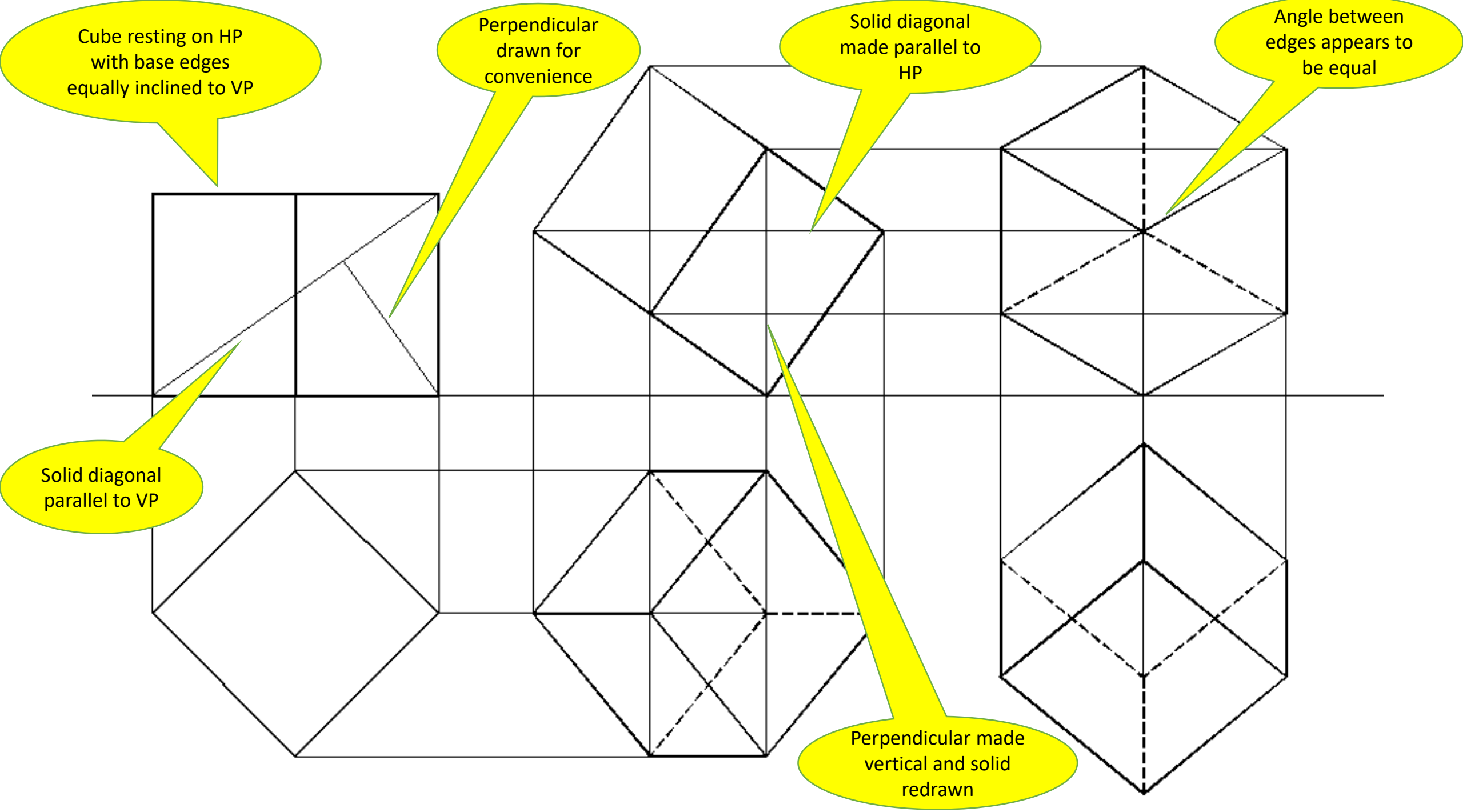
MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

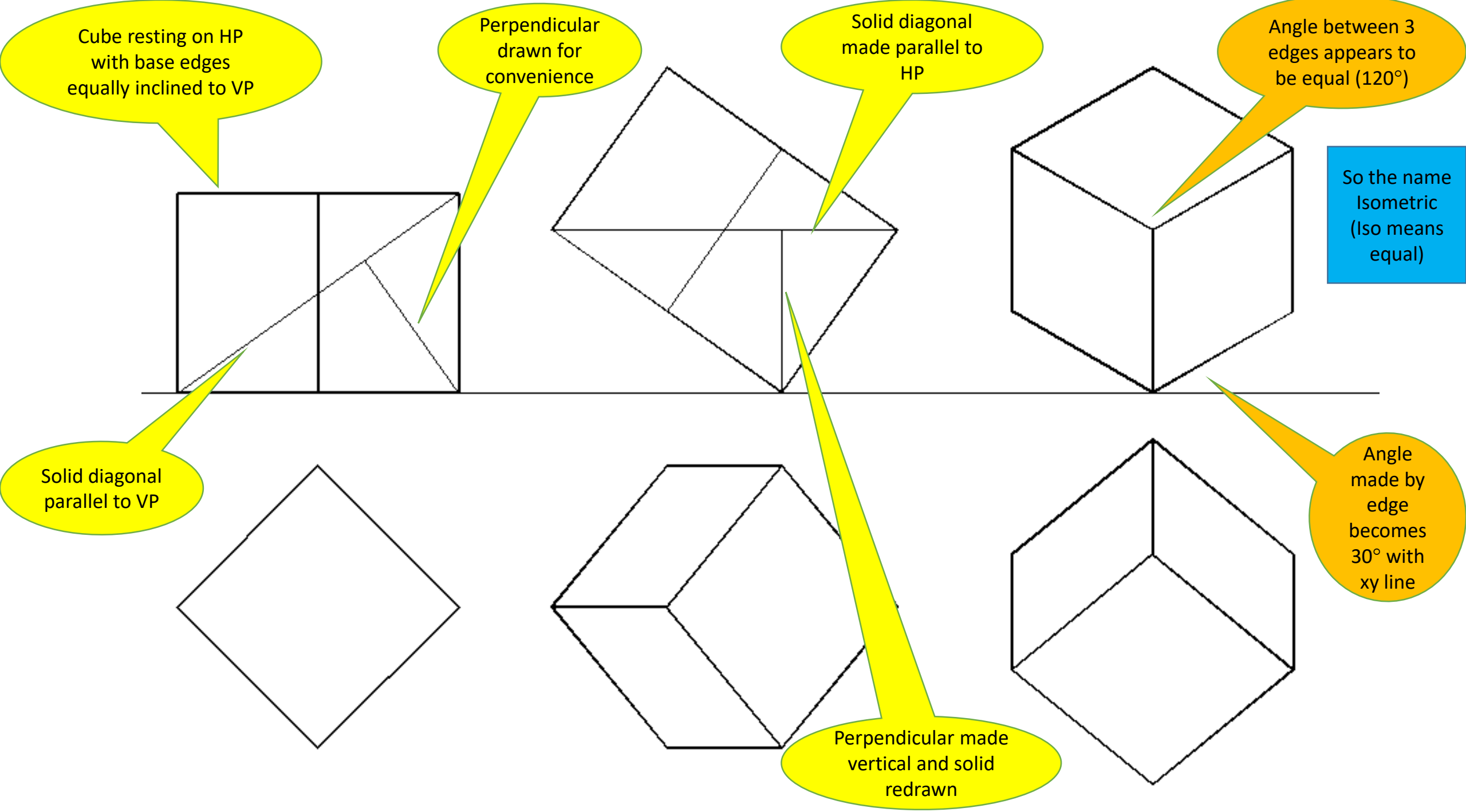
Department of Mechanical and Manufacturing Engineering

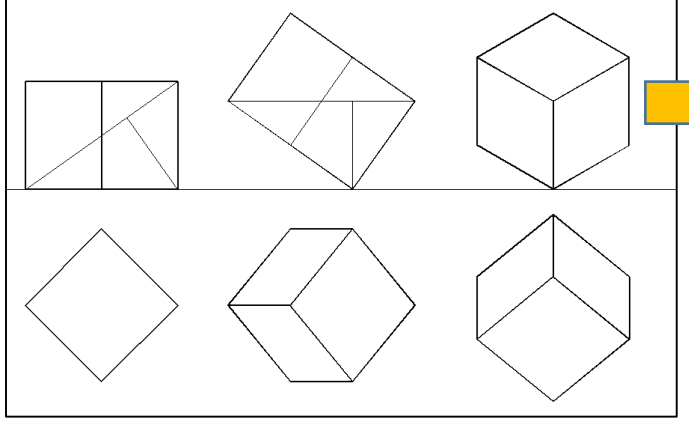
ENGINEERING GRAPHICS - II

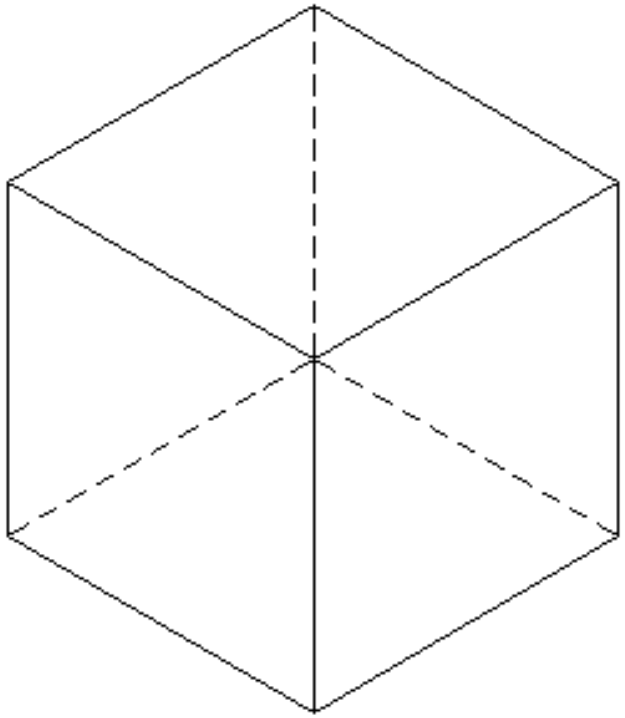
CLASS 5: ISOMETRIC PROJECTION

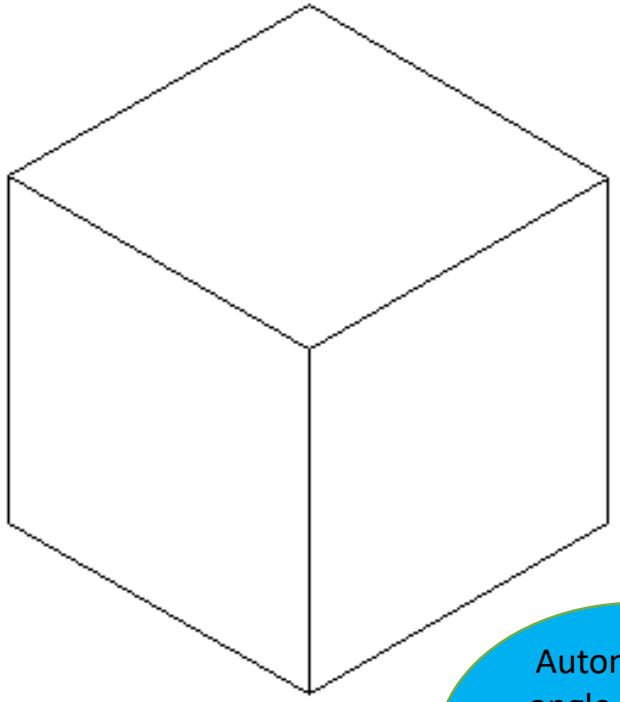
(SHEET 5)


Cube resting on HP with base edges equally inclined to VP
Perpendicular drawn for convenience
Solid diagonal made parallel to HP
Angle between edges appears to be equal
Solid diagonal parallel to VP
Perpendicular made vertical and solid redrawn


Cube resting on HP with base edges equally inclined to VP
Perpendicular drawn for convenience
Solid diagonal made parallel to HP
Angle between 3 edges appears to be equal (120°)
So the name Isometric (Iso means equal)
Solid diagonal parallel to VP
Angle made by edge becomes 30° with xy line
Perpendicular made vertical and solid redrawn

