Name Schlansky
Mr. Schlansky

Date _____
Geometry

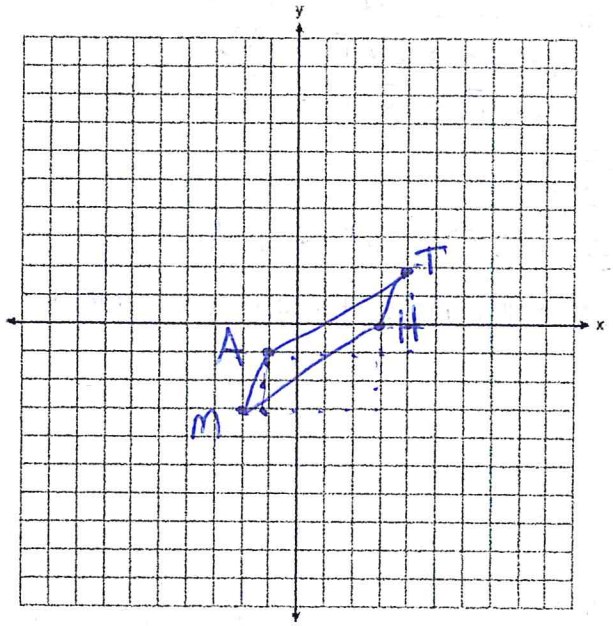
Parallelogram Coordinate Geometry Proofs

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

1) MATH is a parallelogram because it has 2 pairs of opposite sides ≅.

2) d $\overline{MA} = \sqrt{1^2+2^2} = \sqrt{1+4} = \sqrt{5}$
d $\overline{TH} = \sqrt{1^2+2^2} = \sqrt{1+4} = \sqrt{5}$
d $\overline{AT} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$
d $\overline{MH} = \sqrt{5^2+3^2} = \sqrt{25+9} = \sqrt{34}$

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

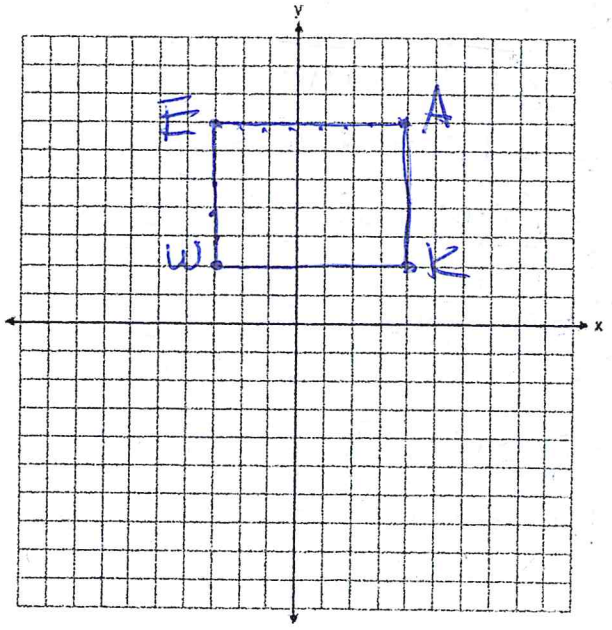


2. Quadrilateral WEAK has vertices W(-3,2), E(-3, 7), A(4,7), and K(4,2). Prove that quadrilateral WEAK is a rectangle.

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

2) d $\overline{WE} = 5$
d $\overline{KA} = 5$
d $\overline{EA} = 7$
d $\overline{WK} = 7$
d $\overline{EK} = \sqrt{7^2+5^2} = \sqrt{49+25} = \sqrt{74}$
d $\overline{WA} = \sqrt{7^2+5^2} = \sqrt{49+25} = \sqrt{74}$

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

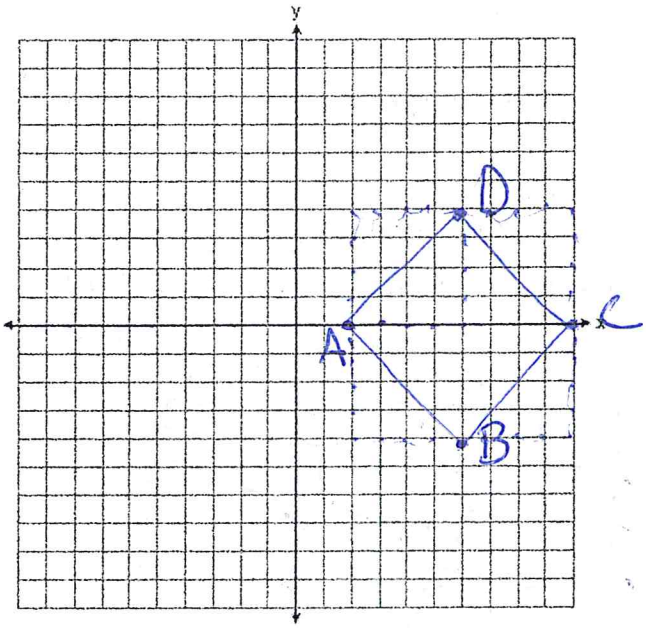


3. The coordinates of the vertices of quadrilateral ABCD are A(2,0), B(6,-4), C(10,0), and D(6,4). Prove that quadrilateral ABCD is a square.

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

2) d $\overline{AD} = \sqrt{4^2+4^2} = \sqrt{16+16} = \sqrt{32}$
d $\overline{DC} = \sqrt{4^2+4^2} = \sqrt{16+16} = \sqrt{32}$
d $\overline{CB} = \sqrt{4^2+4^2} = \sqrt{16+16} = \sqrt{32}$
d $\overline{BA} = \sqrt{4^2+4^2} = \sqrt{16+16} = \sqrt{32}$
d $\overline{AC} = 8$
d $\overline{DB} = 8$

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



4. Quadrilateral FRDY has vertices F(-2, -8), R(7,-1), D(10,10) and Y(1,3). Using coordinate geometry, prove that quadrilateral FRDY is a rhombus but *not* a square.

1) FRDY is a rhombus because all sides are congruent. It is not a square because the diagonals are not congruent.

2) d $\overline{FY} = \sqrt{3^2+11^2} = \sqrt{9+121} = \sqrt{130}$
d $\overline{YD} = \sqrt{9^2+7^2} = \sqrt{81+49} = \sqrt{130}$
d $\overline{DR} = \sqrt{3^2+11^2} = \sqrt{9+121} = \sqrt{130}$
d $\overline{RF} = \sqrt{9^2+7^2} = \sqrt{81+49} = \sqrt{130}$
d $\overline{FD} = \sqrt{12^2+18^2} = \sqrt{144+324} = \sqrt{468}$
d $\overline{YR} = \sqrt{6^2+4^2} = \sqrt{36+16} = \sqrt{52}$

3) $\overline{FY} \cong \overline{YD} \cong \overline{DR} \cong \overline{RF}$ because they have the same distance.
$\overline{FD} \ncong \overline{YR}$ because they don't have the same distance.