

# REGULAR POLYGON

The measure of a single interior angle in a regular polygon can be found by dividing the sum of the interior angle measures,  $S$ , by the number of sides,  $n$ .

**Find the measure of each interior angle in the following polygons.**

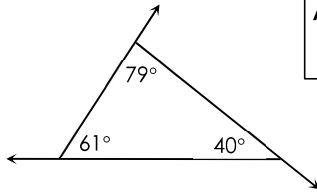
5. regular pentagon

6. regular 18-gon

## Sum of the EXTERIOR ANGLE Measures

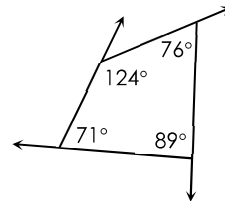
Exterior angles are supplementary to their adjacent interior angle. Find the measure of each exterior angle on the polygons below, then give the sum of all exterior angle measures.

**Triangle:**



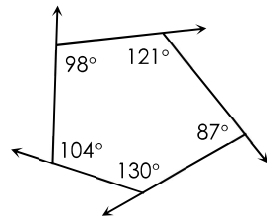
Sum of Exterior Angles Measures: \_\_\_\_\_

**Quadrilateral:**



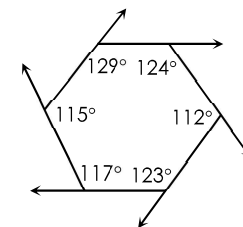
Sum of Exterior Angles Measures: \_\_\_\_\_

**Pentagon:**



Sum of Exterior Angles Measures: \_\_\_\_\_

**Hexagon:**



Sum of Exterior Angles Measures: \_\_\_\_\_

**What can you conclude about the sum of the exterior angles measures of a polygon?**

## MORE EXAMPLES

7. What is the measure of each exterior angle of a regular hexagon?

8. What is the measure of each exterior angle of a regular 24-gon?

9. If the exterior angle of a regular polygon measures  $12^\circ$ , how many sides does the polygon have?

10. If the exterior angle of a regular polygon measures  $40^\circ$ , how many sides does the polygon have?



more practice with

# INTERIOR & EXTERIOR ANGLE MEASURES



## INTERIOR & EXTERIOR OF ANY POLYGON REFERENCE:

Sum of the INTERIOR Angle Measures:

Sum of the EXTERIOR Angle Measure:

## INTERIOR & EXTERIOR ANGLES OF REGULAR POLYGONS REFERENCE:

Interior Angle Measure  
of a Regular Polygon:

Exterior Angle Measure  
of a Regular Polygon:

The Number of Sides  
of a Regular Polygon:

## PRACTICE QUESTIONS

1. What is the sum of the measures of the interior angles of a pentagon?

2. What is the sum of the measures of the interior angles of a 27-gon?

3. What is the measure of each interior angle of a regular octagon?

4. What is the measure of each interior angle of a regular 20-gon?

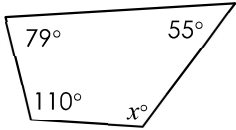
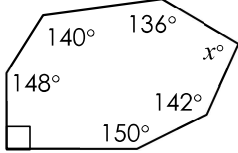
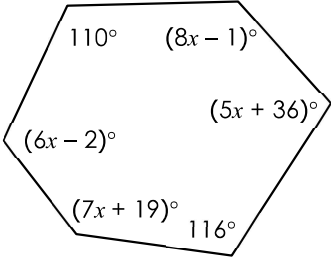
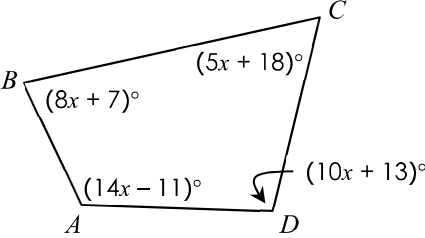
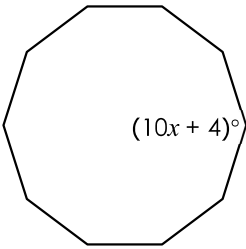
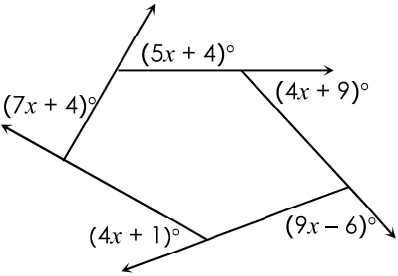
5. Five angles of a hexagon measure  $119^\circ$ ,  $129^\circ$ ,  $104^\circ$ ,  $139^\circ$ , and  $95^\circ$ . What is the measure of the sixth angle?

6. The sum of the interior angles of a polygon is  $1620^\circ$ . How many sides does the polygon have?

7. The sum of the interior angles of a polygon is  $3960^\circ$ . How many sides does the polygon have?

8. What is the sum of the measures of the exterior angles of a nonagon?

9. What is the measure of each exterior angle of a regular 20-gon?

<p><b>10.</b> If the exterior angle of a regular polygon measures <math>9^\circ</math>, how many sides does the polygon have?</p>	<p><b>11.</b> If the interior angle of a regular polygon measures <math>108^\circ</math>, how many sides does the polygon have?</p>
<p><b>12.</b> Find the value of <math>x</math>.</p> 	<p><b>13.</b> Find the value of <math>x</math>.</p> 
<p><b>14.</b> Solve for <math>x</math>.</p> 	
<p><b>15.</b> Find <math>m\angle B</math>.</p> 	
<p><b>16.</b> If the figure below is a regular polygon, find the value of <math>x</math>.</p> 	
<p><b>17.</b> Find the value of <math>x</math>.</p> 	

Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



Date: \_\_\_\_\_ Per: \_\_\_\_\_

Homework 1: Angles of Polygons

**\*\* This is a 2-page document! \*\***

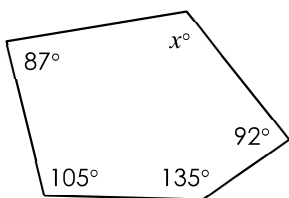
1. What is the sum of the measures of the interior angles of an octagon? \_\_\_\_\_
2. What is the sum of the measures of the interior angles of a 25-gon? \_\_\_\_\_
3. What is the measure of each interior angle of a regular hexagon? \_\_\_\_\_
4. What is the measure of each interior angle of a regular 16-gon? \_\_\_\_\_
5. What is the sum of the measures of the exterior angles of a decagon? \_\_\_\_\_
6. What is the measure of each exterior angle of a regular 30-gon? \_\_\_\_\_
7. An exterior angle of a regular polygon measures  $22.5^\circ$ . How many sides does it have? \_\_\_\_\_
8. An interior angle of a regular polygon measures  $170^\circ$ . How many sides does it have? \_\_\_\_\_

9. If the sum of the measures of the interior angles of a polygon is  $1980^\circ$ , how many sides does the polygon have?

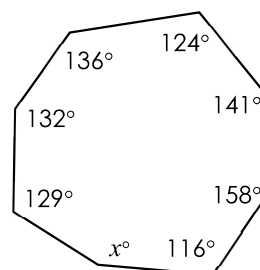
10. If the sum of the measures of the interior angles of a polygon is  $5400^\circ$ , how many sides does the polygon have?

11. The measure of the seven angles in a nonagon measure  $138^\circ$ ,  $154^\circ$ ,  $145^\circ$ ,  $132^\circ$ ,  $128^\circ$ ,  $147^\circ$ , and  $130^\circ$ . If the two remaining angles are equal in measure, what is the measure of each angle?

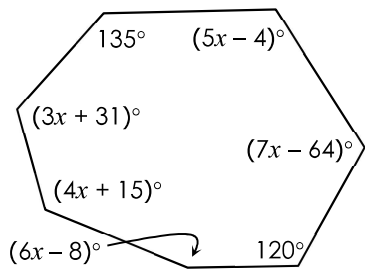
12. Find the value of  $x$ .



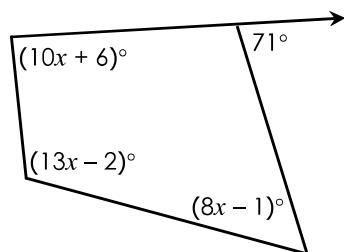
13. Find the value of  $x$ .



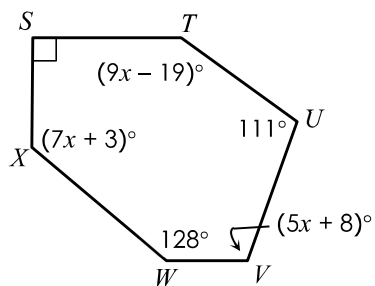
14. Find the value of  $x$ .



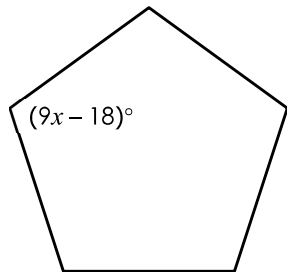
15. Find the value of  $x$ .



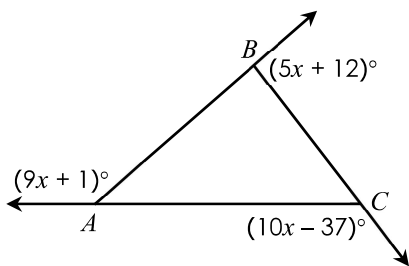
16. Find  $m\angle V$ .



17. If the figure below is a regular polygon, find the value of  $x$ .



18. Find  $m\angle BCA$ .



Name: \_\_\_\_\_

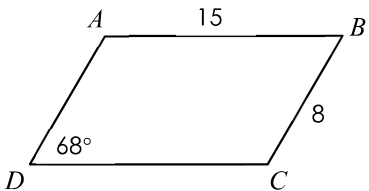
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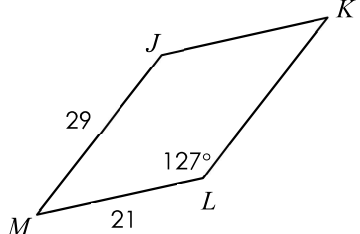
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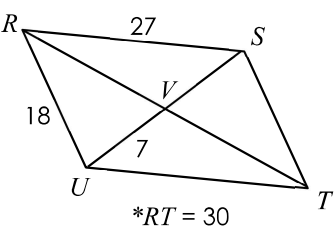
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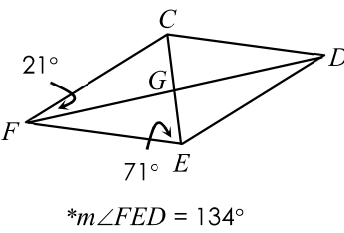
Main Ideas/Questions	Notes/Examples
<p style="text-align: center;"><i>Properties of</i> <b>PARALLELOGRAMS</b></p>	<b>Definition of a Parallelogram:</b>
	<b>Other important properties of parallelograms:</b>
	① _____
	② _____

**Directions:** Each quadrilateral below is a parallelogram. Find the missing measures.

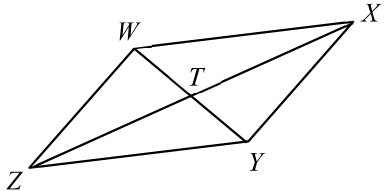
1.   $AD = \underline{\hspace{2cm}}$   
 $DC = \underline{\hspace{2cm}}$   
 $m\angle A = \underline{\hspace{2cm}}$   
 $m\angle B = \underline{\hspace{2cm}}$   
 $m\angle C = \underline{\hspace{2cm}}$

2.   $JK = \underline{\hspace{2cm}}$   
 $KL = \underline{\hspace{2cm}}$   
 $m\angle J = \underline{\hspace{2cm}}$   
 $m\angle K = \underline{\hspace{2cm}}$   
 $m\angle M = \underline{\hspace{2cm}}$

3.   $UT = \underline{\hspace{2cm}}$   
 $ST = \underline{\hspace{2cm}}$   
 $VS = \underline{\hspace{2cm}}$   
 $VT = \underline{\hspace{2cm}}$

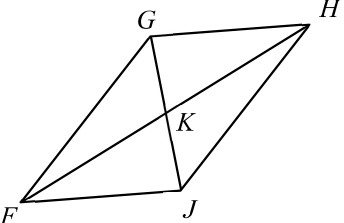
4.   $m\angle DEC = \underline{\hspace{2cm}}$   
 $m\angle CDE = \underline{\hspace{2cm}}$   
 $m\angle ECD = \underline{\hspace{2cm}}$   
 $m\angle DFE = \underline{\hspace{2cm}}$

5. Given  $XY = 15$ ,  $WX = 22$ ,  $ZX = 32$ ,  $WT = 10$ ,  $m\angle WZY = 62^\circ$ ,  $m\angle WXT = 27^\circ$ , and  $m\angle ZWT = 77^\circ$ .



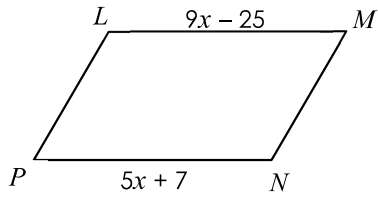
$ZW = \underline{\hspace{2cm}}$        $m\angle TZY = \underline{\hspace{2cm}}$   
 $ZY = \underline{\hspace{2cm}}$        $m\angle XYZ = \underline{\hspace{2cm}}$   
 $TX = \underline{\hspace{2cm}}$        $m\angle XWT = \underline{\hspace{2cm}}$   
 $WY = \underline{\hspace{2cm}}$        $m\angle XYT = \underline{\hspace{2cm}}$

6. Given  $m\angle GHF = 34^\circ$ ,  $m\angle HJF = 124^\circ$ , and  $m\angle FKJ = 79^\circ$ .

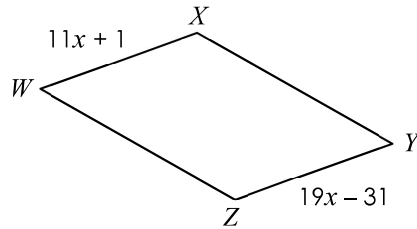


$m\angle GFJ = \underline{\hspace{2cm}}$        $m\angle JGH = \underline{\hspace{2cm}}$   
 $m\angle FGH = \underline{\hspace{2cm}}$        $m\angle FGJ = \underline{\hspace{2cm}}$   
 $m\angle HFJ = \underline{\hspace{2cm}}$        $m\angle FHJ = \underline{\hspace{2cm}}$   
 $m\angle HKJ = \underline{\hspace{2cm}}$        $m\angle GJF = \underline{\hspace{2cm}}$

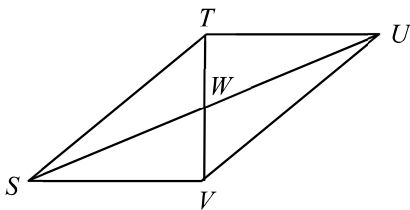
7. Solve for  $x$ .



