

Honors 2



Chapter 6 - Quadrilaterals



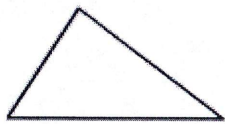
| <u>Day</u> | <u>Topic</u> | <u>Assignment</u> |
|------------|---|--|
| 1 | 6.1/6.2 Angles of polygons/parallelograms | pg 398 #9, 17, 50, 56 pg 407 #5, 17, 19, 30, 43, 48 43 (46-49 all) |
| 2 | 6.3 Tests for Parallelograms/6.4 Rectangles | pg 418 # 7, 9-14, 40 pg 426 #1-4, 20, 48 |
| 3 | 6.5 Rhombi and Square | pg 435 #7-12, 13, 48 |
| 4 | 6.6 Trapezoids and Kites | pg 444 #1, 2, 5, 6, 7, 34, 66, 70 |
| 5 | Review | |
| 6 | Quiz Chapter 6 | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

| Date | Description | Amount |
|-----------|-------------|--------|
| 1912-1-1 | To Balance | 100.00 |
| 1912-1-15 | By Cash | 50.00 |
| 1912-1-20 | By Cash | 25.00 |
| 1912-1-25 | By Cash | 75.00 |
| 1912-1-30 | By Cash | 100.00 |
| 1912-2-5 | By Cash | 150.00 |
| 1912-2-10 | By Cash | 200.00 |
| 1912-2-15 | By Cash | 250.00 |

6-1 and 6-2 Angles of Polygons and Parallelograms

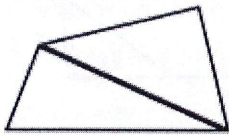
Name: _____

How many degrees are in each polygon?



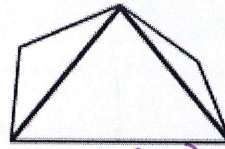
180

Triangle



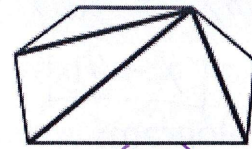
$180(n-2)$ $2(180)$

Quadrilateral 360°



$3(180)$

Pentagon 540°



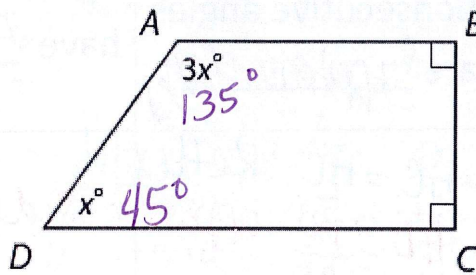
$4(180) = 720$

Hexagon

How many
Δ's
 $(n-2)180$

Can we create an equation to represent this?

Example 1:



$$360 - 180 = 180^\circ$$

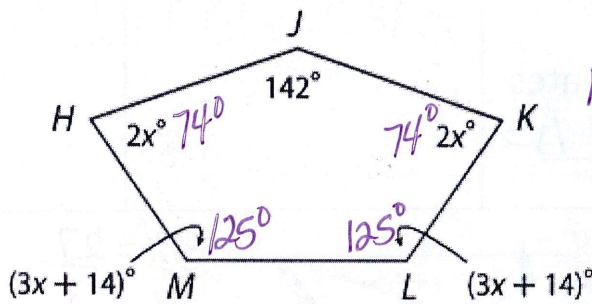
$$x + 3x = 180$$

$$4x = 180^\circ$$

$$x = 45^\circ$$

Example 2:

$(n-2)(180)$
 $3(180)$



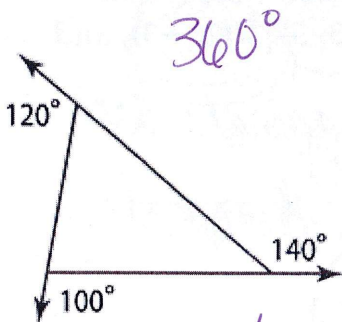
$$142 + 2x + 3x + 14 + 3x + 14 + 2x = 540$$

