You may use this on the Ch. 8 Summative, but not on the Sem. 2 Final.

Name:

8.1 Find Angle Measures in Polygons

Goal • Find angle measures in polygons.

Complete the vocab. with definitions or pictures that make sense to you.

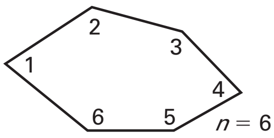
Rewrite the Goal as an "I can" statement!

VOCABULARY

Diagonal

THEOREM 8.1: POLYGON INTERIOR ANGLES THEOREM

The sum of the measures of the interior angles of a convex *n*-gon is (n − ___) • ______.



$n = 6$

$m\angle 1 + m\angle 2 + \cdots + m\angle n = (n -$ ___ $) \cdot$ ______

COROLLARY TO THEOREM 8.1: INTERIOR ANGLES OF A QUADRILATERAL

The sum of the measures of the interior angles of a quadrilateral is ______.

Example 1 ***Find the sum of angle measures in a polygon***

Find the sum of the measures of the interior angles of a convex hexagon.

Solution

A hexagon has ___ sides. Use the Polygon Interior Angles Theorem.

(n − ___) • ______	= (___ − ___) • ______	**Substitute ___ for *n*.**
	= ___ • ______	**Subtract.**
	= ______	**Multiply.**

The sum of the measures of the interior angles of a hexagon is ______.

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Your Notes

Example 2 ***Find the number of sides of a polygon***

The sum of the measures of the interior angles of a convex polygon is 1260°. Classify the polygon by the number of sides.

Solution

Use the Polygon Interior Angles Theorem to write an equation involving the number of sides *n*. Then solve the equation to find the number of sides.

$(n - \underline{\quad}) \cdot \underline{\qquad} = \underline{\qquad}$ **Polygon Interior Angles Theorem**

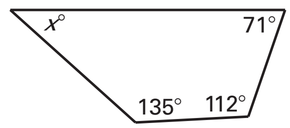
$n - \underline{\quad} = \underline{\quad}$ **Divide each side by ______.**

$n = \underline{\quad}$ **Add ___ to each side.**

The polygon has ___ sides. It is a __________.

Example 3 ***Find an unknown interior angle measure***

Find the value of *x* in the diagram shown.



Solution

The polygon is a quadrilateral. Use the Corollary to the Polygon Interior Angles Theorem to write an equation involving *x*. Then solve the equation.

$x^\circ + \underline{\qquad} + \underline{\qquad} + \underline{\qquad} = \underline{\qquad}$ **Corollary to Theorem 8.1**

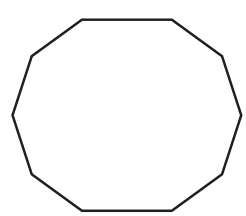
$x + \underline{\qquad} = \underline{\qquad}$ **Combine like terms.**

$x = \underline{\qquad}$ **Subtract ______ from each side.**

Stop and get the teacher's signature before you move on.

✔ ***Checkpoint*** **Complete the following exercise.**

1. Find the sum of the measures of the interior angles of the convex decagon.



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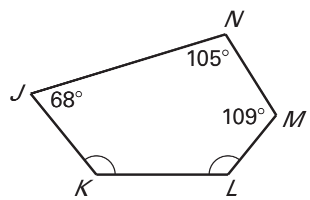
Your Notes

✔ *Checkpoint* Complete the following exercises.

2. The sum of the measures of the interior angles of a convex polygon is 1620°. Classify the polygon by the number of sides.

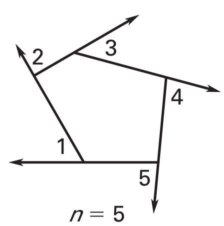
3. Use the diagram at the right. Find $m\angle K$ and $m\angle L$.



THEOREM 8.2: POLYGON EXTERIOR ANGLES THEOREM

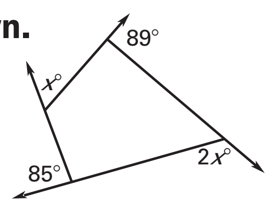
The sum of the measures of the exterior angles of a convex polygon, one angle at each vertex, is ______.

$m\angle 1 + m\angle 2 + \cdots + m\angle n =$ ______



Example 4 ***Find unknown exterior angle measures***

Find the value of *x* in the diagram shown.



Solution

Use the Polygon Exterior Angles Theorem to write and solve an equation.

$x° +$ _____ $+$ _____ $+$ _____ $=$ ______	**Polygon Exterior Angles Theorem.**
___$x +$ _____ $=$ _____	**Combine like terms.**
$x =$ ____	**Solve for *x*.**

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Your Notes

Example 5 ***Find angle measures in regular polygons***

Lamps The base of a lamp is in the shape of a regular 15-gon. Find (a) the measure of each interior angle and (b) the measure of each exterior angle.

Solution

a. Use the Polygon Interior Angles Theorem to find the sum of the measures of the interior angles.

