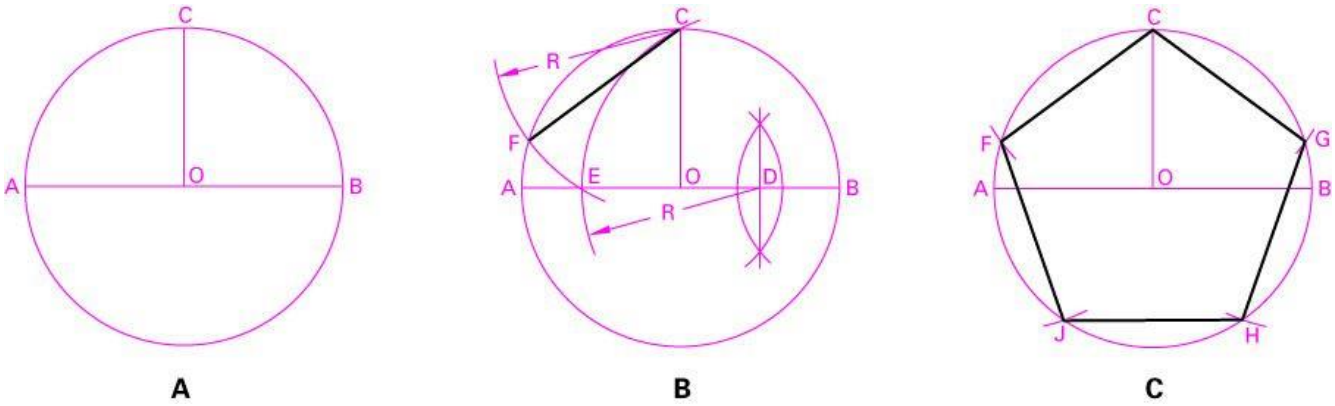
PLANE GEOMETRY

Problem 1: To Draw a PENTAGON.

Solution 1:

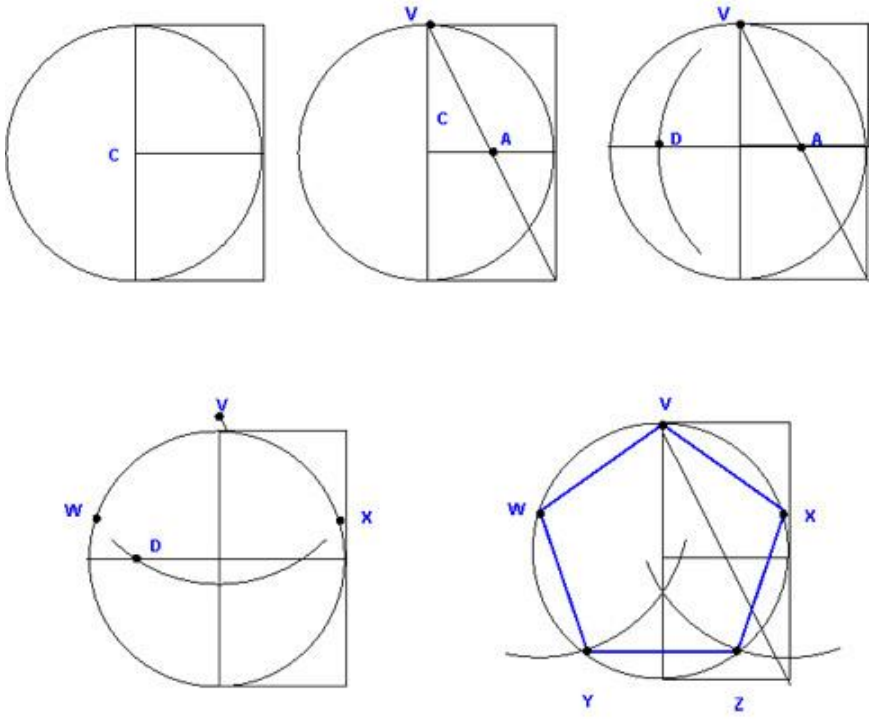
1. Circle at 'O'; with diameter AB & apex 'C';
2. Bisect OB = point D;
3. Center 'D' & radius CD = cut diameter at 'E';
4. Center 'C' & radius CE = cut circle at 'F';
5. Connect CF = one arm of the pentagon;
6. Radius = Arm of pentagon = cut another 3 points on the circle.
7. Connect all cutting points = desired pentagon.



