

ICG -Day 13 Coordinate Proof

Prove that segment AB bisects segment CD.

A(3,6) B(3,1)

C(0,1) D(6,5)

What is a bisector, what does it do?

A coordinate proof will require algebraic formulas and a written explanation.

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

$$\overleftrightarrow{AB} = x = 3 \quad (3, 3)$$

The segment \overline{AB} cuts \overline{CD} at its midpoint
therefore \overline{AB} bisects \overline{CD} .

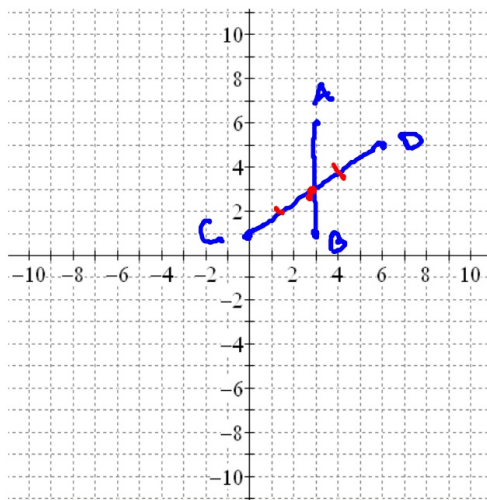
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Step 1 - plot the points on graph paper

A(3,6) B(3,1)

C(0,1) D(6,5)

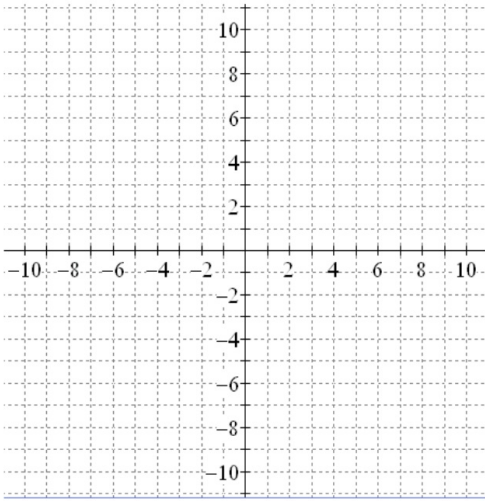
Step 2 - use a formula or formulas to demonstrate what you are asked to prove



Step 3 - write a conclusion

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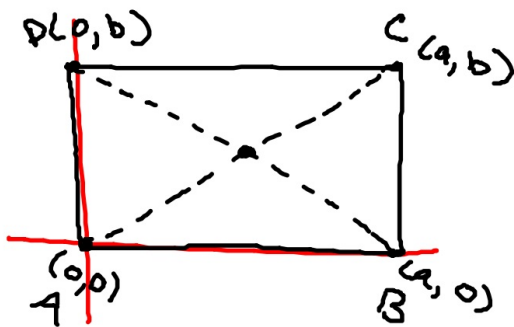
Prove that AB and CD bisect each other and are perpendicular to each other if the coordinates of the endpoints of these segments are A(-3,5), B(5,1), C(-2,-3) and D(4,9)



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Proving a general theorem using coordinate geometry.

Ex 1 - The vertices of rectangle ABCD are A(0,0), B(a,0), C(a,b) and D(0,b).
Prove that the two diagonals AC and BD bisect each other.



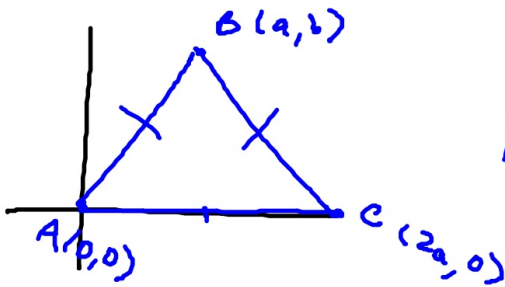
$$\begin{aligned} \text{midpoint } \overline{AC} &= \left(\frac{0+a}{2}, \frac{0+b}{2} \right) \\ &= \left(\frac{a}{2}, \frac{b}{2} \right) \end{aligned}$$

$$\begin{aligned} \text{midpoint of } \overline{BD} &= \left(\frac{a+0}{2}, \frac{0+b}{2} \right) \\ &= \left(\frac{a}{2}, \frac{b}{2} \right) \end{aligned}$$

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The vertices of triangle ABC are A(0,0), B(a,b) and C(2a,0)

Prove that AB is congruent to BC.



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

$$AB = \sqrt{(0 - a)^2 + (0 - b)^2}$$

$$= \sqrt{a^2 + b^2}$$

$$BC = \sqrt{(a - 2a)^2 + (b - 0)^2}$$

$$= \sqrt{(-a)^2 + b^2}$$

$$= \sqrt{a^2 + b^2}$$