

Rectangle

Definition: A rectangle is a parallelogram that has a right angle.

Corollary 4.3.1: All angles of a rectangle are right angles.

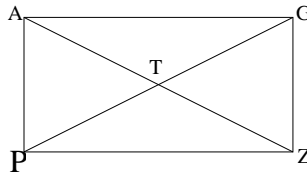
Theorem 4.3.2: The diagonals of a rectangle are congruent.

A rectangle is a parallelogram:

- 1) Opposite sides are congruent (they equal each other).
- 2) Opposite angles are congruent (they equal each other).
- 3) Consecutive angles are supplementary (they add up to 180)
- 4) Diagonals bisect each other (they cut each other in half)
- 5) Diagonals are congruent (they equal each other)
- 6) All four angles are 90.

Example 1:

Given: Rectangle AGPZ

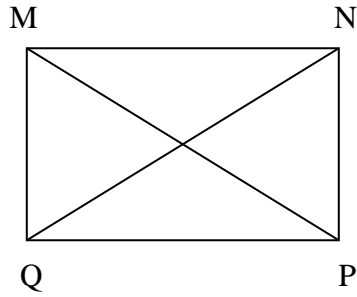


a. $\overline{GT} = 6$. Find \overline{AZ} .

b. $m\angle AGP = 34$. Find $m\angle GZA$.

c. $\overline{AT} = 3x + 13$ and $\overline{TG} = 5x - 21$. Find \overline{GP} .

Example 2: Given the rectangle



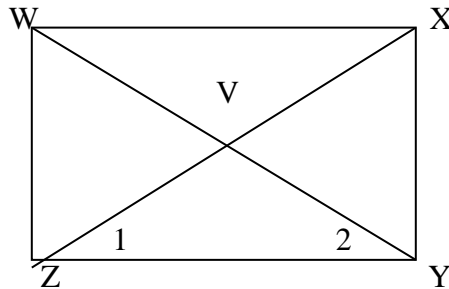
a. If $QP = 9$ and $NP = 6$, find NQ and MP .

b. If $MQ = x$, $MP = 51$ and $QP = 2x$, find x and the length of QP .

Example 3:

Given : Rectangle $WXYZ$ with diagonals \overline{WY} and \overline{XZ} .

Prove: $m\angle 1 \cong m\angle 2$

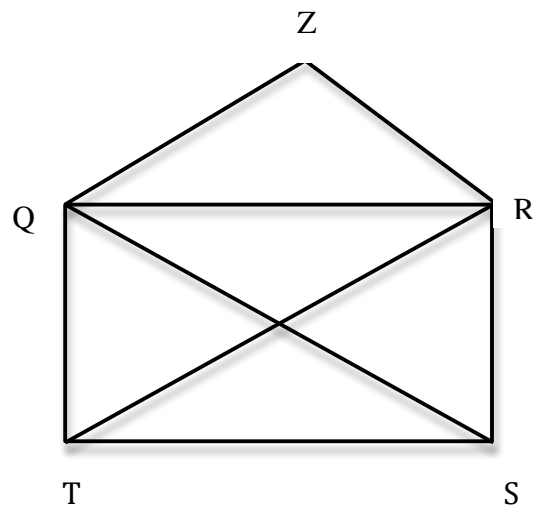


Statements

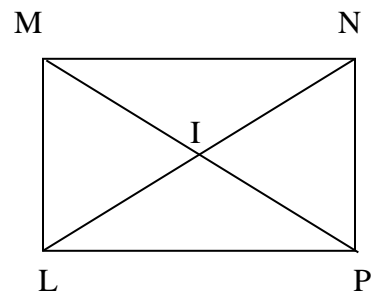
Reasons

- | | |
|------------------------------------------------------------------------|----------------------------------------------|
| 1. Rectangle $WXYZ$ with diagonals \overline{WY} and \overline{XZ} | 1. Given |
| 2. | 2. The diagonals of a rectangle are \cong |
| 3. $\overline{WZ} \cong \overline{XY}$ | 3. Opposite sides of a rectangle are \cong |
| 4. $\overline{ZY} \cong \overline{ZY}$ | 4. |
| 5. $\Delta XZY \cong \Delta WYZ$ | 5. |
| 6. | 6. |