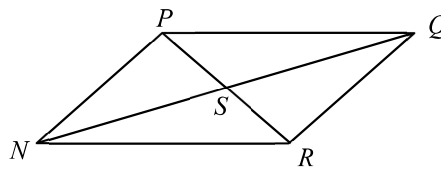
8. Find  $YZ$ .



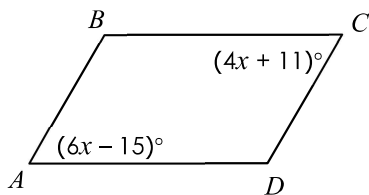
9. If  $TV = 74$  and  $WV = 4x + 1$ , solve for  $x$ .



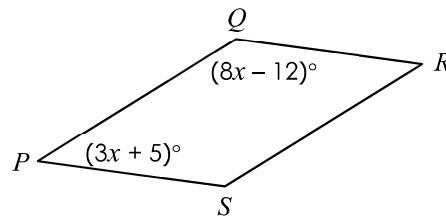
10. If  $NS = 2x + 7$  and  $SQ = 5x - 23$ , find  $NQ$ .



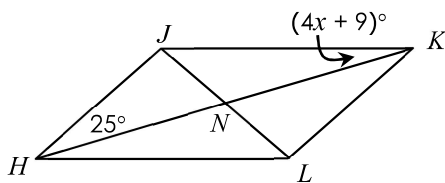
11. Find  $m\angle B$ .



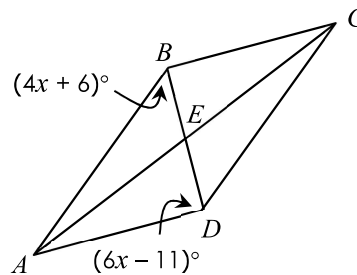
12. Find  $m\angle R$ .



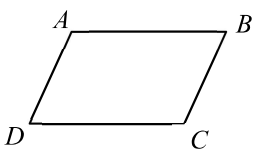
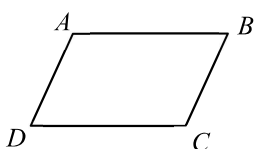
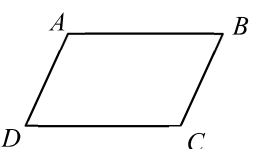
13. If  $m\angle KLH = 134^\circ$ , solve for  $x$ .



14. If  $m\angle ABC = 115^\circ$ , find  $m\angle ADB$ .



# PROVING PARALLELOGRAMS *in the Coordinate Plane*

<b>METHOD 1</b>	<p>Prove <b>both pairs of opposite sides</b> are <b>congruent</b>.</p>  <p>If _____ and _____, then <math>ABCD</math> is a parallelogram.</p>	<b>Use....</b>
<b>METHOD 2</b>	<p>Prove <b>both pairs of opposite sides</b> are <b>parallel</b>.</p>  <p>If _____ and _____, then <math>ABCD</math> is a parallelogram.</p>	<b>Use....</b>
<b>METHOD 3</b>	<p>Prove <b>one pair of opposite sides</b> are <b>congruent and parallel</b>.</p>  <p>If _____ and _____, then <math>ABCD</math> is a parallelogram.</p>	<b>Use....</b>

**SET I:** Use the **distance formula** to determine if the figure is a parallelogram.

1.  $A(-7, 4)$ ,  $B(1, 2)$ ,  $C(9, -8)$ ,  $D(1, -6)$

2.  $P(-4, 2)$ ,  $Q(6, 4)$ ,  $R(11, -2)$ ,  $S(2, -3)$



**SET 2:** Use the **slope formula** to determine if the figure is a parallelogram.

3.  $W(-7, -4), X(1, -6), Y(5, -13), Z(1, -12)$

4.  $E(0, 8), F(6, 10), G(2, 0), H(-4, -2)$

**SET 3:** Use the **distance formula AND slope formula** to determine if the figure is a parallelogram.

5.  $J(-9, -2), K(-5, 1), L(1, -4), M(-3, -7)$

6.  $S(1, 5), T(10, 7), U(14, 1), V(-3, -1)$

Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



Date: \_\_\_\_\_ Per: \_\_\_\_\_

Homework 2: Parallelograms

**\*\* This is a 2-page document! \*\***

**Directions:** If each quadrilateral below is a parallelogram, find the missing measures.

**1.**

$MN =$  \_\_\_\_\_  
 $KN =$  \_\_\_\_\_  
 $m\angle K =$  \_\_\_\_\_  
 $m\angle L =$  \_\_\_\_\_  
 $m\angle M =$  \_\_\_\_\_

**2.**

$CF =$  \_\_\_\_\_  
 $FE =$  \_\_\_\_\_  
 $CE =$  \_\_\_\_\_  
 $GD =$  \_\_\_\_\_

$*FD = 22$

**3.** Given  $PQ = 24$ ,  $PS = 19$ ,  $PR = 42$ ,  $TQ = 10$ ,  $m\angle PQR = 106^\circ$ ,  $m\angle QSR = 49^\circ$ , and  $m\angle PRS = 35^\circ$ .

$QR =$  \_\_\_\_\_       $m\angle QRS =$  \_\_\_\_\_  
 $SR =$  \_\_\_\_\_       $m\angle PQS =$  \_\_\_\_\_  
 $PT =$  \_\_\_\_\_       $m\angle RPS =$  \_\_\_\_\_  
 $SQ =$  \_\_\_\_\_       $m\angle PSQ =$  \_\_\_\_\_

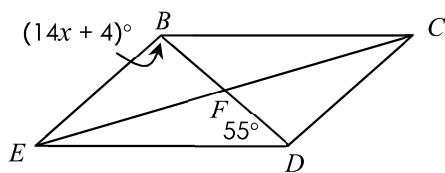
**4.** Find  $KL$ .

**5.** If  $AC = 8x - 14$  and  $EC = 2x + 11$ , solve for  $x$ .

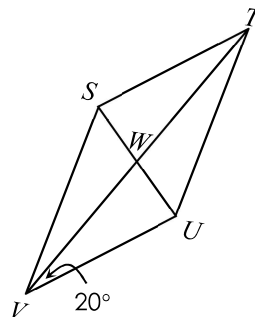
**6.** Solve for  $x$ .

**7.** Find  $m\angle V$ .

8. If  $m\angle BCD = 51^\circ$ , solve for  $x$ .



9. If  $m\angle VST = (5x + 23)^\circ$  and  $m\angle VUT = (8x - 49)^\circ$ , find  $m\angle SVT$ .



**Directions:** Determine whether the quadrilateral is a parallelogram using the indicated method.

10.  $Q(-10, -2), R(1, -1), S(1, -7), T(-11, -8)$  (Distance Formula)

11.  $K(2, 7), L(6, 12), M(13, 13), N(9, 8)$  (Slope Formula)

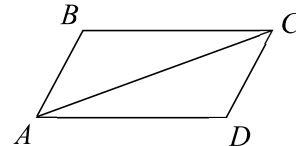
12.  $D(-5, -6), E(5, 2), F(4, -4), G(-6, -12)$  (Distance & Slope Formulas)

# PARALLELOGRAM *Proofs*

**Recall:** What is the definition of a parallelogram?

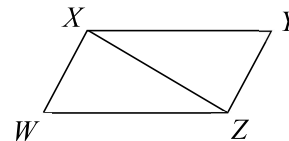
Use the definition of a parallelogram to complete each proof.

- 1** **Given:**  $\angle BAC \cong \angle DCA$ ;  $\angle BCA \cong \angle DAC$   
**Prove:**  $ABCD$  is a parallelogram



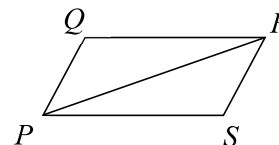
Statements	Reasons

- 2** **Given:**  $\overline{WX} \cong \overline{YZ}$ ;  $\overline{WZ} \cong \overline{YX}$   
**Prove:**  $WXYZ$  is a parallelogram



Statements	Reasons

- 3** **Given:**  $\overline{PQ} \cong \overline{RS}$ ;  $\overline{PQ} \parallel \overline{RS}$   
**Prove:**  $PQRS$  is a parallelogram



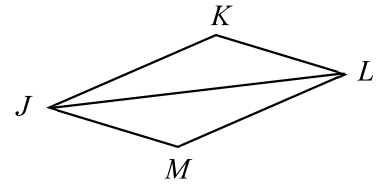
Statements	Reasons

**Other properties of parallelograms:**

- Opposite sides are congruent.
- Opposite angles are congruent.
- Diagonals bisect each other.
- Adjacent angles are supplementary.

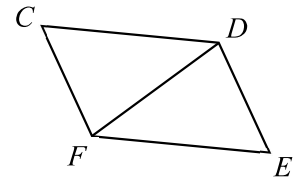
**Complete each proof.**

**4** **Given:**  $JKLM$  is a parallelogram  
**Prove:**  $\overline{JK} \cong \overline{LM}$  and  $\overline{JM} \cong \overline{LK}$



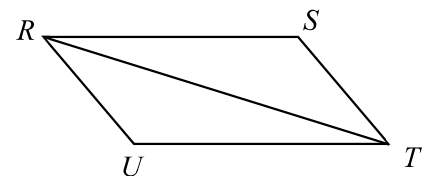
Statements	Reasons

**5** **Given:**  $CDEF$  is a parallelogram  
**Prove:**  $\angle DCF$  and  $\angle CFE$  are supplementary



Statements	Reasons

**6** **Given:**  $RSTU$  is a parallelogram  
**Prove:**  $\angle U \cong \angle S$



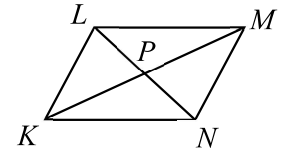
Statements	Reasons

**Properties of parallelograms are sufficient to prove a quadrilateral is a parallelogram. The list below summarizes ways to prove a quadrilateral is a parallelogram.**

- Show that both pairs of opposite sides are parallel. **(Definition of a Parallelogram)**
- Show that both pairs of opposite sides are congruent.
- Show that both pairs of opposite angles are congruent.
- Show that the diagonals bisect each other.
- Show that one angle is supplementary to both adjacent angles.
- Show that one pair of opposite sides are congruent and parallel.

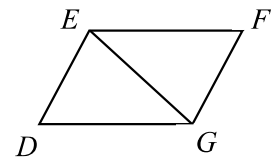
**Complete each proof.**

- 7** **Given:**  $P$  is the midpoint of  $\overline{LN}$  and  $\overline{KM}$   
**Prove:**  $KLMN$  is a parallelogram



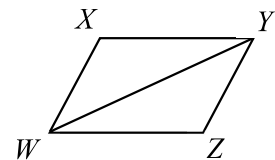
Statements	Reasons

- 8** **Given:**  $\triangle EDG \cong \triangle GFE$   
**Prove:**  $DEFG$  is a parallelogram



Statements	Reasons

- 9** **Given:**  $\angle XWZ \cong \angle ZYX$ ;  $\triangle WXY \cong \triangle YZW$   
**Prove:**  $WXYZ$  is a parallelogram



Statements	Reasons









Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



Date: \_\_\_\_\_ Per: \_\_\_\_\_

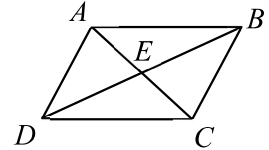
Homework 3: Parallelogram Proofs

**\*\* This is a 2-page document! \*\***

**Directions:** Complete each proof.

1. **Given:**  $\overline{AD} \parallel \overline{BC}$ ;  $\angle ABD \cong \angle CDB$

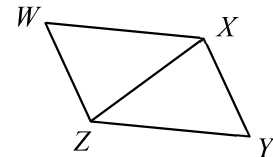
**Prove:**  $ABCD$  is a parallelogram



Statements	Reasons

2. **Given:**  $\overline{WX} \cong \overline{YZ}$ ;  $\angle WXZ \cong \angle YZX$

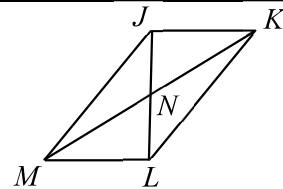
**Prove:**  $WXYZ$  is a parallelogram



Statements	Reasons

3. **Given:**  $\overline{JN} \cong \overline{NL}$ ;  $\angle JMK \cong \angle LKM$

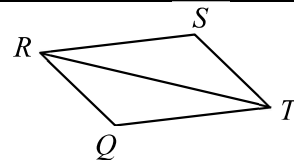
**Prove:**  $JKLM$  is a parallelogram



Statements	Reasons

4. **Given:**  $\angle QRT \cong \angle STR$ ;  $\angle S \cong \angle Q$

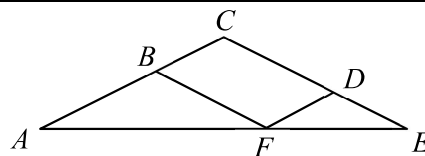
**Prove:**  $QRST$  is a parallelogram



Statements	Reasons

5. **Given:**  $BCDF$  is a parallelogram;  $\overline{AB} \cong \overline{BF}$

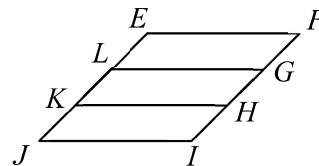
**Prove:**  $\angle A \cong \angle E$



Statements	Reasons

6. **Given:**  $EFGL$  and  $LGIJ$  are parallelograms

**Prove:**  $\angle E \cong \angle I$



Statements	Reasons

Name: \_\_\_\_\_

Geometry

Date: \_\_\_\_\_ Per: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals

Quiz 8-1: Angles of Polygons & Parallelograms

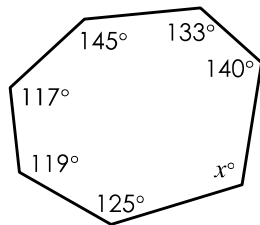
Part I: Angles of Polygons

1. What is the sum of the degrees of the interior angles of a 19-gon?
2. If the sum of the interior angles of a polygon is  $1800^\circ$ , how many sides does it have?
3. What is the measure of an interior angle of a regular nonagon?
4. What is the sum of the exterior angles of a 25-gon?
5. What is the measure of each exterior angle of a regular decagon?

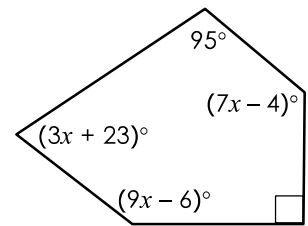
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____

Find the value of  $x$ .