A B C

Solution 2:

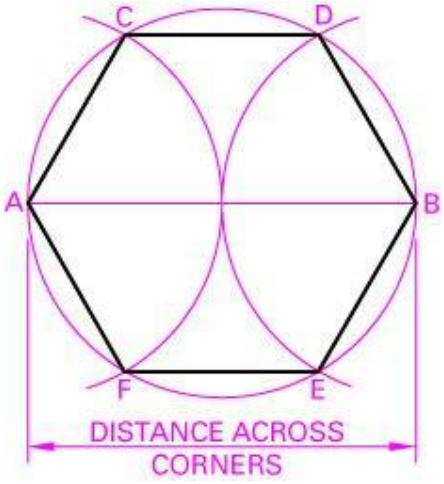
1. Circle at 'C'; draw tangential rectangle.
2. Connect the diagonal of rectangle = cutting point 'A'.
3. Center 'A' & radius VA = cut diameter at 'D'.
4. Center 'V' & radius VD & again cut circle at 'W' & 'X'.
5. Connect VW & VX = 2 arms of the pentagon
6. Radius VW and VX = 2 adjacent arms of pentagon
7. Arc from point W with Radius VW = point Y
8. Arc from point X with Radius VX = point Z
9. Connect all cutting points, VWYZX = desired pentagon.

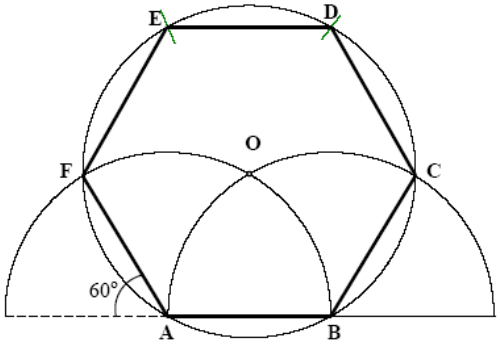


Problem 2: To Draw a HEXAGON with a given length.

Solution :

I. AB = Diagonal of Hexagon;
II. Bisect AB & draw half circle = point C, F & D, E;
III. Connect all cutting points = desired hexagon.



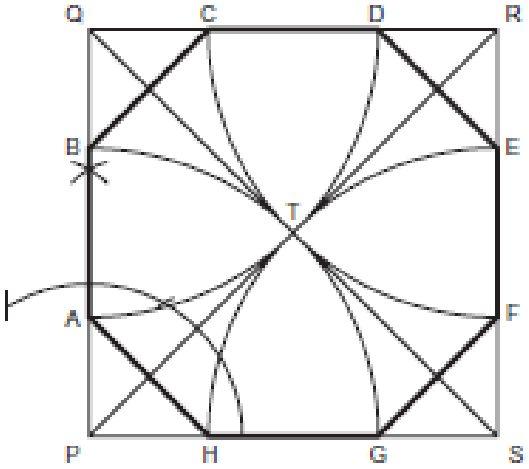


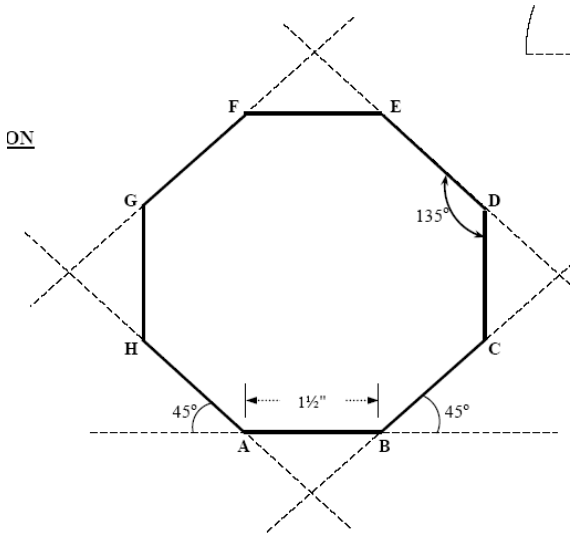
REGULAR HEXAGON
SCALE: 2" = AB

Problem 3: To Draw an OCTAGON with a given length.

