

# Lesson 6-4R : Conditions of Special Parallelograms

## Agenda:

- Check & Review Homework 6-3
- Notes 6.4

## Homework:

- p. 422-423 # 7, 8 11-16, 24-27, #30 - write out proof

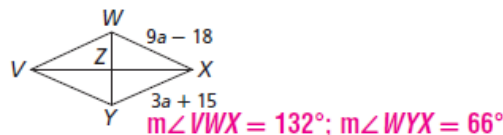
HW p. 412-413 14-15, 19, 20, 23, 25-31 odd , 35, 41, 42

Find the measures of the numbered angles in each rectangle.

VWXY is a rhombus. Find each measure.

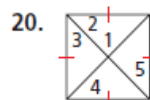
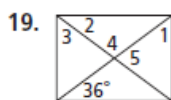
14.  $VW = 31.5$

15.  $m\angle VWX$  and  $m\angle WYX$  if  
 $m\angle WWY = (4b + 10)^\circ$   
 and  $m\angle XZW = (10b - 5)^\circ$

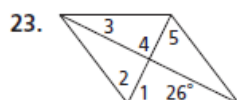


Find the measures of the numbered angles in each rhombus.

19.  $m\angle 1 = 54^\circ$ ;  
 $m\angle 2 = 36^\circ$ ;  
 $m\angle 3 = 54^\circ$ ;  
 $m\angle 4 = 108^\circ$ ;  
 $m\angle 5 = 72^\circ$



20.  $m\angle 1 = 90^\circ$ ;  $m\angle 2 = 45^\circ$ ;  $m\angle 3 = 45^\circ$ ;  
 $m\angle 4 = 45^\circ$ ;  $m\angle 5 = 45^\circ$



23.  $m\angle 1 = 64^\circ$ ;  $m\angle 2 = 64^\circ$ ;  $m\angle 3 = 26^\circ$ ;  
 $m\angle 4 = 90^\circ$ ;  $m\angle 5 = 64^\circ$

Tell whether each statement is sometimes, always, or never true.  
(Hint: Refer to your graphic organizer for this lesson.)

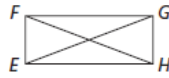
- 24. A rectangle is a parallelogram. **A**
- 25. A rhombus is a square. **S**
- 26. A parallelogram is a rhombus. **S**
- 27. A rhombus is a rectangle. **S**
- 28. A square is a rhombus. **A**
- 29. A rectangle is a quadrilateral. **A**
- 30. A square is a rectangle. **A**
- 31. A rectangle is a square. **S**

35. Complete the two-column proof of Theorem 6-4-2 by filling in the blanks.

Given:  $EFGH$  is a rectangle.

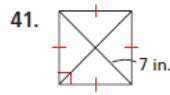
Prove:  $\overline{FH} \cong \overline{GE}$

Proof:

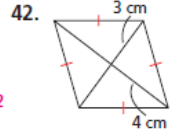


Statements	Reasons
1. $EFGH$ is a rectangle.	1. Given
2. $EFGH$ is a parallelogram.	2. a. ? <b>Rect. <math>\rightarrow</math> <math>\square</math></b>
3. $\overline{EF} \cong \overline{HG}$	3. $\square \rightarrow$ opp. sides $\cong$
4. $\overline{EH} \cong \overline{EH}$	4. c. ? <b>Reflex. Prop. of <math>\cong</math></b>
5. $\angle FEH$ and $\angle GHE$ are right angles.	5. d. ? <b>Def. of rect.</b>
6. $\angle FEH \cong \angle GHE$	6. Rt. $\angle \cong$ Thm.
7. $\triangle FEH \cong \triangle GHE$	7. f. ? <b>SAS</b>
8. $\overline{FH} \cong \overline{GE}$	8. g. ? <b>CPCTC</b>

**Multi-Step** Find the perimeter and area of each figure. Round to the nearest hundredth, if necessary.



$28\sqrt{2}$  in.  $\approx$  39.60 in.; 98 in<sup>2</sup>



20 cm; 24 cm<sup>2</sup>


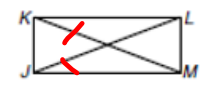
COMPLETE THE CHART BY PLACING A CHECK IF THE QUADRILATERAL HAS THAT PROPERTY.

