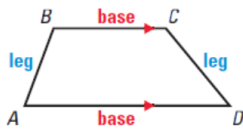


Geometry

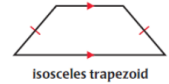
9.5 Properties of Trapezoids and Kites

Trapezoid - a quadrilateral with EXACTLY ONE pair of parallel sides.

- the parallel sides are called bases
- has 2 pairs of base angles
- the nonparallel sides are the legs of the trapezoid

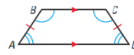


ISOSCELES TRAPEZOIDS If the legs of a trapezoid are congruent, then the trapezoid is an **isosceles trapezoid**.



Theorems that prove a trapezoid is isosceles:

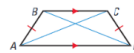
- If a trapezoid is isosceles, then both pairs of base angles are \cong .



- If you have 1 pair of \cong base angles, then it's an isosceles trapezoid.



- A trapezoid is isosceles if and only if its diagonals are \cong .

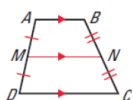


Midsegment - a segment that connects the midpoints of 2 sides



The midsegment of a trapezoid

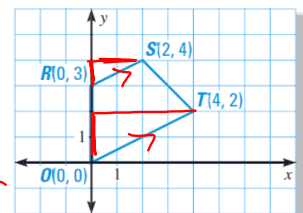
- the segment connects to the midpoints of the 2 legs
- the segment is parallel to the 2 bases
- the length of the midsegment is the average of the bases



$$MN = \frac{1}{2}(AB + CD)$$

EXAMPLE 1 Use a coordinate plane

Show that ORST is a trapezoid.



$$RS \quad m = \frac{1}{2}$$

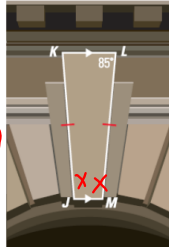
$$OT \quad m = \frac{2}{4} = \frac{1}{2}$$

$$RO \quad m = \text{undefined}$$

I have exactly 1 pair of parallel sides $RS \parallel OT$ so ORST is a Trapezoid

EXAMPLE 2 Use properties of isosceles trapezoids

ARCH The stone above the arch in the diagram is an isosceles trapezoid. Find $m\angle K$, $m\angle M$, and $m\angle L$.



$m\angle K = m\angle L$

$m\angle K = 85^\circ$

$m\angle J = m\angle M = 95^\circ$

$(n-2) \cdot 180$
 $4 \cdot 2$

$2 \cdot 180 = 360$

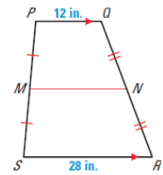
$85 + 85 + x + x = 360$
 $170 \quad -170$

$2x = 190$
 2

$x = 95$

EXAMPLE 3 Use the midsegment of a trapezoid

In the diagram, \overline{MN} is the midsegment of trapezoid $PQRS$. Find MN .



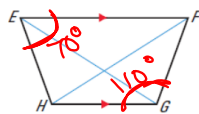
$MN = \frac{PQ + SR}{2}$

$MN = \frac{12 + 28}{2}$

$MN = 20 \text{ in}$

In Exercises 3 and 4, use the diagram of trapezoid $EFGH$.

3. If $EG = FH$, is trapezoid $EFGH$ isosceles? Explain.



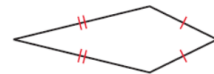
yes bc if it's an isosceles trapezoid then its diagonals are \cong

4. If $m\angle HEF = 70^\circ$ and $m\angle FGH = 110^\circ$, is trapezoid $EFGH$ isosceles? Explain.

Since the base \angle 's are \cong
 $70 + 70 + 110 + 110 = 360$

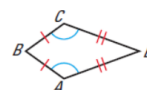
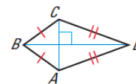
then yes it's an isosceles \square

Kite - a quadrilateral that has 2 pairs of consecutive \cong sides, but the opposite sides are NOT \cong .



Theorems about Kites:

- a quadrilateral is a kite if its diagonals are perpendicular.
- a quadrilateral is a kite if exactly one pair of opposite angles are \cong .



EXAMPLE 4Find $m\angle D$ in the kite shown at the right.

$$m\angle D = 78^\circ$$

$$x + x + 124 + 80 = 360$$

$$2x + 204 = 360$$

$$2x = 156$$

$$x = 78$$



In a kite, the measures of the angles are $3x^\circ$, 75° , 90° , and 120° . Find the value of x . What are the measures of the angles that are congruent?

$$3x + 75 + 90 + 120 = 360$$

$$3x + 285 = 360$$

$$3x = 75$$

$$x = 25$$

$$75^\circ$$

Homework

Worksheet