Solution :

- Draw square PQRS, length equal to the diameter;
- Draw the diagonal SQ and PR to intersect at T;
- With center at P, Q, R & S draw arc with radius PT;
- Four arcs will cut square at D, E, F, G, H, A, B, C & D;
- Connect all cutting points = desired octagon.

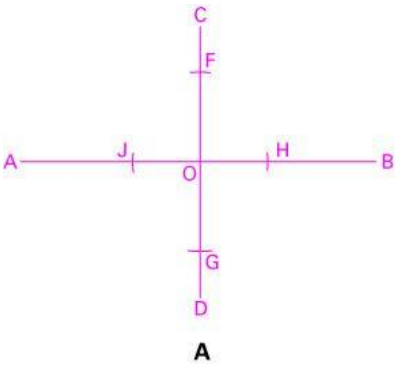




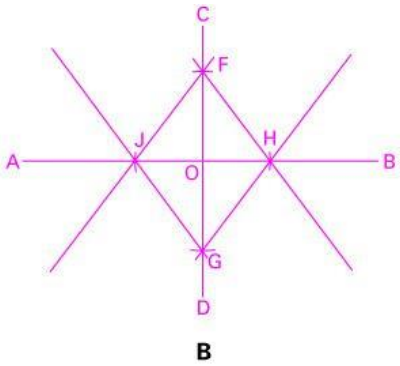
REGULAR OCTAGON
SCALE: 1.5" = AB

Problem 4: To Draw an ELLIPSE with a given length.

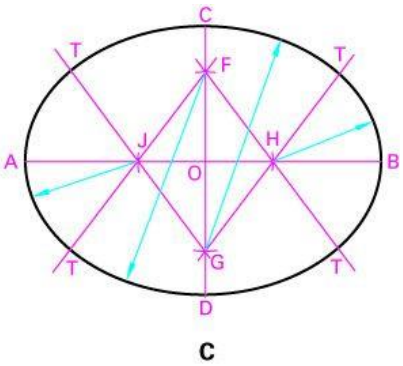
- Draw Major Axis AB and minor Axis CD;
- Cut smaller circle at FHGJ and CD; (Point J & H is closer to Center at 'O' & Point F, G is distant to Center at 'O')
- Connect and extend FJ, GJ, FH & GH to touch point T at all four corners;
- Draw arc from J & H with radius JA of HB;
- Draw arc from F & G with radius GT or FT = desired ellipse.



