

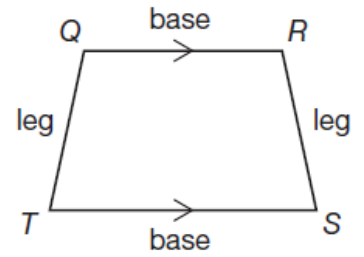
## Geometry Lesson 69

Objective: TSW learn properties of trapezoids and kites.

The bases of a trapezoid are its two parallel sides. A base angle of a trapezoid is one of a pair of consecutive angles whose common side is a base of the trapezoid. Trapezoids have two pairs of base angles. The legs of a trapezoid are the two nonparallel sides.

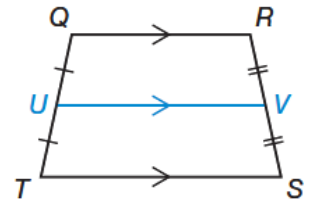
Figure  $QRST$  is a trapezoid.

$\overline{QR}$  and  $\overline{TS}$  are \_\_\_\_\_,  
 $\angle Q$  and  $\angle R$  are \_\_\_\_\_ angles,  
 $\angle T$  and  $\angle S$  are \_\_\_\_\_ angles,  
 And  $\overline{QT}$  and  $\overline{RS}$  are \_\_\_\_\_ of the trapezoid.



The \_\_\_\_\_ of a trapezoid - The segment whose endpoints are the midpoints of the legs of the trapezoid.

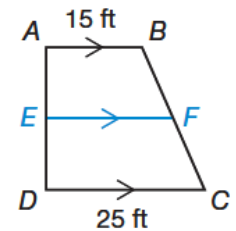
Theorem 69–1: Trapezoid Midsegment Theorem - The midsegment of a trapezoid is parallel to both bases and has a length that is equal to half the sum of the bases. Therefore, if  $\overline{UV}$  is the midsegment of trapezoid  $QRST$ , then  $\overline{UV} \parallel \overline{QR}$ ,  $\overline{UV} \parallel \overline{TS}$ , and  $UV = \frac{1}{2}(QR + TS)$ .



Example 1 Applying Properties of the Midsegment of a Trapezoid

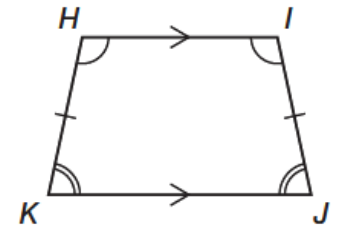
The midsegment of trapezoid  $ABCD$  is  $\overline{EF}$ . Find the length of  $\overline{EF}$ .

SOLUTION



An isosceles trapezoid is a trapezoid with congruent legs. Like isosceles triangles, isosceles trapezoids have congruent base angles.

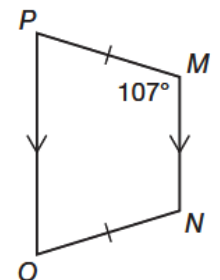
Properties of Isosceles Trapezoids - Base angles of an isosceles trapezoid are congruent. If trapezoid  $HIJK$  is isosceles, then  $\angle H \cong \angle I$  and  $\angle J \cong \angle K$ .



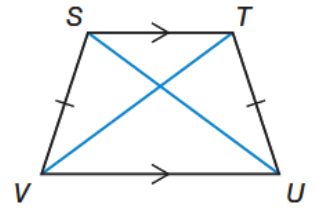
Example 2 Applying Properties of the Base Angles of an Isosceles Trapezoid

Find the measures of  $\angle N$ ,  $\angle O$ , and  $\angle P$  in isosceles trapezoid  $MNOP$ .

SOLUTION



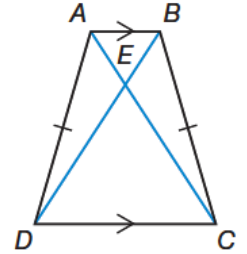
Properties of Isosceles Trapezoids - The diagonals of an isosceles trapezoid are congruent. In isosceles trapezoid  $STUV$ ,  $\overline{SU} \cong \overline{TV}$ .



