

# Orthography 102

Although there are many software such as Solid work, AutoCAD, CATIA, Pro-E provide computer generated orthographic drawing, it is recommended to practice it with hand before exploring the software version. It has been found that hand activities promote creativity and imagination which you would be required to make any form of drawing.

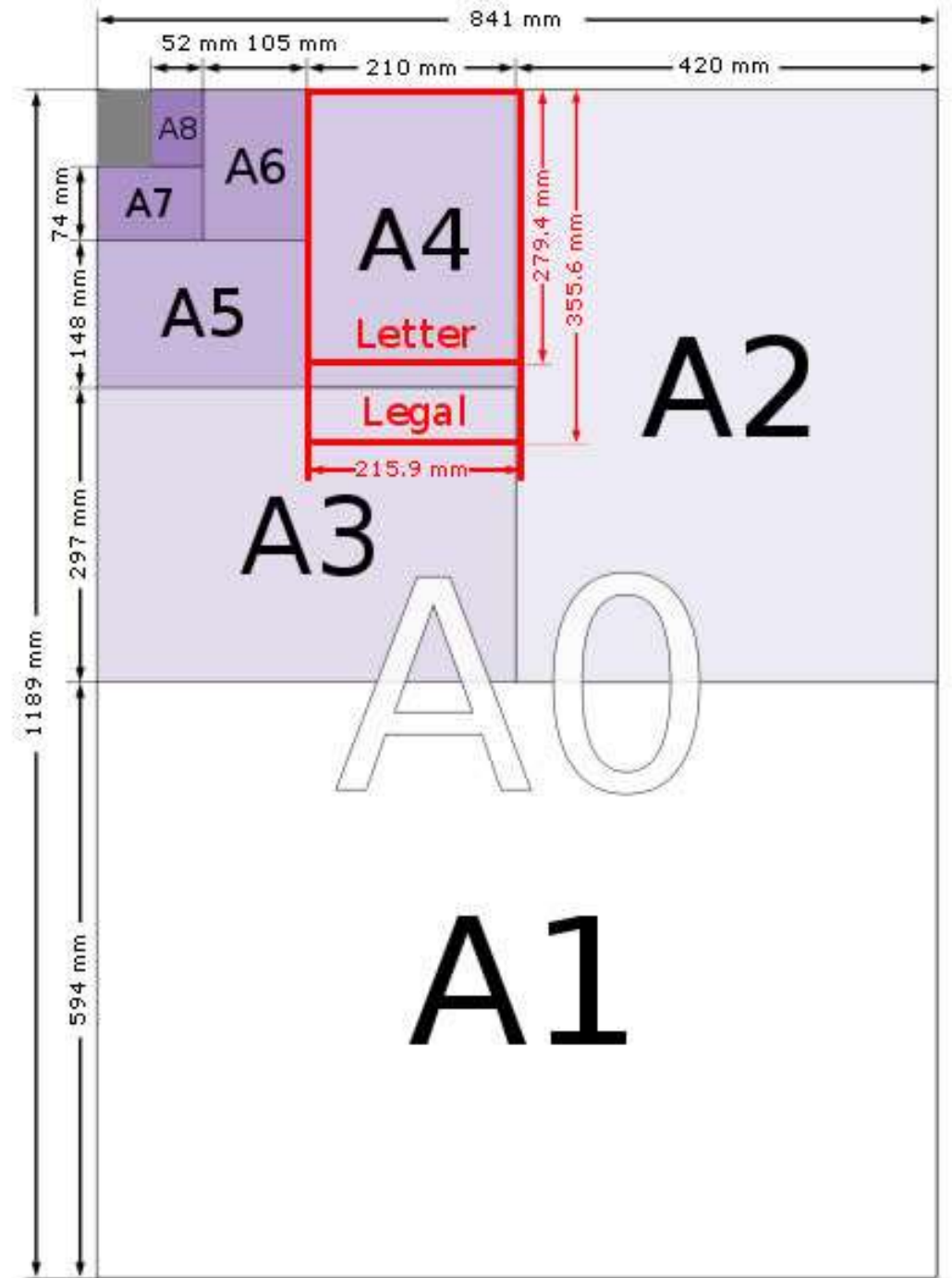
### Materials required.

- Paper
- Pencil 2H,1H, HB
- Eraser
- Ruler
- Protector
- Compass
- Set Squares
- Drafter(optional)

