Math Document Template

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***Abstract*—This is a document explaining for a question on the concept of triangles.**

Download all python codes from

svn co https://github.com/Ashuwin/Summer_2020/trunk/triangle/codes

and latex-tikz codes from

svn co https://github.com/Ashuwin/Summer_2020/trunk/triangle/figs

1 Problem

In $\triangle PQR$, $PR > PQ$ and PS bisects $\angle QPR$. Prove that $\angle PSR > \angle PSQ$

2 Construction

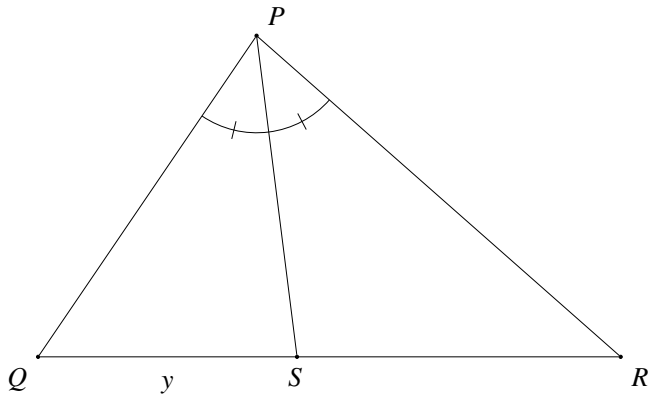

Fig. 2.0: Quadilateral by Latex-Tikz

2.1. The figure obtained looks like Fig. 2.0. $PR > PQ$, $\angle QPS = \angle SPR = x$

2.2. The design parameters used for construction are :

$$QR = p = 6$$

$$PR = q = 5$$

$$PQ = r = 4$$

2.3. Point S can be found by Triangle angle bisector theorem.

$$QS/PQ = SR/PR$$

$$y/4 = (6-y)/5$$

$$5y = 24 - 4y$$

$$9y = 24$$

$$y = 8/3$$

2.4. Draw fig. 2.4.

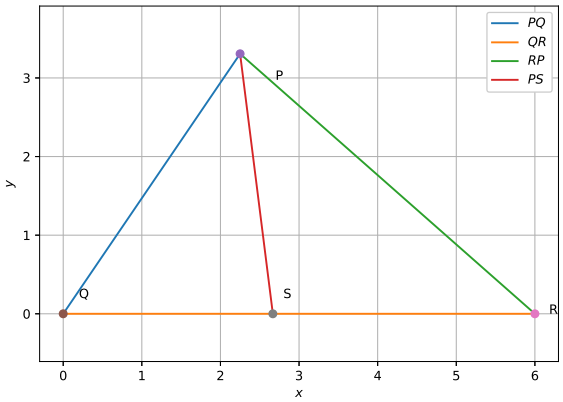

Fig. 2.4: Triangle generated using python

Solution: The following Python code generates Fig. 2.4

codes/tri.py

and the equivalent latex-tikz code generating Fig. 2.4 is

figs/triangle.tex

3 Solution

PS is the bisector of $\angle QPR$.
Therefore, $\angle QPS = \angle SPR = x$
In $\triangle PQS$,

$$\angle PSR = \angle PQR + \angle QPS$$

(Exterior angle is sum of interior opposite angles)
In $\triangle PSR$,

$$\angle PSQ = \angle PRQ + \angle SPR$$

(Exterior angle is sum of interior opposite angles)

Given

$$PR > PQ$$

Therefore, $\angle PQR > \angle PRQ$ (Angle opposite to the longer side is greater)

Adding x to both sides,

$$\angle PQR + x > \angle PRQ + x$$

$$\angle PSR > \angle PSQ$$

Hence proved.