

Name \_\_\_\_\_

Must pass MC by: \_\_\_\_\_

## [PACKET 5.4: PROPERTIES OF RHOMBUSES, RECTANGLES AND SQUARES]

1

Write your questions here!

Parallelograms are quadrilaterals with both pairs of opposite sides parallel. But what happens when all of the sides are congruent? What about if all of the angles are congruent? Let's use a graphic organizer to help us:

We can also show this using a Venn Diagram:

Write your questions here!

take note

## Key Concept Special Parallelograms

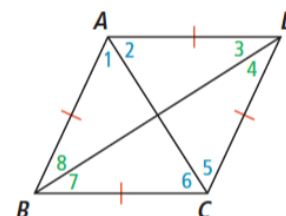
take note

## Rhombus Theorems

Theorem

Theorem

1. If  $ABCD$  is a rhombus, then  $\overline{AC} \perp$  .
2. If  $ABCD$  is a rhombus, then  $\overline{AC}$  bisects  $\angle$   and  $\angle$  .
3. If  $ABCD$  is a rhombus, then  $\angle 1 \cong \angle 2 \cong \angle$    $\cong \angle$  .
4. If  $ABCD$  is a rhombus, then  $\overline{BD}$  bisects  $\angle$   and  $\angle$  .
5. If  $ABCD$  is a rhombus, then  $\angle 3 \cong \angle$    $\cong \angle$    $\cong \angle$  .



take note

## Rectangle Diagonals Theorem

Theorem

## Finding Diagonal Length

**Got It?** If  and , what are the lengths of the diagonals of rectangle  $LMNO$ ?

Underline the correct word to complete each sentence.

1.  $LMNO$  is a rectangle / rhombus.
2. The diagonals of this figure are congruent / parallel.

Complete.

3.  $LN =$  , so  $4x - 17 =$  .
4. Write and solve an equation to find the value of  $x$ .
5. Use the value of  $x$  to find the length of  $\overline{LN}$ .

Write your questions here!

## [PACKET 5.4: PROPERTIES OF RHOMBUSES, RECTANGLES AND SQUARES]

3

In square  $ABCD$ , \_\_\_\_\_ and \_\_\_\_\_ . What is the length of  $\overline{AC}$ ?

Now, summarize  
your notes here!

Solve each equation for  $x$ !

1.  $-2(x - 3) = -3x - 10$

2.  $2(x - 5) - 2 = -4x$

Multiply!

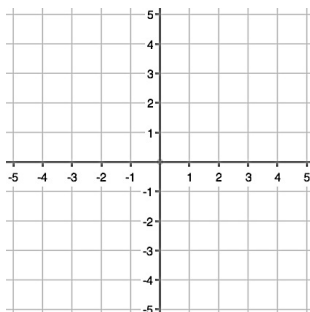
Factor!

3.  $(x + 1)(2x - 7)$

4.  $2x^2 - 9x - 5$

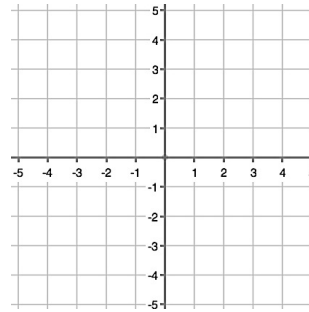
5. Graph the equation:

$$y = 4 - \frac{1}{2}x$$



6. Graph the equation:

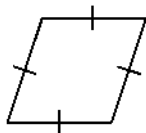
$$y = 1 - x$$



# 5.4 Practice

Decide whether the parallelogram is a rhombus, a rectangle, or a square. Explain

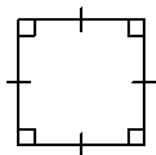
1.



2.



3.

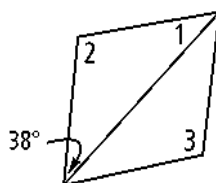


4.



Find the measures of the numbered angles in each rhombus.

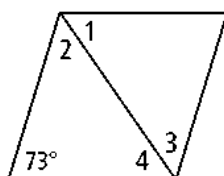
5.



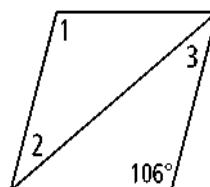
To start, a diagonal of a rhombus forms an isosceles triangle with congruent base angles.

So,  $m\angle \square = 38$ .

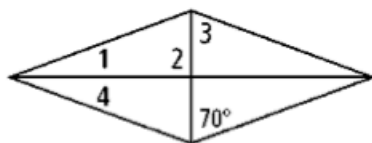
6.



