

6-6

TRAPEZOIDS AND KITES

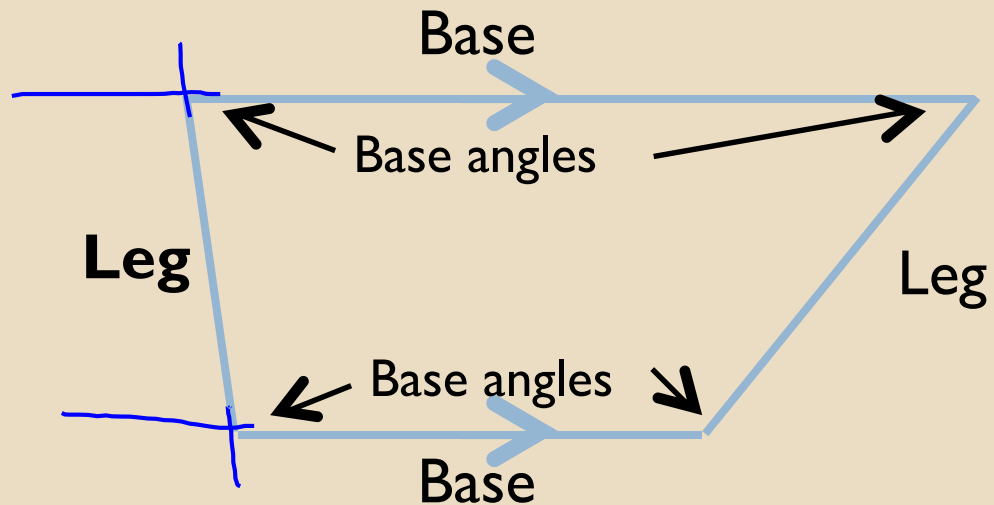


**TO VERIFY AND
USE PROPERTIES
OF TRAPEZOIDS
AND KITES**

OBJECTIVE

KEY CONCEPT

Trapezoid – quadrilateral with exactly one pair of parallel sides

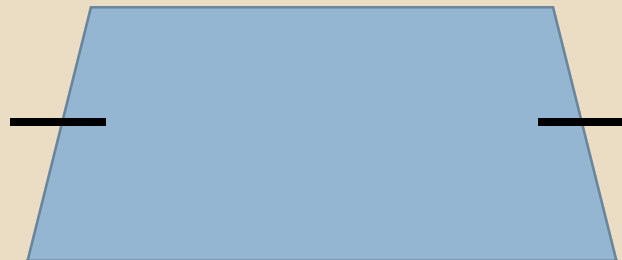


KEY CONCEPT

Properties of an Isosceles trapezoid:

If a trapezoid is an isosceles trapezoid:

Source	then...
Definition of isosceles trapezoid	legs are congruent

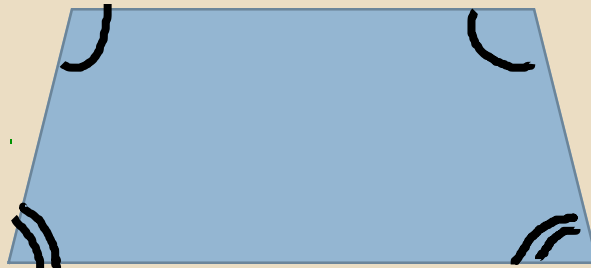


KEY CONCEPT

Properties of an Isosceles trapezoid:

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Definition of isosceles trapezoid	legs are congruent
Theorem 6-6-3	each pair of base angles is congruent



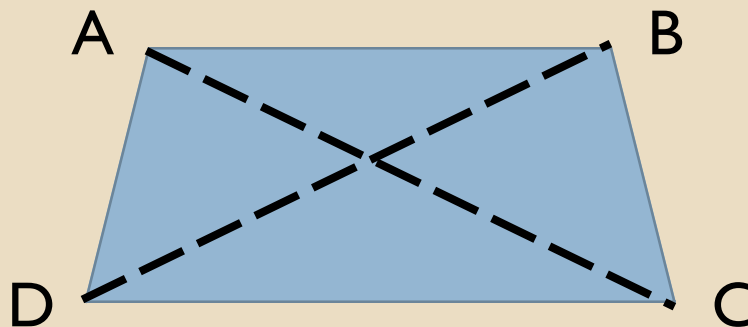
KEY CONCEPT

Properties of an Isosceles trapezoid:

If a trapezoid is an isosceles trapezoid:

Source	then...
Definition of isosceles trapezoid	legs are congruent
Theorem 6-6-3	each pair of base angles is congruent
Theorem 6-6-5	diagonals are congruent

$$\overline{AC} \cong \overline{BD}$$



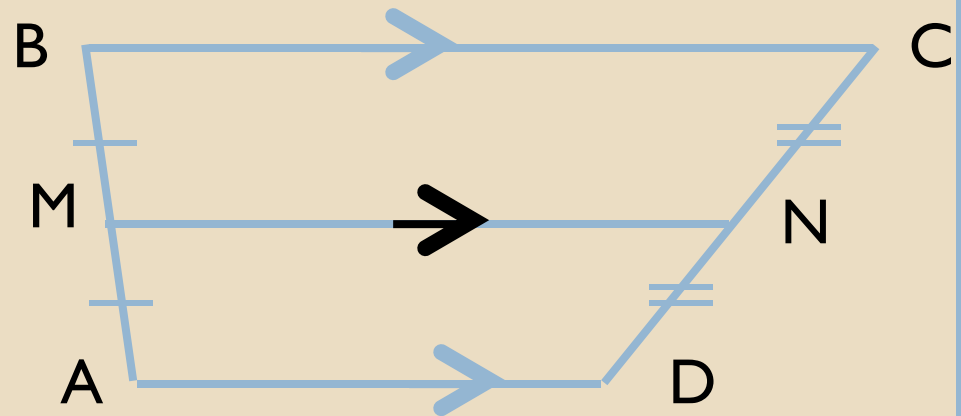
KEY CONCEPT

Trapezoid Midsegment Theorem:

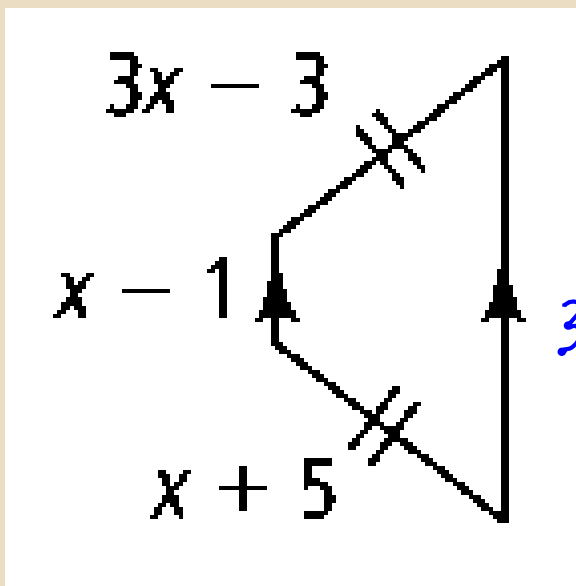
If a quadrilateral is a trapezoid, then:

- the midsegment is parallel to the bases and
- the length of the midsegment is the average of the lengths of the bases.

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



1.

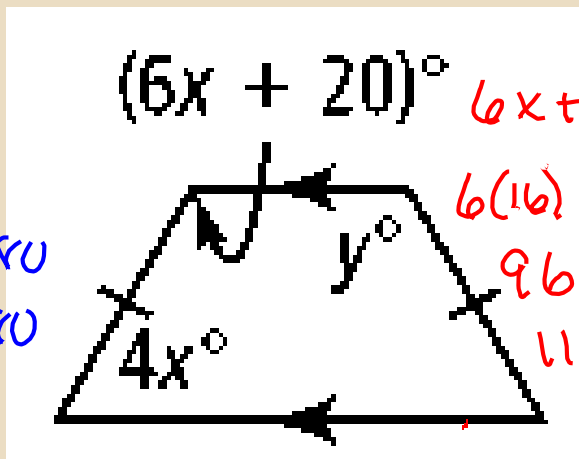


$$\begin{aligned} 3x - 3 &= x + 5 \\ 2x &= 8 \\ x &= 4 \end{aligned}$$

Find the value(s) of the variable(s) in each isosceles trapezoid.

2.