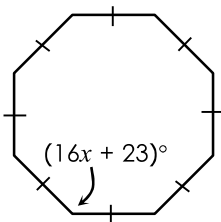
6.  $x =$  \_\_\_\_\_



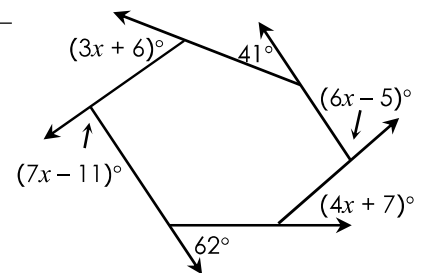
7.  $x =$  \_\_\_\_\_



8.  $x =$  \_\_\_\_\_

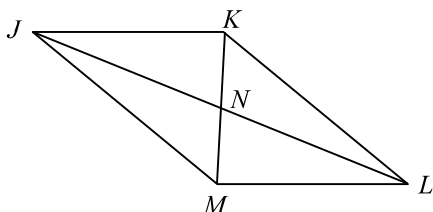


9.  $x =$  \_\_\_\_\_



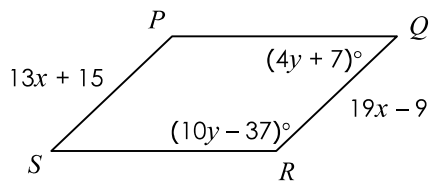
Part II: Parallelograms

10. Given  $JM = 27$ ,  $ML = 16$ ,  $JL = 46$ ,  $NK = 15$ ,  $m\angle KLM = 48^\circ$ ,  $m\angle JKM = 78^\circ$ , and  $m\angle MJL = 22^\circ$ , find each missing value.



- |              |                       |
|--------------|-----------------------|
| $KL =$ _____ | $m\angle JKL =$ _____ |
| $JK =$ _____ | $m\angle KLJ =$ _____ |
| $MK =$ _____ | $m\angle KMJ =$ _____ |
| $NL =$ _____ | $m\angle KJL =$ _____ |

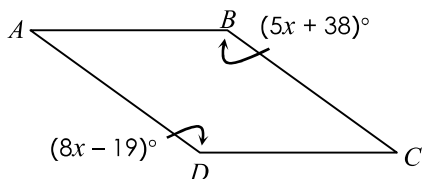
11. If  $PQRS$  is a parallelogram, find the values of  $x$  and  $y$ .



11.  $x =$  \_\_\_\_\_

$y =$  \_\_\_\_\_

12. If  $ABCD$  is a parallelogram, find  $m\angle C$ .



12.  $m\angle C =$  \_\_\_\_\_

**Determine whether the quadrilateral is a parallelogram using the indicated method.**

13.  $D(-8, 1), E(-3, 6), F(7, 4), G(2, -1)$  (Distance Formula)

13. YES / NO

14.  $L(-1, 6), M(5, 9), N(0, 2), P(-8, -2)$  (Slope Formula)

14. YES / NO

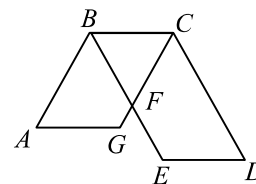
15.  $B(-2, -9), C(0, -5), D(6, -3), E(4, -7)$  (Distance and Slope Formulas)

15. YES / NO

Complete each proof.

16. **Given:**  $ABCG$  and  $BCDE$  are parallelograms

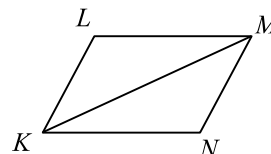
**Prove:**  $\overline{AG} \cong \overline{ED}$



Statements	Reasons

17. **Given:**  $\overline{KL} \parallel \overline{NM}$ ;  $\angle L \cong \angle N$

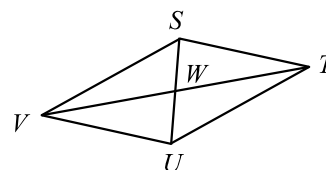
**Prove:**  $KLMN$  is a parallelogram



Statements	Reasons

18. **Given:**  $W$  is the midpoint of  $\overline{SU}$ ;  $\overline{ST} \parallel \overline{VU}$

**Prove:**  $STUV$  is a parallelogram



Statements	Reasons

Name: \_\_\_\_\_

Date: \_\_\_\_\_

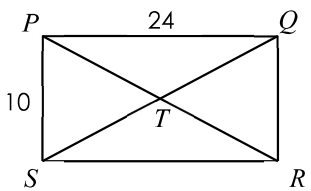
Topic: \_\_\_\_\_

Class: \_\_\_\_\_

Main Ideas/Questions	Notes/Examples
<p style="text-align: center;"><i>Properties of</i> <b>RECTANGLES</b></p> <p style="text-align: center;"><b>PLUS THESE!</b> ►</p>	<p><b>Rectangles have the same properties of parallelograms:</b></p> <ul style="list-style-type: none"> <li>• Opposite sides are congruent.</li> <li>• Opposite sides are parallel.</li> <li>• Opposite angles are congruent.</li> <li>• Consecutive angles are supplementary.</li> <li>• Diagonals bisect each other.</li> </ul> <p>❶ _____</p> <p>❷ _____</p>

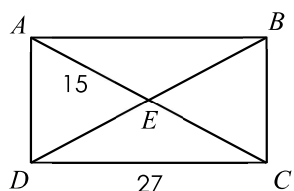
**Directions:** Each quadrilateral below is a rectangle. Find the missing measures.

**1.**



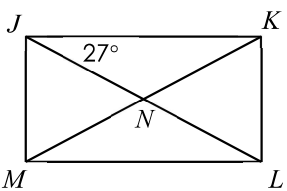
$QR = \underline{\hspace{2cm}}$   
 $SR = \underline{\hspace{2cm}}$   
 $SQ = \underline{\hspace{2cm}}$   
 $PR = \underline{\hspace{2cm}}$   
 $QT = \underline{\hspace{2cm}}$

**2.**



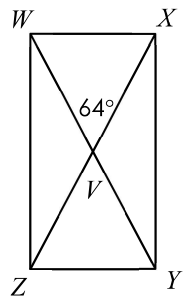
$AC = \underline{\hspace{2cm}}$   
 $BD = \underline{\hspace{2cm}}$   
 $BE = \underline{\hspace{2cm}}$   
 $AB = \underline{\hspace{2cm}}$   
 $BC = \underline{\hspace{2cm}}$

**3.**



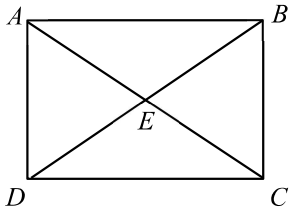
$m\angle MJK = \underline{\hspace{2cm}}$   
 $m\angle MJL = \underline{\hspace{2cm}}$   
 $m\angle JLK = \underline{\hspace{2cm}}$   
 $m\angle KML = \underline{\hspace{2cm}}$   
 $m\angle MNL = \underline{\hspace{2cm}}$

**4.**



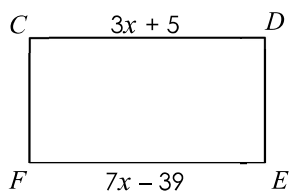
$m\angle XWY = \underline{\hspace{2cm}}$   
 $m\angle YXZ = \underline{\hspace{2cm}}$   
 $m\angle WVZ = \underline{\hspace{2cm}}$   
 $m\angle XWZ = \underline{\hspace{2cm}}$   
 $m\angle XZY = \underline{\hspace{2cm}}$

**5.** Given  $DB = 42$ ,  $AD = 26$ , and  $m\angle DAE = 52^\circ$ .

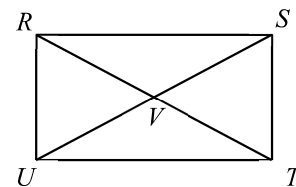


$AC = \underline{\hspace{2cm}}$   
 $EB = \underline{\hspace{2cm}}$   
 $BC = \underline{\hspace{2cm}}$   
 $AB = \underline{\hspace{2cm}}$   
 $m\angle ADC = \underline{\hspace{2cm}}$   
 $m\angle ABD = \underline{\hspace{2cm}}$   
 $m\angle BCA = \underline{\hspace{2cm}}$   
 $m\angle DEC = \underline{\hspace{2cm}}$

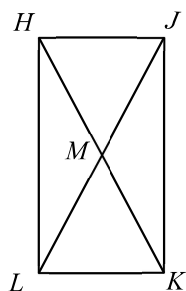
6. Find  $EF$ .



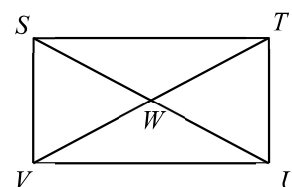
7. If  $RT = 5x - 14$  and  $US = 2x + 10$ , find  $VT$ .



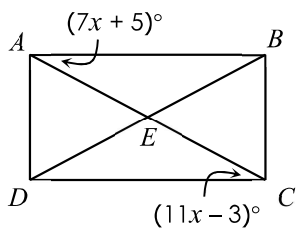
8. If  $JM = x + 17$  and  $MK = 5x - 23$ , find  $JL$ .



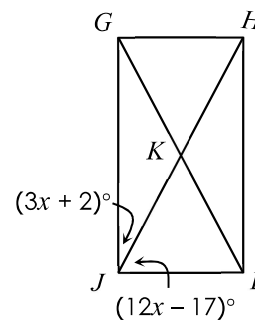
9. If  $VW = 9x - 11$  and  $SU = 16x - 12$ , find  $WT$ .



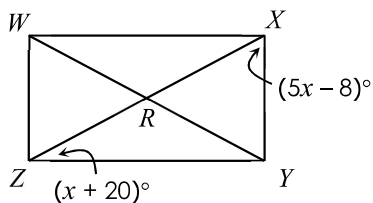
10. Find  $m\angle BCE$ .



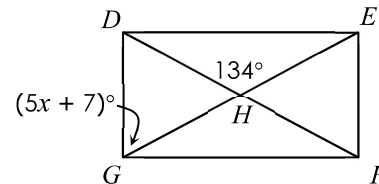
11. Find  $m\angle JHI$ .



12. Find  $m\angle XZW$ .



13. Solve for  $x$ .





Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



Date: \_\_\_\_\_ Per: \_\_\_\_\_

Homework 4: Rectangles

**\*\* This is a 2-page document! \*\***

**Directions:** If each quadrilateral below is a rectangle, find the missing measures.

**1.**

$VW =$  \_\_\_\_\_  
 $WX =$  \_\_\_\_\_  
 $YW =$  \_\_\_\_\_  
 $ZX =$  \_\_\_\_\_  
 $VX =$  \_\_\_\_\_

**2.**

$GF =$  \_\_\_\_\_  
 $GE =$  \_\_\_\_\_  
 $DF =$  \_\_\_\_\_  
 $HF =$  \_\_\_\_\_  
 $DG =$  \_\_\_\_\_

\* $GH = 14$

**3.**

$m\angle 1 =$  \_\_\_\_\_       $m\angle 5 =$  \_\_\_\_\_       $m\angle 9 =$  \_\_\_\_\_  
 $m\angle 2 =$  \_\_\_\_\_       $m\angle 6 =$  \_\_\_\_\_       $m\angle 10 =$  \_\_\_\_\_  
 $m\angle 3 =$  \_\_\_\_\_       $m\angle 7 =$  \_\_\_\_\_       $m\angle 11 =$  \_\_\_\_\_  
 $m\angle 4 =$  \_\_\_\_\_       $m\angle 8 =$  \_\_\_\_\_

**4.**

$m\angle BCD =$  \_\_\_\_\_       $m\angle ADE =$  \_\_\_\_\_  
 $m\angle ABD =$  \_\_\_\_\_       $m\angle AEB =$  \_\_\_\_\_  
 $m\angle CBE =$  \_\_\_\_\_       $m\angle DEA =$  \_\_\_\_\_

**5.**

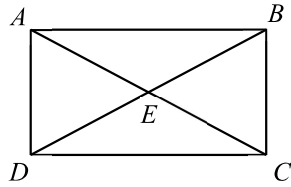
$m\angle JMK =$  \_\_\_\_\_       $m\angle HJL =$  \_\_\_\_\_  
 $m\angle JKH =$  \_\_\_\_\_       $m\angle LHK =$  \_\_\_\_\_  
 $m\angle HLK =$  \_\_\_\_\_       $m\angle JLK =$  \_\_\_\_\_

**6.** Find  $WZ$ .

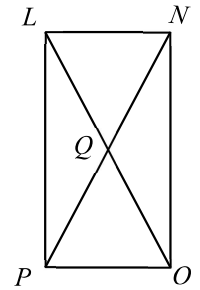
$WZ = 7x - 6$        $XY = 3x + 14$

**7.** If  $SQ = 11x - 26$  and  $PR = 5x + 28$ , find  $PR$ .

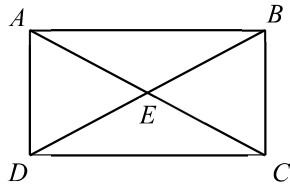
8. If  $AE = 6x - 55$  and  $EC = 3x - 16$ , find  $DB$ .



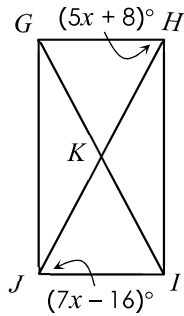
9. If  $LO = 15x + 19$  and  $QN = 10x + 2$ , find  $PN$ .



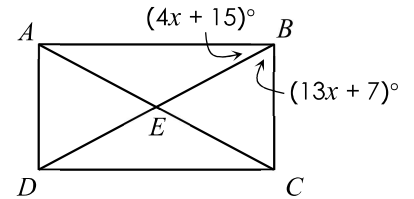
10. If  $DE = 4x + 1$ ,  $EB = 12x - 31$ , and  $CD = 28$ , find  $AD$ .



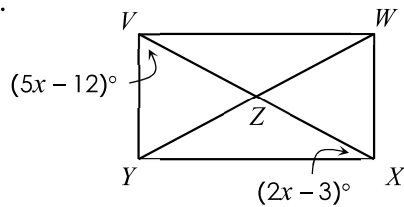
11. Find  $m\angle GJK$ .



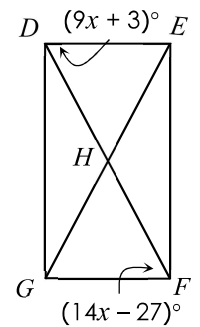
12. Find  $m\angle ADE$ .