Example 3 Applying Properties of the Diagonals of an Isosceles Trapezoid

$ABCD$  is an isosceles trapezoid. Find the length of  $\overline{CE}$  if  $AC = 22.3$  centimeters and  $AE = 8.9$  centimeters.

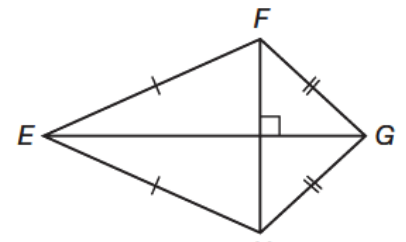
SOLUTION



Recall that kites are quadrilaterals with exactly two pairs of congruent adjacent sides.

Properties of Kites - The diagonals of a kite are perpendicular.

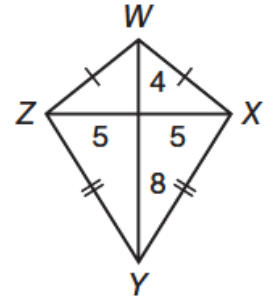
$$\overline{EG} \perp \overline{FH}$$



Example 4 Applying Properties of the Diagonals of a Kite

Find the lengths of the sides of kite  $WXYZ$ . Round to the nearest tenth.

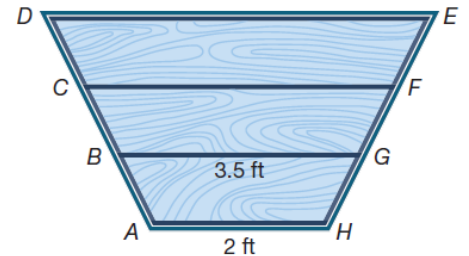
SOLUTION



Example 5 Application: Woodworking

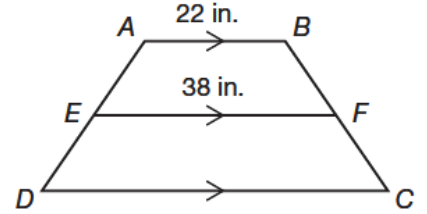
A carpenter is making an end table with a trapezoid-shaped top. There will be three glass panels on the top of the table, as shown in the diagram. In the trapezoid  $BDEG$ ,  $\overline{CF}$  is a midsegment. In the trapezoid  $ACFH$ ,  $\overline{BG}$  is a midsegment. What are the lengths of  $\overline{CF}$  and  $\overline{DE}$ ?

SOLUTION

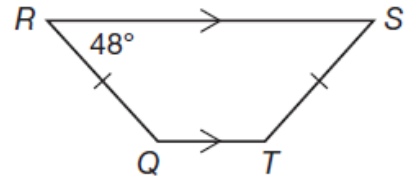


You Try!!!!

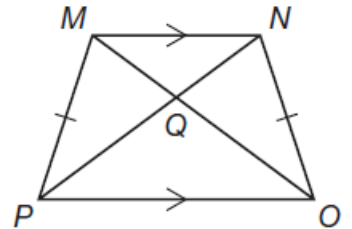
a. In the diagram,  $\overline{EF}$  is the midsegment of trapezoid  $ABCD$ . Find the length of  $\overline{CD}$ .



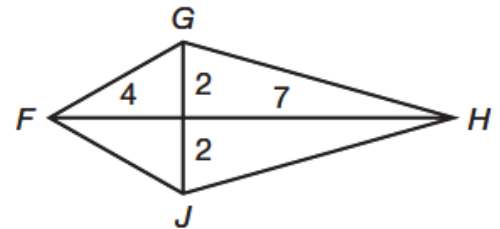
b. Find the measures of  $\angle Q$ ,  $\angle S$ , and  $\angle T$  in trapezoid  $QRST$ .



c. In isosceles trapezoid  $MNOP$ , find the length of  $\overline{MQ}$  if  $NP = 17.5$  yards and  $PQ = 9.6$  yards.



d. Find the lengths of the sides of kite  $FGHJ$ . Round the lengths to the nearest tenth.



e. The side of a building is shaped like a trapezoid. The base of a row of windows runs along the midsegment of this trapezoid. What is the length of the building's roof?

