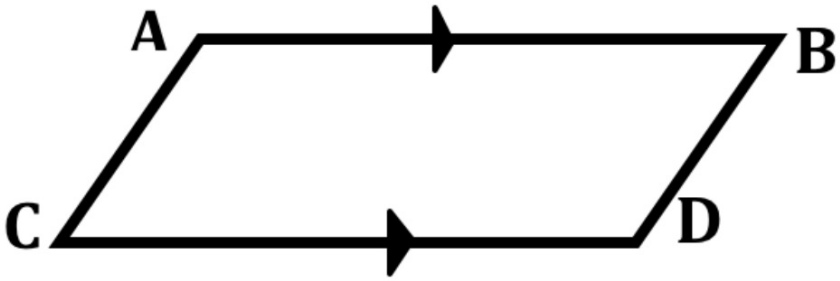
6-2&3 Parallelograms

Objective:

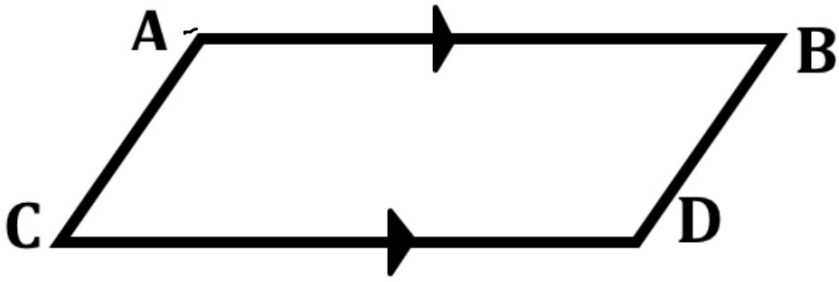
- Recognize and apply properties of the sides, angles and diagonals of parallelograms.
- Recognize the conditions that ensure a quadrilateral is a parallelogram.



Parallelogram: A quadrilateral with both pairs of opposite side **PARALLEL**.

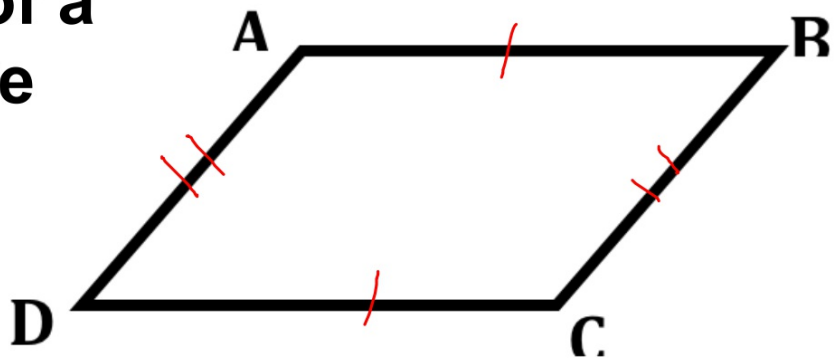
When you name a polygon, the LETTERS (Vertices) must be in 'connect the dot' order.

If it is a parallelogram, draw the little parallelogram before the letters.



Properties of Parallelograms:

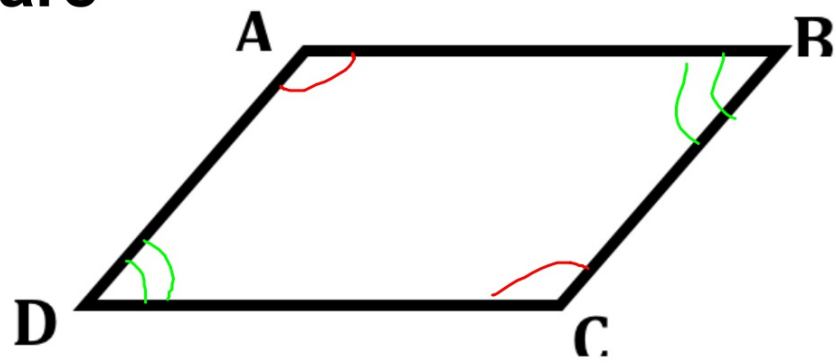
Opposite sides of a parallelogram are congruent.



