

+"%& Properties of Parallelograms

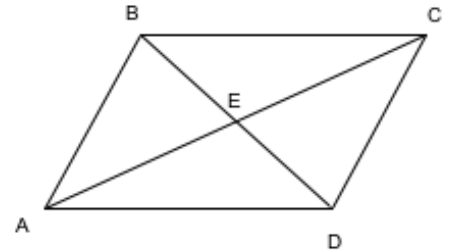
**Parallelogram**

A quadrilateral with both pairs of opposite sides \_\_\_\_\_.

**Properties of Parallelograms:**

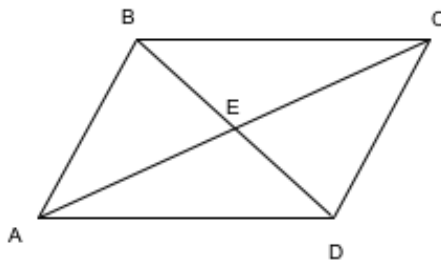
If a quadrilateral is a parallelogram, then:

- \*Its opposite sides are congruent.
- \*Its opposite angles are congruent.
- \*Its consecutive angles are supplementary.
- \*Its diagonals bisect each other.

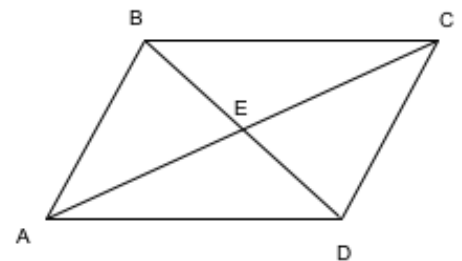


**Ways to Prove a Quadrilateral is a Parallelogram**

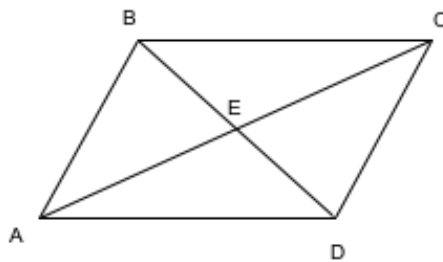
Show **BOTH** pairs of opposite sides of a quadrilateral are congruent.



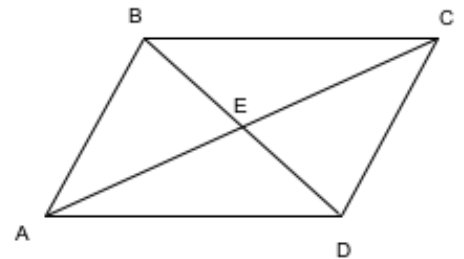
Show **BOTH** pairs of opposite angles of a quadrilateral are congruent



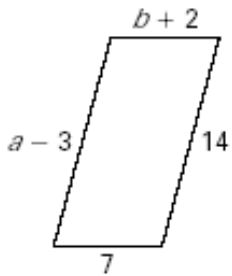
Show **ONE PAIR** of opposite sides is **BOTH** parallel and congruent.



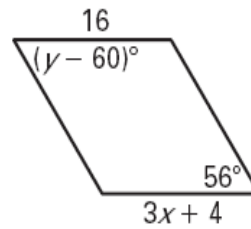
Show that the **diagonals** bisect each other.



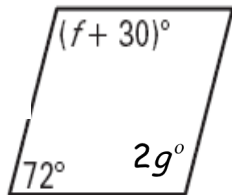
1. Solve for the variables in the parallelogram.



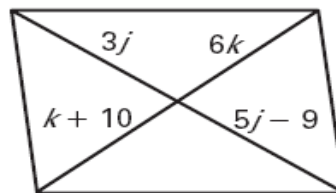
2. Solve for the variables in the parallelogram.



3. Solve for the variables in the parallelogram.



4. Solve for the variables in the parallelogram.



Use the diagram of parallelogram  $MNOP$  to complete each statement.