## Size of paper

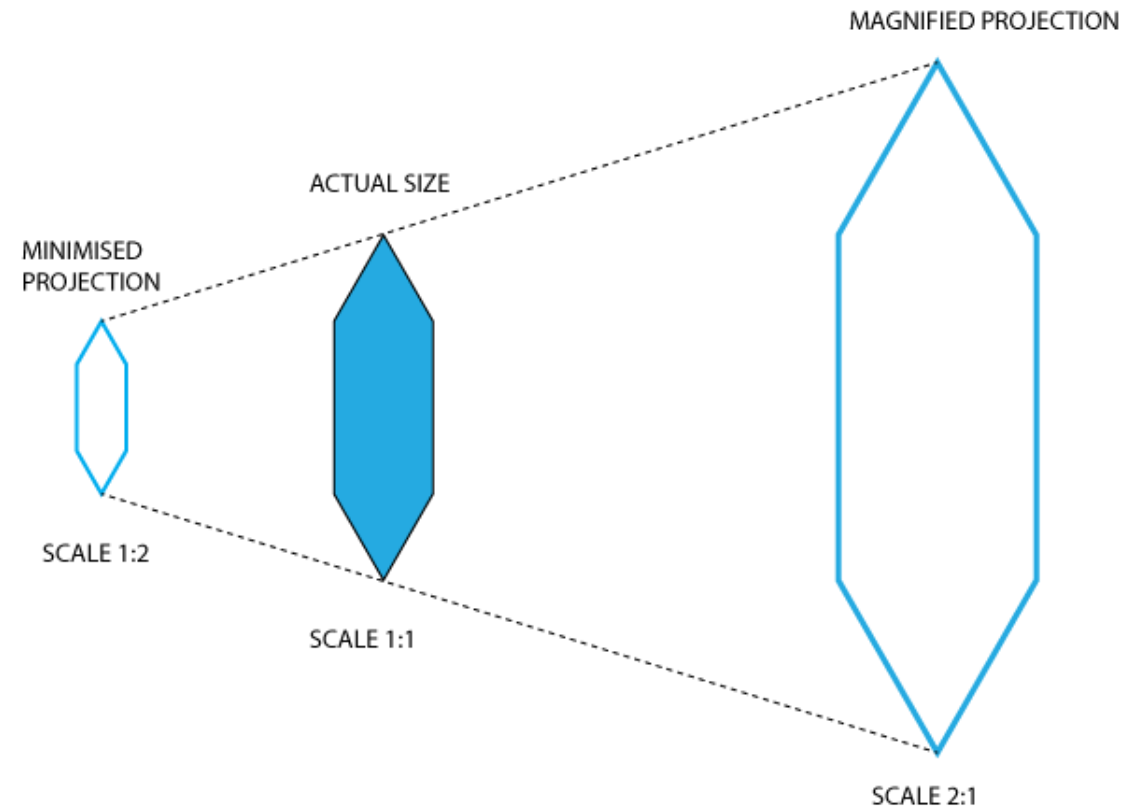
- It is important to pick the right size of paper for the right scale to choose.
- The drawing should not be clutter also too much of void space is undesirable.

Size	Millimetres	Inches
A0	841 × 1189	33 1/8 × 46 3/4
A1	594 × 841	23 3/8 × 33 1/8
A2	420 × 594	16 1/2 × 23 3/8
A3	297 × 420	11 3/4 × 16 1/2
A4	210 × 297	8 1/4 × 11 3/4
A5	148 × 210	5 7/8 × 8 1/4
A6	105 × 148	4 1/8 × 5 7/8
A7	74 × 105	2 7/8 × 4 1/8
1/3 A4	99 × 210	8 × 4 1/4
20" × 30"	508 × 762	20 × 30
30" × 40"	762 × 1016	30 × 40
40" × 60"	1016 × 1524	40 × 60



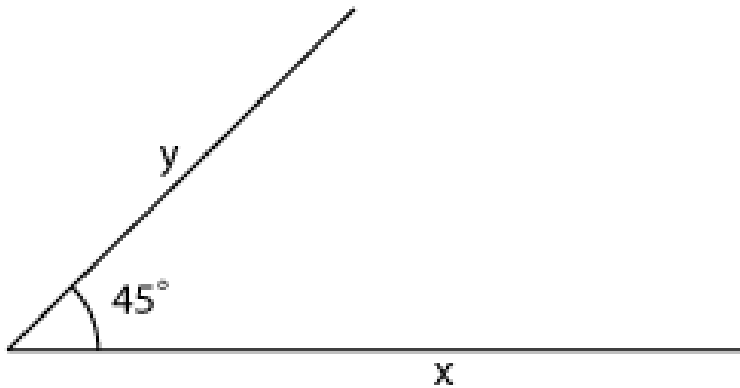
**SCALE.** Scale is the deviation ratio of magnification or minimization of projection from the actual sizes, generally represented by x:y

- Scale is the one of the important factor.
- While using scale it effects every dimension of the part.
- Selection of the Right scale will give a good orthography without compromising in details (such as in architecture or floor space layout scaling is 1:50 or 1:200)
- Scale is universal(drawing sheet is the universe), it applies to every dimension, every projection in the drawing sheet. One cannot take one scale of for one projection and other scale for the other projection.



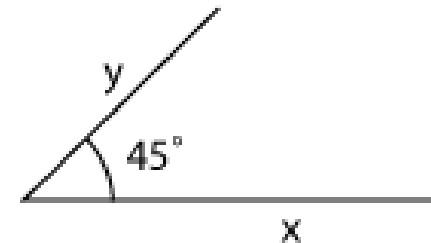
- Scale does not effect angular dimension.
- Lets take an example as shown in figure  $x=60$  cm  $y=40$  , Angle  $xy = 45$  degree and if we choose a 1:2 scale the  $x$  will become 30cm and  $y$  will be 20cm angle  $xy=45$  degree, please note the value of angle has not change.

