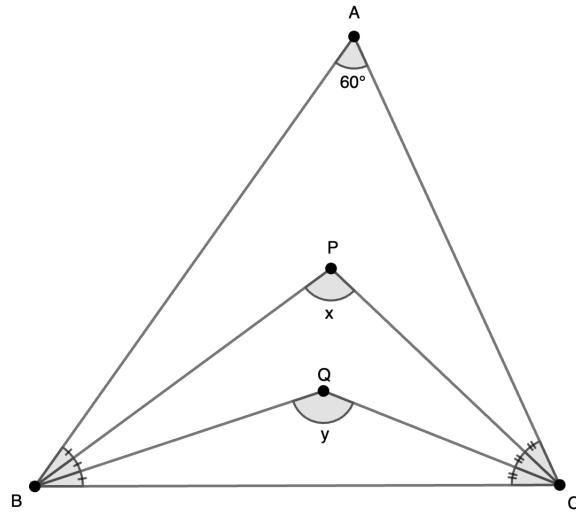


As shown in the figure below,  $\angle A = 60^\circ$ . Segments  $BP$ ,  $BQ$ ,  $CP$ , and  $CQ$  are trisectors of  $\angle B$  and  $\angle C$ . If  $\angle BPC = x^\circ$  and  $\angle BQC = y^\circ$ , find the values of  $x$  and  $y$ .<sup>1</sup>



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<sup>1</sup>Sundai Kofu High School, Yamanashi

## Solution

Answer :  $x = 100, y = 140$

Proof:  $\angle BPC = 60^\circ + \angle ABP + \angle ACP = 60^\circ + \frac{1}{3}(\angle ABC + \angle ACB) = 60^\circ + \frac{1}{3}(180^\circ - 60^\circ) = 100^\circ$ .

Therefore,  $\mathbf{x} = \angle \mathbf{BPC} = \mathbf{100}$ .

$\angle BQC = 60^\circ + \angle ABQ + \angle ACQ = 60^\circ + \frac{2}{3}(\angle ABC + \angle ACB) = 60^\circ + \frac{2}{3} \times 120^\circ = 140^\circ$ . Therefore,  
 $\mathbf{y} = \angle \mathbf{BQC} = \mathbf{140}$ .