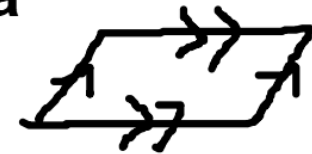


Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram.
Prove that a set of points forms a parallelogram in the coordinate plane.

- Using the definition - If you can show that a quadrilateral has 2 pairs of opposite sides parallel the figure is a parallelogram.



To show a pair of sides is parallel - USE SLOPE

Remember || lines have = slope

4 slopes needed

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

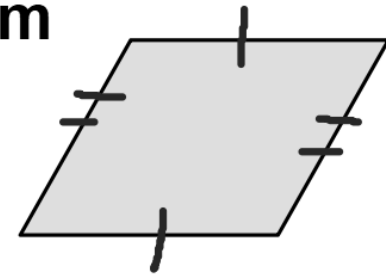
OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram.
Prove that a set of points forms a parallelogram in the coordinate plane.

Use distance to prove 2 sides are congruent

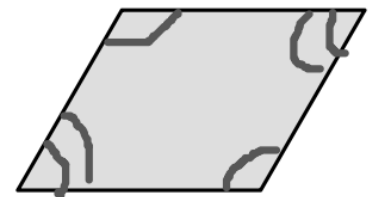
● If both pairs of opposite sides of a quadrilateral are congruent, then the figure is a parallelogram

$$\text{distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

④ distances needed



● If both pairs of opposite angles of a quadrilateral are congruent, then the figure is a parallelogram



Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

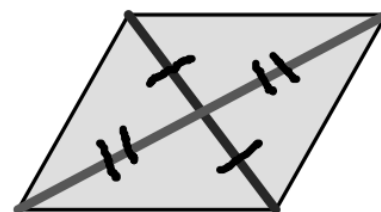
OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram. Prove that a set of points forms a parallelogram in the coordinate plane.

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

Use midpoint of the diagonals to prove diagonals bisect each other

$$\text{midpoint} = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$$

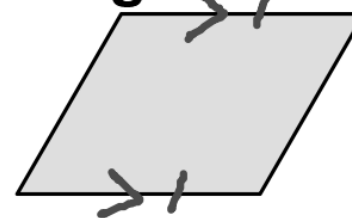
② midpoints, DIAGONALS



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

② parallel (SLOPE)

② congruent (distance)



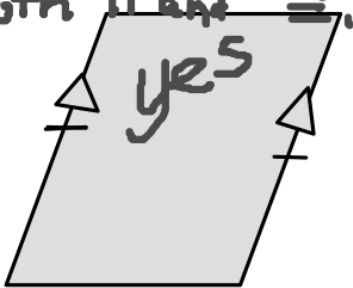
Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram.
 Prove that a set of points forms a parallelogram in the coordinate plane.

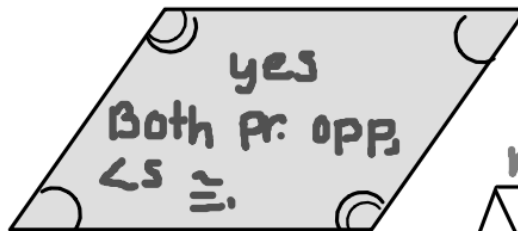
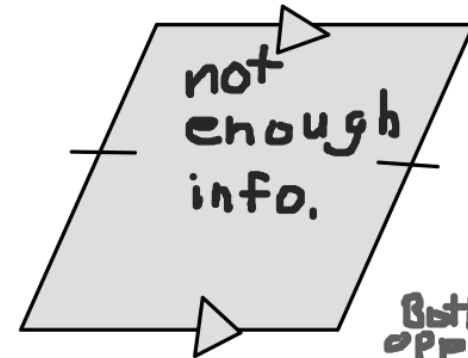
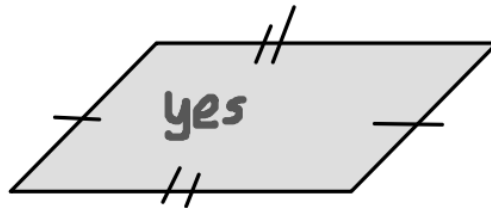
Are the following figures parallelograms? Justify your

answer.

