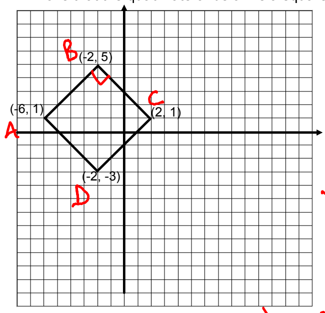
Prove that the quadrilateral below is a square:



Part 1 5%

① Use distance formula to show that all four sides are the same length.

(i) side AB: $A(-6,1)$ $x_1\ y_1$ $B: (-2,5)$ $x_2\ y_2$

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

$$= \sqrt{(-2+6)^2+(5-1)^2}$$

$$= \sqrt{4^2+4^2}$$

$$= \sqrt{16+16} = \sqrt{32} = \boxed{5.66\text{u}}$$

(ii) side $\overline{BC}$: $B(-2,5)$ $x_1\ y_1$ $C: (2,1)$ $x_2\ y_2$

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

$$= \sqrt{(2+2)^2+(1-5)^2}$$

$$= \sqrt{4^2+(-4)^2}$$

$$= \sqrt{16+16} = \sqrt{32} = \boxed{5.66\text{u}}$$

(iii) side $\overline{CD}$: $C(2,1)$ $x_1\ y_1$ $D(-2,-3)$ $x_2\ y_2$

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

$$= \sqrt{(-2-2)^2+(-3-1)^2}$$

$$= \sqrt{(-4)^2+(-4)^2} = \sqrt{16+16} = \sqrt{32} = \boxed{5.66\text{u}}$$

(iv) side $\overline{DA}$: $D(-2,-3)$ $x_1\ y_1$ $A(-6,1)$ $x_2\ y_2$

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

$$= \sqrt{(-6+2)^2+(1+3)^2}$$

$$= \sqrt{(-4)^2+(4)^2} = \sqrt{16+16}$$

$$= \sqrt{32} = \boxed{5.66\text{u}}$$

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Part II Determine slopes of adjacent sides to prove there is at least one right angle.

Slope $\overline{AB}$ $A(-6, 1)$ $B(-2, 5)$

(x_1, y_1) (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-1}{-2+6} = \frac{4}{4} = 1 = m_{AB}$$

Slope BC $B(-2, 5)$ $C(2, 1)$

(x_1, y_1) (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-5}{2+2} = \frac{-4}{4} = -1 = m_{BC}$$

$AB \perp BC$ since $m_{AB} \cdot m_{BC} = -1$

This is a square since all four sides are congruent (same measure) and there is at least one right angle.