Example 4: Given: rectangle QRST and Parallelogram QZRC, find length of RZ, ZQ and CS if $RZ = 6x$, $ZQ = 3x + 2y$ and $CS = 14 - x$



Example 5: Find the measure of LN. Given $LI = 3x - 2$ and $MI = 2x + 3$ and LMNP is a rectangle.



Square

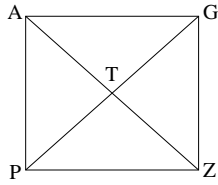
Definition: A square is a rectangle that has two adjacent sides congruent.



Corollary 4.3.3: All sides of a square are congruent.

Example 6:

AGZP is a square with $\overline{GT} = 12$. Find \overline{AZ} .

**Rhombus**

Definition: A rhombus is a parallelogram with two congruent adjacent sides.

Corollary 4.3.4: All sides of a rhombus are congruent.

Theorem 4.3.5: The diagonals of a rhombus are perpendicular.

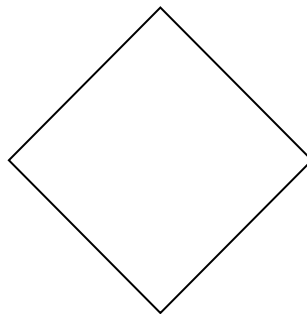
Squares and Rhombi

A square is a quadrilateral with 4 right angles and 4 congruent sides.

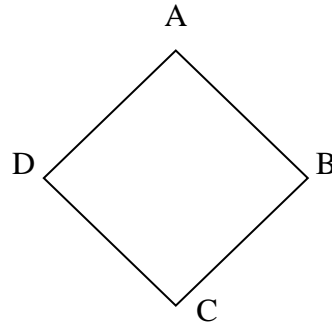
A rhombus is also a quadrilateral, but its characterized by 4 congruent sides; a rhombus does NOT have four congruent angles.

The properties of a parallelogram apply to both squares and rhombi. A rhombus however has two special properties:

- 2) The diagonals of a rhombus are perpendicular (they form right angles)
- 3) Each diagonal of a rhombus bisects a pair of opposite angles (the angles are cut in half).



Example 7: Given a rhombus ABCD

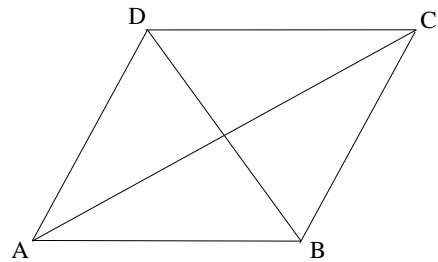


a. If $DC = 6.3$, find the perimeter of ABCD.

b. If $DB = 8$ and $AC = 6$, find DC.

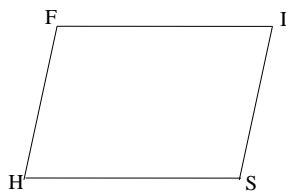
Example 8:

ABCD is a rhombus. $m\angle ADB = 27$. Find the $m\angle ADC$.



Example 9:

FISH is a rhombus with $\overline{FI} = 6x + 2$ and $\overline{SI} = 8x - 4$. Find \overline{FH} .



Example 10:

Use rhombus ABCD and the given information to find each value.

a. $\overline{AE} = 14$
find \overline{AC}

b. $m\angle ABE = 34^\circ$
find $m\angle ABC$

c. find $m\angle DEA$

d. $\overline{CB} = 4x - 1$
 $\overline{AB} = 20 + x$
find "x"

