Geometry: *Hutschenreuter* Name KEY

Section 8.3: Show that a Quadrilateral is a Parallelogram

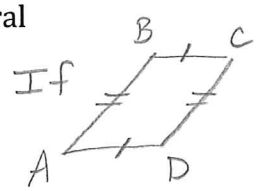
Essential Question:
How can you prove that a quadrilateral is a parallelogram?

PREVIOUS VOCABULARY:

Converse Statement — Interchange the hypothesis & conclusion
"If x, then y." becomes "If y, then x"

Theorem 8.7:

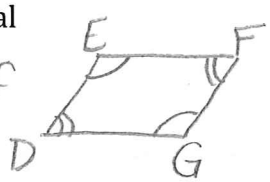
If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.



If , then ABCD is a parallelogram.

Theorem 8.8:

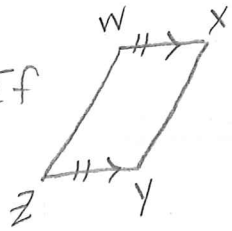
If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.



If then DEFG is a parallelogram.

Theorem 8.9:

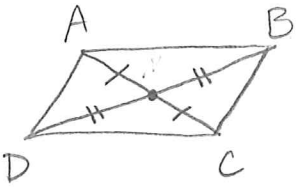
If one pair of opposite sides of a quadrilateral are congruent and parallel, then the quadrilateral is a parallelogram.



If then WXYZ is a parallelogram.

Theorem 8.10:

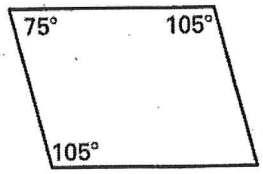
If the diagonals of a quadrilateral bisect Each other, then the quadrilateral is a parallelogram.



If then ABCD is a parallelogram.

A1. What theorem can you use to show that the quadrilateral is a parallelogram?

a.



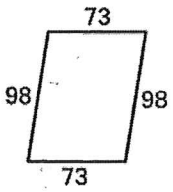
Int ∠ Sum = 360°

360
−105
−105
− 75
75°

missing ∠ = 75°

Thm 8.8 → opp ∠s ≅

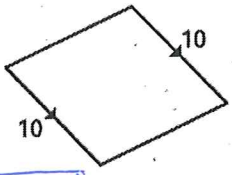
b.



Thm 8.7

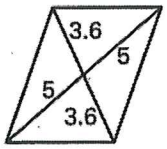
both pairs of opp. sides are ≅

A1(continued). What theorem can you use to show that the quadrilateral is a parallelogram?

c. 

Thm 8.9

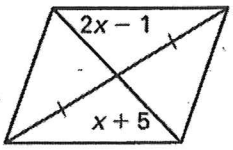
One pair of opp. sides are // and ≅

d. 

Thm 8.10

The diagonals bisect each other

A2. For what value of x is the quadrilateral a parallelogram?

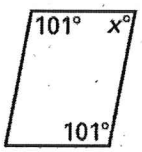
a. 

(Thm 8.10)

$2x-1 = x+5$

$-x \quad +1$

$x = 6$

b. 

$101 + x = 180$

-101

$x = 79°$

(Thm 8.5)

How do you know if a quadrilatteral is a parallelogram?

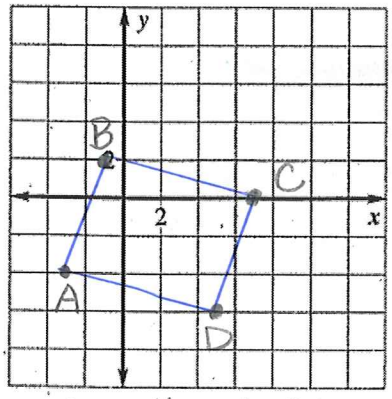
1) Show that opposite sides are **congruent** using the distance formula = $\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$

2) Show that opposite sides are **parallel** using the slope formula = $m = \frac{y_1-y_2}{x_1-x_2}$

3) Show that one pair of opposite sides are parallel **AND** congruent

A3. Draw ABCD and show that it's a parallelogram.
$A(-3,-4), B(-1,2), C(7,0), D(5,-6)$

Choose any option... I pick #3 here



$BC = \sqrt{8^2+2^2} = \sqrt{64+4} = \sqrt{68}$

$AD = \sqrt{8^2+2^2} = \sqrt{64+4} = \sqrt{68}$ > same ✓

$m(BC) = \frac{2-0}{-1-7} = \frac{2}{-8} = -\frac{1}{4}$

$m(AD) = \frac{-4+6}{-3-5} = \frac{2}{-8} = -\frac{1}{4}$ > same ✓

One pair is // and ≅

∴ ABCD is a parallelogram

Summary 8.3:

To show a quadrilateral is a parallelogram you can:

1. Show both pairs of opposite sides are parallel OR
2. Show both pairs of opposite sides are congruent OR
3. Show one pair of opp. sides are // AND ≅