Research Article
Volume 14:2, 2020
DOI: 10.37421/glta.2020.14.301

Journal of
Generalized Lie Theory and Applications

ISSN: 1736-4337
Open Access

The Intersect Point Theorem

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Abstract

In this paper titled 'The Intersect Point Theorem' I had performed many mathematical operations on a figure formed by three non-collinear points called a triangle. In this paper a concept, when two lines intersect at a common point on one of the segments of the triangle, then their cause is defined. I had tried to keep my work in the ordinary language of Geometry. All these principles keep me on researching various geometrical concepts throughout the year.

Keywords: Non-collinear points • Geometry • Operations

Abbreviations: C.S.C.T: Corresponding Side of Congruent Triangles • C.A.S.T: Corresponding Angles of Similar Triangles

Introduction

The theorem is based on basic geometrical concepts. I had performed many mathematical operations on a triangle which would further introduce the world new theorem which is proved logically in mathematical sciences.

Statement of the Theorem

In a triangle, when two lines intersect at a point and touch the one segment of the triangle, then that segment is twice the length of one of the intersecting lines.

Theorem

In a triangle, when two lines intersect at a point and touch the one segment of the triangle, then that segment is twice the length of one of the intersecting lines.

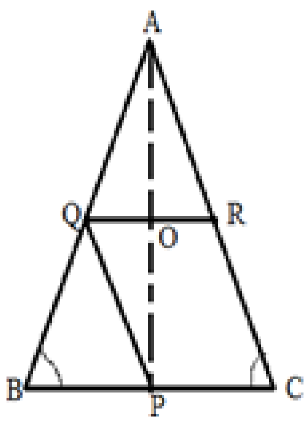

Figure 1. △ABC.

Construction

Draw segment AP || BC (i.e B-P-C).

I assumed in Figure 1, triangle ABC, angle ABC=angle ACB.

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Received 05 May, 2020; **Accepted** 18 May, 2020; **Published** 23 July, 2020

Segment QR // segment BC, segment QP // segment Ac (by mid-point statement) [1-3]

And segment QR is a bisector of angle AQP (i.e angle AQP=angle PQO).

Likewise, segment QP is a bisector of angle BPA (i.e angle QPB=angle QPO).

To prove: segment AB=½ QP.

Proof: If segment PO || QR and segment AO || QR then, Angle AOQ ≅ angle POQ=90 [4] (1)

Angle AQO ≅ angle PQO ------------ (given) (2)

Now in triangle AQO and triangle PQO, Angle AOQ ≅ Angle POQ (from 1)

Angle AQO ≅ Angle PQO (from 2)

Triangle AQO~Triangle PQO (AA Test) [5]

Angle QAO ≅ Angle QPO------- (c.a.s.t) (3)

Now in triangle AQO and triangle PQO, Angle QAO ≅ Angle QPO (from 3)

Angle QAO ≅ Angle QOP (each 90°)

Segment QO ≅ Segment OQ (common side)

Triangle AQO ≅ Triangle PQO (AAS Test) [6]

Segment AQ ≅ Segment QP --------- (c.s.c.t) (4)

Now angle ABC ≅ angle ACB ----- (Given) (5)

Segment QP // segment AC and BC is a transversal, Angle QPB ≅ Angle BCR (corresponding angles) [7]

i.e angle QPB=angle ACB (6)

i.e Angle QPB=Angle ABC (from 5)

Segment QP ≅ Segment BQ ---- (converse of isosceles triangle theorem) [8] (7)

Now,

Segment AQ ≅ Segment QP (from 4) (8)

And segment BQ ≅ segment QP (from 7)

Now, if AQ+BQ=AB

QP+QP=AB (from 8)

2QP=AB
i.e QP=1/2 AB

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Results

Firstly-in a triangle, when two lines intersect at a point and touch the one segment of the triangle, then that segment is twice the length of one of the intersecting lines. This Statement is proved above by giving the notions of Euclidean Geometry. Secondly, we may find the length of QP=½ AB by certain Measurements mentioned in Figure 1.

Conclusion

By these theorems, the world may introduce to the new way of finding the length of the side of a triangle, the segment joining the two mid-points of a triangle and we might get a complete solution by proving the theorem mentioned in methodology.

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How to cite this article: Dalal, Soham Mohan. "The Intersect Point Theorem." J Generalized Lie Theory Appl 14 (2020): 301. doi: 10.37421/GLTA.2020.14.301