$$10x + 170 = 540$$

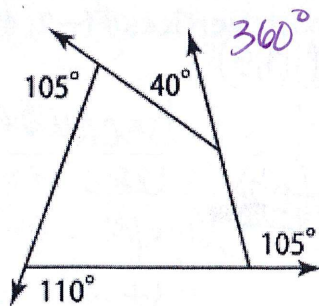
$$10x = 370$$

$$x = 37$$

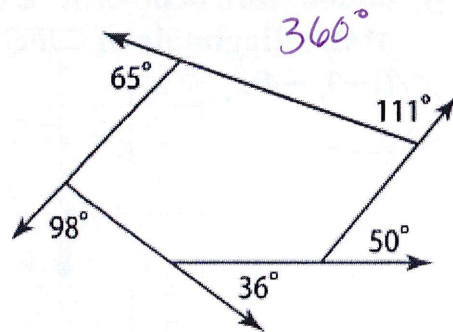
What do the sums of exterior angles of polygons add up to?



360°



360°



360°

always 360°

5-1 and 6-2 Angles of Polygons and Parallelograms

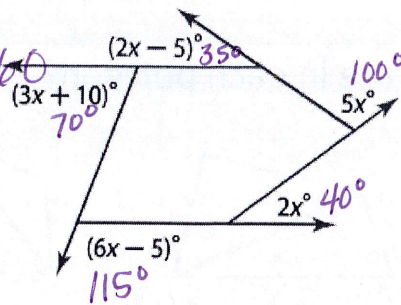
Name: _____

Example 3: Solve for X

$$2x - 5 + 3x + 10 + 5x + 2x + 6x - 5 = 360$$

$$18x = 360$$

$$x = 20$$



In a Parallelogram:

| | | | |
|--|--|--|--|
| <p>Opposite sides are <u>Congruent</u></p> | <p>Opposite angles are <u>Congruent</u></p> | <p>add up to 180°</p> <p>Consecutive angles are <u>Supplementary</u></p> | <p>If you have one right angle you have <u>4 right</u></p> |
| <p>Diagonals <u>bisect</u> Each other</p> | <p>A diagonal creates two <u>Congruent Δ's</u></p> | <p>$\overline{AC} = \overline{AC}$ Reflexive $\overline{AD} \cong \overline{BC}$ opposite sides $\overline{AB} \cong \overline{CD}$ " " $\triangle ABC \cong \triangle CDA$ SSS</p> | |

Example 4: Find x, y, and z

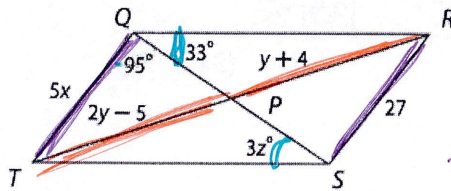
$$2y - 5 = y + 4$$

$$-y \quad -y$$

$$y - 5 = 4$$

$$+5 \quad +5$$

$$y = 9$$



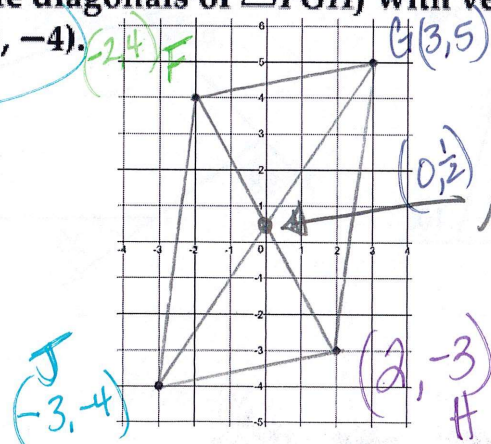
$$\frac{5x}{5} = \frac{27}{5}$$

$$x = 5.4$$

$$\frac{3z}{3} = \frac{33}{3}$$

$$z = 11$$

Example 5: **COORDINATE GEOMETRY** Determine the coordinates of the intersection of the diagonals of $\square FGHIJ$ with vertices $F(-2, 4)$, $G(3, 5)$, $H(2, -3)$, and $J(-3, -4)$.