ACTUAL SIZE PROJECTION WITH SCALE 1:1



SCALE 1:1

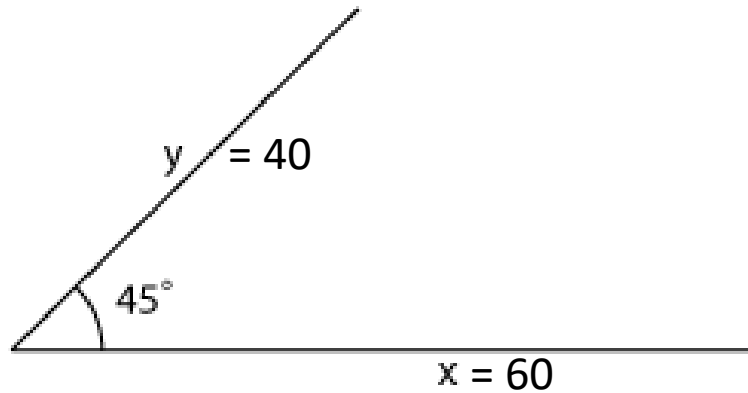
PROJECTION WITH SCALE 1:2



SCALE 1:2

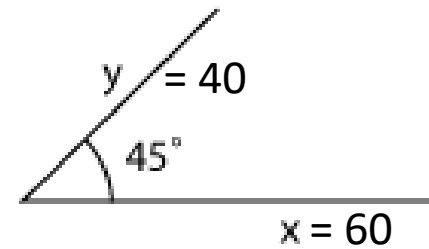
NOTE : In both the images the value of  $x$  and value of  $y$  doesn't change. No matter what scale do you use , you will always have to write the actual value with appropriate scale mentioned.