$(n - \_\_\_) \cdot \_\_\_\_\_\_ = (\_\_\_\_ - \_\_\_) \cdot \_\_\_\_\_\_$

$= \_\_\_\_\_\_\_$

Then find the measure of one interior angle. A regular 15-gon has ____ congruent interior angles.
Divide _______ by ____: _______ ÷ ____ = ______.

The measure of each interior angle in the 15-gon is ______.

b. By the Polygon Exterior Angles Theorem, the sum of the measures of the exterior angles, one angle at each vertex, is ______. Divide ______ by ____:
______ ÷ ____ = _____.

The measure of each exterior angle in the 15-gon is _____.

Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

4. A convex pentagon has exterior angles with measures 66°, 77°, 82°, and 62°. What is the measure of an exterior angle at the fifth vertex?

5. Find the measure of (a) each interior angle and (b) each exterior angle of a regular nonagon.

Homework

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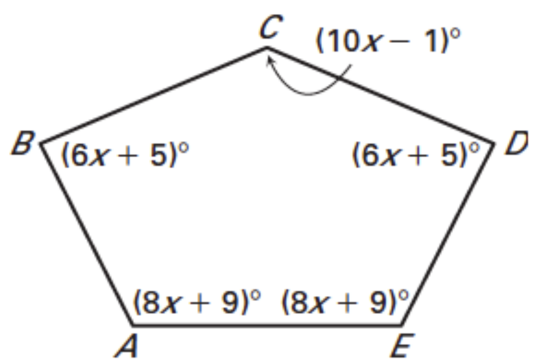
Complete the following problem. Make sure you justify your answer by either:

- **Checking your answer**
- **Providing a theorem, postulate, or definition**
- **Showing your work.**

Light Fixture The side view of a light fixture is shown below. Find the value of x. Then determine the measure of each angle.



Answer the following questions. Make sure you use full sentences and use the correct vocabulary words when appropriate.

1. Describe how section is connected to something that we learned previously this year.

2. What skills did you use in this section that you learned earlier in this class?

3. What do you think will come next?

8.2 Use Properties of Parallelograms

Goal • Find angle and side measures in parallelograms.

Rewrite the Goal as an "I can" statement!

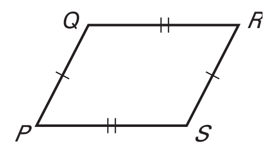
Complete the vocab. with definitions or pictures that make sense to you.

VOCABULARY

Parallelogram

THEOREM 8.3

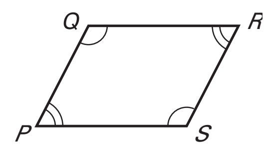
If a quadrilateral is a parallelogram, then its opposite sides are congruent.



If *PQRS* is a parallelogram, then _____ $\cong \overline{RS}$ and $\overline{QR} \cong$ _____.

THEOREM 8.4

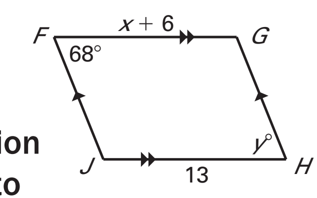
If a quadrilateral is a parallelogram, then its opposite angles are congruent.



If *PQRS* is a parallelogram, then $\angle P \cong$ _____ and _____ $\cong \angle S$.

Example 1 ***Use properties of parallelograms***

Find the values of x and y.



Solution

FGHJ is a parallelogram by the definition of a parallelogram. Use Theorem 8.3 to find the value of x.

$FG =$ _____	**Opposite sides of a ▱ are ≅.**
$x + 6 =$ _____	**Substitute $x + 6$ for FG and _____ for _____.**
$x =$ ____	**Subtract 6 from each side.**

By Theorem 8.4, $\angle F \cong$ _____, or $m\angle F =$ _______. So, $y° =$ _____.

In ▱*FGHJ*, $x =$ ____ and $y =$ ____.

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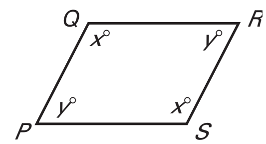
Your Notes

THEOREM 8.5

If a quadrilateral is a parallelogram, then its consecutive angles are

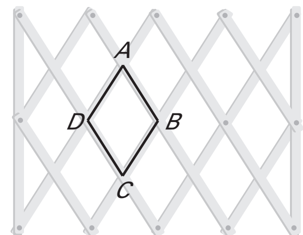
_______________.



If *PQRS* is a parallelogram, then $x° + y° =$ ______.

Example 2 ***Use properties of a parallelogram***

Gates As shown, a gate contains several parallelograms. Find $m\angle ADC$ when $m\angle DAB = 65°$.

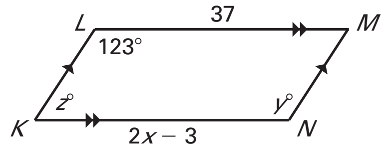


Solution

By Theorem 8.5, the consecutive angle pairs in $\square ABCD$ are _______________. So, $m\angle ADC + m\angle DAB =$ ______. Because $m\angle DAB = 65°$, $m\angle ADC =$ ______ $-$ ______ $=$ ______.

