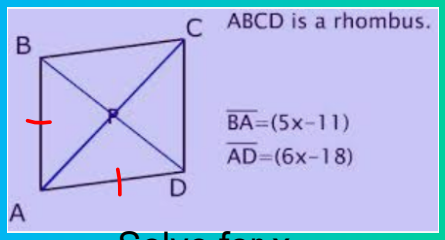
Warm Up



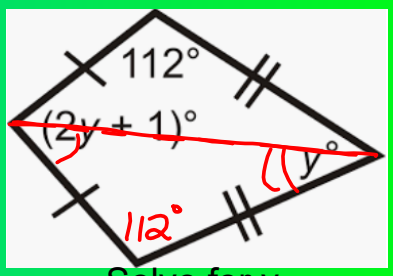
Solve for x

$5x-11=6x-18$

All sides ≅

$7=x$

Kite



Solve for y

$2y+1+y+112+112=360$

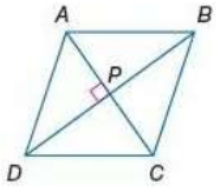
$3y+225=360$

$3y=135$

$y=45$

6-5 Special Parallelograms: Rhombi, Squares

ALGEBRA Quadrilateral *ABCD* is a rhombus. Find each value or measure.



7. If $AB = 14$, find BC.

ANSWER:
14

8. If $m\angle BCD = 54$, find $m\angle BAC$.

ANSWER:
27

9. If $AP = 3x - 1$ and $PC = x + 9$, find AC.

ANSWER:
28

10. If $DB = 2x - 4$ and $PB = 2x - 9$, find PD.

ANSWER:
5

11. If $m\angle ABC = 2x - 7$ and $m\angle BCD = 2x + 3$, find $m\angle DAB$.

ANSWER:
95

12. If $m\angle DPC = 3x - 15$, find x.

ANSWER:
35

6-5 Special Parallelograms: Rhombi, Squares

17. **ROADWAYS** Main Street and High Street intersect as shown in the diagram. Each of the crosswalks is the same length. Classify the quadrilateral formed by the crosswalks. Explain your reasoning.

ANSWER:

rhombus; Sample answer: The measure of the angle formed between the two streets is 29, and vertical angles are congruent, so the measure of one angle of the quadrilateral is 29. Because the crosswalks are the same length, the sides of the quadrilateral are congruent. Therefore, they form a rhombus.

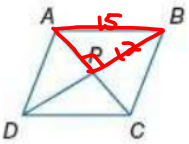
COORDINATE GEOMETRY Given each set of vertices, determine whether ▱ *JKLM* is a *rhombus*, a *rectangle*, or a *square*. List all that apply. Explain.

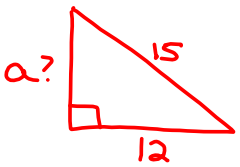
19. $J(-4, -1)$, $K(1, -1)$, $L(4, 3)$, $M(-1, 3)$

ANSWER:

Rhombus; the diagonals are ⊥.

***ABCD* is a rhombus. If $PB = 12$, $AB = 15$, and $m\angle ABD = 24$, find each measure.**





$a^2 + b^2 = c^2$

$a^2 + 12^2 = 15^2$

$a^2 + 144 = 225$

$a^2 = 81$

$a = \sqrt{81} = 9$

23. AP

ANSWER:

9

24. CP

ANSWER:

9

25. $m\angle BDA$

ANSWER:

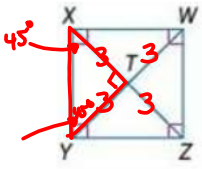
24

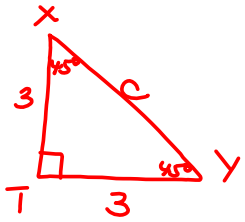
6-5 Special Parallelograms: Rhombi, Squares

26. $m\angle ACB$

ANSWER:
66

$WXYZ$ is a square. If $WT = 3$, find each measure.





27. ZX

ANSWER:
6

28. XY

ANSWER:
$3\sqrt{2}$

$a^2+b^2=c^2$
$3^2+3^2=c^2$
$9+9=c^2$
$18=c^2$
$\sqrt{18}=c$
$\sqrt{9}\sqrt{2}$
$3\sqrt{2}=c$

29. $m\angle WTZ$

ANSWER:
90

30. $m\angle WYX$

ANSWER:
45

Classify each quadrilateral.

