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Date
Geometry

Parallelogram Coordinate Geometry Proofs

1. Quadrilateral *MATH* has vertices M(-2, -3), A(-1, 1), T(4, 4), and H(3, 0). Prove that *MATH* is a parallelogram.

1) MATH is a parallelogram because it has two pairs of opposite sides congruent.

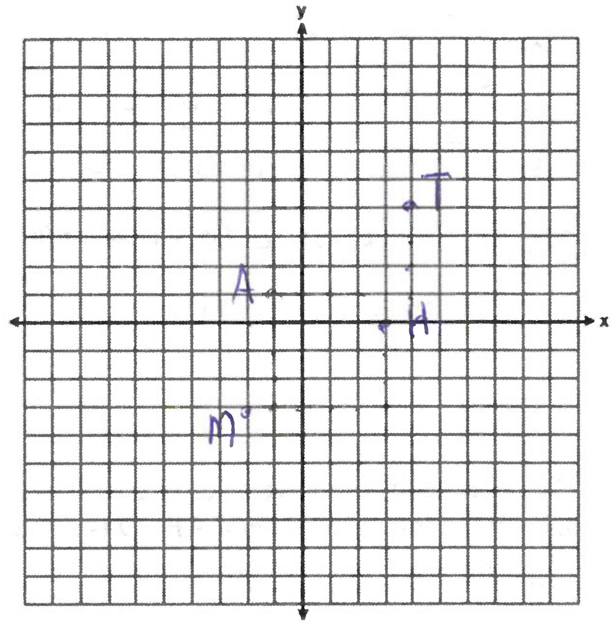
2) $d\,\overline{MA} = \sqrt{1^2+4^2} = \sqrt{1+16} = \sqrt{17}$

$d\,\overline{AT} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$

$d\,\overline{TH} = \sqrt{1^2+4^2} = \sqrt{1+16} = \sqrt{17}$

$d\,\overline{Hm} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$

3) $\overline{MA} \cong \overline{TH}$, $\overline{mH} \cong \overline{AT}$ because they have the same distance.



2. Quadrilateral *WEAK* has vertices W(-3,2), E(0, -3), A(10,3), and K(7,8). Prove that quadrilateral *WEAK* is a rectangle.

1) WEAK is a rectangle because it has 2 pairs of opposite sides ≅ and diagonals congruent.

2) $d\,\overline{WE} = \sqrt{3^2+5^2} = \sqrt{9+25} = \sqrt{34}$

$d\,\overline{EA} = \sqrt{10^2+6^2} = \sqrt{100+36} = \sqrt{136}$

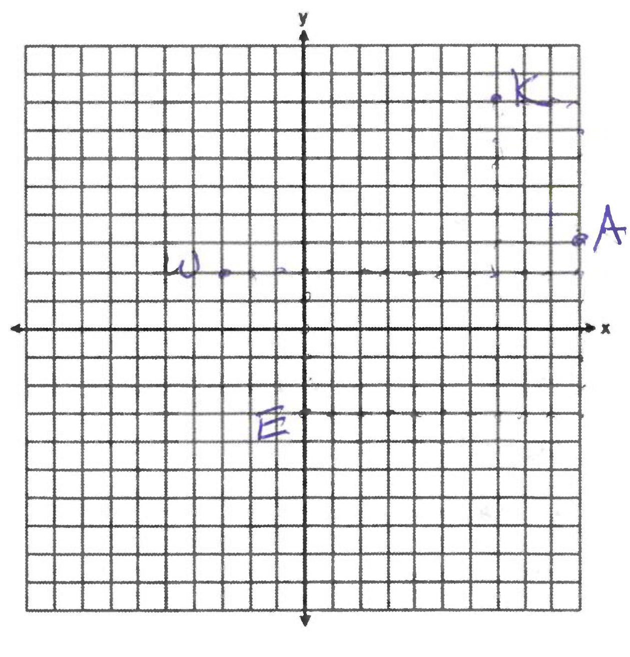
$d\,\overline{AK} = \sqrt{3^2+5^2} = \sqrt{9+25} = \sqrt{34}$

$d\,\overline{KW} = \sqrt{10^2+6^2} = \sqrt{100+36} = \sqrt{136}$

$d\,\overline{WA} = \sqrt{13^2+1^2} = \sqrt{169+1} = \sqrt{170}$

$d\,\overline{EK} = \sqrt{7^2+11^2} = \sqrt{49+121} = \sqrt{170}$

3) $\overline{WK} \cong \overline{EA}$, $\overline{WE} \cong \overline{KA}$, $\overline{WA} \cong \overline{EK}$ because they have the same distance.



3. The coordinates of the vertices of quadrilateral *ROCK* are R(-7,4), O(-2,9), C(5,8), and K(0,3). Prove that quadrilateral *ROCK* is a rhombus.

1) ROCK is a rhombus because all sides are congruent

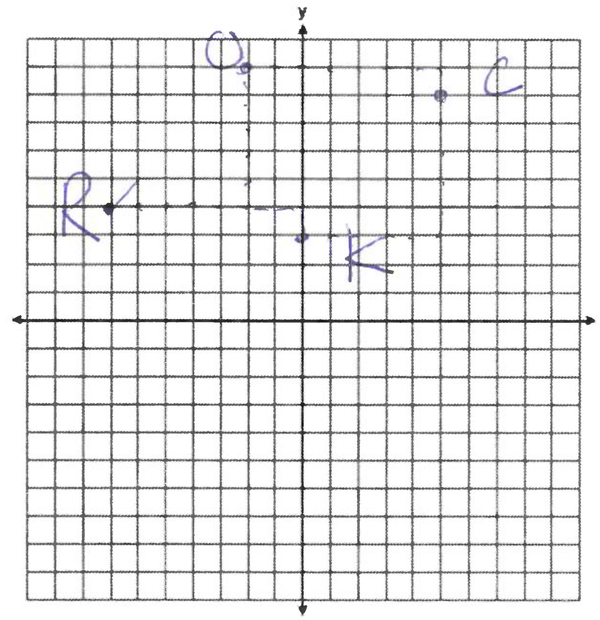
2) $d\overline{RO} = \sqrt{5^2+5^2} = \sqrt{25+25} = \sqrt{50}$

$d\overline{OC} = \sqrt{7^2+1^2} = \sqrt{49+1} = \sqrt{50}$

$d\overline{CK} = \sqrt{5^2+5^2} = \sqrt{25+25} = \sqrt{50}$

$d\overline{KR} = \sqrt{7^2+1^2} = \sqrt{49+1} = \sqrt{50}$

3) $\overline{RO} \cong \overline{OC} \cong \overline{CK} \cong \overline{KR}$ because they have the same distance.



4. The coordinates of the vertices of quadrilateral *ABCD* are A(2,0), B(6,-4), C(10,0), and D(6,4). Prove that quadrilateral ABCD is a square.

1) ABCD is a square because all sides are congruent and diagonals are congruent.

2) $d\overline{AD} = \sqrt{4^2+4^2}$

$d\overline{DC} = \sqrt{4^2+4^2}$

$d\overline{CB} = \sqrt{4^2+4^2}$

$d\overline{BA} = \sqrt{4^2+4^2}$

$d\overline{BD} = 8$

$d\overline{AC} = 8$

3) $\overline{AD} \cong \overline{DC} \cong \overline{CB} \cong \overline{BA}$ because they have the same distance.

$\overline{BD} \cong \overline{AC}$ because they have the same distance