Stop and get the teacher's signature before you move on.

Checkpoint **Find the indicated measure in $\square KLMN$ shown at the right.**

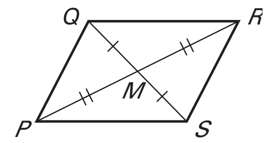


1. x	**2.** y
3. z	

Your Notes

THEOREM 8.6

If a quadrilateral is a parallelogram, then its diagonals ________ each other.

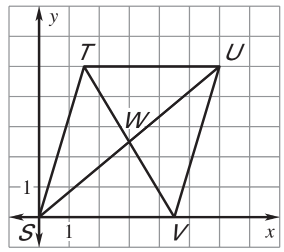


$\overline{QM} \cong$ ______ and

$\overline{PM} \cong$ ______

Example 3 *Use properties of a parallelogram*

The diagonals of ▱*STUV* intersect at point *W*. Find the coordinates of *W*.



Solution

By Theorem 8.6, the diagonals of a parallelogram ________ each other. So, *W* is the ___________ of the diagonals $\overline{TV}$ and $\overline{SU}$. Use the ____________________.

Coordinates of midpoint *W* of

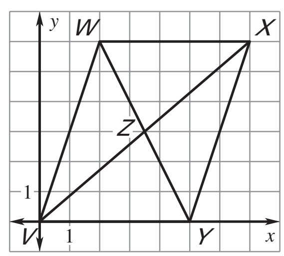
$\overline{SU} = \left(\qquad\qquad \right) = \left(\qquad \right)$

In Example 3, you can use either diagonal to find the coordinates of *W*. Using $\overline{SU}$ simplifies calculations because one endpoint is (0, 0).

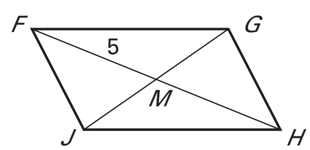
Stop and get the teacher's signature before you move on.

✔ ***Checkpoint*** **Complete the following exercises.**

4. The diagonals of ▱*VWXY* intersect at point *Z*. Find the coordinates of *Z*.



5. Given that ▱*FGHJ* is a parallelogram, find *MH* and *FH*.



Homework

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Complete the following problem. Make sure you justify your answer by either:

- **Checking your answer**
- **Providing a theorem, postulate, or definition**
- **Showing your work.**

The measure of one interior angle of a parallelogram is 2.6 times the measure of another angle. Find the measure of each angle.

Answer the following questions. Make sure you use full sentences and use the correct vocabulary words when appropriate.

1. Describe how section is connected to something that we learned previously this year.

2. What skills did you use in this section that you learned earlier in this class?

3. What do you think will come next?

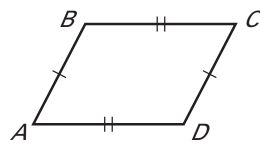
8.3 Show that a Quadrilateral is a Parallelogram

Goal • Use properties to identify parallelograms.

Rewrite the Goal as
an "I can" statement!

THEOREM 8.7

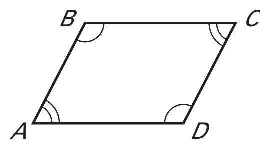
If both pairs of opposite _______ of a quadrilateral are congruent, then the quadrilateral is a parallelogram.



If $\overline{AB} \cong$ _____ and $\overline{BC} \cong$ _____, then *ABCD* is a parallelogram.

THEOREM 8.8

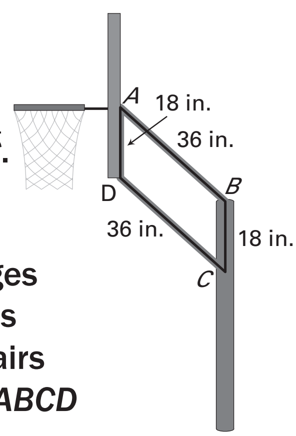
If both pairs of opposite ________ of a quadrilateral are congruent, then the quadrilateral is a parallelogram.



If $\angle A \cong$ _____ and $\angle B \cong$ _____, then *ABCD* is a parallelogram.

Example 1 ***Solve a real-world problem***

Basketball In the diagram at the right, $\overline{AB}$ and $\overline{DC}$ represent adjustable supports of a basketball hoop. *Explain* why $\overline{AD}$ is always parallel to $\overline{BC}$.



Solution

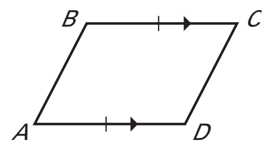
The shape of quadrilateral *ABCD* changes as the adjustable supports move, but its ______________ do not change. Both pairs of opposite _______ are congruent, so *ABCD* is a parallelogram by ______________.

By the definition of a parallelogram, $\overline{AD} \parallel$ _____.

THEOREM 8.9

If one pair of opposite sides of a quadrilateral are __________ and __________, then the quadrilateral is a parallelogram.

