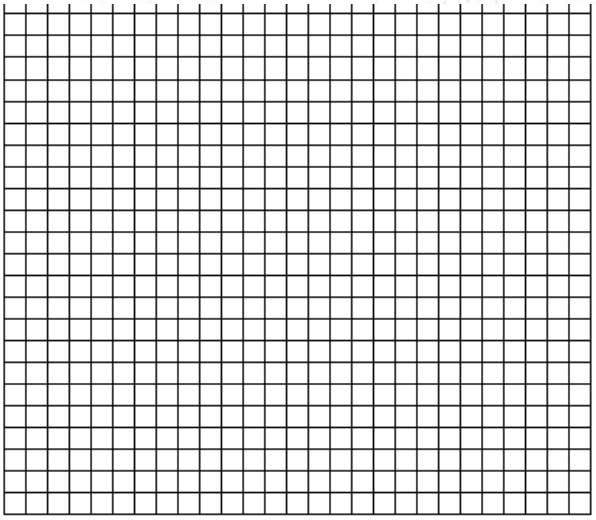
Special Quadrilaterals Practice Name:_____ Per:_____

1. Review some of the algebra **tools** you already have. On graph paper, draw $\overline{AB}$ given $A(0, 8)$ and $B(9, 2)$, and $\overline{CD}$ given $C(1, 3)$ and $D(9, 15)$.

   a. Draw these two segments on a coordinate grid. Find the length of each segment.



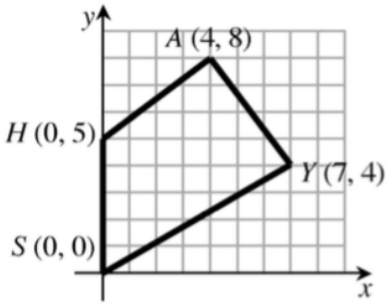
   b. Find the equation of $\overleftrightarrow{AB}$ and the equation of $\overleftrightarrow{CD}$. Write both equations in $y = mx + b$ form.

   c. Is $\overline{AB} \parallel \overline{CD}$? Is $\overline{AB} \perp \overline{CD}$? **Justify** your answer.

   d. Use algebra to find the coordinates of the point where $\overline{AB}$ and $\overline{CD}$ intersect.

2. Shayla just drew quadrilateral *SHAY*, shown at right. The coordinates of its vertices are:

   $S(0, 0)$ $H(0, 5)$ $A(4, 8)$ $Y(7, 4)$



   a. Shayla thinks her quadrilateral is a trapezoid. Is she correct? How can you **justify** your answer?

   b. Does Shayla's quadrilateral look like one of the other special quadrilaterals that you have studied? If so, which one?

   c. Even if her quadrilateral doesn't have a special name, it may still have some special properties like the ones listed on your notes sheet. Use algebra and geometry tools to **investigate** Shayla's quadrilateral to see if it has any special properties. Show how you know that these special properties are present.

3. THE MUST BE / COULD BE GAME

Mr. Quincey plays a game with his class. He says, "My quadrilateral has four right angles." His students say, "Then it *must be* a rectangle" and "It *could be* a square." For each description of a quadrilateral below, say what special type the quadrilateral *must be* and/or what special type the quadrilateral *could be*. Look out: Some descriptions may have no "must be"s, and some descriptions may have many "could be"s!

a. "My quadrilateral has four equal sides."

b. "My quadrilateral has two pairs of opposite parallel sides."

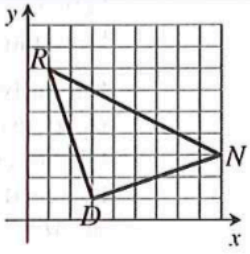
c. "My quadrilateral has two consecutive right angles."

d. "My quadrilateral has two pairs of congruent sides."

4. Describe the minimum information you would need to know about the shapes below in order to identify it correctly. For example, to know that a shape is a square, you must know that it has four sides of equal length and at least one right angle. Refer to your notes sheet, and be as thorough as possible:

a) rhombus b) trapezoid

5. Randy has decided to study the triangle graphed at right.



a. Consider all the special properties this triangle can have. Without using any algebra tools, predict the best name for this triangle.

b. For your answer to part (a) to be correct, what is the minimum amount of information that must be true about $\triangle RND$?

c. Use your algebra tools to verify each of the properties you listed in part (b). If you need, you may change your prediction of the shape of $\triangle RND$.

d. Randy wonders if there is anything special about the midpoint of $\overline{RN}$. Find the midpoint M, and then find the lengths of $\overline{RM}$, $\overline{DM}$, and $\overline{MN}$. What do you notice?

6. Tomika remembers that the diagonals of a rhombus are perpendicular to each other.

a. Graph on $ABCD$ if $A(1, 4)$, $B(6, 6)$, $C(4, 1)$, and $D(-1, -1)$. Is $ABCD$ a rhombus? Show how you know.

b. Find the equation of the lines on which the diagonals lie. That is, find the equations of $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$.

c. Compare the slopes of $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$. What do you notice?