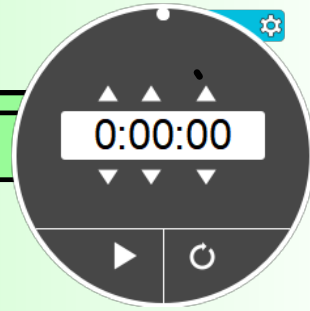


Different types of 4-sided polygons**How many can you come up with?**

1. Quadrilateral
 2. Kite
 3. Trapezoid
 4. Isosceles Trapezoid
-
5. Parallelogram
 6. Rhombus
 7. Rectangle
 8. Square



Diagonal = Segment connecting 2 non-adjacent vertices



Opposite Angles = Angles across from each other in a quadrilateral.
They do not share any common sides.

1 and 3, 2 and 4

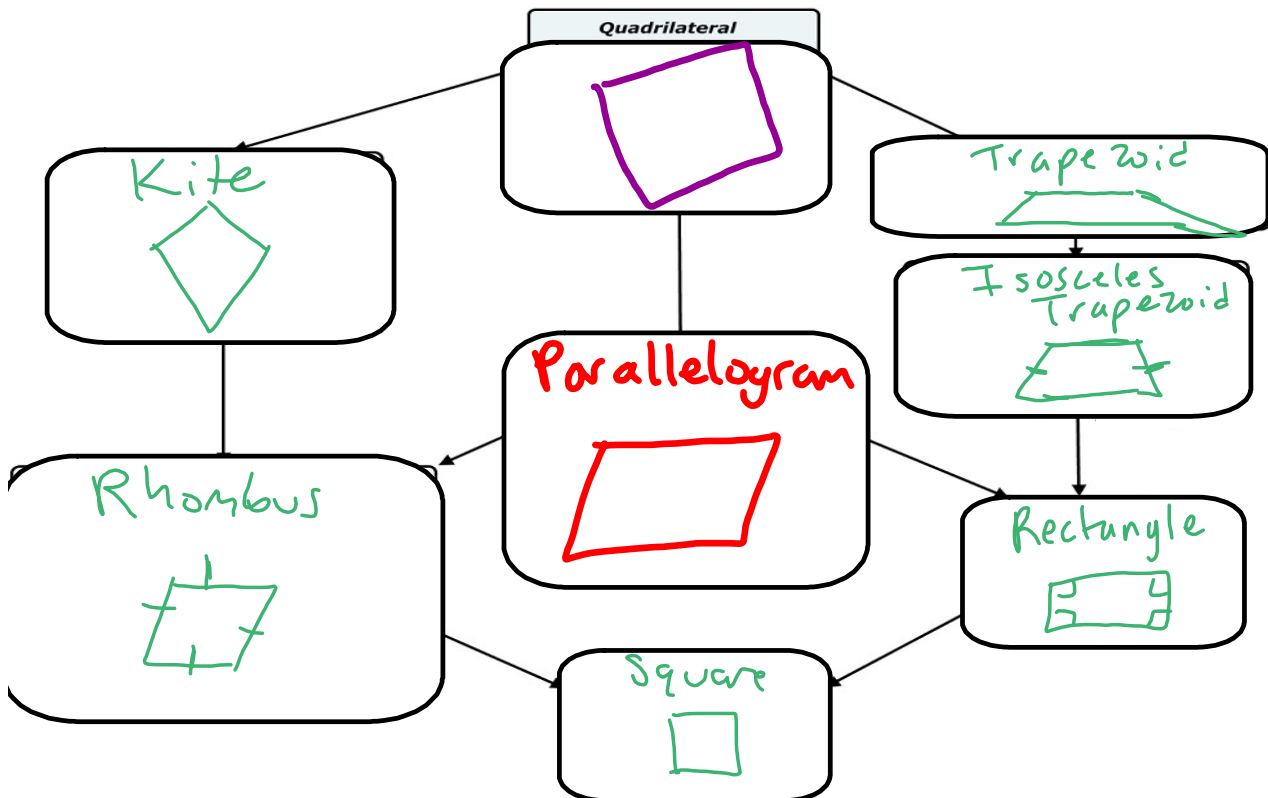


Consecutive Angles = Angles next to each other in a quadrilateral.
They share one common side.

