Name:

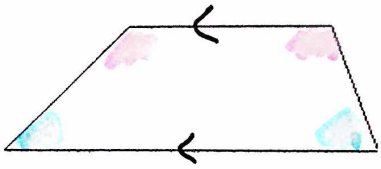
Date:

Period: 4

Trapezoids

Lesson Objective IWBAT apply thms about properties of trapezoids.

Trapezoid (DEF): A trapezoid is a quadrilateral with exactly one pair of parallel sides.

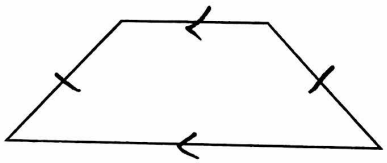


- The parallel sides are called the bases
- The non-parallel sides are called the legs

Base Angles: The base angles of a trapezoid are two consecutive angles whose common side is a base.

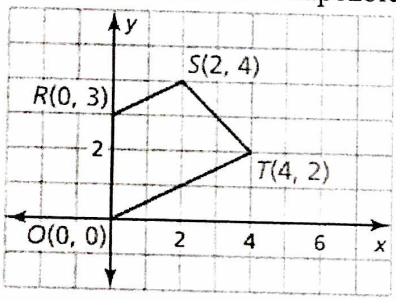
- A trapezoid always has 2 pairs of base angles

Isosceles Trapezoid: If the legs of the trapezoid are $\cong$, then the trapezoid is isosceles.



Example:

1. Show that ORST is a trapezoid. Then decide whether it is an isosceles trapezoid.



trapezoid?

$m_{\overline{RS}} = \frac{1}{2}$ since slopes are same, $\overline{RS} \parallel \overline{OT}$.

$m_{\overline{OT}} = \frac{1}{2}$

$m_{\overline{OR}}$ = undef. since slopes are not the same, $\overline{RO}$ is not $\parallel$ to $\overline{ST}$.

$m_{\overline{ST}} = -1$

isos?

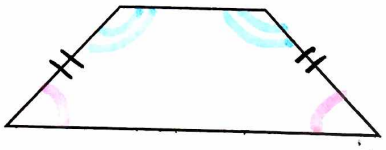
$RO = 3$ since $RO \neq ST$, then

$ST = 2\sqrt{2}$ the legs are not $\cong$, so not isos.

trapezoid since exactly one pair of opp. sides $\parallel$.

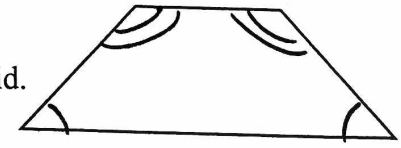
Isosceles Trapezoid Base Angles Theorem

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



Isosceles Trapezoid Base Angles Converse

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

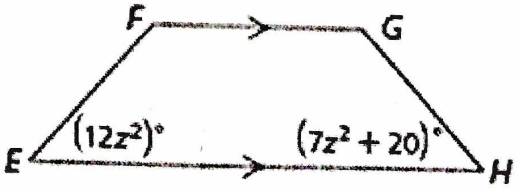


Example:

2. Find the value of z so that trapezoid EFGH is isosceles.

$12z^2 = 7z^2 + 20$

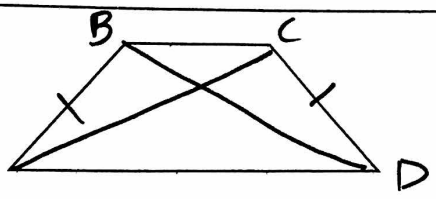
$z^2 = 4 \rightarrow$ $z = \pm 2$



...es Trapezoid Diagonals Theorem

...apezoid is isosceles if and only if its diagonals are congruent.

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



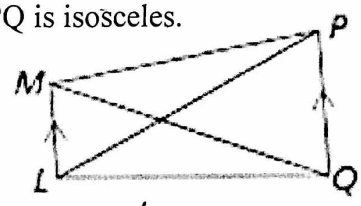
Example:

3. $MQ = 7y - 6$ and $LP = 4y + 12$. Find the value of y so that trapezoid LMPQ is isosceles.