because diagonals are bisect each other
 Midpoint of the diagonals

$$\left(\frac{3 + -3}{2}, \frac{5 + -4}{2} \right)$$

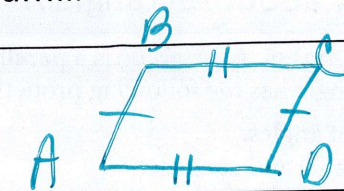
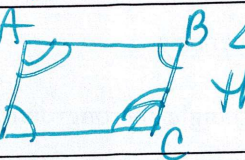
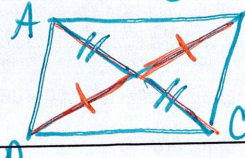
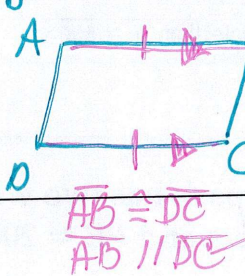
$$\left(0, \frac{1}{2} \right)$$

Intersection

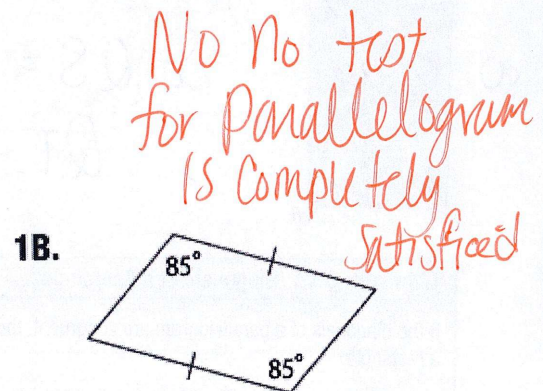
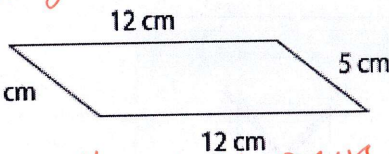
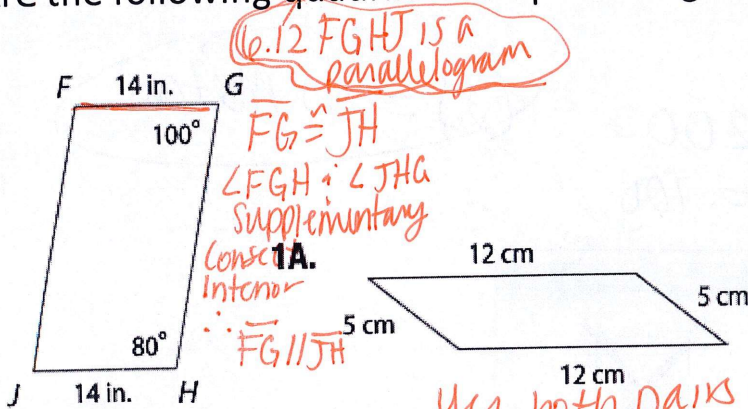
6-3 and 6-4 Tests for Parallelograms and Rectangles

Name: _____

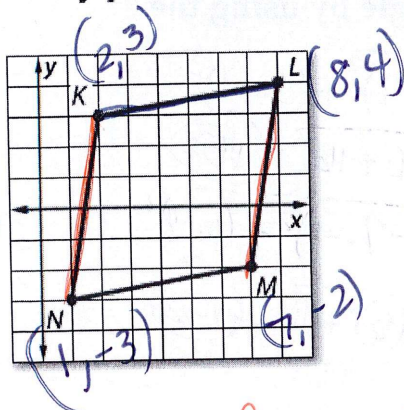
Tests for proving a quadrilateral is a parallelogram...

| | |
|--|--|
| <p>If both pairs of opp. sides of a quad. are congruent then it is a parallelogram</p> |  <p>$\overline{AB} \cong \overline{CD}$ $\overline{BC} \cong \overline{AD}$ then ABCD is parallel.</p> |
| <p>If both pairs of opposite ^{angles} sides of a quad. are congruent then it is a parallelogram</p> |  <p>$\angle A \cong \angle C$ $\angle D \cong \angle B$ then ABCD is parallelogram</p> |
| <p>If the diagonals of a quad. Bisect each other then it is a parallelogram</p> |  <p>If \overline{AC} & \overline{DB} bisect each other then ABCD is parallel</p> |
| <p>If one pair of opposite sides of a quad. is both congruent and parallel then it is a parallelogram.</p> |  <p>if one pair of opp sides are \cong and \parallel then ABCD is a parallelo</p> <p>$\overline{AB} \cong \overline{DC}$ $\overline{AB} \parallel \overline{DC}$</p> |

Are the following quadrilaterals parallelograms?