$\overline{AB} \cong \overline{DC}$

$\overline{AD} \cong \overline{BC}$

Opposite angles in a parallelogram are congruent.



$\angle A \cong \angle C$

$\angle B \cong \angle D$

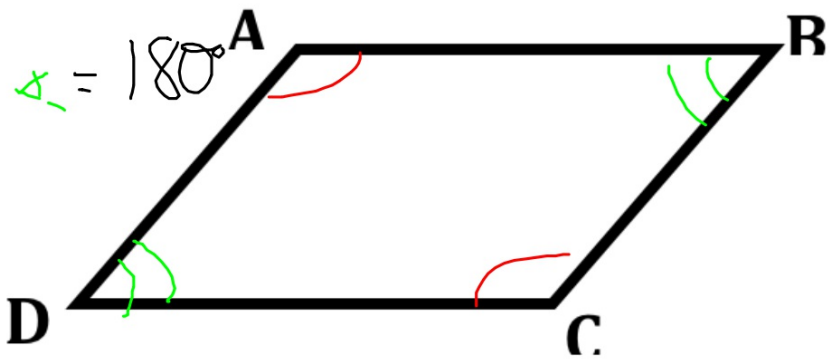
big ∡ ≅ big ∡

little ∡ ≅ little ∡

Consecutive angles in a parallelogram are supplementary adds to 180°

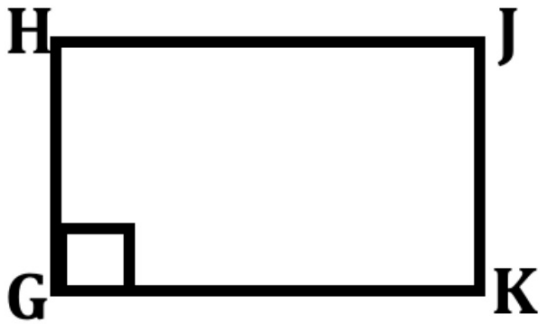
$$m\angle A + m\angle B = 180$$
$$m\angle B + m\angle C = 180$$
$$m\angle C + m\angle D = 180$$
$$m\angle D + m\angle A = 180$$

big x + little x = 180°



If a parallelogram has one right angle, it has four right angles.

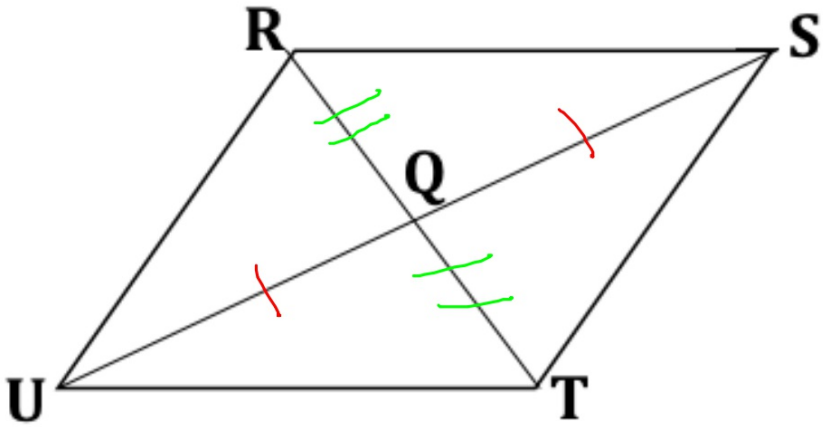
$$m\angle G = 90$$
$$m\angle H = 90$$
$$m\angle J = 90$$
$$m\angle K = 90$$



The diagonals of a parallelogram bisect each other.

