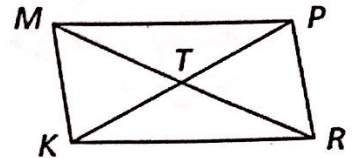


**Day 2 – Proving and Justifying with Parallelograms – Notes**

Yesterday, you explored 4 out of the 5 theorems associated with parallelograms. You learned that opposite sides are congruent, opposite angles are congruent, consecutive angles are supplementary, and diagonals bisect each other. It was mentioned that, in a parallelogram, diagonals form two congruent triangles, but you never really explored it. In the problem below, you are going to prove that a parallelogram forms two congruent triangles.

Using the picture at the right, answer the following questions about parallelogram MPRK. Justify your answer (using properties of parallelograms) for each question.



- a.  $\angle MPR \cong \angle MKR$  Why? opposite angles are  $\cong$
- b.  $\angle PRK \cong \angle PMK$  Why? opposite angles are  $\cong$
- c.  $\overline{MT} \cong \overline{TR}$  Why? diagonals bisect each other
- d.  $\overline{PR} \cong \overline{MK}$  Why? opposite sides are  $\cong$
- e.  $\overline{MP} \parallel \overline{KR}$  Why? opposite sides are parallel
- f.  $\overline{MK} \parallel \overline{PR}$  Why? opposite sides are parallel
- g.  $\angle MPK \cong \angle PKR$  Why? alternate interior angles are  $\cong$
- h.  $\angle MTK \cong \angle PTR$  Why? vertical angles are  $\cong$
- i.  $m\angle MKR + m\angle PRK = 180^\circ$  Why? consecutive angles are supplementary

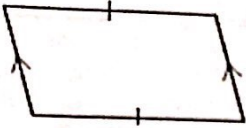
**Proving that a Quadrilateral is a Parallelogram**

To show that a quadrilateral is a parallelogram, you must prove one of the following:

- Prove that both pairs of opposite sides are parallel
- Prove that both pairs of opposite sides are congruent
- Prove that an angle is supplementary to both of its consecutive angles
- Prove that both pairs of opposite angles are congruent
- Prove that the diagonals bisect each other
- Prove that one pair of opposite sides is congruent and parallel

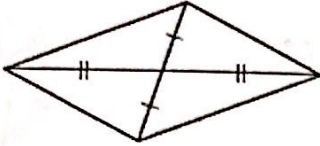
Determine if each quadrilateral must be a parallelogram. Explain why or why not.

a.



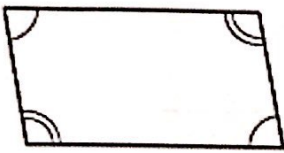
not enough info - you need one pair of opposite sides that are parallel and congruent

b.



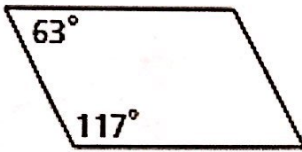
yes - diagonals bisect each other

c.



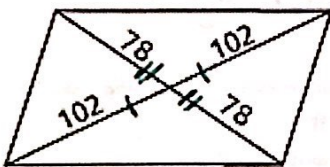
yes opposite angles are  $\cong$

d.



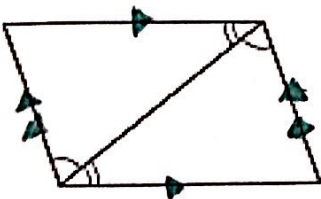
not enough info - you need to know the other consecutive angle is  $117^\circ$

e.



yes since each diagonal has been bisected

f.



yes, two sets of alternate interior angles show the opposite sides are parallel to each other