13. Find  $m\angle VWZ$ .



14. Find  $m\angle DHG$ .



Name: \_\_\_\_\_

Date: \_\_\_\_\_

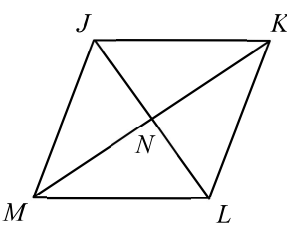
Topic: \_\_\_\_\_

Class: \_\_\_\_\_

Main Ideas/Questions	Notes/Examples
<p style="text-align: center;"><i>Properties of</i> <b>RHOMBI</b></p> <p style="text-align: center;">Plus these! ►</p>	<p><b>Rhombi have the same properties of parallelograms:</b></p> <ul style="list-style-type: none"> <li>• Opposite sides are congruent.</li> <li>• Opposite sides are parallel.</li> <li>• Opposite angles are congruent.</li> <li>• Consecutive angles are supplementary.</li> <li>• Diagonals bisect each other.</li> </ul> <p>① _____</p> <p>② _____</p> <p>③ _____</p>

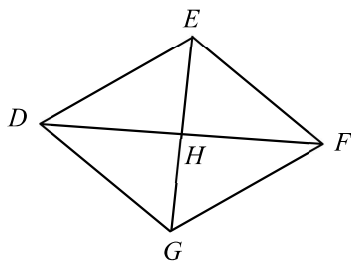
**Directions:** Each quadrilateral below is a rhombus. Find the missing measures.

1.  $JK = 12$  and  $JN = 7$



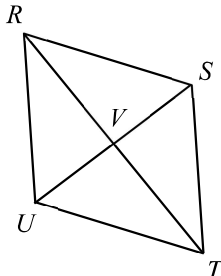
$JM =$  \_\_\_\_\_  
 $JL =$  \_\_\_\_\_  
 $MN =$  \_\_\_\_\_  
 $MK =$  \_\_\_\_\_

2.  $EF = 23$  and  $DF = 40$



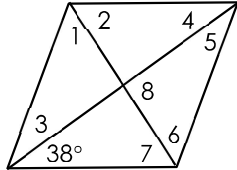
$GF =$  \_\_\_\_\_  
 $HF =$  \_\_\_\_\_  
 $GH =$  \_\_\_\_\_  
 $GE =$  \_\_\_\_\_

3.  $RT = 22$  and  $US = 18$



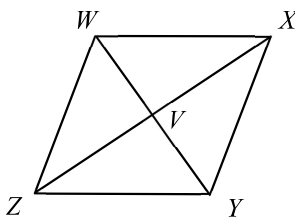
$VT =$  \_\_\_\_\_  
 $UV =$  \_\_\_\_\_  
 $RS =$  \_\_\_\_\_  
 $ST =$  \_\_\_\_\_

4.



$m\angle 1 =$  \_\_\_\_\_       $m\angle 5 =$  \_\_\_\_\_  
 $m\angle 2 =$  \_\_\_\_\_       $m\angle 6 =$  \_\_\_\_\_  
 $m\angle 3 =$  \_\_\_\_\_       $m\angle 7 =$  \_\_\_\_\_  
 $m\angle 4 =$  \_\_\_\_\_       $m\angle 8 =$  \_\_\_\_\_

5.  $ZY = 34$ ,  $WY = 38$ , and  $m\angle ZXY = 34^\circ$ .



$WZ =$  \_\_\_\_\_       $m\angle WXZ =$  \_\_\_\_\_  
 $VY =$  \_\_\_\_\_       $m\angle WVZ =$  \_\_\_\_\_  
 $ZV =$  \_\_\_\_\_       $m\angle ZYW =$  \_\_\_\_\_  
 $ZX =$  \_\_\_\_\_       $m\angle XYW =$  \_\_\_\_\_

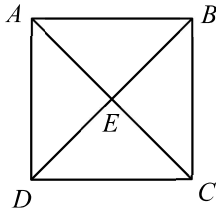
Properties of  
**SQUARES**

**A square has ALL the properties of a parallelogram, rectangle, and rhombus!**

- Opposite sides are congruent.
- Opposite sides are parallel.
- Opposite angles are congruent.
- Consecutive angles are supplementary.
- Diagonals bisect each other.

- Four right angles.
- Diagonals are congruent.
- Four congruent sides.
- Diagonals are perpendicular.
- Diagonals bisect opposite angles.

6. If  $ABCD$  is a square and  $AD = 11$ , find each missing value.



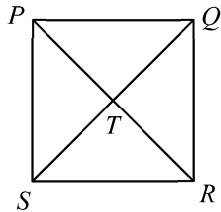
$$BC = \underline{\hspace{2cm}} \quad m\angle DAB = \underline{\hspace{2cm}}$$

$$AC = \underline{\hspace{2cm}} \quad m\angle AEB = \underline{\hspace{2cm}}$$

$$BD = \underline{\hspace{2cm}} \quad m\angle CBD = \underline{\hspace{2cm}}$$

$$EC = \underline{\hspace{2cm}} \quad m\angle BAC = \underline{\hspace{2cm}}$$

7. If  $PQRS$  is a square and  $TR = 17$ , find each missing value.



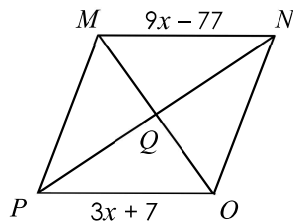
$$PR = \underline{\hspace{2cm}} \quad m\angle PRS = \underline{\hspace{2cm}}$$

$$QS = \underline{\hspace{2cm}} \quad m\angle STR = \underline{\hspace{2cm}}$$

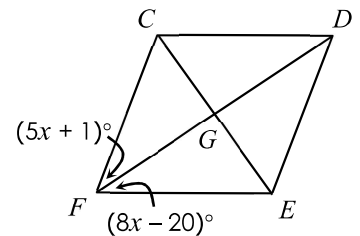
$$QT = \underline{\hspace{2cm}} \quad m\angle PSR = \underline{\hspace{2cm}}$$

$$PQ = \underline{\hspace{2cm}} \quad m\angle QPR = \underline{\hspace{2cm}}$$

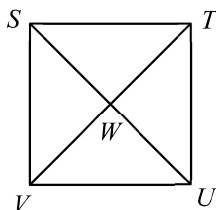
8. If  $MNOP$  is a rhombus, find  $MP$ .



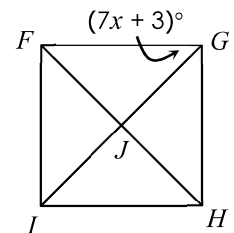
9. If  $CDEF$  is a rhombus, find  $m\angle FED$ .



10. If  $STUV$  is a square with  $SW = 2x + 13$  and  $WU = 8x - 41$ , find  $VT$ .



11. If  $FGHI$  is a square, solve for  $x$ .



Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



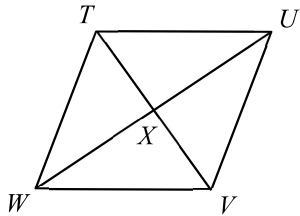
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Homework 5: Rhombi and Squares

**\*\* This is a 2-page document! \*\***

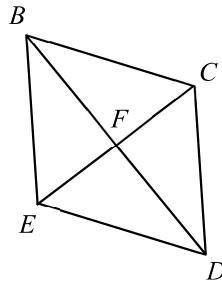
**Directions:** If each quadrilateral below is a rhombus, find the missing measures.

1.  $UV = 8$  and  $WX = 5$



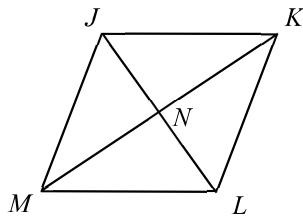
- $TU =$  \_\_\_\_\_
- $WU =$  \_\_\_\_\_
- $TX =$  \_\_\_\_\_
- $TV =$  \_\_\_\_\_

2.  $BC = 28$  and  $BD = 32$



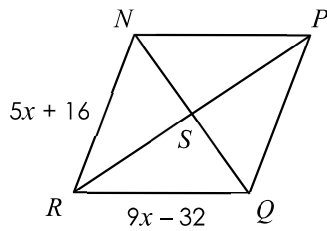
- $CD =$  \_\_\_\_\_
- $FD =$  \_\_\_\_\_
- $EF =$  \_\_\_\_\_
- $EC =$  \_\_\_\_\_

3.  $MK = 24$ ,  $JL = 20$ , and  $m\angle MJL = 50^\circ$

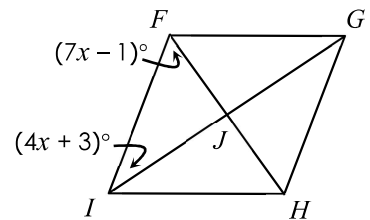


- $NK =$  \_\_\_\_\_
- $NL =$  \_\_\_\_\_
- $ML =$  \_\_\_\_\_
- $JM =$  \_\_\_\_\_
- $m\angle KNL =$  \_\_\_\_\_
- $m\angle KJL =$  \_\_\_\_\_
- $m\angle MLK =$  \_\_\_\_\_
- $m\angle JKM =$  \_\_\_\_\_
- $m\angle JML =$  \_\_\_\_\_

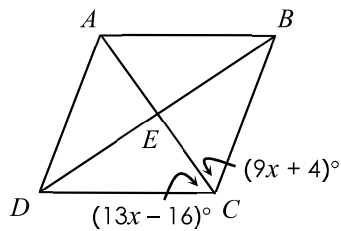
4. Find  $PQ$ .



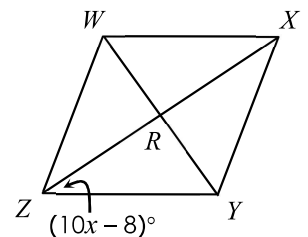
5. Find  $m\angle HGI$ .



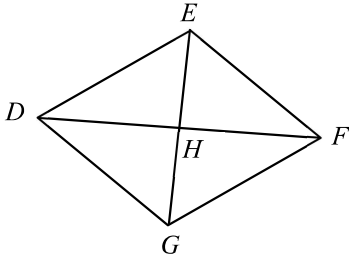
6. Find  $m\angle ADB$ .



7. If  $m\angle XYZ = 136^\circ$ , solve for  $x$ .



8. If  $DE = 16x - 3$ ,  $EF = 9x + 11$ , and  $DF = 52$ , find  $HG$ .



**Directions:** If each quadrilateral below is a square, find the missing measures.

9.  $VU = \underline{\hspace{2cm}}$   
 $SU = \underline{\hspace{2cm}}$   
 $TV = \underline{\hspace{2cm}}$   
 $SW = \underline{\hspace{2cm}}$

10.  $OM = \underline{\hspace{2cm}}$   
 $PN = \underline{\hspace{2cm}}$   
 $ON = \underline{\hspace{2cm}}$   
 $MN = \underline{\hspace{2cm}}$

11.  $m\angle EFG = \underline{\hspace{2cm}}$   
 $m\angle GDH = \underline{\hspace{2cm}}$   
 $m\angle FEG = \underline{\hspace{2cm}}$   
 $m\angle DHG = \underline{\hspace{2cm}}$

12. Solve for  $x$ .  $(6x - 21)^\circ$

13. Which quadrilaterals always have diagonals that are congruent?

- Parallelograms
- Rectangles
- Rhombi
- Squares

14. Which quadrilaterals always have consecutive angles that are supplementary?

- Parallelograms
- Rectangles
- Rhombi
- Squares

15. Which quadrilaterals always have diagonals that are perpendicular?

- Parallelograms
- Rectangles
- Rhombi
- Squares

16. Which quadrilaterals always have diagonals that bisect each other?

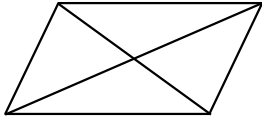
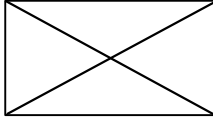
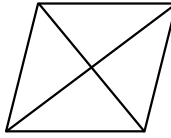
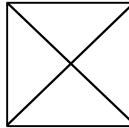
- Parallelograms
- Rectangles
- Rhombi
- Squares

# COORDINATE GEOMETRY: Name that Quadrilateral!

To classify a quadrilateral as a parallelogram, rectangle, rhombus, or square:

➤ Step 1: \_\_\_\_\_

➤ Step 2: \_\_\_\_\_

<b>CASE 1</b> (Parallelogram)	Opposite sides are congruent and diagonals are NOT congruent.	
<b>CASE 2</b> (Rectangle)	Opposite sides are congruent and diagonals are congruent.	
<b>CASE 3</b> (Rhombus)	All four sides are congruent and diagonals are NOT congruent.	
<b>CASE 4</b> (Square)	All four sides are congruent and diagonals are congruent.	

**Directions:** Given the vertices, determine the quadrilaterals most specific classification.

①  $A(9, -4), B(8, -2), C(2, -5), D(3, -7)$

$ABCD$  is a \_\_\_\_\_.

2  $Q(-2, -7), R(1, -5), S(4, -7), T(1, -9)$

$QRST$  is a \_\_\_\_\_.

3  $J(5, -1), K(8, 2), L(11, 10), M(8, 7)$

$JKLM$  is a \_\_\_\_\_.



4  $W(-4, -3), X(1, -2), Y(2, -7), Z(-3, -8)$

$WXYZ$  is a \_\_\_\_\_.

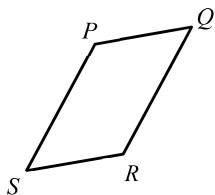
5  $D(-5, 9), E(-3, 6), F(-6, -2), G(-8, 1)$

$DEFG$  is a \_\_\_\_\_.

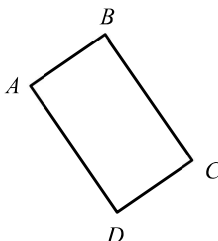
# QUADRILATERALS *in the* COORDINATE PLANE

**Directions:** Use your knowledge of slope, distance, midpoint, and the properties of quadrilaterals to answer the following questions.

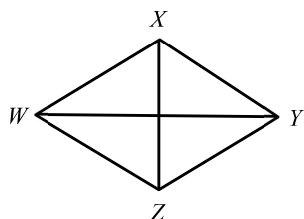
1. On parallelogram  $PQRS$  below, if  $P$  is located at  $(-1, 6)$  and  $S$  is located at  $(-7, -3)$ , what is the slope of  $\overline{QR}$ ?



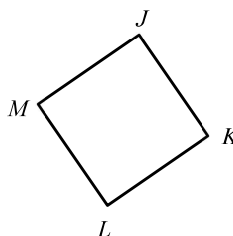
2. On rectangle  $ABCD$  below, if  $A$  is located at  $(3, 4)$  and  $B$  is located at  $(7, 6)$ , what is the slope of  $\overline{BC}$ ?