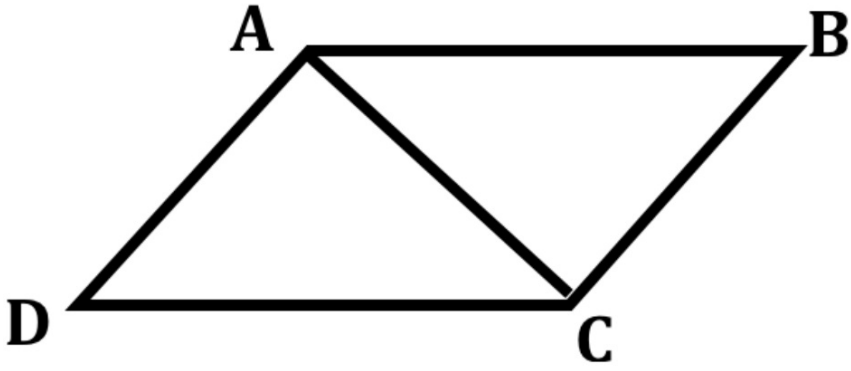
$\overline{QU} \cong \overline{QS}$

$\overline{QR} \cong \overline{QT}$



Each diagonal of a parallelogram separates the parallelogram into two congruent triangles.

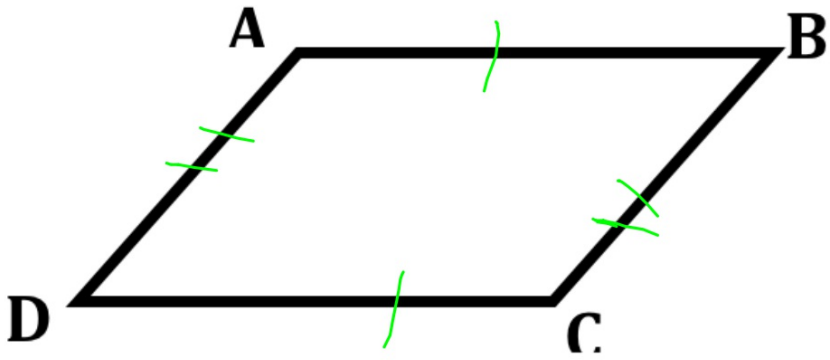
$$\Delta ACD \cong \Delta CAB$$



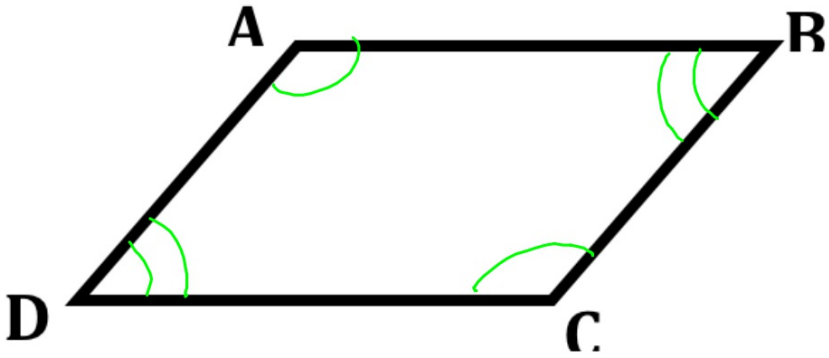
Properties of parallelograms – You *know* the figure is a parallelogram

Tests for Parallelograms – You *don't know* the figure is a parallelogram. You are trying to determine whether of not the figure is a parallelogram.

