Bellwork
01/31/2012

Name each type of quadrilateral-parallelogram, rectangle, rhombus, and square-for which the statement is true.

1. Both pairs of opposite angles are congruent.

▱, rectangle,
rhombus, square

2. The quadrilateral is equilateral.

Rhombus,
Square

Geometry
8.5 Use Properties of Trapezoids and Kites
Standard(s): 3, 4

Vocabulary:

Trapezoid: A quadrilateral with exactly one pair of parallel sides.

Bases: The parallel sides of the trapezoid.

Legs: The nonparallel sides of a trapezoid.

Isosceles Trapezoid: A trapezoid with congruent legs.

Midsegment of a Trapezoid: A segment that connects the midpoint of its legs.

Kite: A quadrilateral that has 2 pairs of consecutive congruent sides, but opposite sides are not congruent.

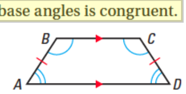
THEOREMS *For Your Notebook*

THEOREM 8.14

If a trapezoid is isosceles, then each pair of base angles is congruent.

If trapezoid $ABCD$ is isosceles, then $\angle A \cong \angle D$ and $\angle B \cong \angle C$.

Proof: Ex. 37, p. 548

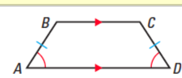


THEOREM 8.15

If a trapezoid has a pair of congruent base angles, then it is an isosceles trapezoid.

If $\angle A \cong \angle D$ (or if $\angle B \cong \angle C$), then trapezoid $ABCD$ is isosceles.

Proof: Ex. 38, p. 548

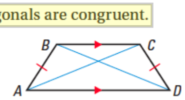


THEOREM 8.16

A trapezoid is isosceles if and only if its diagonals are congruent.

Trapezoid $ABCD$ is isosceles if and only if $\overline{AC} \cong \overline{BD}$.

Proof: Exs. 39 and 43, p. 549



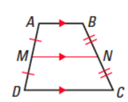
THEOREM *For Your Notebook*

THEOREM 8.17 Midsegment Theorem for Trapezoids

The midsegment of a trapezoid is parallel to each base and its length is one half the sum of the lengths of the bases.

If $\overline{MN}$ is the midsegment of trapezoid $ABCD$, then $\overline{MN} \parallel \overline{AB}$, $\overline{MN} \parallel \overline{DC}$, and $MN = \frac{1}{2}(AB + CD)$.

Justification: Ex. 40, p. 549
Proof: p. 937



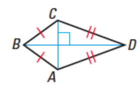
THEOREMS *For Your Notebook*

THEOREM 8.18

If a quadrilateral is a kite, then its diagonals are perpendicular.

If quadrilateral $ABCD$ is a kite, then $\overline{AC} \perp \overline{BD}$.

Proof: Ex. 41, p. 549

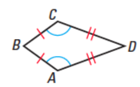


THEOREM 8.19

If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.

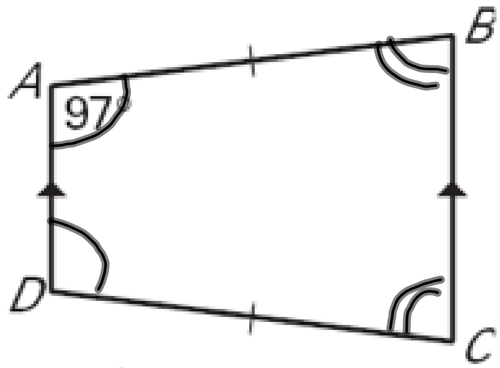
If quadrilateral $ABCD$ is a kite and $\overline{BC} \cong \overline{BA}$, then $\angle A \cong \angle C$ and $\angle B \not\cong \angle D$.

Proof: Ex. 42, p. 549



Use Properties of Isosceles Trap.

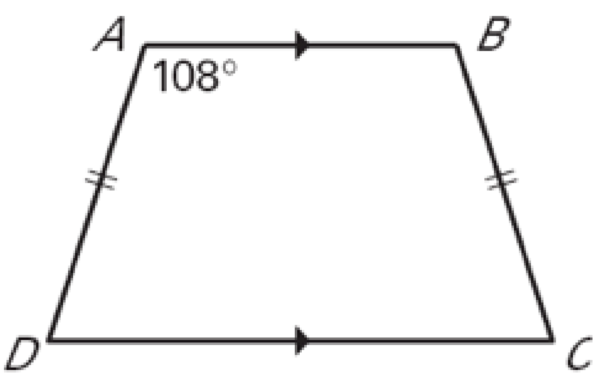
Find the $m\angle B$, $m\angle C$, and $m\angle D$.



