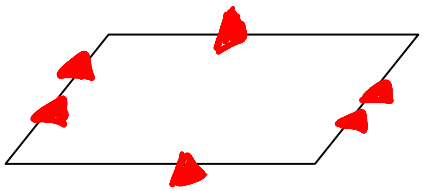
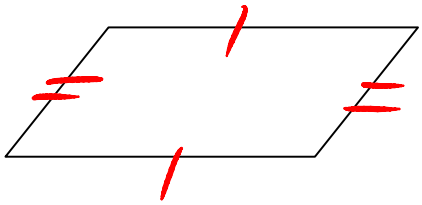
6.3 Tests for Parallelograms

Thm: A quadrilateral is a parallelogram:

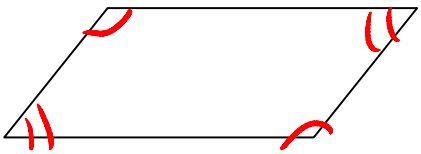
- If both pairs of opposite sides are ∥



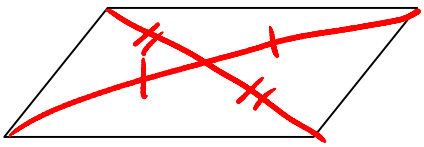
- If both pairs of opposite sides are ≅



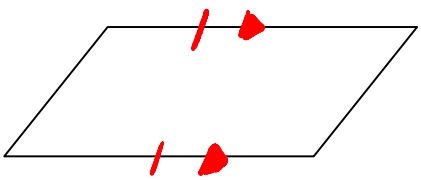
- If both pairs of opposite ∠'s are ≅



- If diagonals bisect each other



- If one pair of opposite sides is both parallel and ≅



If you need to determine if a quadrilateral is a parallelogram, using points, how could you use the:

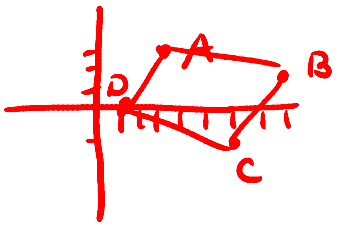
a.) Slope formula? opp sides ∥ (same slope)

b.) Distance formula? opp sides ≅

opp sides ≅ and ∥

c.) Slope and distance formula? 1 pair

For example: Determine whether the quadrilateral is a parallelogram. Justify your answer using the given formula. A(3,3), B(8,2), C(6,-1), D(1,0)



a.) Slope Formula

$AB \to -\frac{1}{5}$ $AD \to \frac{3}{2}$

$BC \to \frac{3}{2}$

$CD \to -\frac{1}{5}$

yes

b.) Distance Formula

$AB = \sqrt{26}$ $AD = \sqrt{13}$

$BC = \sqrt{13}$

$CD = \sqrt{26}$

yes

c.) Slope and distance formula

$AB \to -\frac{1}{5}$ $\sqrt{26}$

$CD \to -\frac{1}{5}$ $\sqrt{26}$ yes

Write a coordinate proof for the following statement. If a quadrilateral is a parallelogram, then the opposite sides are congruent.

Using the distance formula,

$OL = \sqrt{(z+f-f)^2 + (q-q)^2} = \sqrt{z^2} = z$

$BD = \sqrt{(z-0)^2 + (0-0)^2} = \sqrt{z^2} = z$

$BO = \sqrt{(f-0)^2 + (q-0)^2} = \sqrt{f^2+q^2}$

$DL = \sqrt{(z+f-z)^2 + (q-0)^2} = \sqrt{f^2+q^2}$

Since my opposite sides are equal, they are congruent.