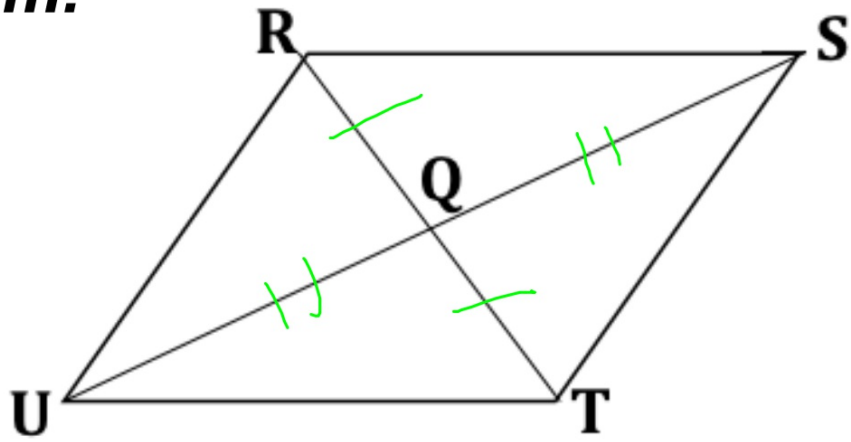
If both pairs of opposite sides of a quadrilateral are congruent, then it is a parallelogram.



If both pairs of opposite angles of a quadrilateral are congruent, then it is a parallelogram.

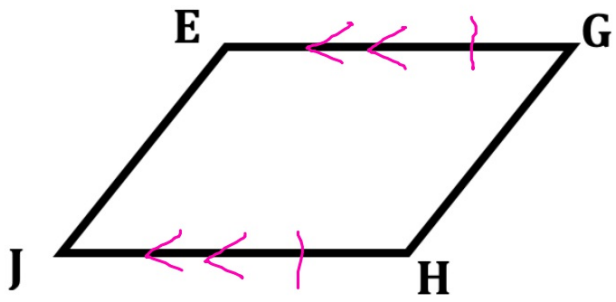


If the diagonals of a quadrilateral bisect each other, then it is a parallelogram.

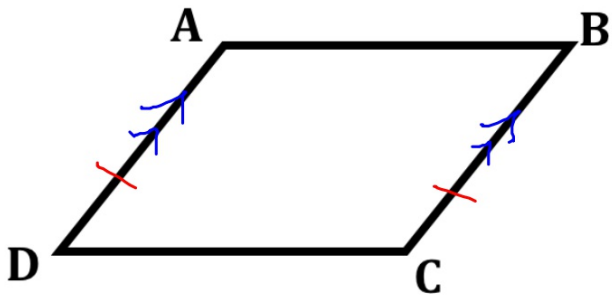


If one pair of opposite sides of a quadrilateral is both parallel and congruent, then it is a parallelogram.

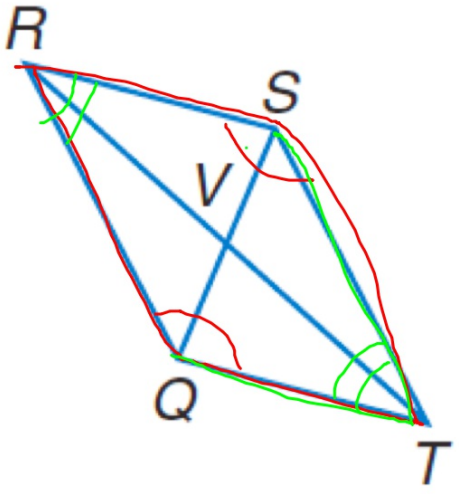
$\overline{EG} \parallel \overline{JH}$ and $\overline{EG} \cong \overline{JH}$



$\overline{AD} \parallel \overline{BC}$ and $\overline{AD} \cong \overline{BC}$



Complete each statement about $\square QRST$. Justify your answer.



