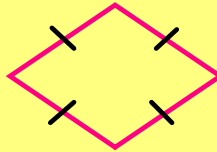


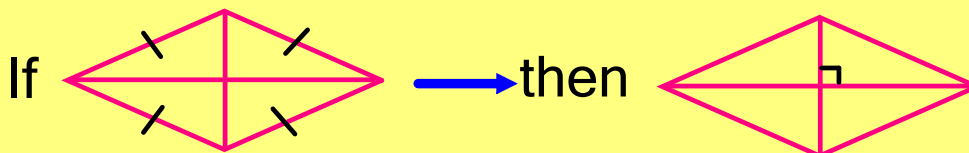
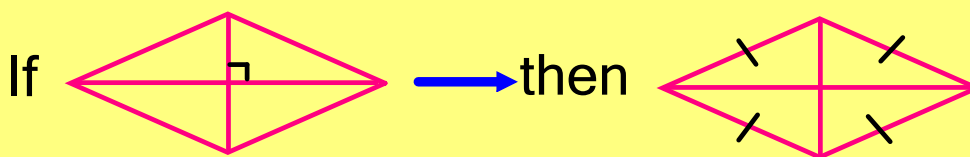
8.4 Part 2: SQUARES & RHOMBI

rhombus (rhombi is the plural form)
a parallelogram with four congruent sides



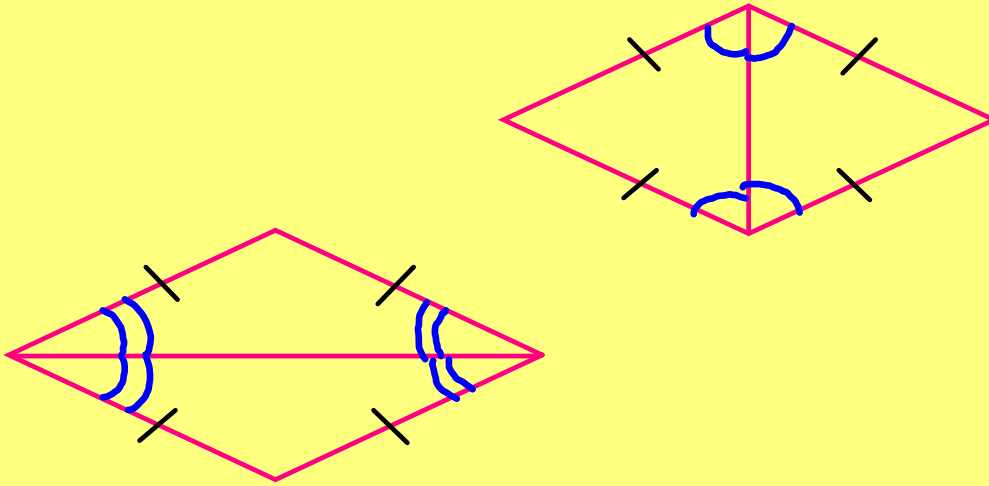
Theorem 8.11

A parallelogram is a rhombus if and only if its diagonals are perpendicular.

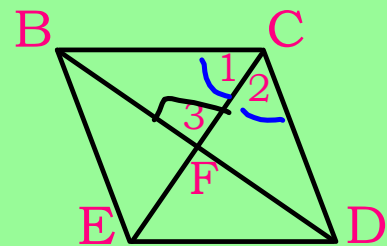


Theorem 8.12

A parallelogram is a rhombus if and only if each diagonal bisects a pair of opposite angles.

Example 1

Use rhombus BCDE and the given information to find each missing value.



- A) If $m\angle 1 = 2x + 20$ and $m\angle 2 = 5x - 4$,
find the value of x .

$$\begin{array}{r} 2x + 20 = 5x - 4 \\ -2x \quad -2x \\ \hline 20 = 3x - 4 \\ +4 \quad +4 \\ \hline 24 = 3x \\ x = 8 \end{array}$$

- B) If $BD = 15$, find BF .

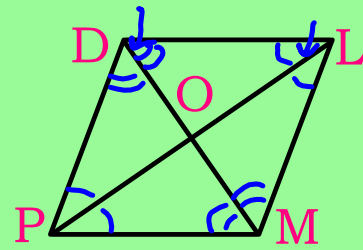
$$BF = 7\frac{1}{2} \text{ or } 7.5$$

- C) If $m\angle 3 = y^2 + 26$, find y .

$$\begin{array}{r} y^2 + 26 = 90 \\ -26 \quad -26 \\ \hline y^2 = 64 \\ \sqrt{y^2} = \sqrt{64} \\ y = \pm 8 \end{array}$$

Example 2

Use rhombus DLMP with $DM = 26$ to determine whether each statement is **true** or **false**. Justify your answers.



