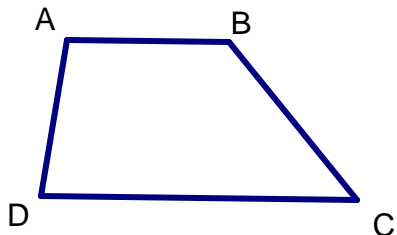


4.4 The Trapezoid

Definition A **trapezoid** is a quadrilateral with exactly one pair of parallel sides.



Bases: _____

Legs: _____

Base angles: _____

Median: _____

Altitude: _____

- Questions:
1. Can you find any relationships between the angles of the trapezoid?
 2. Can a trapezoid have all of its angles acute angles? Why or why not?

Definition An **isosceles trapezoid** is a trapezoid with the nonparallel sides (legs) congruent.

Properties of isosceles trapezoids

Theorem 1 (4.4 – T 4.4.1) The base angles of an isosceles trapezoid are congruent.



Corollary 1

(4.4 – C 4.4.2)

The diagonals of an isosceles trapezoid are congruent.

**Theorem**

(4.4 – T 4.4.8)

If three (or more) parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

(if 3 \parallel lines cut \cong segm 1 trans, then \cong segm every trans)



Write a formal proof .

Recall : The segment that joins the midpoints of two sides of a triangle is _____ to the third side and has a length equal to _____

Theorem 2 (4.4 – T 4.4.3) The length of the median of a trapezoid equals one-half the sum of the lengths of the two bases.



Write a formal proof .

Theorem 3 (4.4 – T 4.4.4) The median of a trapezoid is parallel to each base.

When is a quadrilateral a trapezoid?

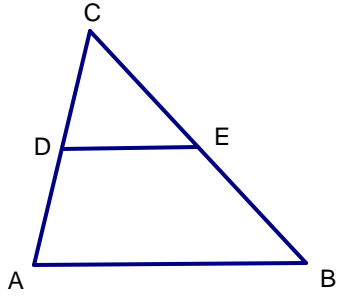
Theorem 1 (4.4 – T 4.4.5) If two of three consecutive angles of a quadrilateral are supplementary, the quadrilateral is a trapezoid.

When is a trapezoid isosceles?

Theorem 1 (4.4 – T 4.4.6) If two base angles of a trapezoid are congruent, the trapezoid is an isosceles trapezoid.

Theorem 2 (4.4 – T 4.4.7) If the diagonals of a trapezoid are congruent, the trapezoid is an isosceles trapezoid.

Problem #1 Use the figure to answer the questions.



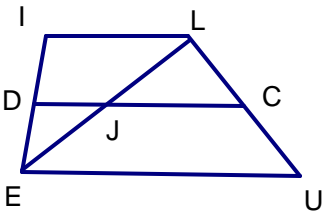
Given: D, E midpoints

a) What is DEBA?

b) If $DE = 7$ in, find AB.

c) If AB is 23 cm, find DE.

Problem #2 Use the figure to answer the questions.



Given: trap EULI (\overline{EU} , \overline{IL} bases)

D, C midpoints, J midpoint \overline{EL}

$\overline{DC} \parallel \overline{EU}$

a) If $IL = 43$ cm, find DJ.

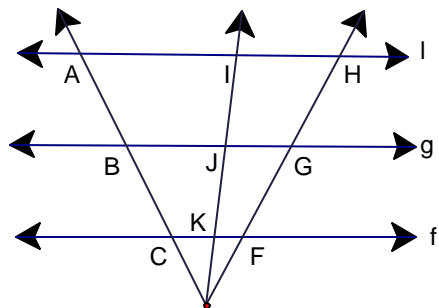
b) If $EU = 17$ in, find JC.

c) If $JC = 12.5$ cm, find EU.

e) If $DJ = 6.3$ cm, find IL.

f) If $EU = 21$ in and $IL = 16$ in, find DC.

Problem #3 Use the figure to answer the questions.



Given: $l \parallel g \parallel f$
 $\overline{IJ} \cong \overline{JK}$

a) If $AB = 14$ cm, find AC .

b) If $FG = 3$ in, find FH .

c) If $AC = 36$ cm, find BC .

d) If $GH = 22$ in, find HF .

e) If $BC = 4$ in and $GF = 6$ in, find $AC + HF$.

Problem #4
 (4.4 - #18)

Given: $RSTV$ trapezoid

$$\overline{RV} \parallel \overline{ST}$$

$$m\angle SRV = 90^\circ$$

M, N midpoints

$$ST = 13 \text{ in}, RV = 17 \text{ in}, RS = 16 \text{ in}$$

Find: RN .