A



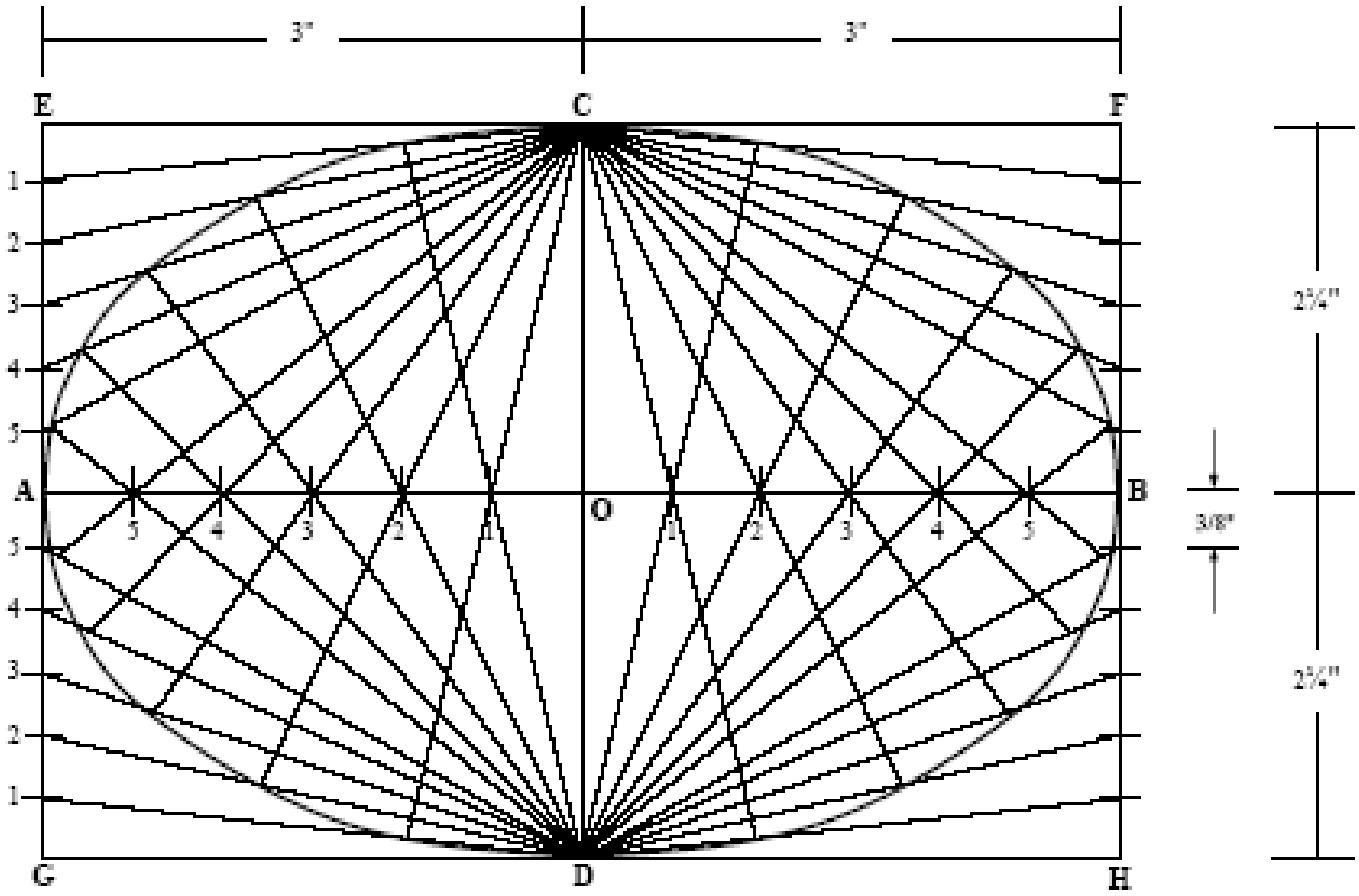
B



C

Another Process:

- Draw Major Axis AB = 6″ and minor Axis CD = 4.5″;
- Divide major axis AB into 12 equal part (1/2″);
- Divide minor axis CD into 12 equal part (3/8″);
- From C, connect smaller divisions from point F to B & from 1 to 5;
- From D, connect smaller divisions from point H to B & from 1 to 5;
- From C, connect smaller divisions from point 1 to 5 at AO & OB;
- From D, connect smaller divisions from point 1 to 5 at AO & OB;
- Connect intersecting points and get the desired ellipse.