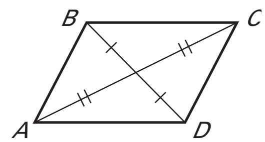
If $\overline{BC}$ ___ $\overline{AD}$ and $\overline{BC}$ ___ $\overline{AD}$, then *ABCD* is a parallelogram.



THEOREM 8.10

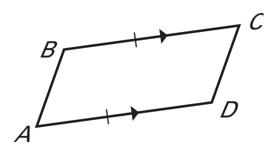
If the diagonals of a quadrilateral __________ each other, then the quadrilateral is a parallelogram.

If $\overline{BD}$ and $\overline{AC}$ __________ each other, then *ABCD* is a parallelogram.



Example 2 ***Identify a parallelogram***

Lights The headlights of a car have the shape shown at the right. *Explain* how you know that $\angle B \cong \angle D$.



Solution

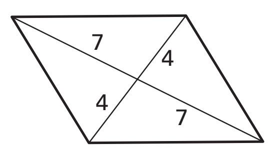
In the diagram, $\overline{BC} \parallel$ _____ and $\overline{BC} \cong$ _____. By __________, quadrilateral *ABCD* is a parallelogram. By __________, you know that opposite angles of a parallelogram are congruent. So, $\angle B \cong$ _____.

Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

1. In quadrilateral *GHJK*, $m\angle G = 55°$, $m\angle H = 125°$, and $m\angle J = 55°$. Find $m\angle K$. What theorem can you use to show that *GHJK* is a parallelogram?

2. What theorem can you use to show that the quadrilateral is a parallelogram?



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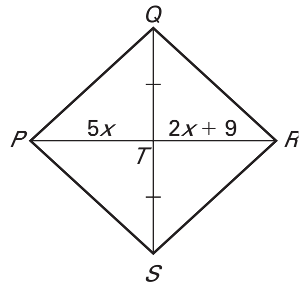
Your Notes

Example 3 *Use algebra with parallelograms*

For what value of x is quadrilateral *PQRS* a parallelogram?



Solution

By Theorem 8.10, if the diagonals of *PQRS* ________ each other, then it is a parallelogram. You are given that $\overline{QT} \cong$ _____. Find x so that $\overline{PT} \cong$ _____.

$PT =$ _____ **Set the segment lengths equal.**

$5x =$ _________ **Substitute $5x$ for PT and _________ for _____.**

___$x =$ ___ **Subtract _____ from each side.**

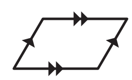
$x =$ ___ **Divide each side by ___.**

When $x =$ ___, $PT = 5($___$) =$ _____ and $RT = 2($___$) + 9 =$ _____.

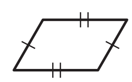
Quadrilateral *PQRS* is a parallelogram when $x =$ ___.

CONCEPT SUMMARY: WAYS TO PROVE A QUADRILATERAL IS A PARALLELOGRAM

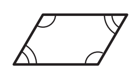
1. Show both pairs of opposite sides are parallel. **(Definition)**



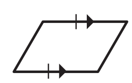
2. Show both pairs of opposite sides are congruent. **(Theorem 8.7)**



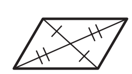
3. Show both pairs of opposite angles are congruent. **(Theorem 8.8)**



4. Show one pair of opposite sides are congruent and parallel. **(Theorem 8.9)**



5. Show the diagonals bisect each other. **(Theorem 8.10)**



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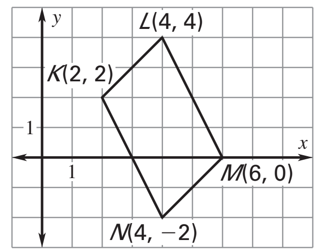
Your Notes

Example 4 *Use coordinate geometry*

Show that quadrilateral *KLMN* is a parallelogram.



Solution

One way is to show that a pair of sides are congruent and parallel. Then apply ________________.

First use the Distance Formula to show that $\overline{KL}$ and $\overline{MN}$ are ______________.

$KL = \sqrt{\qquad\qquad\qquad} = \sqrt{\quad}$

$MN = \sqrt{\qquad\qquad\qquad} = \sqrt{\quad}$

Because $KL = MN = \sqrt{\quad}$, $\overline{KL}$ ____ $\overline{MN}$.

Then use the slope formula to show that $\overline{KL}$ ___ $\overline{MN}$.

Slope of $\overline{KL} = \dfrac{\boxed{\quad}}{\boxed{\quad}} =$ ___

Slope of $\overline{MN} = \dfrac{\boxed{\quad}}{\boxed{\quad}} =$ ___

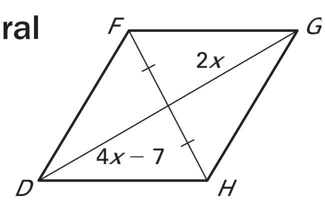
$\overline{KL}$ and $\overline{MN}$ have the same slope, so they are __________.

$\overline{KL}$ and $\overline{MN}$ are congruent and parallel. So, *KLMN* is a parallelogram by ________________.

Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

3. For what value of *x* is quadrilateral *DFGH* a parallelogram?



4. *Explain* another method that can be used to show that quadrilateral *KLMN* in Example 4 is a parallelogram.

