

# Assignment 1

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Download all python codes from

[https://github.com/Ravalika1630/Assignment1/blob/main/assignment%20\(1\).py](https://github.com/Ravalika1630/Assignment1/blob/main/assignment%20(1).py)

and latex-tikz codes from

<https://github.com/Ravalika1630/Assignment1/blob/main/main.txt>

then,

$$\mathbf{PQ} = \|\mathbf{Q} - \mathbf{P}\|^2 = \|\mathbf{Q}\|^2 = 4^2 = 16 \quad (\because \mathbf{P} = 0) \quad (2.0.10)$$

$$\mathbf{QR} = \|\mathbf{R} - \mathbf{Q}\|^2 = \left\| \begin{pmatrix} 2.47 \\ 3.15 \end{pmatrix} - \begin{pmatrix} 4 \\ 0 \end{pmatrix} \right\|^2 = 12.2 \quad (2.0.11)$$

$$\mathbf{PR} = \|\mathbf{R} - \mathbf{P}\|^2 = \|\mathbf{R}\|^2 = 2.47^2 + 3.15^2 = 16.02 \quad (\because \mathbf{P} = 0) \quad (2.0.12)$$

Here

$$\mathbf{PQ} = \mathbf{PR} \quad (2.0.13)$$

( $\because$  Twosidesareequal)

Hence  $\triangle PQR$  is a isosceles triangle.

Plot of the isosceles  $\triangle PQR$  :

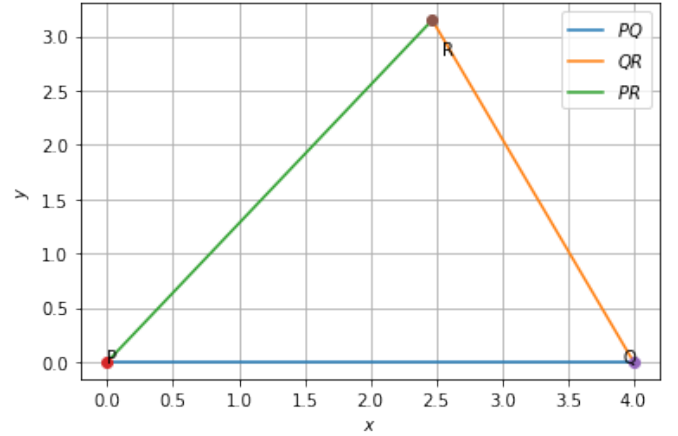


Fig. 2.1: isosceles  $\triangle PQR$

## 1 QUESTION NO. 2.12

Draw  $\triangle PQR$  with  $PQ=4, QR=3.5$  and  $PR=4$ . what type of triangle is this?

## 2 EXPLANATION

Let

$$\mathbf{P} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{Q} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}, \mathbf{R} = \begin{pmatrix} a \\ b \end{pmatrix} \quad (2.0.1)$$

The vertex  $\mathbf{R}$  can be expressed in *polar coordinate form* as

$$\mathbf{R} = PR \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix} \quad (2.0.2)$$

where,

$$PQ (\sin \theta \div 2) = QR \div 2 \quad (2.0.3)$$

$$\theta = 2 \sin^{-1} (QR \div 2PQ) \quad (2.0.4)$$

$$\theta = 2 \sin^{-1} (3.5 \div 8) \quad (2.0.5)$$

$$\theta = 51.88 \quad (2.0.6)$$

$$\mathbf{R} = 4 \begin{pmatrix} 0.6173 \\ 0.786 \end{pmatrix} \quad (2.0.7)$$

$$\mathbf{R} = \begin{pmatrix} 2.47 \\ 3.15 \end{pmatrix} \quad (2.0.8)$$

so, the vertices of  $\triangle PQR$  are

$$\mathbf{P} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{Q} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}, \mathbf{R} = \begin{pmatrix} 2.47 \\ 3.15 \end{pmatrix} \quad (2.0.9)$$

Lines  $PQ$ ,  $QR$  and  $RP$  are then generated and plotted using these coordinates to form  $\triangle PQR$ .