31. 

ANSWER:
square

32. 

ANSWER:
rhombus

33. 

ANSWER:
rectangle

6-6

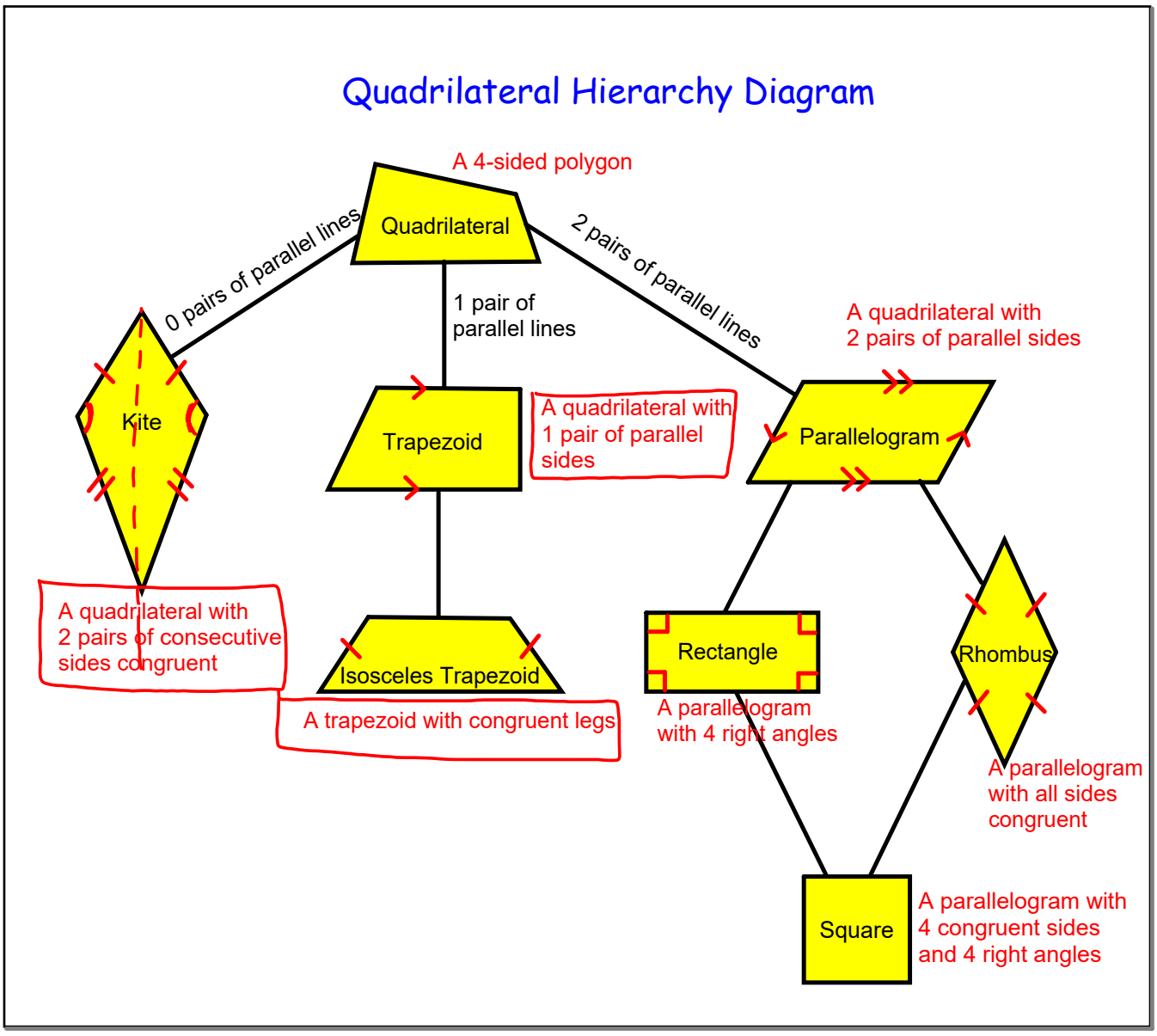
Trapezoids and Kites

Objectives: Apply the properties of Trapezoids.

Apply the properties of Kites.

