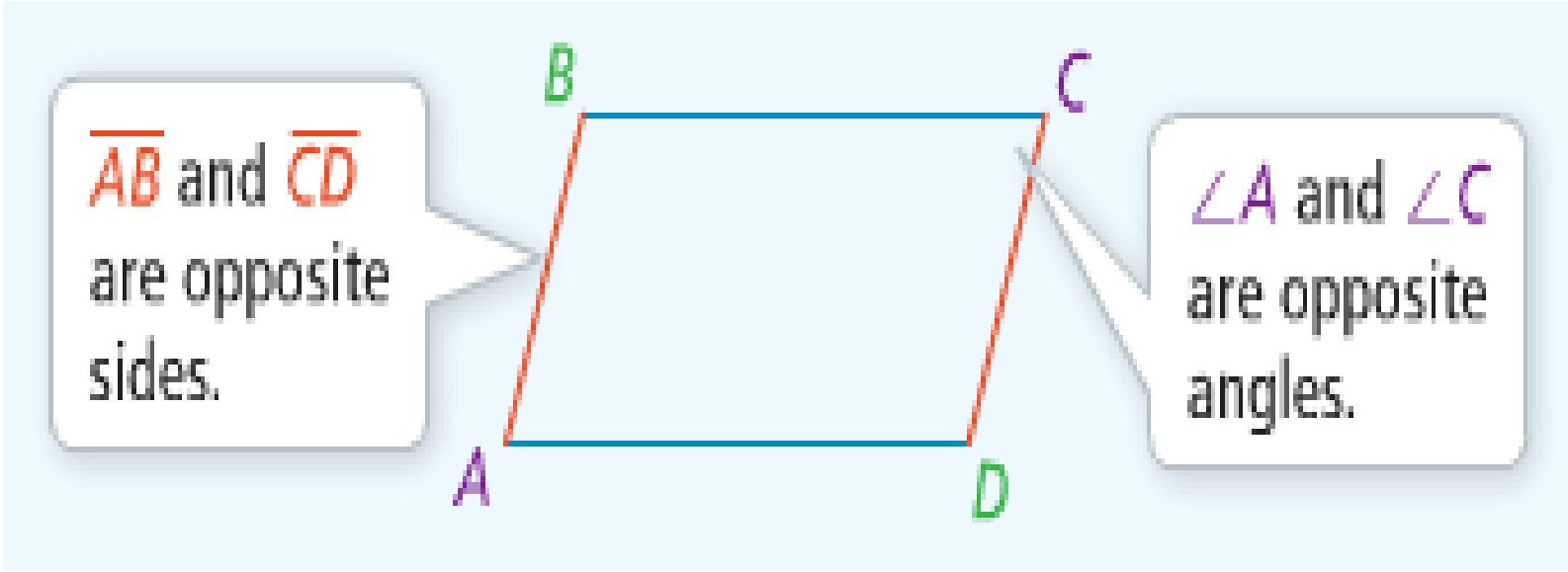
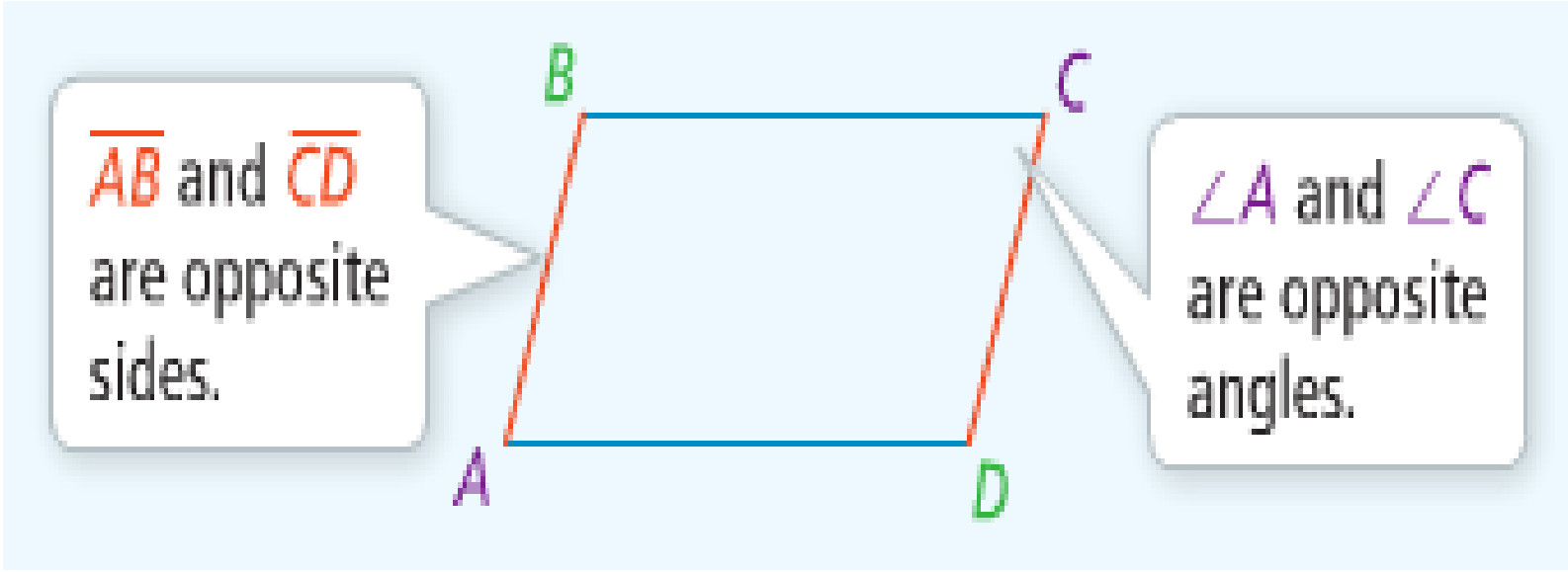
# U1 Day 12 - Properties of Parallelograms