ACTUAL SIZE PROJECTION WITH SCALE 1:1



SCALE 1:1

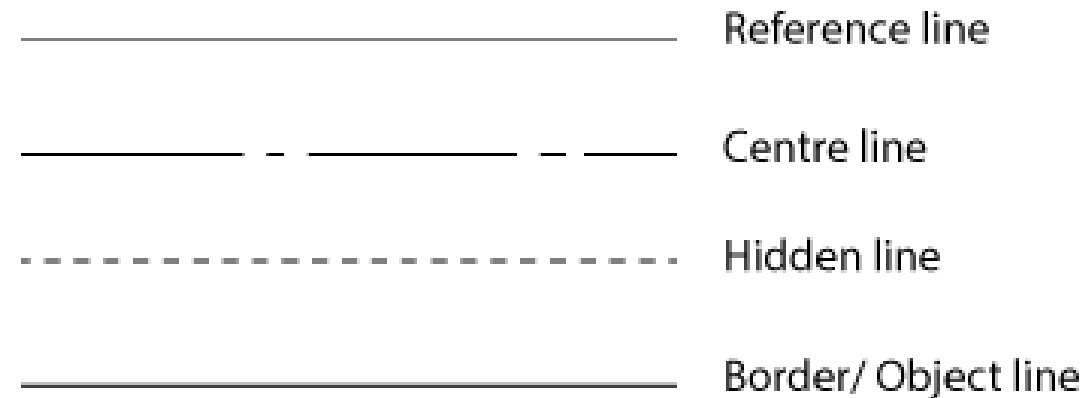
PROJECTION WITH SCALE 1:2



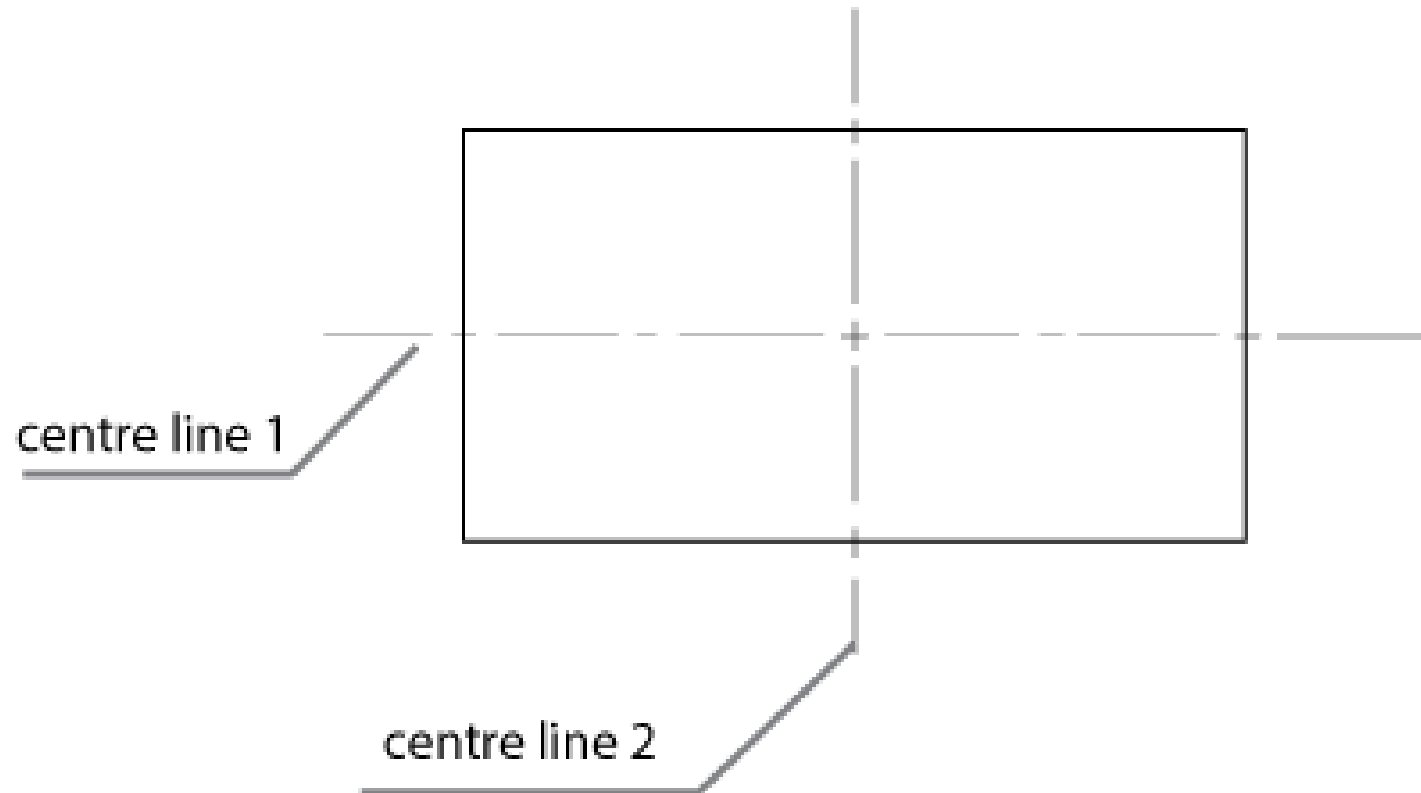
SCALE 1:2

# Lines

- Reference line, as the name suggest they are used for references. Reference line are between projections, dimensions lines etc. 2H pencil is recommended with very light strokes.
- Centre line: These lines are used to represent center of any projection. Centre line should be along the axis of any cross sectional which is circular and has a center. 1H pencil is recommended. Please note that the gap between the small line and the long line are uniform in nature.
- Hidden line: represented with equidistance dashed line, used for hidden details in projection.
- Border line HB pencil
- Object line: HB pencil, no overlapping of lines is allowed.

