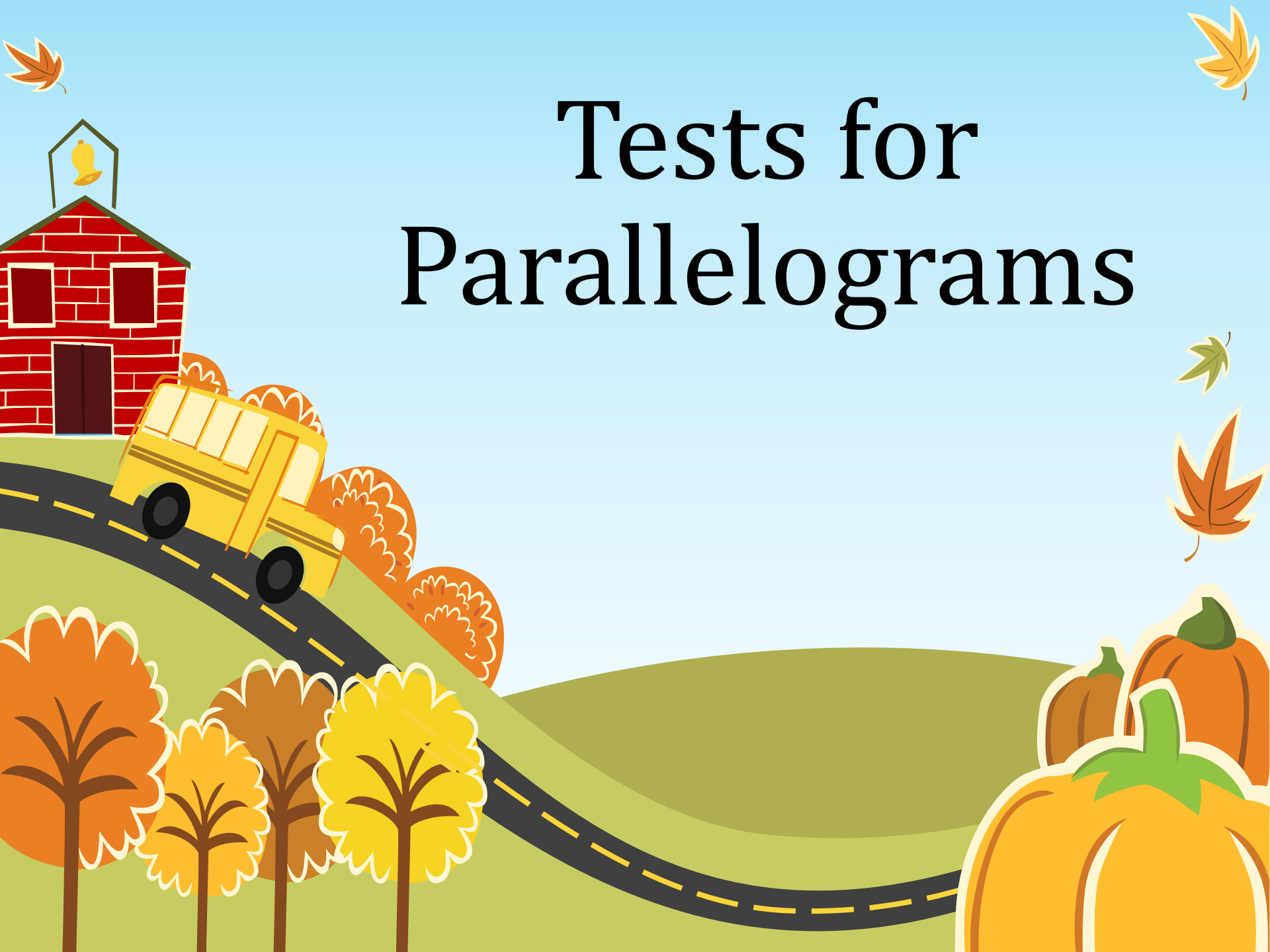
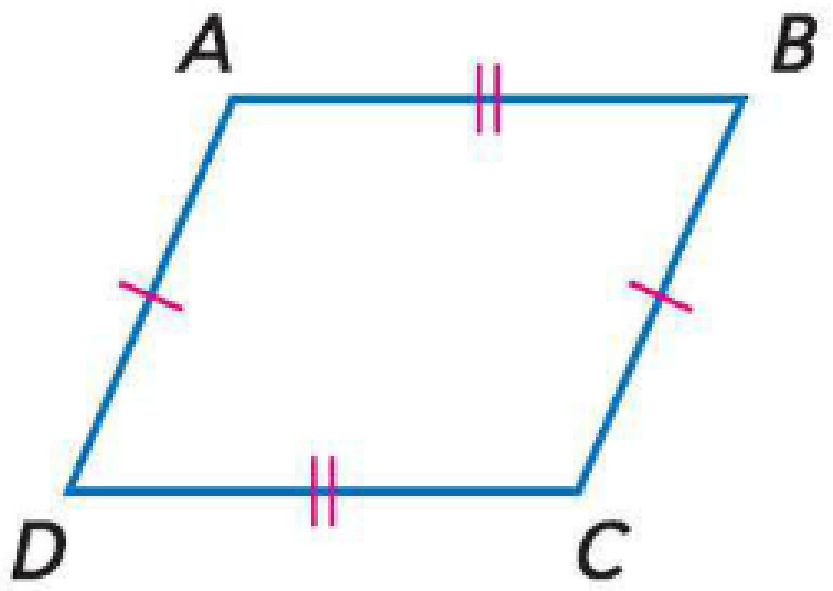
Tests for Parallelograms



