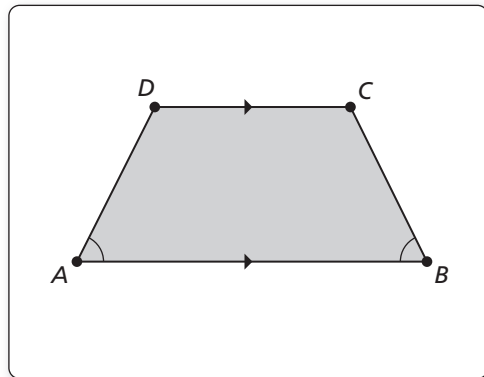


**7.5****Properties of Trapezoids and Kites**

For use with Exploration 7.5

**Essential Question** What are some properties of trapezoids and kites?**1 EXPLORATION:** Making a Conjecture about TrapezoidsGo 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)**

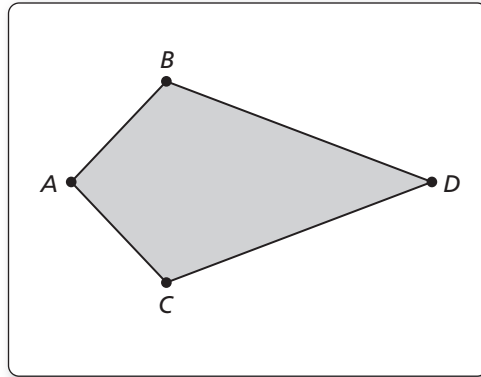
**2 EXPLORATION:** Discovering a Property of Kites

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.

Sample



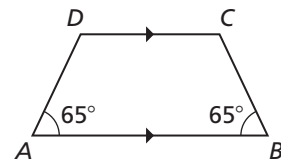
- b. Measure the angles of the kite. What do you observe?

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

**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

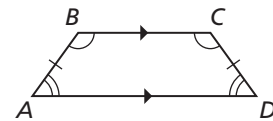
kite

**Theorems**

**Theorem 7.14 Isosceles Trapezoid Base Angles Theorem**

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

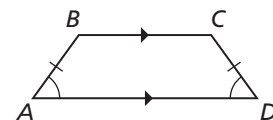
If trapezoid  $ABCD$  is isosceles, then  $\angle A \cong \angle D$  and  $\angle B \cong \angle C$ .



**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.

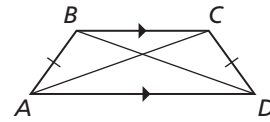


**7.5** Notetaking with Vocabulary (continued)

**Theorem 7.16 Isosceles Trapezoid Diagonals Theorem**

A trapezoid is isosceles if and only if its diagonals are congruent.

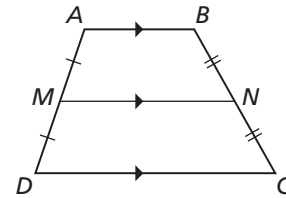
Trapezoid  $ABCD$  is isosceles if and only if  $\overline{AC} \cong \overline{BD}$ .



**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.

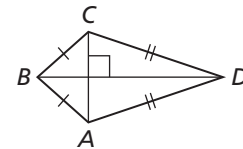
If  $\overline{MN}$  is the midsegment of trapezoid  $ABCD$ , then  $\overline{MN} \parallel \overline{AB}$ ,  $\overline{MN} \parallel \overline{DC}$ , and  $MN = \frac{1}{2}(AB + CD)$ .



**Theorem 7.18 Kite Diagonals Theorem**

If a quadrilateral is a kite, then its diagonals are perpendicular.

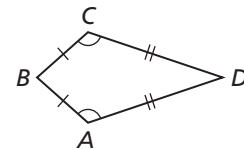
If quadrilateral  $ABCD$  is a kite, then  $\overline{AC} \perp \overline{BD}$ .



**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  $\overline{BC} \cong \overline{BA}$ , then  $\angle A \cong \angle C$  and  $\angle B \not\cong \angle D$ .

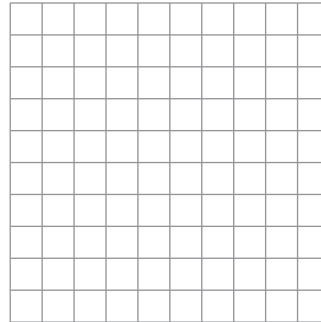


**Notes:**

**7.5** Notetaking with Vocabulary (continued)

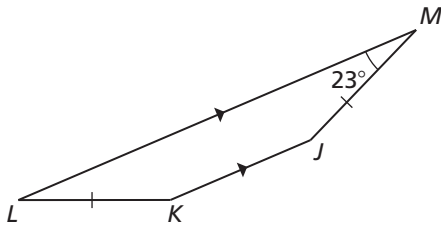
**Extra Practice**

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.

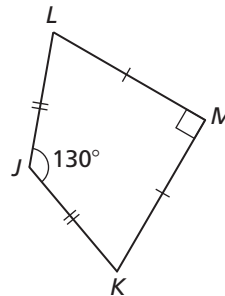


In Exercises 2 and 3, find  $m\angle K$  and  $m\angle L$ .

2.

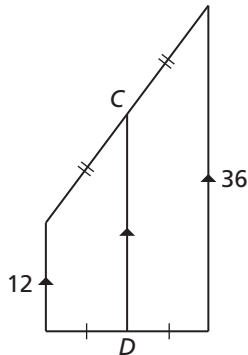


3.

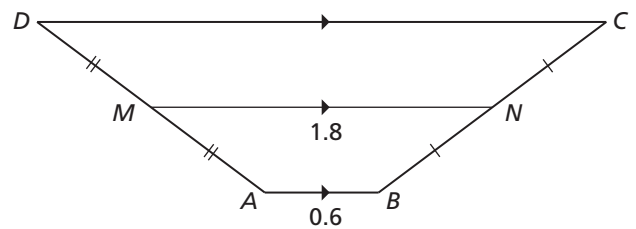


In Exercises 4 and 5, find  $CD$ .

4.

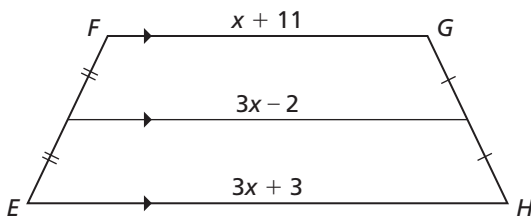


5.



In Exercises 6 and 7, find the value of  $x$ .

6.



7.