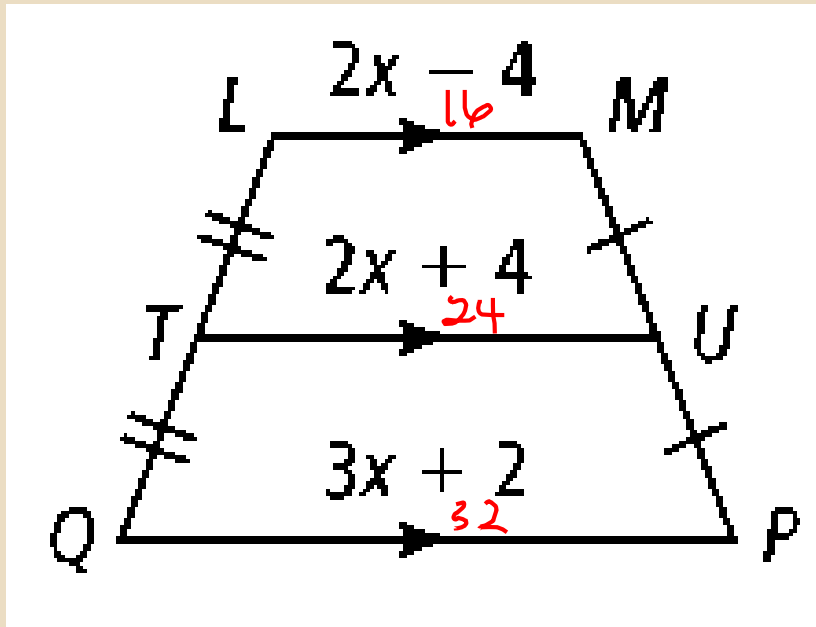
$$\begin{aligned} 4x + 6x + 20 &= 180 \\ 10x + 20 &= 180 \\ 10x &= 160 \\ x &= 16 \end{aligned}$$



$$\begin{aligned} 6x + 20 &= 4 \\ 6(16) + 20 &= 4 \\ 96 + 20 &= 4 \\ 116 &= 4 \end{aligned}$$

CLASS WORK

3.



$$2x + 4 = \frac{1}{2}(2x - 4 + 3x + 2)$$

$$2(2x + 4) = 2x - 4 + 3x + 2$$

$$4x + 8 = 5x - 2$$

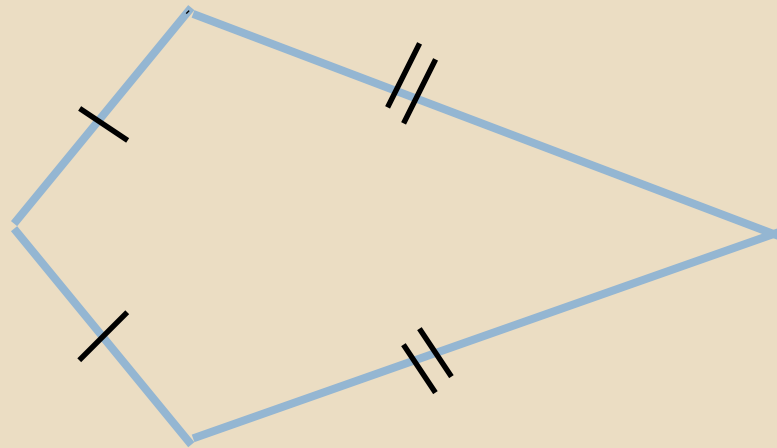
$$10 = x$$

Find the lengths of the segments with variable expressions.

CLASS WORK

KEY CONCEPT

Kite – quadrilateral with two pairs of consecutive sides congruent and no opposite sides congruent or parallel

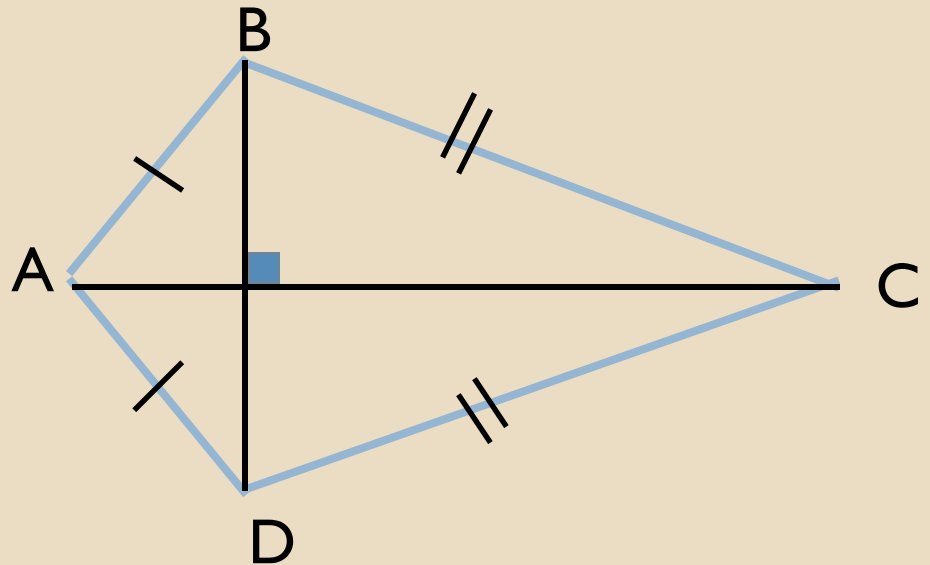


KEY CONCEPT

Theorem 6-6-1:

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

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

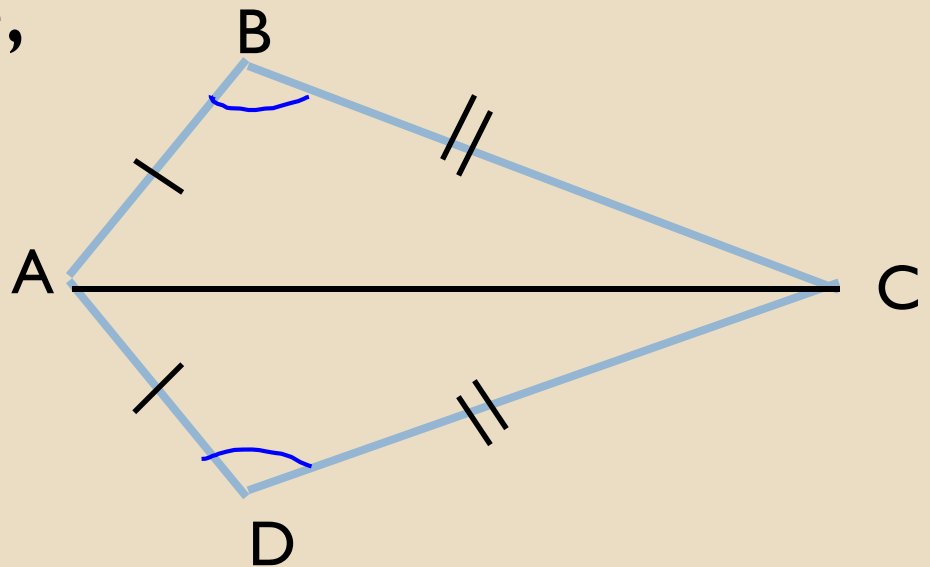


KEY CONCEPT

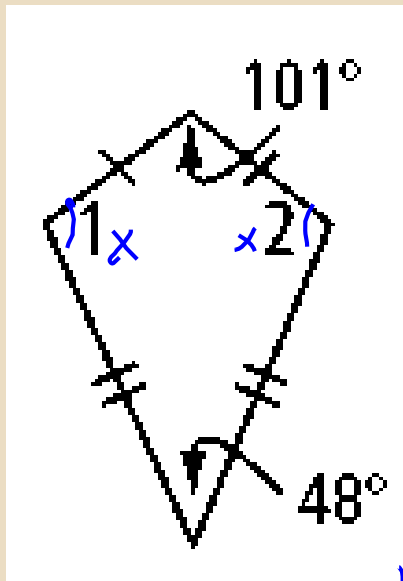
Theorem 6-6-2:

If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.

If $ABCD$ is a kite,
then $\angle B \cong \angle D$.



4.



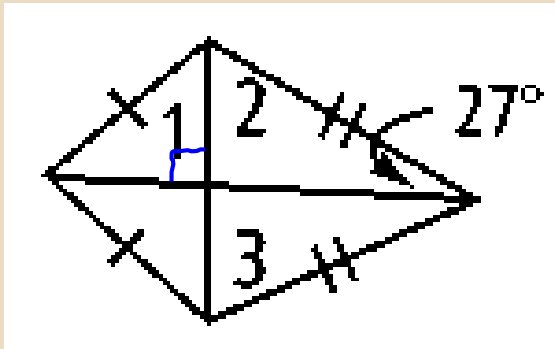
$$101 + x + 48 + x = 360$$

$$2x + 149 = 360$$

$$2x = 211$$

$$m\angle 1 = m\angle 2 = x = 105.5$$

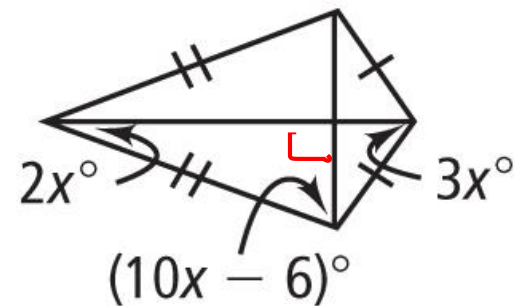
5.



