

COORDINATE PROOFS

Name \_\_\_\_\_ Per: \_\_\_ Date \_\_\_\_\_

Warm- up/review

<p><b>Distance formula:</b></p> $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	<p><b>Midpoint Formula:</b></p> $\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	<p><b>Slope Formula</b></p> $m = \frac{y_2 - y_1}{x_2 - x_1}$	<p><b>Equation of a line:</b>                  Slope Intercept form  <math>y = mx + b</math>                  Point slope form  <math>(y - y_2) = m(x - x_1)</math></p>
<p>Recall: 2 lines are parallel if their slopes are the <b>same</b></p>		<p>2 lines are <math>\perp</math> if their slopes are <b>negative reciprocals</b></p>	

1. What is the equation of the line that goes through (1, 3) and (5, 12)? Leave your answer in slope-intercept form.
2. What is the midpoint of (1, 3) and (5, 12)?
3. What is the distance between (1, 3) and (5, 12)?
4. What is the equation of the line that is P to the line in #1 and also goes through (0, -1)?
5. What is the equation of the line that is  $\perp$  to the line in #1 and also goes through (0, -1)?

**Coordinate Geometry Proofs: SOME HELPFUL HINTS**

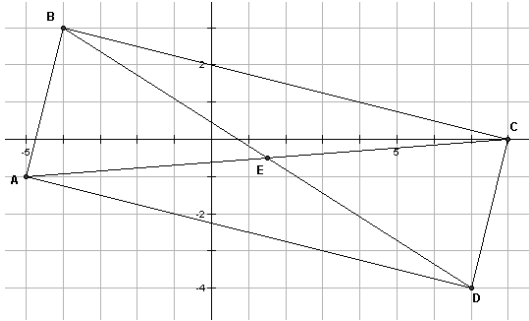
---Can add more at the bottom---

To Prove a Quadrilateral is:	Prove the following	How to do the proofs
Parallelogram  <b>(Use only one of these four methods)</b>	1. both pairs of opposite sides are parallel	1. use slope formula
	2. both pairs of opposite sides are congruent	2. distance formula
	3. one pair of opposite sides are parallel <b>and</b> congruent	3. slope and distance formula
	4. diagonals bisect each other	4. midpoint formula
Rectangle	1. Find the slope of all 4 sides. First show it's a parallelogram because opposite sides are parallel and then prove it's a rectangle by showing it's a parallelogram with right angles.	1. Slope formula
Rhombus	1. Show all sides are congruent	1. distance formula
Square  <b>(must show both!!!)</b>	1. Show all 4 sides are congruent (showing it's a parallelogram and rhombus) 2. Show diagonals are congruent	1. distance formula  2. distance formula
Trapezoid	1. Show 1 pair of sides are parallel 2. Show the other sides are not parallel	1. MUST FIND SLOPE OF ALL 4 SIDES
Isosceles Trapezoid <b>(must show both)</b>	1. Prove it's a trapezoid 2. Show non parallel sides congruent	1. Find slope of all 4 sides 2. distance formula
Right Trapezoid <b>(must show both)</b>	1. Prove it's a trapezoid 2. Show one set of sides are perpendicular.	1. Slope formula 2. Slope formula (2 consecutive sides have slopes that are negative reciprocals).

**Tips for doing Coordinate Geometry Proofs:**

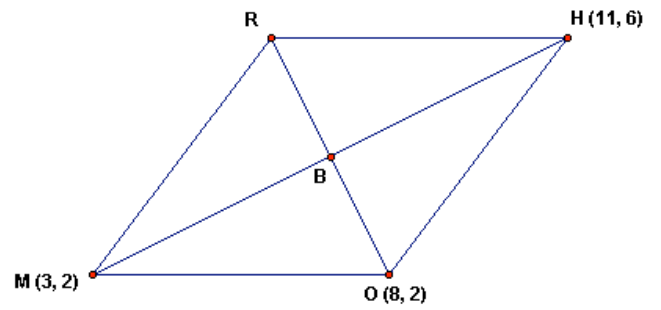
- Organize** your work and **label everything**.
- You must refer to your calculations and provide a **summary/proof statement** when done. So, for example, if you have just finished finding 4 slopes and are now ready to say that it is a parallelogram, then you would finish with something like this:
  - $\overline{BC} \parallel \overline{AD}$  because both have slopes =  $-1/4$
  - $\overline{AB} \parallel \overline{CD}$  because both have slopes =  $4/1$
  - since both pairs of opp. sides are  $\parallel$ , it's a  $\square$  by def.
- you must **show algebraic work** for things in your proofs – you cannot make a conclusion by just looking at it.