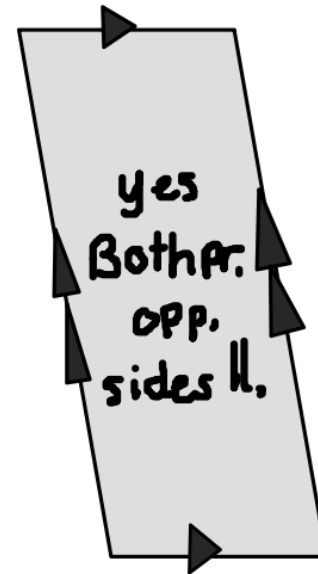
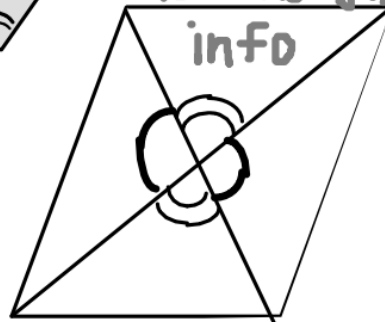
One pr. opp. sides
 both \parallel \cong .



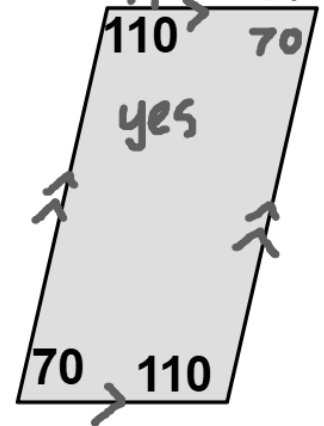
Both pr. opp. sides \cong



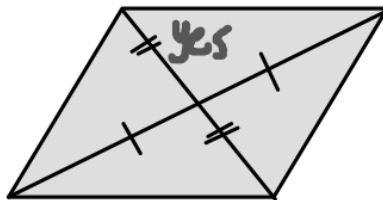
not enough info



Both pr. opp. \angle s \cong .



Diags. bisect each other.



Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram.
Prove that a set of points forms a parallelogram in the coordinate plane.

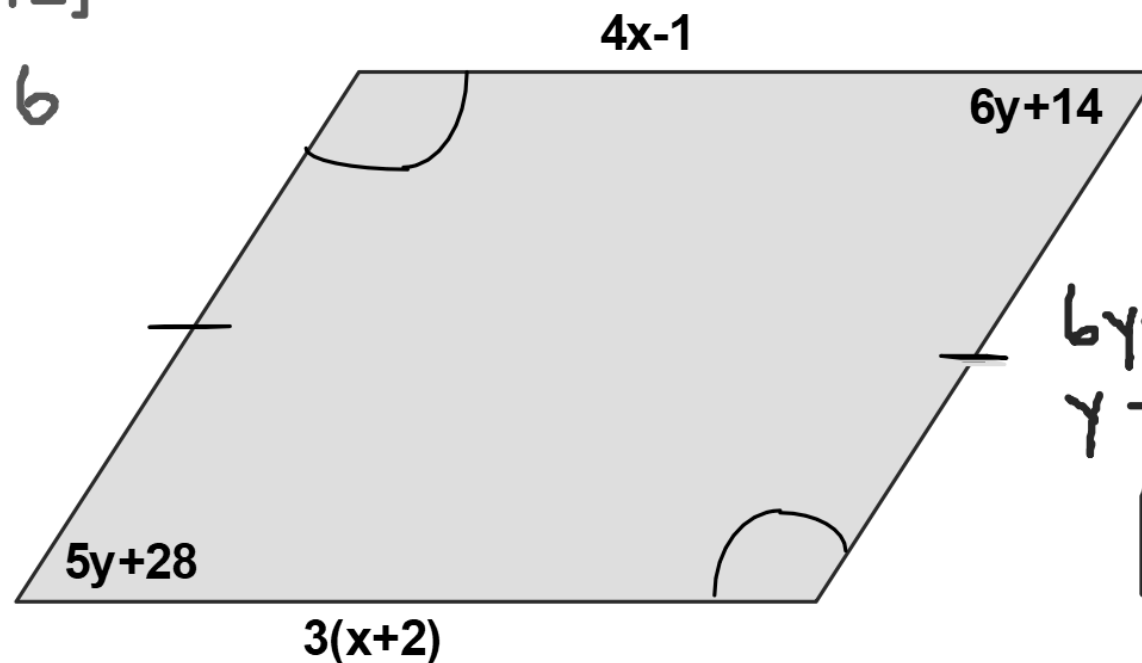
Find x and y such that ABCD is a parallelogram