5.  $\overline{MN} \cong$  \_\_\_\_\_

6.  $\overline{MN} \parallel$  \_\_\_\_\_

7.  $\overline{ON} \cong$  \_\_\_\_\_

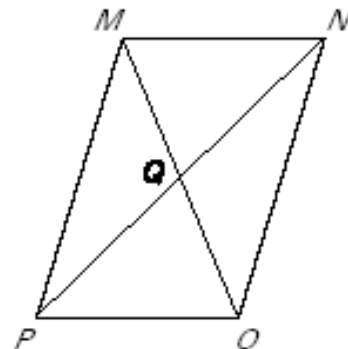
8.  $\angle MPO \cong$  \_\_\_\_\_

9.  $\overline{PQ} \cong$  \_\_\_\_\_

10.  $\overline{QM} \cong$  \_\_\_\_\_

11.  $\angle MQN \cong$  \_\_\_\_\_

12.  $\angle NPO \cong$  \_\_\_\_\_

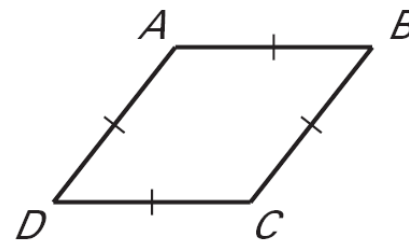


+" ! +"( Properties of Rhombi, Rectangles & Squares

A Rhombus is a parallelogram with \_\_\_\_\_.

Because it is a parallelogram we know:

- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.



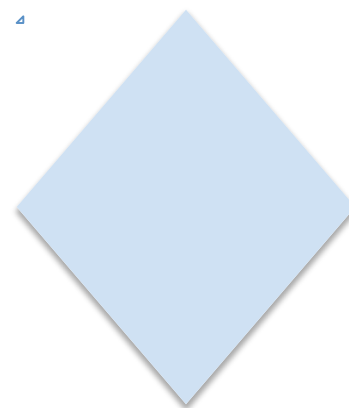
Because it is a *SPECIAL* parallelogram it has several additional properties.

- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.

PRACTICE

1. Draw rhombus PQRS with the diagonals intersecting at point T.

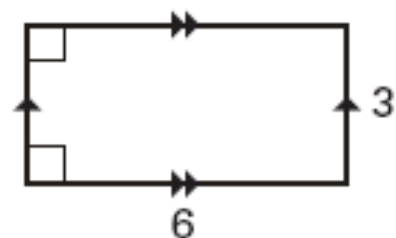
- a) If  $ST = 13$  find  $SQ$ .
- b) If  $m\angle PRS = 17^\circ$  find  $m\angle QRS$ .
- c) Find  $m\angle STR$ .
- d) Find  $PT$ .
- e) If  $SP = 4x - 3$  and  $PQ = 18 + x$  find  $x$ .



A Rectangle is a parallelogram with \_\_\_\_\_.

Because it is a parallelogram we know:

- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.



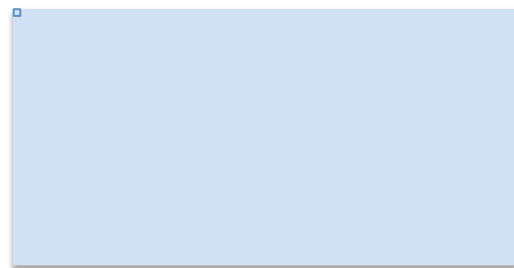
Because it is a SPECIAL parallelogram it has another additional property.

- ✓ \_\_\_\_\_.

### PRACTICE

2. Draw rectangle EFGH with the diagonals intersecting at point D. If  $\angle HFG = 48^\circ$  and  $EG = 18$  find the following.

- a)  $EF$
- b)  $m\angle FHG$
- c)  $DE$
- d)  $m\angle HDG$
- e)  $EH$

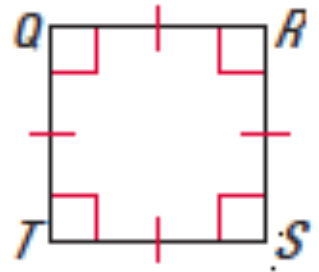


A Square is a parallelogram with \_\_\_\_\_.

A quadrilateral is a square if it is BOTH \_\_\_\_\_.

List ALL of the properties of a SQUARE!

- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.
- ✓ \_\_\_\_\_.