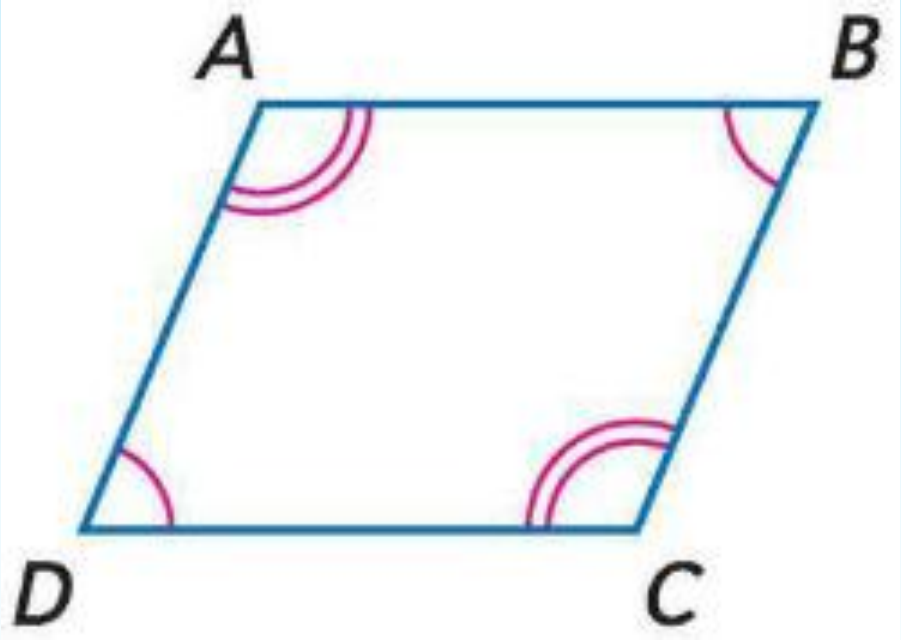
Conditions for Parallelograms

- If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.