COORDINATE GEOMETRY Graph quadrilateral KLMN with vertices $K(2, 3)$, $L(8, 4)$, $M(7, -2)$, and $N(1, -3)$. Determine whether the quadrilateral is a parallelogram. Justify your answer using the Slope Formula.



Distance $KL = \sqrt{(2-8)^2 + (3-4)^2} = \sqrt{36+1} = \sqrt{37}$

Slope $KL = \frac{1}{6}$ Slope $LM = \frac{6}{1}$
Slope $NM = \frac{1}{6}$ Slope $KN = \frac{6}{1}$

Since opposite sides have the same slope $\overline{KL} \parallel \overline{NM}$ $\overline{LM} \parallel \overline{KN}$

If opposite sides of a Quad are parallel then it is a parallelogram

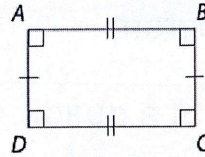
5-3 and 6-4 Tests for Parallelograms and Rectangles

Name: _____

What do we know about rectangles?

1 Properties of Rectangles A **rectangle** is a parallelogram with four right angles. By definition, a rectangle has the following properties.

- All four angles are right angles.
- Opposite sides are parallel and congruent.
- Opposite angles are congruent.
- Consecutive angles are supplementary.
- Diagonals bisect each other.



Rectangle ABCD

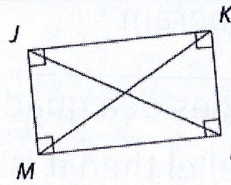
In addition, the diagonals of a rectangle are congruent.

Theorem 6.13 Diagonals of a Rectangle

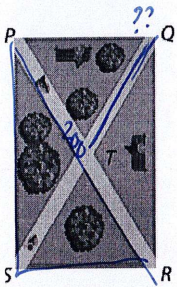
If a parallelogram is a rectangle, then its diagonals are congruent.

Abbreviation If a \square is a rectangle, $diag. are \cong$.

Example If $\square JKLM$ is a rectangle, then $\overline{JL} \cong \overline{MK}$.



EXERCISE A rectangular park has two walking paths as shown. If $PS = 180$ meters and $PR = 200$ meters, find QT .



Diagonals are \cong because it is a rectangle

So $QS = 200$

$QT + ST = 200$

$\frac{1}{2} 200 = 100$

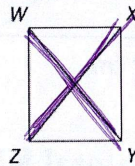
$QS = 100$ meters

Theorem 6.14 Diagonals of a Rectangle

If the diagonals of a parallelogram are congruent, then the parallelogram is a rectangle.

Abbreviation If $diag. of a \square are \cong$, then \square is a rectangle.

Example If $\overline{WY} \cong \overline{XZ}$ in $\square WXYZ$, then $\square WXYZ$ is a rectangle.



COORDINATE GEOMETRY Quadrilateral PQRS has vertices $P(-5, 3)$, $Q(1, -1)$, $R(-1, -4)$, and $S(-7, 0)$. Determine whether PQRS is a rectangle by using the Distance Formula.

