Angles in Quadrilaterals

ACMMG202

7 **8** 9 10 11 12

TI-Nspire Navigator Student 50 min

Objective

Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning.

Equipment

For this activity you will need:

- TI-Nspire
- TI-Nspire file: “Angles in Quadrilaterals” (tns)
- TI-Navigator system (Optional)

Problem 1 – Properties of Rhombi

You will begin this activity by looking at angle properties of rhombi. On page 1.3, you are given rhombus *READ* and the measure of angles *R*, *E*, *A*, and *D*.

Question: 1.

Move point *E* to four different positions and collect the measures of *R*, *E*, *A*, and *D* and record your measurements in the table below.

Position	*R*	*E*	*A*	*D*
1				
2				
3				
4				

Question: 2.

Consecutive angles of a rhombus are ___________________________.

Question: 3.

Opposite angles of a rhombus are ______________________________.

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Next, you will look at the properties of the angles created by the diagonals of a rhombi. On page 1.7, you are given rhombus *CARD* and the measure of angles *CSA*, *ASR*, *RSD*, and *DSC*.

Question: 4.

Move point *C* to four different positions. Angles formed by the intersection of the two diagonals of a rhombus are ___________________________________.

On page 1.10, you are given rhombus *RHOM* and the measure of all angles created by the diagonals of the rhombus.

Question: 5.

The diagonals of a rhombus bisect the vertices.

Problem 2 – Properties of Kites

You will begin this problem by looking at angle properties of kites. You are given kite *KING* and the measure of angles *K*, *I*, *N*, and G.

Question: 6.

Move point *I* to two different positions and point *K* to two different positions and collect the measures of *K*, *I*, *N*, and *G* and record your measurements in the table below.

Position	*K*	*I*	*N*	*G*
1				
2				
3				
4				

Question: 7.

What do you notice about the opposite angles of a kite?

Next, you will look at the properties of the angles created by the diagonals of a kite. On page 2.5, you are given kite *BLUE* and the measure of angles *BSL*, *LSU*, *USE*, and *ESB*.

Question: 8.

Move point *L* to four different positions. Angles formed by the intersection of the two diagonals of a kite are _______________________________.

On page 2.8, you are given rhombi *KITE* and the measure of all angles created by the diagonals of the rhombus.

Question: 9.

Move point *K* to four different positions. What do you notice about the angles created by the diagonals of a kite?

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Problem 3 – Properties of Trapezoids

In this problem, you will look at angle properties of trapezoids. You are given trapezoid *TRAP* and the measure of angles *T*, *R*, *A*, and *P*.

Question: 10.

Move point *R* to four different positions and collect the measures of *T*, *R*, *A*, and *P* onto the table below.

Position	*T*	*R*	*A*	*P*
1				
2				
3				
4				

Question: 11.

What do you notice about the angles of a trapezoid?

Problem 4 – Beyond Observation (Extension)

Parallelogram:

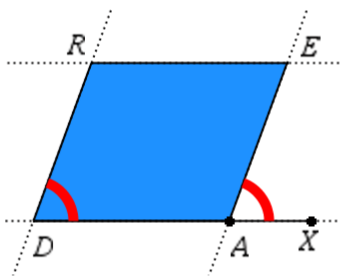
"A quadrilateral with pairs of opposite sides parallel".

Parallelograms have many properties that are a consequence of this definition. In problem 4 a parallelogram has been constructed. On page 4.1 the angle properties are explored through a series of steps. Follow these steps then answer the questions below.

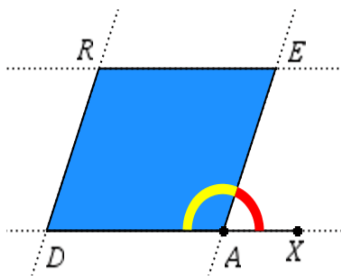
Question: 12.

Name and describe the relationship between each angle pair.

a)



b)



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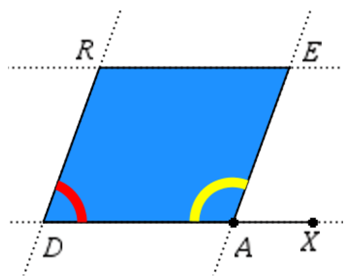

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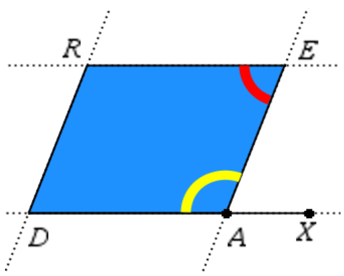
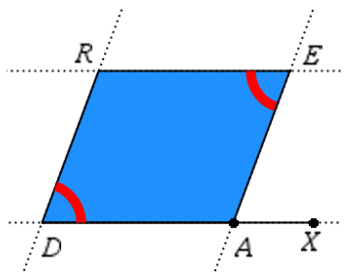


e)



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The interactive diagram on page 4.2 provides guided steps, to help prove that opposite sides of a parallelogram are equal in length.

Question: 13.

Use the interactive diagram to help formulate a proof to show that the opposite sides of a parallelogram are equal.

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