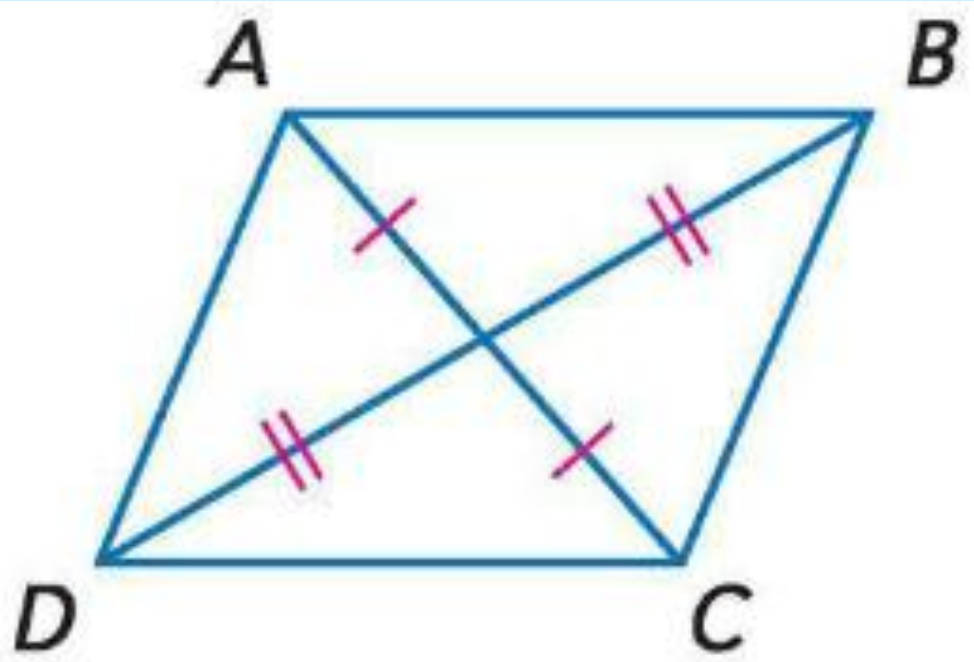
Conditions for Parallelograms

- If both pairs of opposite angles of quadrilaterals are congruent, then the quadrilateral is a parallelogram.



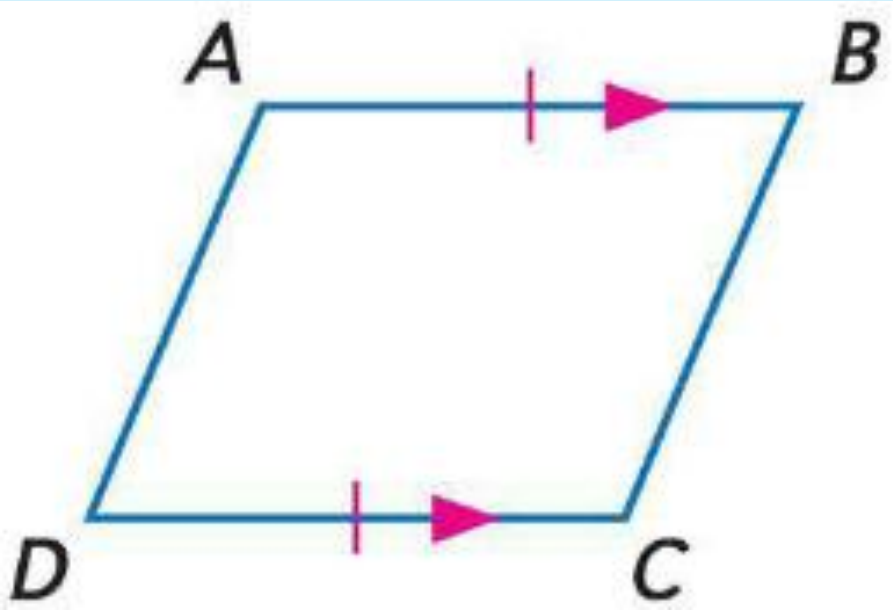
Conditions for Parallelograms

- If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.