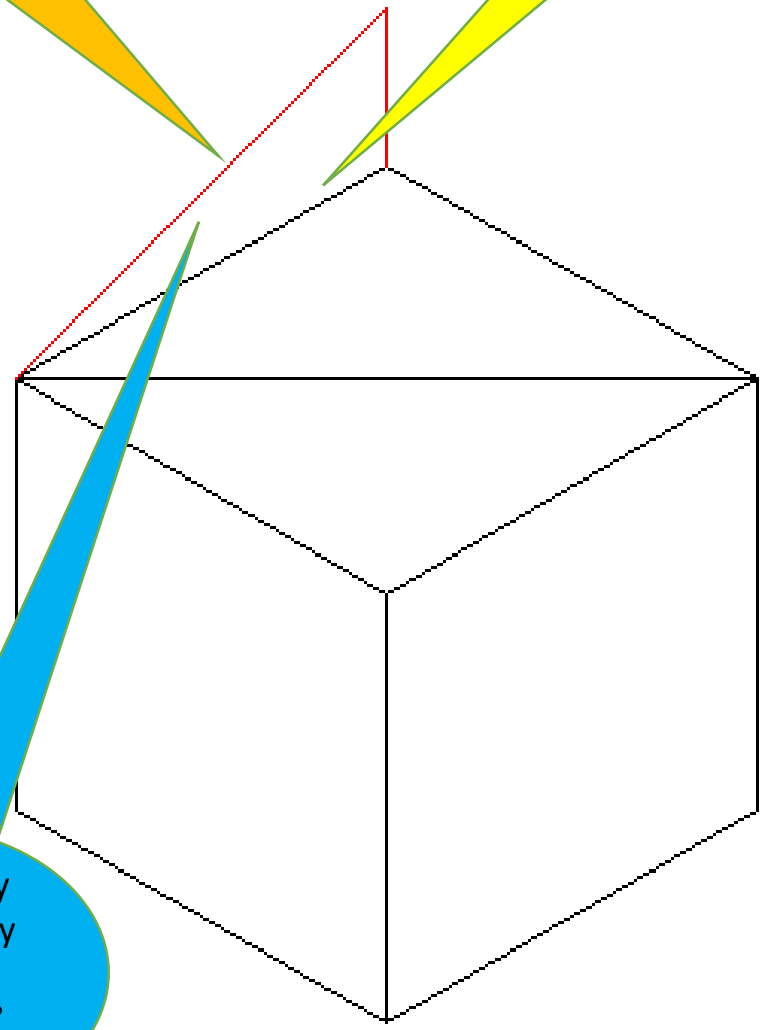




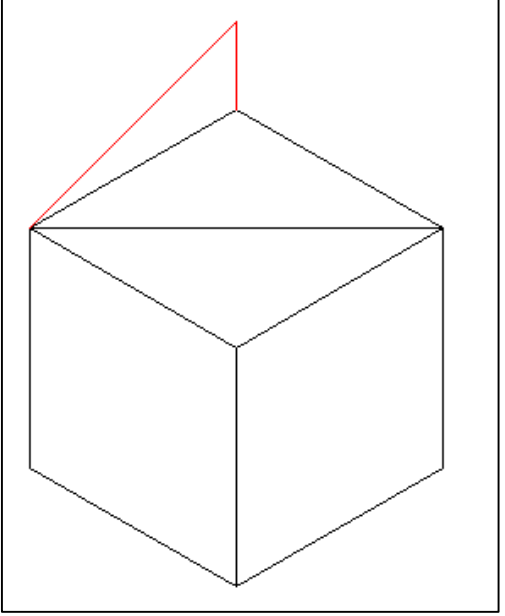


True length of edge accommodated above apparent length

Edge appears to be shrunk (Apparent length)



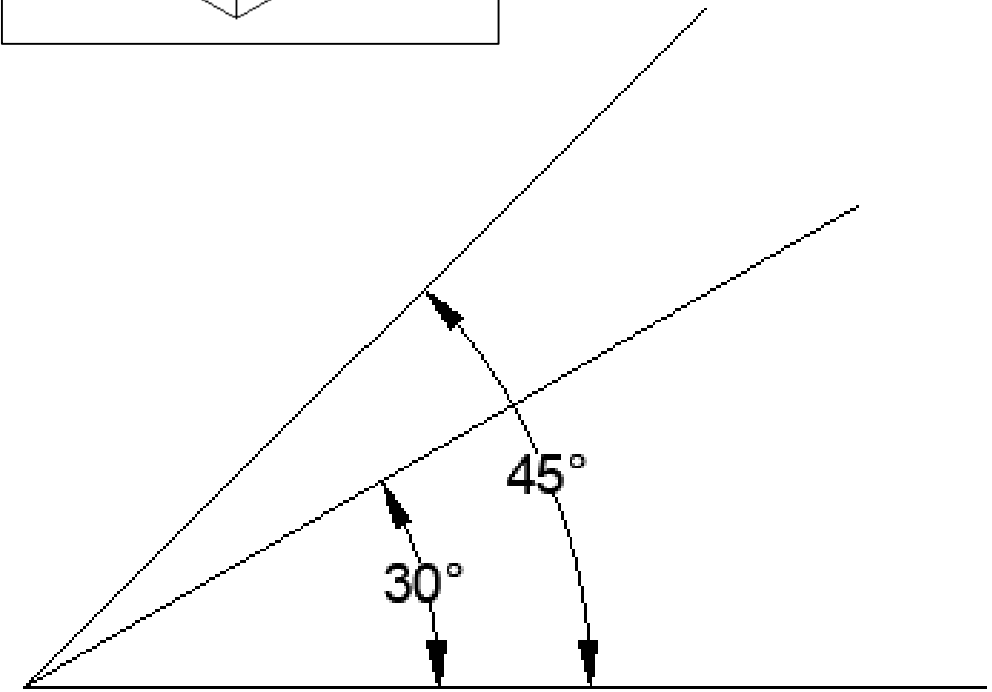
Automatically angle made by true length becomes 45° with xy line



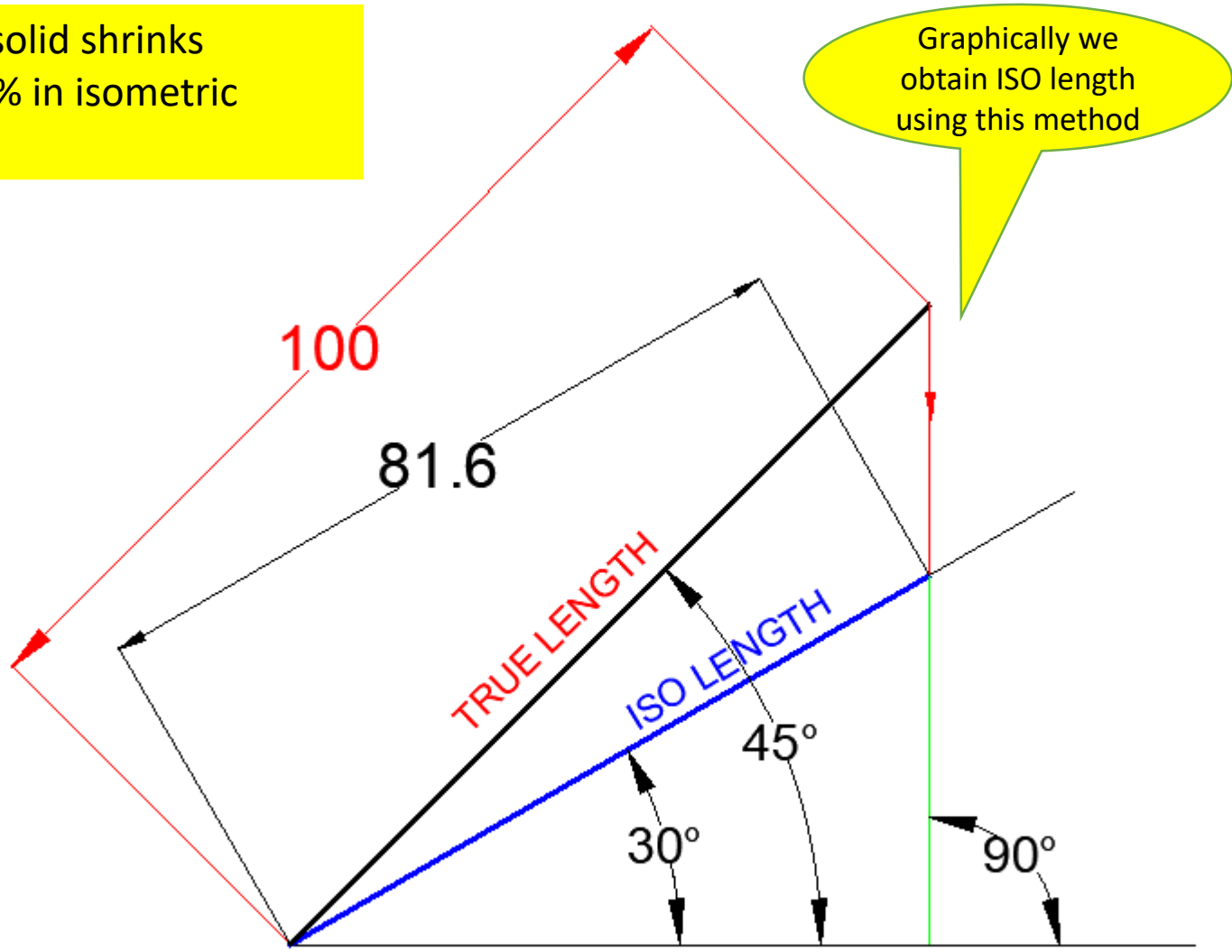
Note: Exact fractional value can be derived using trigonometry and found to be $\frac{\sqrt{2}}{\sqrt{3}}$

In short, the edge of a solid shrinks (appears to be) to 81.6% in isometric projection

Ex: Let TRUE LENGTH = 100mm
ISO LENGTH = TL X 0.816= 0.816 TL mm
ISO 100 = 100 X 0.816= 81.6mm