1. Given the figure below, prove that it is specifically a **rectangle** and not a square.



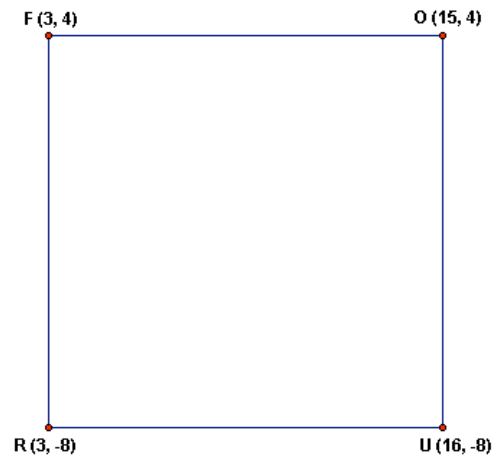
- Show it's a parallelogram with one right angle and 2 sides are not  $\cong$ .
- show that the diagonals are congruent and bisect each other and 2 sides are not  $\cong$
- show that the quadrilateral has 4 right angles and the diagonals are not  $\perp$

2. If the quadrilateral below is a rhombus, what is the coordinate of R. (show how you get it and say why your method works)?

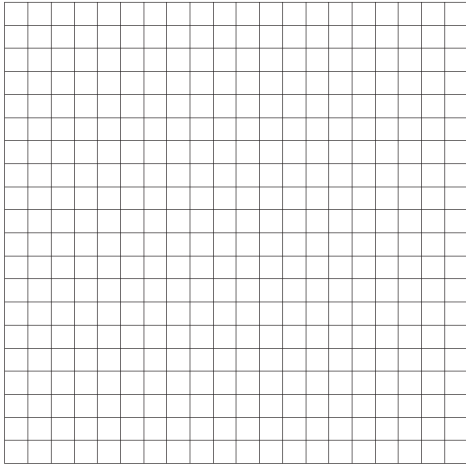


- now prove that  $RHOM$  is a rhombus

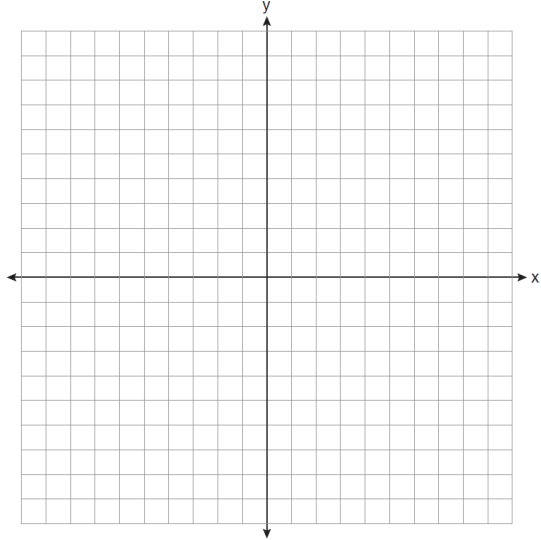
3. Being as specific as possible, what type of figure is this? prove it.



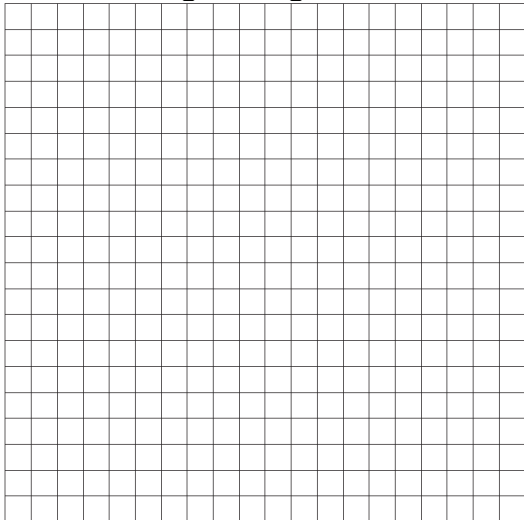
1) Triangle TRI has vertices T(15,6), R(5,1), and I(5,11). Use coordinate geometry to prove that triangle TRI is isosceles.