PROPERTY	PARALLELOGRAM	RECTANGLE	RHOMBUS	SQUARE
Opposite Sides are Parallel				
Opposite Sides are Congruent				
Opposite Angles are Congruent				
Consecutive Angles are Supplementary				
Four Congruent Angles (4 Right $\angle$ 's)				
Four Congruent Sides				
Diagonals Bisect each other				
Diagonals are Congruent				
Diagonals are Angle Bisectors				
Diagonals are Perpendicular				

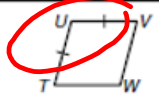
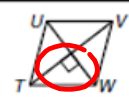
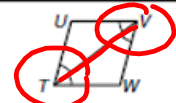
GEOMETRY + LAB Name: \_\_\_\_\_ Date: \_\_\_\_\_ Section: \_\_\_\_\_

Lesson 6-4R / 6-5L Notes: Conditions for Special Parallelograms

You can use the following conditions to determine whether a parallelogram is a rectangle.

 <p>If one angle is a right angle, then <math>\square JKLM</math> is a rectangle.</p>	 <p>If the diagonals are congruent, then <math>\square JKLM</math> is a rectangle.</p>
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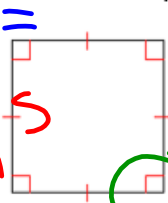
You can use the following conditions to determine whether a parallelogram is a rhombus.

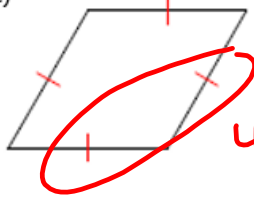
 <p>If one pair of <u>consecutive</u> sides are congruent, then <math>\square TUVW</math> is a rhombus.</p>	 <p>If the diagonals are perpendicular, then <math>\square TUVW</math> is a rhombus.</p>	 <p>If one diagonal bisects a pair of opposite angles, then <math>\square TUVW</math> is a rhombus.</p>
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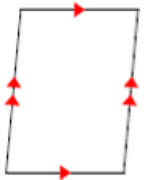
\*\*Take out "Ways To Prove Quadrilaterals" from your Lesson Summaries or record below then transcribe:

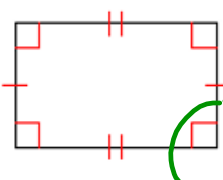
Ways to prove a quadrilateral is a rectangle:		
Show it's a parallelogram w/ <u>1 RIGHT <math>\angle</math></u>	$\square + \square \rightarrow$	RECT
Show it's a parallelogram w/ <u><math>\cong</math> DIAGONALS</u>	$\square + \square \rightarrow$	RECT
Ways to prove a quadrilateral is a rhombus:		
Show it has 4 <u><math>\cong</math> SIDES</u>	$\square \rightarrow$	RHOMBUS
Show it's a parallelogram w/ <u>1 SET CONSEC SIDES</u>	$\square + \square \rightarrow$	RHOM
Show it's a parallelogram w/ <u>1 <math>\perp</math> diagonals</u>	$\square + \square \rightarrow$	RHOM
Ways to prove a quadrilateral is a square:		
Show it is a parallelogram that is both <u>RECT + RHOM</u>	$\square +$ RECT + RHOM	$\rightarrow$ SQUARE
• ADD TO RHOMBUS:		
Show it's a parallelogram w/ <u>1 DIAGONAL BISECTS A PAIR OF OPP. <math>\angle</math>'S</u>	$\square + \square \rightarrow$	RHOM

**Ex 1** Tell whether each quadrilateral is a parallelogram, rectangle, rhombus, or square.  
Give *all* names that apply.

A)  **P** **SQ**  
 4  $\cong$  SIDES  
 RHOM  
**RECT**

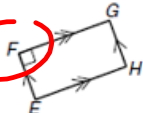
C)  **P**  
 4  $\cong$  SIDES  
 RHOM

B)  **P**

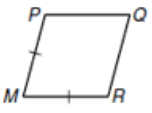
D)  **P**  
**RECT**

Determine whether the conclusion is valid. If not, tell what additional information is needed to make it valid.

