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CC GEOMETRY

TROICI

LESSON #3: KITES AND COORDINATE "NOT" PROOFS

Do Now:

Properties of a Kite: Two pairs of consecutive congruent sides. Diagonals are perpendicular.

To prove a quadrilateral is a Kite: 4 distance formulas

1. Prove that Quadrilateral *ABCD* is a kite.

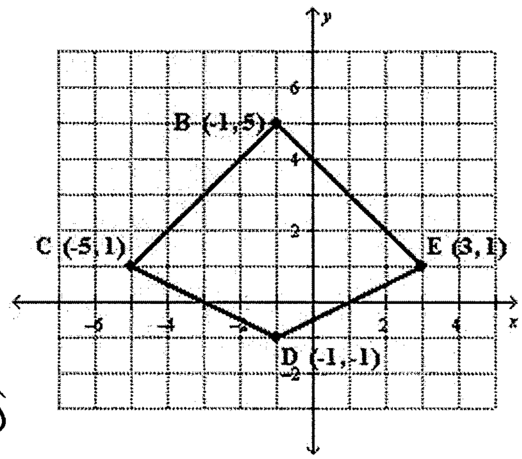
$\overline{BC} = \sqrt{(-1--5)^2+(5-1)^2} = \sqrt{32}$ ✓

$\overline{BE} = \sqrt{(-1-3)^2+(5-1)^2} = \sqrt{32}$

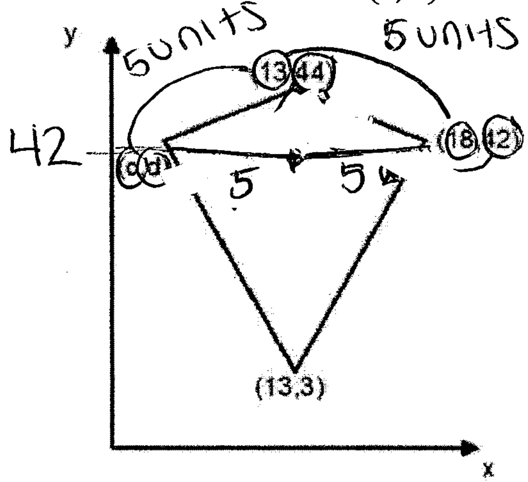
$\overline{CD} = \sqrt{(-5--1)^2+(1--1)^2} = \sqrt{20}$ ✓

$\overline{ED} = \sqrt{(3--1)^2+(1--1)^2} = \sqrt{20}$

∴ Quad ABCD is a kite b/c it has 2 pairs of consecutive ≅ sides.



2. Determine the values of (c, d).



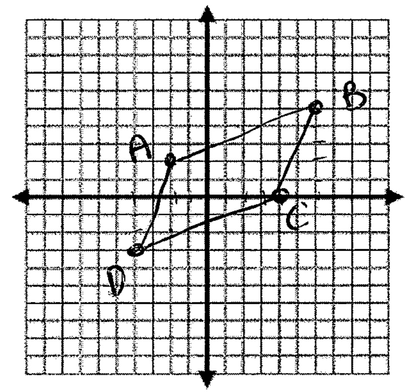
$c = 13 - 5 = 8$

$d = 42$

$\boxed{(8, 42)}$

HOW DO WE COMPLETE COORDINATE "NOT" PROOFS?!?!?

3. Given the coordinates of Quadrilateral $ABCD$ are $A(-2,2), B(6,5), C(4,0), D(-4,-3)$ Prove that quadrilateral $ABCD$ is a parallelogram, but **not** a rectangle.



Step 1: prove $\boxed{P}$ (Diagonals bisect)

$$mp_{AC} = \left(\frac{-2+4}{2}, \frac{2+0}{2}\right) = \left(\frac{2}{2}, \frac{2}{2}\right) = (1,1)$$

$$mp_{BD} = \left(\frac{6+-4}{2}, \frac{5+-3}{2}\right) = \left(\frac{2}{2}, \frac{2}{2}\right) = (1,1)$$

$\therefore$ ABCD is a $\boxed{P}$ b/c the diagonals bisect.