HW: #5

(6-6 problems)p. 474. #8-11, 14, 16-22 even, 24-27, 35-50

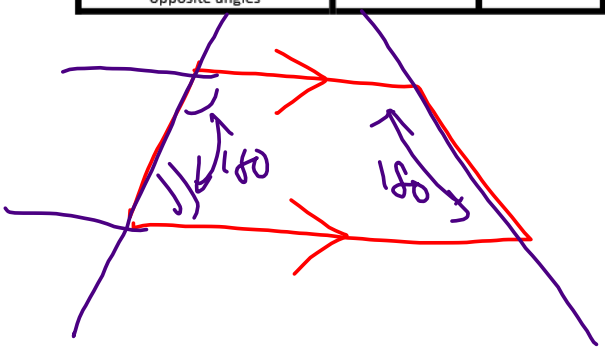

Quadrilateral Hierarchy Diagram
A 4-sided polygon
Quadrilateral
0 pairs of parallel lines
1 pair of parallel lines
2 pairs of parallel lines
Kite
Trapezoid
A quadrilateral with 1 pair of parallel sides
Parallelogram
A quadrilateral with 2 pairs of parallel sides
A quadrilateral with 2 pairs of consecutive sides congruent
Isosceles Trapezoid
A trapezoid with congruent legs
Rectangle
A parallelogram with 4 right angles
Rhombus
A parallelogram with all sides congruent
Square
A parallelogram with 4 congruent sides and 4 right angles

Geometry A Name_____

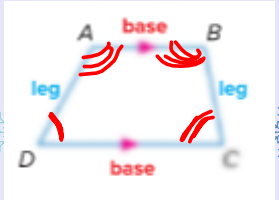
Quadrilateral Properties Summary Checklist

Place a checkmark in the table where the properties are true for each quadrilateral.

Properties	Parallelogram	Rectangle	Rhombus	Square	Kite	Trapezoid	Isosceles Trapezoid
Sides							
Exactly one pair of opposite sides are congruent							✓
Both pairs of opposite sides are congruent	✓	✓	✓	✓			
Exactly two pairs of consecutive sides are congruent					✓		
All sides are congruent			✓	✓			
Angles							
Exactly one pair of opposite angles are congruent					✓		
Both pairs of opposite angles are congruent	✓	✓	✓	✓			
Exactly two pairs of consecutive angles are congruent							✓
All angles are congruent and therefore right angles		✓		✓			
Exactly two pairs of consecutive angles are supplementary						✓	✓
All pairs of consecutive angles are supplementary	✓	✓	✓	✓			
Diagonals							
Diagonals are congruent		✓		✓			✓
Exactly one diagonal bisects the other					✓		
Both diagonals bisect each other	✓	✓	✓	✓			
Diagonals are perpendicular to each other			✓	✓	✓		
Exactly one diagonal bisects a pair of opposite angles					✓		
Both diagonals bisect pairs of opposite angles			✓	✓			



Definitions



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

Bases: The parallel sides of a trapezoid.

Legs: The nonparallel sides of a trapezoid.

Base Angles: The pair of angles formed by one base and each of the legs of a trapezoid. There are 2 pair of base angles for each trapezoid.

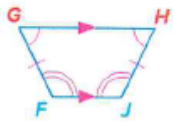
Isosceles Trapezoid: A trapezoid with congruent legs.

Feb 14-10:54 AM

Theorems for Isosceles Trapezoids

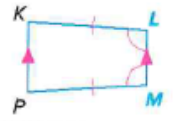
If a trapezoid is isosceles, then each pair of base angles is congruent.

Example If trapezoid $FGHJ$ is isosceles, then $\angle G \cong \angle H$ and $\angle F \cong \angle J$.



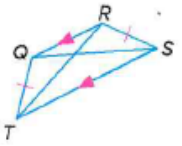
If a trapezoid has one pair of congruent base angles, then it is an isosceles trapezoid.

Example If $\angle L \cong \angle M$, then trapezoid $KLMP$ is isosceles.



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

Example If trapezoid $QRST$ is isosceles, then $\overline{QS} \cong \overline{RT}$. Likewise, if $\overline{QS} \cong \overline{RT}$, then trapezoid $QRST$ is isosceles.