Homework

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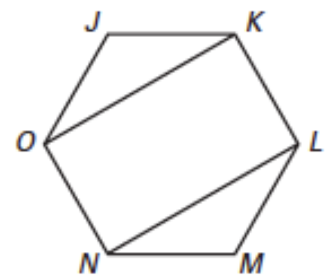
Complete the following problem. Make sure you justify your answer by either:

- **Checking your answer**
- **Providing a theorem, postulate, or definition**
- **Showing your work.**

Complete the proof.

19. GIVEN: Regular hexagon *JKLMNO*

PROVE: *OKLN* is a parallelogram.



Statements	Reasons
1. _?_	1. Given
2. $\overline{JO} \cong \overline{NM}$ $\overline{JK} \cong \overline{ML}$ $\angle J \cong \angle M$	2. _?_
3. _?_	3. SAS Congruence Postulate
4. $\overline{OK} \cong \overline{NL}$	4. _?_
5. _?_	5. Definition of regular polygon
6. *OKLN* is a ▱.	6. _?_

Answer the following questions. Make sure you use full sentences and use the correct vocabulary words when appropriate.

1. Describe how section is connected to something that we learned previously this year.

2. What skills did you use in this section that you learned earlier in this class?

3. What do you think will come next?

8.4 Properties of Rhombuses, Rectangles, and Squares

Goal • Use properties of rhombuses, rectangles, and squares.

Rewrite the Goal as an "I can" statement!

Complete the vocab. with definitions or pictures that make sense to you.

VOCABULARY

Rhombus

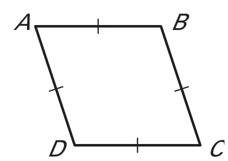
Rectangle

Square

RHOMBUS COROLLARY

A quadrilateral is a rhombus if and only if it has four congruent _______.

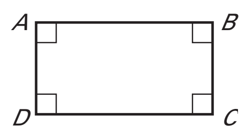
ABCD is a rhombus if and only if $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{AD}$.



RECTANGLE COROLLARY

A quadrilateral is a rectangle if and only if it has four _______________.

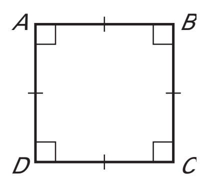
ABCD is a rectangle if and only if $\angle A$, $\angle B$, $\angle C$, and $\angle D$ are right angles.



SQUARE COROLLARY

A quadrilateral is a square if and only if it is a ___________ and a ___________.

ABCD is a square if and only if $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{AD}$ and $\angle A$, $\angle B$, $\angle C$, and $\angle D$ are right angles.



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Your Notes

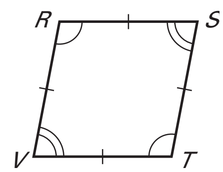
Example 1 ***Use properties of special quadrilaterals***

For any rhombus *RSTV*, decide whether the statement is always or sometimes true. Draw a sketch and explain your reasoning.

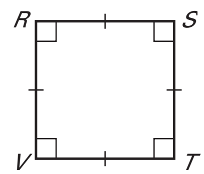
a. $\angle S \cong \angle V$ **b.** $\angle T \cong \angle V$

Solution

a. By definition, a rhombus is a parallelogram with four congruent ______. By Theorem 8.4, opposite angles of a parallelogram are ________. So, $\angle S \cong \angle V$. The statement is ______ true.

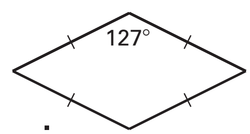


b. If rhombus *RSTV* is a ______, then all four angles are congruent right angles. So $\angle T \cong \angle V$ if *RSTV* is a ______. Because not all rhombuses are also ______, the statement is ________ true.



Example 2 ***Classify special quadrilaterals***

Classify the special quadrilateral. *Explain* your reasoning.



The quadrilateral has four congruent ______. One of the angles is not a ________, so the rhombus is not also a ______. By the Rhombus Corollary, the quadrilateral is a ______.

Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

1. For any square *CDEF*, is it *always* or *sometimes* true that $\overline{CD} \cong \overline{DE}$? *Explain* your reasoning.

2. A quadrilateral has four congruent sides and four congruent angles. Classify the quadrilateral.

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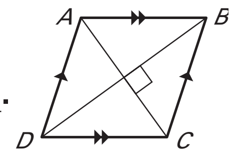
Your Notes

THEOREM 8.11

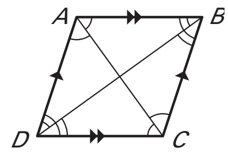
A parallelogram is a rhombus if and only if its diagonals are ________________.



▱*ABCD* is a rhombus if and only if _____ ⊥ _____.

THEOREM 8.12

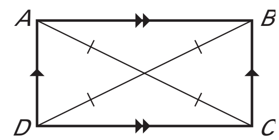
A parallelogram is a rhombus if and only if each diagonal bisects a pair of opposite angles.



