Proving type of quadrilateral with slope, distance, or midpoint:

1) Quadrilateral MNOP has vertices M(-2,5), N(2,6), O(4,-2), P(0,-3). Find the slopes of the sides (show use of formula). Be sure to write name of side next to answer.
What do the slopes of the sides tell you about the figure? Use two sentences. What quadrilateral is it?
Find the lengths (distance) for MN and NO. What quadrilateral can it not be because of this information?

2) Quadrilateral PQRS has vertices P(-5,3), Q(1,6), R(9,0), S(-5,-7). Find the slopes of the sides just like you did in problem 1.
What do the slopes of the sides tell you about the figure? What quadrilateral is it?
Find the lengths of the two non-parallel sides. What additional information about the type of quadrilateral did you just prove?

Answers:

1) Slope MN = $\frac{1}{4}$
   Slope NO = -4
   Slope OP = $\frac{1}{4}$
   Slope PM = -4
   2 pairs of equal slopes mean that 2 pairs of sides are parallel.
   Consecutive sides have slopes that are negative reciprocals,
   meaning all the angles are right angles. So it must be a rectangle.
   The distances (lengths) of MN = $\sqrt{17}$ and NO = $\sqrt{68}$. They are not
   the same, so MNOP cannot be a square. It is just a rectangle.

2) Slope PQ = $\frac{1}{2}$
   Slope QR = -3/4
   Slope RS = $\frac{1}{2}$
   Slope SP = undefined (vertical line, division by zero is not
   defined)
   Two slopes are the same, so two sides are parallel, so PQRS must
   be a trapezoid.
   Length of QR = 10, Length of SP = 10, so the trapezoid is
   isosceles (non-parallel sides are congruent)