4.4 The Trapezoid

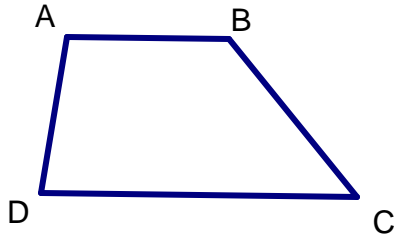**Definition**   A **trapezoid** is a quadrilateral with exactly one pair of parallel sides.

A   B

D   C

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 4.20)

The base angles of an isosceles trapezoid are congruent.

Corollary 1
(4.4 – t 4.21)

The diagonals of an isosceles trapezoid are congruent.

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 4.22)

The median of a trapezoid is parallel to each base.

Theorem 3
(4.4 – T 4.22)

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
(4.4 – T 4.23)

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

(if 3 || lines cut ≅ segm 1 trans, then ≅ segm every trans)

Write a formal proof .

When is a quadrilateral a trapezoid?

Theorem 1   If two of three consecutive angles of a quadrilateral are supplementary, the quadrilateral is a trapezoid.
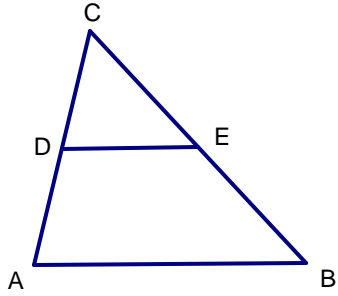
When is a trapezoid isosceles?

Theorem 1   If two base angles of a trapezoid are congruent, the trapezoid is an isosceles trapezoid.

Theore m 2   If the diagonals of a trapezoid are congruent, the trapezoid is an isosceles trapezoid.

Problem #1   Use the figure to answer the questions.
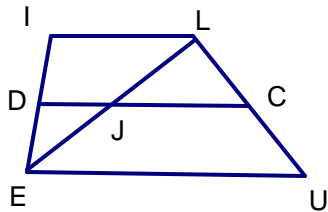

Given: D, E midpoints

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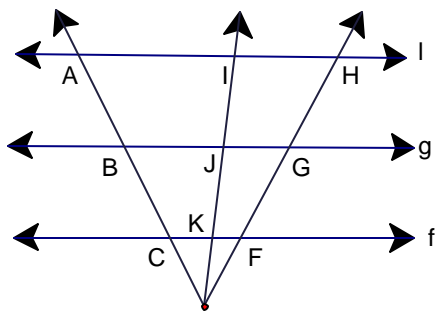 $\overline{DC} \parallel \overline{EU}$

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   Let WXYZ a trapezoid with bases $WX = 5x+3$ and $ZY = 13x-1$. If the median $AB = 6x+7$,
(4.4 - #32)   find x.