ISOMETRIC SCALE



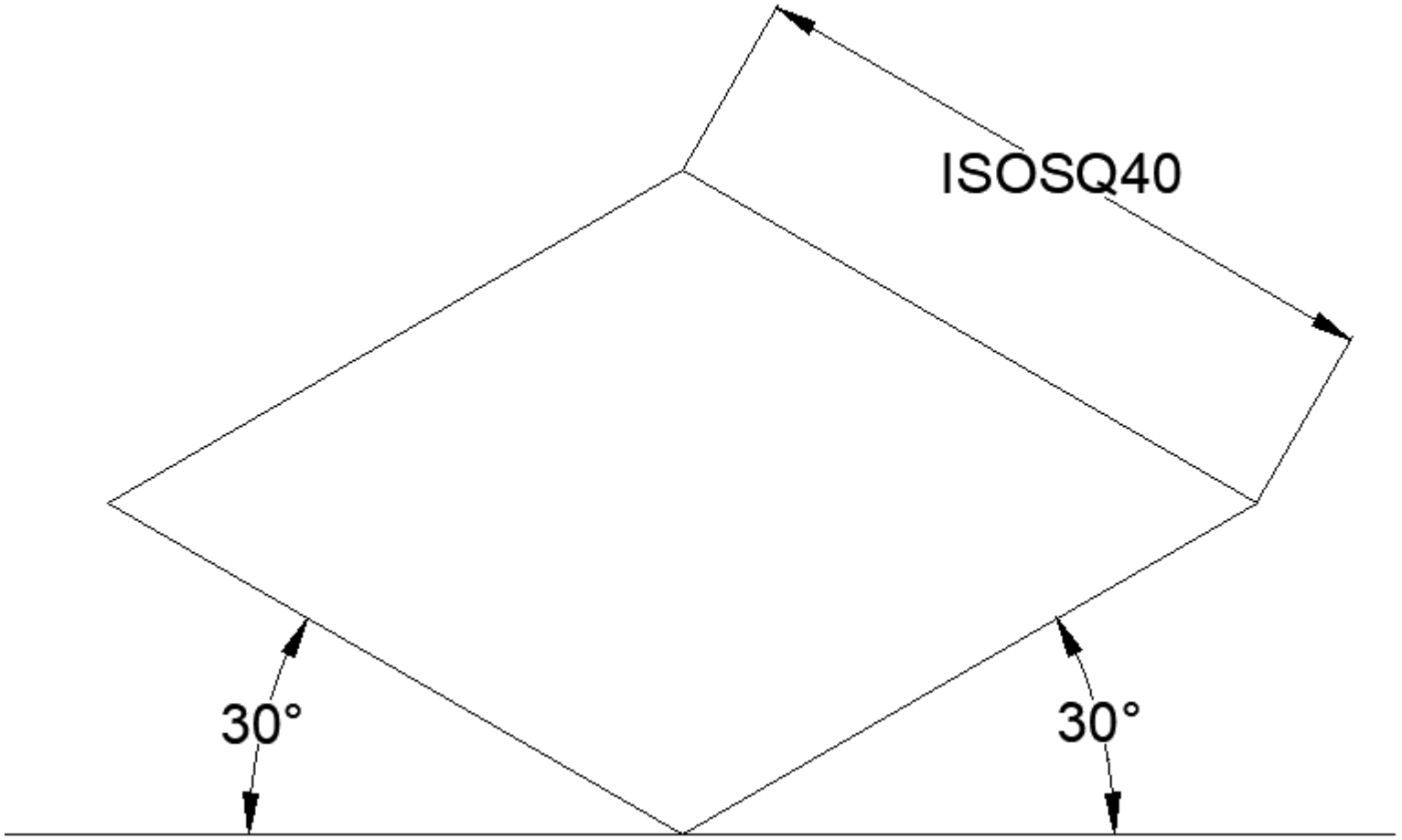
ISOMETRIC SCALE

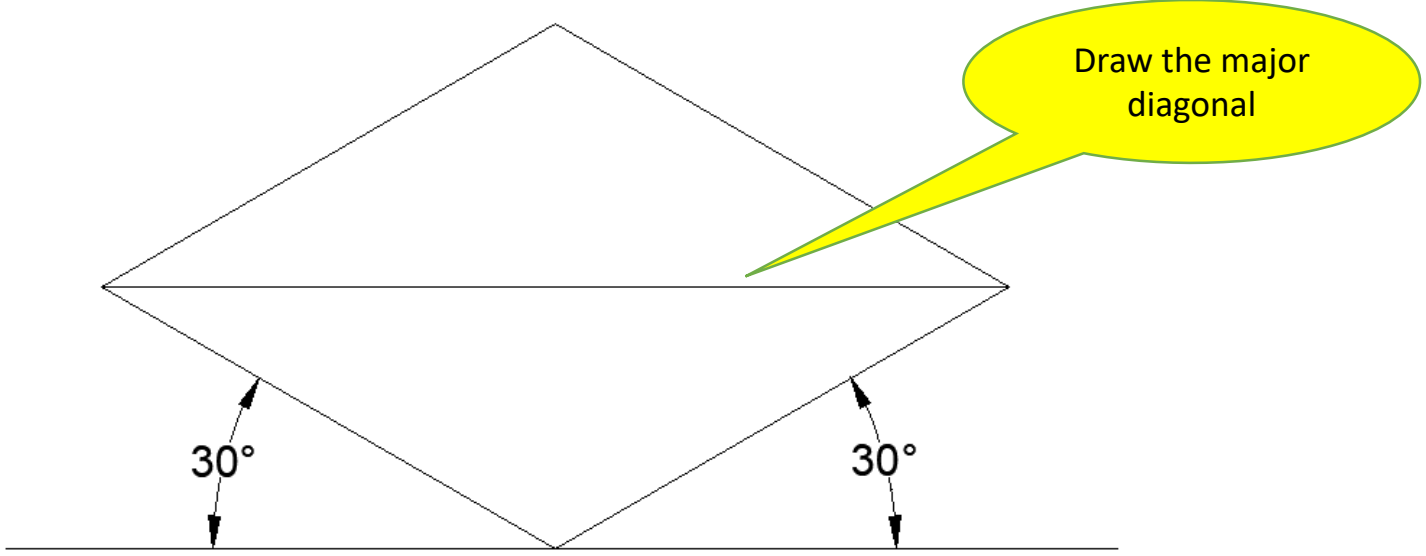
Construction of an Ellipse
For a circle parallel to HP

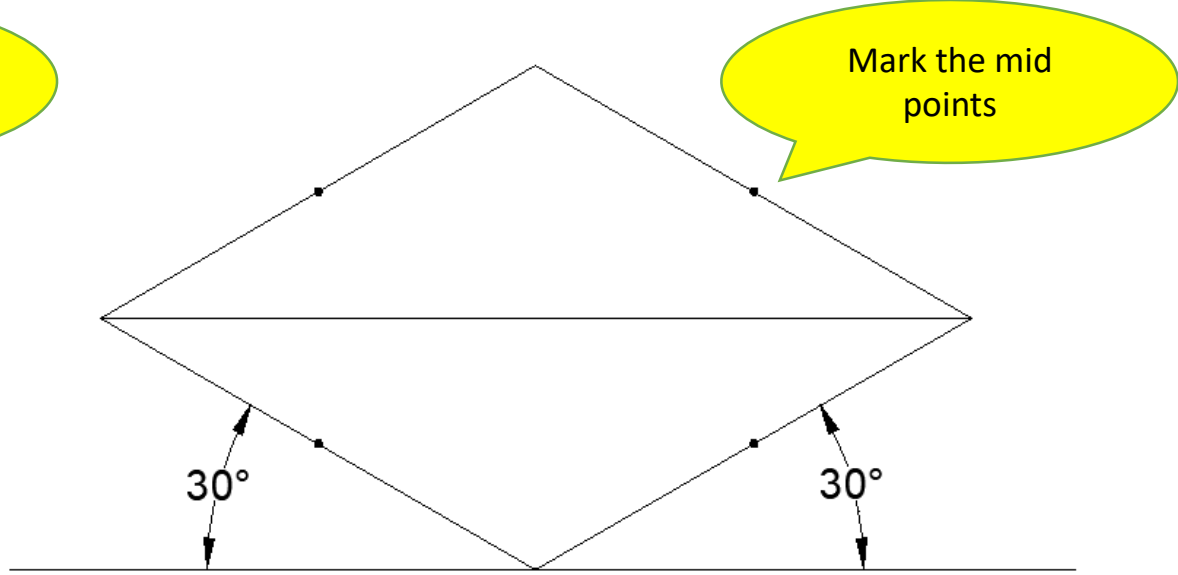
- Ex: Let us consider circle of Diameter 40mm
- The rhombus will be of sides ISO40

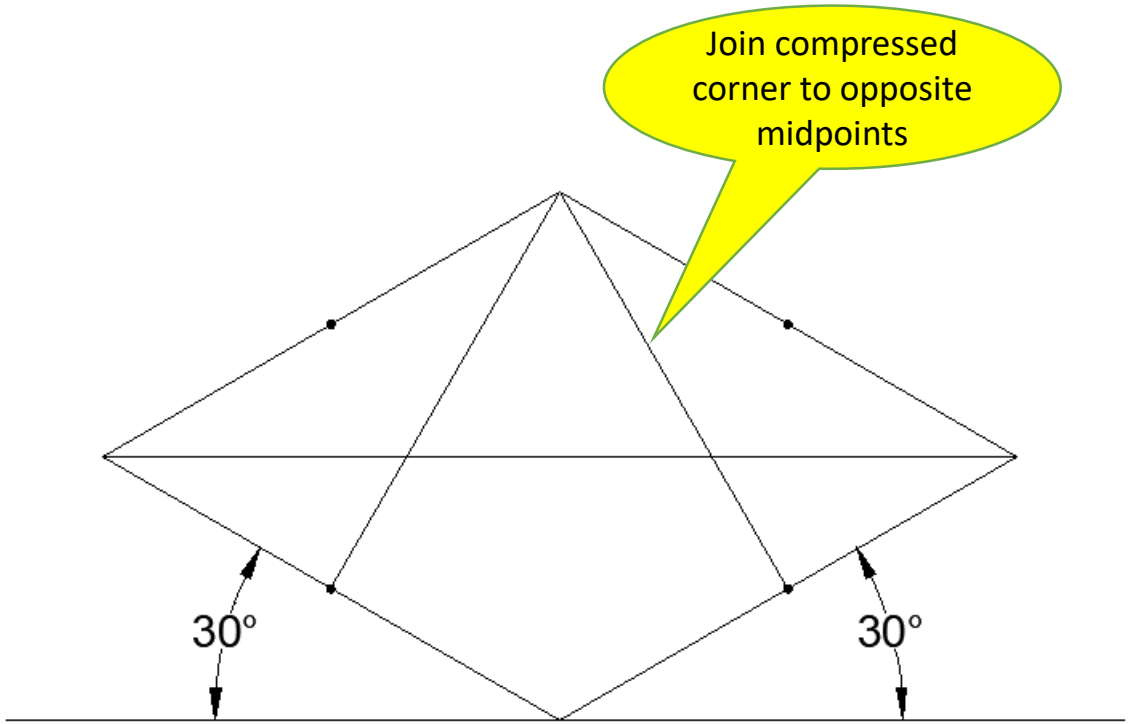
- In isometric projection a circle appears as an ellipse

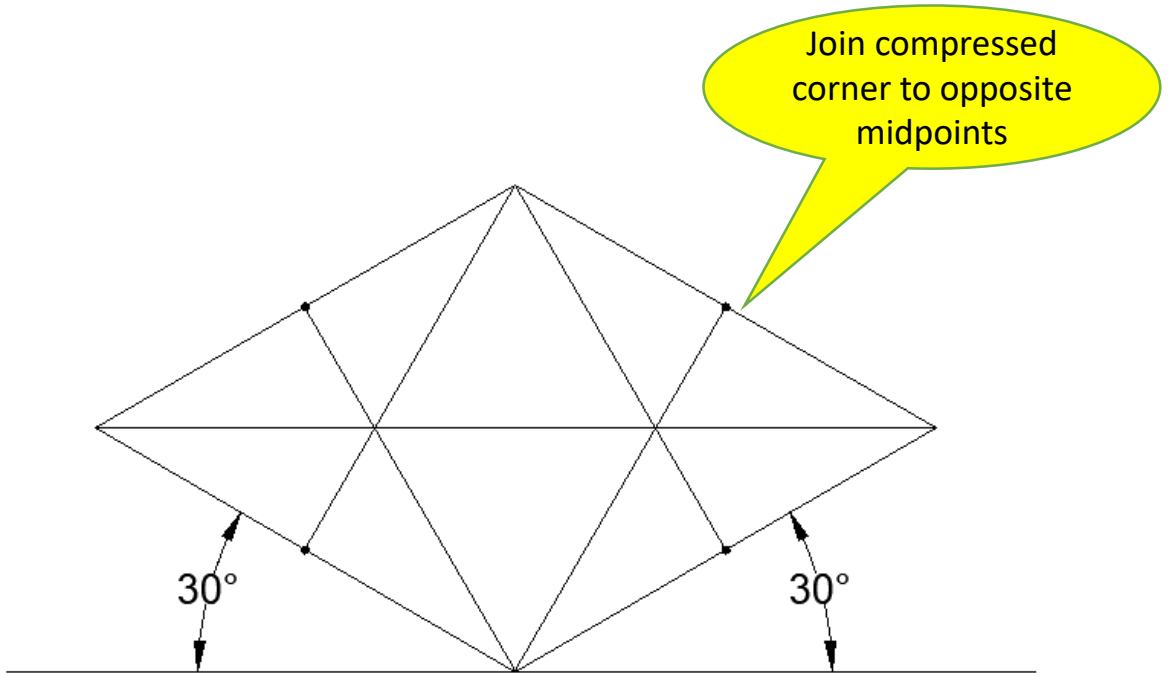
- To construct an ellipse corresponding to a circle (resting on HP) of diameter X, we have to construct a rhombus of sides ISO X