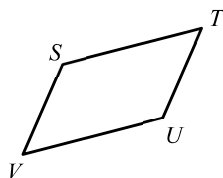
3. On rhombus  $WXYZ$ , if  $W$  is located at  $(-5, -2)$  and  $Y$  is located at  $(3, -2)$ , what is the slope of  $\overline{XZ}$ ?



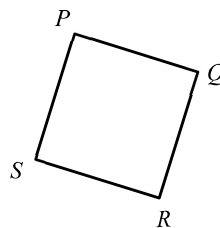
4. On square  $JKLM$  below, if  $J$  is located at  $(-2, 5)$  and  $K$  is located at  $(2, 2)$ , what is the slope of  $\overline{LK}$ ?



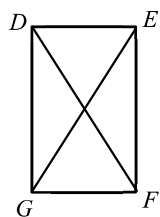
5. On parallelogram  $STUV$  below, if  $S$  is located at  $(-4, 1)$  and  $T$  is located at  $(5, 3)$ , what is the length of  $\overline{VU}$ ?



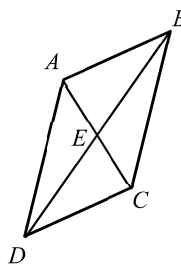
6. On square  $PQRS$  below, if  $Q$  is located at  $(7, 0)$  and  $R$  is located at  $(5, -8)$ , what is the length of  $\overline{SR}$ ?



7. On rectangle  $DEFG$  below, if  $D$  is located at  $(-1, -1)$  and  $F$  is located at  $(4, -8)$ , what is the length of  $\overline{GE}$ ?



8. On parallelogram  $ABCD$  below, if  $A(1, 1)$ ,  $B(8, 5)$ ,  $C(5, -5)$  and  $D(-2, -9)$ , what are the coordinates of point  $E$ ?



Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



Date: \_\_\_\_\_ Per: \_\_\_\_\_

Homework 6: Classifying Quadrilaterals  
in the Coordinate Plane

**\*\* This is a 2-page document! \*\***

**Directions:** Given the vertices, determine the quadrilaterals most specific classification: Parallelogram, Rectangle, Rhombus, or Square. Justify your answer using the distance formula.

1.  $S(-9, 14)$ ,  $T(1, 10)$ ,  $U(-3, 0)$ ,  $V(-13, 4)$

$STUV$  is a \_\_\_\_\_.

2.  $E(-7, -4)$ ,  $F(2, -3)$ ,  $G(0, -7)$ ,  $H(-9, -8)$

$EFGH$  is a \_\_\_\_\_.

3.  $A(-5, 8)$ ,  $B(-2, 14)$ ,  $C(12, 7)$ ,  $D(9, 1)$

$ABCD$  is a \_\_\_\_\_.

4.  $K(5, -3)$ ,  $L(7, 1)$ ,  $M(9, -3)$ ,  $N(7, -7)$

$KLMN$  is a \_\_\_\_\_.

Name: \_\_\_\_\_

Geometry

Date: \_\_\_\_\_ Per: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals

**Quiz 8-2:** Parallelograms, Rectangles, Rhombi, & Squares

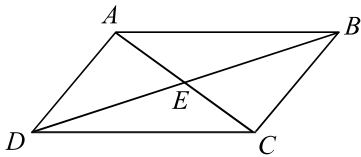
1. Which quadrilaterals always have opposite angles that are congruent?

- Parallelograms
- Rectangles
- Rhombi
- Squares

2. Which quadrilaterals always have diagonals that bisect opposite angles?

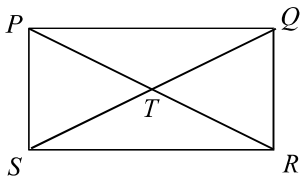
- Parallelograms
- Rectangles
- Rhombi
- Squares

3. If  $ABCD$  is a parallelogram,  $AD = 14$ ,  $EC = 11$ ,  $m\angle ABC = 64^\circ$ ,  $m\angle DAC = 71^\circ$ , and  $m\angle BDC = 25^\circ$ , find each measure.



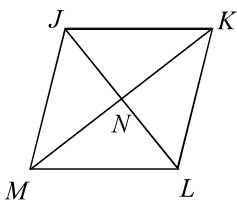
- a)  $BC =$  \_\_\_\_\_
- b)  $AC =$  \_\_\_\_\_
- c)  $m\angle DAB =$  \_\_\_\_\_
- d)  $m\angle ABD =$  \_\_\_\_\_
- e)  $m\angle ACD =$  \_\_\_\_\_
- f)  $m\angle ADB =$  \_\_\_\_\_

4. If  $PQRS$  is a rectangle,  $ST = 12$ , and  $m\angle PRS = 23^\circ$ , find each measure.



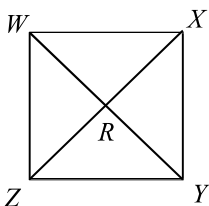
- a)  $SQ =$  \_\_\_\_\_
- b)  $PR =$  \_\_\_\_\_
- c)  $m\angle QPR =$  \_\_\_\_\_
- d)  $m\angle PSR =$  \_\_\_\_\_
- e)  $m\angle SQR =$  \_\_\_\_\_
- f)  $m\angle PTQ =$  \_\_\_\_\_

5. If  $JKLM$  is a rhombus,  $MK = 30$ ,  $NL = 13$ , and  $m\angle MKL = 41^\circ$ , find each measure.



- a)  $NK =$  \_\_\_\_\_
- b)  $JL =$  \_\_\_\_\_
- c)  $KL =$  \_\_\_\_\_
- d)  $m\angle JKM =$  \_\_\_\_\_
- e)  $m\angle JML =$  \_\_\_\_\_
- f)  $m\angle MLK =$  \_\_\_\_\_
- g)  $m\angle MNL =$  \_\_\_\_\_
- h)  $m\angle KJL =$  \_\_\_\_\_

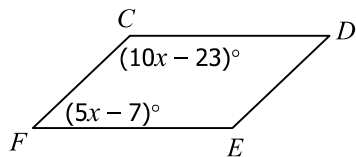
6. If  $WXYZ$  is a square with  $WZ = 27$ , find each measure.



- a)  $ZY =$  \_\_\_\_\_
- b)  $WY =$  \_\_\_\_\_
- c)  $RX =$  \_\_\_\_\_
- d)  $m\angle WRZ =$  \_\_\_\_\_
- e)  $m\angle XYZ =$  \_\_\_\_\_
- f)  $m\angle ZWY =$  \_\_\_\_\_

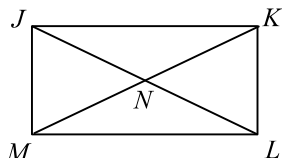
7. If  $CDEF$  is a parallelogram, find  $m\angle FCD$ .

7. \_\_\_\_\_



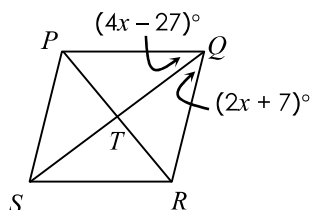
8. If  $JKLM$  is a rectangle,  $JL = 2x + 5$ , and  $MK = 7x - 40$ , find  $MK$ .

8. \_\_\_\_\_



9. If  $PQRS$  is a rhombus, find  $m\angle PQR$ .

9. \_\_\_\_\_



10. Quadrilateral  $BCDE$  has vertices  $B(-1, -1)$ ,  $C(6, -2)$ ,  $D(5, -9)$ , and  $E(-2, -8)$ . Determine the most precise classification of  $BCDE$ : a parallelogram, rectangle, rhombus, or square. Use the distance formula to justify your answer.

10.  $BCDE$  is a \_\_\_\_\_

Name: \_\_\_\_\_

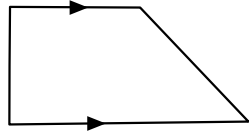
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Topic: \_\_\_\_\_

Class: \_\_\_\_\_

Main Ideas/Questions	Notes/Examples
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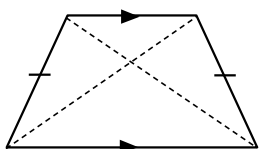
**NON-ISOSCELES**  
*Trapezoids*



**Properties of Non-Isosceles Trapezoids:**

- Only ONE pair of opposite sides are parallel.
- Consecutive angles between parallel lines are supplementary.

**ISOSCELES**  
*Trapezoids*



**Isosceles trapezoids have the same properties as non-isosceles trapezoids, plus these:**

- Non-parallel sides (legs) are congruent.
- Diagonals are congruent.
- Base angles are congruent.
- Opposite angles are supplementary.

**Directions:** Find each missing value on the trapezoids below.

1.  $m\angle K = \underline{\hspace{2cm}}$   
 $m\angle M = \underline{\hspace{2cm}}$

2.  $m\angle C = \underline{\hspace{2cm}}$   
 $m\angle D = \underline{\hspace{2cm}}$

3. Solve for  $x$ .  $54^\circ$   $(8x + 6)^\circ$

4. Find  $m\angle R$ .  $(12x + 3)^\circ$   $(7x - 13)^\circ$

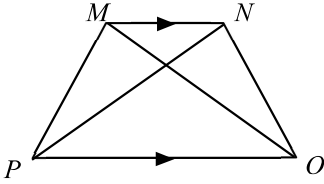
5.  $DEFG$  is an isosceles trapezoid.  $\overline{DG} \cong \underline{\hspace{2cm}}$   
 $\overline{DF} \cong \underline{\hspace{2cm}}$

6.  $TUVW$  is an isosceles trapezoid.  $\angle T \cong \underline{\hspace{2cm}}$   
 $\angle V \cong \underline{\hspace{2cm}}$

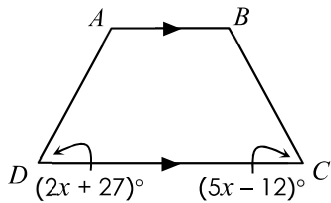
7.  $112^\circ$   $m\angle Q = \underline{\hspace{2cm}}$   
 $m\angle R = \underline{\hspace{2cm}}$   
 $m\angle S = \underline{\hspace{2cm}}$

8.  $47^\circ$   $m\angle W = \underline{\hspace{2cm}}$   
 $m\angle Y = \underline{\hspace{2cm}}$   
 $m\angle Z = \underline{\hspace{2cm}}$

9. If  $MNOP$  is an isosceles trapezoid,  $MP = 16x - 13$ ,  $NO = 9x + 8$ ,  $PN = 5y + 19$ , and  $MO = 12y - 37$ , solve for  $x$  and  $y$ .

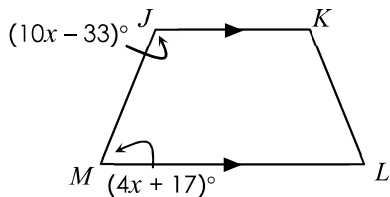


10. If  $ABCD$  is an isosceles trapezoid, find each missing angle.



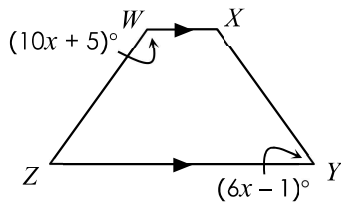
$$\begin{aligned} m\angle A &= \underline{\hspace{2cm}} \\ m\angle B &= \underline{\hspace{2cm}} \\ m\angle C &= \underline{\hspace{2cm}} \\ m\angle D &= \underline{\hspace{2cm}} \end{aligned}$$

11. If  $JKLM$  is an isosceles trapezoid, find each missing angle.



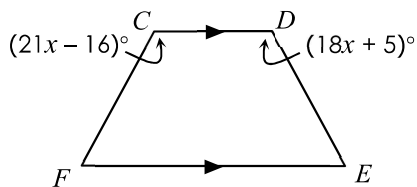
$$\begin{aligned} m\angle J &= \underline{\hspace{2cm}} \\ m\angle K &= \underline{\hspace{2cm}} \\ m\angle L &= \underline{\hspace{2cm}} \\ m\angle M &= \underline{\hspace{2cm}} \end{aligned}$$

12. If  $WXYZ$  is an isosceles trapezoid, find each missing angle.



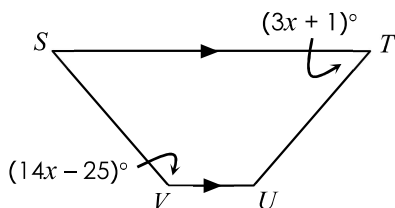
$$\begin{aligned} m\angle W &= \underline{\hspace{2cm}} \\ m\angle X &= \underline{\hspace{2cm}} \\ m\angle Y &= \underline{\hspace{2cm}} \\ m\angle Z &= \underline{\hspace{2cm}} \end{aligned}$$

13. If  $CDEF$  is an isosceles trapezoid, find each missing angle.



$$\begin{aligned} m\angle C &= \underline{\hspace{2cm}} \\ m\angle D &= \underline{\hspace{2cm}} \\ m\angle E &= \underline{\hspace{2cm}} \\ m\angle F &= \underline{\hspace{2cm}} \end{aligned}$$

14. If  $STUV$  is an isosceles trapezoid, find each missing angle.



$$\begin{aligned} m\angle S &= \underline{\hspace{2cm}} \\ m\angle T &= \underline{\hspace{2cm}} \\ m\angle U &= \underline{\hspace{2cm}} \\ m\angle V &= \underline{\hspace{2cm}} \end{aligned}$$

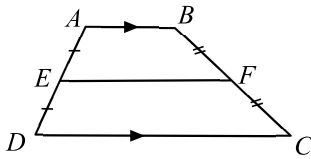


Name:

Date:

Topic:

Class:

Main Ideas/Questions	Notes/Examples
<p>MIDSEGMENT of a TRAPEZOID</p>	<p>The midsegment of a trapezoid connects the midpoints of the legs:</p>  <p>If <math>\overline{EF}</math> is the midsegment of trapezoid <math>ABCD</math>, then:</p> <ul style="list-style-type: none"> <li>• _____</li> <li>• _____</li> </ul>

**Directions:** Use the trapezoid above for questions 1-4.

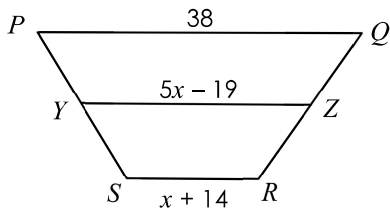
1. If  $AB = 14$  and  $DC = 26$ , find  $EF$ .

2. If  $AB = 7$  and  $DC = 31$ , find  $EF$ .

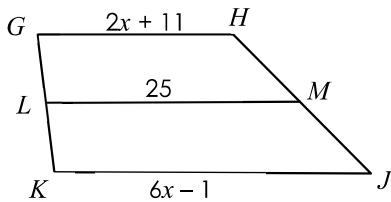
3. If  $EF = 22$  and  $DC = 38$ , find  $AB$ .

