

Geometry CC - Unit 9  
Lesson 6: Parallelogram Proofs  
M1 L28  
HW 9.5 Answers

26)  $AM = 31$   
 $KN = 45$   
 $m\angle K = 61^\circ$   
 $m\angle L = 119^\circ$   
 $m\angle M = 61^\circ$   
 $m\angle N = 119^\circ$

27) Given  $PQ = 24$ ,  $PS = 19$ ,  $PR = 41$ ,  $TQ = 10$ ,  $m\angle PQR = 105^\circ$ ,  $m\angle QSR = 40^\circ$ , and  $m\angle PRS = 35^\circ$ .  
 $QR = 19$ ,  $m\angle QRS = 74^\circ$   
 $SR = 24$ ,  $m\angle QRS = 49^\circ$   
 $PT = 31$ ,  $m\angle PRS = 39^\circ$   
 $SQ = 30$ ,  $m\angle PSQ = 57^\circ$

28) Find KL.  $KL = 7x - 2$ ,  $LM = 12x - 22$ .  
 $12x - 22 = 7x - 2$   
 $-7x$   
 $5x - 22 = -2$   
 $+22$   
 $5x = 20$   
 $x = 4$

29) If  $AC = 3x - 14$  and  $EC = 2x + 11$ , solve for x.  
 $2x + 11 + 2x + 11 = 3x - 14$   
 $4x + 22 = 3x - 14$   
 $-3x$   
 $x + 22 = -14$   
 $-22$   
 $x = -36$   
 $|x| = 36$

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6) In parallelogram ABCD,  $AB = 7x - 4$  and  $CD = 2x + 21$ . Find AB and CD.  
 $7x - 4 = 2x + 21$   
 $-2x$   
 $5x - 4 = 21$   
 $+4$   
 $5x = 25$   
 $5$   
 $x = 5$   
 $AB = 7(5) - 4 = 31$   
 $CD = 2(5) + 21 = 31$

7) Parallelogram ABCD is given with diagonals intersecting at E. If  $m\angle DAB = 9x - 60$  and  $m\angle DCB = 30 - x$ , find  $m\angle DAB$ ,  $m\angle DCB$ , and  $m\angle ABC$ .  
 $9x - 60 = 30 - x$   
 $+x$   
 $5x - 60 = 30$   
 $+60$   
 $5x = 90$   
 $x = 18$   
 $4(18) - 60 = 12$   
 $30 - 18 = 12$   
 $m\angle DAB = 12^\circ$   
 $m\angle DCB = 12^\circ$   
 $m\angle ABC = 168^\circ$

8) Parallelogram ABCD is given with diagonals intersecting at E. If  $DE = 4y + 1$  and  $EB = 5y - 1$ , find DB.  
 $4y + 1 = 5y - 1$   
 $-4y$   
 $1 = y - 1$   
 $+1$   
 $y = 2$   
 $5(2) - 1 = 9$   
 $4(2) + 1 = 9$   
 $9 + 9 = 18$   
 $DB = 18$

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Topics on Exam 2

- Co-functions
- law of Sines
- law of cosines
- Polygons
  - Sum int.  $\angle$ 's of a regular polygon
  - Each int.  $\angle$  of a regular polygon
  - Sum ext.  $\angle$ 's of a regular polygon
  - Each ext.  $\angle$  of a regular polygon
- Quads
  - ↳ family tree
  - ↳ Trapezoids including Isos. trap.
  - ↳ Illograms

Mar 9-1:21 PM

DO NOW:

a) Name the FIVE properties of a parallelogram:

- 2 pairs opp sides are  $\parallel$
- 2 pairs opp sides are  $\cong$
- opposite  $\angle$ 's are  $\cong$
- Consecutive  $\angle$ 's are Supplementary
- Diagonals bisect each other

b) To prove that a quadrilateral is a parallelogram:

-Show that the quadrilateral has any one of the 5 properties above.  $\cong$

OR

-Show that one pair of opposite sides are both  $\parallel$  and  $\cong$ .