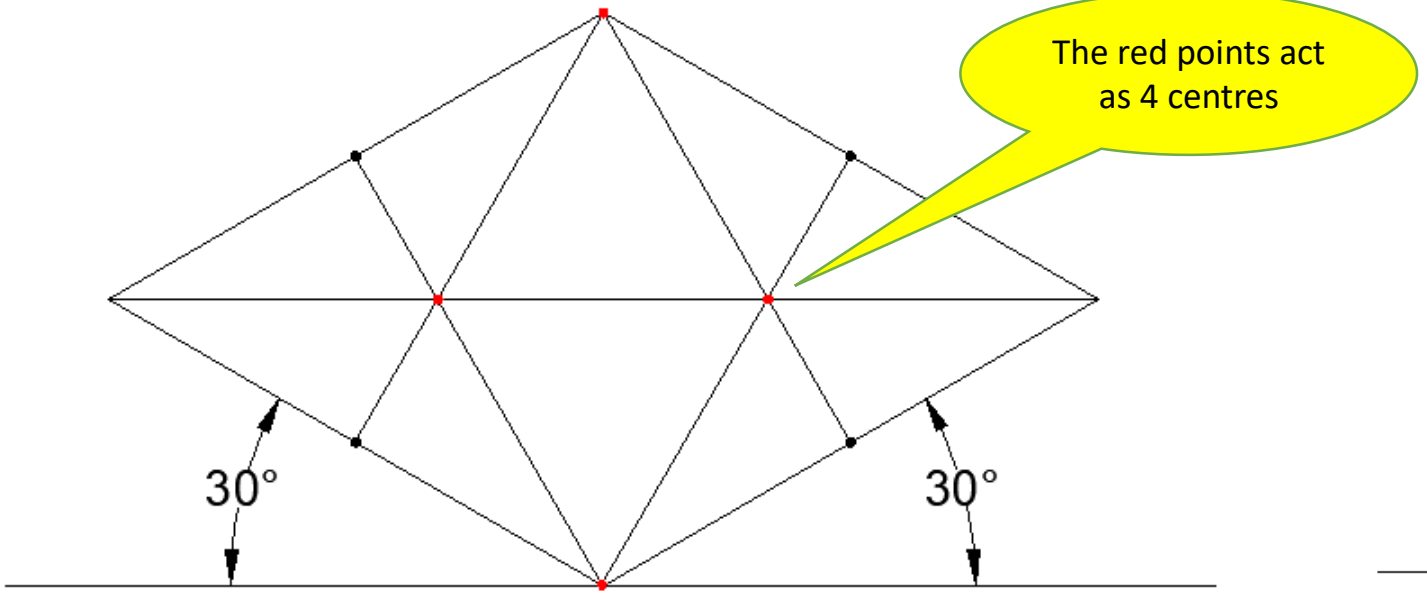


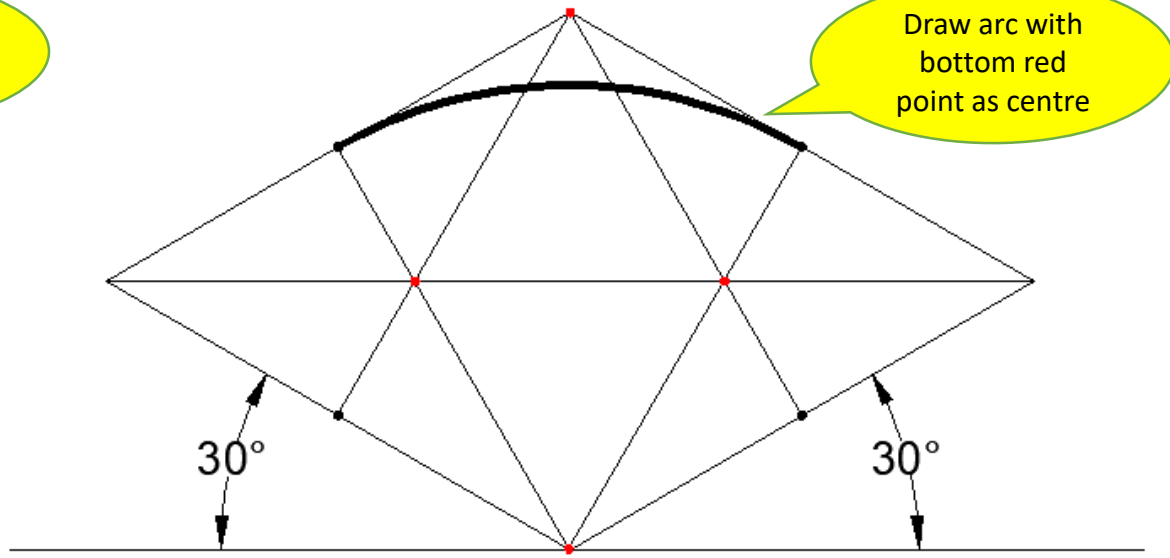

Draw the major diagonal
30°
30°

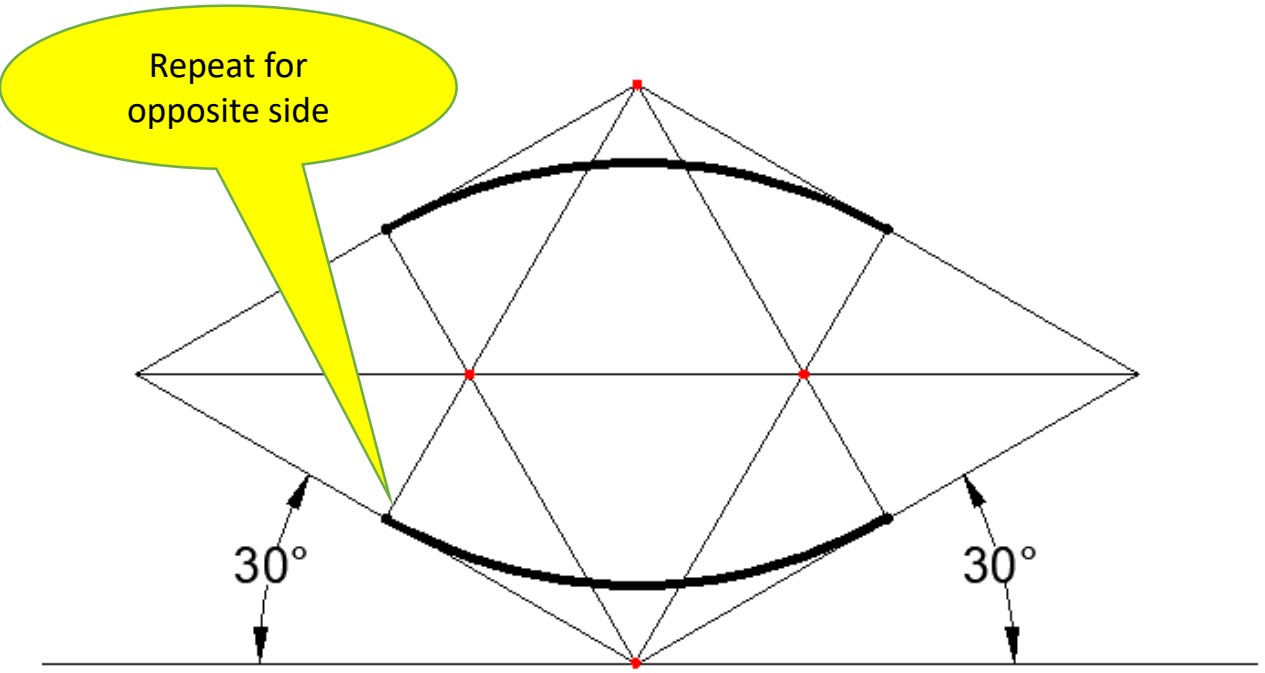

Mark the mid points
30°
30°

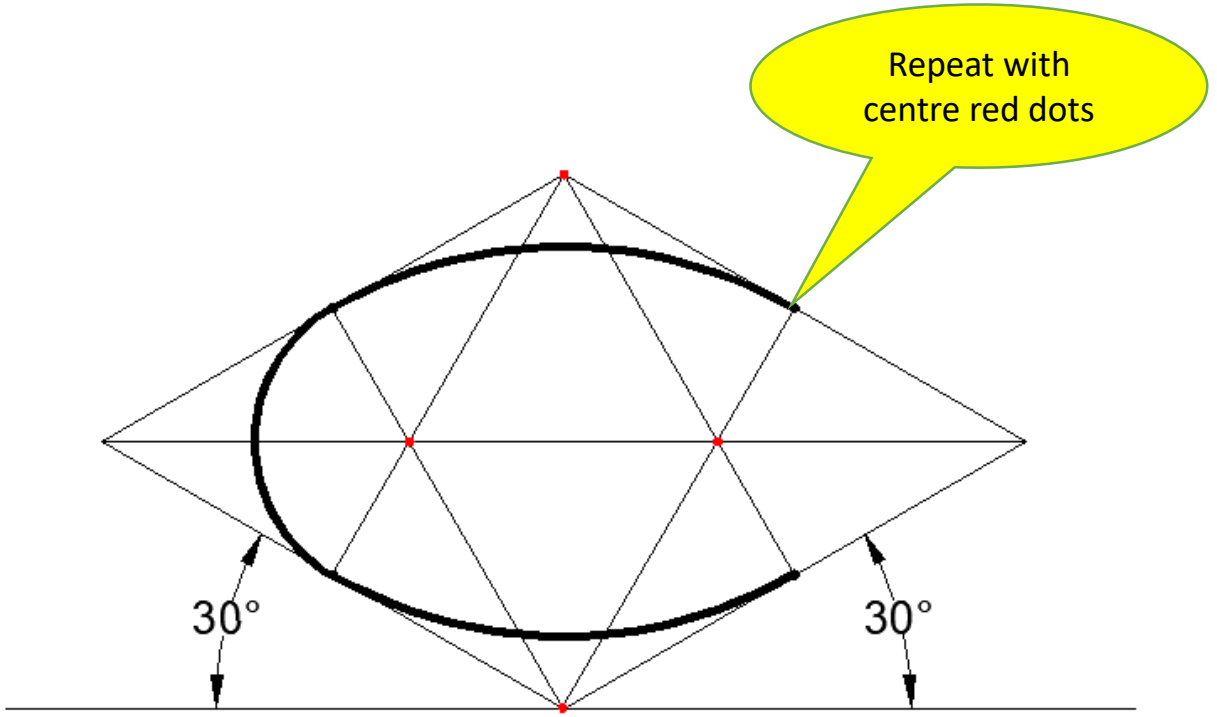

Join compressed corner to opposite midpoints
30°
30°

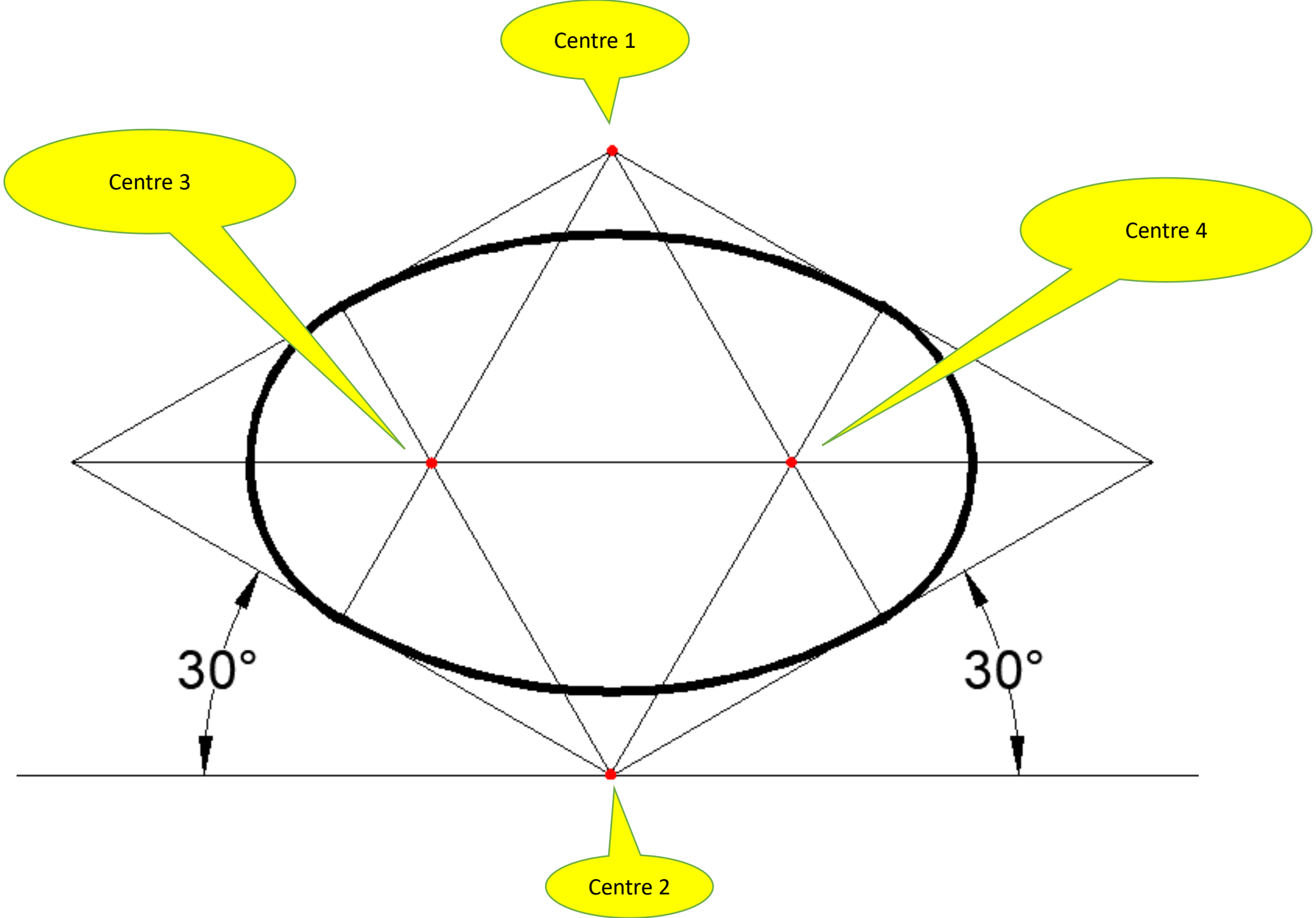

Join compressed corner to opposite midpoints
30°
30°

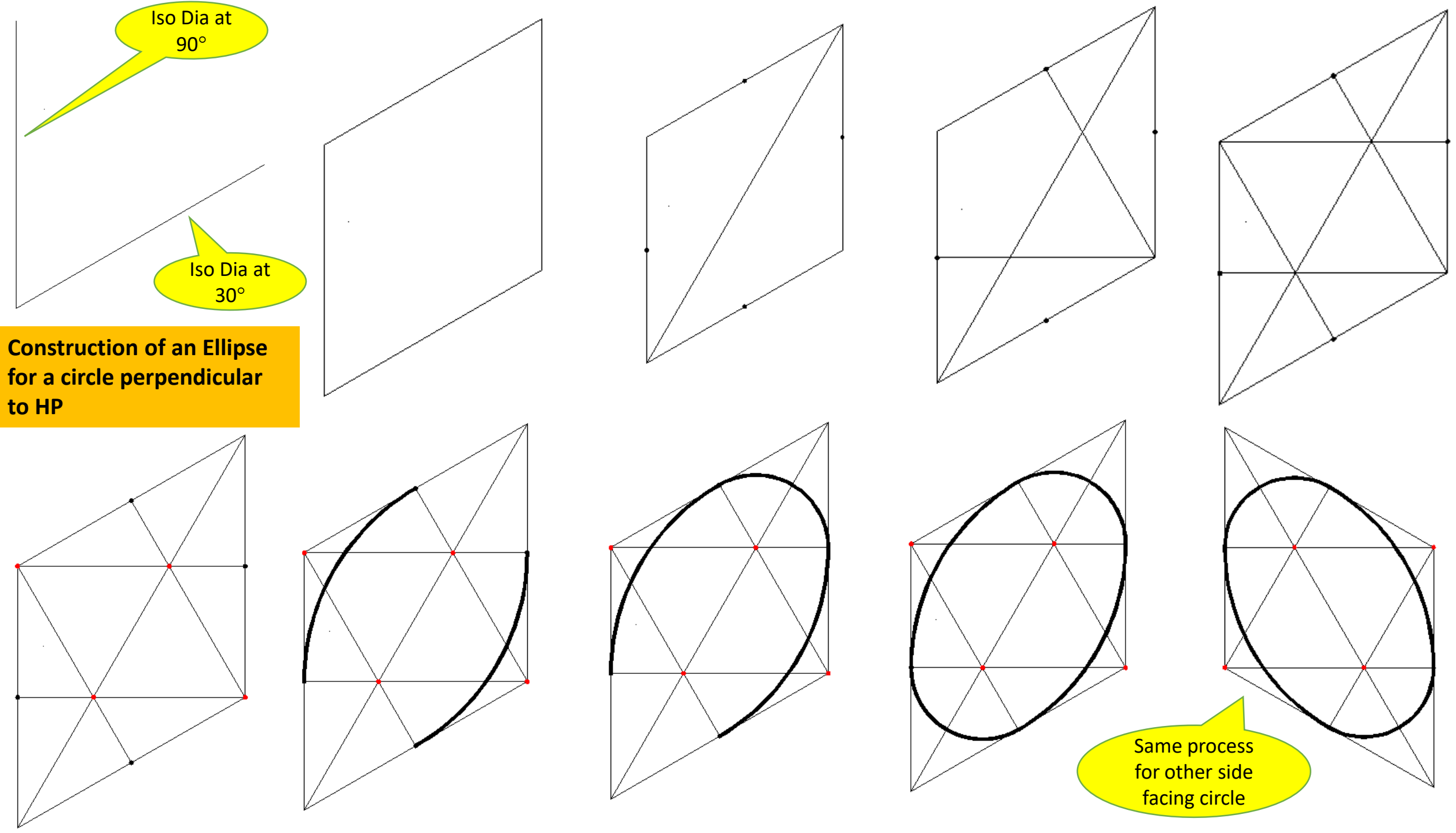

The red points act as 4 centres
30°
30°


