Essential Question  What are some properties of trapezoids and kites?

1 Exploration: Making a Conjecture about Trapezoids

Go to BigIdeasMath.com for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software.

a. Construct a trapezoid whose base angles are congruent. Explain your process.

Sample

b. Is the trapezoid isosceles? Justify your answer.

c. Repeat parts (a) and (b) for several other trapezoids. Write a conjecture based on your results.
### 7.5 Properties of Trapezoids and Kites (continued)

#### EXPLORATION: Discovering a Property of Kites

Go to BigIdeasMath.com for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software.

a. Construct a kite. Explain your process.

b. Measure the angles of the kite. What do you observe?

c. Repeat parts (a) and (b) for several other kites. Write a conjecture based on your results.

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**Communicate Your Answer**

3. What are some properties of trapezoids and kites?

4. Is the trapezoid at the right isosceles? Explain.

5. A quadrilateral has angle measures of $70^\circ$, $70^\circ$, $110^\circ$, and $110^\circ$. Is the quadrilateral a kite? Explain.
7.5 Notetaking with Vocabulary
For use after Lesson 7.5

In your own words, write the meaning of each vocabulary term.

trapezoid

bases

base angles

legs

isosceles trapezoid

midsegment of a trapezoid

kite

Theorems

Theorem 7.14 Isosceles Trapezoid Base Angles Theorem

If a trapezoid is isosceles, then each pair of base angles is congruent.

If trapezoid $ABCD$ is isosceles, then $\angle A \cong \angle D$ and $\angle B \cong \angle C$.

Theorem 7.15 Isosceles Trapezoid Base Angles Converse

If a trapezoid has a pair of congruent base angles, then it is an isosceles trapezoid.

If $\angle A \cong \angle D$ (or if $\angle B \cong \angle C$), then trapezoid $ABCD$ is isosceles.
Theorem 7.16  Isosceles Trapezoid Diagonals Theorem
A trapezoid is isosceles if and only if its diagonals are congruent.

Trapezoid $ABCD$ is isosceles if and only if $AC \cong BD$.

Theorem 7.17  Trapezoid Midsegment Theorem
The midsegment of a trapezoid is parallel to each base, and its length is one-half the sum of the lengths of the bases.

If $MN$ is the midsegment of trapezoid $ABCD$, then $MN \parallel AB$, $MN \parallel DC$, and $MN = \frac{1}{2}(AB + CD)$.

Theorem 7.18  Kite Diagonals Theorem
If a quadrilateral is a kite, then its diagonals are perpendicular.

If quadrilateral $ABCD$ is a kite, then $AC \perp BD$.

Theorem 7.19  Kite Opposite Angles Theorem
If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.

If quadrilateral $ABCD$ is a kite and $BC \cong BA$, then $\angle A \cong \angle C$ and $\angle B \neq \angle D$.

Notes:
7.5 Notetaking with Vocabulary (continued)

Extra Practice

1. Show that the quadrilateral with vertices at \(Q(0, 3), R(0, 6), S(-6, 0),\) and \(T(-3, 0)\) is a trapezoid. Decide whether the trapezoid is isosceles. Then find the length of the midsegment of the trapezoid.

In Exercises 2 and 3, find \(m\angle K\) and \(m\angle L\).

2.

3.

In Exercises 4 and 5, find \(CD\).

4.

5.

In Exercises 6 and 7, find the value of \(x\).

6.

7.