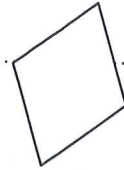


GOALS:

- Recognize and apply the properties of rhombi
- Recognize and apply the properties of squares



Rhombus: a parallelogram w/ all 4 sides congruent

Properties of Rhombi	Example	Figure
<p>1. Since a rhombus is a type of parallelogram, it has all the properties of parallelograms! List these: _____</p> <p><u>opposite \angle's are \cong</u></p> <p><u>consecutive \angle's supplementary</u></p> <p><u>opposite sides \parallel and \cong</u></p> <p>In addition to these properties, a rhombus has the following 3 "special" properties:</p>	<p>$\angle A \cong \angle C$</p> <p>$\angle B \cong \angle D$</p>	
<p>2. All four sides are <u>congruent</u>.</p>	<p>$\overline{WX} \cong \overline{XY}$</p> <p>$\overline{XY} \cong \overline{YZ}$</p> <p>$\overline{YZ} \cong \overline{ZW}$</p>	
<p>3. Its diagonals are <u>angle Bisectors</u>.</p>		
<p>4. Each diagonal <u>perpendicular</u>.</p>		

Area of a Rhombus: $A = b \cdot h$
 $\overline{LN} \cdot \overline{MP}$

Example 1: LMNP is a rhombus.

a. Find y if $m\angle 1 = y^2 - 54$.

$y^2 - 54 = 90$
 $+54 \quad +54$

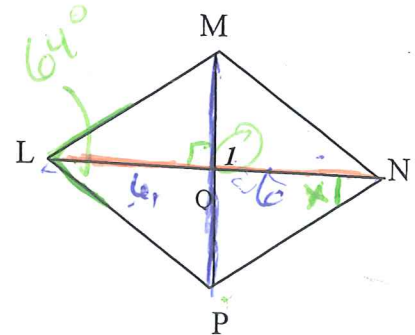
$\sqrt{y^2} = \sqrt{144}$
 $y = 12$



b. Find $m\angle PNL$ if $m\angle MLP = 64$.

$64 \div 2 = 32$

c. Find the area of LMNP if $MP = 10$ in. and $LQ = 6$ in.

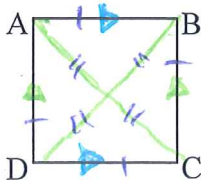
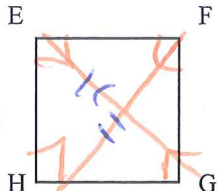
$12 \cdot 10$
 120 in^2



Tests for Rhombi; if <u>either</u> of the following is true, the figure is a <i>rhombus</i> :	Figure
1. All 4 sides of the quadrilateral are \cong .	Distance Formula 
2. The <u>diagonals</u> of a \square are <u>perpendicular</u> .	Slope Formula 

opposite reciprocals

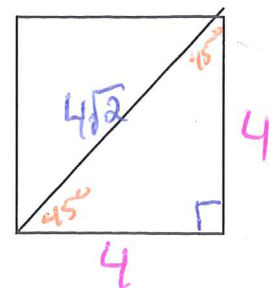
Square: A quadrilateral that is **BOTH** a rectangle and a rhombus.

Properties of Squares	Example	Figure
1. Since a square is a type of <i>parallelogram</i> , it has all the properties of parallelograms! List these: <u>opp. sides \parallel and \cong</u> <u>diagonals bisect each other</u> <u>opposite \angle's are \cong</u> <u>consecutive \angle's supp.</u>		
2. Since a square is a type of rectangle, it has the "special" rectangle properties: <u>4 90° \angle's</u> <u>diagonals are \cong</u>	$\overline{HF} \cong \overline{EG}$ $\angle E, \angle F, \angle H, \angle G$ are right	
3. Since a square is a type of rhombus, it has the "special" rhombus properties: <u>4 congruent sides</u> <u>Diagonals are perpendicular</u>	***Since a square is a <u>rectangle</u> AND a <u>rhombus</u> , you can use either of these formulas for AREA : $A = b \cdot h$ $A = b \cdot w$	