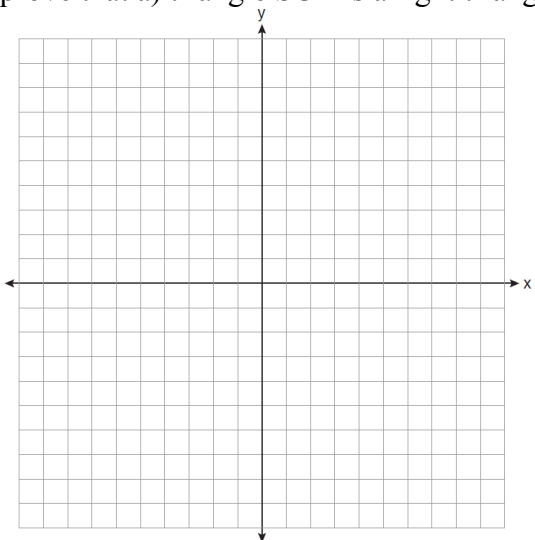
2) Triangle DAN has coordinates D(-10,4), A(-4,1), and N(-2,5). Using coordinate geometry, prove that triangle DAN is a right triangle.



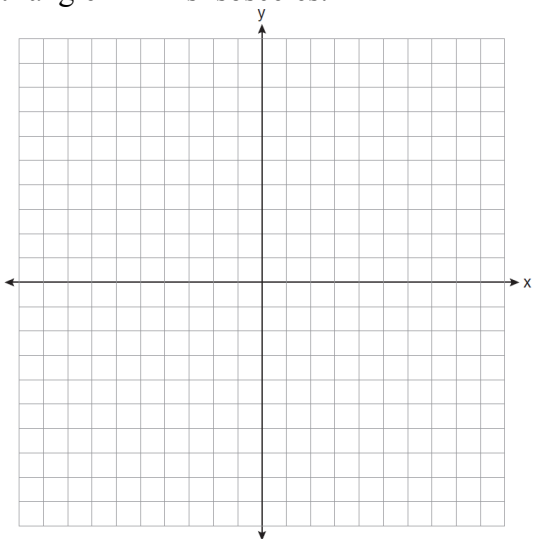
3) The vertices of triangle JEN are J(2,10), E(6,4), and N(12,8). Use coordinate geometry to prove that Jen is an isosceles right triangle.



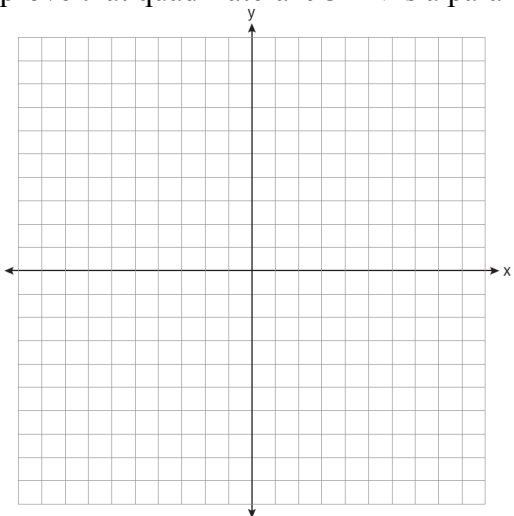
4) The coordinates of the vertices of triangle SUE are  $S(-2,-4)$ ,  $Y(2,-1)$ , and  $E(8,-9)$ . Using coordinate geometry, prove that a) triangle SUE is a right triangle, and b) triangle SUE is not an isosceles right triangle.



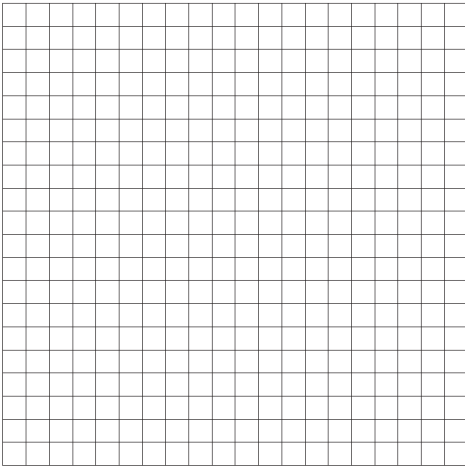
5) Triangle ART has vertices  $A(a,b)$ ,  $R(a + c, b)$ , and  $T(a + c/2, b + d)$ . Using coordinate geometry prove that triangle ART is isosceles.



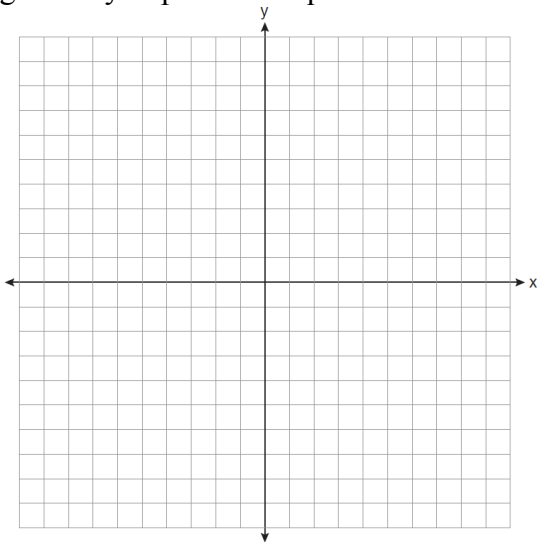
6) The vertices of quadrilateral JOHN are  $J(-3,1)$ ,  $O(3,3)$ ,  $H(5,7)$ , and  $N(-1,5)$ . Use coordinate geometry to prove that quadrilateral JOHN is a parallelogram.