$7y - 6 = 4y + 12$

$3y = 18$

$y = 6$



REVIEW: A *midsegment* of a **triangle** is the segment that connects midpoints of sides.

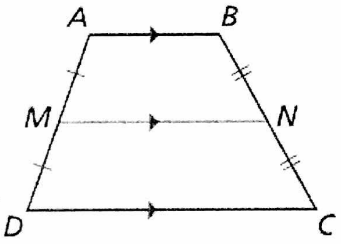
The midsegment of a **trapezoid** is the segment that connects midpoints of legs.

Trapezoid Midsegment Theorem

The midsegment of a trapezoid is…

1. ∥ to each base
2. $\frac{1}{2}$ the length of the sum of the lengths of the bases

avg. of bases

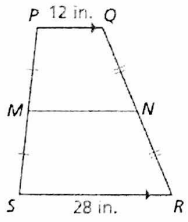


...mple:

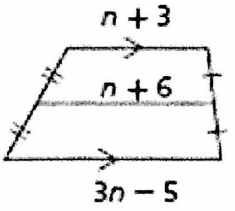
4. In the diagram, $\overline{MN}$ is the midsegment of trapezoid PQRS. Find MN.

$MN = \frac{1}{2}(12 + 28)$

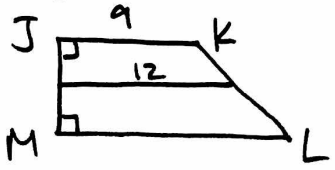
$MN = 20$



5. Find the value of n.



6. In trapezoid JKLM, $\angle J$ and $\angle M$ are right angles, and JK = 9 cm. The length of midsegment $\overline{NP}$ of the trapezoid is 12 cm. Sketch the trapezoid and its midsegment, and find the length of $\overline{ML}$.

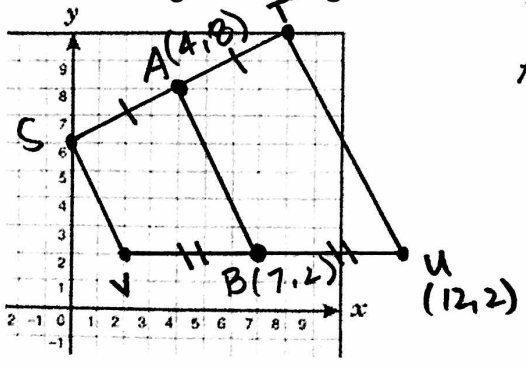


$12 = \frac{1}{2}(x + 9)$

$24 = x + 9$

$ML = 15$

7. Find the length of midsegment $\overline{YZ}$ in trapezoid STUV.



$AB = \sqrt{(7-4)^2 + (2-8)^2}$

$= \sqrt{(+3)^2 + (-6)^2}$

$= \sqrt{9 + 36}$

$= \sqrt{45}$

$= 3\sqrt{5}$

Name: Date: Period: 4

Kites

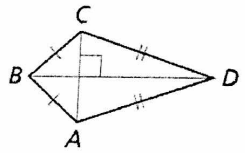
Lesson Objective WBAT prove and apply thms about kites.

Kite (DEF): A kite is a quadrilateral that has two pairs of consec. $\cong$ sides, BUT opp. sides are not $\cong$.

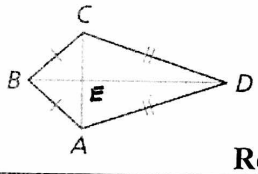
Kite Diagonals Theorem

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

★ $\overline{BD}$ bisects $\overline{AC}$



PROOF: **Given**: ABCD is a kite
Prove: $\overline{AC} \perp \overline{BD}$

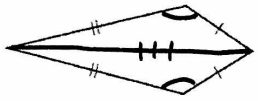


Statements	Reasons
① ABCD is a kite	① given
② $\overline{BC} \cong \overline{BA}$, $\overline{DC} \cong \overline{DA}$	② def. of a kite
③ B is on ⊥ bisector of $\overline{AC}$	③ point is equidist. from 2 points → lies on ⊥ bisector
D " " " " " "	
④ $\overline{BD} \perp \overline{AC}$	④ thru 2 points is one line.

