LESSON 3.7

NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 172–178

1. Let $P(3, 4)$, $Q(-3, -4)$, and $R(x, y)$ be three points in the coordinate plane.

a. Find the slopes of $\overline{PR}$ and $\overline{QR}$.

b. If $\overline{PR} \perp \overline{QR}$, find and simplify an equation involving x and y.

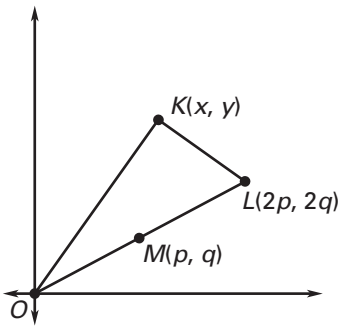
c. Describe the set of points R for which $\overline{PR} \perp \overline{QR}$.

2. Let $A(1, 4)$ and $B(-3, 2)$ be two points in the coordinate plane.

a. If $C(x, y)$ is a third point such that $AC = BC$, use the Distance Formula to find and simplify an equation involving x and y.

b. Describe the set of points C with $AC = BC$. How is this set of points related to line $\overleftrightarrow{AB}$? (*Hint:* Compare slopes.)

3. In the diagram, M is the midpoint of $\overline{OL}$, and $OM = KM$.



a. Use the Distance Formula to express the condition $OM = KM$ as an equation in terms of p, q, x, and y.

b. Find the product of the slopes $\overleftrightarrow{OK}$ and $\overleftrightarrow{KL}$ in terms of p, q, x, and y.

c. Use your result from part (a) to simplify the expression. (*Hint:* What can you substitute for $x^2 - 2px$?)

d. Use your results to write a theorem regarding the midpoint of a side of a triangle.

4. Suppose j is the line given by $y = mx + b$. Let (c, d) be a point on the line.

a. Find m in terms of b, c, and d.

b. Let k_1 be the line that is perpendicular to j and passes through $(0, 0)$. Find an equation for k_1 in terms of b, c, and d.

c. Let k_2 be the line that is perpendicular to j and passes through (c, d). Find an equation for k_2 in terms of b, c, and d.

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