1 and 2, 2 and 3, 3 and 4, 4 and 1



Properties of Quadrilaterals



Parallelogram Properties Exploration

(Activities - Parallelogram Exploration Image - Student Copy)

- Using a ruler, measure the lengths of all 4 sides.
- Using a protractor, measure all 4 angles.
- Draw the 2 diagonals, labeling the point of intersection as E. Now use a ruler to measure the distance from E to each of the 4 vertices.

Questions to discuss in your groups:

1.) What did you observe about the sides?

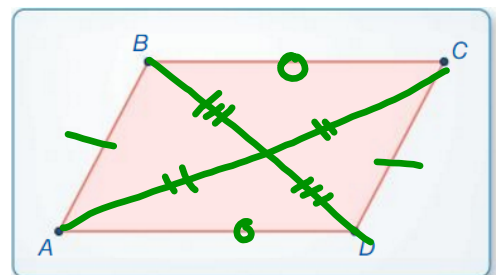
opposite sides equal

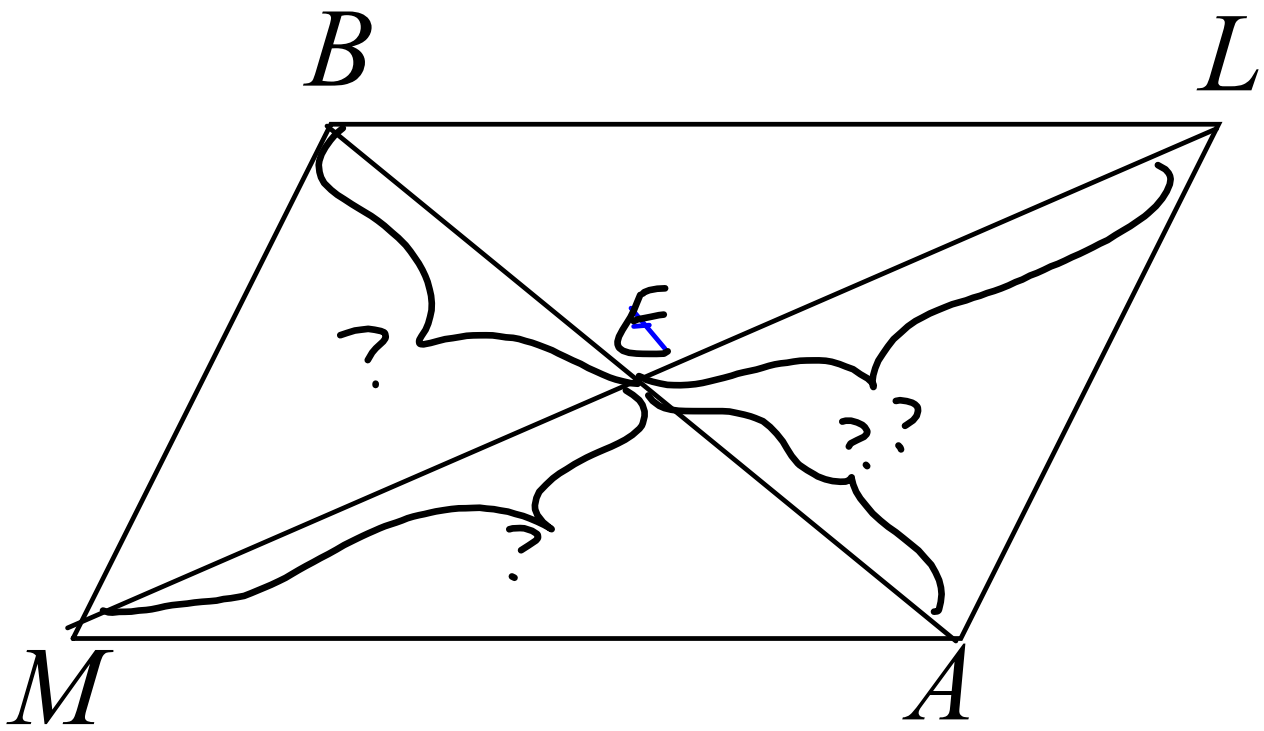
2.) What did you observe about the angles?