Draw arc with bottom red point as centre
30°
30°


Repeat for opposite side
30°
30°


Repeat with centre red dots
30°
30°

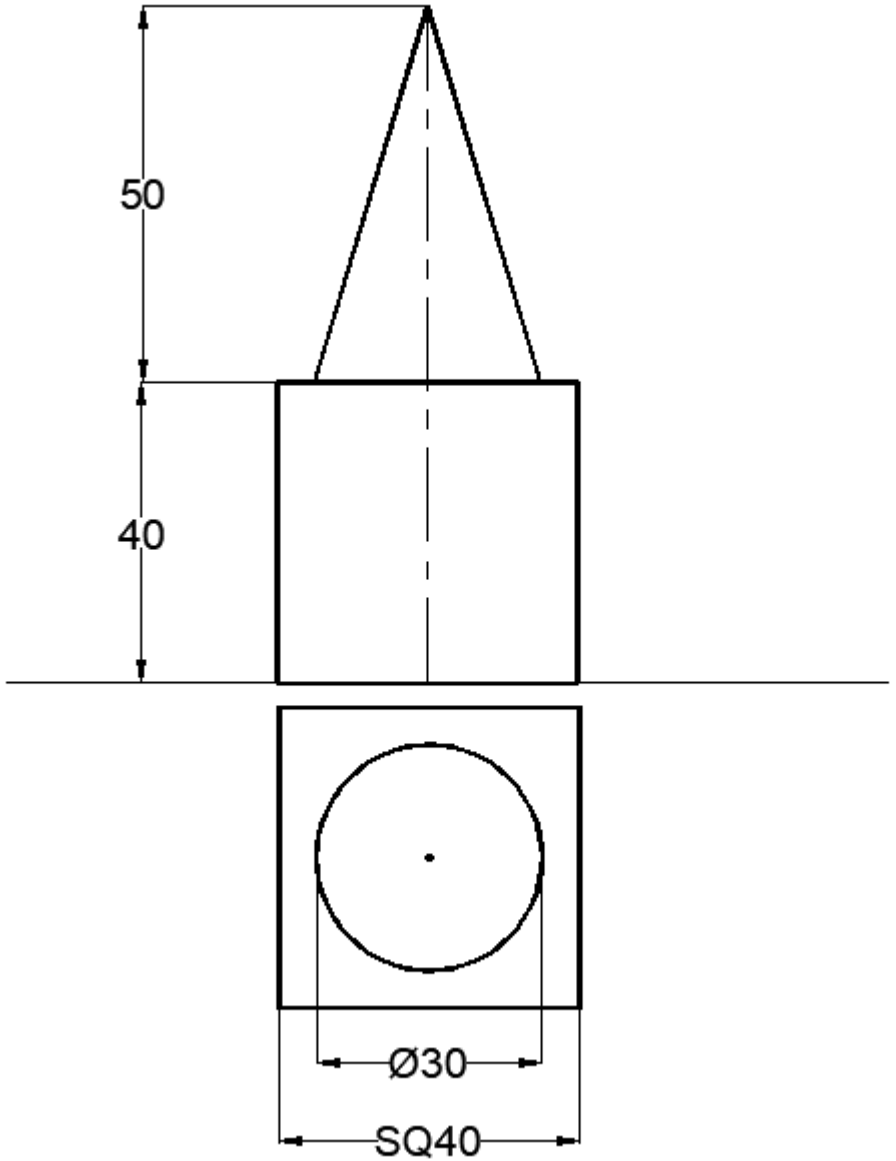

Centre 1
Centre 3
Centre 4
30°
30°
Centre 2



Construction of an Ellipse for a circle perpendicular to HP

QUESTION BANK: ISOMETRIC PROJECTION PROBLEM 1

A cone of base diameter 30mm and height 50mm rests centrally over the cube of 40mm side. Draw the isometric projection of the combination of solids.



