ASSIGNMENT-2

Ojaswa Pandey

1 QUESTION No. 2.36

Construct a quadrilateral MORE where $MO = 6, OR = 4.5, \angle M = 60°, \angle 0 = 105°$ and $\angle R = 105°$.

2 SOLUTION

For this quadrilateral MORE we have,

$$\angle M + \angle O + \angle R = 60° + 105° + 105° = 270°, \tag{2.0.1}$$

1) Now on calculating, we get

$$\implies \angle E + 270° = 360°, \tag{2.0.2}$$
$$\implies \angle E = 90° \tag{2.0.3}$$

2) Now taking sum of all the angles given and (2.0.3) we get

$$\angle M + \angle O + \angle R + \angle E = 360° \tag{2.0.4}$$

So construction of given quadrilateral is possible as sum of all the angles is equal to $360°$.

3) Now,Using cosine formula in $\triangle MOR$ we can find RM:

$$\implies \|\mathbf{R} - \mathbf{M}\|^2 =$$
$$\|\mathbf{M} - \mathbf{O}\|^2 + \|\mathbf{O} - \mathbf{R}\|^2 - 2 \times \|\mathbf{M} - \mathbf{O}\| \times \|\mathbf{O} - \mathbf{R}\| \cos O \tag{2.0.5}$$

$$\implies RM = 8.38 \tag{2.0.6}$$

4) Also in $\triangle MOR$, Let $\angle ORM = \theta$, $\angle MOR = \beta$, $\angle ORM = \gamma$.Now using sine formula in $\triangle MOR$ we have

$$\frac{\sin \theta}{OR} = \frac{\sin \beta}{RM} = \frac{\sin \gamma}{MO} \tag{2.0.7}$$

$$\theta = \sin^{-1}(-0.1750); \tag{2.0.8}$$
$$\theta = \angle OMR = 31.24°; \tag{2.0.9}$$

5) Now polar coordinates of vertex R of $\triangle MOR$ be
$(RM \cos \theta, RM \sin \theta)$, we get

$$R(8.38 \times \cos 31.24, 8.38 \times \sin 31.24) \tag{2.0.10}$$
$$\implies R(8.25, -1.46) \tag{2.0.11}$$

6) Now in $\triangle MER$,we get

$$\angle EMR = 28.76° \tag{2.0.12}$$

7) Considering the polar coordinates of E of $\triangle MER$ and solving we get,

$$E(-6.49, -3.42) \tag{2.0.13}$$

8) Now, we have the coordinate of vertices M,O,R,E as M(0,0); O(6,0); R(8.25,-1.46) ;E(-6.49,-3.42).
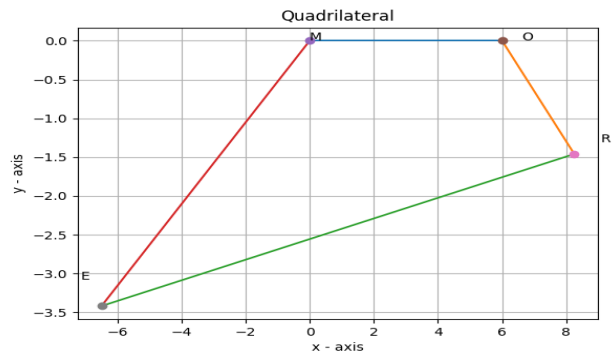
9) On constructing the given quadilateral on python we get:

Fig. 2.1: Quadrilateral MORE