Geometry   Name _____

2. Plot points E(1, 2), F(2, 5), G(4, 3) and H(5, 6).

   a. Find the length of all four sides.

$EF = \sqrt{(2-1)^2 + (5-2)^2} = \sqrt{(1)^2 + (3)^2} = \sqrt{10}$

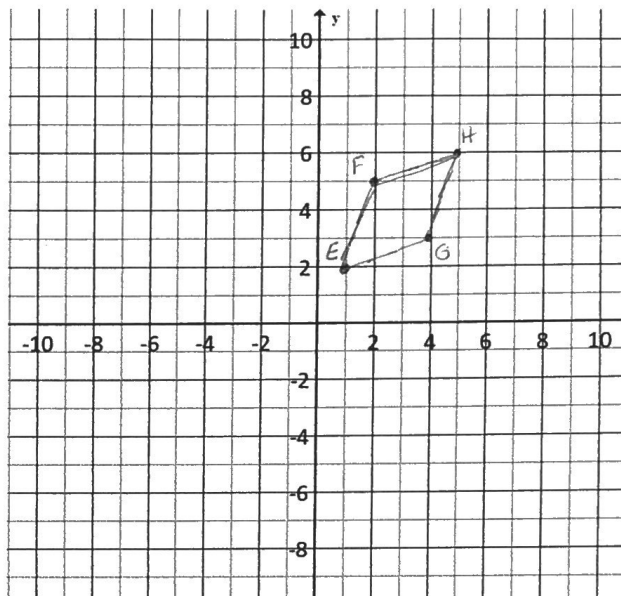$FH = \sqrt{(5-2)^2 + (6-5)^2} = \sqrt{(3)^2 + (1)^2} = \sqrt{10}$

$GH = \sqrt{(5-4)^2 + (6-3)^2} = \sqrt{(1)^2 + (3)^2} = \sqrt{10}$

$EG = \sqrt{(4-1)^2 + (3-2)^2} = \sqrt{(3)^2 + (1)^2} = \sqrt{10}$

   b. Find the slope of all four sides.

$m\,EF = \dfrac{3}{1} = 3$ $m\,HG = \dfrac{-3}{-1} = 3$

$m\,FH = \dfrac{1}{3}$ $m\,GE = \dfrac{-1}{-3} = \dfrac{1}{3}$

c. What specialized geometric figure is quadrilateral EFHG? How do you know?

   • all sides are $\cong$
   • opposite sides as parallel   } Rhombus

d. Describe another way that we could have shown that this figure was a rhombus?

   • Diagonals are perpendicular
         $\overline{FG} \perp \overline{EH}$

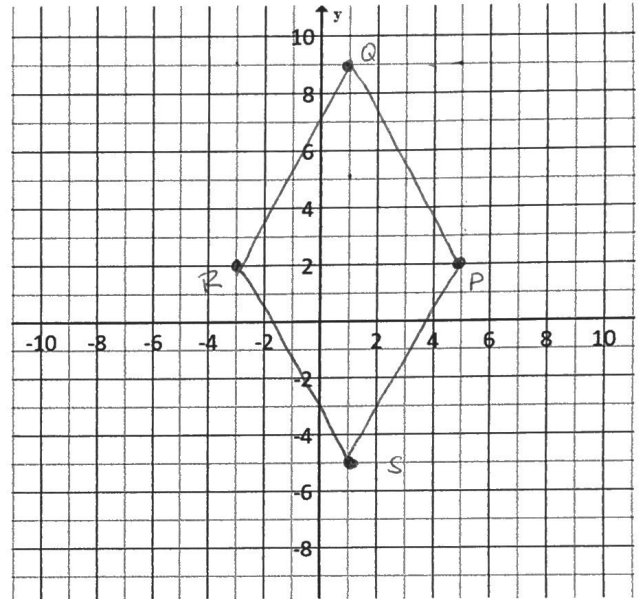3. Plot the points P(5, 2), Q(1, 9), R(-3, 2), and S(1, -5).

   a. What properties do you need to prove PQRS is a rhombus?

   - opposite sides parallel
   - all sides $\cong$ / or Diagonals are $\perp$

   b. Show that PQRS is a rhombus.