ISO 40

ISO 40

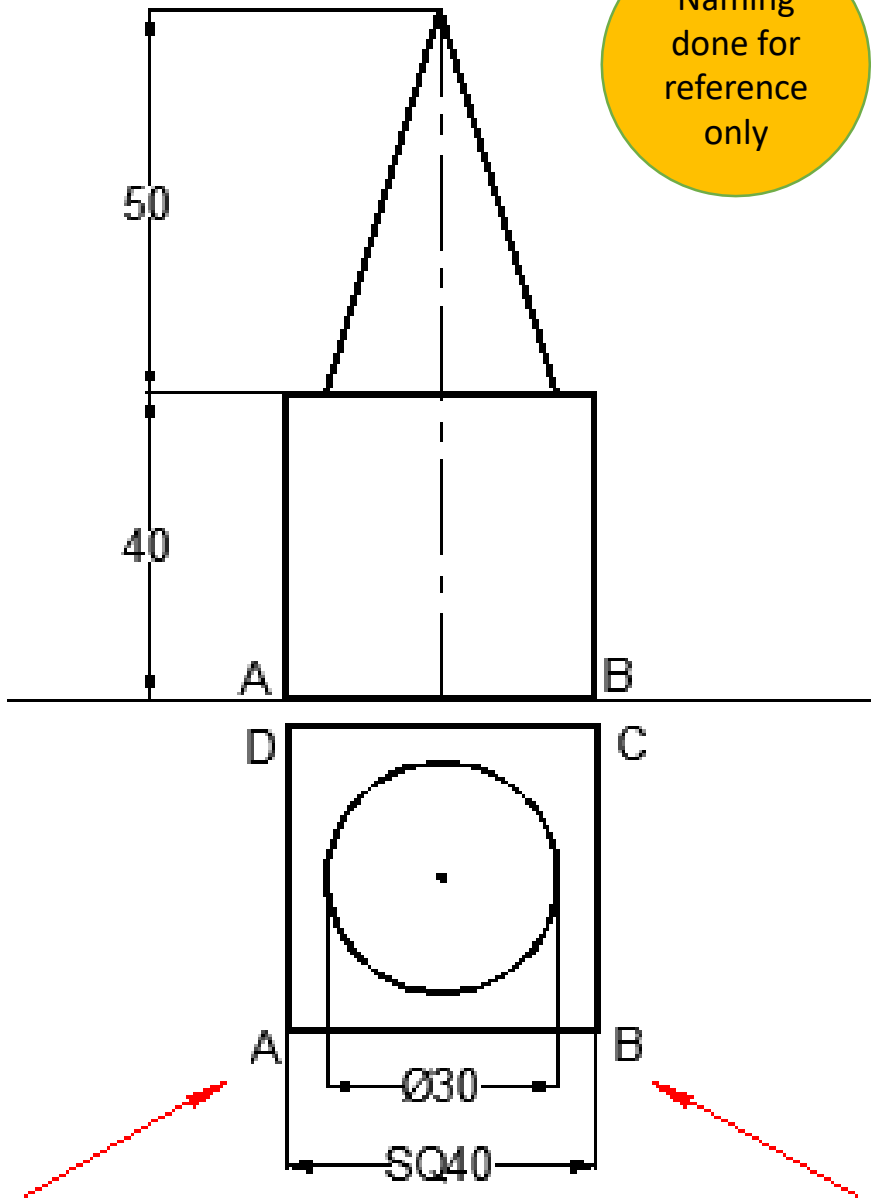
30°

30°

Corner A

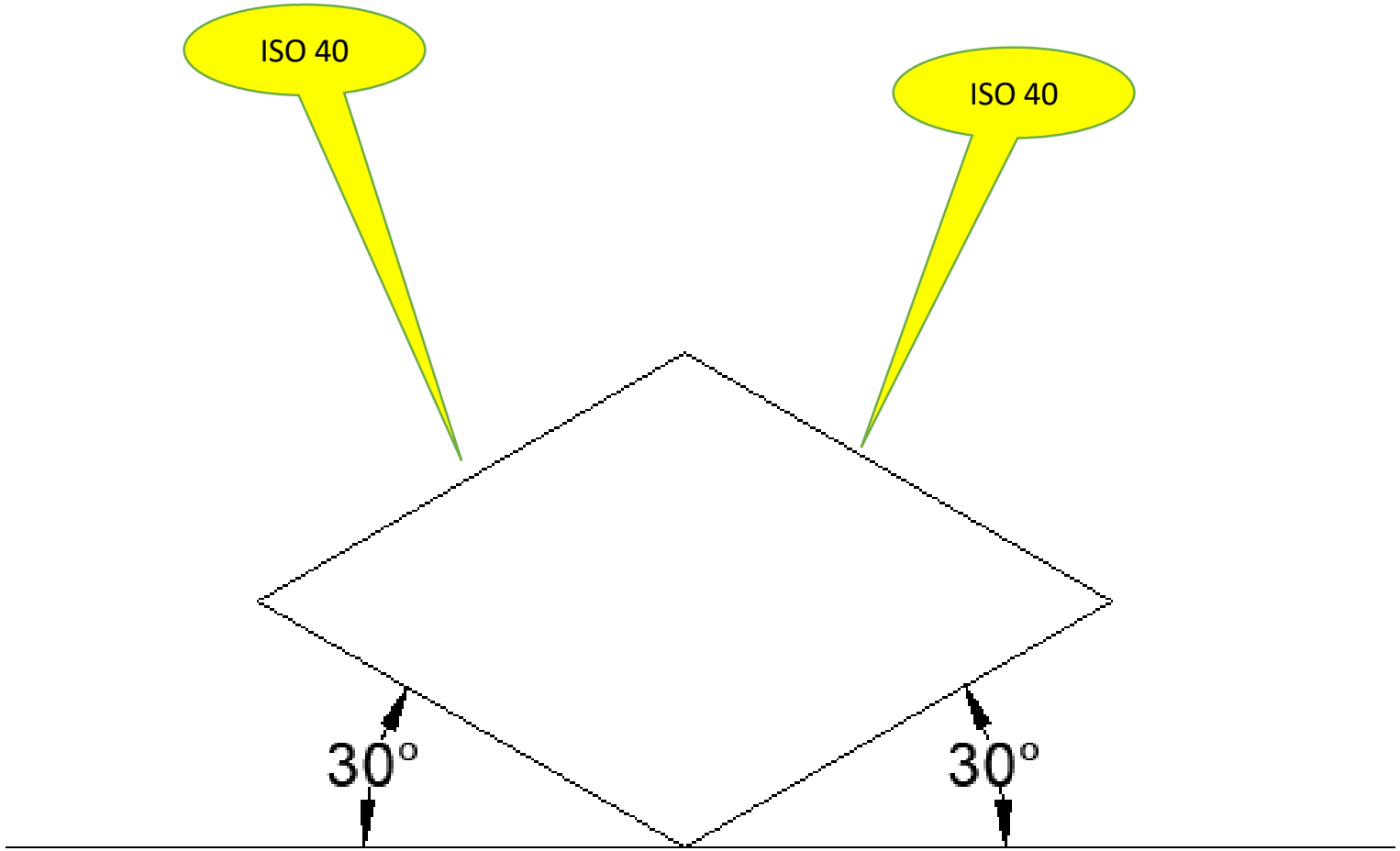
In this case, viewing from both sides gives same result as the solid is symmetric

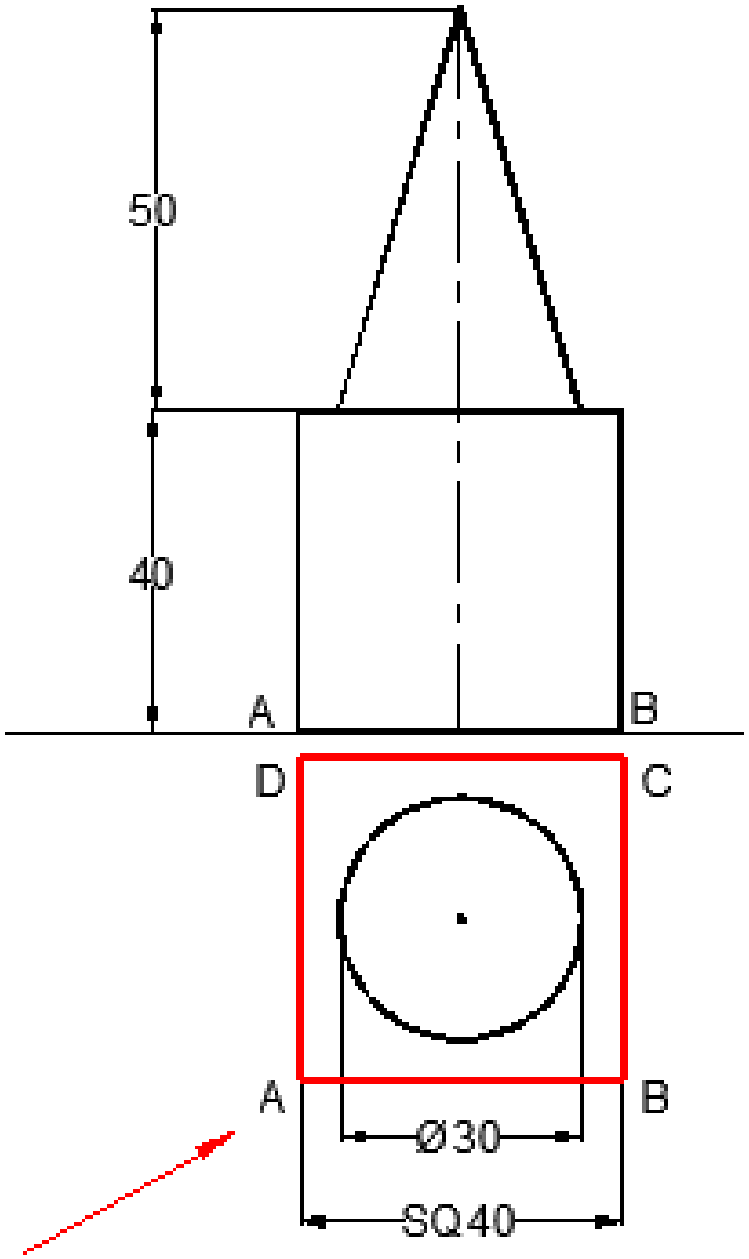
Select a viewing side which gives maximum details