▱*ABCD* is a rhombus if and only if $\overline{AC}$ bisects ∠______ and ∠______ and $\overline{BD}$ bisects ∠______ and ∠______.

THEOREM 8.13

A parallelogram is a rectangle if and only if its diagonals are ____________.



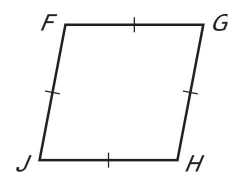
▱*ABCD* is a rectangle if and only if _____ ≅ _____.

Example 3 *List properties of special parallelograms*

Sketch rhombus *FGHJ*. List everything you know about it.

Solution

By definition, you need to draw a figure with the following properties:



- The figure is a ________________.
- The figure has four congruent _______.

Because *FGHJ* is a parallelogram, it has these properties:

- Opposite sides are _________ and ____________.
- Opposite angles are ____________. Consecutive angles are _________________.
- Diagonals ________ each other.

By Theorem 8.11, the diagonals of *FGHJ* are ________________. By Theorem 8.12, each diagonal bisects a pair of _________________.

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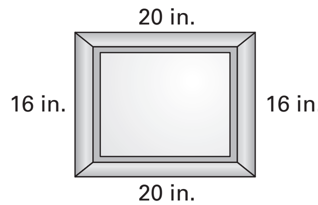
Your Notes

Example 4 ***Solve a real-world problem***

Framing You are building a frame for a painting. The measurements of the frame are shown at the right.



a. The frame must be a rectangle. Given the measurements in the diagram, can you assume that it is? *Explain*.

b. You measure the diagonals of the frame. The diagonals are about 25.6 inches. What can you conclude about the shape of the frame?

Solution

a. No, you cannot. The boards on opposite sides are the same length, so they form a ______________. But you do not know whether the angles are ____________.

b. By Theorem 8.13, the diagonals of a rectangle are ___________. The diagonals of the frame are ___________, so the frame forms a __________.

Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

3. Sketch rectangle *WXYZ*. List everything that you know about it.

4. Suppose the diagonals of the frame in Example 4 are not congruent.

Could the frame still be a rectangle? *Explain*.

Homework

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Complete the following problem. Make sure you justify your answer by either:

- **Checking your answer**
- **Providing a theorem, postulate, or definition**
- **Showing your work.**

Find the length or angle measure.

$WXYZ$ is a square.

$WX = 1 - 10x$

$YZ = 14 + 3x$

$XY = \underline{\ \ ?\ \ }$

Answer the following questions. Make sure you use full sentences and use the correct vocabulary words when appropriate.

1. Describe how section is connected to something that we learned previously this year.

2. What skills did you use in this section that you learned earlier in this class?

3. What do you think will come next?

8.5 Use Properties of Trapezoids and Kites

Goal • Use properties of trapezoids and kites.

Rewrite the Goal as an "I can" statement!

VOCABULARY
Trapezoid
Bases of a trapezoid
Base angles of a trapezoid
Legs of a trapezoid
Isosceles trapezoid
Midsegment of a trapezoid
Kite

Complete the vocab. with definitions or pictures that make sense to you.

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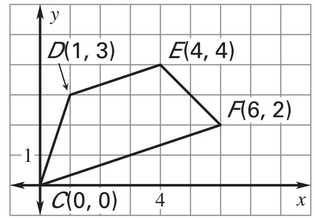
Your Notes

Example 1 *Use a coordinate plane*

Show that *CDEF* is a trapezoid.



Solution

Compare the slopes of opposite sides.

Slope of $\overline{DE}$ = ______ = ___

Slope of $\overline{CF}$ = ______ = ___ = ___

The slopes of $\overline{DE}$ and $\overline{CF}$ are the same, so $\overline{DE}$ ___ $\overline{CF}$.

Slope of $\overline{EF}$ = ______ = _____ = _____

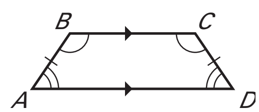
Slope of $\overline{CD}$ = ______ = ___ = ___

The slopes of $\overline{EF}$ and $\overline{CD}$ are not the same, so $\overline{EF}$ is ____________ to $\overline{CD}$.

Because quadrilateral *CDEF* has exactly one pair of ______________, it is a trapezoid.

THEOREM 8.14

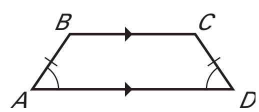
If a trapezoid is isosceles, then each pair of base angles is ____________.



If trapezoid *ABCD* is isosceles, then $\angle A \cong \angle$___ and $\angle$___ $\cong \angle C$.

THEOREM 8.15

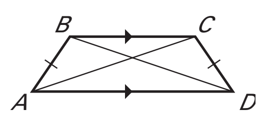
If a trapezoid has a pair of congruent ______________, then it is an isosceles trapezoid.



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

THEOREM 8.16

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



Trapezoid *ABCD* is isosceles if and only if _____ $\cong$ _____.