1. EFGH is a rectangle. ✓

 **P**  
 RT  
 X

2. MPQR is a rhombus. <sup>NO</sup>

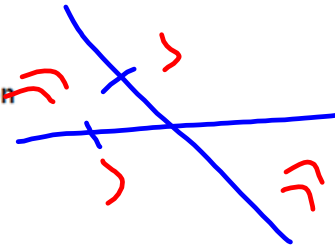
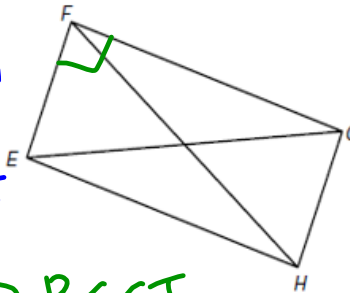
 **NOT A P**  
 NEED 4  $\cong$  SIDES

And 5

For Exercises 3 and 4, use the figure to determine whether the conclusion is valid. If not, tell what additional information is needed to make it valid.

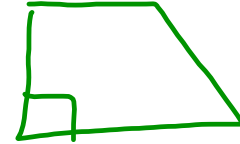
3. Given:  $\overline{EF} \parallel \overline{GH}$ ,  $\overline{HE} \parallel \overline{FG}$ ,  $\overline{EG} \cong \overline{FH}$   
 Conclusion:  $EFGH$  is a rectangle.

$\square P$  +  $\square$  (with diagonals)  $\rightarrow$   $\square$  (with right angles)  
 DIAG  
 RECT

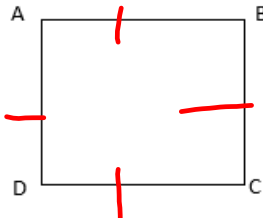


4. Given:  $m\angle EFG = 90^\circ$   
 Conclusion:  $EFGH$  is a rectangle.

$\square$  (with right angle) +  $\square$  (with right angle)  $\rightarrow$  RECT  
 NO INFO



5. Given:  $AB=BC=CD=AD$   
 Conclusion:  $ABCD$  is a square

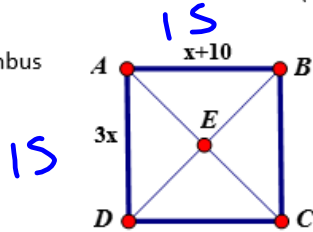


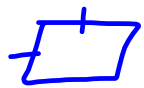
$\square P$  + RHOM + ~~RECT~~  $\rightarrow$  SQ  
 NO INFO  
 - RT &  
 OR ? DIAG



6. Determine the values of the variable(s) that will make the following parallelogram ABCD into a

c) Rhombus

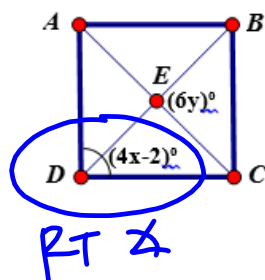


+   $\rightarrow$  RHOM

$$\begin{aligned} AB &= AD \\ x+10 &= 3x \\ 10 &= 2x \\ 5 &= x \\ 15 &= 15 \checkmark \end{aligned}$$

6. Determine the values of the variable(s) that will make the following parallelogram ABCD into a

d) Square



+ RECT + RHOM

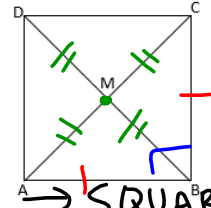


$$4x-2=90 \quad 6y=90$$

7. **Given:**  $\angle ABC$  is a right angle,  $\overline{BA} \cong \overline{BC}$ ,  
 $\overline{BM}$  is a median of  $\triangle ABC$ , and  
 M is the midpoint of  $\overline{BD}$

Is  $ABCD$  is a square? \_\_\_\_\_

Explain:



[P] + RECT + RHOM → SQUARE

DIAG  
 BISECT  
 EACH  
 OTHER



1 SET CONSEC SIDES  $\cong$   
 $\overline{BA} \cong \overline{BC}$

