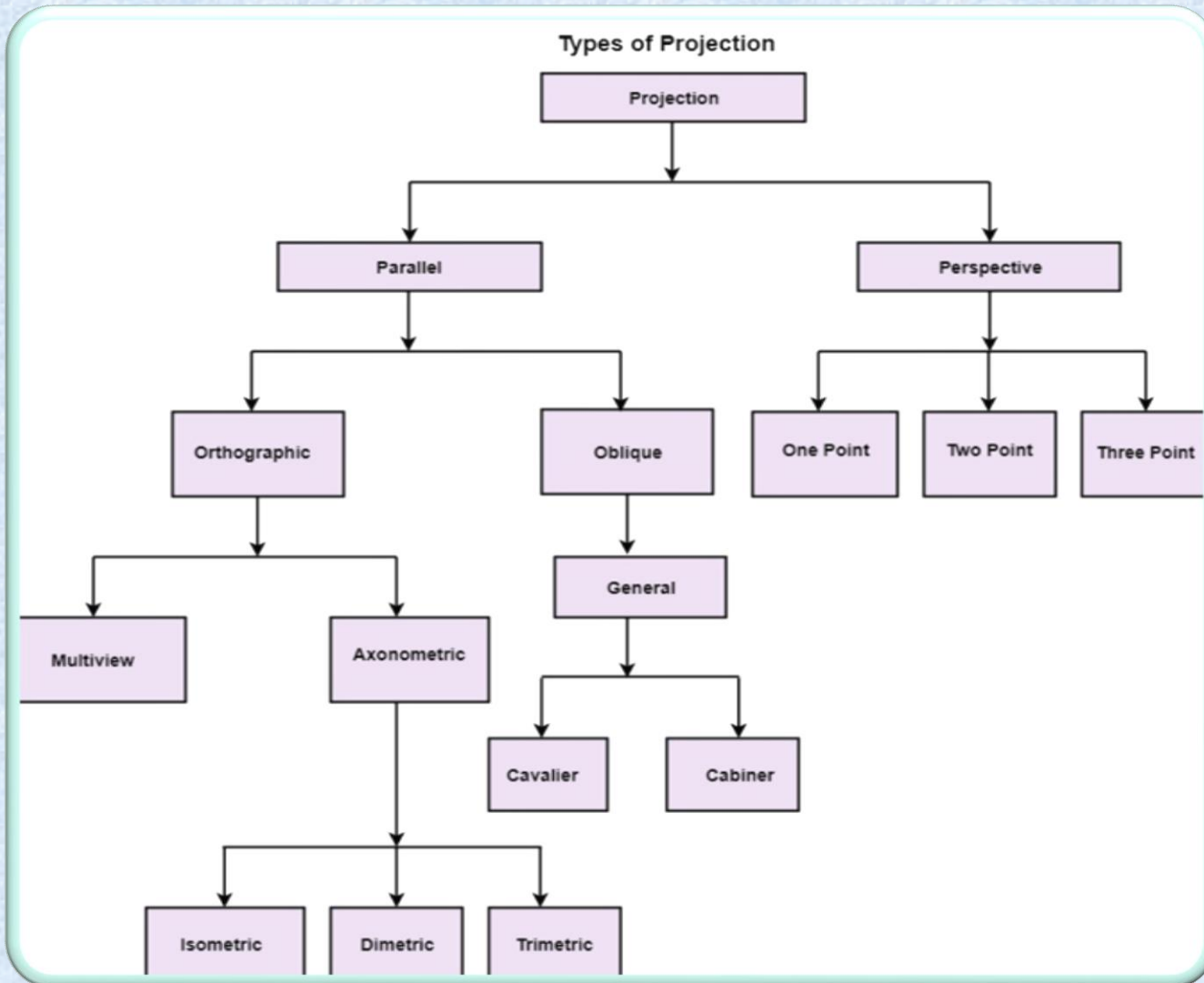
Plumbing symbols:

Plumbing symbols

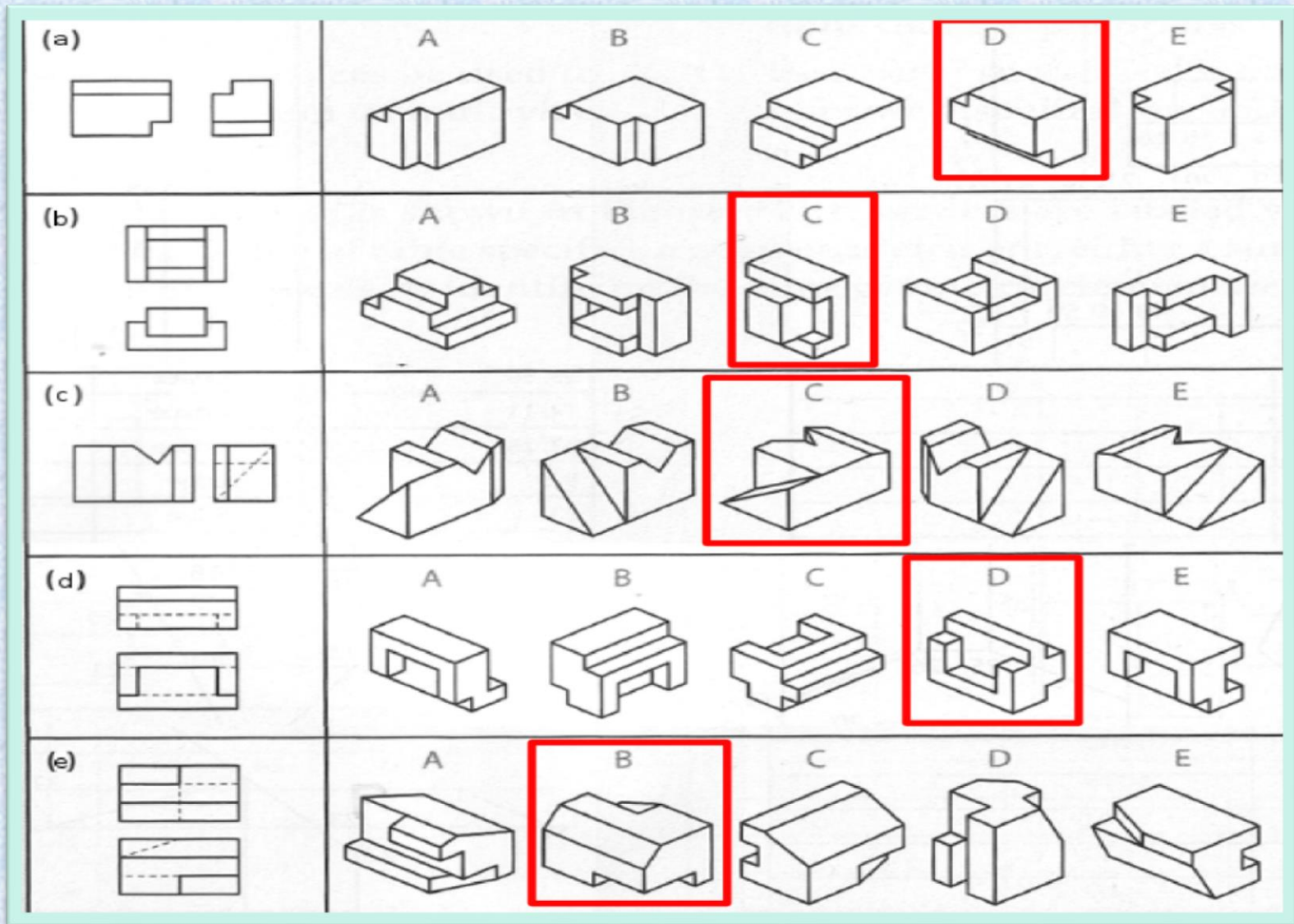


□ Projection

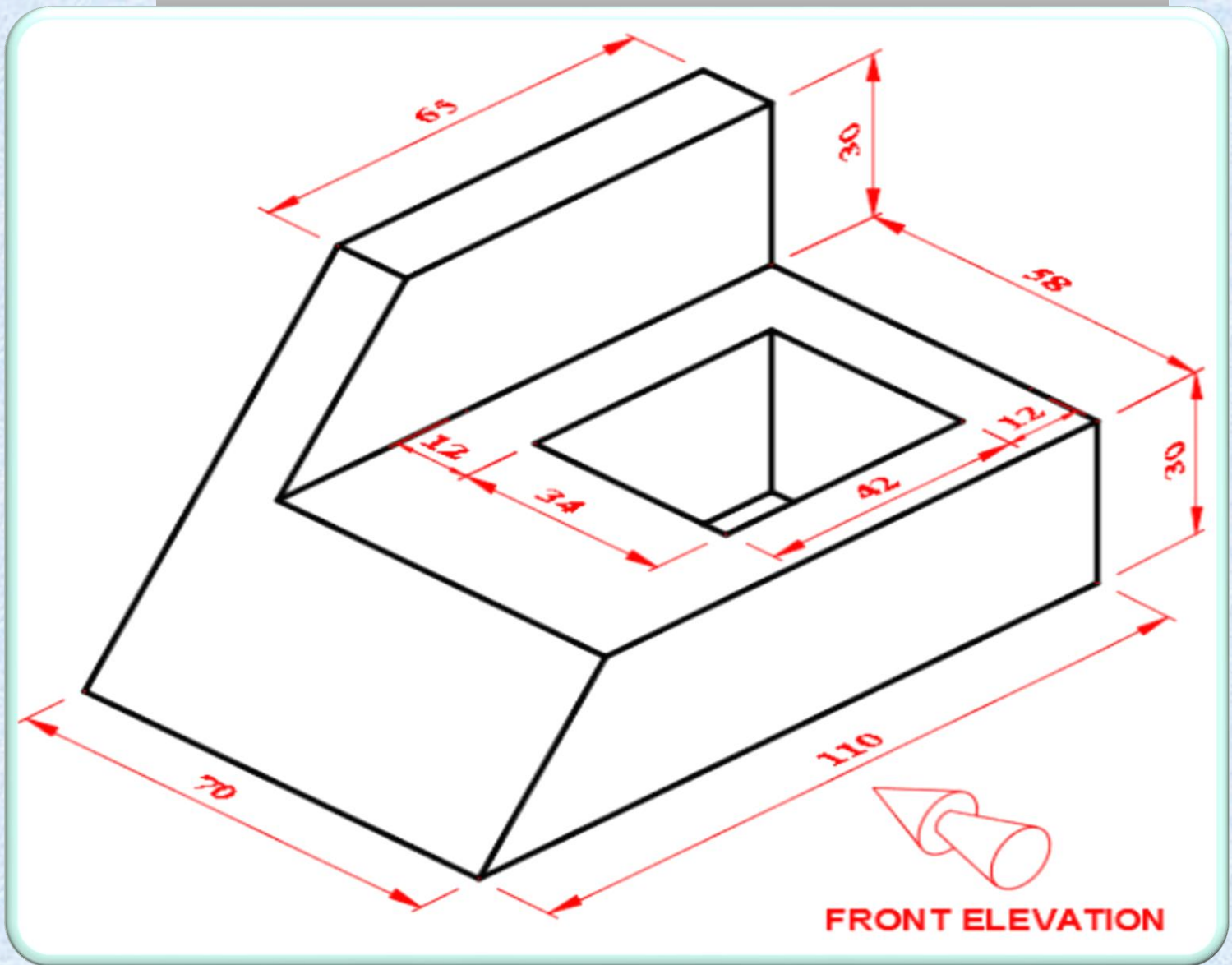
□ *Classification of Projection:*



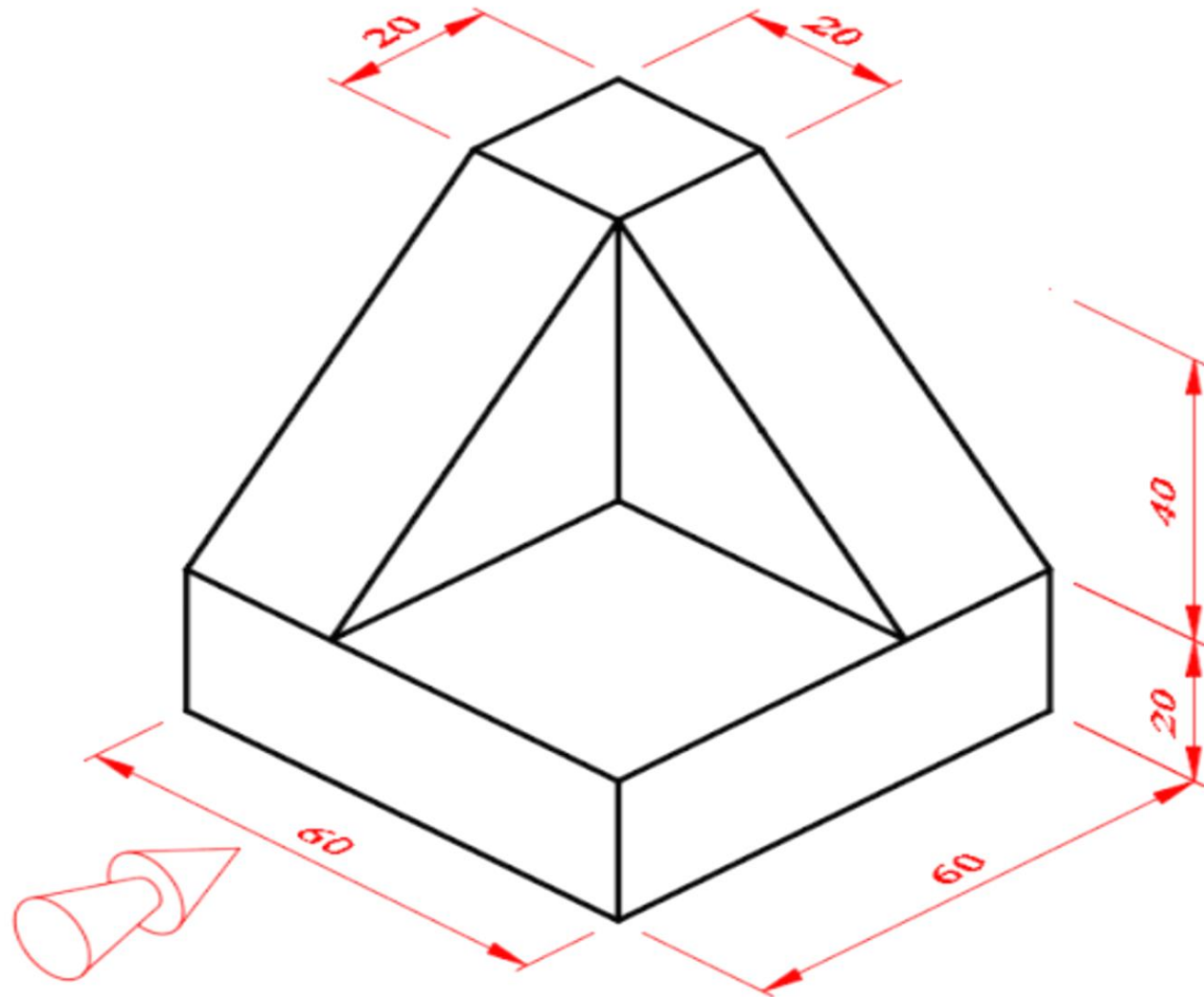