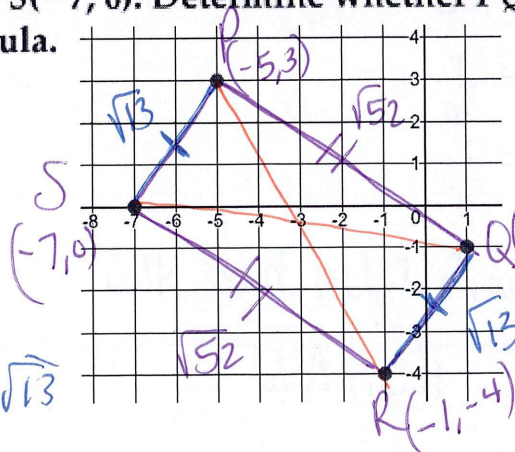
$SP = RQ$

$\sqrt{(-7 - -5)^2 + (0 - 3)^2}$

$\sqrt{4 + 9} = \sqrt{13}$

$\sqrt{(-1 - 1)^2 + (-4 - -1)^2} = \sqrt{13}$

$\sqrt{4 + 9}$



$PQ = \sqrt{(-5 - 1)^2 + (3 - -1)^2}$

$(PQ) = \sqrt{36 + 16} = \sqrt{52}$

$SR = \sqrt{(-7 - -1)^2 + (0 - -4)^2}$

$(SR) = \sqrt{36 + 16} = \sqrt{52}$

oppose

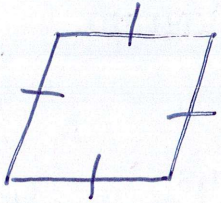
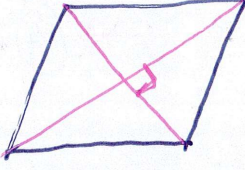
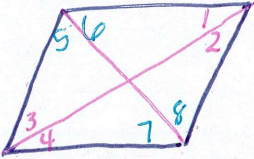
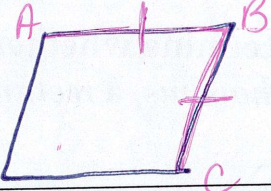
Diagonals $\cong PR = \sqrt{(-5 - -1)^2 + (3 - -4)^2}$

$\sqrt{16 + 49} = \sqrt{65}$

$SQ = \sqrt{(-7 - 1)^2 + (0 - -1)^2}$

6.5 Rhombi and Squares

Name: _____

| | |
|---|---|
| <p>A rhombus is a parallelogram with <u>4</u> congruent sides</p> |  |
| <p>If a parallelogram is a rhombus then its diagonals are <u>perpendicular</u></p> |  |
| <p>If a parallelogram is a rhombus then its diagonals <u>bisect</u> the opposite angles $\angle 1 \cong \angle 2$ $\angle 3 \cong \angle 4$ $\angle 5 \cong \angle 6$ $\angle 7 \cong \angle 8$</p> |  |
| <p>If one pair of consecutive sides of a parallelogram are <u>congruent</u> then that parallelogram is a rhombus</p> |  <p>$\overline{AB} \cong \overline{BC}$ $\square ABCD$ is <u>Rhombus</u></p> |

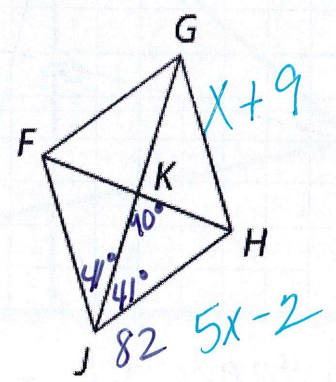
Example 1 Use Properties of a Rhombus

The diagonals of rhombus FGHI intersect at K. Use the given information to find each measure or value.

a. If $m\angle FJH = 82$, find $m\angle KHJ$.

$$m\angle KHJ = 180 - 90 - 41$$

$$m\angle KHJ = 49^\circ$$



b. ALGEBRA If $GH = x + 9$ and $JH = 5x - 2$, find x .

$$\begin{array}{r} x+9 = 5x-2 \\ -x+2 \quad -x+2 \\ \hline 11 = 4x \\ \frac{11}{4} = \frac{4x}{4} \end{array}$$

$$x = 2.75$$

$$x = 2\frac{3}{4}$$

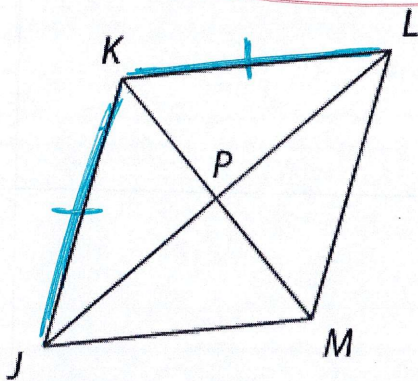
5.5 Rhombi and Squares

Name: _____

Given: JKLM is a parallelogram.

