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Summer Edition

Geometry

Activity 2

knoxschools.org/kcsathome

This packet includes four sections that cover the major content of Geometry. Each section includes four pages of notes and practice for each topic. For additional support, visit KCS TV on YouTube for instructional videos that accompany each section.

The following content is included in this packet:

	Section			
	Section I **Similarity**	Section II **Quadrilaterals**	Section III **Trigonometry**	Section IV **Circles**
Problem Set 1	Ratios & Proportions	The Polygon Angle-Sum Theorems	The Pythagorean Theorem and Its Converse	Tangent Lines
Problem Set 2	Similar Polygons	Properties of Parallelograms	Special Right Triangles	Chords and Arcs
Problem Set 3	Proving Triangles Similar	Proving That a Quadrilateral is a Parallelogram	Trigonometry and Angles of Elevation & Depression	Inscribed Angles
Problem Set 4	N/A	Properties of Rhombuses, Rectangles, and Squares	Law of Sines and Cosines	Angle Measures and Segments

Geometry

SECTION II

Quadrilaterals
• The Polygon Angle-Sum Theorems • Properties of Parallelograms • Proving That a Quadrilateral is a Parallelogram • Properties of Rhombuses, Rectangles, and Squares

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II Quadrilaterals

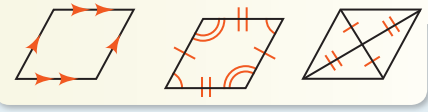
Connecting BIG ideas and Answering the Essential Questions

1 Measurement
You can find the sum of the interior angle measures of any polygon using a formula based on its number of sides.

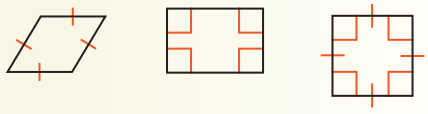
Polygon Angle-Sum Theorems (Lesson 6-1)
Sum $= (n - 2)180$, where n is the number of sides

2 Reasoning and Proof
If you know certain information about the sides, angles, or diagonals of a quadrilateral, you can classify it.

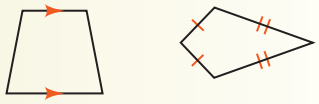
Parallelograms (Lessons 6-2 and 6-3)



Special Parallelograms (Lessons 6-4 and 6-5)



Trapezoids and Kites (Lesson 6-6)



3 Coordinate Geometry
Coordinate proofs use variable coordinates to prove relationships in the coordinate plane.

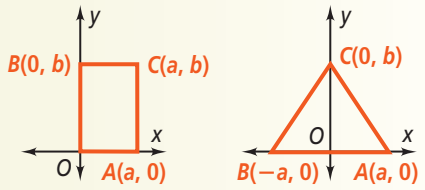
Applying Coordinate Geometry (Lessons 6-7 and 6-8)

midpoint: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

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

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

Coordinate Proofs (Lesson 6-9)



Chapter Vocabulary

- base, base angle, and leg of a trapezoid (p. 389)
- consecutive angles (p. 360)
- coordinate proof (p. 408)
- equiangular, equilateral polygon (p. 354)
- isosceles trapezoid (p. 389)
- kite (p. 392)
- midsegment of a trapezoid (p. 391)
- opposite angles (p. 359)
- opposite sides (p. 359)
- parallelogram (p. 359)
- rectangle (p. 375)
- regular polygon (p. 354)
- rhombus (p. 375)
- square (p. 375)
- trapezoid (p. 389)

Choose the vocabulary term that correctly completes the sentence.

1. A parallelogram with four congruent sides is a(n) ? .

2. A polygon with all angles congruent is a(n) ? .

3. Angles of a polygon that share a side are ? .

4. A(n) ? is a quadrilateral with exactly one pair of parallel sides.

6-1 The Polygon Angle-Sum Theorems

Quick Review

The sum of the measures of the interior angles of an n-gon is $(n-2)180$. The measure of one interior angle of a regular n-gon is $\frac{(n-2)180}{n}$. The sum of the measures of the exterior angles of a polygon, one at each vertex, is 360.

Example

Find the measure of an interior angle of a regular 20-gon.

$$\text{Measure} = \frac{(n-2)\,180}{n} \quad \text{Corollary to the Polygon Angle-Sum Theorem}$$

$$= \frac{(20-2)180}{20} \quad \text{Substitute.}$$

$$= \frac{18 \cdot 180}{20} \quad \text{Simplify.}$$

$$= 162$$

The measure of an interior angle is 162.

Exercises

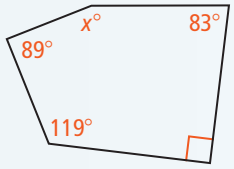
Find the measure of an interior angle and an exterior angle of each regular polygon.

5. hexagon **6.** 16-gon **7.** pentagon

8. What is the sum of the exterior angles for each polygon in Exercises 5–7?

Find the measure of the missing angle.

9.