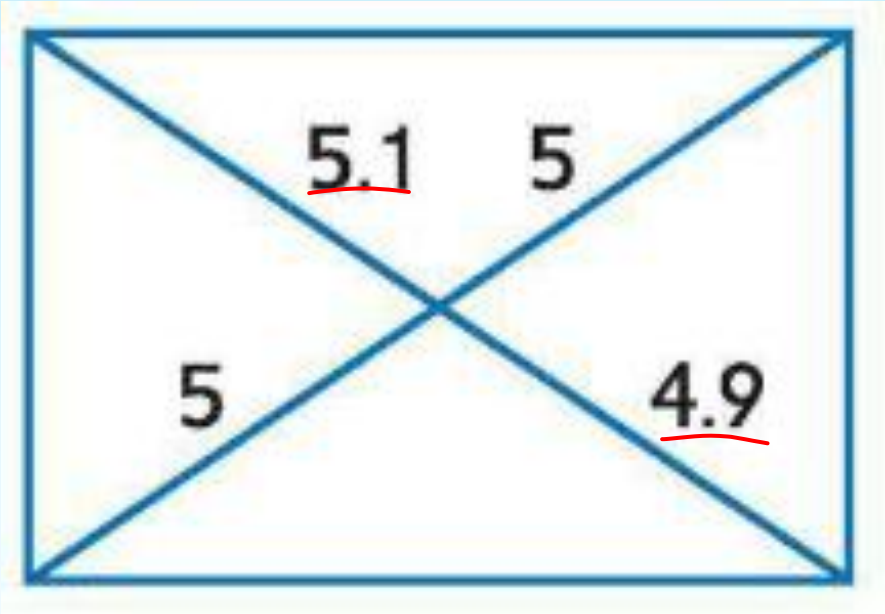
Conditions for Parallelograms

- If one pair of opposite sides of a quadrilateral is both parallel and congruent, then the quadrilateral is a parallelogram.



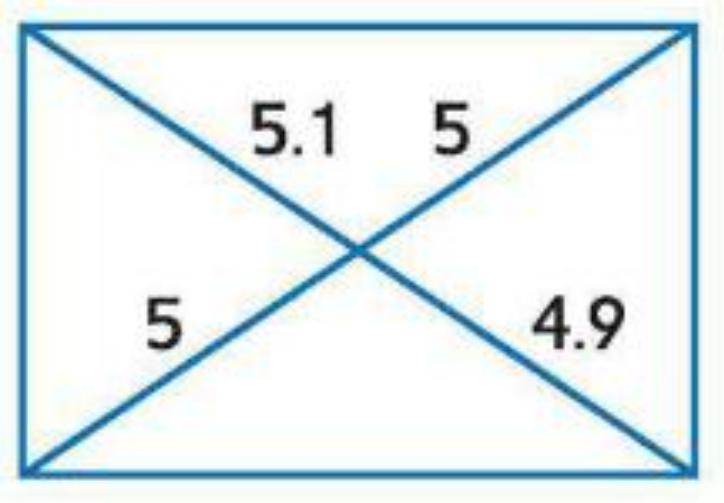
Examples

- Determine whether the quadrilateral is a parallelogram.



Examples

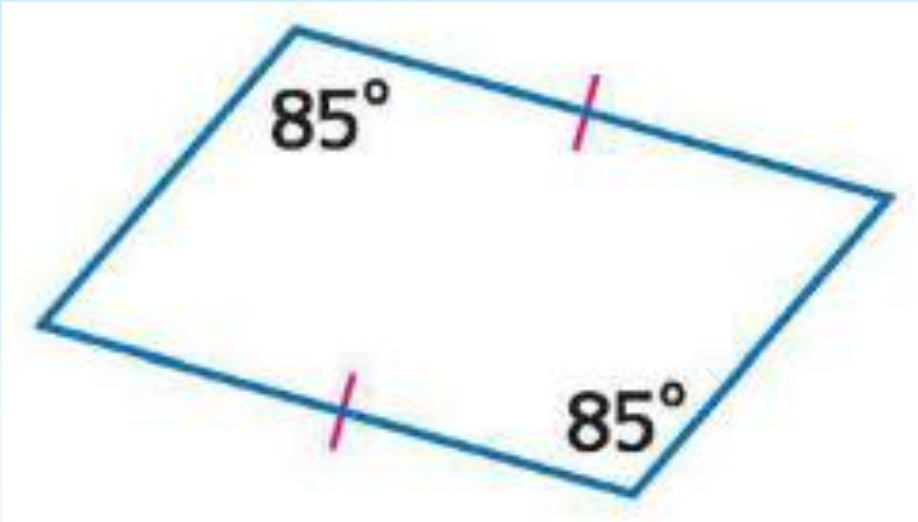
- Determine whether the quadrilateral is a parallelogram.



- No; diagonals are not bisected.

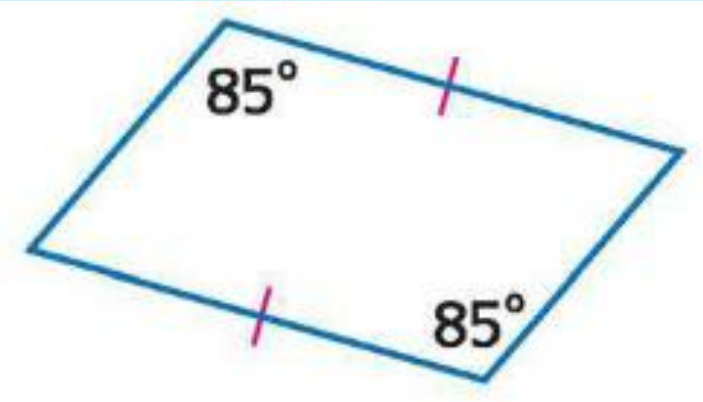
Examples

- Determine whether the quadrilateral is a parallelogram.