7.



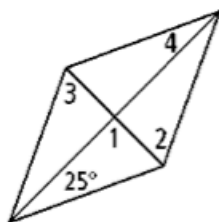
8.



To start, the diagonals of a rhombus are perpendicular.

So,  $m\angle \square = 90$ .

9.



10.



# [PACKET 5.4: PROPERTIES OF RHOMBUSES, RECTANGLES AND SQUARES]

**Algebra**  $QRST$  is a rectangle. Find the value of  $x$  and the length of each diagonal.

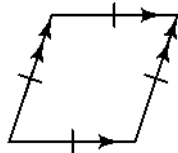
11.  $QS = x$  and  $RT = 6x - 10$

12.  $QS = 5x + 12$  and  $RT = 6x - 2$

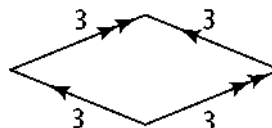
13.  $QS = 6x - 3$  and  $RT = 4x + 19$

Determine the most precise name for each quadrilateral.

14.

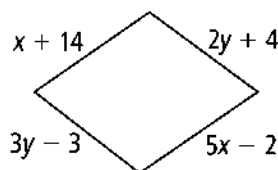


15.

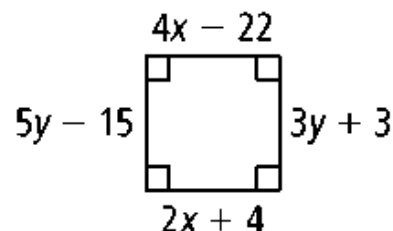


**Algebra** Find the values of the variables. Then find the side lengths.

16.



17.



Determine whether each statement is *true* or *false*. If it is false, rewrite the sentence to make it true. If it is true, list any other quadrilaterals for which the sentence would be true.

18. Rhombuses have four congruent sides.

19. Rectangles have four congruent angles.

20. The diagonals of a rectangle bisect the opposite angles.

21. The diagonals of a rhombus are always congruent.

**For Exercises 22-29, write *All*, *Some*, or *No*. Explain.**

22.   ?   rectangles are squares.

23.   ?   isosceles trapezoids are parallelograms.

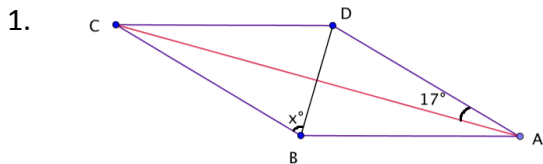
24.   ?   rhombuses are quadrilaterals.

25.   ?   squares are parallelograms.

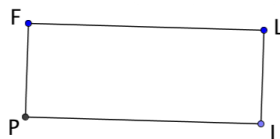
26.   ?   squares are rhombuses.

# 5.4 Application and Extension

Find the measure of  $x$  in Rhombus ABCD.

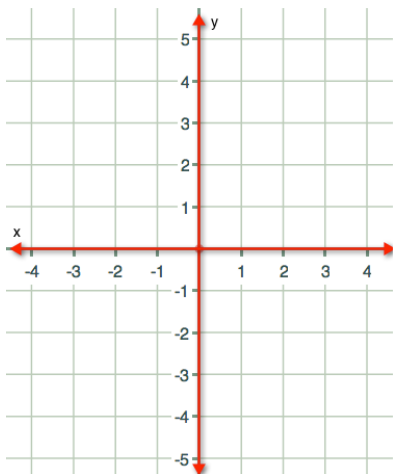


2.



Find  $x$  in rectangle FLIP if  
 $LP = 4x - 2$ ,  $FP = 13$ , and  $FI = 2x + 1$

3. The coordinates of the vertices of quadrilateral ABCD are A(0, 5), B(3, 4), C(0, -5) and D(-3, -4).



- Graph ABCD on the graph.
- Show ABCD is a parallelogram by showing the opposite sides are parallel.

Use the slope formula:  $m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

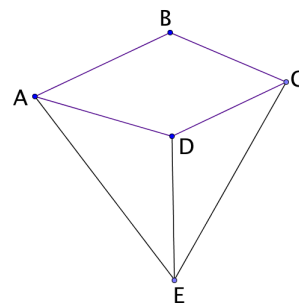
- Show ABCD is a rectangle by showing the diagonals are congruent.

Use the distance formula:  $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

4.

Statements

Reasons



Given: ABCD is a rhombus,  $\overline{AE} \cong \overline{CE}$ .

Prove:  $\triangle ADE \cong \triangle CDE$ .