opposite angles equal

3.) What did you observe about the diagonals?

diagonals cut in half





Parallelogram 

- 1.) Both Pairs of Opposite Sides Parallel
- 2.) Both Pairs of Opposite Sides Congruent
- 3.) Opposite Angles Congruent
- 4.) Consecutive Angles Supplementary
- 5.) Diagonals Bisect Each Other



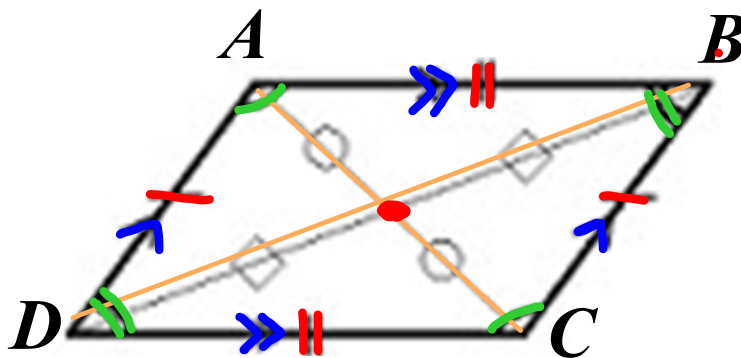
Parallelogram

- 1.) Both Pairs of Opposite Sides Parallel
- 2.) Both Pairs of Opposite Sides Congruent
- 3.) Opposite Angles Congruent
- 4.) Consecutive Angles Supplementary
- 5.) Diagonals Bisect Each Other

SIDES

ANGLES

DIAGONALS



Using Parallelogram Properties

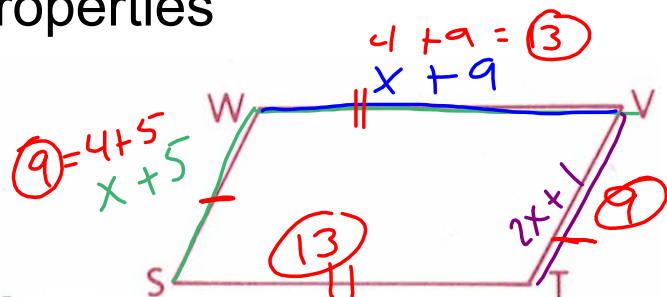
1. Given: \square WSTV,
 $WS = x + 5$,
 $WV = x + 9$,
 $VT = 2x + 1$

Find the perimeter of WSTV.