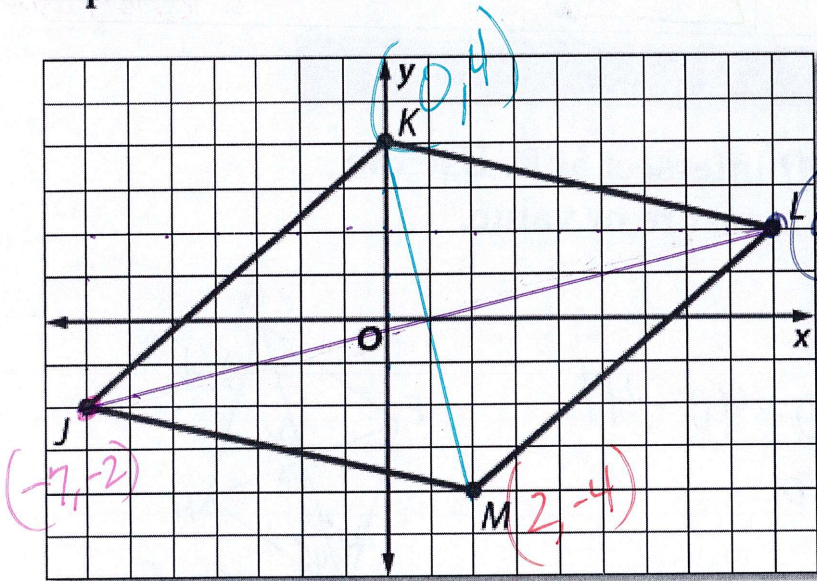
$\triangle JKL$ is isosceles.

Prove: JKLM is a rhombus.



- | | |
|--|--|
| <ul style="list-style-type: none"> ① JKLM is parallel ② $\triangle JKL$ is isos. ③ $\overline{KL} \cong \overline{JK}$ ④ JKLM is a Rhombus | <ul style="list-style-type: none"> ① Given ② Given ③ Def of Isos \triangle ④ \overline{KL} & \overline{JK} are consecutive sides of parallelogram |
|--|--|

COORDINATE GEOMETRY Determine whether $\square JKLM$ with vertices $J(-7, -2)$, $K(0, 4)$, $L(9, 2)$, and $M(2, -4)$ is a rhombus, a rectangle, or a square. List all that apply. Explain.



Find diagonals slope

$JL \ m = \frac{4}{16} = \frac{1}{4}$
 $KM \ m = \frac{8}{2} = 4$
 yes according to slope the diagonals are \perp

$$\begin{aligned} \text{distance } JL &= \sqrt{(-7-9)^2 + (-2-2)^2} \\ &= \sqrt{256 + 16} = \sqrt{272} \end{aligned}$$

$$\begin{aligned} \text{distance } KM &= \sqrt{(0-2)^2 + (4-(-4))^2} \\ &= \sqrt{4 + 64} = \sqrt{68} \end{aligned}$$

because diagonals are not equal it isn't a rectangle. \therefore can't be a square and $\square JKLM$ is a Rhombus

6.6 Trapezoids and Kites

Name: _____

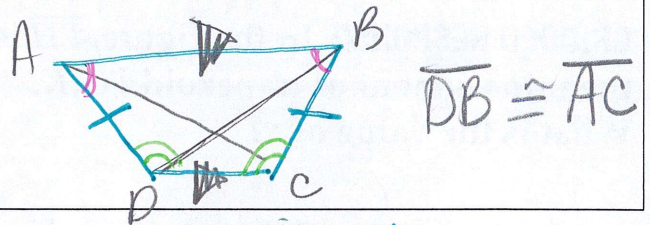
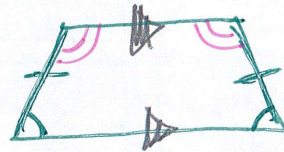
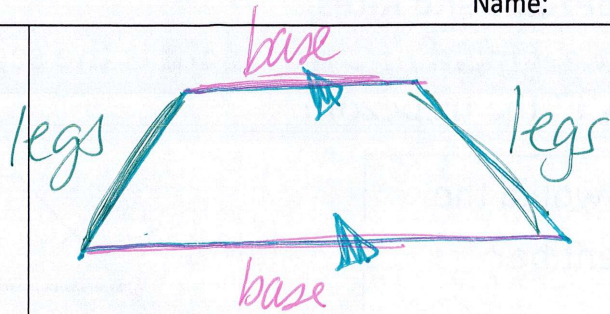
A Trapezoid is a quadrilateral with exactly one set of parallel sides.

