

# Assignment 1

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Download all python codes from

<https://github.com/teja3657/Assignment1/tree/master/CODES>

and latex-tikz codes from

<https://github.com/teja3657/Assignment1/blob/master/Assignment1.tex>

Coordinates of O(p1,q1)

$$\mathbf{p1} = \frac{ld^2 + ol^2 - od^2}{2(ld)} \quad (2.0.12)$$

$$\mathbf{p1} = \frac{(6.5)^2 + (6.5)^2 - (10.6)^2}{2(6.5)} \quad (2.0.13)$$

$$\mathbf{p1} = \frac{42.25 + 42.25 - 112.36}{13} \quad (2.0.14)$$

$$\Rightarrow p1 = -2.14 \quad (2.0.15)$$

$$\mathbf{q1} = \sqrt{(ol)^2 - (p1)^2} \quad (2.0.16)$$

$$\mathbf{q1} = \sqrt{(6.5)^2 - (-2.14)^2} \quad (2.0.17)$$

$$\Rightarrow q1 = 6.13 \quad (2.0.18)$$

## 1 QUESTION No.2.16

Construct an isosceles triangle in which the lengths of the equal sides is 6.5 and the angle between them is  $110^\circ$ .

The vertex O can be expressed in polar coordinate form as

$$\mathbf{O} = ol \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix} \quad (2.0.19)$$

## 2 SOLUTION

The vertices are:

$$\mathbf{L} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{D} = \begin{pmatrix} ld \\ 0 \end{pmatrix}, \mathbf{O} = \begin{pmatrix} p1 \\ q1 \end{pmatrix} \quad (2.0.1)$$

Finding  $\angle O$  and  $\angle D$

In  $\triangle OLD$ ,

$$\angle O + \angle L + \angle D = 180^\circ \quad (2.0.2)$$

$$\angle O = \angle D = x \quad (2.0.3)$$

$$x + 110^\circ + x = 180^\circ \quad (2.0.4)$$

$$2x = 180^\circ - 110^\circ \quad (2.0.5)$$

$$2x = 70^\circ \quad (2.0.6)$$

$$x = 35^\circ \quad (2.0.7)$$

$$\Rightarrow x = \angle O = \angle L = 35^\circ \quad (2.0.8)$$

Now, Lines  $od$ ,  $ol$  and  $ld$  Can be plotted.

$$\mathbf{OD} = 2a \cos(35) \quad (2.0.9)$$

$$(here, a = ol = 6.5) \quad (2.0.10)$$

$$\mathbf{OD} = (13) \cos(35) = 10.6 \quad (2.0.11)$$

O can be expressed as

$$\mathbf{O} = ol \begin{pmatrix} \cos O \\ \sin O \end{pmatrix} \quad (2.0.20)$$

$$Here, ol = 6.5 \quad (2.0.21)$$

$$\mathbf{O} = 6.5 \begin{pmatrix} \cos 35 \\ \sin 35 \end{pmatrix} \quad (2.0.22)$$

$$\mathbf{O} = 6.5 \begin{pmatrix} 0.819 \\ 0.573 \end{pmatrix} \quad (2.0.23)$$

$$\mathbf{O} = \begin{pmatrix} 5.324 \\ 3.728 \end{pmatrix} \quad (2.0.24)$$

So, the vertices of  $\triangle OLD$  are

$$\mathbf{L} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{D} = \begin{pmatrix} 6.5 \\ 0 \end{pmatrix}, \mathbf{O} = \begin{pmatrix} 5.324 \\ 3.728 \end{pmatrix} \quad (2.0.25)$$

Now, Isosceles  $\triangle OLD$  can be plotted using vertices  $LD$ ,  $OL$  and  $DO$ .

Plot of the Isosceles  $\triangle OLD$  is required.

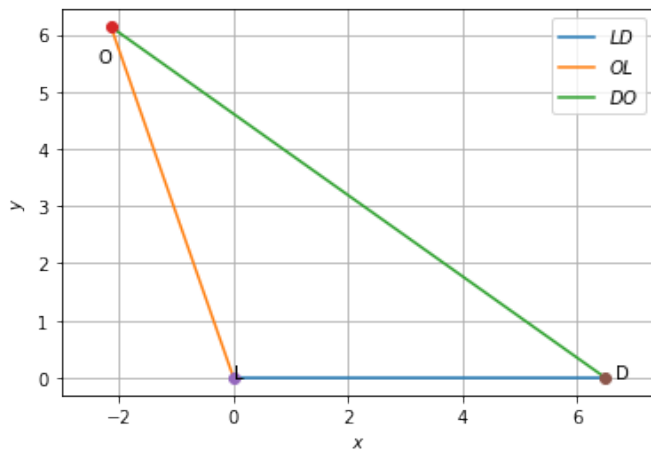


Fig. 2.1: Isosceles triangle  $\triangle OLD$