$$4x - 1 = 3(x + 2)$$

$$4x - 1 = 3x + 6$$

$$x - 1 = 6$$

$$x = 7$$



$$6y + 14 = 5y + 28$$

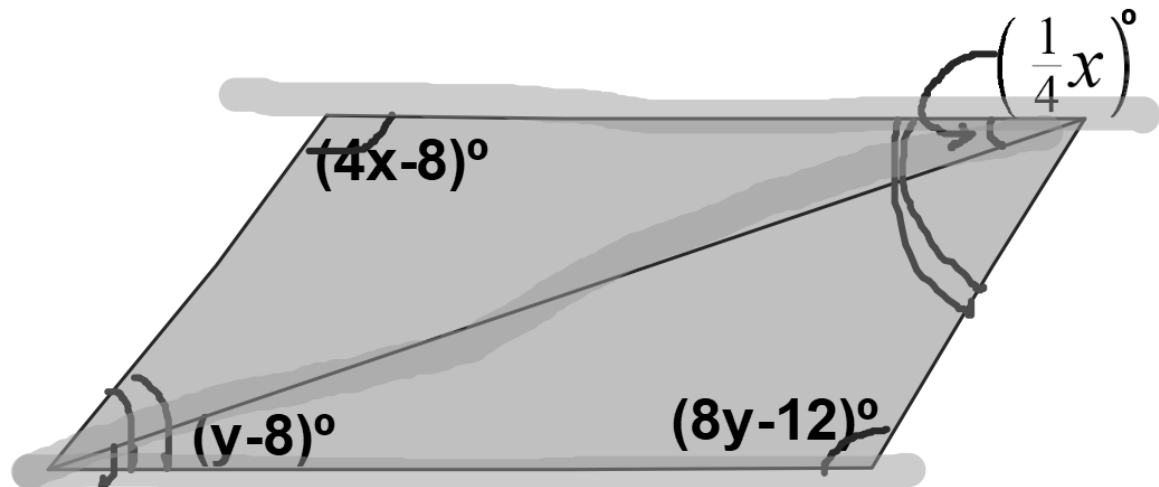
$$y + 14 = 28$$

$$y = 14$$

Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram.
Prove that a set of points forms a parallelogram in the coordinate plane.

Find x and y so that the quadrilateral is a parallelogram.



$$4x - 8 = 8y - 12 \quad * \rightarrow 4(4y - 32) - 8 = 8y - 12$$

$$4\left(\frac{1}{4}x = y - 8\right)$$

$$x = 4y - 32 \quad *$$
$$x = 4(15.5) - 32$$
$$x = 62 - 32$$

$$\boxed{x = 30}$$

$$16y - 128 - 8 = 8y - 12$$

$$16y - 136 = 8y - 12$$

$$8y - 136 = -12$$

$$8y = 124$$

$$\boxed{y = 15.5}$$

Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram.
Prove that a set of points forms a parallelogram in the coordinate plane.

Determine whether the figure with the given vertices is a parallelogram. Use the method indicated.


A(-3, 0) B(-1, 3) C(3, 2) D(1, -1) SLOPE METHOD



$$\begin{aligned}m \overline{AB} &= \frac{0-3}{-3+1} = \frac{-3}{-2} = \frac{3}{2} \\m \overline{BC} &= \frac{2-3}{3+1} = \frac{-1}{4} = -\frac{1}{4} \\m \overline{CD} &= \frac{2+1}{3-1} = \frac{3}{2} \\m \overline{AD} &= \frac{0+1}{-3-1} = \frac{1}{-4} = -\frac{1}{4}\end{aligned}$$

Same slope
 $\overline{AB} \parallel \overline{CD}$
 $\overline{BC} \parallel \overline{AD}$

yes, it is a

 because both pr. opp. sides are \parallel .

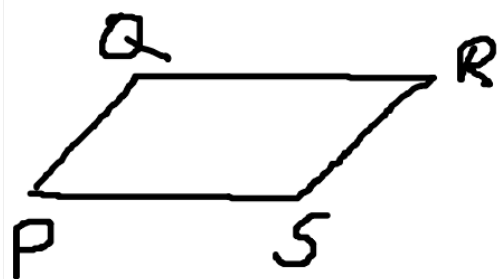
Unit 7 Lesson 4: Tests for Parallelograms (Section 6-3)

OBJ: Recognize the conditions that ensure a quadrilateral is a parallelogram.
Prove that a set of points forms a parallelogram in the coordinate plane.

Determine whether the figure with the given vertices is a parallelogram. Use the method indicated.

P(-3, -1) Q(-1, 3) R(3,1) S(1,-3)

Distance and SLOPE METHOD



$$m \overline{QP} = \frac{-1-3}{-3+1} = \frac{-4}{-2} = 2$$
$$m \overline{RS} = \frac{1+3}{3-1} = \frac{4}{2} = 2$$

$\overline{QP} \parallel \overline{RS}$

$$QP = \sqrt{(-3+1)^2 + (-1-3)^2}$$
$$= \sqrt{(-2)^2 + (-4)^2} = \sqrt{4+16} = \sqrt{20}$$

$QP = RS$

$$RS = \sqrt{(3-1)^2 + (1+3)^2} = \sqrt{4+16} = \sqrt{20}$$
$$= \sqrt{2^2 + 4^2}$$

Yes, it is  because one pr. opp sides both \parallel & \cong .