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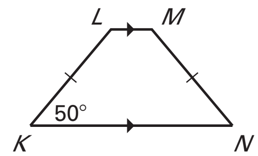
Your Notes

Example 2 ***Use properties of isosceles trapezoids***

Kitchen A shelf fitting into a cupboard in the corner of a kitchen is an isosceles trapezoid. Find $m\angle N$, $m\angle L$, and $m\angle M$.



Solution

Step 1 **Find $m\angle N$.** *KLMN* is an ____________________, so $\angle N$ and $\angle$___ are congruent base angles, and $m\angle N = m\angle$___ = _____.

Step 2 **Find $m\angle L$.** Because $\angle K$ and $\angle L$ are consecutive interior angles formed by $\overleftrightarrow{KL}$ intersecting two parallel lines, they are ________________. So, $m\angle L$ = ______ − _____ = ______.

Step 3 **Find $m\angle M$.** Because $\angle M$ and $\angle$___ are a pair of base angles, they are congruent, and $m\angle M = m\angle$___ = ______.

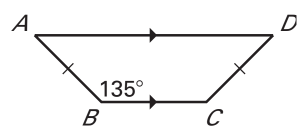
So, $m\angle N$ = _____, $m\angle L$ = ______, and $m\angle M$ = ______.

Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

1. In Example 1, suppose the coordinates of point E are (7, 5). What type of quadrilateral is *CDEF*? *Explain.*

2. Find $m\angle C$, $m\angle A$, and $m\angle D$ in the trapezoid shown.



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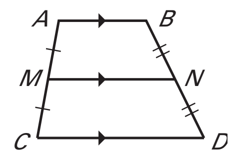
Your Notes

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.

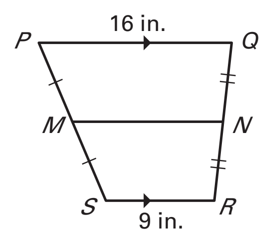


If $\overline{MN}$ is the midsegment of trapezoid *ABCD*, then

$\overline{MN} \parallel$ _____, $\overline{MN} \parallel \overline{\quad\quad}$, and $MN = \frac{\quad}{\quad}$(_____ + _____).

Example 3 ***Use the midsegment of a trapezoid***

In the diagram, $\overline{MN}$ is the midsegment of trapezoid *PQRS*. Find *MN*.



Solution

Use Theorem 8.17 to find *MN*.

$MN = \frac{\quad}{\quad}$(_____ + _____) **Apply Theorem 8.17.**

$= \frac{\quad}{\quad}$(_____ + ____) **Substitute _____ for *PQ* and ____ for *SR*.**

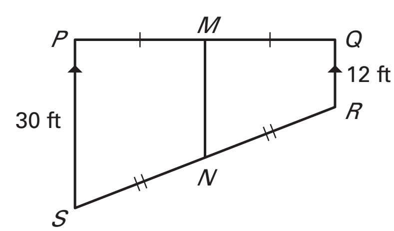
= _______ **Simplify.**

The length *MN* is _______ inches.

Stop and get the teacher's signature before you move on.

✔ ***Checkpoint*** **Complete the following exercise.**

3. Find *MN* in the trapezoid at the right.



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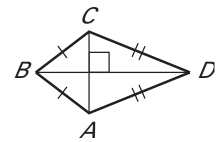
Your Notes

THEOREM 8.18

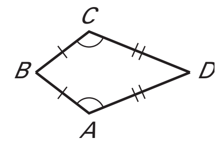
If a quadrilateral is a kite, then its diagonals are ______________.

If quadrilateral *ABCD* is a kite, then ____ $\perp$ ____.



THEOREM 8.19

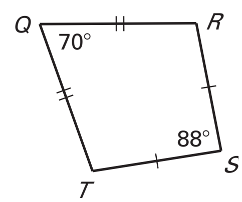
If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.



If quadrilateral *ABCD* is a kite and $\overline{BC} \cong \overline{BA}$, then $\angle A$ ___ $\angle C$ and $\angle B$ ___ $\angle D$.

Example 4 ***Apply Theorem 8.19***

Find $m\angle T$ in the kite shown at the right.



Solution

By Theorem 8.19, *QRST* has exactly one pair of ___________ opposite angles. Because $\angle Q \ncong \angle S$, $\angle$___ and $\angle T$ must be congruent. So, $m\angle$___ $= m\angle T$. Write and solve an equation to find $m\angle T$.

$m\angle T + m\angle R +$ _____ $+$ _____ $=$ ______ **Corollary to Theorem 8.1**

$m\angle T + m\angle T +$ _____ $+$ _____ $=$ ______ **Substitute $m\angle T$ for $m\angle R$.**

___$(m\angle T) +$ ______ $=$ ______ **Combine like terms.**

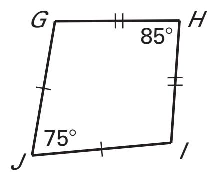
$m\angle T =$ ______ **Solve for $m\angle T$.**

Stop and get the teacher's signature before you move on.