$$m\angle 1 = 90 \quad 6. \text{ Find } x.$$

$$m\angle 2 = 90 - 27 = 63$$

$$m\angle 3 = 63$$



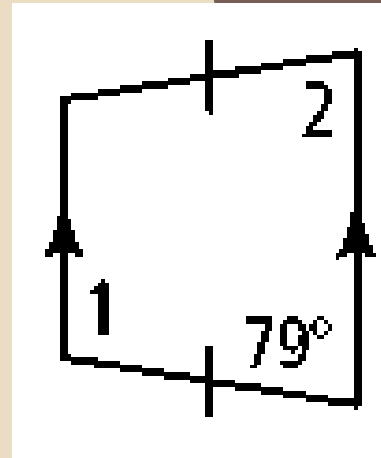
$$2x + 10x - 6 = 90 \quad 12x = 96$$

$$12x - 6 = 90 \quad x = 8$$

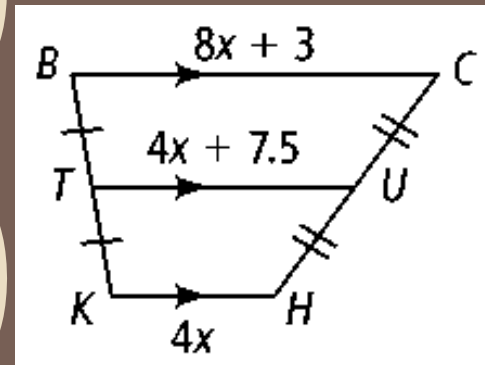
Find the measures of the numbered angles in each kite.

