Assignment-2 1-1.5-28

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$\mathbf{P}(5,-3)$ and $\mathbf{Q}(3,y)$ are the points of trisection of the line segment joining $\mathbf{A}(7,-2)$ and $\mathbf{B}(1,-5)$. Theny equals

Solution: Given $\mathbf{P}(5,-3)$, $\mathbf{A}(7,-2)$, $\mathbf{B}(1,-5)$ and $\mathbf{Q}(3,y)$

Also given that $\mathbf{P}and\mathbf{Q}$ are the points of tricection of AB.

Let $\mathbf{Q}$ divides the line segment AB in the ratio $k:1$. That implies $\mathbf{P}$ divides line segment AB in the ratio $1:k$.

$$\mathbf{P} = \frac{k\mathbf{A}+\mathbf{B}}{k+1}$$

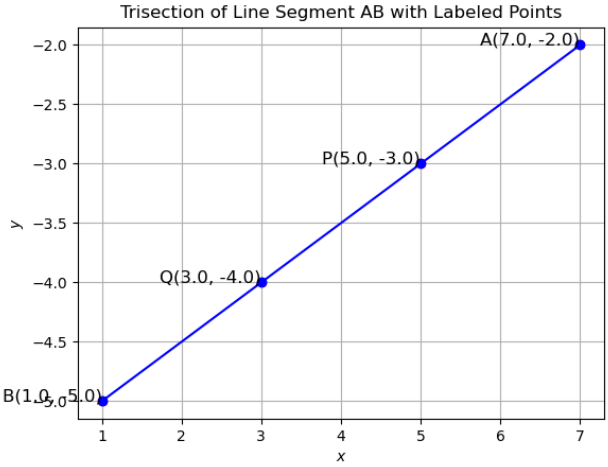
lets solve x coordinate

$$5 = \frac{7k+1}{k+1}$$
$$k = 2$$

Therefore $\mathbf{Q}$ divides AB in the ratio $2:1$

$$\begin{pmatrix}3\\y\end{pmatrix} = \frac{\mathbf{B}+\frac{1}{2}\mathbf{A}}{1+\frac{1}{2}+1}$$
$$y = \frac{(-5)+(-2)\frac{1}{2}}{\frac{3}{2}}$$
$$y = -4.$$

Point	Description
P(5,-3)	This point divides A(7,-2) and B(1,-5) in the ratio 1:2
Q(3,-4)	This point divides A(7,-2) and B(1,-5) in the ratio 2:1


Trisection of Line Segment AB with Labeled Points
A(7.0, -2.0)
P(5.0, -3.0)
Q(3.0, -4.0)
B(1.0, -5.0)
−2.0
−2.5
−3.0
−3.5
−4.0
−4.5
−5.0
y
1
2
3
4
5
6
7
x