180 - 97

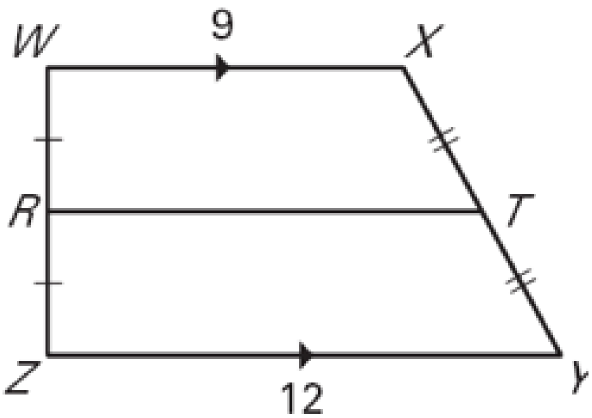
$m\angle D = 97°$
$m\angle B = 83°$
$m\angle C = 83°$

$m\angle B = 108°$
$m\angle D = 72°$
$m\angle C = 72°$



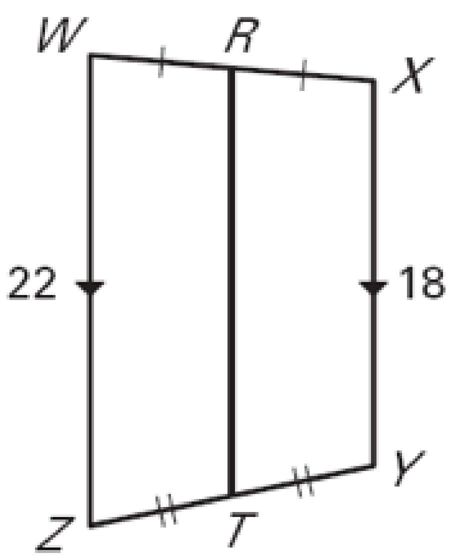
Use the Midsegment of a Trap.

Find the length of midsegment $\overline{RT}$.



$RT = \frac{1}{2}(9+12)$

$RT = \frac{21}{2}$ or 10.5

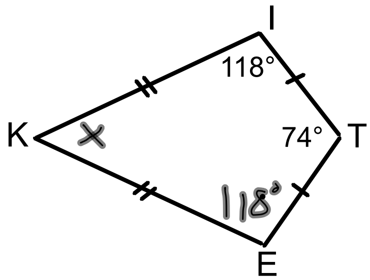


$RT = \frac{1}{2}(22+18)$

$RT = 20$

Apply the Kite Theorems

Find the $m\angle K$ in the kite shown.



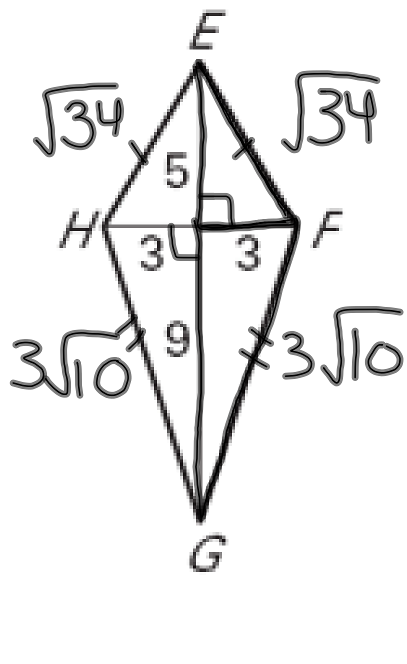
$x+2(118)+74=360$

$x+310=360$

$x=50°$

$\boxed{m\angle K=50°}$

Use Theorem 8.18 and the Pythagorean Theorem to find the side lengths of the kite. Write the lengths in simplest radical form.



1) $EF^2=5^2+3^2$

$EF^2=25+9$

$EF^2=34$

$EF=\sqrt{34}$

2) $FG^2=9^2+3^2$

$FG^2=81+9$

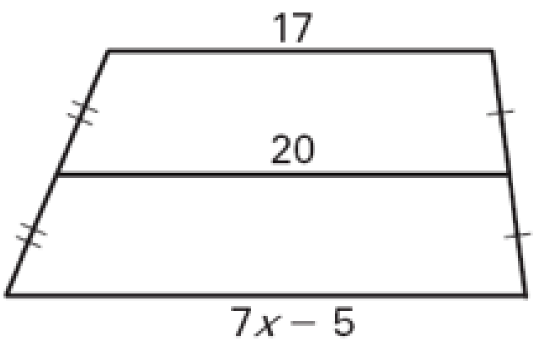
$FG^2=90$

$FG=\sqrt{90}$

$FG=3\sqrt{10}$

Use Algebra and Properties of Trap.

Find the value of x.

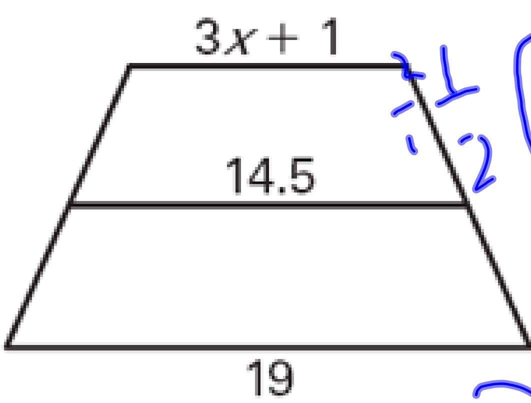


$2 \cdot \frac{1}{2}(17 + 7x - 5) = 20 \cdot 2$

$12 + 7x = 40$

$7x = 28$

$\boxed{x = 4}$



$2 \cdot \frac{1}{2}(3x + 1 + 19) = 14.5 \cdot 2$

$3x + 20 = 29$

$-20 \quad -20$

$\frac{3x}{3} = \frac{9}{3}$

$x = 3$

Homework Assignment

Worksheet 8.5B