- A **parallelogram** is a quadrilateral with both pairs of opposite sides parallel.
- In a quadrilateral, **opposite sides** do not share a vertex and **opposite angles** do not share a side.



# #1 Opp Sides //

- A **parallelogram** is a quadrilateral with both pairs of opposite sides parallel.

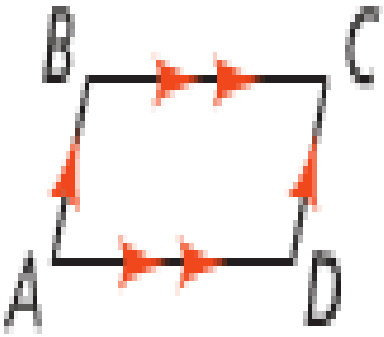


# #2 – Opp Sides ≅

- If a quadrilateral is a parallelogram, then its opposite sides are congruent.

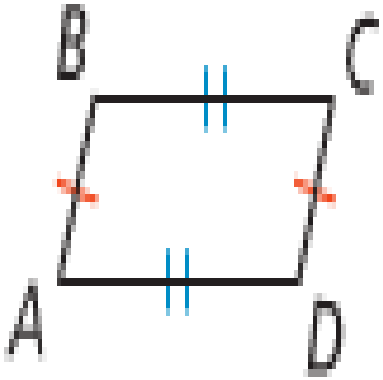
**If . . .**

$ABCD$ is a $\square$




**Then . . .**

$\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$



# #3 – Opp Angles ≅

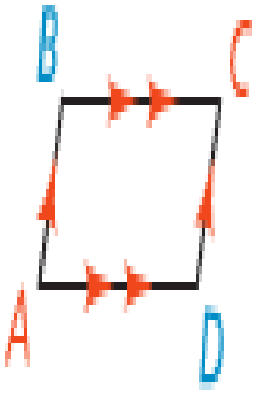
- If a quadrilateral is a parallelogram, then its opposite angles are congruent.

**Theorem**

If a quadrilateral is a parallelogram, then its opposite angles are congruent.

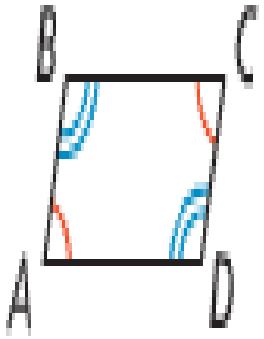
**If . . .**

$ABCD$ is a $\square$.