### PRACTICE

3. Draw square ABCD with diagonals intersecting at point E. If  $AD=6$  find:

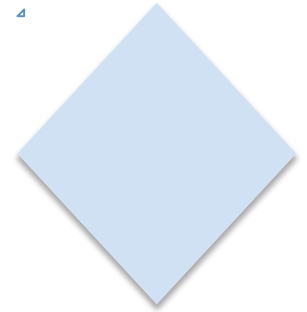
- |                  |       |
|------------------|-------|
| a) $m\angle EDA$ | e) DC |
| b) $m\angle AEB$ | f) AE |
| c) $m\angle AEC$ | g) AC |
| d) $m\angle ABC$ | h) BD |



+" ! +"( Properties of Rhombi, Rectangles & Squares

1. Draw rhombus ABCD with the diagonals intersecting at point E. If  $\angle ABC = 120^\circ$  and  $EC = 12$  find the following.

- a)  $m\angle BCE$
- b)  $m\angle BEC$
- c) AD
- d) DE
- e) BD
- f) What kind of triangle is ABD?



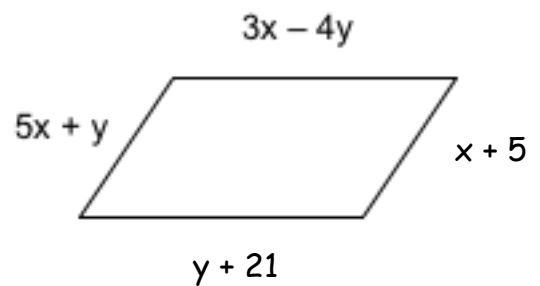
2. Draw rectangle QUAD and its diagonals. If  $QA = x^2 - 2x + 4$  and  $DU = 12$  find x.

3. Draw rhombus WXYZ with the diagonals intersecting at point V. If  $\angle WYZ = 46^\circ$  and  $VZ = 7$  find the following.

- a) VY
- b) ZY
- c) perimeter of WXYZ

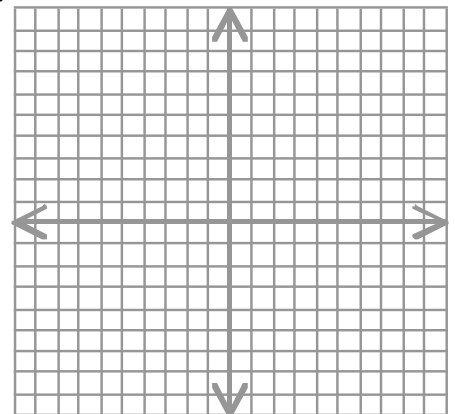
4. Draw rectangle  $STOR$  with diagonals intersecting at  $Y$ .  $ST = 2x + 2$ ,  $OT = x$ ,  $SO = 3x - 2$ , and  $YR = \frac{2x + 3}{2}$ . Find the perimeter of  $STOR$ .

5. The figure to the right is a parallelogram. Is it a rhombus? Why or why not?



6. Given the following coordinates determine the best name for the quadrilateral. Make a sketch, but also provide algebra to support your answer.

$M(-4, -2)$ ,  $N(-1, 4)$ ,  $O(5, 1)$ ,  $P(2, -5)$



# Module 7 Review

Name \_\_\_\_\_

Put an X in the box if the shape *ALWAYS* has the given property.

| PROPERTY                                     | Parallelogram | Rectangle | Rhombus | Square |
|--|---------------|-----------|---------|--------|
| All sides are congruent.                     |               |           |         |        |
| Both pairs of opposite sides are congruent.  |               |           |         |        |
| Both pairs of opposite sides are parallel.   |               |           |         |        |
| All angles are congruent.                    |               |           |         |        |
| Diagonals are congruent.                     |               |           |         |        |
| Diagonals are perpendicular.                 |               |           |         |        |
| Diagonals bisect each other.                 |               |           |         |        |
| Diagonals bisect opposite angles.            |               |           |         |        |
| Both pairs of opposite angles are congruent. |               |           |         |        |
| Consecutive angles are supplementary.        |               |           |         |        |
|  |               |           |         |        |