

Class Drill for Section 9.6

Theorem 110 The Euclidean Geometry Triangle Midsegment Theorem

In Euclidean Geometry, if the endpoints of a line segment are the midpoints of two sides of a triangle, then the line segment is parallel to the third side and is half as long as the third side. That is, a midsegment of a triangle is parallel to the third side and half as long.

Proof

(1) In Euclidean Geometry, suppose that the endpoints of a line segment are the midpoints of two sides of a triangle. Label the triangle $\triangle ABC$ so that the line segment is \overline{DE} , with endpoints D and E being the midpoints of sides \overline{AB} and \overline{AC} . **(Make a drawing.)**

(2) There exists a point F such that $D * E * F$ and $\overline{EF} \cong \overline{ED}$. **(Justify.) (Make a new drawing.)**

(3) $\triangle CEF \cong \triangle AED$. **(Justify.) (Make a new drawing.)**

(4) $\angle FCE \cong \angle DAE$ and $\overline{CF} \cong \overline{AD}$. **(Justify.) (Make a new drawing.)**

(5) $\overline{CF} \cong \overline{BD}$. **(Justify.) (Make a new drawing.)**

(6) Line \overleftrightarrow{CF} is parallel to line \overleftrightarrow{AD} . **(Justify.) (Make a new drawing.)**

(7) Quadrilateral $\square BCFD$ is a parallelogram. **(Justify.)**

(8) Segment $\overline{DF} \cong \overline{BC}$ and line \overleftrightarrow{DF} is parallel to line \overleftrightarrow{BC} . **(Justify.) (Make a new drawing.)**

(9) Midsegment \overline{DE} is parallel to side \overline{BC} . **(Justify.) (Make a new drawing.)**

(10) $DE = \frac{1}{2}DF$. **(Justify.)**

(11) $DE = \frac{1}{2}BC$. **(Justify.)**

End of proof