□ Different Orthographic Projection



□ Different Orthographic Projection

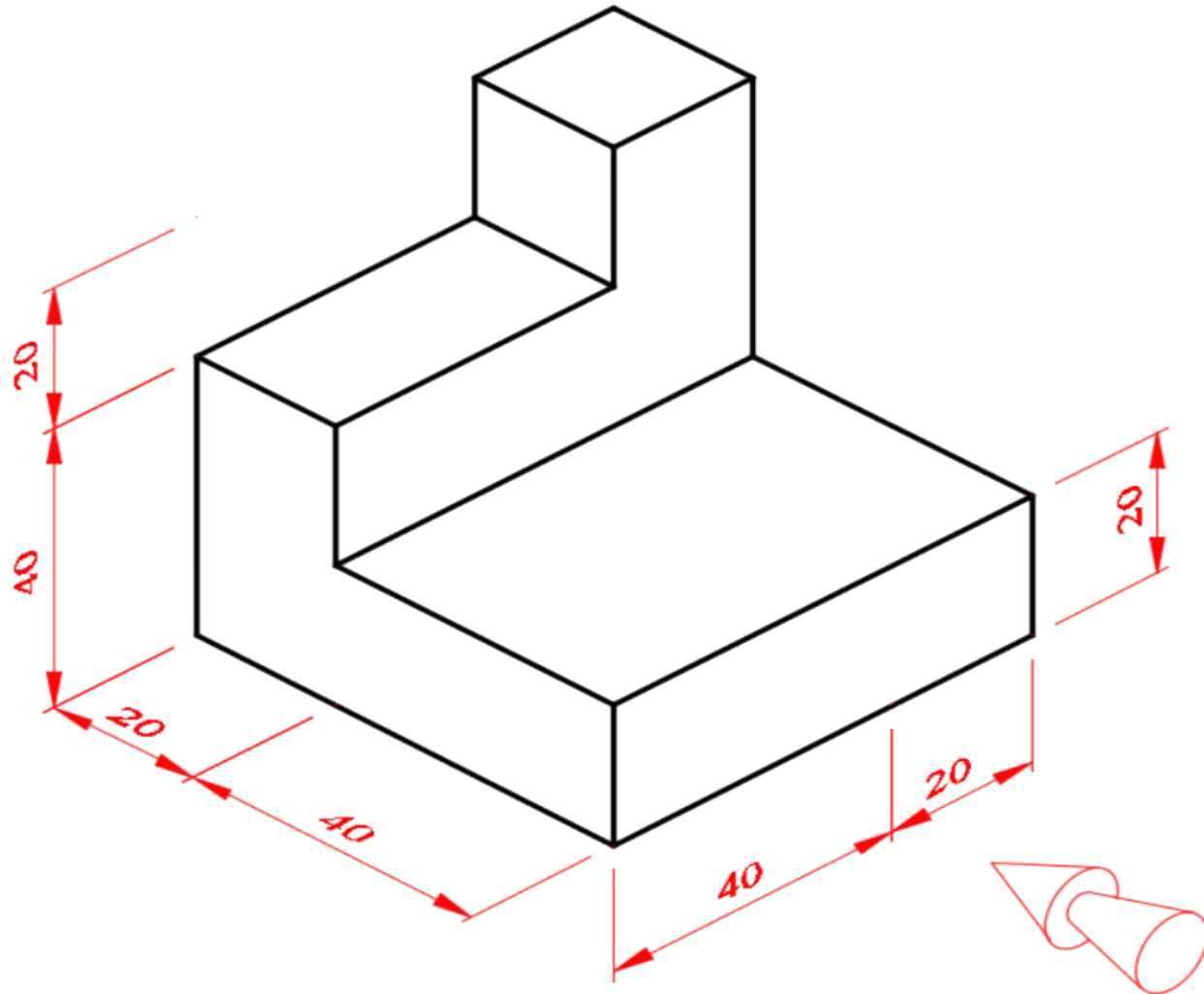


□ Different Orthographic Projection



FRONT ELEVATION

