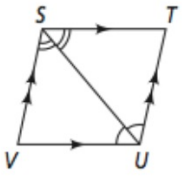
Do Now:

Please answer the following questions...

Multiple Choice

For Exercises 1–4, choose the correct letter.

1. Which is the most precise name of this figure?



(A) parallelogram (C) rectangle

(B) rhombus (D) square

2. Which of the following conditions or set of conditions must be met for a parallelogram to be a rectangle?

(F) Diagonals are perpendicular.

(G) Diagonals are congruent.

(H) All sides are congruent.

(I) The length of a diagonal is equal to the length of a side.

3. Which of the following conditions or set of conditions is sufficient for a parallelogram to be a square?

(A) Diagonals are perpendicular and diagonals are congruent.

(B) Diagonals are congruent.

(C) All sides are congruent.

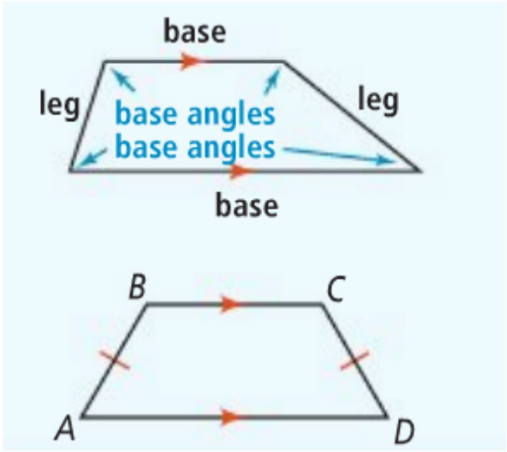
(D) The length of a diagonal is equal to the length of a side.

I can...

- verify and use properties of trapezoids and kites.

6-6 Trapezoids and Kites

- trapezoid - quadrilateral with exactly one pair of parallel sides
- base - the parallel sides of a trapezoid
- legs- nonparallel sides
- base angles - two angles that share a base of a trapezoid.
- isosceles trapezoid - trapezoid with legs that are congruent.

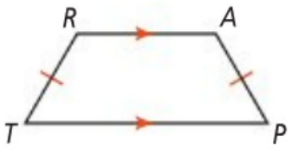


take note

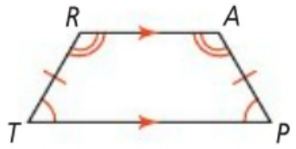
Theorem 6-19

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

If . . .
$TRAP$ is an isosceles trapezoid with bases $\overline{RA}$ and $\overline{TP}$



Then . . .
$\angle T \cong \angle P$, $\angle R \cong \angle A$

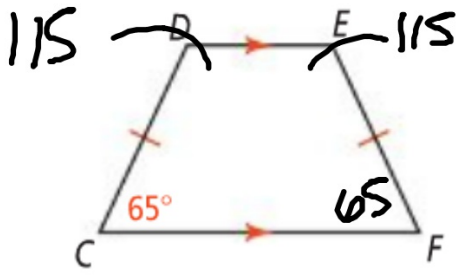


You will prove Theorem 6-19 in Exercise 45.

** Angle R and Angle T are also supplementary!

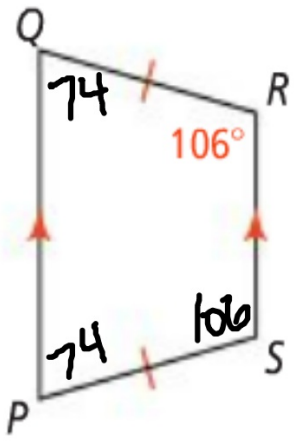
Problem 1 Finding Angle Measures in Trapezoids

CDEF is an isosceles trapezoid and $m\angle C = 65$. What are $m\angle D$, $m\angle E$, and $m\angle F$?



