

Geometry Notes – Chapter 8: Quadrilaterals

8.1 – Angle Measures in Polygons

Thm 8.1: Polygon Interior Angles Thm

The sum of the measures of the interior angles of a convex n -gon is $(n - 2) \cdot 180^\circ$.

Quadrilateral Corollary – The sum of the measures of the interior angles of any quadrilateral is 360° .

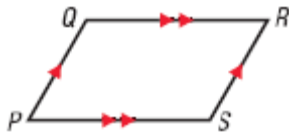
Thm 8.2: Polygon Exterior Angles Thm

The sum of the measures of the exterior angles of a convex polygon is 360° .

8.2 – Properties of Parallelograms

Parallelogram Definition

A quadrilateral is a parallelogram if both pairs of its opposite sides are parallel.



Parallelogram Properties (Theorems)

- Opposite sides are congruent
- Opposite angles are congruent
- Consecutive angles are supplementary
- Diagonals bisect each other

8.3 – Proving Quads are Parallelograms

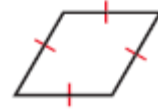
Ways to Prove a Quad is a Parallelogram

1. Show that both pairs of opposite sides are parallel (definition)
2. Show that both pairs of opposite sides are congruent (Thm 8.7)
3. Show that both pairs of opposite angles are congruent (Thm 8.8)
4. Show that one pair of opposite sides are parallel and congruent (Thm 8.9)
5. Show that the diagonals bisect each other (Thm 8.10)

8.4 – Rhombuses, Rectangles & Squares

Rhombus Definition

A rhombus is a parallelogram with four congruent sides (equilateral).



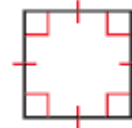
Rectangle Definition

A rectangle is a parallelogram with four congruent, right angles (equiangular).



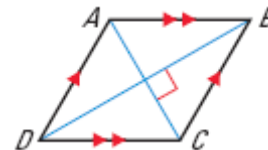
Square Definition

A square is a parallelogram with four congruent sides and four congruent, right angles (equilateral and equiangular). So a square is both a rhombus and a rectangle.

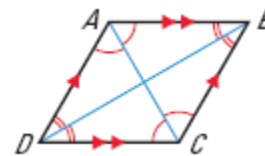


Diagonal Properties of a Rhombus

The diagonals of a rhombus are perpendicular (Thm 8.11)

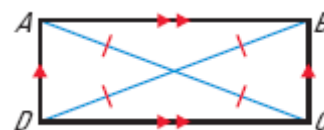


The diagonals of a rhombus bisect each pair of opposite angles (Thm 8.12)



Diagonal Property of a Rectangle

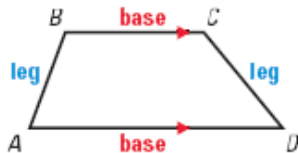
The diagonals of a rectangle are congruent (Thm 8.13)



Geometry Notes – Chapter 8: Quadrilaterals

8.5 – Properties of Trapezoids and Kites

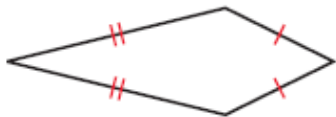
A **trapezoid** is a quadrilateral with exactly one pair of parallel sides. The parallel sides are called the *bases* and the nonparallel sides are called the *legs*.



An **isosceles trapezoid** is a trapezoid in which the legs are congruent (the nonparallel sides).

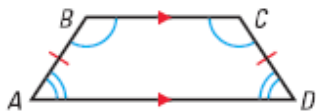


A **kite** is a quadrilateral with two pairs of consecutive congruent sides, but whose opposite sides are not congruent.

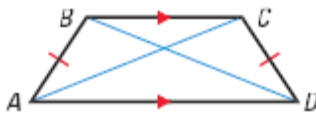


Properties of Isosceles Trapezoids

Both pairs of base angles are congruent

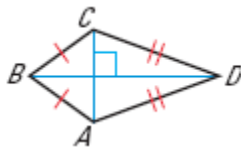


The diagonals are congruent

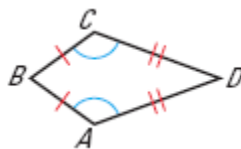


Properties of Kites

The diagonals are perpendicular

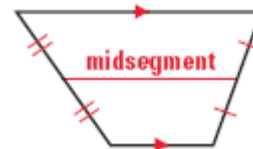


Exactly one pair of opposite angles are congruent



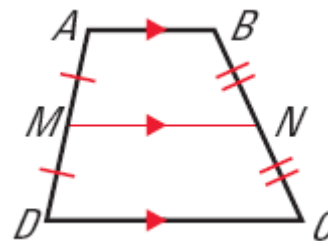
Midsegments of Trapezoids

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



Midsegment Theorem

The midsegment of a trapezoid is parallel to the bases and equal to one half the sum of the lengths of the bases.



In the diagram above, if \overline{MN} is the midsegment of trapezoid ABCD, then $\overline{MN} \parallel \overline{AB}$ and $\overline{MN} \parallel \overline{DC}$, and

$$MN = \frac{1}{2}(AB + CD)$$

8.6 – Summary of Special Quadrilaterals

Refer to your worksheet in which we made a table of all special quadrilaterals and their properties.