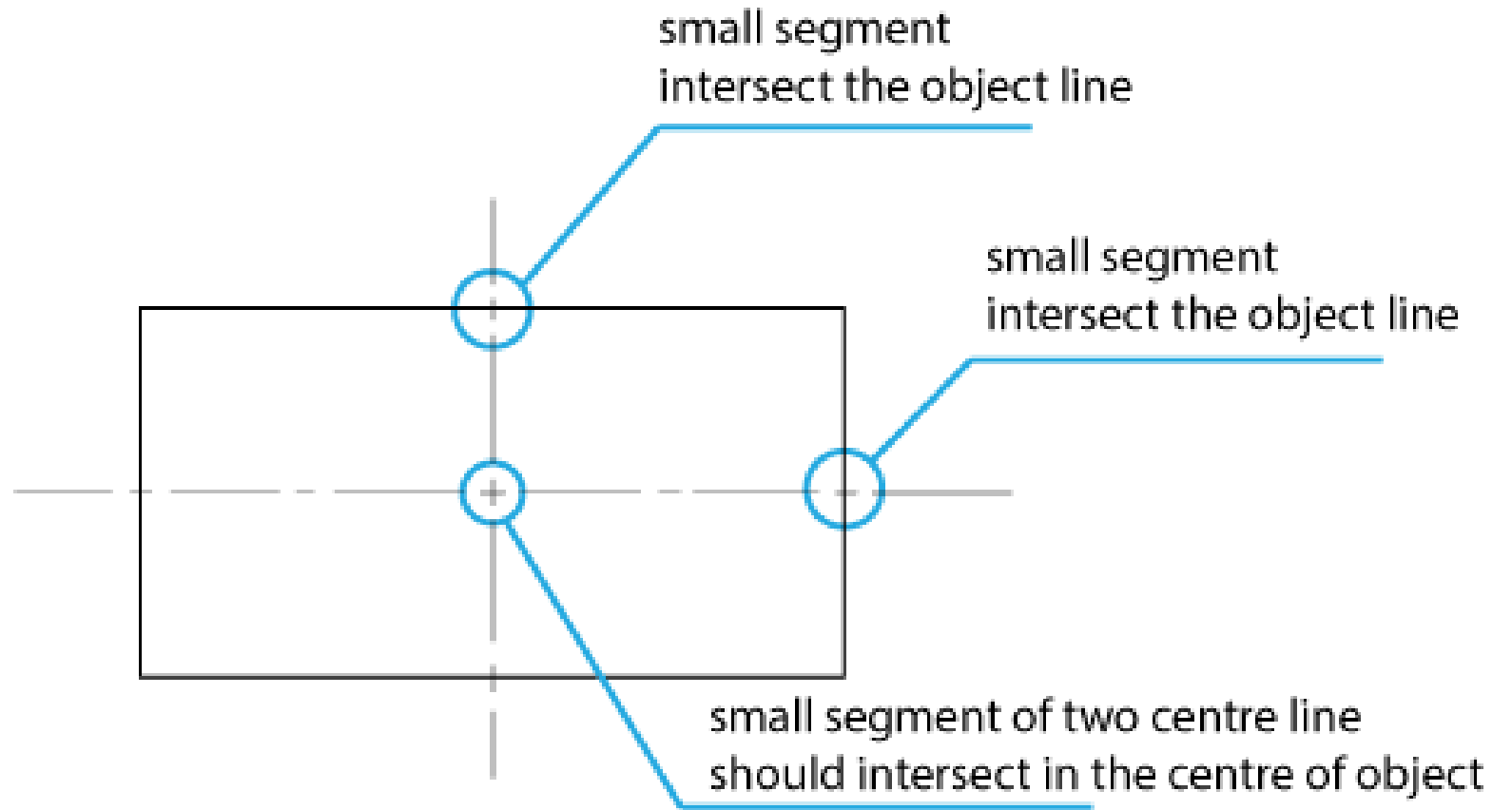


Centre line: The centre line is the one of the important line, Correct drawing of centre line would give a better projections and it has been observed that students make mistakes in the correct representation of center lines. The centre line requires Uniformity , i.e. a similar fashion of small segment and the long segment should be followed.





Please notice that Centre line 1 and centre line 2 are not exact but have similar fashion, i.e the length of longer segment and the length of small segment is different in both the lines . Yet they way the interact with object line and the way they intersect with each other are same. This convention must be followed



# Name plate and border line

- Name plate should consist of Title
- Drawn by
- Scale
- Measurement used( mm/cm) we are use only one measurement unit
- Size of paper used for print
- Material of the part
- Drawn date
- Checked by
- Checked date
- Approved by
- Drawing number
- Drawing date
- Weight
- Density
- Tolerance



## Few Important points to be kept in mind

- Name Plate changes for every organization
- Depending on their requirement and the style
- Sometimes nameplate is also use to copyright its drawing
- Nameplates are always on the southeast side of paper.
- You can customize your own nameplate but for our convention we are going to use the following.
- All typography should be in capital unless necessary
- The unit of measurement should be mention above , “ ALL DIMENTION ARE IN mm” please note everything is in capital except mm as millimeter is represented in small letters
- All typography shall be used with HB pencil

# WE ARE GOING TO USE THIS CONVENTION

" ALL DIMENTIONS ARE IN mm "

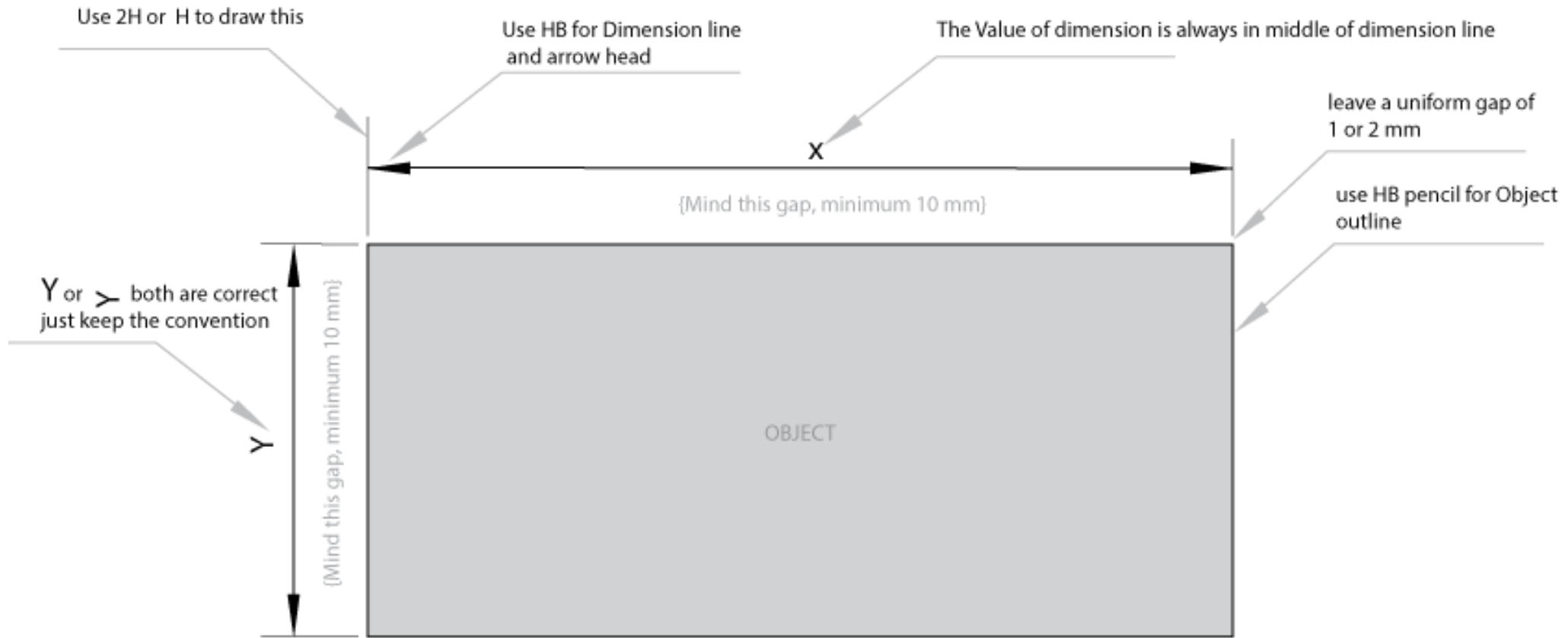
<b>**TITLE OF DRAWING**</b>	
DRAWN BY:	SCALE:
DATE	DRAWING NO. :
CHKD BY:	APPROVED BY
MATERIAL:	<b>**DRAW THE SYMBOL OF PROJECTION**</b>
ITERATION NO:	