$\overline{SV} \cong$? $\overline{QV}$

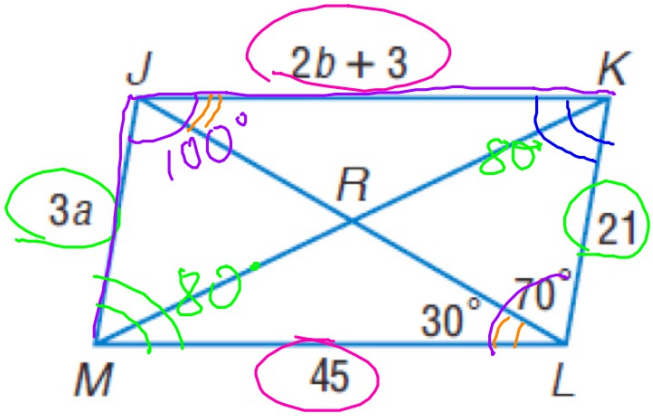
$\triangle VRS \cong$? ~~$\triangle VQT$~~ $\triangle VTQ$

$\angle TSR$ is supplementary to ? .

add to 180°

~~$\angle TQR$~~ $\angle SRQ$ $\angle STQ$

Use $\square JKLM$ to find each measure or value if $JK = 2b + 3$ and $JM = 3a$.



Find:

a

$3a = 21$

$a = 7$

b

$2b + 3 = 45$

$-3 \quad -3$

$2b = 42$

$\frac{2b}{2} = \frac{42}{2}$

$b = 21$

$m\angle MJK = 100°$

$m\angle JKL$ $180 - 100 = 80°$

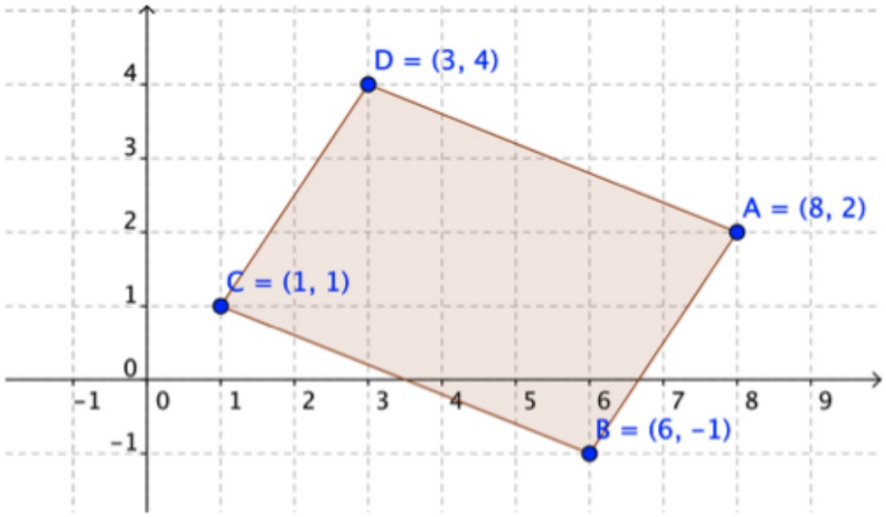
$m\angle KJL$ $30°$ alt int angles

$m\angle JML$ $80°$

Is quadrilateral ABCD a parallelogram?

A(8, 2), B(6, –1), C(1, 1), D(3, 4)

To prove the quadrilateral is a parallelogram, we must use ***ONE*** *of the following* ***TESTS.***



First TEST: Definition of Parallelogram:

Are opposite sides parallel?