CLASS WORK

7. Find the numbered angles.

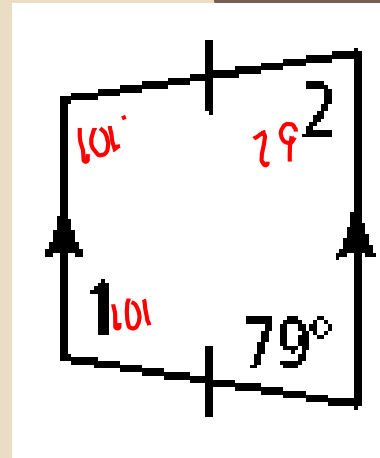


8. Find the lengths of the segments with variable expressions.



EXIT PROBLEMS

7. Find the numbered angles.



8. Find the lengths of the segments with variable expressions.

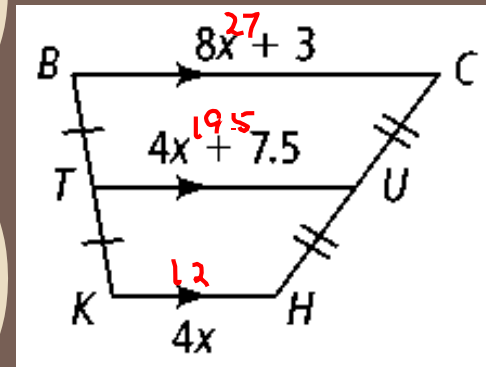
$$4x + 7.5 = \frac{1}{2}(8x + 3 + 4x)$$

$$2(4x + 7.5) = 8x + 3 + 4x$$

$$8x + 15 = 12x + 3$$

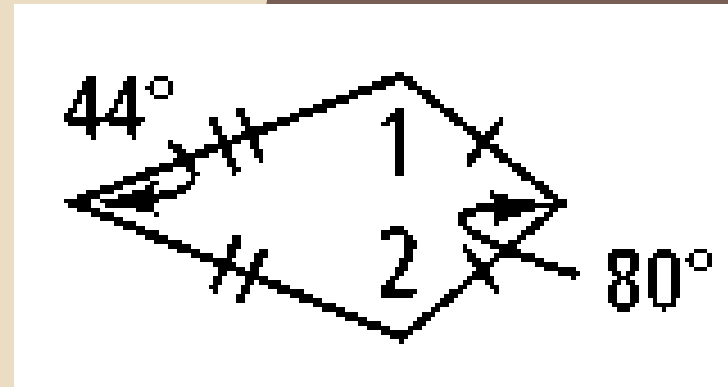
$$12 = 4x$$

$$3 = x$$

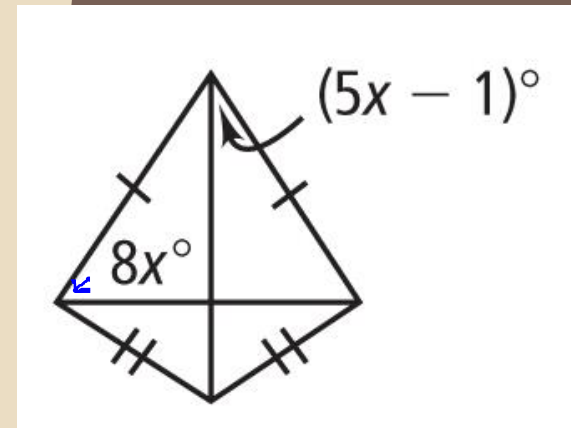


EXIT PROBLEMS

9. Find the numbered angles.



10. Find the value of the variables in the kite.

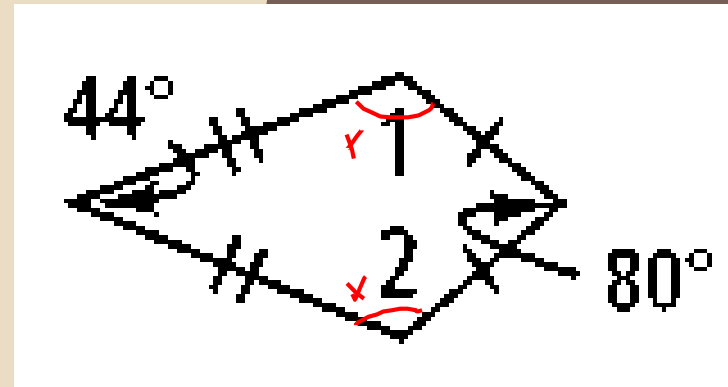


EXIT PROBLEMS

9. Find the numbered angles.

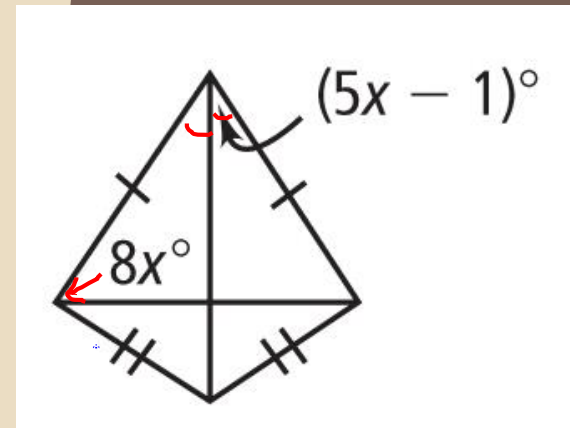
$$\begin{aligned}44 + x + 90 + x &= 360 \\2x + 134 &= 360 \\2x &= 226 \\x &= 113\end{aligned}$$

$$m\angle 1 = m\angle 2 = 113^\circ$$



10. Find the value of the variables in the kite.

$$\begin{aligned}8x + 5x - 1 &= 90 \\13x &= 91 \\x &= 7\end{aligned}$$



EXIT PROBLEMS

LEARNING RUBRIC

Got It: Completes general proofs and uses proof to prove theorems about trapezoids

Almost There: Uses formulas with special parallelograms on the coordinate plane

Moving Forward: Applies the properties of trapezoids and kites to write equations to find segment lengths and angle measures

Getting Started: Applies the properties of trapezoids and kites to find segment lengths and angle measures


HOMework

Pages 445 – 446:


14 – 22 even

23 – 25 all

28 – 36 even

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- THE PARALLEL SIDES OF A TRAPEZOID ARE ITS BASES AND THE NONPARALLEL SIDES ARE ITS LEGS.
 - TWO ANGLES THAT SHARE A BASE OF A TRAPEZOID ARE BASE ANGLES.
 - THE MIDSEGMENT OF A TRAPEZOID JOINS THE MIDPOINTS OF ITS LEGS.
 - IN AN ISOSCELES TRAPEZOID THE LEGS ARE CONGRUENT, THE EACH PAIR OF BASE ANGLES IS CONGRUENT, AND THE DIAGONALS ARE CONGRUENT.

SUMMARY

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- A KITE HAS TWO PAIRS OF CONSECUTIVE SIDES CONGRUENT. IT HAS NO PAIRS OF PARALLEL SIDES.
 - THE DIAGONALS OF A KITE ARE CONGRUENT.

SUMMARY