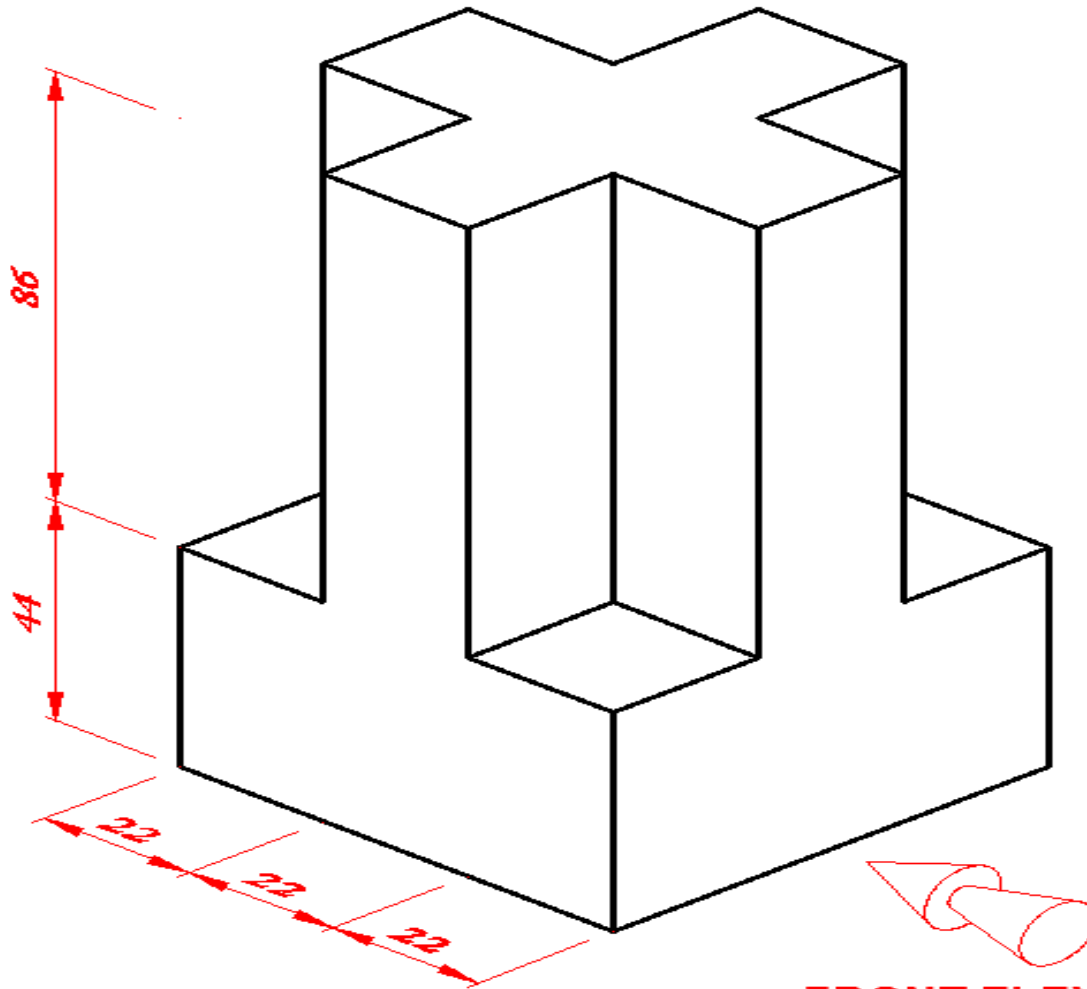
□ Different Orthographic Projection



FRONT ELEVATION

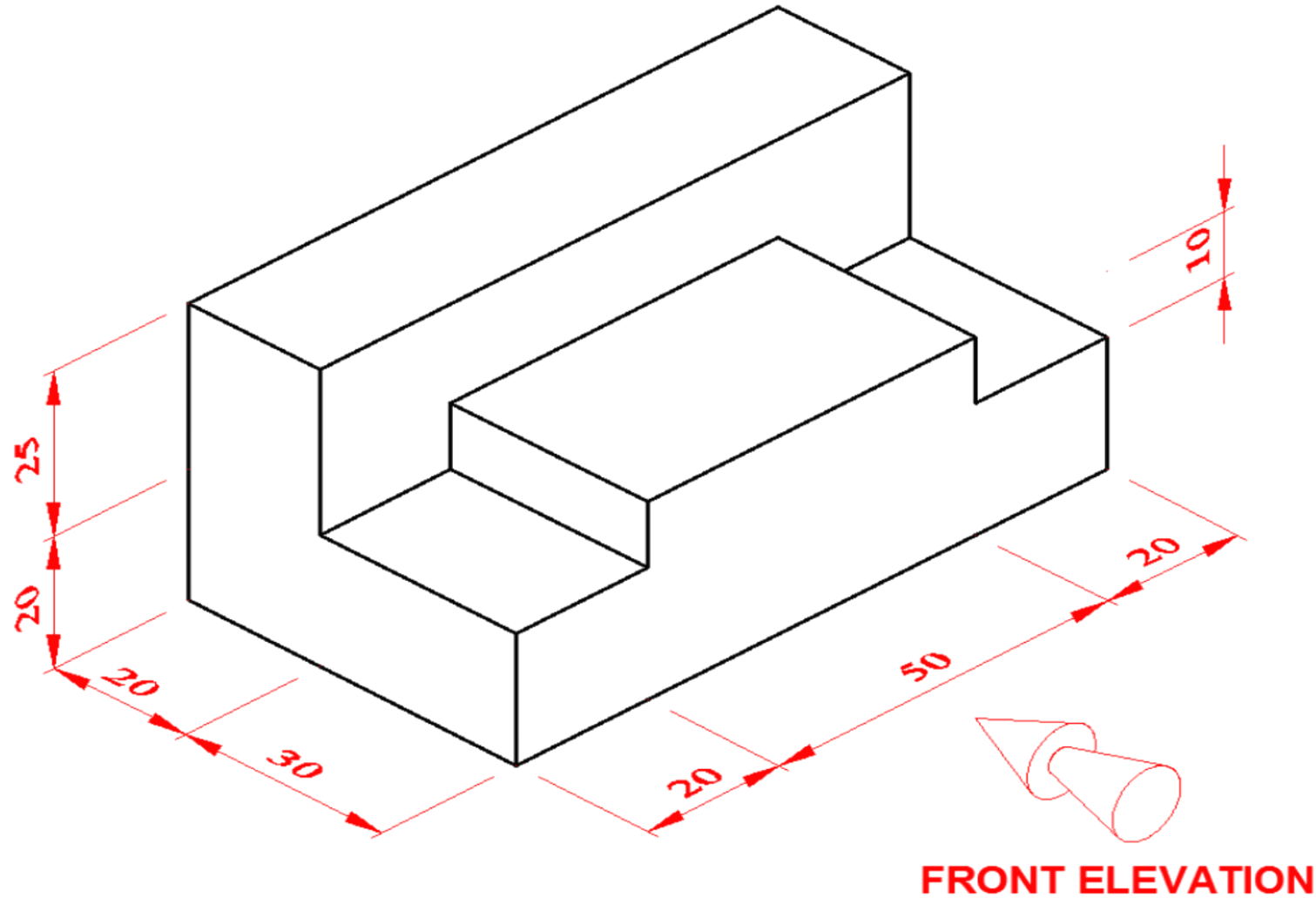
FRONT ELEVATION

□ Different Orthographic Projection