5 "ALL DIMENTIONS ARE IN mm"

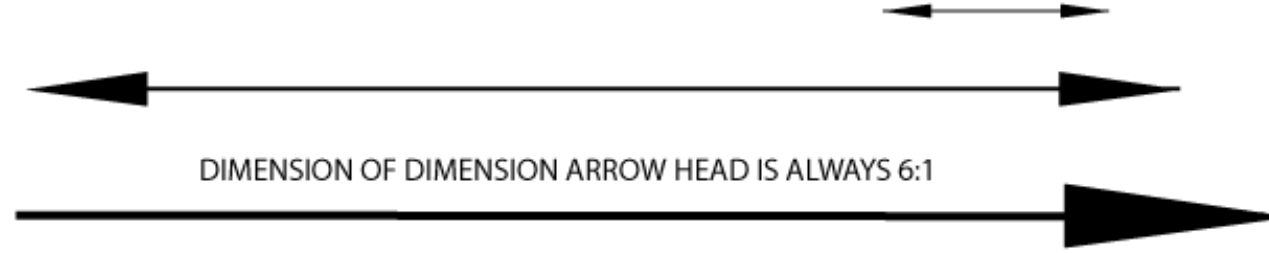
25	<b>**TITLE OF DRAWING**</b>		10
10	DRAWN BY: _____	SCALE: _____	5
10	DATE _____	DRAWING NO. : _____	5
10	CHKD BY: _____	APPROVED BY _____	5
10	MATERIAL: _____	<b>**DRAW THE SYMBOL OF PROJECTION**</b>	
10	ITERATION NO: _____		
	60	60	

The thin lines are reference line  
Use HB pencil to draw the nameplate  
All typography is in capital  
The title of drawing should be double stroked  
All dimensions are in mm

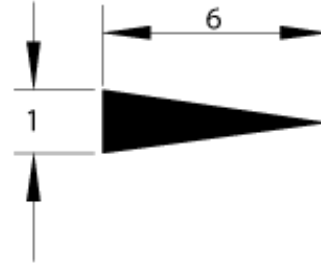
Some convention that is followed to achieve a neat drawing.



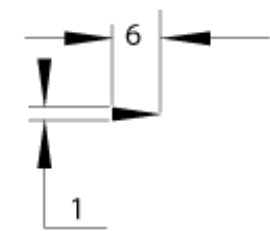
# Dimension Arrows



Note how this dimension convention is used when the space is small, generally less than 5 mm



Use This convention when there is no space to even write a number



# Convention while Dimensioning

- All dimensions should be outside the body
- All dimension line must maintain a minimum distance of 10 mm from the body
- Make sure none of the dimension line are crossing each other ,
- The best way is to start is the smallest dimension closer to the body and the bigger dimension are the furthest away.
- Keep minimum 10 mm distance between two consecutive dimension arrows.
- Too many repetition of one single part should be avoided however no dimensional detail should be missed.