4. If  $AB = 41$  and  $EF = 47$ , find  $DC$ .

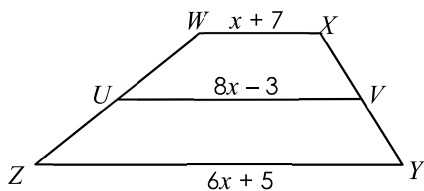
5. For trapezoid  $PQRS$ ,  $Y$  and  $Z$  are midpoints of the legs. Find  $YZ$ .



6. For trapezoid  $GHJK$ ,  $L$  and  $M$  are midpoints of the legs. Find  $KJ$ .



7. For trapezoid  $WXYZ$ ,  $U$  and  $V$  are midpoints of the legs. Find  $UV$ .



Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



Date: \_\_\_\_\_ Per: \_\_\_\_\_

Homework 7: Trapezoids

**\*\* This is a 2-page document! \*\***

**Directions:** If each quadrilateral below is a trapezoid, find the missing measures.

**1.**

$m\angle C = \underline{\hspace{2cm}}$   
 $m\angle E = \underline{\hspace{2cm}}$

**2.**

$m\angle Q = \underline{\hspace{2cm}}$   
 $m\angle S = \underline{\hspace{2cm}}$

**3.**

$m\angle J = \underline{\hspace{2cm}}$   
 $m\angle L = \underline{\hspace{2cm}}$   
 $m\angle M = \underline{\hspace{2cm}}$

**4.**

$m\angle W = \underline{\hspace{2cm}}$   
 $m\angle X = \underline{\hspace{2cm}}$   
 $m\angle Z = \underline{\hspace{2cm}}$

**5. Solve for  $x$ .**

**6. Find  $m\angle B$ .**

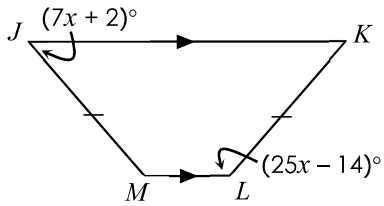
**7.**

$m\angle M = \underline{\hspace{2cm}}$   
 $m\angle N = \underline{\hspace{2cm}}$   
 $m\angle O = \underline{\hspace{2cm}}$   
 $m\angle P = \underline{\hspace{2cm}}$

**8.**

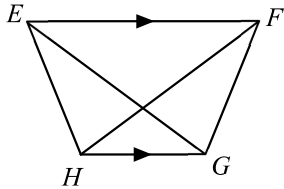
$m\angle W = \underline{\hspace{2cm}}$   
 $m\angle X = \underline{\hspace{2cm}}$   
 $m\angle Y = \underline{\hspace{2cm}}$   
 $m\angle Z = \underline{\hspace{2cm}}$

9.

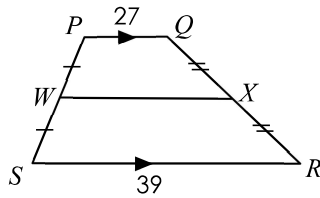


$m\angle J = \underline{\hspace{2cm}}$   
 $m\angle K = \underline{\hspace{2cm}}$   
 $m\angle L = \underline{\hspace{2cm}}$   
 $m\angle M = \underline{\hspace{2cm}}$

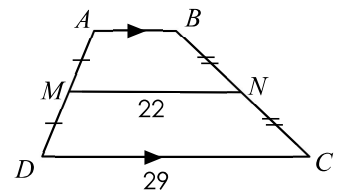
10. If  $EFGH$  is an isosceles trapezoid,  $EH = 4x - 27$ ,  $FG = x + 9$ ,  $EG = 3y + 19$ , and  $FH = 11y - 21$ , solve for  $x$  and  $y$ .



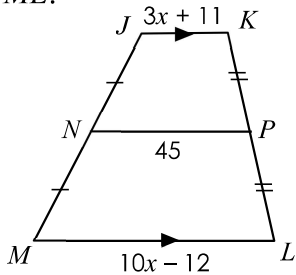
11. Find  $WX$ .



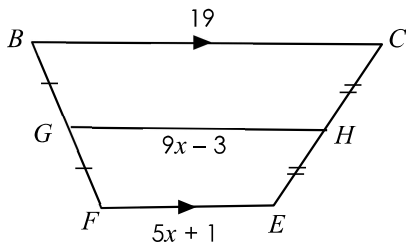
12. Find  $AB$ .



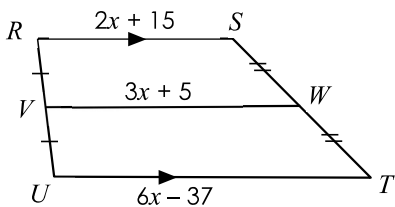
13. Find  $ML$ .



14. Find  $GH$ .



15. Find  $RS$ .

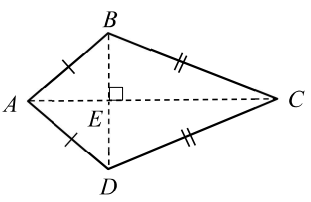


Name: \_\_\_\_\_

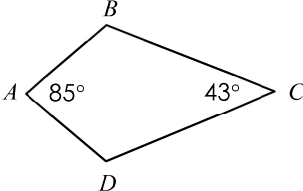
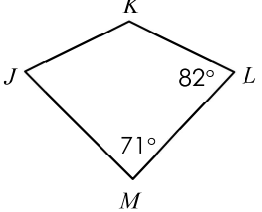
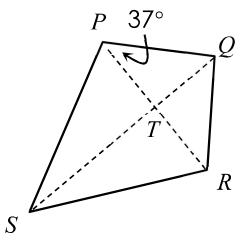
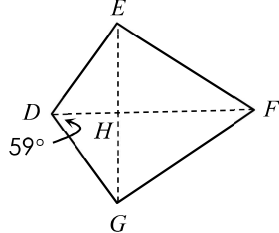
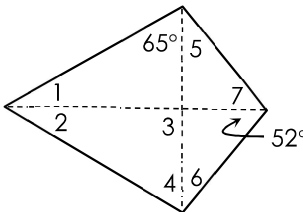
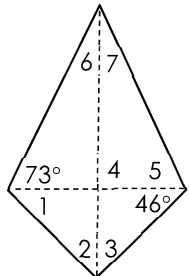
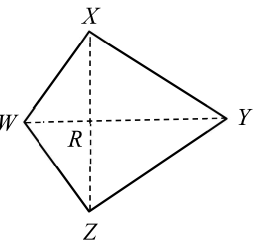
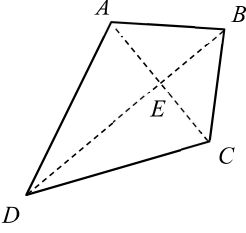
Date: \_\_\_\_\_

Topic: \_\_\_\_\_

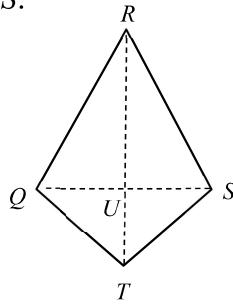
Class: \_\_\_\_\_

Main Ideas/Questions	Notes/Examples
<p style="text-align: center;"><i>Properties of</i> <b>KITES</b></p>	<p style="text-align: center;"><b>A kite is a quadrilateral with the following properties:</b></p> <div style="display: flex; align-items: center;">  <ul style="list-style-type: none"> <li>• Exactly two pairs of consecutive congruent sides. ( <math>\overline{AB} \cong \overline{AD}</math> and <math>\overline{BC} \cong \overline{DC}</math> )</li> <li>• One pair of opposite angles are congruent. ( <math>\angle ABC \cong \angle ADC</math> )</li> <li>• Diagonals are perpendicular. ( <math>\overline{AC} \perp \overline{BD}</math> )</li> </ul> </div>

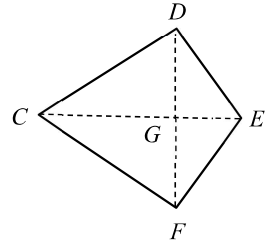
**Directions:** If each quadrilateral below is a kite, find the missing values.

<p>1.</p>  <p style="margin-left: 200px;"><math>m\angle B =</math> _____ <math>m\angle D =</math> _____</p>	<p>2.</p>  <p style="margin-left: 200px;"><math>m\angle J =</math> _____ <math>m\angle K =</math> _____</p>
<p>3.</p>  <p style="margin-left: 200px;"><math>m\angle PTQ =</math> _____ <math>m\angle PQT =</math> _____ <math>m\angle QRT =</math> _____</p>	<p>4.</p>  <p style="margin-left: 200px;"><math>m\angle GDE =</math> _____ <math>m\angle DEH =</math> _____ <math>m\angle DGH =</math> _____</p>
<p>5.</p>  <p style="margin-left: 200px;"><math>m\angle 1 =</math> _____ <math>m\angle 2 =</math> _____ <math>m\angle 3 =</math> _____ <math>m\angle 4 =</math> _____ <math>m\angle 5 =</math> _____ <math>m\angle 6 =</math> _____ <math>m\angle 7 =</math> _____</p>	<p>6.</p>  <p style="margin-left: 200px;"><math>m\angle 1 =</math> _____ <math>m\angle 2 =</math> _____ <math>m\angle 3 =</math> _____ <math>m\angle 4 =</math> _____ <math>m\angle 5 =</math> _____ <math>m\angle 6 =</math> _____ <math>m\angle 7 =</math> _____</p>
<p>7. If <math>WX = 14</math> and <math>WR = 8</math>, find <math>RZ</math>.</p> 	<p>8. If <math>AC = 38</math> and <math>ED = 41</math>, find <math>CD</math>.</p> 

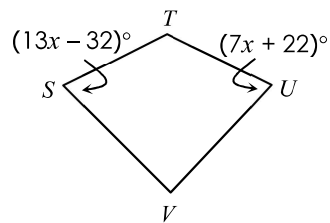
9. If  $RS = 10$  and  $RU = 9$ , find  $QS$ .



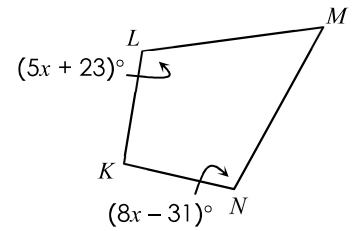
10. If  $GF = 15$  and  $CG = 23$ , find  $CD$ .



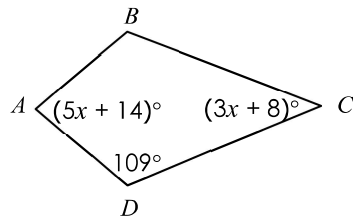
11. Solve for  $x$ .



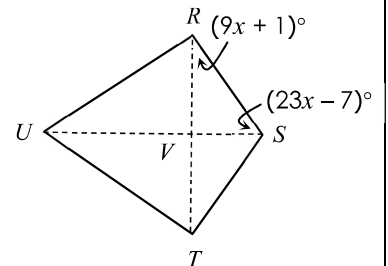
12. Find  $m\angle L$ .



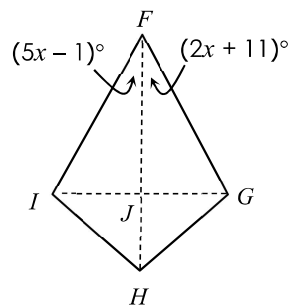
13. Solve for  $x$ .



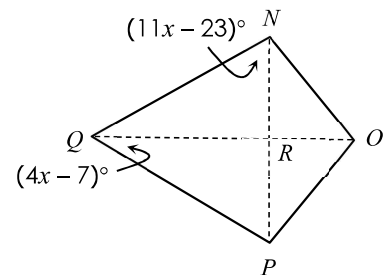
14. Find  $m\angle STV$ .



15. Find  $m\angle FGJ$ .

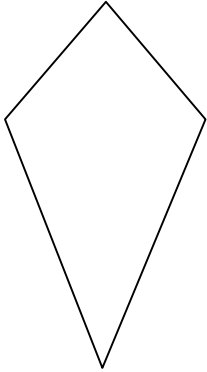


16. Find  $m\angle NQP$ .



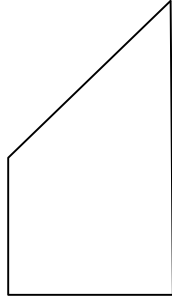
# QUADRILATERALS

## KITE



- Exactly two pairs of consecutive congruent sides.
- One pair of opposite angles are congruent.
- Diagonals are perpendicular.

## TRAPEZOID

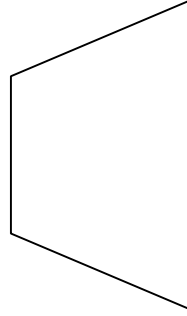


- Only ONE pair of opposite sides are parallel (called bases).
- Consecutive angles are supplementary.

### Midsegment of a Trapezoid:

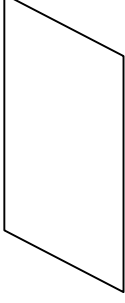
A midsegment of a trapezoid connects the midpoints of the legs. This segment is equal to the average of the two bases.

## ISOSCELES TRAPEZOID



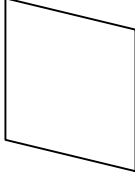
- Non-parallel sides (legs) are congruent.
- Diagonals are congruent.
- Base angles are congruent.
- Opposite angles are supplementary.

## PARALLELOGRAM



- Opposite sides parallel.
- Opposite sides congruent.
- Opposite angles supplementary.
- Consecutive angles supplementary.
- Diagonals bisect each other.

## RHOMBUS



- Four congruent sides.
- Diagonals are perpendicular.
- Diagonals bisect opposite angles.

## RECTANGLE



- Four right angles.
- Diagonals are congruent.

## SQUARE



Squares have ALL the properties of parallelograms, rectangles, and rhombi!