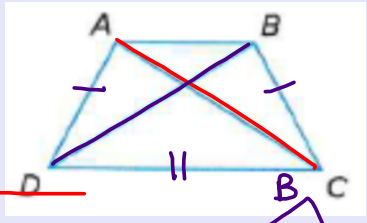


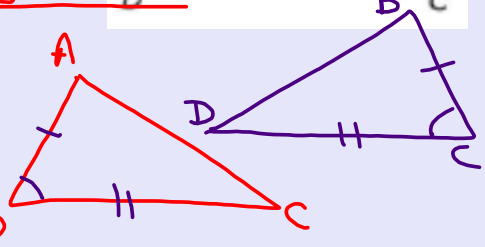
Jan 7-11:22 AM

Proof

Given: ABCD is an isosceles trapezoid

Prove: $\overline{AC} \cong \overline{BD}$



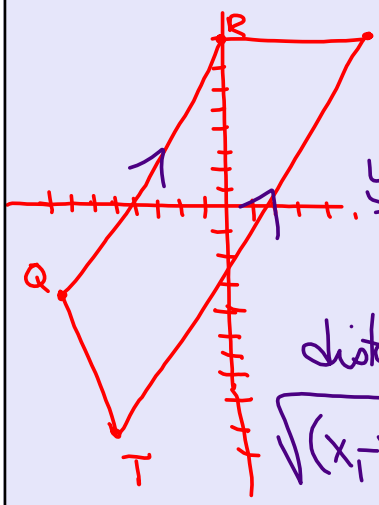


Statements	Reasons
1. ABCD is isosceles trapezoid	1. given
2. $\overline{AD} \cong \overline{BC}$	2. Defn of isos. trap.
3. $\overline{DC} \cong \overline{DC}$	3. Reflexive Prop $\cong$
4. $\angle ADC \cong \angle BCD$	4. Base $\angle$'s $\cong$
5. $\triangle ADC \cong \triangle BCD$	5. SAS
6. $\overline{AC} \cong \overline{BD}$	6. CPCTC

Jan 30-11:45 AM

Practice

Quadrilateral QRST has vertices Q(-8, -4), R(0, 8), S(6, 8), and T(-6, -10). Show that QRST is a trapezoid and determine whether QRST is an isosceles trapezoid.



Slope

$\frac{y_2 - y_1}{x_2 - x_1}$

distance

$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

$\overline{QR}$ $\frac{8 + +4}{0 + +8} = \frac{12}{8} = \frac{3}{2}$

$\overline{ST}$ $\frac{-10 - 8}{-6 - 6} = \frac{+18}{+12} = \frac{3}{2}$

RS $\sqrt{0^2 + 6^2} = 6$

QT $\sqrt{(4) + 36} = \sqrt{40}$

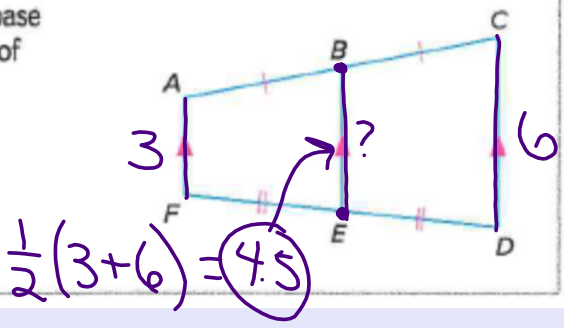
Midsegment of a Trapezoid

Definition: The midsegment of a trapezoid is the segment that connects the midpoints of the legs of a trapezoid.

Theorem 6.24 Trapezoid Midsegment Theorem

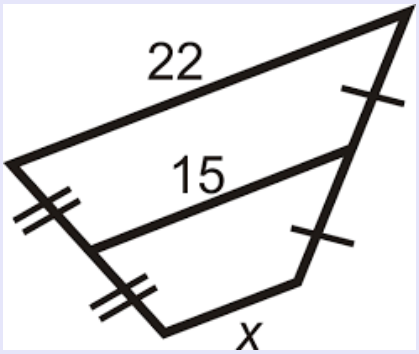
The midsegment of a trapezoid is parallel to each base and its measure is one half the sum of the lengths of the bases.

Example If $\overline{BE}$ is the midsegment of trapezoid $ACDF$, then $\overline{AF} \parallel \overline{BE}$, $\overline{CD} \parallel \overline{BE}$, and $BE = \frac{1}{2}(AF + CD)$.