Kite Opposite Angles Theorem

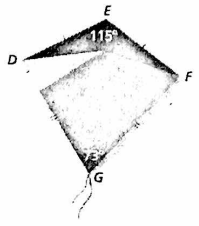
If a quadrilateral is a kite, then exactly one pair of opposite angles are congruent.

★ line of symm. bisects opp. ∠s



Examples:

1. Find $m\angle D$ in the kite shown.



$x + x + 115 + 73 = 360$

$2x = 172$

$x = 86$

$m\angle D = 86°$

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

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

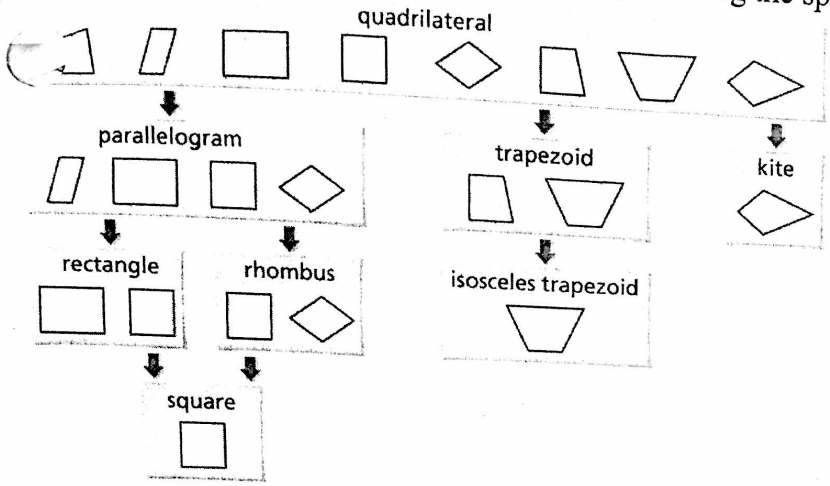
$3x = 75$

$x = 25$

75°

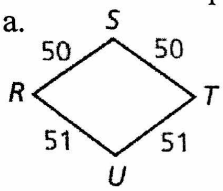
...ying a Quadrilateral

The following diagram shows the relationships among the special quadrilaterals in the chapter.

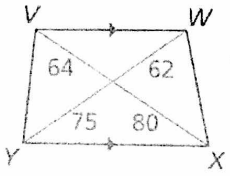


Examples:

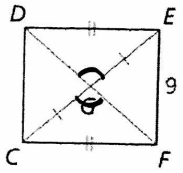
3. Give the most specific name for the quadrilateral. Briefly explain your reasoning.

a. 

kite

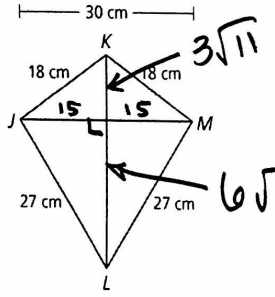
b. 

trap.

c. 

quad.

4. Find $\overline{KL}$.



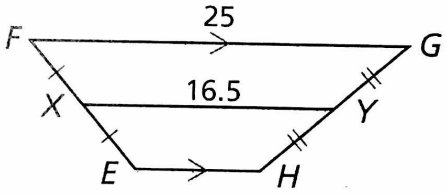
$3\sqrt{11}$

$6\sqrt{14}$

$= 3\sqrt{11} + 6\sqrt{14}$

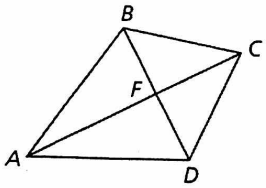
≈ 32.40

5. Find EH

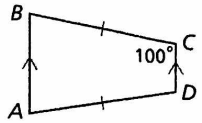


6. In kite ABCD, CB = CD, m∠DAB = 54° and m ∠CDF = 52°.

a. Find m∠BCD. b. Find m∠ABC. c. Find m∠FDA



7. Find m∠A.



8. KB = 21.9 m and MF = 32.7 m. Find FB.