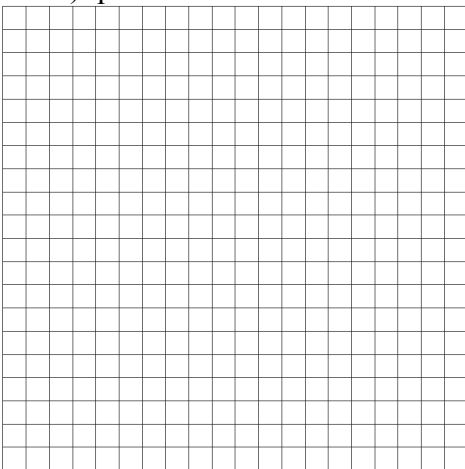
1) Quadrilateral MIKE has vertices  $M(4,1)$ ,  $I(6,4)$ ,  $K(12,0)$ , and  $E(10,-3)$ . Use coordinate geometry to prove that quadrilateral MIKE is a rectangle.



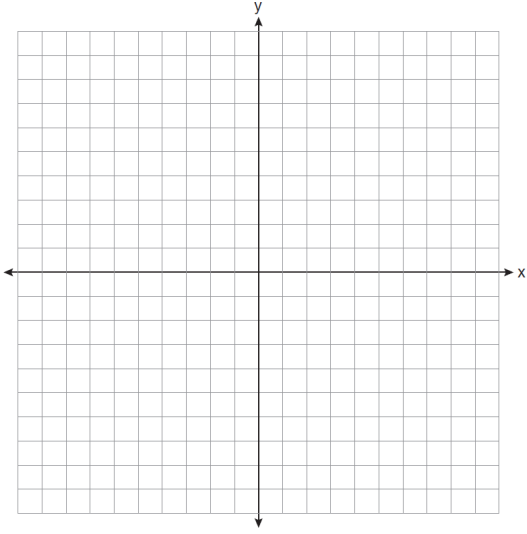
2) The coordinates of the vertices of quadrilateral DIAN are  $D(0,5)$ ,  $I(3,6)$ ,  $A(4,3)$ , and  $N(1,2)$ . Use coordinate geometry to prove that quadrilateral DIAN is a square.



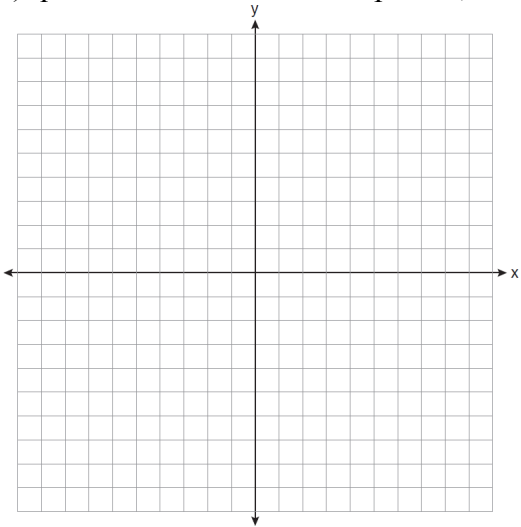
3) Quadrilateral NORA has vertices  $N(3,2)$ ,  $O(7,0)$ ,  $R(11,2)$ , and  $A(7,4)$ . Use coordinate geometry to prove that a) quadrilateral NORA is a rhombus, and b) quadrilateral NORA is not a square.



4) The vertices of quadrilateral KAIT are  $K(0,0)$ ,  $A(a,0)$ ,  $I(a + b,c)$ , and  $T(b,c)$ . Use coordinate geometry to prove that quadrilateral KAIT is a parallelogram.



5) Quadrilateral JACK has vertices  $J(1,-4)$ ,  $A(10,2)$ ,  $C(8,5)$ , and  $K(2,1)$ . Use coordinate geometry to prove that a) quadrilateral JACK is a trapezoid, and b) quadrilateral JACK is not isosceles.



6) The vertices of quadrilateral MARY are  $M(-3,3)$ ,  $A(7,3)$ ,  $R(3,6)$ , and  $Y(1,6)$ . Use coordinate geometry to prove that quadrilateral MARY is an isosceles trapezoid.