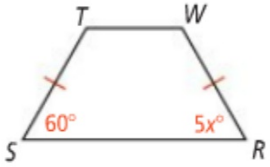
Got It? **1. a.** In the diagram, $PQRS$ is an isosceles trapezoid and $m\angle R = 106$. What are $m\angle P$, $m\angle Q$, and $m\angle S$?

b. Reasoning In Problem 1, if $CDEF$ were not an isosceles trapezoid, would $\angle C$ and $\angle D$ still be supplementary? Explain.



Algebra Find the value of the variable in each isosceles trapezoid.

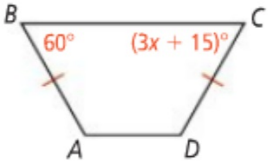
28.



$60 = 5x$

$x = 12$

29.

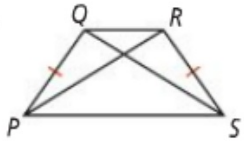


$60 = 3x + 15$

$45 = 3x$

$x = 15$

30.



$QS = x + 5$
$RP = 3x + 3$

$x + 5 = 3x + 3$

$-3x \quad -3x$

$-2x + 5 = 3$

$-2x = -2$

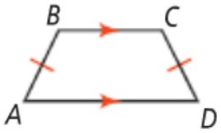
$x = 1$

take note

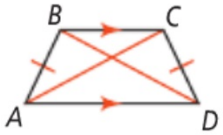
Theorem 6-20

Theorem
If a quadrilateral is an isosceles trapezoid, then its diagonals are congruent.

If . . .
$ABCD$ is an isosceles trapezoid



Then . . .
$\overline{AC} \cong \overline{BD}$



You will prove Theorem 6-20 in Exercise 54.

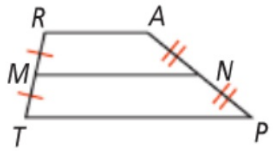
- Midsegment - segment that joins the midpoints of its legs
  It has the following two properties....

take note

Theorem 6-21 Trapezoid Midsegment Theorem

Theorem
If a quadrilateral is a trapezoid, then
(1) the midsegment is parallel to the bases, and
(2) the length of the midsegment is half the sum of the lengths of the bases.

If . . .
TRAP is a trapezoid with midsegment $\overline{MN}$



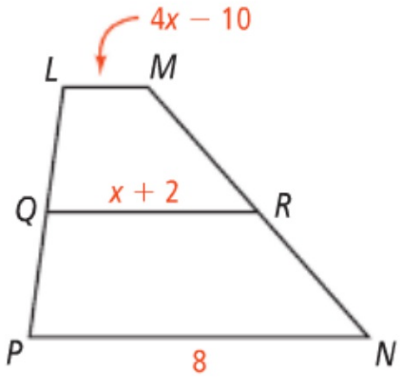
Then . . .
(1) $\overline{MN} \parallel \overline{TP}$, $\overline{MN} \parallel \overline{RA}$, and
(2) $MN = \frac{1}{2}\left(TP + RA\right)$

You will prove Theorem 6-21 in Lesson 6-9.

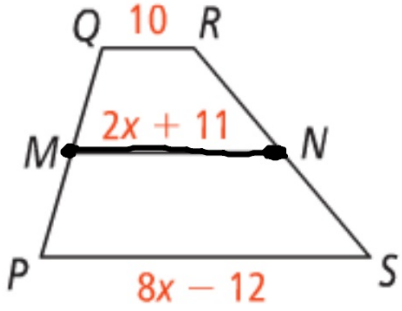
Problem 3 Using the Midsegment of a Trapezoid

Algebra $\overline{QR}$ is the midsegment of trapezoid $LMNP$. What is x?

$$x+2=\frac{1}{2}(4x-10+8)$$
$$x+2=\frac{1}{2}(4x-2)$$
$$x+2=2x-1$$
$$-x \quad -x$$
$$2=x-1$$
$$+1 \quad +1$$
$$x=3$$