Homework

Checkpoint **Complete the following exercise.**

4. Find $m\angle G$ in the kite shown at the right.



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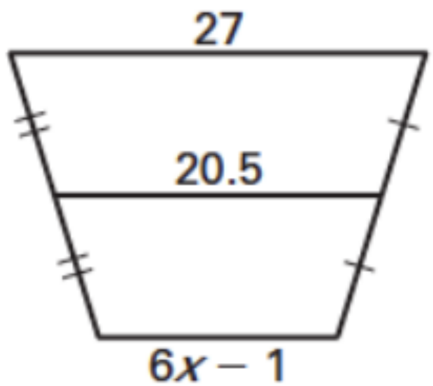
Complete the following problem. Make sure you justify your answer by either:

- **Checking your answer**
- **Providing a theorem, postulate, or definition**
- **Showing your work.**

Find the value of *x*.



Answer the following questions. Make sure you use full sentences and use the correct vocabulary words when appropriate.

1. Describe how section is connected to something that we learned previously this year.

2. What skills did you use in this section that you learned earlier in this class?

3. What do you think will come next?

8.6 Identify Special Quadrilaterals

Complete the vocab. with definitions or pictures that make sense to you.

Goal • Identify special quadrilaterals.

Rewrite the Goal as an "I can" statement!

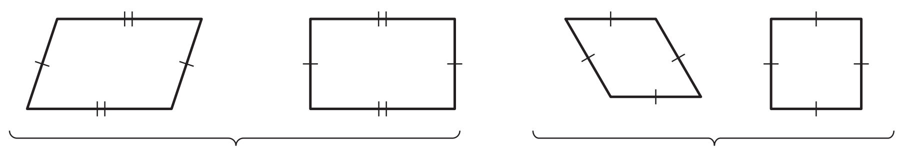
Example 1 *Identify quadrilaterals*

Quadrilateral *ABCD* has both pairs of opposite sides congruent. What types of quadrilaterals meet this condition?

Solution

There are many possibilities.

__________ __________ __________ __________



Opposite sides are congruent. All sides are congruent.

Stop and get the teacher's signature before you move on.

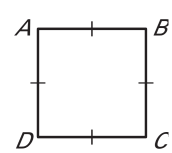
✔ *Checkpoint* Complete the following exercise.

1. Quadrilateral *JKLM* has both pairs of opposite angles congruent. What types of quadrilaterals meet this condition?

In Example 2, *ABCD* is shaped like a square. But you must rely only on marked information when you interpret a diagram.

Example 2 *Identify a quadrilateral*

What is the most specific name for quadrilateral *ABCD*?



Solution

The diagram shows that both pairs of opposite sides are congruent. By Theorem 8.7, *ABCD* is a ______________. All sides are congruent, so *ABCD* is a __________ by definition.

__________ are also rhombuses. However, there is no information given about the angle measures of *ABCD*. So, you cannot determine whether it is a ________.

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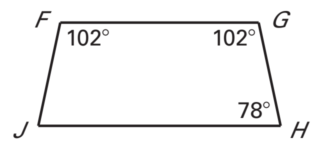
Your Notes

Example 3 *Identify a quadrilateral*

Is enough information given in the diagram to show that quadrilateral *FGHJ* is an isosceles trapezoid? *Explain*.



Solution

Step 1 **Show** that *FGHJ* is a ____________. ∠*G* and ∠*H* are __________________ but ∠*F* and ∠*G* are not. So, _____ ∥ _____, but $\overline{FJ}$ is not __________ to $\overline{GH}$. By definition, *FGHJ* is a ____________.

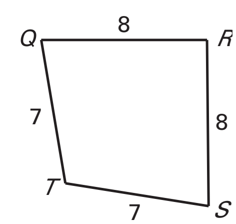
Step 2 **Show** that trapezoid *FGHJ* is ____________. ∠*F* and ∠*G* are a pair of congruent _______________. So, *FGHJ* is an ______________________ by Theorem 8.15.

Yes, the diagram is sufficient to show that *FGHJ* is an isosceles trapezoid.

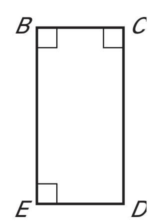
Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

2. What is the most specific name for quadrilateral *QRST*? *Explain* your reasoning.



3. Is enough information given in the diagram to show that quadrilateral *BCDE* is a rectangle? *Explain*.



Homework

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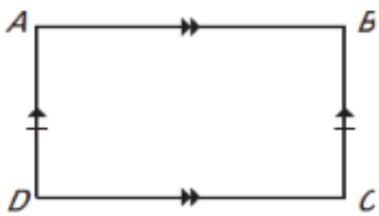
Complete the following problem. Make sure you justify your answer by either:

- **Checking your answer**
- **Providing a theorem, postulate, or definition**
- **Showing your work.**

Which pairs of segments or angles must be congruent so that you can prove that *ABCD* is the indicated quadrilateral? *Explain*. There may be more than one right answer.

Rectangle



Answer the following questions. Make sure you use full sentences and use the correct vocabulary words when appropriate.

1. Describe how section is connected to something that we learned previously this year.

2. What skills did you use in this section that you learned earlier in this class?

3. What do you think will come next?