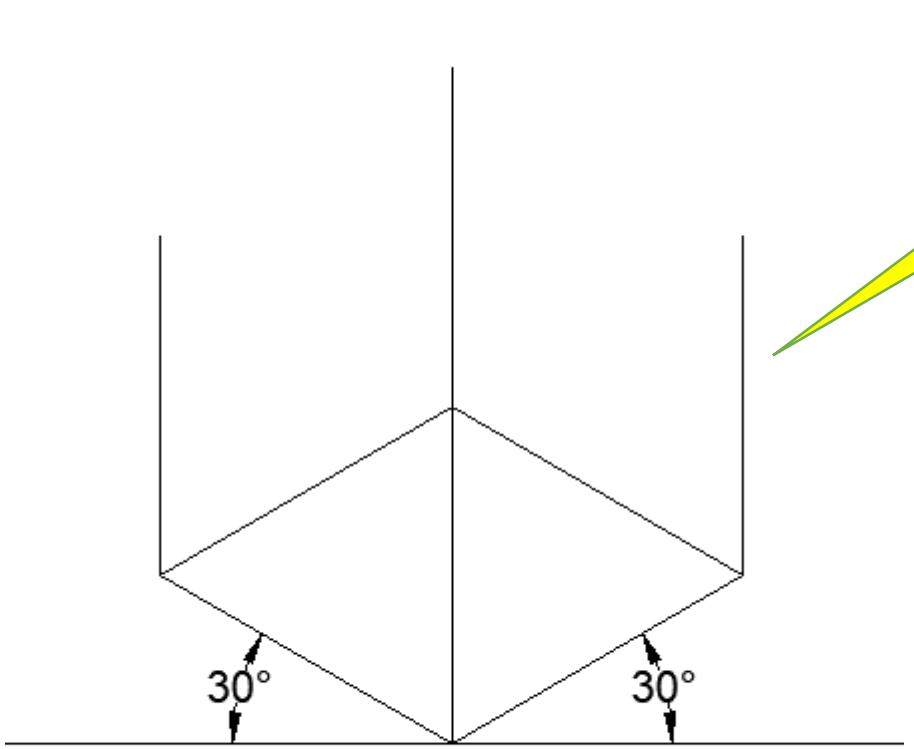


View the solid from either side

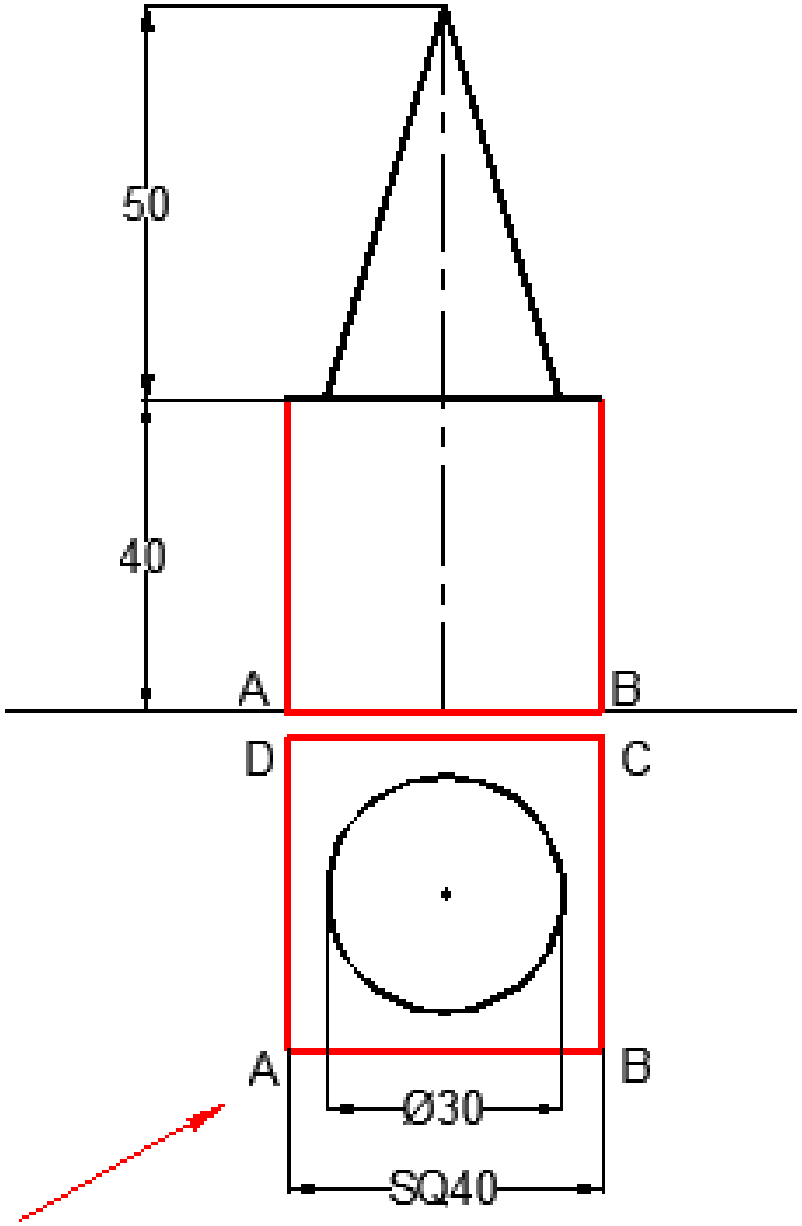
Naming done for reference only


ISO 40
ISO 40
30°
30°

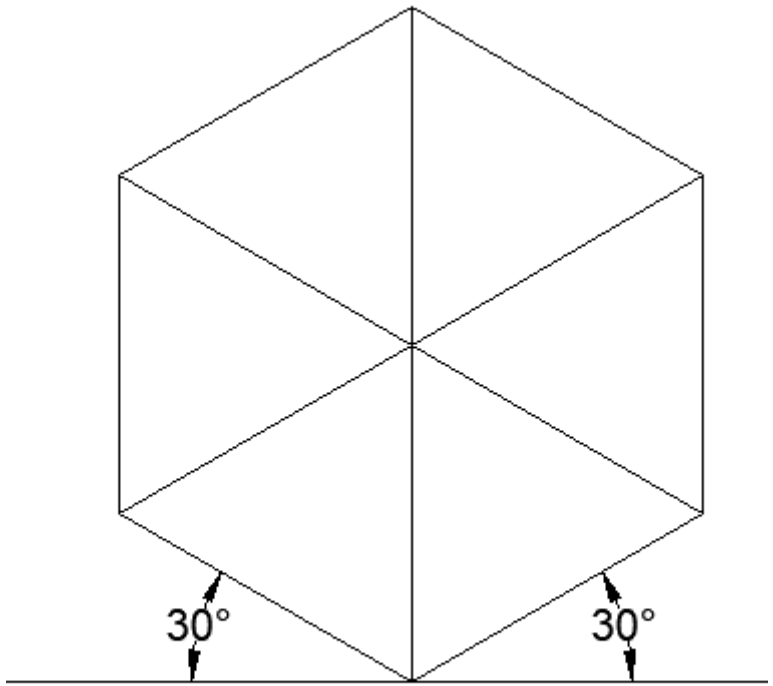

50
40
A
B
D
C
A
B
Ø30
SQ40



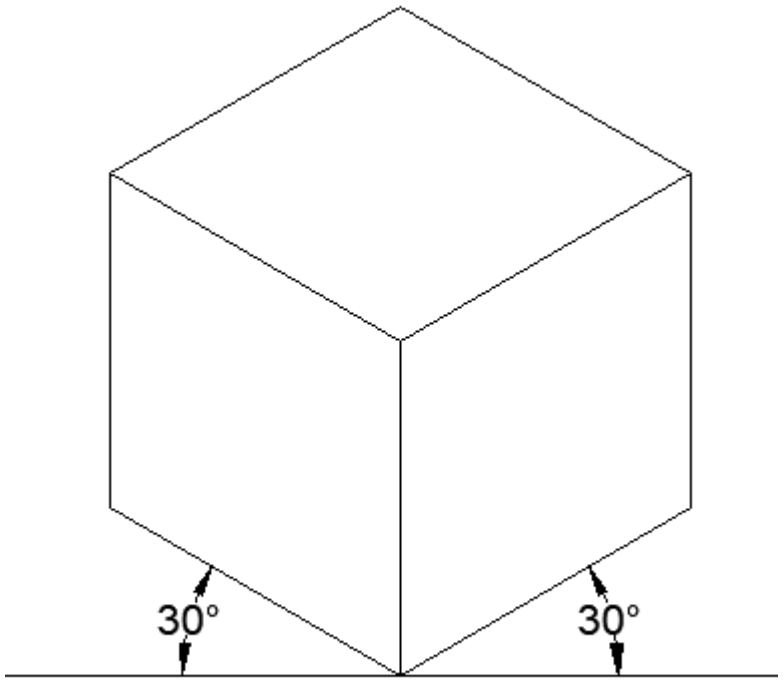
ISO 40
HEIGHT

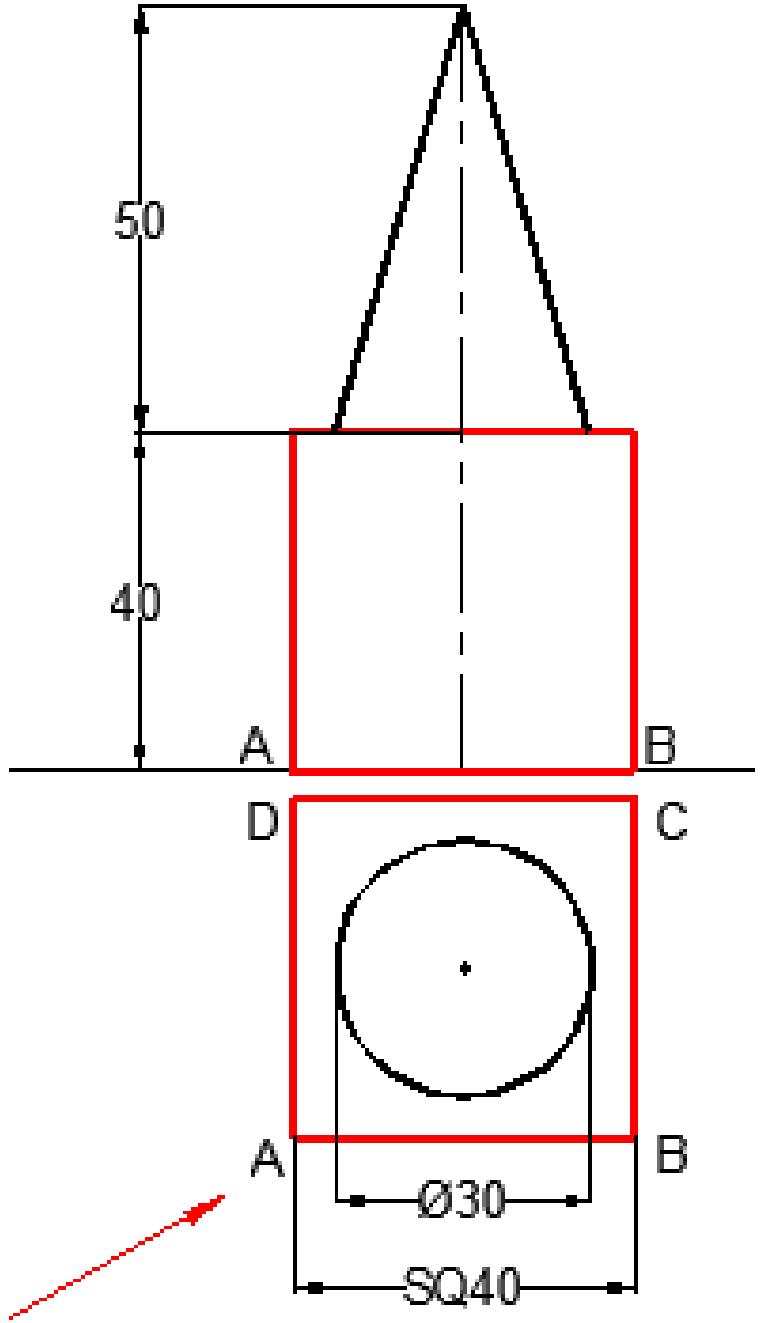


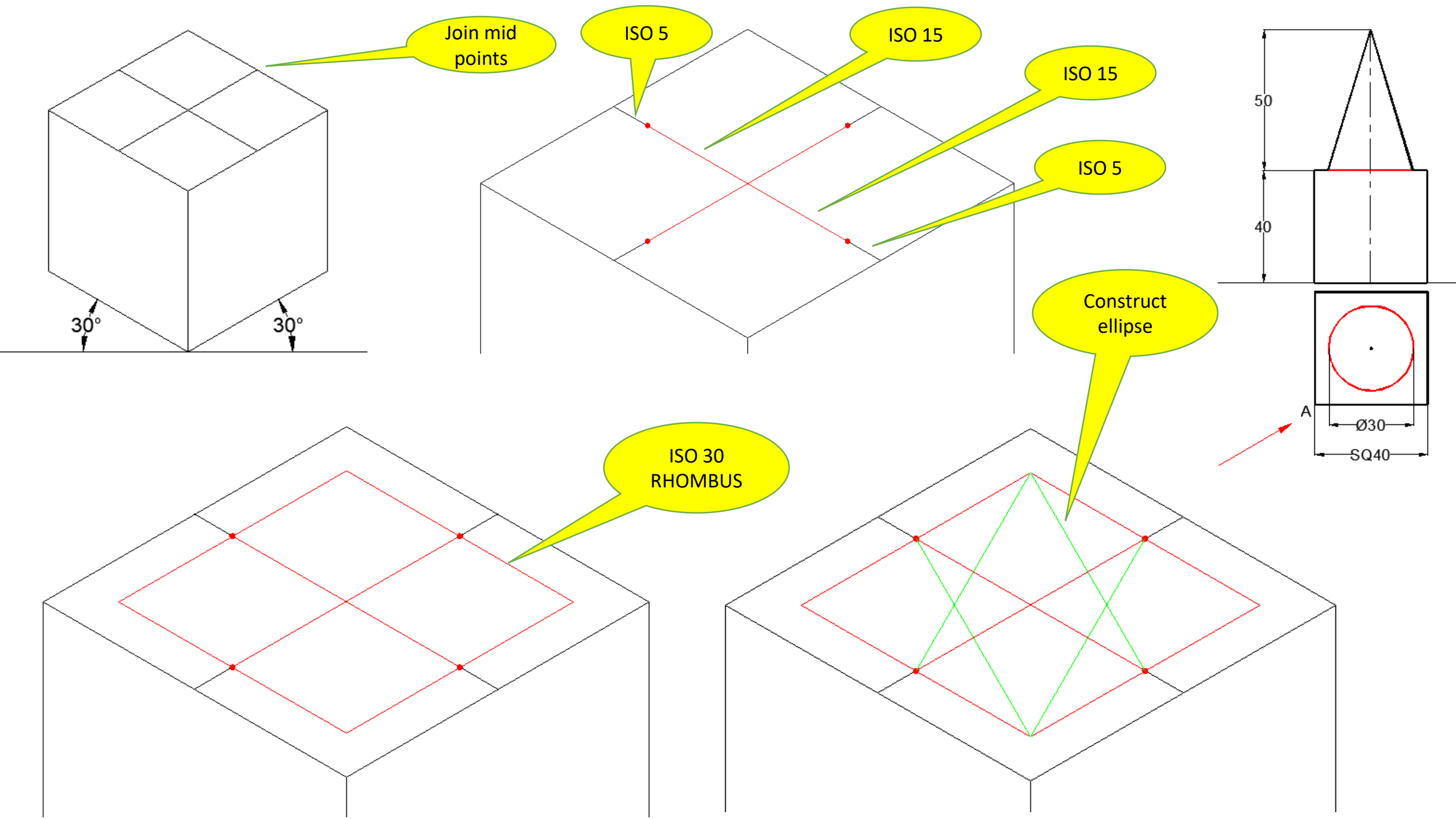
Initially draw all lines lightly

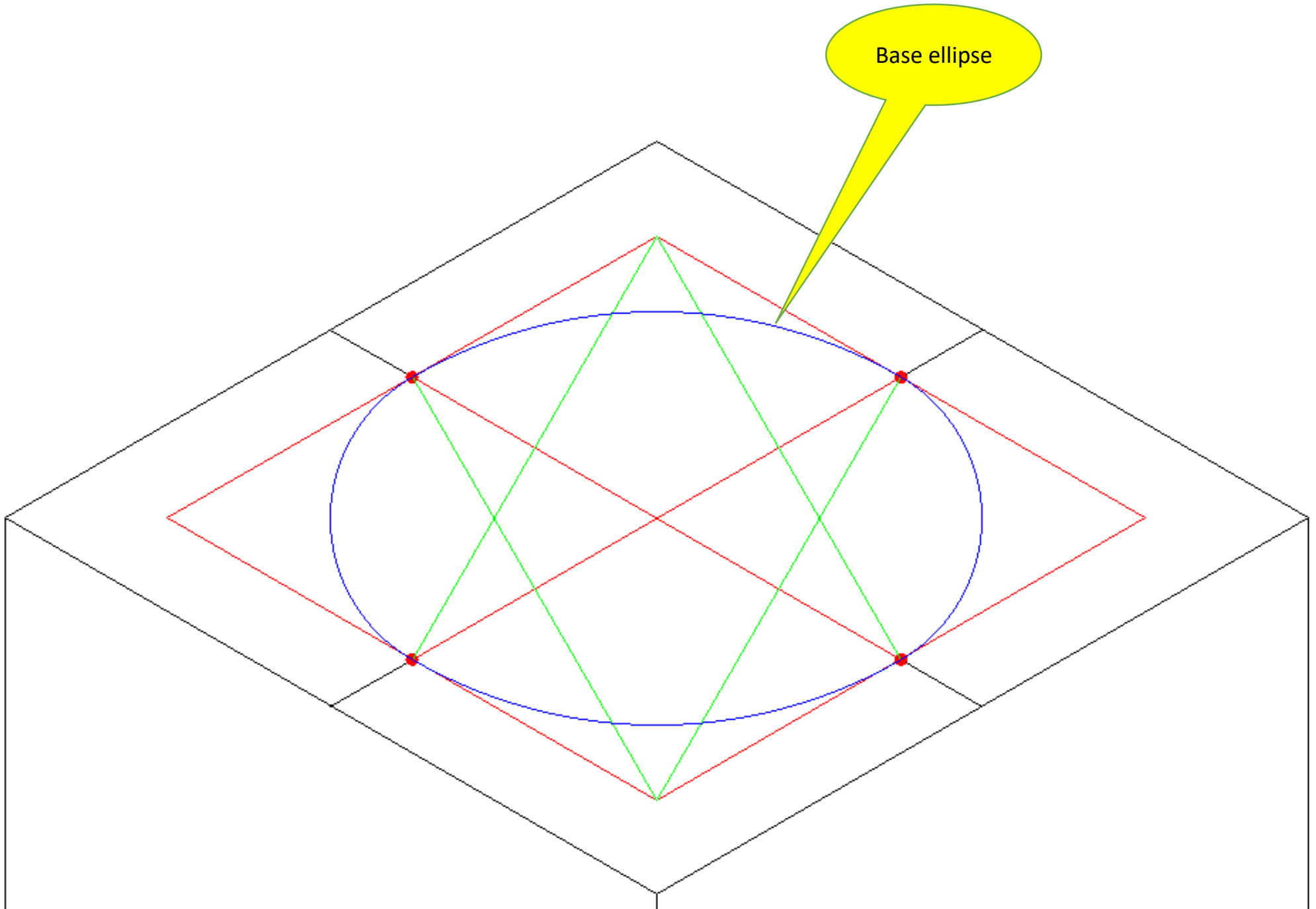


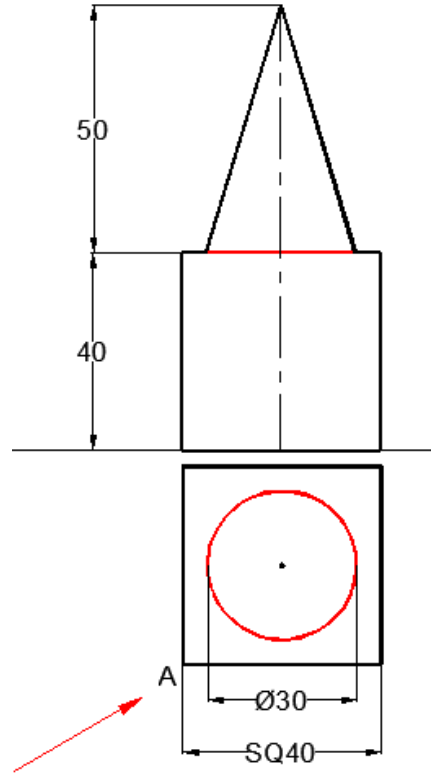
