

Assignment 1

N.Manga

Download all python codes from

<https://github.com/N.manga/ASSIGNMNT/Assignment1.py>

and latex-tikz codes from

<https://github.com/N.manga/ASSIGNMNT/main.tex>

so, the vertices of $\triangle PQR$ are

Plot of the $\triangle PQR$:

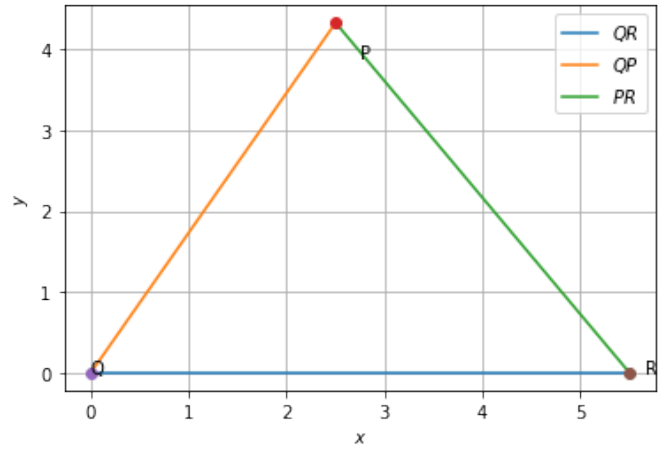


Fig. 2.1: $\triangle PQR$

1 QUESTION No.2.14

In $\triangle PQR$, $PQ = 3$, $\angle Q = 60^\circ$ and $QR = 5.5$ Sketch PQR

2 SOLUTION

The vertex **P** can be expressed in *polar coordinate form* as $P = c \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix}$, $Q = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$, $R = \begin{pmatrix} P \\ 0 \end{pmatrix}$

From $\triangle PQR$, we use the law of cosines:

$$b^2 = a^2 + c^2 - 2ac \quad (2.0.1)$$

$$c^2 - b^2 + a^2 - 2ac = 0 \quad (2.0.2)$$

$$(c + b)(c - b) + 8^2 - 2(8) \left(\frac{1}{\sqrt{2}} \right) c = 0 \quad (\because \text{angle } Q = 60^\circ) \quad (2.0.3)$$

$$\frac{7}{2}(c + b) + 64 - 8\sqrt{2}c = 0 \quad (\because QR = 5.5) \quad (2.0.4)$$

$$\Rightarrow (7 - 16\sqrt{2})c + 7b = -128 \quad (2.0.5)$$

And we have,

$$\Rightarrow QR = 5.5 \quad (2.0.6)$$

$$QR = \frac{7}{2} \quad (2.0.7)$$

which can be expressed as the matrix equation

$$\begin{pmatrix} 7 - 16\sqrt{2} & 7 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} c \\ b \end{pmatrix} = \begin{pmatrix} -128 \\ \frac{7}{2} \end{pmatrix} \quad (2.0.8)$$

therefore, $\begin{pmatrix} c \\ b \end{pmatrix} = \begin{pmatrix} 11.99 \\ 8.49 \end{pmatrix}$