The Parallel sides are called bases

The non-parallel sides are called legs

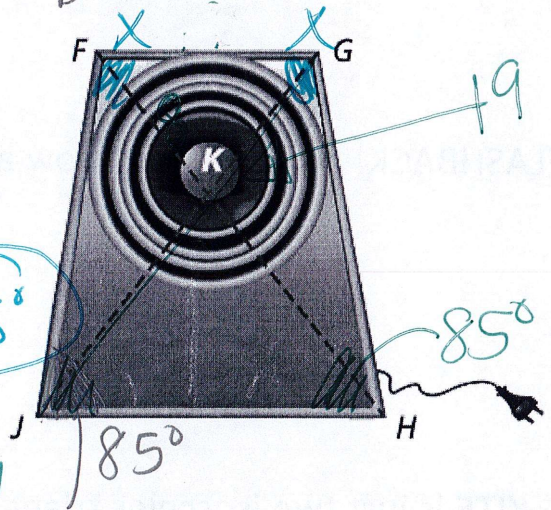
An isosceles trapezoid has congruent legs and base angles

A trapezoid is isosceles if it's diagonals are congruent



MUSIC The speaker shown is an isosceles trapezoid. If $m\angle FJH = 85$, $FK = 8$ inches, and $JG = 19$ inches, find each measure.

- a. $m\angle FGH$ $85 + 85 + x + x = 360$
 OR $170 + 2x = 360$ $2x = 190$ $x = 95^\circ$
 $85 + x = 180^\circ$
- b. $KH = 11$ inches
 If $JG = 19$ then $FH = 19$
 $19 - 8 = 11$ So KH



COORDINATE GEOMETRY Quadrilateral ABCD has vertices $A(-3, 4)$, $B(2, 5)$, $C(3, 3)$, and $D(-1, 0)$. Show that ABCD is a trapezoid and determine whether it is an isosceles trapezoid.

Trapezoid opp side 1 pair parallel
 ★ Slope AD = -2 Slope BC = -2 ★

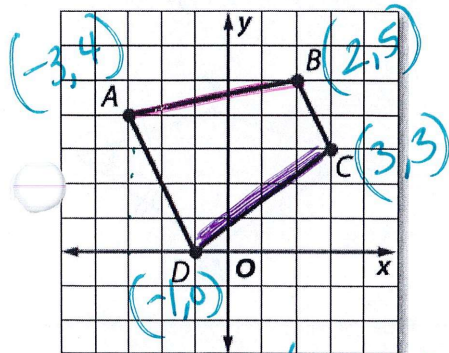
If isosceles AB would = DC

$$AB = \sqrt{(-3-2)^2 + (4-5)^2} = \sqrt{5^2 + 1} = \sqrt{26}$$

$$DC = \sqrt{(-1-3)^2 + (0-3)^2} = \sqrt{16 + 9} = \sqrt{25} = 5$$

$$DC = \sqrt{16 + 9} = \sqrt{25} = 5$$

$\sqrt{26} \neq 5$



because $AB \neq DC$ Not isosceles trapezoid but is a trap

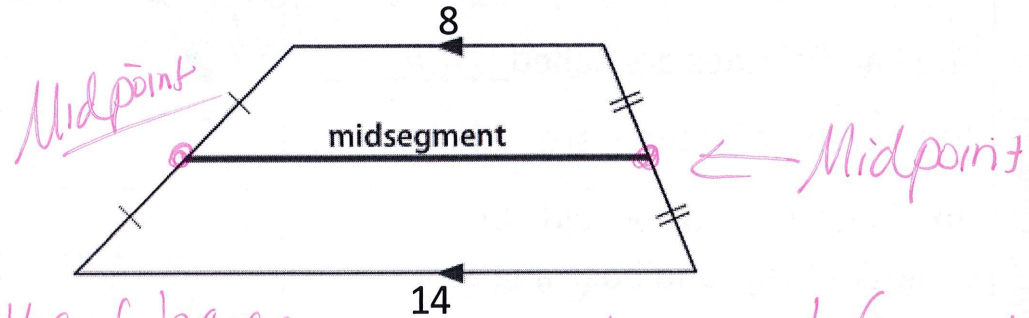
5.6 Trapezoids and Kites

Name: _____

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

How long would the midsegment be?

