

Questions 5.4-5.5 Essential Question: What are properties of special ||-grams?

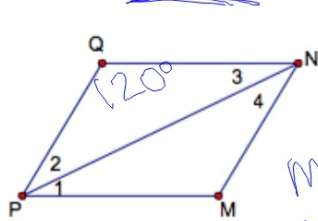
Theorem: Each diagonal of a rhombus bisects two angles of the rhombus.

Theorem: The diagonals of a rhombus are ⊥.

Theorem: If one diagonal of a ||-gram bisects two angles, then it is a rhombus.

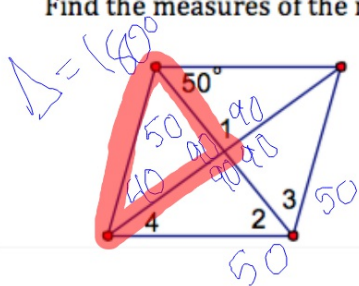
Theorem: If the diagonals of a ||-gram are perpendicular then it is a rhombus.

Example 1: ||-gram (consec. ∠s supp)
 MNPQ is a rhombus and $m\angle Q = 120^\circ$. Find the measure of the numbered angles.



$m\angle MPQ = 180 - 120 = 60^\circ = m\angle MNQ$
 $m\angle 1 = m\angle 2 = \frac{1}{2}(60) = 30^\circ$
 $m\angle 3 = m\angle 4 = \frac{1}{2}(60) = 30^\circ$

Example 2:
 Find the measures of the numbered angles in the rhombus.



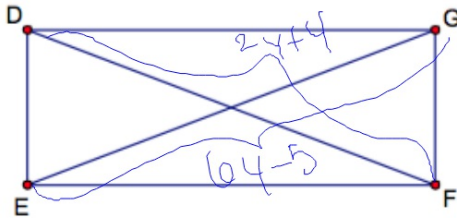
$m\angle 1 = 90^\circ$ (diagonals \perp)
 $m\angle 4 = 40^\circ$
 $m\angle 2 = m\angle 3 = 50^\circ$

Theorem: The diagonals of a rectangle are congruent.

Theorem: If the diagonals of a ||-gram are congruent, then it is a rectangle.

Example 3:

Find the length of the diagonals of rectangle GFED if $FD = 2y + 4$ and $GE = 6y - 5$.



diagonals \cong
 $2y + 4 = 6y - 5$
 $y = 2.25$

Example 4:

Determine whether the quadrilateral can be a parallelogram. If so, classify the parallelogram.

a) The quadrilateral has congruent diagonals and one angle of 60° .

No

b) The quadrilateral has perpendicular diagonals and four right angles.

Square

Summary:

Rhombus (rhombi)

- All sides \cong
- opp sides \parallel
- Diagonals are \angle bisectors
- Diagonals are \perp
- opp \angle s \cong

Rectangle

- opp sides \parallel
- \angle s \cong (all 90°)
- opp sides \cong
- Diagonals \cong

Square

- all sides \cong
- all \angle s \cong (90°)
- diagonals \perp
- opp sides \parallel
- diagonals \cong
- diagonals are \angle bisectors
- (rhombus + rectangle)