Got It? 3. a. **Algebra** $\overline{MN}$ is the midsegment of trapezoid $PQRS$. What is x? What is MN?



$$2x+11=\frac{1}{2}(10+8x-12)$$

$$2x+11=\frac{1}{2}(-2+8x)$$

$$2x+11=-1+4x$$

$$-2x \qquad\qquad -2x$$

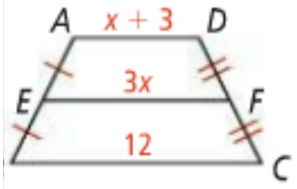
$$11=-1+2x$$

$$12=2x$$

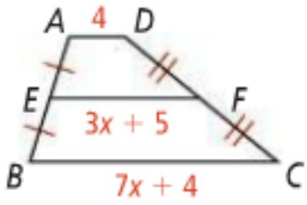
$$x=6$$

EF in each trapezoid.

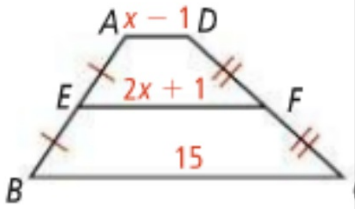
See Pro



14.



15.



$2\left(3x = \frac{1}{2}(x+3+12)\right)$

$2 \cdot 3x = \frac{1}{2}(x+15) \cdot 2$

$6x = x+15$

$5x = 15$

$x = 3$

$3x+5 = \frac{1}{2}(4+7x+4)$

$2\left(3x+5 = \frac{1}{2}(8+7x)\right)$

$6x+10 = 8+7x$

$-x+10 = 8$

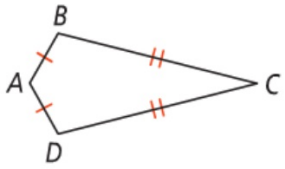
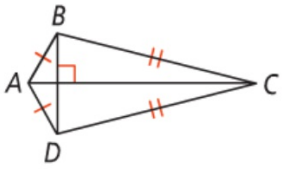
$-x = -2$

$x = 2$

- kite - a quadrilateral with two pairs of consecutive sides congruent and no opposite sides congruent.

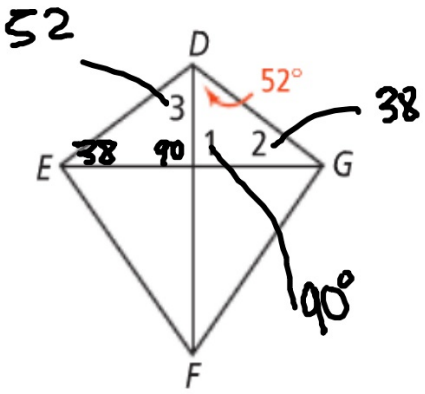
take note

Theorem 6-22

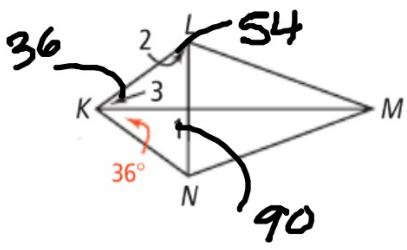
Theorem	If . . .	Then . . .
If a quadrilateral is a kite, then its diagonals are perpendicular.	$ABCD$ is a kite 	$\overline{AC} \perp \overline{BD}$ 

Problem 4 Finding Angle Measures in Kites

Quadrilateral $DEFG$ is a kite. What are $m\angle 1$, $m\angle 2$, and $m\angle 3$?



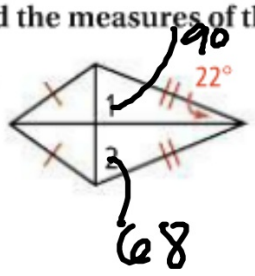
Got It? **4.** Quadrilateral $KLMN$ is a kite. What are $m\angle 1$, $m\angle 2$, and $m\angle 3$?