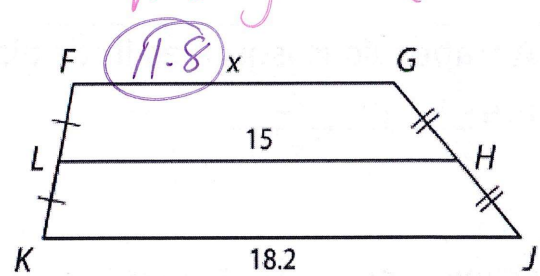
11



$\frac{1}{2}$ Sum of lengths of bases
 $\frac{1}{2}(8+14) = 11$

Midseg = $\frac{1}{2}$ (base + base)

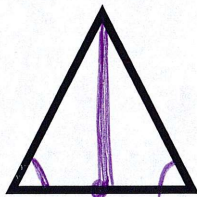
GRIDDED RESPONSE In the figure, \overline{LH} is the midsegment of trapezoid $FGJK$. What is the value of x ?



Note: The figure is not drawn to scale.

$15 = \frac{1}{2}(18.2 + x)$
 $30 = 18.2 + x$
 $x = 11.8$

FLASHBACK! What do we know about isosceles triangles?



Area = $\frac{1}{2} b \cdot h$

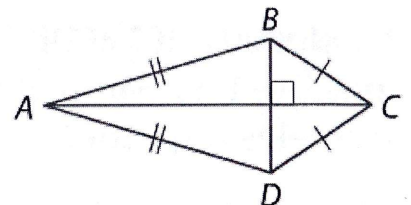
Base Angles are Congruent

Median from vertex Altitude

A **KITE** is just two isosceles triangles glued together!

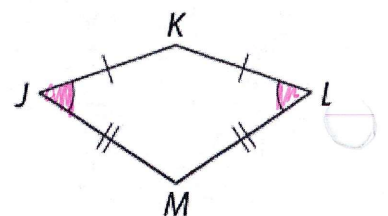
6.25 If a quadrilateral is a kite, then its diagonals are perpendicular.

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



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

Example If quadrilateral $JKLM$ is a kite, $\overline{JK} \cong \overline{KL}$, and $\overline{JM} \cong \overline{LM}$, then $\angle J \cong \angle L$ and $\angle K \not\cong \angle M$.



only $\angle J \cong \angle L$ Not Other 2

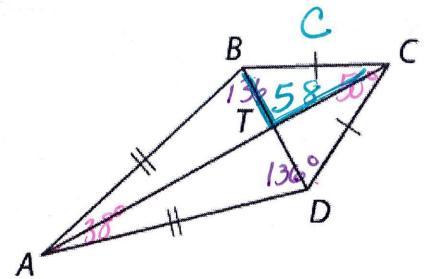
6.6 Trapezoids and Kites

Name: _____

Example:

4A. If $m\angle BAD = 38$ and $m\angle BCD = 50$, find $m\angle ADC$.

4B. If $BT = 5$ and $TC = 8$, find CD .



We know $\angle CBA \cong \angle CDA$
Call them x

$$x + x + 50 + 38 = 360^\circ$$

$$2x + 88 = 360$$

$$2x = 272$$

$$x = 136$$

quad \rightarrow

$$m\angle ADC = 136^\circ$$

$$a^2 + b^2 = c^2 \quad \text{find } BC \text{ first because}$$

$$5^2 + 8^2 = c^2$$

$$25 + 64 = c^2$$

$$89 = c^2$$

$$\sqrt{89} = c$$

$$BC = CD$$

$$\sqrt{89} = CD$$

if