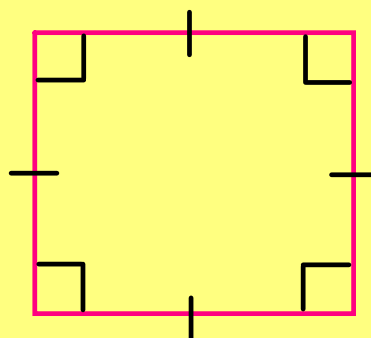
A) $OM = 13$
true b/c diag. bisect

B) $\underline{MD} \cong \underline{PL}$
false b/c diag. don't have to be \cong in rhombus

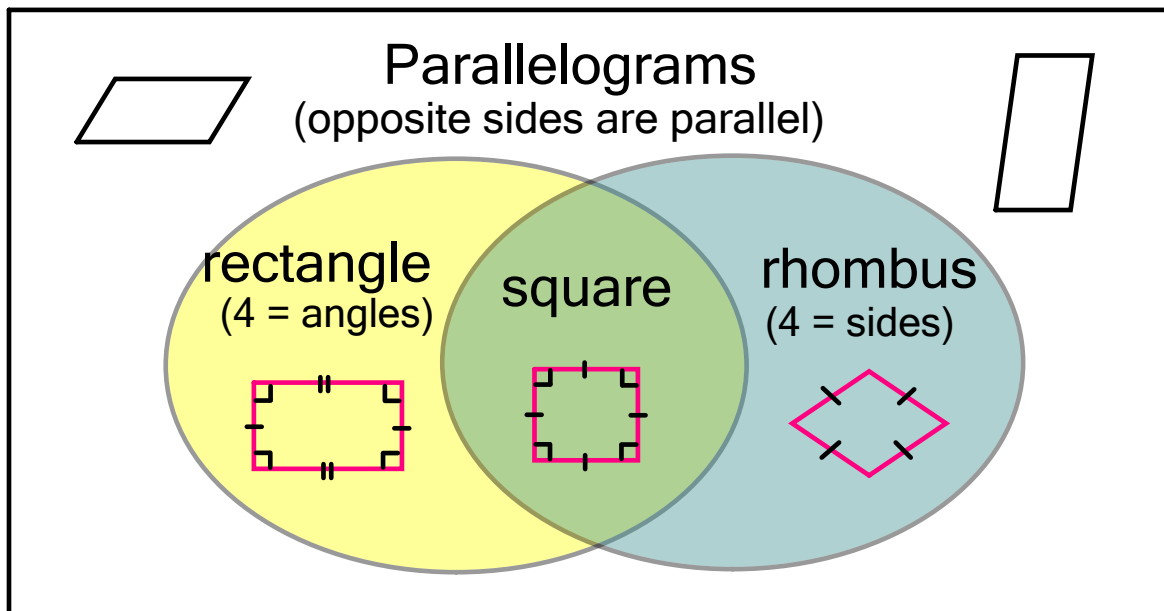
C) $m \angle DLO = m \angle LDO$
false b/c cons. \angle s don't have to be \cong in rhombus

square - a quadrilateral that is both a rhombus and a rectangle

- all four sides are congruent
- all four angles are right angles



regular

Example 3

Determine whether parallelogram WXYZ is a rhombus, a rectangle, or a square for $W(1, 10)$, $X(-4, 0)$, $Y(7, 2)$ & $Z(12, 12)$ without drawing a diagram.

rhombus b/c diag. bisect & \perp

diagonals

WY *XZ*

$\left(\frac{1+7}{2}, \frac{10+2}{2}\right) \rightarrow (4, 6)$ $\left(\frac{-4+12}{2}, \frac{0+12}{2}\right) \rightarrow (4, 6)$

mdpt *mdpt*

diag bisect \rightarrow par. \checkmark

diag not \cong \rightarrow not rect.

$$\sqrt{\frac{(7-1)^2 + (2-10)^2}{(6)^2 + (-8)^2}} = \sqrt{\frac{36+64}{100}} = 10$$

$$\sqrt{\frac{(12+4)^2 + (12-0)^2}{(16)^2 + (12)^2}} = \sqrt{\frac{256+144}{400}} = 20$$

diag \perp rhombus!

$$m = \frac{2-10}{7-1} = \frac{-8}{6} = -\frac{4}{3}$$

$$m = \frac{12-0}{12+4} = \frac{12}{16} = \frac{3}{4}$$

Example 4

Determine whether parallelogram ABCD is a rhombus, a rectangle, or a square for A(-4, 3), B(-2, 3), C(-2, 1) & D(-4, 1) without drawing a diagram.

$$\begin{array}{l} \text{AC} \\ \left(\frac{-4-2}{2}, \frac{3+1}{2}\right) \rightarrow (-3, 2) \text{ par.} \downarrow \\ \sqrt{\frac{(-2+4)^2 + (1-3)^2}{(2)^2 + (-2)^2}} \\ \sqrt{\frac{4+4}{8}} \\ m = \frac{1-3}{-2+4} = \frac{-2}{2} = -1 \text{ rhom.} \downarrow \end{array}$$

$$\begin{array}{l} \text{BD} \\ \left(\frac{-2-4}{2}, \frac{3+1}{2}\right) \rightarrow (-3, 2) \\ \sqrt{\frac{(-4+2)^2 + (1-3)^2}{(-2)^2 + (-2)^2}} \\ \sqrt{\frac{4+4}{8}} \\ m = \frac{1-3}{-4+2} = \frac{-2}{-2} = 1 \end{array}$$

rect. \downarrow

square b/c diag. bisect, \cong , & \perp