Practice

Given the trapezoid, solve for x



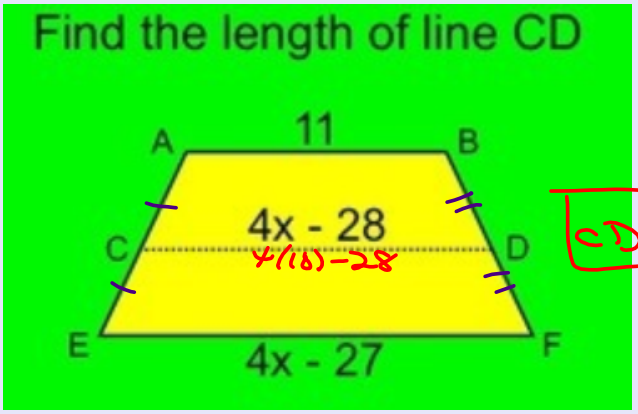
$15 = \frac{1}{2}(x+22)$

$30 = x+22$

$8 = x$

Jan 8-9:08 AM

Find the length of line CD



CD = 12

$4x-28=\frac{1}{2}(11+4x-27)$

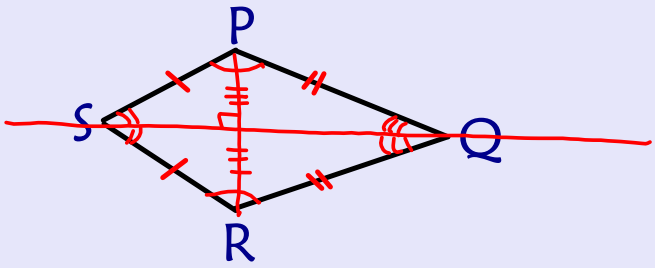
$8x-56=4x-16$

$4x=40$

$x=10$

Properties of Kites

Definition: A kite is a quadrilateral with exactly two pairs of consecutive congruent sides.

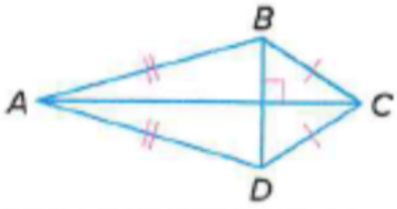


Feb 7-10:51 AM

Theorems for Kites

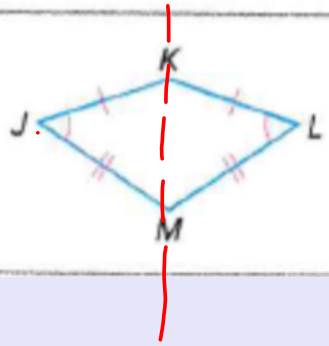
If a quadrilateral is a kite, then its diagonals are perpendicular.

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



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

Example If quadrilateral $JKLM$ is a kite, $\overline{JK} \cong \overline{KL}$, and $\overline{JM} \cong \overline{LM}$, then $\angle J \cong \angle L$ and $\angle K \ncong \angle M$.

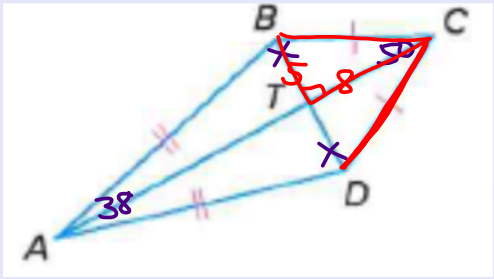


Practice

1) If $m\angle BAD = 38$ and $m\angle BCD = 50$, find $m\angle ADC$.

136°

2) If BT=5 and TC = 8, find CD.



$5^2 + 8^2 = c^2$

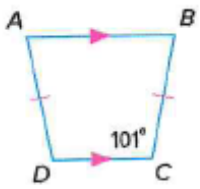
$25 + 64 = c^2$

$89 = c^2$

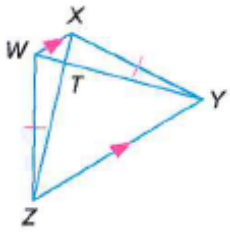
$\sqrt{89} = CD$

Find each measure.

1. $m\angle D$ 101



2. WT, if $ZX = 20$ and $TY = 15$ 5

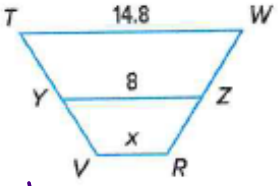


COORDINATE GEOMETRY Quadrilateral $ABCD$ has vertices $A(-4, -1)$, $B(-2, 3)$, $C(3, 3)$, and $D(5, -1)$.

3. Verify that $ABCD$ is a trapezoid. $\overline{BC} \parallel \overline{AD}$, $\overline{AB} \nparallel \overline{CD}$; $ABCD$ is a trapezoid.