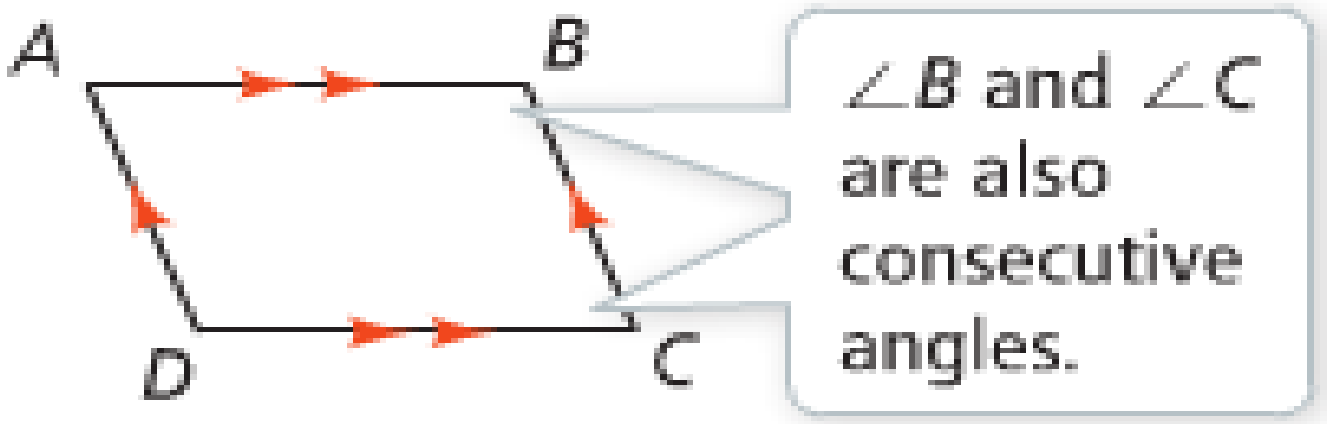

**Then . . .**

$\angle A \cong \angle C$ and $\angle B \cong \angle D$



# Def: Consecutive Angles

- Angles of a polygon that share a side are **consecutive angles**.

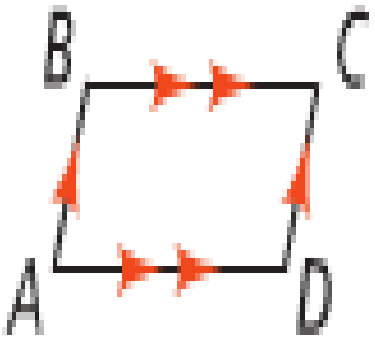


# #4 - Consecutive Angles Supp

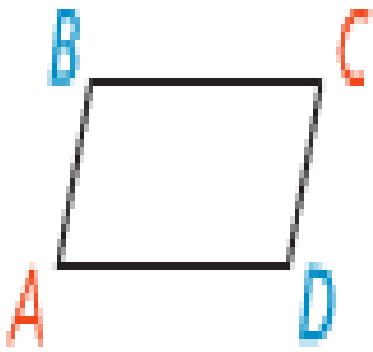
- If a quadrilateral is a parallelogram, then its consecutive angles are supplementary.

**If . . .**

$ABCD$ is a $\square$




**Then . . .**




$m\angle A + m\angle B = 180$

$m\angle B + m\angle C = 180$

$m\angle C + m\angle D = 180$

$m\angle D + m\angle A = 180$

# Using Consecutive Angles

- What is the measure of angle P in parallelogram PQRS?

A. 26°
B. 64°
C. 116°
D. 126°


$$m\angle P + m\angle S = 180$$

$$m\angle P + 64 = 180$$

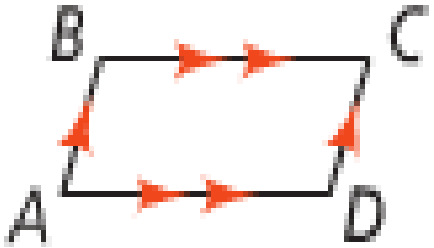
$$m\angle P = 116^\circ$$

# #5 – Diagonals Bisect

- If a quadrilateral is a parallelogram, then its diagonals **bisect each other.**

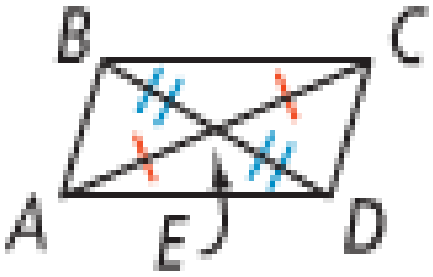
**If . . .**

$ABCD$ is a $\square$



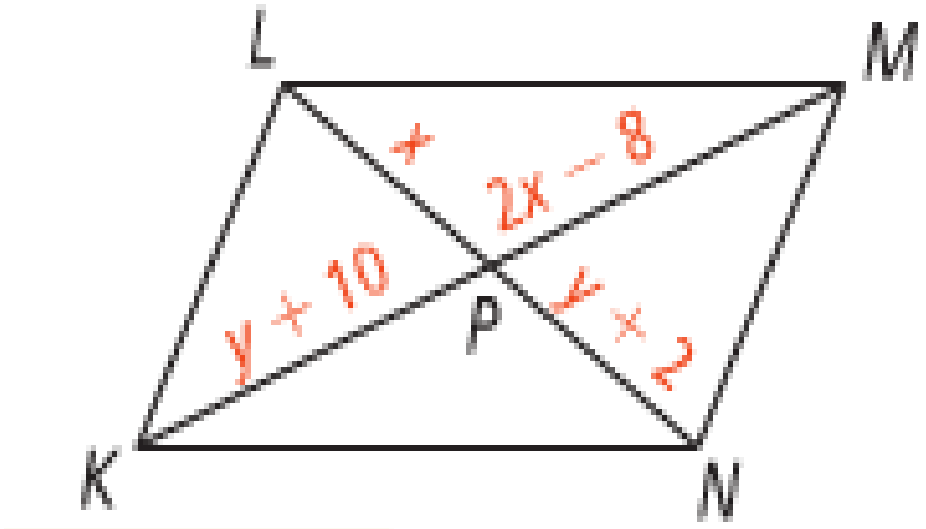

**Then . . .**

$\overline{AE} \cong \overline{CE}$ and $\overline{BE} \cong \overline{DE}$



# For example: Find Lengths

- Solve a system of linear equations to find the values of x and y in parallelogram KLMN. What are KM and LN?