Name: \_\_\_\_\_

Unit 8: Polygons & Quadrilaterals



Date: \_\_\_\_\_ Per: \_\_\_\_\_

Homework 8: Kites

**\*\* This is a 2-page document! \*\***

**Directions:** If each quadrilateral below is a kite, find the missing measures.

**1.**

$m\angle F = \underline{\hspace{2cm}}$   
 $m\angle H = \underline{\hspace{2cm}}$

**2.**

$m\angle U = \underline{\hspace{2cm}}$   
 $m\angle V = \underline{\hspace{2cm}}$

**3.**

$m\angle 1 = \underline{\hspace{2cm}}$        $m\angle 5 = \underline{\hspace{2cm}}$   
 $m\angle 2 = \underline{\hspace{2cm}}$        $m\angle 6 = \underline{\hspace{2cm}}$   
 $m\angle 3 = \underline{\hspace{2cm}}$        $m\angle 7 = \underline{\hspace{2cm}}$   
 $m\angle 4 = \underline{\hspace{2cm}}$

**4.** Given:  $m\angle ABC = 70^\circ$  and  $m\angle ADC = 46^\circ$ .

$m\angle 1 = \underline{\hspace{2cm}}$   
 $m\angle 2 = \underline{\hspace{2cm}}$   
 $m\angle 3 = \underline{\hspace{2cm}}$   
 $m\angle 4 = \underline{\hspace{2cm}}$   
 $m\angle 5 = \underline{\hspace{2cm}}$   
 $m\angle 6 = \underline{\hspace{2cm}}$   
 $m\angle 7 = \underline{\hspace{2cm}}$   
 $m\angle 8 = \underline{\hspace{2cm}}$   
 $m\angle 9 = \underline{\hspace{2cm}}$

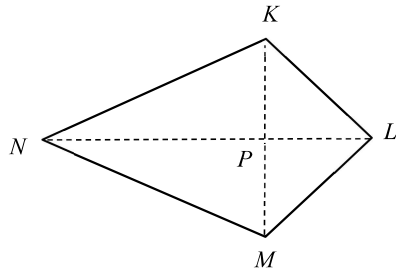
**5.** If  $QR = 13$  and  $PT = 8$ , find  $QT$ .

**6.** If  $KM = 52$  and  $NL = 33$ , find  $LM$ .

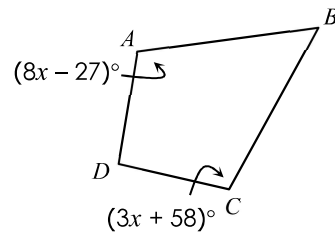
**7.** If  $XZ = 46$  and  $WR = 21$ , find  $WX$ .

**8.** If  $DE = 15$  and  $EH = 11$ , find  $DF$ .

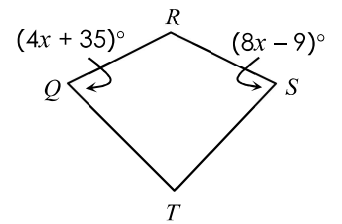
9. If  $NK = 7x - 1$ ,  $NM = 10x - 13$ , and  $KM = 24$ , find  $NP$ .



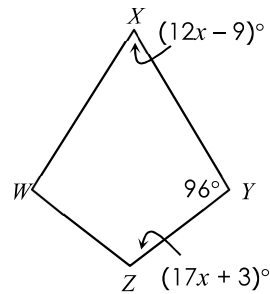
10. Solve for  $x$ .



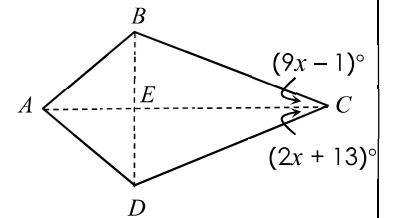
11. Find  $m\angle S$ .



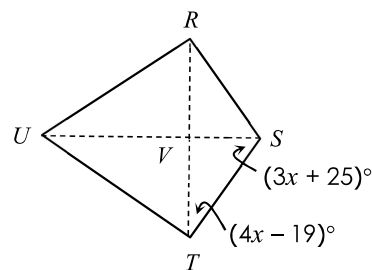
12. Solve for  $x$ .



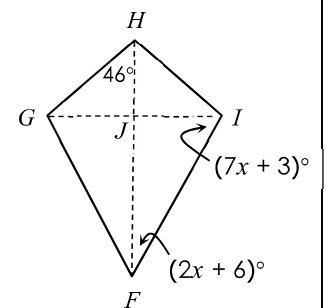
13. Find  $m\angle EDC$ .



14. Find  $m\angle RST$ .



15. Find  $m\angle HIF$ .





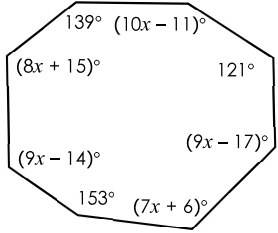
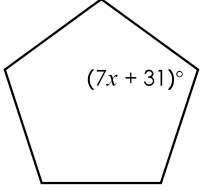
# Unit 8 Test Study Guide

## (Polygons & Quadrilaterals)

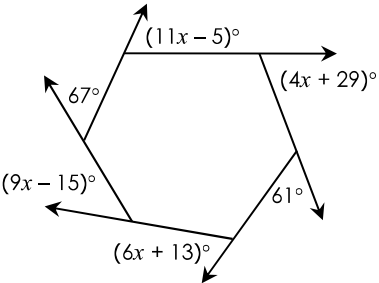
Name: \_\_\_\_\_

Date: \_\_\_\_\_ Per: \_\_\_\_\_

### Topic 1: Angles of Polygons

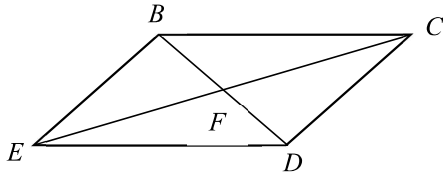
<p>1. What is the formula for the sum of the interior angle measures of a polygon?</p>	<p>2. What is the formula to find the measure of each interior angle of a regular polygon?</p>
<p>3. Find the sum of the interior angle measures of a 35-gon.</p>	<p>4. Six angles of a heptagon measure <math>107^\circ</math>, <math>139^\circ</math>, <math>131^\circ</math>, <math>110^\circ</math>, <math>145^\circ</math>, and <math>128^\circ</math>. What is the measure of the seventh angle?</p>
<p>5. If the sum of the interior angles of a polygon is <math>3780^\circ</math>, how many sides does it have?</p>	<p>6. What is the measure of each interior angle of a regular 18-gon?</p>
<p>7. What is the sum of the exterior angle measures of any polygon?</p>	<p>8. What is the measure of each exterior angle of a regular 30-gon?</p>
<p>9. If the exterior angle of a regular polygon measures <math>24^\circ</math>, how many sides does it have?</p>	<p>10. If the interior angle of a regular polygon is <math>162^\circ</math>, how many sides does it have?</p>
<p>11. Solve for <math>x</math>.</p> 	<p>12. If the figure is a regular polygon, solve for <math>x</math>.</p> 

13. Solve for  $x$ .



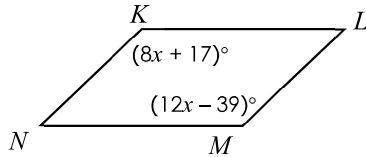
**Topic 2: Parallelograms**

14. If  $EBCD$  is a parallelogram,  $EB = 16$ ,  $ED = 25$ ,  $BF = 11$ ,  $EC = 34$ ,  $m\angle BED = 55^\circ$ ,  $m\angle CDB = 67^\circ$ , and  $m\angle BCE = 24^\circ$ , find each missing measure.

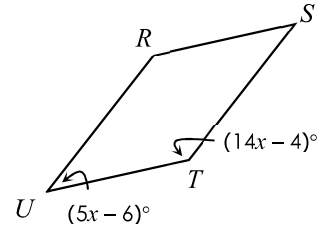


$BC = \underline{\hspace{2cm}}$        $m\angle EDC = \underline{\hspace{2cm}}$   
 $BD = \underline{\hspace{2cm}}$        $m\angle EBD = \underline{\hspace{2cm}}$   
 $FC = \underline{\hspace{2cm}}$        $m\angle BEC = \underline{\hspace{2cm}}$   
 $CD = \underline{\hspace{2cm}}$        $m\angle DBC = \underline{\hspace{2cm}}$

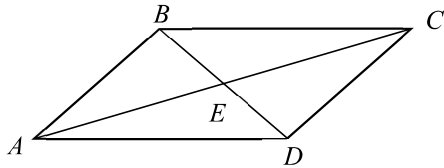
15. Find  $m\angle N$ .



16. Find  $m\angle R$ .

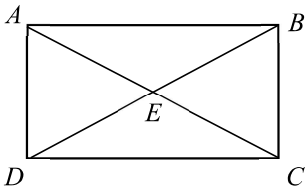


17. In parallelogram  $ABCD$ , if  $ED = 7x - 13$  and  $BD = 16x - 38$ , find  $BD$ .



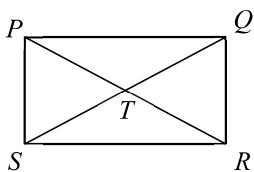
**Topic 3: Rectangles**

18. If  $ABCD$  is a rectangle,  $AD = 9$ ,  $AC = 22$ , and  $m\angle BCA = 66^\circ$ , find each missing measure.

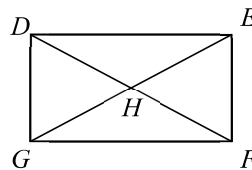


$BC = \underline{\hspace{2cm}}$        $m\angle ADC = \underline{\hspace{2cm}}$   
 $AB = \underline{\hspace{2cm}}$        $m\angle BAC = \underline{\hspace{2cm}}$   
 $BD = \underline{\hspace{2cm}}$        $m\angle CDB = \underline{\hspace{2cm}}$   
 $EC = \underline{\hspace{2cm}}$        $m\angle AEB = \underline{\hspace{2cm}}$

19. If  $PQRS$  is a rectangle,  $PR = 9x + 1$ , and  $QS = 13x - 11$ , find  $TR$ .

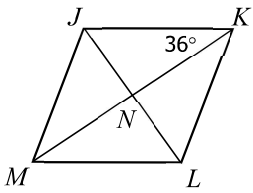


20. If  $DEFG$  is a rectangle,  $m\angle DEG = (4x - 5)^\circ$ , and  $m\angle FGE = (6x - 21)^\circ$ , find  $m\angle DGE$ .



**Topic 4: Rhombi & Squares**

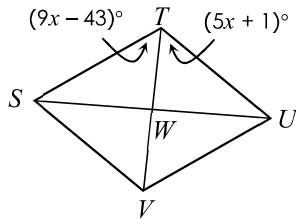
**21.** If  $JKLM$  is a rhombus, find each angle.



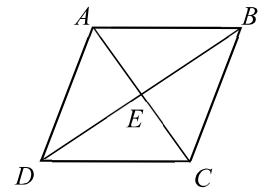
- $m\angle JKL =$  \_\_\_\_\_
- $m\angle MLK =$  \_\_\_\_\_
- $m\angle JMK =$  \_\_\_\_\_
- $m\angle MJL =$  \_\_\_\_\_
- $m\angle KNL =$  \_\_\_\_\_

**22.** Using  $JKLM$  from the previous question, if  $MN = 20$  and  $JL = 26$ , find  $JK$ .

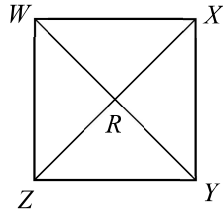
**23.** If  $STUV$  is a rhombus, find  $m\angle SVU$ .



**24.** If  $ABCD$  is a rhombus,  $AD = 4x + 2$ ,  $DC = 7x - 13$ , and  $BD = 34$ , find  $AE$ .



**25.** If  $WXYZ$  is a square, find each angle.

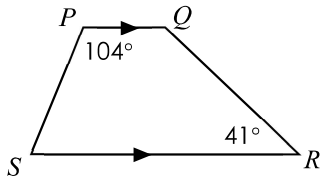


- $m\angle WXY =$  \_\_\_\_\_
- $m\angle XZY =$  \_\_\_\_\_
- $m\angle YXZ =$  \_\_\_\_\_
- $m\angle WRZ =$  \_\_\_\_\_
- $m\angle XWY =$  \_\_\_\_\_

**26.** Using  $WXYZ$  from the previous question, if  $WY = 32$ , find  $XY$ .

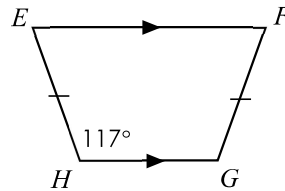
**Topic 5: Trapezoids**

**27.** Find each measure.



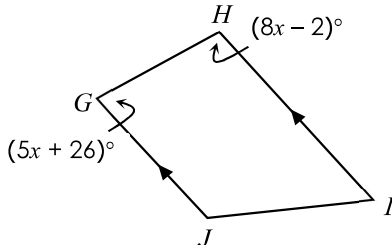
- $m\angle Q =$  \_\_\_\_\_
- $m\angle S =$  \_\_\_\_\_

**28.** Find each measure.

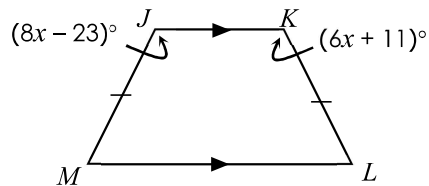


- $m\angle E =$  \_\_\_\_\_
- $m\angle F =$  \_\_\_\_\_
- $m\angle G =$  \_\_\_\_\_

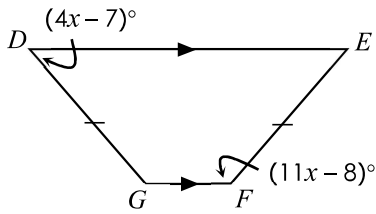
**29.** Find  $m\angle H$ .



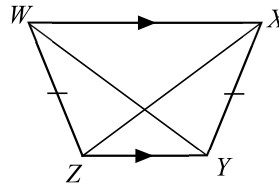
**30.** Find  $m\angle M$ .



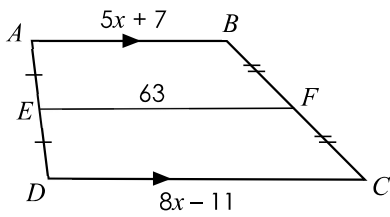
31. Find  $m\angle G$ .



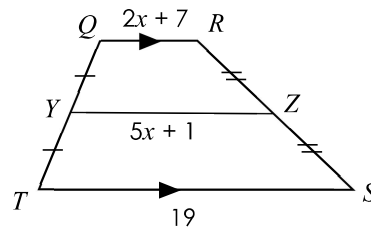
32. If  $WY = 15x - 2$  and  $XZ = 9x + 10$ , find  $WY$ .