Slope formula 4 times

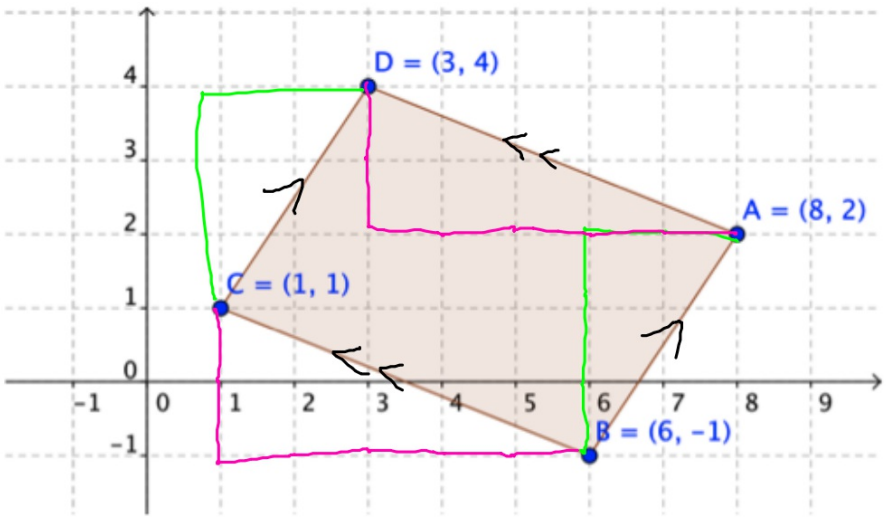
$\frac{2-4}{8-3} = m\overline{DA}$

$m\overline{CD} = m\overline{BA}$

$\frac{3}{2} = \frac{3}{2}$

$m\overline{CB} = m\overline{DA}$

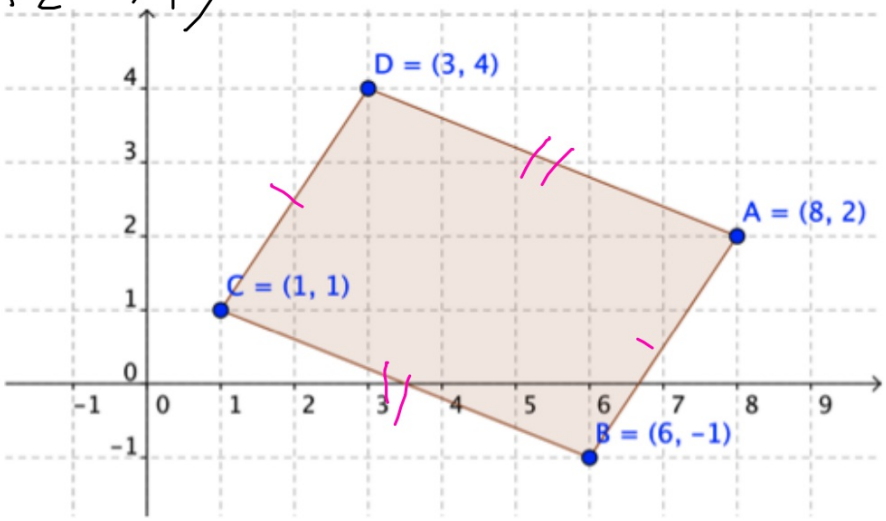
$\frac{-2}{5} = \frac{-2}{5}$



Are opposite sides congruent?

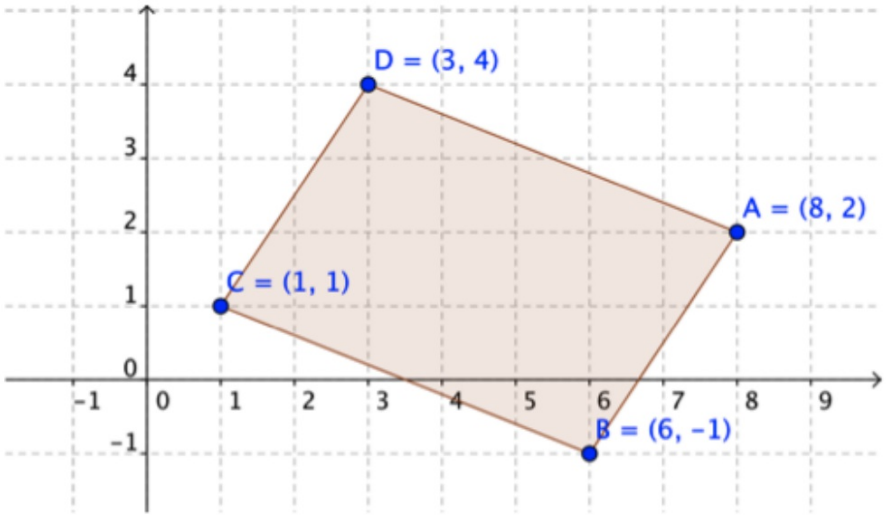
Distance formula 4 time

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



Are opposite angles congruent?

