The student will verify characteristics of quadrilaterals and use properties of quadrilaterals to solve real-world problems.

The student will solve real-world problems involving angles of polygons.

<table>
<thead>
<tr>
<th>Block / Date</th>
<th>Section and Objectives</th>
<th>Classwork and Homework</th>
</tr>
</thead>
</table>
| 8.1          | **Find Angle Measures in Polygons**  
- Construct all possible diagonals from a given vertex in a polygon  
- Find the sum of the measures of the angles in a convex polygon  
- Know and apply the Polygons Interior Angles Theorem  
- Know that the sum of the measures of the interior angles of a quadrilateral is 360°  
- Find the number of sides of a polygon when given the sum of the interior angles  
- Determine the measure of an unknown interior angle for a quadrilateral  
- Know and apply the Polygon Exterior Angles Theorem  
- Find the interior angle measures in a regular polygon  
- Know the names for polygons with 3-10 sides, as well as 12, 20, and n sides | • AIMS Inside Job  
• Gizmo: Polygon Angle Sum  
• WS Practice 8.1  
• Activity 3: Find Missing Angle Measures  
• Activity 4: Algebra and Polygon Angle Sums  
• Activity 6: Processing Exterior Angle Sum  
• Activity 7: Regular Polygons, Exterior Angles, and Number of Sides  
• WSQ 8-1  
• WSQ 8-2 |
| 8.2          | **Use Properties of Parallelograms**  
- Opposite sides in a parallelogram are congruent and parallel  
- Opposite angles in a parallelogram are congruent  
- Consecutive angles in a parallelogram are supplementary  
- Diagonals of a parallelogram bisect each other | • WS Practice 8.2 & 8.3  
• Activity 2: Processing the Properties of the Angles of a Parallelogram  
• Activity 3: Processing All Properties of Parallelograms  
• Activity 4: Am I a Parallelogram?  
• Quiz next class on 8.1–8.3  
• WSQ 8-4 |
| 8.3          | **Show That a Quadrilateral is a Parallelogram**  
- Know and apply the 5 ways to Prove a Quadrilateral is a Parallelogram (pg. 525) |  |
| 8.4          | **Properties of Rhombuses, Rectangles, and Squares**  
- Know the definitions and properties for rhombus, rectangle, and square | • Quiz on 8.1–8.3  
• Activity 2: Arithmetic, Algebra, and the Rhombus  
• Activity 3: Algebra and Rectangles  
• Activity 5: Algebra and Squares  
• WSQ 8-5 and 8-6 |
### 8.5 Use Properties of Trapezoids and Kites
- Know the definition of a trapezoid
- Identify the bases, the base angles, and the legs for a trapezoid
- Know the definition of an isosceles trapezoid
- Know the properties for an isosceles trapezoid
- Define the median/midsegment of a trapezoid
- Apply the Midsegment Theorem for Trapezoids
- Know the definition of a kite
- Know the properties for a kite

### 8.6 Identify Special Quadrilaterals
- Given information for a shape, determine the type of quadrilateral

### Review
- Review Pre Test
- Activity 3: Always, Sometimes, Never
- Activity 4: Always, Sometimes, Never and Quadrilaterals

### Test
- Big Quadrilateral Project
- Bigger Quadrilateral Project
- Pg 648 #1-9

### Helpful Hints
- Review your notes daily.
- Complete all WSQs and notes in a timely fashion.
- Come to class with specific questions.
- Keep your work nice, neat, and organized.
- Include all drawings and show the work that leads to your solution as you work through these problems. If this is missing, you will not receive any credit on your assessments.
## PROPERTIES OF QUADRILATERALS

<table>
<thead>
<tr>
<th>Name of figure</th>
<th>Diagonals</th>
<th>Angles</th>
<th>Sides</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Are ⊥</td>
<td>Are ≅</td>
<td>Bisect ea. other</td>
</tr>
<tr>
<td>Parallelogram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectangle</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rhombus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Square</td>
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</tbody>
</table>
# PROPERTIES OF SPECIAL QUADRILATERALS

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Are ⊥</td>
<td>Are ≡</td>
<td>Bisect ea. other</td>
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<tr>
<td>Trapezoid</td>
<td></td>
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<tr>
<td>Isosceles Trapezoid</td>
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<td></td>
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</tr>
<tr>
<td>Kite</td>
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</tbody>
</table>
An Inside Job

To find the number of degrees in each inside angle of a regular polygon:
1. Form triangles inside each polygon by drawing diagonals from each star. Count the triangles. Multiply by 180°.
2. Divide by number of sides in polygon.

