

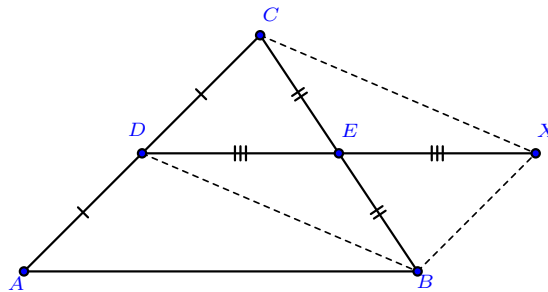
Midsegment Theorem

Proofs updated.

Theorem 1. *Midsegment Theorem: The segment joining the midpoints of two sides of a triangle is parallel to and half the length of the third side.*

Note: In preparation for the midsegment theorem, the class proved several useful theorems about parallelograms.

Problem 1 To prove the midsegment theorem for $\triangle ABC$ with midpoints D and E of sides AC and BC , respectively, Mitch extended \overline{DE} to a point X such that $EX = DE$, as shown in the marked figure. Then he added dotted lines to the figure to show parallelograms.



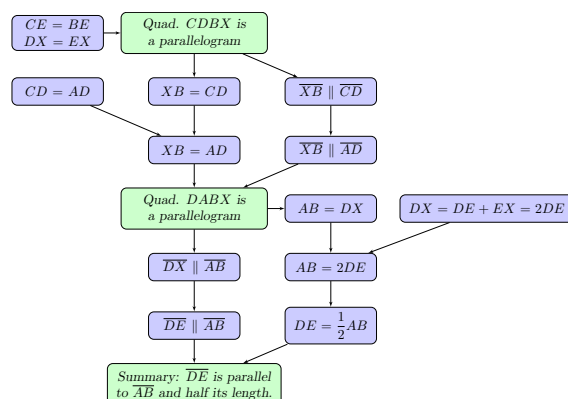
Mitch organized his reasoning in the following flow chart:

Fix note: The flowchart omits reasons to reduce clutter. The most significant steps are green whereas the details are blue.

Learning outcomes:

Author(s): Brad Findell

Midsegment Theorem



In the proof above, which theorem may Mitch use to conclude that quadrilateral $CDBX$ a parallelogram?

Multiple Choice:

- (a) If a pair of sides of a quadrilateral are congruent and parallel, then it is a parallelogram.
- (b) If the diagonals of a quadrilateral bisect each other, then it is a parallelogram. ✓
- (c) If opposite sides of a quadrilateral are congruent, then it is a parallelogram.
- (d) If opposite angles of a quadrilateral are congruent, then it is a parallelogram.
- (e) The Pythagorean Theorem.
- (f) None of these.

In the proof above, which theorem may Mitch use to conclude that quadrilateral $DABX$ a parallelogram?

Multiple Choice:

- (a) If one pair of sides of a quadrilateral are congruent and parallel, then the quadrilateral is a parallelogram. ✓
- (b) If the diagonals of a quadrilateral bisect each other, then it is a parallelogram.
- (c) If opposite sides of a quadrilateral are congruent, then it is a parallelogram.
- (d) If opposite angles of a quadrilateral are congruent, then it is a parallelogram.

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- (e) *The Pythagorean Theorem.*
- (f) *None of these.*