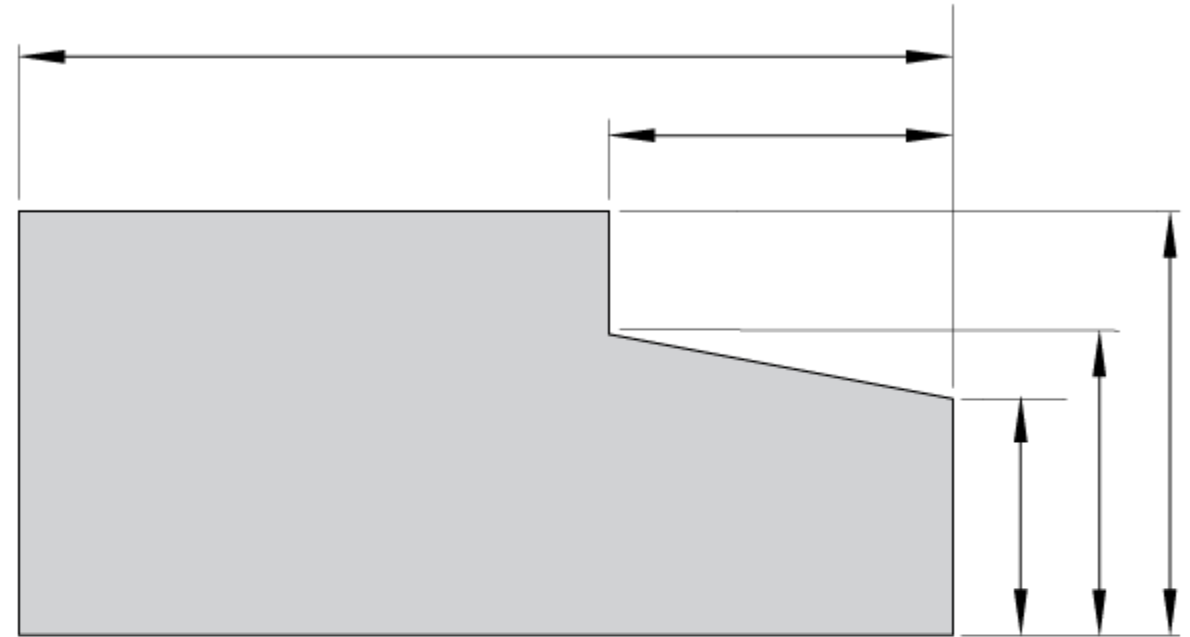
# Convention while Dimension

Note the smallest dimension is close to the body and bigger dimension is further away.

Every dimension line has an uniform increment, that is they are equidistance from each other.

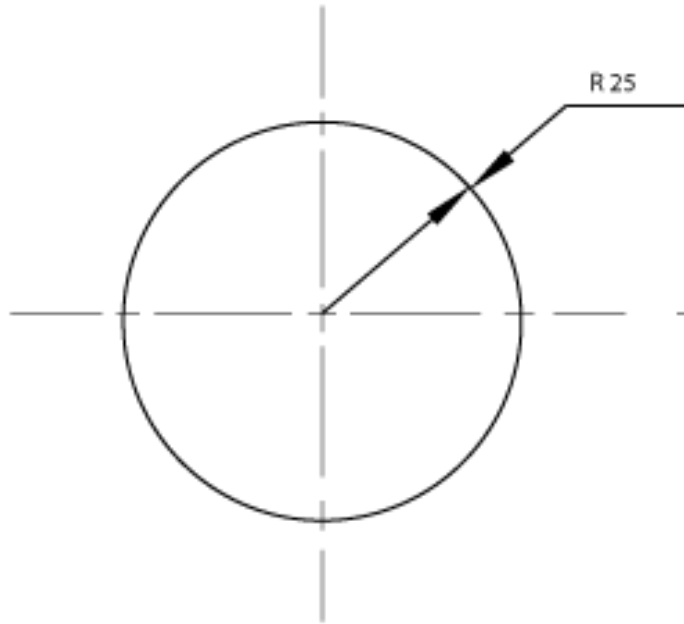
All reference line have a minimum distance of 1~ 2 mm distance from the body, it is not touching the body.