Examples

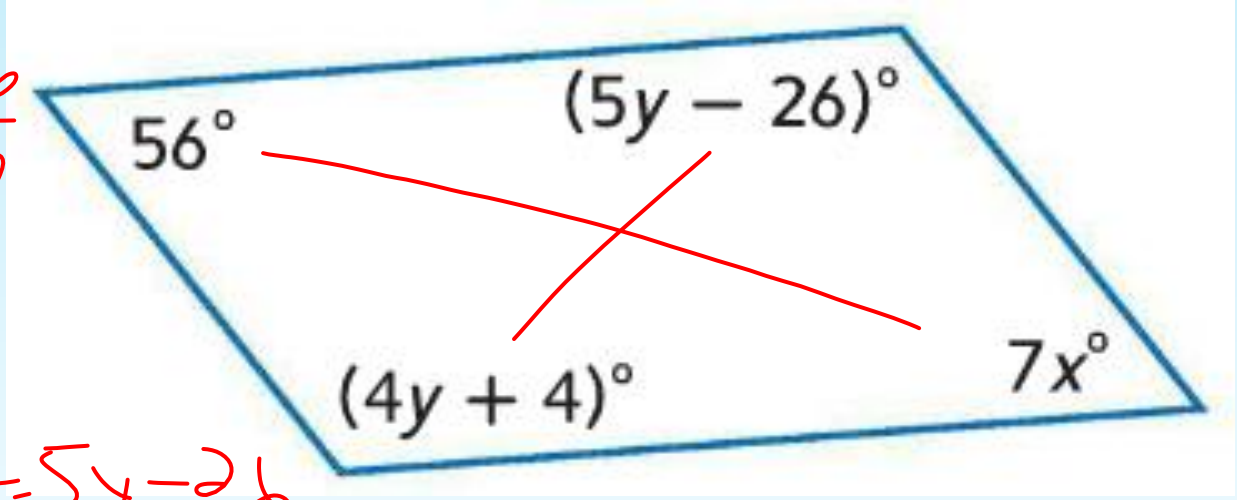
- Determine whether the quadrilateral is a parallelogram.



- Yes; opposite angles are congruent

Examples

- Find x and y so that each quadrilateral is a parallelogram.



