

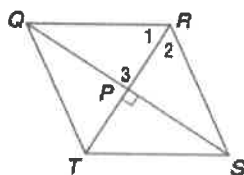
Rhombus: a parallelogram w/ all 4 sides congruent



6.15	If a parallelogram is a rhombus, then its diagonals are perpendicular	
6.16	If a parallelogram is a rhombus, then each diagonal bisects a pair of opposite angles.	

1. QRST is a rhombus.

a. If $m\angle 3 = y^2 - 31$,
find the value of y .



$$y^2 - 31 = 90^\circ$$

$$y^2 - 121 = 0$$

$$(y - 11)^2 = 0$$

$$\boxed{y = 11}$$

b. If $m\angle RST = 56$, find
 $m\angle TQS$.

$\angle RST \cong \angle TQP$ b/c
parallelogram
opposite \angle 's
 \cong

$$m\angle TQR = 56^\circ$$

$$m\angle TQS = \frac{1}{2}(56) \text{ Thm 6.16}$$

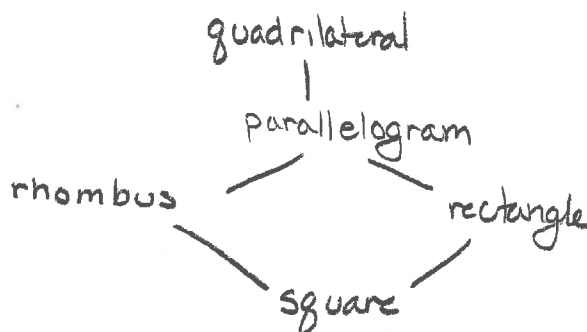
$$\boxed{= 28^\circ}$$

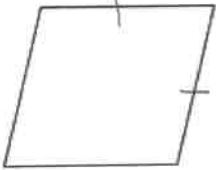
Square: a parallelogram w/ 4 congruent sides and 4 right angles

a rhombus and rectangle is not a always a square but a square is always a rectangle and a rhombus



Parallelogram Diagram:



6.17	If the diagonals of a parallelogram are perpendicular then the parallelogram is a rhombus (converse of Theorem 6.15)	
6.18	If one diagonal of a parallelogram bisects a pair of opposite angles, then the parallelogram is a rhombus (converse of Theorem 6.16)	
6.19	If one pair of consecutive sides of a parallelogram are congruent, then the parallelogram is a rhombus	
6.20	If a quadrilateral is both a rectangle and a rhombus, then it is a square.	

2. In rhombus ABCD, $AB = 2x + 3$ and $BC = 5x$. Find the following:

a. x

$$2x + 3 = 5x$$

$$3 = 3x$$

$$1 = x$$

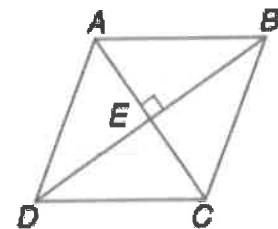
b. AD

$$AD = BC$$

$$= 5x$$

$$= 5(1) = 5$$

c. $m\angle AEB = 90^\circ$



d. $m\angle BCD$ if

$$m\angle ABC = 83.2$$

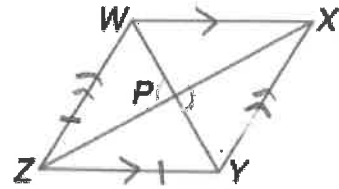
$$180 = 83.2 + m\angle BCD$$

$$96.8^\circ = m\angle BCD$$

3. Write a two column proof:

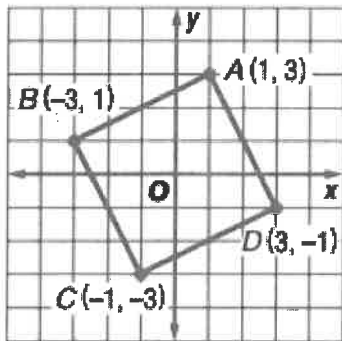
Given: $\overline{WZ} \parallel \overline{XY}$, $\overline{WX} \parallel \overline{ZY}$
 $\overline{WZ} \cong \overline{ZY}$

Prove: $WXYZ$ is a rhombus



statements	Reasons
1) $\overline{WZ} \parallel \overline{XY}$ $\overline{WX} \parallel \overline{ZY}$	1) Given
2) $WXYZ$ is a parallelogram	2) Def of \square (2 pairs of opposite sides \parallel)
3) $\overline{WZ} \cong \overline{ZY}$	3) Given
4) $WXYZ$ is a rhombus	4) Theorem 6.19 (consecutive pair of sides \cong)

4. Determine whether parallelogram $ABCD$ with vertices $A(1, 3)$, $B(-3, 1)$, $C(-1, -3)$ and $D(3, -1)$ is a rhombus, rectangle, or square. List all that apply.



rhombus \rightarrow 1 pair of consecutive sides \cong

rectangle \rightarrow sides \perp OR diagonals \cong

square \rightarrow both rhombus & rectangle

rectangle

$$d_{BD} = \sqrt{(-3-3)^2 + (1-(-1))^2}$$

$$= \sqrt{36 + 4} = \sqrt{40}$$

$$d_{AC} = \sqrt{(1-(-1))^2 + (3-(-3))^2}$$

$$= \sqrt{4 + 36} = \sqrt{40}$$

$$\overline{BD} \cong \overline{AC} \quad \checkmark$$

rhombus

$$d_{BC} = \sqrt{(-3-(-1))^2 + (1-(-3))^2}$$

$$= \sqrt{4 + 16} = \sqrt{20}$$

$$d_{CD} = \sqrt{(-1-3)^2 + (-3-(-1))^2}$$

$$= \sqrt{16 + 4} = \sqrt{20}$$

$$\overline{BC} \cong \overline{CD} \quad \checkmark$$

$ABCD$ is a rectangle, rhombus,
and square