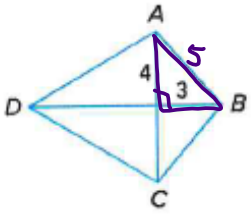
4. Determine whether $ABCD$ is an isosceles trapezoid. Explain. isosceles; $AB = \sqrt{20} = CD$

5. In the figure at the right, $\overline{YZ}$ is the midsegment of trapezoid $TWRV$. Determine the value of x. 12

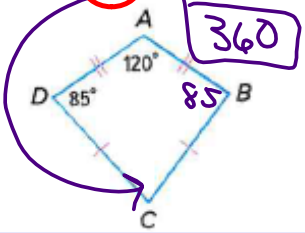


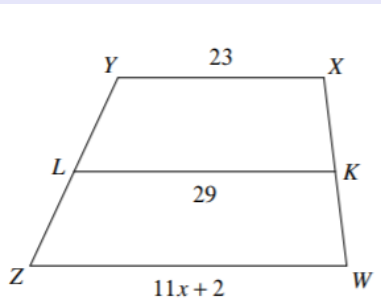
SENSE-MAKING If $ABCD$ is a kite, find each measure.

6. AB 5



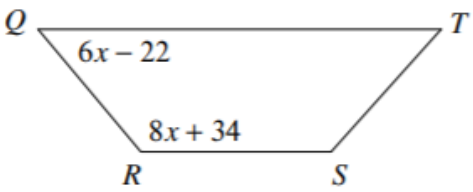
7. $m\angle C$ 70





Jan 7-11:10 AM

Find $m\angle R$



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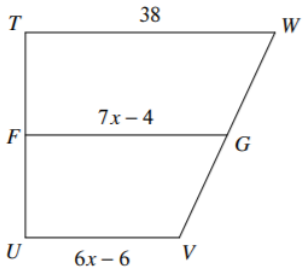
Find VU



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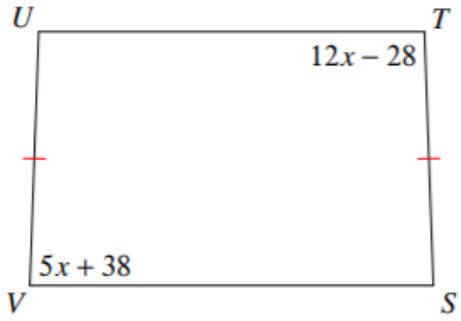
Find $m\angle V$



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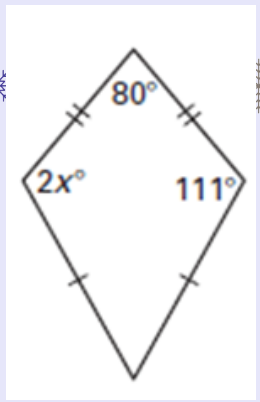

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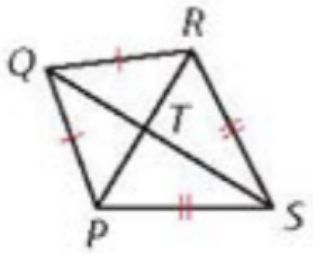
kite PQRS, m∠PQR = 78°, and m∠TRS = 59°. Find each measure.

m∠QRT = _____

m∠QPS = _____

m∠PSR = _____



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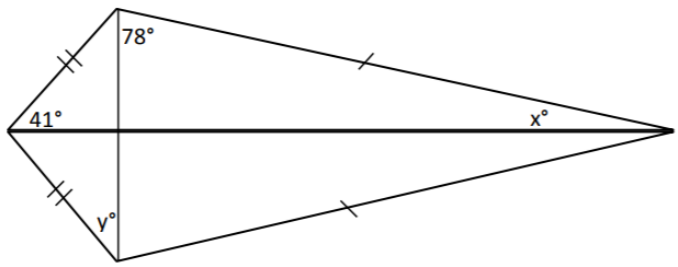
x = _____, y = _____



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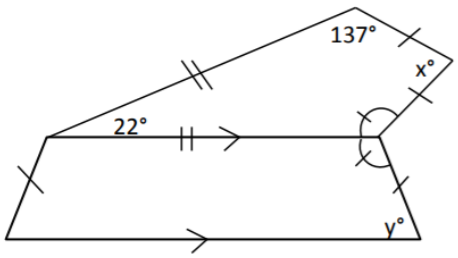
x = _____, y = _____



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