Do not erase construction lines
It is erased in this case for clarity purpose

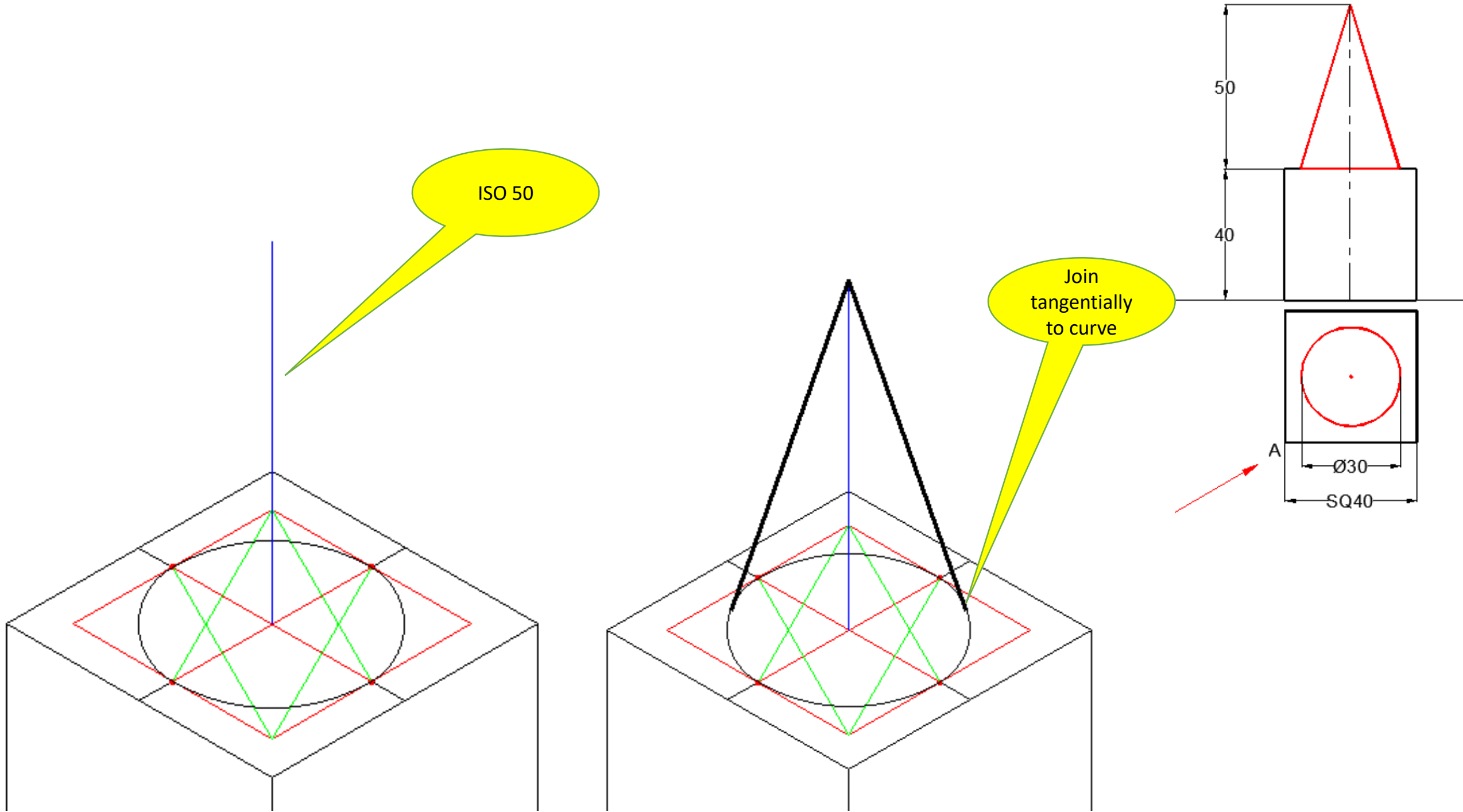




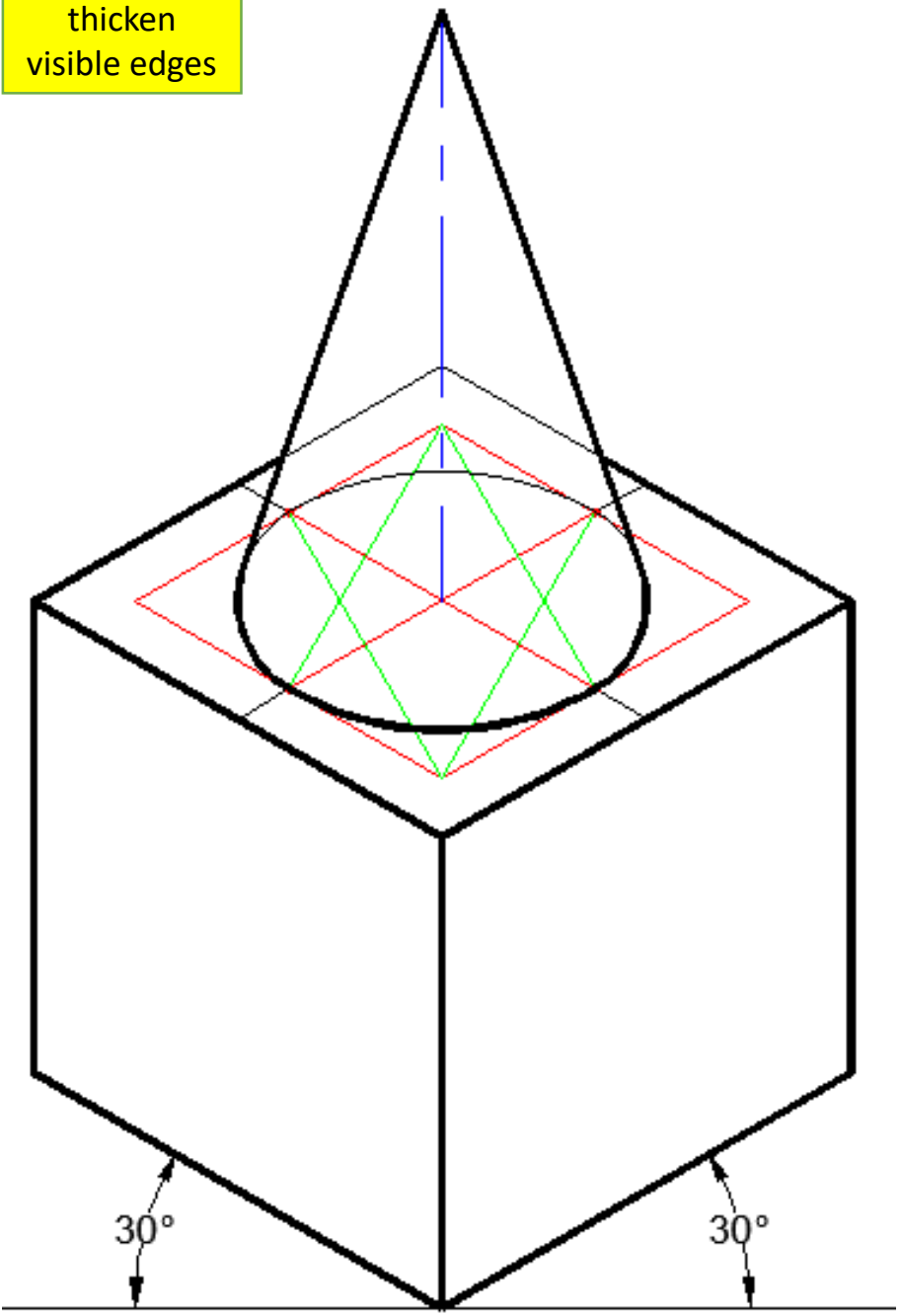

Join mid points
30°
30°
ISO 5
ISO 15
ISO 15
ISO 5
50
40
A
Ø30
SQ40
Construct ellipse
ISO 30 RHOMBUS


Base ellipse


50
40
A
Ø30
SQ40


ISO 50
Join tangentially to curve
50
40
A
Ø30
SQ40

Darken and thicken visible edges



- Retain the construction lines
- It is erased in this case for clarity purpose