- distance around an object
- add all the sides

$$P = 9 + 13 + 9 + 13$$

$$P = 44$$



$$WS = VT$$

$$x + 5 = 2x + 1$$

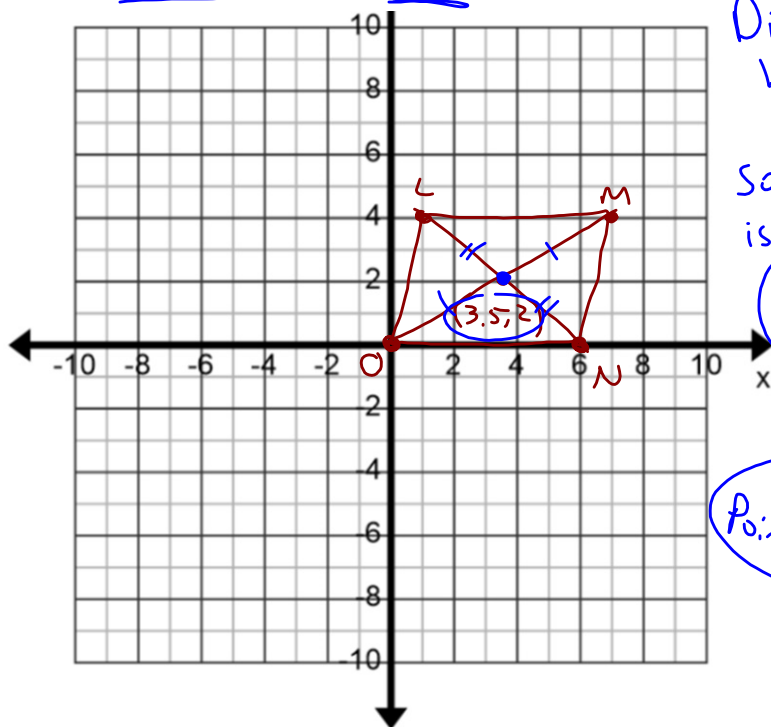
$$5 = x + 1$$

$$-1 \quad -1$$

$$4 = x$$

2. **EXAMPLE** Using Parallelograms in the Coordinate Plane

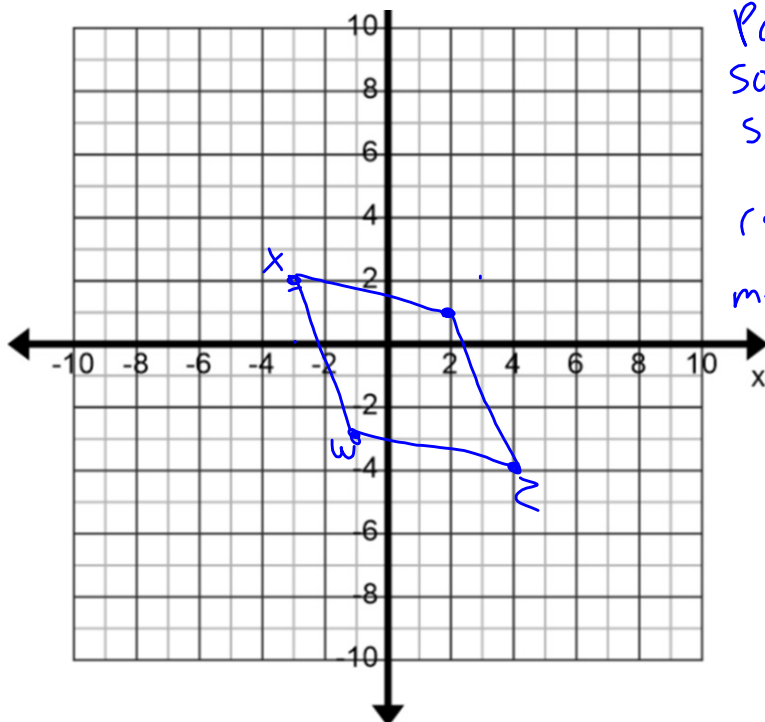
Find the coordinates of the intersection of the diagonals of $\square LMNO$ with vertices $L(1, 4)$, $M(7, 4)$, $N(6, 0)$, and $O(0, 0)$.



Diagonals bisect each other
 so midpoint is the bisector
 $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$
 $\left(\frac{0+7}{2}, \frac{0+4}{2}\right)$
 $(3.5, 2)$
 Point of intersect

3. **EXAMPLE** Using Parallelograms in the Coordinate Plane

Three vertices of $\square WXYZ$ are $W(-1, -3)$, $X(-3, 2)$, and $Z(4, -4)$. Find the coordinates of vertex Y .



has parallel sides
 so find parallel slope of opposite side
 (same slope)
 $m = \frac{1}{-5} = -\frac{1}{5}$

In Exercises 9–16, find the indicated measure in $\square LMNQ$. Explain your reasoning.

9. LM 13

10. LP 7

11. LQ 8

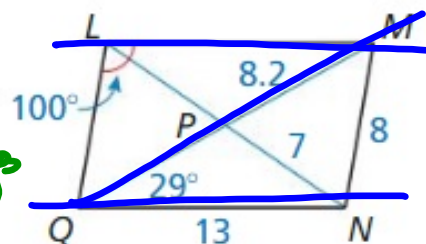
12. MQ 16.4

13. $m\angle LMN$ 80°

14. $m\angle NQL$ 80°

15. $m\angle MNQ$ 100°

16. $m\angle LMQ$ 29°



Homework

7.2 p.372 #4,6,8,9-20