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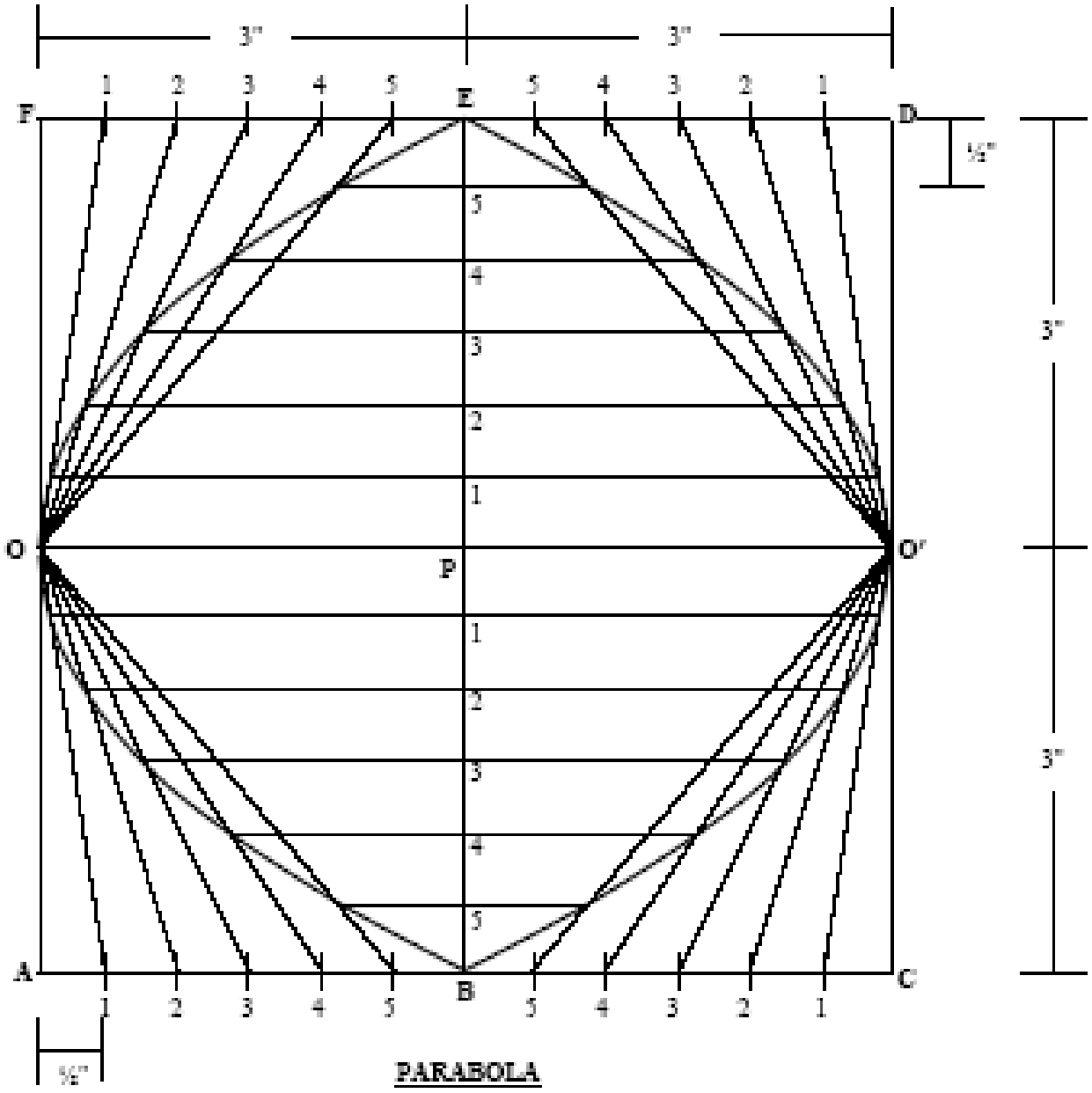
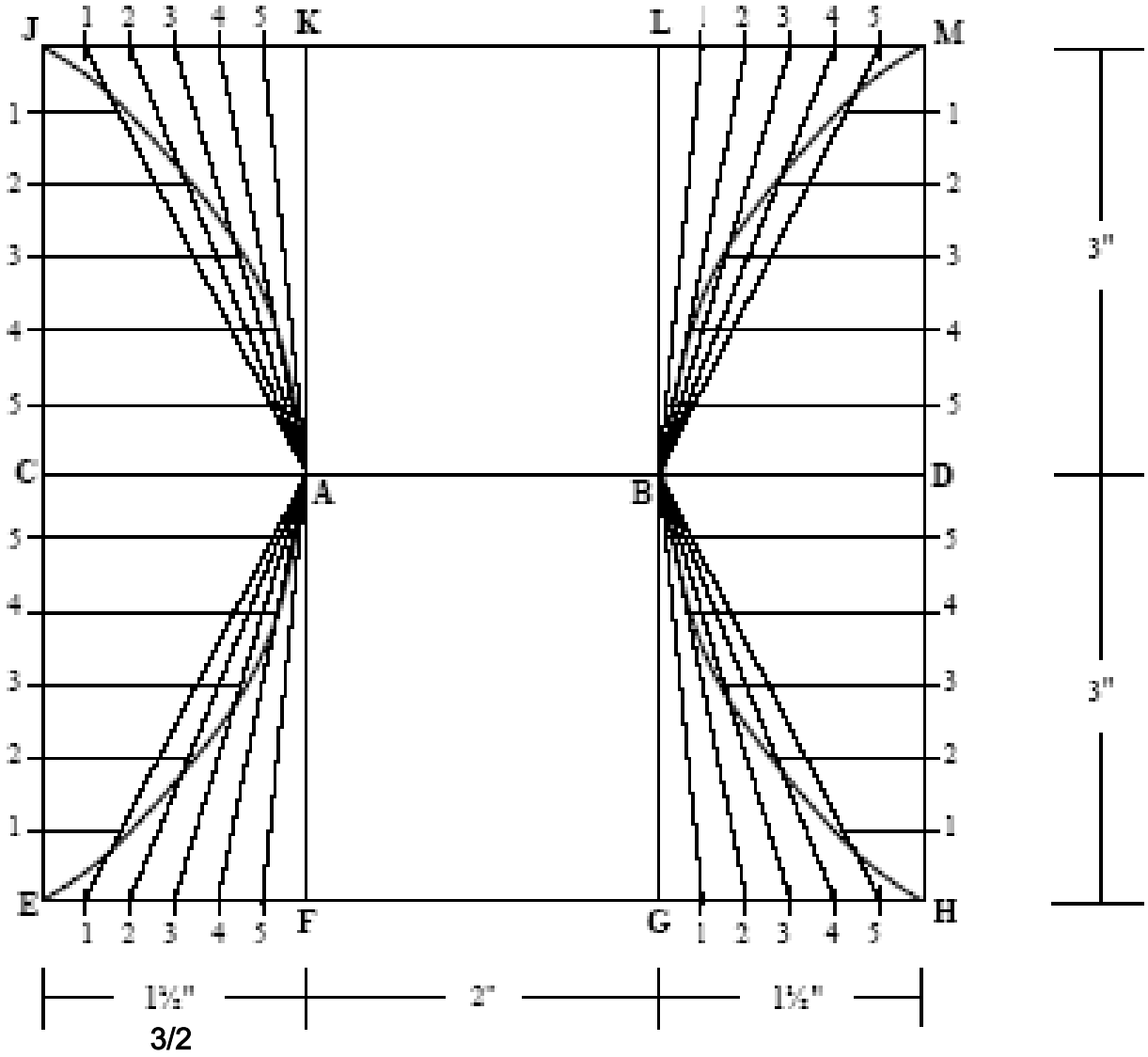
Problem 5: To Draw a PARABOLA by rectangular method.



- Draw Major Axis ABC = 6″ and minor Axis EPB = 6″;
- Divide major axis AB into 12 equal part (1/2″);
- Divide minor axis EPB into 12 equal part (1/2″);
- From O, connect smaller divisions from point 1 to 5 at both FE & AB side;
- From O′, connect smaller divisions from point 1 to 5 at both DE & CB side;
- Draw horizontal parallel lines from E to B;
- Connect intersecting points and get the desired parabola.

Problem 6: To Draw a HYPERBOLA by rectangular method.



HYPERBOLA

- Draw Minor Axis CABD = 1.5″ + 2″ + 1.5″ = 5″ and Major Axis JCE = 6″;
- Divide Major axis JCE into 12 equal horizontal parts (1/2″ each);
- Divide EF, GH, JK & LM into 6 equal parts (1/4″ each);
- From A, connect smaller divisions from point 1 to 5 at both FE & JK side;
- From B, connect smaller divisions from point 1 to 5 at both GH & LM side;
- Connect intersecting points and get the desired hyperbola.