

# Solution For The School Geometry Problems

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**Abstract**—This document includes different problems and solution on geometry from trigonometry and algebra. It also provides the information about the python and latex codes of figures.

Download all python codes from

svn co [https://github.com/yogi13995/yogesh\\_training/tree/master/Geometry/codes](https://github.com/yogi13995/yogesh_training/tree/master/Geometry/codes)

and latex-tikz codes from

svn co [https://github.com/yogi13995/yogesh\\_training/tree/master/Geometry/figures](https://github.com/yogi13995/yogesh_training/tree/master/Geometry/figures)

## 1 PROBLEM

**Ques.** Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of  $\Delta PQR$ . Show that:

- $\Delta ABM \cong \Delta PQN$
- $\Delta ABC \cong \Delta PQR$

## 2 CONSTRUCTION

- We have the values of all three sides of the triangle ABC and PQR so to construct a triangle we need all three coordinates of A, B and C.

Table 2.0.1: table for the output.

Input Table	
parameter	value
a	3
b	5
c	4

$$x = \frac{(a^2 + c^2 - b^2)}{2 * a} \quad (2.0.1)$$

$$y = \sqrt{c^2 - x^2} \quad (2.0.2)$$

coordinates of A  $\rightarrow$

$$x_A = x \quad (2.0.3)$$

$$y_A = y \quad (2.0.4)$$

coordinates of B  $\rightarrow$

$$x_B = 0 \quad (2.0.5)$$

$$y_B = 0 \quad (2.0.6)$$

coordinates of C  $\rightarrow$

$$x_C = a \quad (2.0.7)$$

$$y_C = 0 \quad (2.0.8)$$

coordinates of M  $\rightarrow$

$$x_M = \frac{a}{2} \quad (2.0.9)$$

$$y_M = 0 \quad (2.0.10)$$

Table 2.0.2: table for the output.

output Table	
parameter	value
M	1.5
N	1.5

- Let assume we have two triangles ABC and PQR  $\rightarrow$

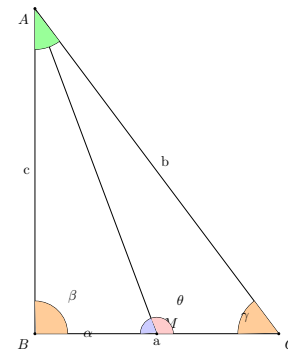
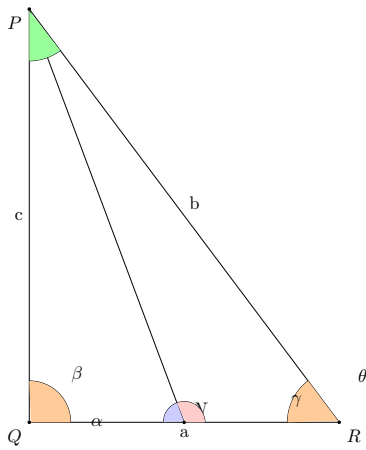
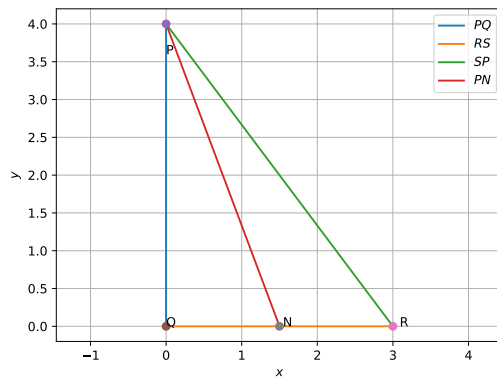


Figure 2.0.1:  $\Delta ABC$

./figures/congurentpicabc.pdf

Figure 2.0.2:  $\Delta PQR$ 

figures/congrentpicabc2.pdf

Figure 2.0.3:  $\Delta ABC$ 

./figures/Triangle.pdf

### 3 SOLUTION

**Ans.a** given that  $\rightarrow$

$$AB = PQ \quad (3.0.1)$$

$$AM = PN \quad (3.0.2)$$

$$BC = QR \quad (3.0.3)$$

from equation (3.0.3)...

$$\frac{BC}{2} = \frac{QR}{2} \quad (3.0.4)$$

$$BM = QN \quad (3.0.5)$$

from fig [3.0.1] and [3.0.2] ...

$$AB = PQ \quad (3.0.6)$$

$$AM = PN \quad (3.0.7)$$

$$BM = QN \quad (3.0.8)$$

$$\Rightarrow \Delta ABM \cong \Delta PQN \quad (3.0.9)$$

**Ans.b** given that  $\rightarrow$

$$AM = PN \quad (3.0.10)$$

from equation (3.0.3)...

$$\frac{BC}{2} = \frac{QR}{2} \quad (3.0.11)$$

$$MC = NR \quad (3.0.12)$$

from equation (3.0.9)...

$$\Delta ABM \cong \Delta PQN \quad (3.0.13)$$

$$\Rightarrow \angle AMB = \angle PNQ \quad (3.0.14)$$

$$180 - \angle AMB = 180 - \angle PNQ \quad (3.0.15)$$

$$\angle AMC = \angle PNR \quad (3.0.16)$$

from equation (3.0.10), (3.0.12) and (3.0.16)...

$$AM = PN \quad (3.0.17)$$

$$MC = NR \quad (3.0.18)$$

$$\angle AMC = \angle PNR \quad (3.0.19)$$

$$\Rightarrow \Delta AMC \cong \Delta PNR \quad (3.0.20)$$

$$\Rightarrow AC = PR \quad (3.0.21)$$

from equation (3.0.1), (3.0.3) and (3.0.21)...

$$AB = PQ \quad (3.0.22)$$

$$BC = QR \quad (3.0.23)$$

$$AC = QR \quad (3.0.24)$$

$$\Rightarrow \Delta ABC \cong \Delta PQR \quad (3.0.25)$$