   $\perp$ Diagonals $m\overline{SG} = $ undefined
   $\overline{SQ} \perp \overline{RP}$ $m\overline{RP} = \frac{0}{8} = 0$

   Slope of sides
   $m\overline{RQ} = \frac{7}{4}$ $m\overline{QP} = \frac{-4}{7}$

   $m\overline{SP} = \frac{7}{4}$ $m\overline{RS} = \frac{-4}{7}$

4. Plot the points P(5, 2), Q(2, 5), R(-1, 2), and S(2, -1).

   a. What properties do you need to prove to show PQRS is a square?
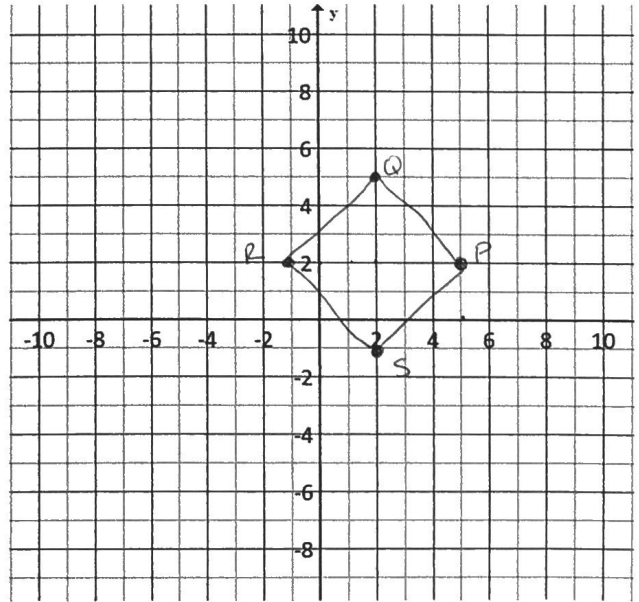
   - opposite sides parallel
   - diagonals are $\cong$ AND $\perp$

   b. Show that PQRS is a square.

   Slope of sides
   $m\overline{RS} = \frac{3}{-3} = -1$ $m\overline{RQ} = \frac{3}{3} = 1$

   $m\overline{QP} = \frac{3}{-3} = -1$ $m\overline{PS} = \frac{3}{3} = 1$

   $m\overline{QS} = $ undefined
   $m\overline{RP} = \frac{0}{6} = 0$ $\perp$ Diagonals

   $QS = \sqrt{(2-2)^2 + (-1-5)^2}$
   $\sqrt{0 + (-6)^2} = \sqrt{36} = 6$

   $RP = \sqrt{(-1-5)^2 + (2-2)^2} = \sqrt{(-6)^2 + (0)^2} = \sqrt{36} = 6$ Diagonals are $\cong$

Geometry   Name _____

3. J(-5, 6), K(-4, -2), L(4, -1), M(3, 7)

opp. sides ∥ $m \overline{JK} = 1/8$ $m \overline{ML} = \frac{-8}{1} = -8$

                $m \overline{KL} = 1/8$ $m \overline{JK} = -8$

Sides are ⊥ $\overline{JK} \perp \overline{KL}$

(all ∠'s are $\overline{JM} \perp \overline{ML}$ $\frac{1}{8} \cdot -8 = 1$
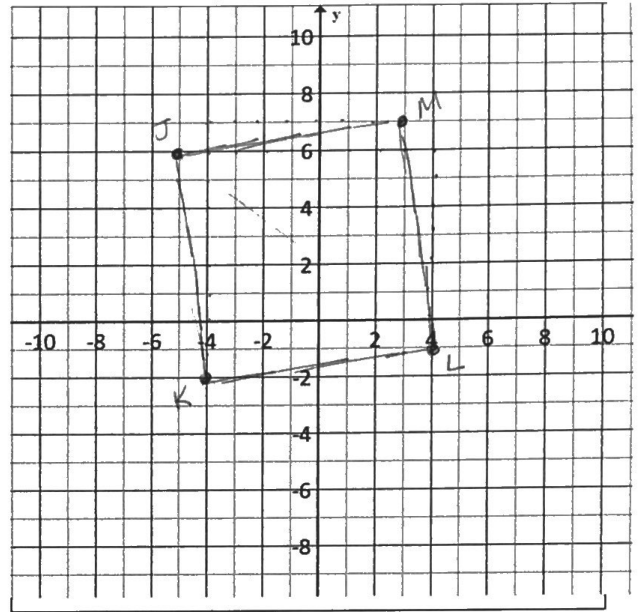
right ∠'s) $\overline{ML} \perp \overline{KL}$

                $\overline{JM} \perp \overline{JK}$

digonals are ⊥ $m \overline{JL} = \frac{7}{-9}$

┌─────────┐ $m \overline{KM} = \frac{9}{7}$
│ Square │
└─────────┘ $\frac{7}{-9} \cdot \frac{9}{7} = -1$

4. P(5, 1), Q(9, 6), R(5, 11), S(1, 6)

opposite sides ∥

    $m SR = \frac{5}{4}$ $m RQ = \frac{-5}{4}$

    $m QP = \frac{-5}{-4} = \frac{5}{4}$ $m PS = \frac{5}{-4}$

diagonals are ⊥

    $\overline{SQ} \perp \overline{RP}$

    $\frac{0}{8} = 0$ $\frac{10}{0} = $ undefined

┌──────────┐
│ Rhombus │
└──────────┘