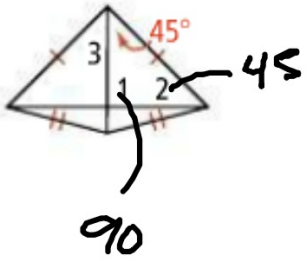
Find the measures of the numbered angles in each kite.

See Proble

16.



17.



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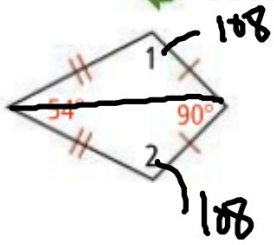

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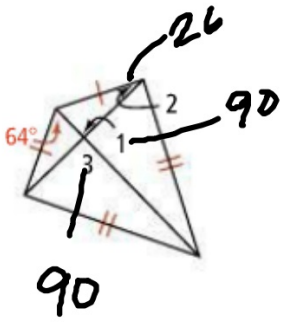

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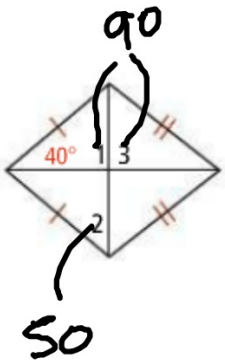
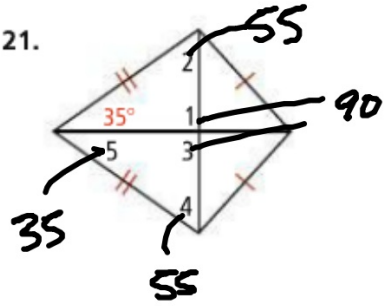
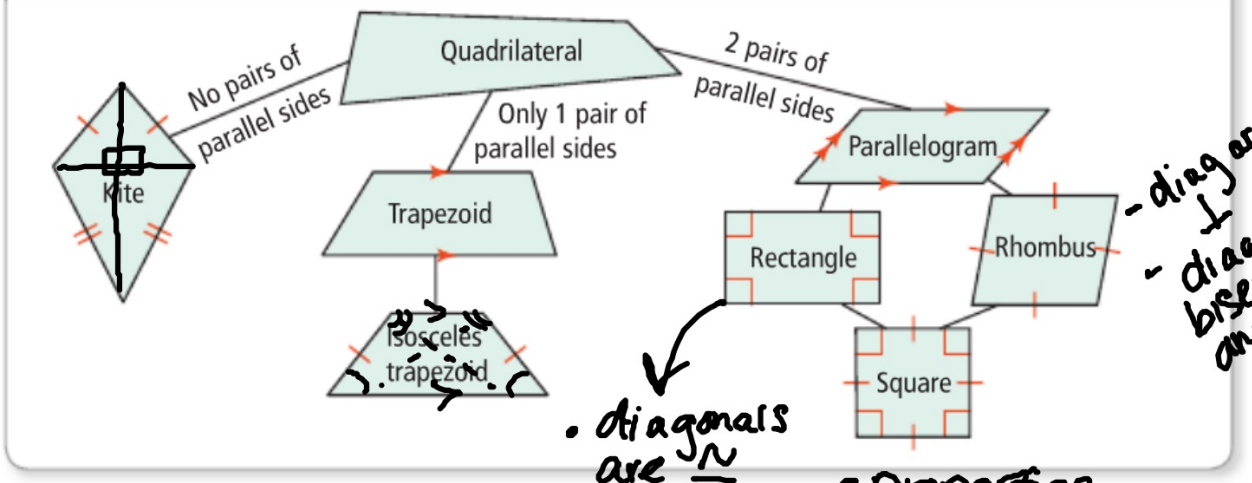


21.



take note

Concept Summary Relationships Among Quadrilaterals



- diag are ⊥
- diagonal bisect angles

• diagonals are ≅

• properties of rectangle & rhombus

Homework:

WB 6-6 #1-17, 20-30