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In each case, tell why the quadrilateral is a parallelogram.

a)  $60^\circ$ ,  $120^\circ$ ,  $120^\circ$ ,  $60^\circ$   
• opp  $\angle$ 's are  $\cong$  ( $\parallel$  pairs)  
• consecutive  $\angle$ 's are Supplementary

b)  $6$ ,  $4$ ,  $4$ ,  $6$   
Diagonals bisect each other

c)  $\parallel$ ,  $\parallel$   
• opp sides are  $\parallel$  (2 pairs)

d)  $\cong$ ,  $\cong$   
• opp sides  $\cong$  (2 pairs)

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1. Given:  $\overline{AB} \cong \overline{CD}$ ,  $\overline{BE} \cong \overline{FD}$ ,  $\overline{EC} \cong \overline{AF}$

Prove: ABCD is a parallelogram.

Statement	Reason
1) $\overline{AB} \cong \overline{CD}$	1) Given
2) $\overline{BE} \cong \overline{FD}$	2) Given
3) $\overline{EC} \cong \overline{AF}$	3) Given
4) $\overline{BE} + \overline{EC} \cong \overline{FD} + \overline{AF}$	4) Addition
$\overline{BC} \cong \overline{AD}$	Postulate
5) ABCD is a $\square$	5) A Illogram has 2 pairs of opp sides that are $\cong$ .

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2. Given:  $\overline{AB} \parallel \overline{CD}$ ,  
 $\angle 1 \cong \angle 2$   
 Prove:  $ABCD$  is a parallelogram.

Statement	Reason
1) $\overline{AB} \parallel \overline{CD}$	1) Given
2) $\angle 1 \cong \angle 2$	2) Given
3) $\overline{BC} \parallel \overline{AD}$	3) If $\angle 1 \cong \angle 2$ then $\overline{BC} \parallel \overline{AD}$
4) $ABCD$ is a $\square$	4) A $\square$ has 2 pairs of opp sides $\parallel$ .

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3. Given:  $\angle O \cong \angle M$ ,  
 $\angle QPR \cong \angle ONM$   
 Prove:  $MNOP$  is a parallelogram.

Statement	Reason
1) $\angle O \cong \angle M$	1) Given
2) $\angle QPR \cong \angle ONM$	2) Given
3) $\angle QPR \cong \angle OPM$	3) Vertical $\angle$ 's are $\cong$ .
4) $\angle QPR \cong \angle OPM$	4) Substitution Postulate
5) $MNOP$ is a $\square$	5) A $\square$ has 2 pairs of opp $\angle$ 's that are $\cong$ .

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4. Given:  $\overline{MA} \cong \overline{HT}$ ,  
 $\angle AMT \cong \angle HTM$   
 Prove:  $MATH$  is a parallelogram.

Statement	Reason
1) $\overline{MA} \cong \overline{HT}$	1) Given
2) $\angle AMT \cong \angle HTM$	2) Given
3) $\overline{MA} \parallel \overline{HT}$	3) If $\overline{MA} \cong \overline{HT}$ and $\angle AMT \cong \angle HTM$ then $\overline{MA} \parallel \overline{HT}$
4) $MATH$ is a $\square$	4) If 1 pair of opp sides are both $\parallel$ and $\cong$ , then it's a $\square$ .

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Given Parallelograms

1) Given:  $ABCD$  is a parallelogram  
 Prove:  $\triangle ABD \cong \triangle DCB$

Statement	Reason
1) $ABCD$ is a parallelogram	1) Given
2) $\overline{AB} \cong \overline{CD}$ , $\overline{AD} \cong \overline{CB}$	2) A $\square$ has 2 pairs of opp sides that are $\cong$ .
3) $\overline{DB} \cong \overline{DB}$	3) Reflexive Property
4) $\triangle ABD \cong \triangle DCB$	4) SSS $\cong$ SSS

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