Step 2: prove diagonals are <u>NOT</u> $\cong$.

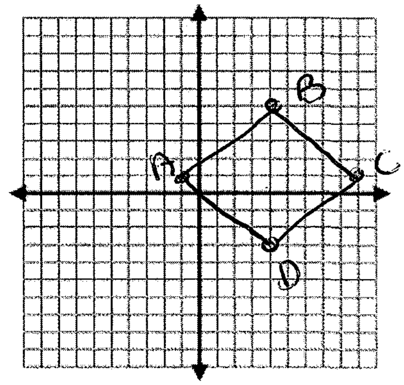
$$d_{\overline{AC}} = \sqrt{(4--2)^2 + (0-2)^2} = \sqrt{40}$$

$$d_{\overline{BD}} = \sqrt{(-4-6)^2 + (-3-5)^2} = \sqrt{164}$$

$\therefore$ ABCD is <u>NOT</u> a rectangle b/c diagonals $\overline{AC} \ncong \overline{BD}$

4. Given the coordinates of Quadrilateral $ABCD$ are $A(-1,1), B(4,5), C(9,1), D(4,-3)$. Prove that Quadrilateral $ABCD$ is a rhombus, but **not** a square.

Plan:
① prove diagonals are $\perp$
② prove diagonals are NOT $\cong$



① $m_{\overline{AC}} = \dfrac{1-1}{9-{}^-1} = \dfrac{0}{10} = 0$ .... ☆ the reciprocal of $\dfrac{0}{1}$ is $\dfrac{1}{0}$ (undefined!)

$m_{\overline{BD}} = \dfrac{-3-5}{4-4} = \dfrac{-8}{0} =$ undefined

∴ ABCD is a rhombus b/c diagonals are $\perp$

②

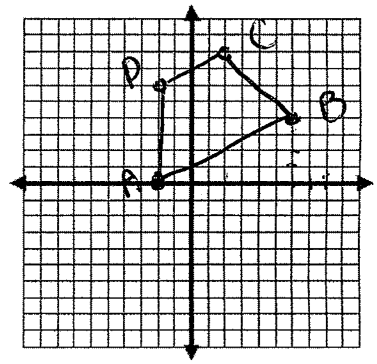
$d_{\overline{AC}} = \sqrt{(9-{}^-1)^2 + (1-1)^2} = \sqrt{100} = 10$

$d_{\overline{BD}} = \sqrt{(-3-5)^2 + (4-4)^2} = \sqrt{64} = 8$

∴ ABCD is <u>NOT</u> a square b/c $\overline{AC} \not\cong \overline{BD}$ (diagonals are not $\cong$)

5.
Quadrilateral $ABCD$ has coordinates $A(-2,0)$, $B(6,4)$, $C(2,8)$, and $D(-2,6)$.
Using coordinate geometry, prove that

a $ABCD$ is a trapezoid – one pair opp sides ∥
b $ABCD$ is *not* an isosceles trapezoid – $AD \ncong BC$



① $m_{\overline{DC}} = \frac{6-8}{-2-2} = \frac{-2}{-4} = \frac{1}{2}$ ✓ $\overline{AB} \parallel \overline{DC}$

$m_{\overline{AB}} = \frac{4-0}{6-{-2}} = \frac{4}{8} = \frac{1}{2}$

∴ ABCD is a trapezoid b/c at least one pair of opp. sides are ∥

② $d_{\overline{AD}} = \sqrt{(-2-{-2})^2+(6-0)^2} = \sqrt{36} = 6$ $\quad AD \ncong \overline{BC}$

$d_{\overline{BC}} = \sqrt{(8-4)^2+(2-6)^2} = \sqrt{32}$

∴ ABCD is <u>NOT</u> an isosceles trapezoid b/c the legs are not ≅