<table>
<thead>
<tr>
<th>Regular Polygon</th>
<th>Number of Triangles × 180°</th>
<th>Number of Sides</th>
<th>Degrees in each inside angle of polygon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equilateral Triangle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Square</td>
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<td></td>
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<tr>
<td>Pentagon</td>
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<td>Hexagon</td>
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<tr>
<td>Octagon</td>
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</tr>
</tbody>
</table>

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### Naming Polygons and Other Information

<table>
<thead>
<tr>
<th>Number of sides</th>
<th>Type of polygon</th>
<th>Sum of interior angles</th>
<th>Measure each interior angle for regular polygon</th>
<th>Measure of each exterior angle for regular polygon</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
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</tbody>
</table>

### Other Formulas for Regular Polygons

<table>
<thead>
<tr>
<th>To Find The…</th>
<th>Use the formula:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of interior angles</td>
<td></td>
</tr>
<tr>
<td>Number of sides given sum of interior angles</td>
<td></td>
</tr>
<tr>
<td>Number of sides and you know the measure of each interior angle</td>
<td></td>
</tr>
<tr>
<td>Sum of exterior angles</td>
<td></td>
</tr>
<tr>
<td>Measure of each interior angle if you know the number of sides</td>
<td></td>
</tr>
<tr>
<td>An exterior angle and you know the measure of each interior angle</td>
<td></td>
</tr>
<tr>
<td>An interior angle and you know the measure of each exterior angle</td>
<td></td>
</tr>
</tbody>
</table>
Finding Angle Measures in Polygons

Examples:
1. Find the sum of the measures of the interior angles of a convex octagon.

2. The sum of the measures of the interior angles of a convex polygon is 900°. Classify the polygon by the number of sides.

3. A coin is in the shape of a regular 11-gon. Find the sum of the measures of the interior angles.

4. The sum of the measures of the interior angles of a convex polygon is 1440°. Classify the polygon by the number of sides.
5. Find the value of $x$ in the diagram shown.

6. Use the diagram to find $\angle S$ and $\angle T$.

7. The measures of three of the interior angles of a quadrilateral are $89^\circ$, $110^\circ$, and $46^\circ$. Find the measure of the fourth interior angle.

8. What is the value of $x$ in the diagram?

9. A convex hexagon has exterior angles with measures $34^\circ$, $49^\circ$, $58^\circ$, $67^\circ$, and $75^\circ$. What is the measure of an exterior angle at the sixth vertex?
Geometry

WS Practice 8.1

Find the sum of the measures of the interior angles of the indicated convex polygon.

1. hexagon
2. dodecagon
3. 11-gon

4. 15-gon
5. 20-gon
6. 40-gon

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

7. 180°
8. 540°
9. 900°

10. 1800°
11. 2520°
12. 3960°

Find the value of x.

16. 17.
18. The measures of the exterior angles of a convex quadrilateral are 90°, 10x°, 5x°, and 45°. What is the measure of the largest exterior angle?

19. The measures of the interior angles of a convex octagon are 45x°, 40x°, 155°, 120°, 155°, 38x°, 158°, and 41x°. What is the measure of the smallest interior angle?

Find the measures of an interior angle and an exterior angle of the indicated polygon.
22. regular triangle 23. regular octagon 24. regular 16-gon

Find the value of n for each regular n-gon described.
25. Each interior angle of the regular n-gon has a measure of 140°.

26. Each interior angle of the regular n-gon has a measure of 175.2°
Parallelograms

If a quadrilateral is a parallelogram, then:
- ___________________________________________________________________
- ___________________________________________________________________
- ___________________________________________________________________
- ___________________________________________________________________

Examples:
1. Find the values of $x$ and $y$.

2. Find the indicated measure given the JKLM is a parallelogram.
   a. $NM$  
   b. $KM$
   c. $m\angle JML$  
   d. $m\angle KML$

3. Find the values of $a$ and $b$ in the parallelogram.

4. Find the indicated measures in parallelogram ABCD.
   a. $m\angle BCD$
   b. If $BE = 9$, find $BD$. 

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How do I know if a quadrilateral is a parallelogram?

If....
- both pairs of______________________________________________________________
- both pairs of______________________________________________________________
- both pairs of______________________________________________________________
- one pair______________________________________________________________
- the diagonals of ________________________________________________________________

Examples:
What reasoning can you use to show that the quadrilateral is a parallelogram?
1.  
   \[
   \text{30 m} \\
   \text{30 m}
   \]

2.  
   \[
   \text{5 in} \\
   \text{7 in}
   \]

3.  
   \[
   \text{65°} \\
   \text{115°}
   \]

4. For what value of \(x\) is quadrilateral CDEF a parallelogram?

5. In quadrilateral WXYZ, \(\angle W = 42^\circ\), \(\angle X = 138^\circ\), \(\angle Y = 42^\circ\). Find \(\angle Z\). Is WXYZ a parallelogram?
Geometry
WS Practice 8.2 & 8.3

Find the measure of the indicated angle in the parallelogram.
1. Find $m \angle B$.
2. Find $m \angle G$.
3. Find $m \angle M$.