All arrow head is in 6:1 ratio

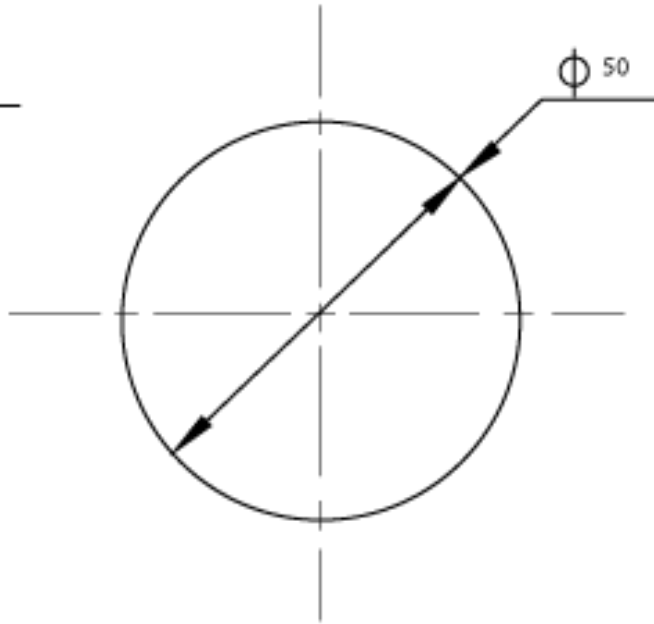


# Dimension of circle

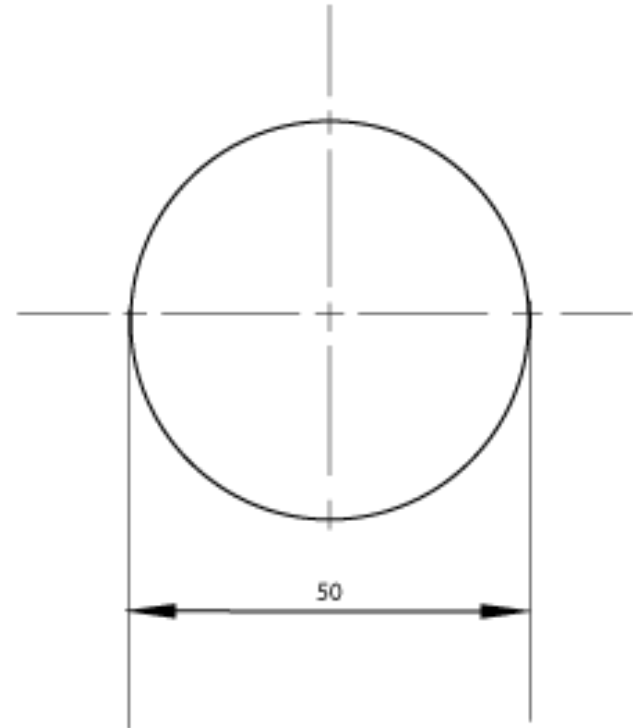
At 45 degree the dimension of radius is express with capital R



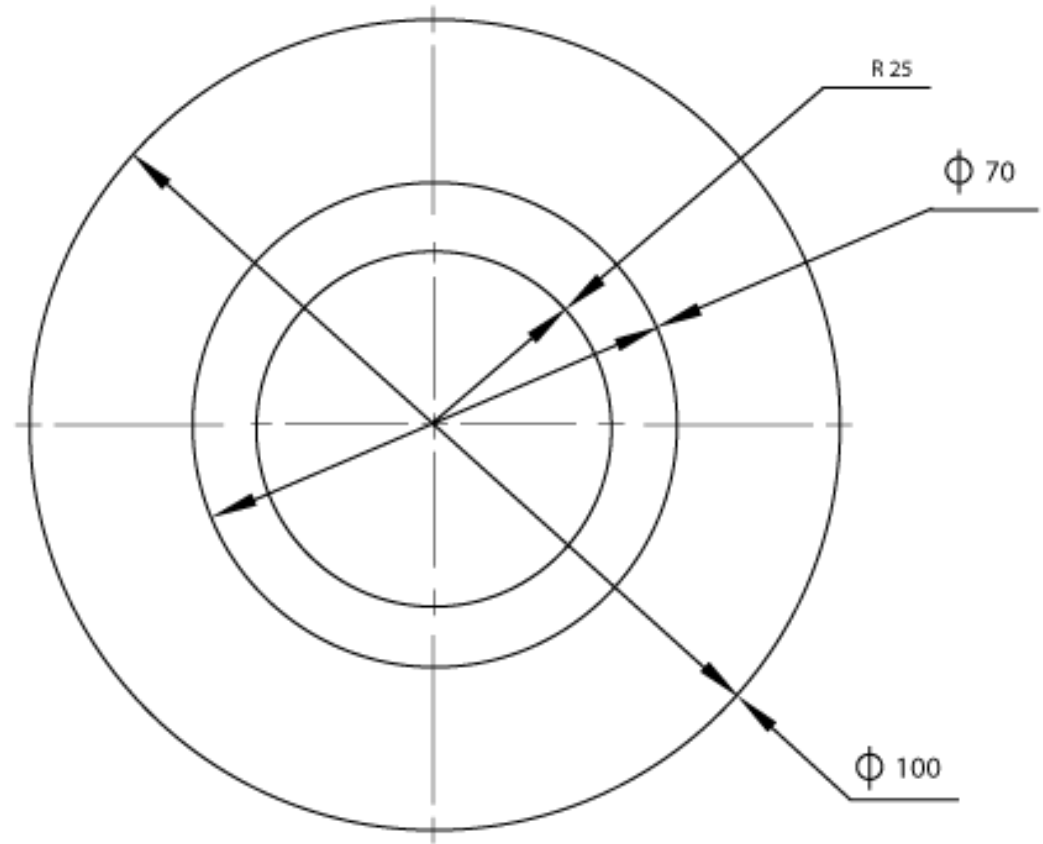
At 45 degree the dimension of diameter is express with the symbol  $\phi$



As Diameter is also a linear dimension, it can be expressed as any other dimension



- The choice is yours however you want to give dimensions; whether you want to express it in terms of radius or diameter.
- Note the increment of degree, it is generally kept 15 degree increment with dimension line at 45, 30 or 60, 15 or 75 degree.
- Note that all dimensions are outside the body and generally kept at one side of the body.
- Also notice the center line



# Some precautions

- Always start with clean white paper.
- Wash your hands as it will effect your quality, moisturizer and other impurities tend to stale the paper and reacts white the chemical present in paper.
- Clean all your measuring tool and device to remove dust or graphite.
- If you have gone wrong do not worry you can start over. Best wishes with that.
- Use sharp edge and draw only one line preferably a. Running your pencil twice on the same line would make things worse

# Assignment

- Take this diagram and try to figure out all the dimension that you need to know to replicate this drawing as it is.
- Draw all the necessary dimension line with appropriate conventions that has been used.
- You can print / trace or redraw this image to complete the assignment (or)
- You can use paint tool or any other electronic medium to complete this assignment.
- Send it as PDF to [deardeboprasadbaruah@gmail.com](mailto:deardeboprasadbaruah@gmail.com)
- Plagiarism is not allowed