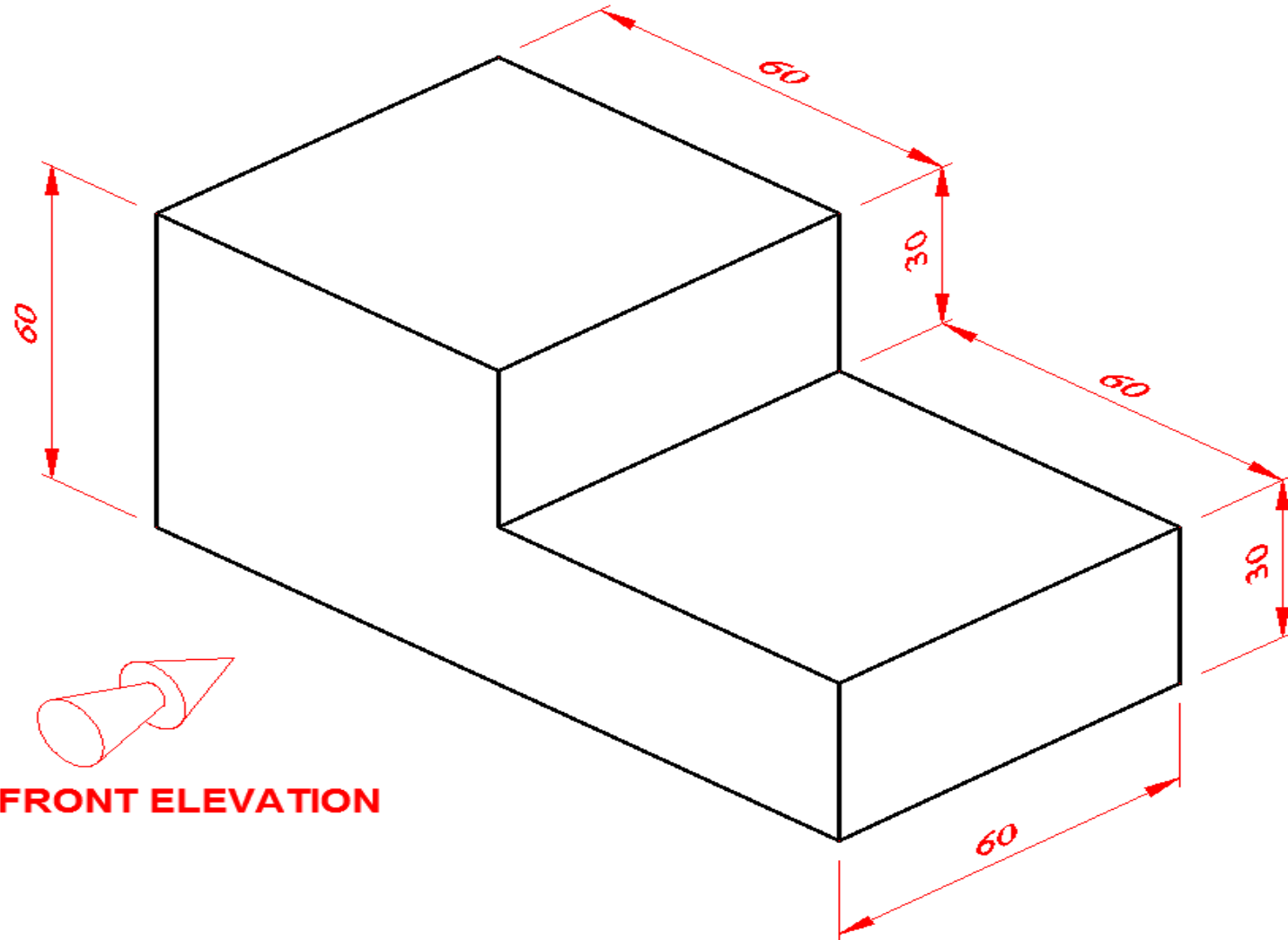
FRONT ELEVATION

□ Different Orthographic Projection

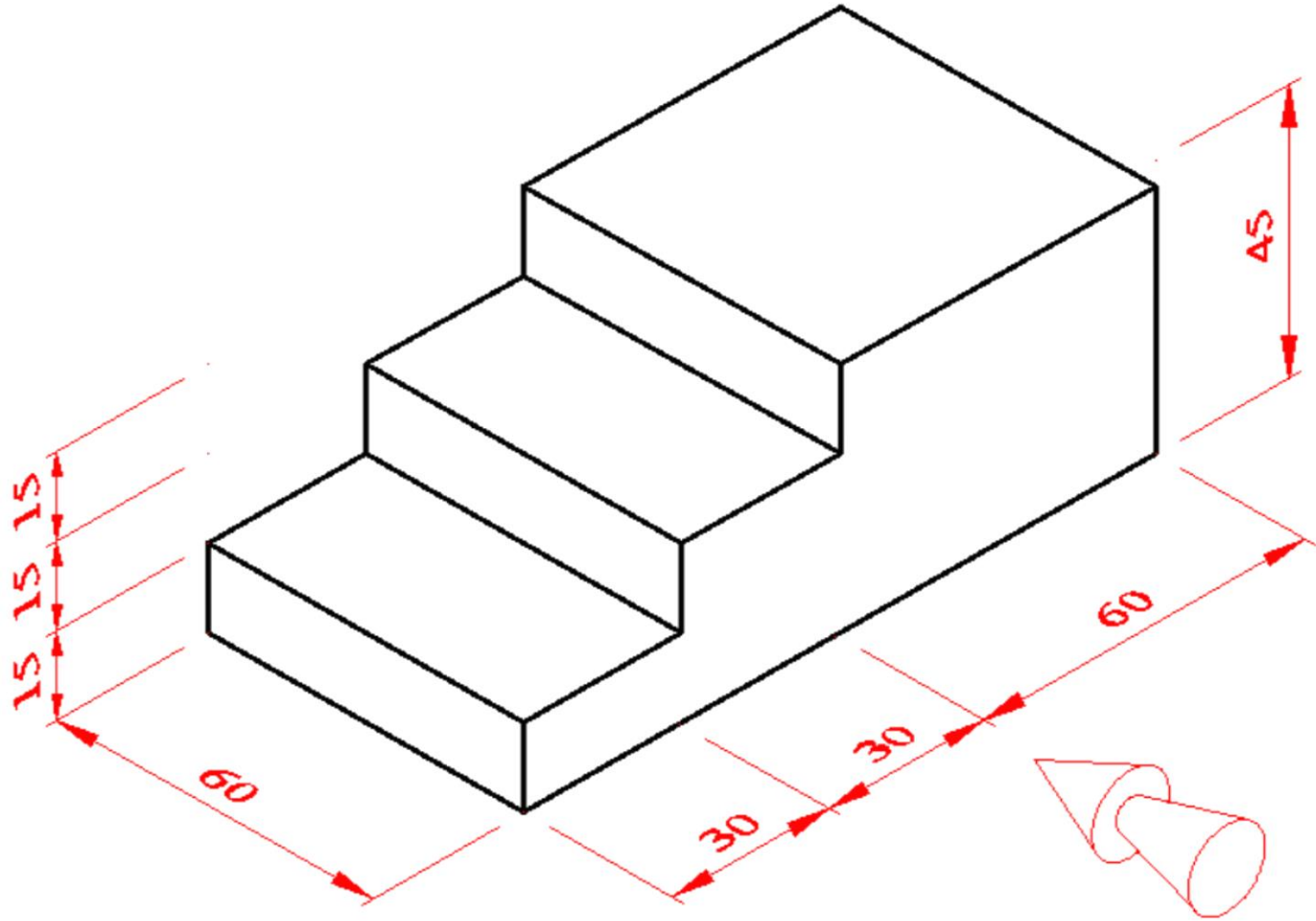


FRONT ELEVATION

□ Different Orthographic Projection



□ Different Orthographic Projection



FRONT ELEVATION

FRONT ELEVATION

❑ Recommendation:

This type of drawing are very much enjoyable & important for us. But a minimum errors are occurred for working defects during drawing period. To decreasing error we need poper attention in working session. Although this topic/subject are very much important & necessary for our practical life. We have vary much enjoy of this experiment topic/subject.

Any

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Thanks

To

All