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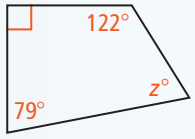


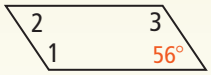
6-2 Properties of Parallelograms

Quick Review

Opposite sides and **opposite angles** of a **parallelogram** are congruent. **Consecutive angles** in a parallelogram are supplementary. The diagonals of a parallelogram bisect each other. If three (or more) parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

Example

Find the measures of the numbered angles in the parallelogram.

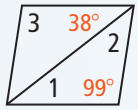


Since consecutive angles are supplementary, $m\angle 1 = 180 - 56$, or 124. Since opposite angles are congruent, $m\angle 2 = 56$ and $m\angle 3 = 124$.

Exercises

Find the measures of the numbered angles for each parallelogram.

11.



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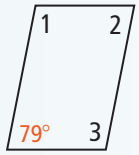

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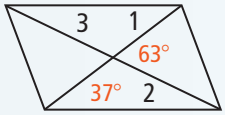


14.

Find the values of x and y in $\square ABCD$.

15. $AB = 2y$, $BC = y + 3$, $CD = 5x - 1$, $DA = 2x + 4$

16. $AB = 2y + 1$, $BC = y + 1$, $CD = 7x - 3$, $DA = 3x$

6-3 Proving That a Quadrilateral Is a Parallelogram

Quick Review

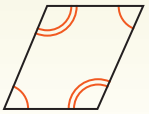
A quadrilateral is a parallelogram if any one of the following is true.

- Both pairs of opposite sides are parallel.
- Both pairs of opposite sides are congruent.
- Consecutive angles are supplementary.
- Both pairs of opposite angles are congruent.
- The diagonals bisect each other.
- One pair of opposite sides is both congruent and parallel.

Example

Must the quadrilateral be a parallelogram?

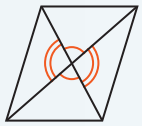
Yes, both pairs of opposite angles are congruent.



Exercises

Determine whether the quadrilateral must be a parallelogram.

17.



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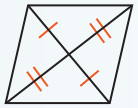
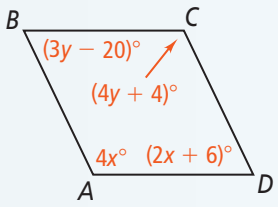


Algebra **Find the values of the variables for which *ABCD* must be a parallelogram.**

19.



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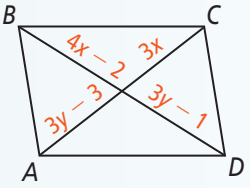


6-4 Properties of Rhombuses, Rectangles, and Squares

Quick Review

A **rhombus** is a parallelogram with four congruent sides.

A **rectangle** is a parallelogram with four right angles.

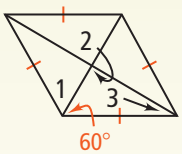
A **square** is a parallelogram with four congruent sides and four right angles.

The diagonals of a rhombus are perpendicular. Each diagonal bisects a pair of opposite angles.

The diagonals of a rectangle are congruent.

Example

What are the measures of the numbered angles in the rhombus?

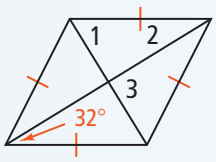


$m\angle 1 = 60$	Each diagonal of a rhombus bisects a pair of opposite angles.
$m\angle 2 = 90$	The diagonals of a rhombus are $\perp$.
$60 + m\angle 2 + m\angle 3 = 180$	Triangle Angle-Sum Thm.
$60 + 90 + m\angle 3 = 180$	Substitute.
$m\angle 3 = 30$	Simplify.

Exercises

Find the measures of the numbered angles in each special parallelogram.

21.



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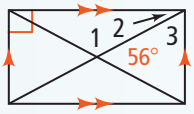

Determine whether each statement is *always*, *sometimes*, or *never* true.

23. A rhombus is a square.

24. A square is a rectangle.

25. A rhombus is a rectangle.

26. The diagonals of a parallelogram are perpendicular.

27. The diagonals of a parallelogram are congruent.

28. Opposite angles of a parallelogram are congruent.

Section II - Quadrilaterals

1. rhombus
2. equiangular polygon
3. consecutive angles
4. trapezoid
5. 120, 60
6. 157.5, 22.5
7. 108, 72
8. 360, 360, 360
9. 159
10. 69
11. $m\angle 1 - 38$, $m\angle 2 = 43$, $m\angle 3 = 99$
12. $m\angle 1 = 101$, $m\angle 2 = 79$, $m\angle 3 = 101$
13. $m\angle 1 = 37$, $m\angle 2 = 26$, $m\angle 3 = 26$
14. $m\angle 1 = 45$, $m\angle 2 = 45$, $m\angle 3 = 45$
15. $x = 3, y = 7$.
16. $x = 2, y = 5$.
17. no
18. yes
19. $x = 29, y = 28$
20. $x = 4, y = 5$.
21. $m\angle 1 = 58$, $m\angle 2 = 32$, $m\angle 3 = 90$
22. $m\angle 1 = 124$, $m\angle 2 = 29$, $m\angle 3 = 62$
23. sometimes
24. always
25. sometimes
26. sometimes
27. sometimes
28. always