

Special Theorems Involving Parallel Lines

Theorem: If 2 lines are parallel, then all points on one line are equidistant from the points on the other line.

given: $l \parallel m, \overline{AC} \perp m; \overline{BD} \perp m$

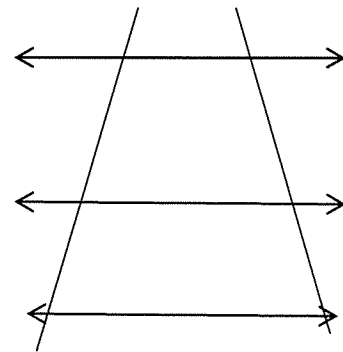
Prove: $AC = BD$



Theorem: If 3 parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

Given: $\overline{AX} \parallel \overline{BY} \parallel \overline{CZ}$
 $\overline{AB} \cong \overline{BC}$

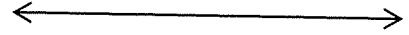
Prove: $\overline{XY} \cong \overline{YZ}$



Theorem: A line that contains the midpoint of one side of a triangle and is parallel to another side passes through the midpoint of the third side.

Given: M is the midpoint of \overline{AB}
 $\overleftrightarrow{MN} \parallel \overline{BC}$

Prove: N is the midpoint of \overleftrightarrow{AC}



Theorem: The segment that joins the midpoints of two sides of a triangle
(1) is parallel to the third side;
(2) is half as long as the third side.

Given: M is the midpoint of \overline{AB}
 $\overleftrightarrow{MN} \parallel \overline{BC}$

Prove: N is the midpoint of \overleftrightarrow{AC}

Explore: P, Q, and R are midpoints of the sides of $\triangle DEF$.

a. What kind of figure is DPQR?

Explore: W, X, Y, and Z are the midpoints of quad ABCD.

What kind of figure is the smaller quadrilateral formed by joining WXYZ?

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Given: A is the midpoint of \overline{OX} ;

$$\overline{AB} \parallel \overline{XY}; \overline{BC} \parallel \overline{YZ}$$

Prove: $\overline{AC} \parallel \overline{XZ}$