# Using Substitution to Find Lengths

$\overline{KP} \cong \overline{MP}$

$y + 10 = 2x - 8$

$\overline{LP} \cong \overline{NP}$

$x = y + 2$

$$y + 10 = 2(y + 2) - 8$$

$$y + 10 = 2y + 4 - 8$$

$$10 = y - 4$$

$$14 = y$$

$$x = 14 + 2$$

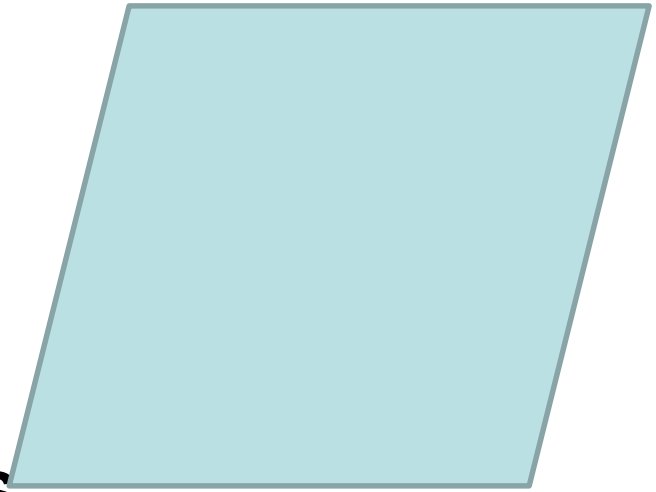
$$x = 16$$

# RECTANGLES

- A rectangle is a parallelogram with:
- **4 Right Angles**
- **Diagonals** ≅

# RHOMBUS

- A rhombus is a parallelogram with:
- **4 Congruent sides**
- **Diagonals ⊥**
- **Diagonals bisect <s**

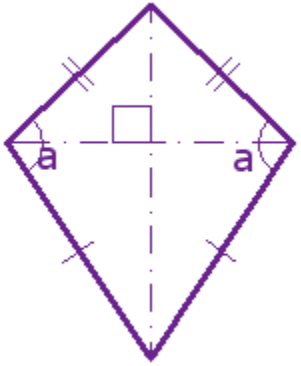


# SQUARE

- A square is a parallelogram with:

- **4 right angles**
- **4 congruent sides**
- **Diagonals ⊥**
- **Diagonals ≅**
- **Diagonals bisect <s**

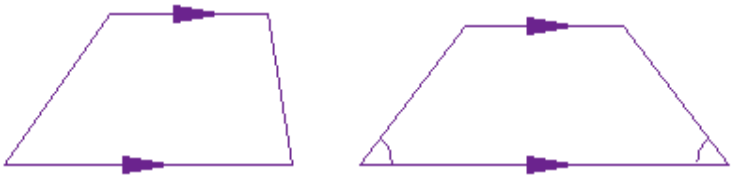
# KITES




- A 4-sided flat shape with straight sides that:

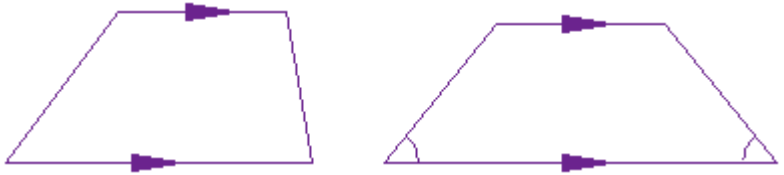
  - has two pairs of sides.
  - each pair is made of two adjacent sides (they meet) that are equal in length.
- Angles are equal where the pairs meet.
- Diagonals are perpendicular

# Trapezoid



- A quadrilateral with exactly one pair of parallel sides.
- The two parallel sides of the trapezoid are called the bases
- The consecutive angles between the bases of the trapezoid are supplementary

# Isosceles Trapezoid



- A trapezoid with two congruent legs
- In an isosceles trapezoid the non-parallel sides are congruent
- Both sets of bases angles of an isosceles trapezoid are congruent
- (find one angle you can find them all)
- The diagonal of an isosceles trapezoid are congruent

# More Practice!!!!!