Find the value of each variable in the parallelogram.
4. $b$
5. $x + 2$
6. $(y - 60)^\circ$
7. $(f + 30)^\circ$
8. $9$
9. $3j$

Find the indicated measure in $\square ABCD$.
10. $m \angle AEB$
11. $m \angle BAE$
12. $m \angle AED$
13. $m \angle ECB$
14. $m \angle BAD$
15. $m \angle DCE$
16. $m \angle ADC$
17. $m \angle DCB$
What theorem can you use to show that the quadrilateral is a parallelogram?

18. 

19. 

For what value of x is the quadrilateral a parallelogram?

22. 

23. 

24. 

25. 

26. 

27.
Rhombuses, Rectangles, and Squares

rhombus –

rectangle –

square –

Examples:
1. For any rhombus QRST, decide whether the statement is always or sometimes true.
   a. $\angle Q \cong \angle S$
   b. $\angle Q \cong \angle R$

2. Classify the special quadrilateral. Explain your reasoning.
Theorems about Diagonals

A parallelogram is a rhombus if and only if...

A parallelogram is a rhombus if and only if...

A parallelogram is a rectangle if and only if...

3. Sketch rectangle ABCD. List everything you know about it.
trapezoid –

bases –

legs –

isosceles trapezoid –

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

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

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

The Midsegment –

Midsegment Characteristics:

1) 
2) 
3) 

Example: Finding the length of the midsegment in trapezoids.

1. 

2.
Example: Finding the length of the base in trapezoids.

3. \[ \text{M} \quad 23 \text{ ft.} \quad \text{N} \quad 27 \text{ ft.} \]

Example: Finding angle measurements in trapezoids.

5. \[ \text{S} \quad 16x - 2 \quad \text{R} \]

6. \[ \text{G} \quad 98^\circ \quad \text{F} \quad 8x + 2 \]

7. \[ \text{X} \quad 3 + 21x \quad \text{Y} \quad 66^\circ \]

Kite –

**Kite Characteristics:**

1)

2)

3. Find \( m \angle D \) in the kite shown at the right.
Always, Sometimes, or Never?

1) Is a square a rectangle?  
   Always   |  Sometimes  |  Never

2) Is a rectangle a square?  
   Always   |  Sometimes  |  Never

3) Is a trapezoid an isosceles trapezoid?  
   Always   |  Sometimes  |  Never

4) Is a rectangle a kite?  
   Always   |  Sometimes  |  Never

Summarize in your own words:
Geometry
WS Practice 8.5

Find m \( \angle F \), m \( \angle G \), and m \( \angle H \).

1. \[ \triangle FJG \]

2. \[ \text{Find the length of the midsegment of the trapezoid.} \]

3. \[ \text{JKLM is a kite. Find m \( \angle K \).} \]

4. \[ \text{Find the value of x.} \]

5. \[ \text{8x + 3.2} \]

6. \[ \text{80°} \]

7. \[ \text{4x} \]

8. \[ \text{Muscarella, 2013} \]
11. You cut out a piece of fabric in the shape of a kite so that the congruent angles of the kite are 100° each. Of the remaining two angles, one is 4 times larger than the other. What is the measure of the largest angle in the kite?

Find the value of $x$.

12. 

13. 

14. 

15.
SHOW ALL WORK!!

Find the value of x.

1. \[ \text{Find the value of each variable in the parallelogram.} \]

2.

3. \[ \]

4.

5.

6.

7.

8.

9.

10.
Find the value of $x$.

11.  
\[ 129^\circ + x^\circ \]

12.  
\[ 16.5 + 4x = 8 \]

13.  
\[ 10 = 2x \]

14.  
\[ 60^\circ + 104^\circ = x \]

Find the value of $x$.

15.  
\[ 155^\circ = (x + 10)^\circ \]
\[ 98^\circ + 120^\circ + 100^\circ + 140^\circ \]

16.  
\[ 112^\circ + 80^\circ = 138^\circ + 2x^\circ \]

17.  
\[ (x - 7)^\circ + 72^\circ + 80^\circ + 65^\circ \]

18.  
\[ x^\circ + 85^\circ + 40^\circ + 2x^\circ \]

Find the measure of an interior angle and an exterior angle of the indicated regular polygon.

19. hexagon

20. nonagon

Find the value of each variable.

21.  
\[ \begin{align*}
6 & = 2a + 4 \\
14 & = b + 1
\end{align*} \]

22.  
\[ \begin{align*}
3a^\circ & = a^\circ + b^\circ
\end{align*} \]
23. Find the value of $x$.

\[
\begin{align*}
\text{Diagram with a parallelogram with sides 19 and 31, and an unknown side marked } x.
\end{align*}
\]

24. RSTV is a kite. Find $m\angle V$.

\[
\begin{align*}
\text{Diagram with a kite RSTV with angles } 80^\circ, 75^\circ, \text{ and } 75^\circ.
\end{align*}
\]

25. Name two properties of:

- about a parallelogram
- about a rectangle
- about a rhombus
- about an isosceles trapezoid