33. Find  $AB$ .

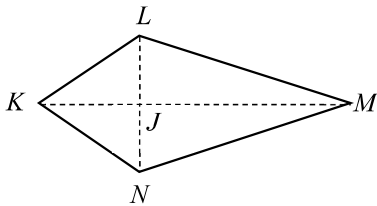


34. Find  $YZ$ .



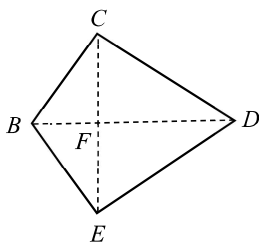
**Topic 6: Kites**

35. If  $KLMN$  is a kite,  $m\angle LMN = 36^\circ$  and  $m\angle KNJ = 54^\circ$ , find each measure.

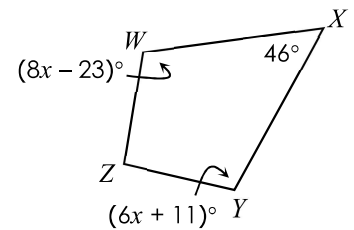


- |                       |                       |
|-----------------------|-----------------------|
| $m\angle KLN =$ _____ | $m\angle JKN =$ _____ |
| $m\angle LKN =$ _____ | $m\angle NMJ =$ _____ |
| $m\angle KNM =$ _____ | $m\angle JLM =$ _____ |
| $m\angle LJM =$ _____ | $m\angle KLM =$ _____ |

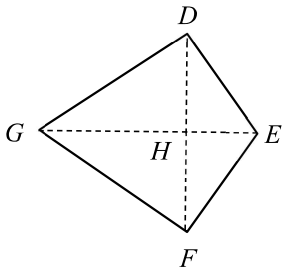
36. If  $BCDE$  is a kite,  $CD = 21$  and  $DF = 18$ , find  $CE$ .



37. If  $WXYZ$  is a kite, find  $m\angle Z$ .



38. If  $DEFG$  is a kite,  $m\angle DEF = (12x - 16)^\circ$ ,  $m\angle EFH = (3x - 1)^\circ$  and  $m\angle DGF = 74^\circ$ , find  $m\angle GFE$ .



**Topic 7: Quadrilaterals in the Coordinate Plane**

**Use the distance and slope formulas to justify your answers to questions 39-40.**

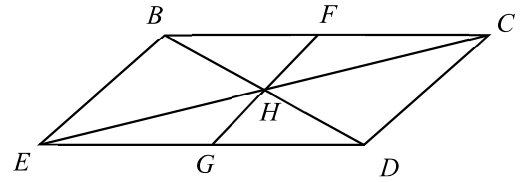
39. Determine whether  $WXYZ$  given  $W(0, 8)$ ,  $X(6, 10)$ ,  $Y(-1, -1)$ ,  $Z(-7, -3)$  is a parallelogram.

40. Determine the most precise classification for quadrilateral  $ABCD$  (parallelogram, rectangle, rhombus, or square) given  $A(3, -4)$ ,  $B(10, -2)$ ,  $C(8, -9)$ ,  $D(1, -11)$ .

**Topic 8: Parallelogram Proofs**

**41. Given:**  $BCDE$  is a parallelogram

**Prove:**  $\overline{EG} \cong \overline{CF}$

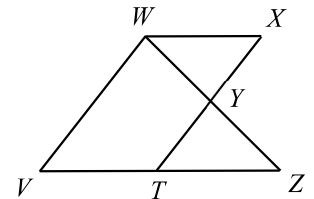


Statements	Reasons

**42. Given:**  $\triangle TYZ \cong \triangle XYW$

$T$  is the midpoint of  $\overline{VZ}$

**Prove:**  $VWXT$  is a parallelogram



Statements	Reasons

Name: \_\_\_\_\_

## Unit 8 Test

Date: \_\_\_\_\_ Per: \_\_\_\_\_

## Polygons & Quadrilaterals

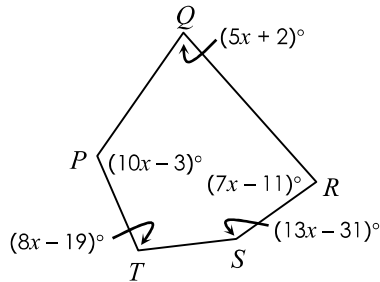
1. What is the sum of the measures of the interior angles of a 27-gon?

- A.  $4860^\circ$       C.  $5220^\circ$   
 B.  $4500^\circ$       D.  $166.7^\circ$

2. If the sum of the interior angles of a polygon is  $2340^\circ$ , how many sides does the polygon have?

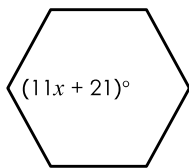
- A. 11 sides      C. 15 sides  
 B. 13 sides      D. 16 sides

3. Find  $m\angle S$ .



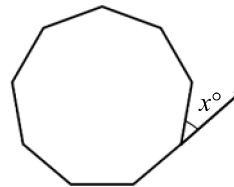
$m\angle S =$

4. A regular hexagon is shown below. Find the value of  $x$ .



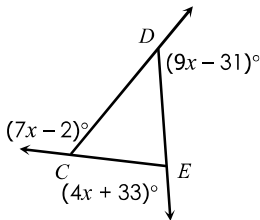
$x =$

5. If the polygon shown below is a regular nonagon, what is the value of  $x$ ?



$x =$

6. Find  $m\angle DCE$ .



$m\angle DCE =$

7. If each interior angle of a regular polygon measures  $168^\circ$ , how many sides does the polygon have?

- A. 12 sides  
 B. 30 sides  
 C. 25 sides  
 D. 15 sides

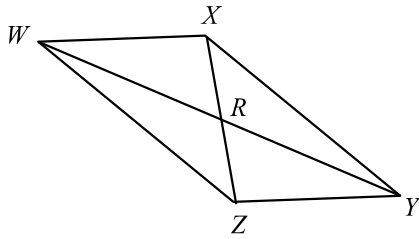
8. Which of the following properties is always true for a parallelogram?

- A. Diagonals bisect each other.  
 B. Diagonals are perpendicular.  
 C. Diagonals are congruent.  
 D. Diagonals bisect opposite angles.

9. Which of the following quadrilaterals always have diagonals that are congruent? Check all that apply.

- Parallelograms  
 Rectangles  
 Rhombi  
 Squares  
 Isosceles Trapezoids

Use parallelogram  $WXYZ$  for questions 10 and 11.



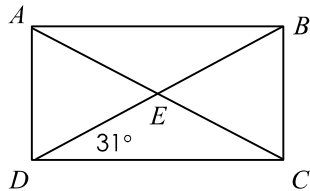
10. If  $m\angle XYZ = 68^\circ$  and  $m\angle WXZ = 71^\circ$ , find  $m\angle WZX$ .

$$m\angle WZX =$$

11. If  $XZ = 8x - 18$  and  $RZ = 2x + 5$ , find  $XR$ .

$$XR =$$

Use rectangle  $ABCD$  for questions 12-14.



12. If  $EC = 13$ , find  $BD$ .

$$BD =$$

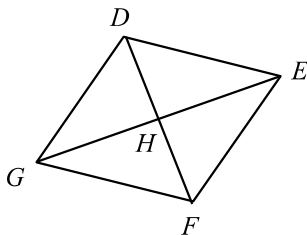
13. Find  $m\angle ADB$ .

$$m\angle ADB =$$

14. Find  $m\angle DEC$ .

$$m\angle DEC =$$

Use rhombus  $DEFG$  for questions 15 and 16.



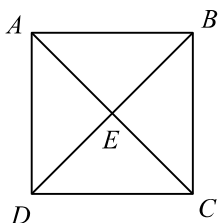
15. If  $GE = 42$  and  $DH = 16$ , find  $GF$ .

$$GF =$$

16. If  $EF = 13$  and  $DF = 18$ , find  $EH$ .

$$EH =$$

Use square  $ABCD$  for questions 17 and 18.



17. If  $AC = 26$ , find  $BC$ .

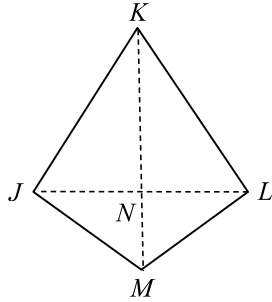
$$BC =$$

18. If  $m\angle ACB = (11x - 32)^\circ$ , find the value of  $x$ .

$$x =$$



Use kite  $JKLM$  for questions 19 and 20.



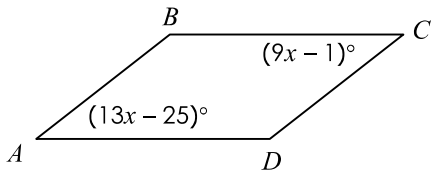
19. If  $m\angle JKN = 28^\circ$  and  $m\angle KLM = 103^\circ$ , find  $m\angle JML$ .

$m\angle JML =$

20. If  $JL = 18$ ,  $NK = 12$ , and  $ML = 10$ , find the perimeter of  $JKLM$ .

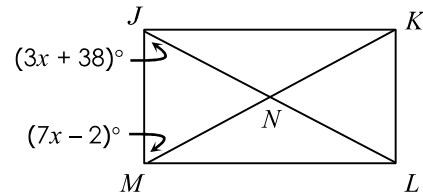
- A. 42
- B. 45
- C. 50
- D. 56

21. If  $ABCD$  is a parallelogram, find  $m\angle D$ .



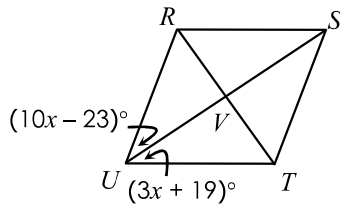
$m\angle D =$

22. If  $JKLM$  is a rectangle, find  $m\angle NML$ .



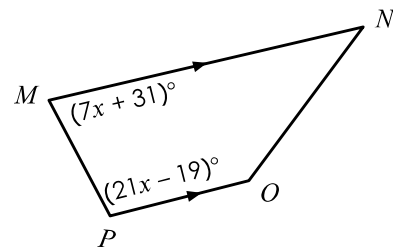
$m\angle NML =$

23. If  $RSTU$  is a rhombus, find  $m\angle UTS$ .



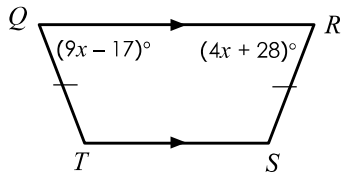
$m\angle UTS =$

24. Find  $m\angle P$ .



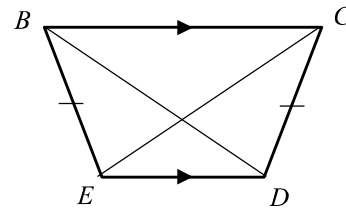
$m\angle P =$

25. Find  $m\angle T$ .



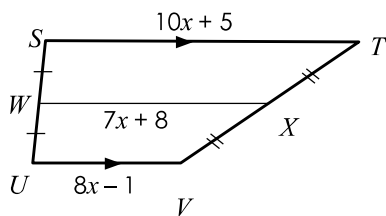
$$m\angle T =$$

26. If  $BD = 8x - 27$  and  $EC = 2x + 33$ , find  $BD$ .



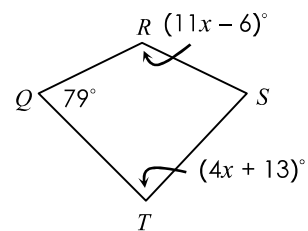
$$BD =$$

27. Find  $WX$ .



$$WX =$$

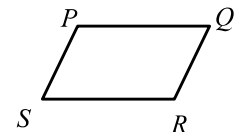
28. If  $QRST$  is a kite, find  $m\angle QRS$ .



$$m\angle QRS =$$

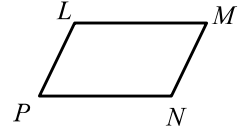
29. The vertices of quadrilateral  $PQRS$  are given below. Use the distance and/or slope formulas to determine if  $PQRS$  is a parallelogram. Use the diagram as a guide.

$P(-6, 4)$ ,  $Q(-2, 7)$ ,  $R(-1, 0)$ ,  $S(-5, -3)$



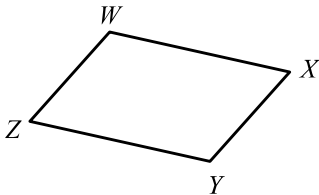
- $PQRS$  is a parallelogram
- $PQRS$  is not a parallelogram

30. The vertices of quadrilateral  $LMNP$  are  $L(-1, 7)$ ,  $M(4, 9)$ ,  $N(8, -1)$ , and  $P(3, -3)$ . Using the distance formula, determine the most precise classification of  $LMNP$ : parallelogram, rectangle, rhombus, or square. Use the diagram as a guide.



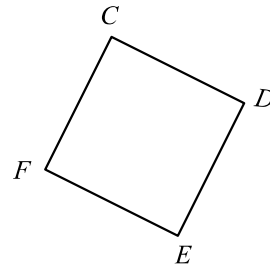
$LMNP$  is a

31.  $WXYZ$  is a quadrilateral with  $W$  located at  $(-5, 2)$  and  $X$  located at  $(3, 0)$ . What must be the slope of  $\overline{ZY}$  in order for  $WXYZ$  to be a parallelogram?



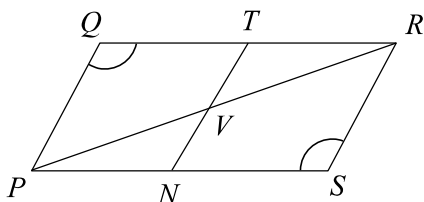
- A. 4                      C.  $\frac{1}{4}$   
 B. -4                     D.  $-\frac{1}{4}$

32. Rhombus  $CDEF$  is shown below. If the slope of  $\overline{FC}$  is  $\frac{5}{2}$ , what must be the slope of  $\overline{CD}$  in order for  $CDEF$  to be a square?



- A.  $\frac{2}{5}$                       C.  $\frac{5}{2}$   
 B.  $-\frac{2}{5}$                     D.  $-\frac{5}{2}$

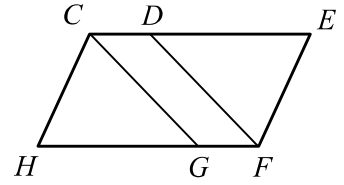
33. In addition to the information given in the drawing, which statement is sufficient to prove  $PQRS$  is a parallelogram?



- A.  $\overline{QR} \cong \overline{SP}$   
 B.  $\overline{QP} \cong \overline{SR}$   
 C.  $V$  is the midpoint of  $\overline{PR}$   
 D.  $\angle QPR \cong \angle SRP$

34. **Given:**  $CEFH$  is a parallelogram,  $\triangle CGH \cong \triangle FDE$

**Prove:**  $CDFG$  is a parallelogram

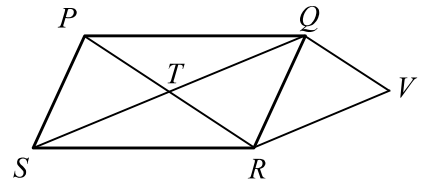


Statements	Reasons

35. **Given:**  $PQRS$  is a parallelogram,  $\angle PSQ \cong \angle VRQ$

$\angle RTQ \cong \angle QVR$

**Prove:**  $TQVR$  is a parallelogram



Statements	Reasons