$\frac{7x}{7} = \frac{56}{7}$

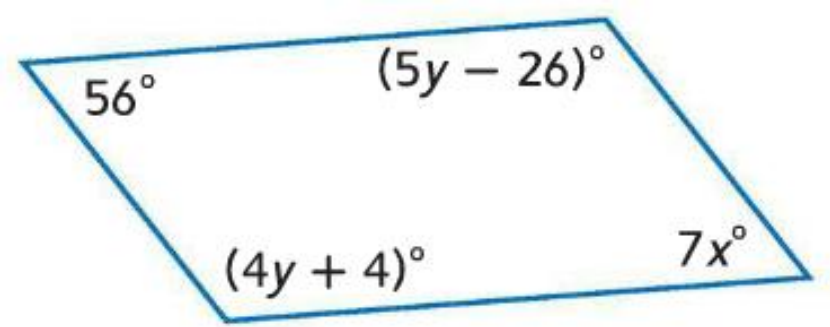
$x = 8$

$4y + 4 = 5y - 26$

$30 = y$

Examples

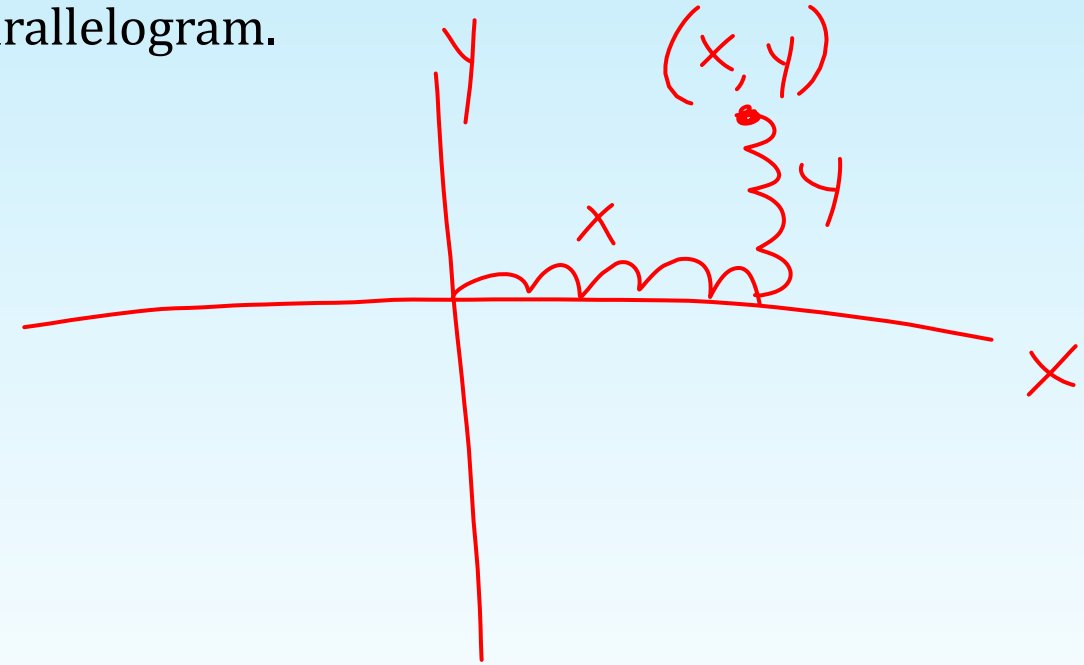
- Find *x* and *y* so that each quadrilateral is a parallelogram.



- 7x = 56; x = 8
- 4y + 4 = 5y – 26; y = 30

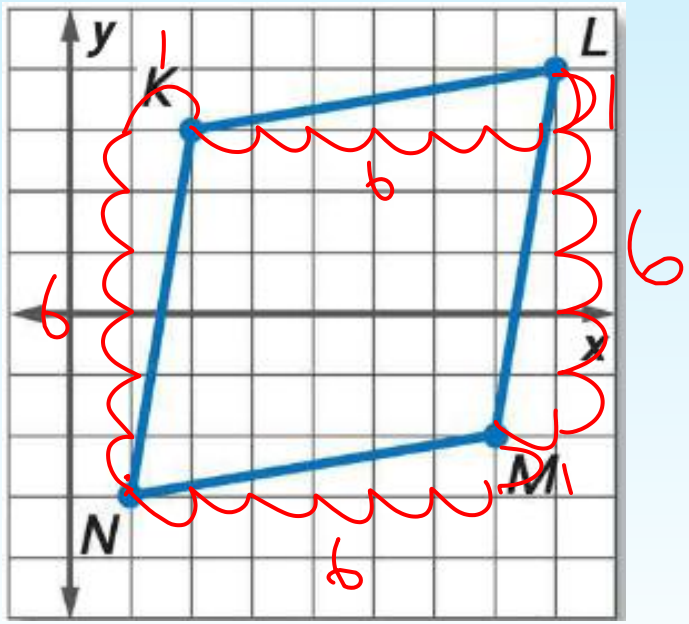
Coordinate Plane

- You can use the Distance, Slope, and Midpoint Formulas to determine whether a quadrilateral in the coordinate plane is a parallelogram.



Examples

- Graph quadrilateral *KLMN* with vertices *K*(2,3), *L*(8,4), *M*(7,-2), and *N*(1,-3). Determine whether the quadrilateral is a parallelogram. Use the Slope Formula.



Examples

If the opposite sides of a quadrilateral are parallel, then it is a parallelogram.

slope of $\overline{KL} = \frac{4-3}{8-2}$ or $\frac{1}{6}$

slope of $\overline{NM} = \frac{-2-(-3)}{7-1}$ or $\frac{1}{6}$

slope of $\overline{KN} = \frac{-3-3}{1-2} = \frac{-6}{-1}$ or 6

slope of $\overline{LM} = \frac{-2-4}{7-8} = \frac{-6}{-1}$ or 6

Examples

- Since opposite sides have the same slope, they are parallel, and the polygon is a parallelogram by definition.