Would have to measure angles – we will not be doing this.

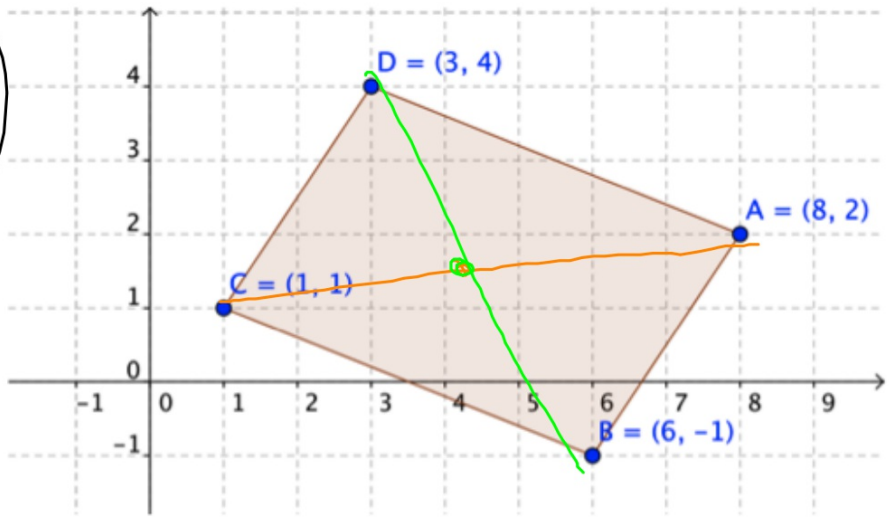


Do the diagonals bisect each other?

Mid point formula 2 times

midpoints must be the same.

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

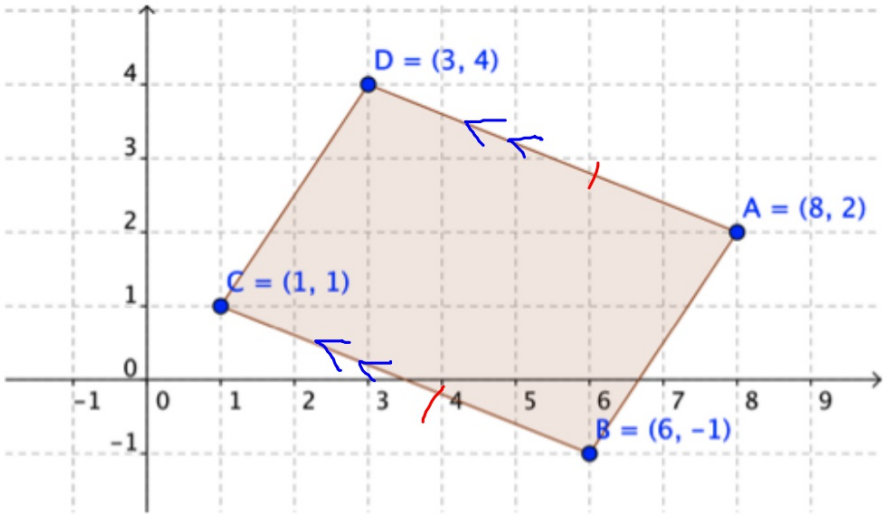


Is one pair opposite sides both congruent and parallel?

Distance formula 2 times, slope formula 2 times

slope

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



Assignment:

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