

1-1.8-10

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Question:

If $\mathbf{Q}(0, 1)$ is equidistant from $\mathbf{P}(5, -3)$ and $\mathbf{R}(x, 6)$, find the values of x . Also find the distances QR and PR .

Solution:

point	Description
\mathbf{P}	$(5, -3)$
\mathbf{Q}	$(0, 1)$
\mathbf{R}	$(x, 6)$

TABLE 0: Variables Used

$$PQ = QR \quad (0.1)$$

$$\sqrt{(\mathbf{P} - \mathbf{Q})^\top (\mathbf{P} - \mathbf{Q})} = \sqrt{(\mathbf{Q} - \mathbf{R})^\top (\mathbf{Q} - \mathbf{R})} \quad (0.2)$$

$$\mathbf{P} - \mathbf{Q} = \begin{pmatrix} 5 \\ -4 \end{pmatrix} \quad (0.3)$$

$$\mathbf{Q} - \mathbf{R} = \begin{pmatrix} -x \\ -5 \end{pmatrix} \quad (0.4)$$

$$\sqrt{41} = \sqrt{x^2 + 25} \quad (0.5)$$

$$x = \pm 4 \quad (0.6)$$

$$QR = \sqrt{(\mathbf{Q} - \mathbf{R})^\top (\mathbf{Q} - \mathbf{R})} \quad (0.7)$$

$$QR = \sqrt{41} \quad (0.8)$$

$$PR = \sqrt{(\mathbf{P} - \mathbf{R})^\top (\mathbf{P} - \mathbf{R})} \quad (0.9)$$

if $x = 4$,

$$PR = \sqrt{82} \quad (0.10)$$

if $x = -4$,

$$PR = \sqrt{162} \quad (0.11)$$

Lines PQ and QR with Circle