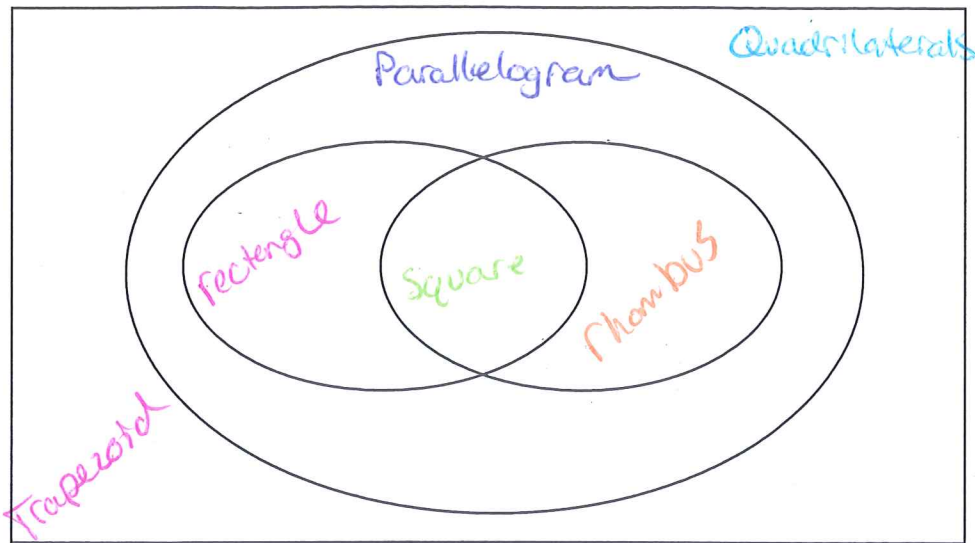
Example 2: Find the perimeter and area of the square if its diagonal's length is $4\sqrt{2}$ ft.

16ft²

1:1: $\sqrt{2}$
 $\times 4 \times 4, \times 4$
 $4:4:4\sqrt{2}$



Example 3: Fill in the Venn Diagram with these terms: quadrilateral, parallelogram, rectangle, rhombus, and square:



(***Teaser for next time ☺: Section 8-6 is about trapezoids, which are quadrilaterals that have **exactly one** pair of parallel sides. Where would trapezoids fit into this Venn Diagram?)

Example 4:

Given the following vertices, is \square ABCD a rhombus, a rectangle, or a square? Remember that a square must pass **BOTH** a rectangle **AND** a rhombus test! (DO NOT graph to find the answer!)

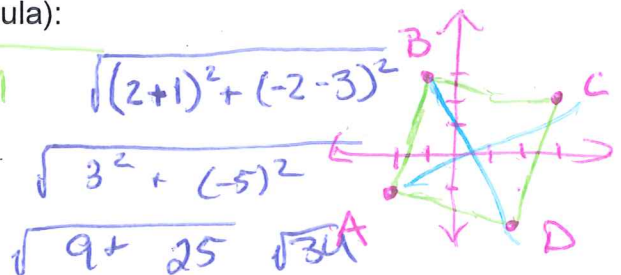
A(-2,-1), B(-1, 3), C(3,2), and D(2,-2)

First, let's see if the parallelogram is a rectangle by testing to see if its diagonals are congruent. (Use the distance formula):

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{25 + 9} = \sqrt{34}$$

$$= \sqrt{(3 + 2)^2 + (2 + 1)^2} = \sqrt{34}$$

$$= \sqrt{5^2 + 3^2}$$



If it passes that test, next we will see if the parallelogram is also a rhombus by testing to see if the diagonals are perpendicular. (Use the Slope Formula formula):

x	y
-2	-1
3	2

$$\frac{\Delta y}{\Delta x} = \frac{3}{5}$$

x	y
-1	3
2	-2

$$\frac{\Delta y}{\Delta x} = \frac{-5}{3}$$

****Note: I hope you realized there is more than one way to solve this problem...

Square