Since $\overline{OP}$ is the longest side of the triangle, we compare as follows:

$$(OP)^2 \ \underline{\ ?\ }\ (OQ)^2 + (PQ)^2$$
$$(\sqrt{45})^2 \ \underline{\ ?\ }\ (\sqrt{41})^2 + (\sqrt{8})^2$$
$$45 \ \underline{\ ?\ }\ 41 + 8$$
$$45 < 49$$

Thus the triangle is acute by Theorem 8-4.

Exercises

The vertices of a triangle are given. Decide whether the triangle is acute, right, or obtuse.

1. $O(0, 0)$, $P(8, 4)$, $Q(6, 8)$

2. $O(0, 0)$, $R(-1, 5)$, $S(-6, 0)$

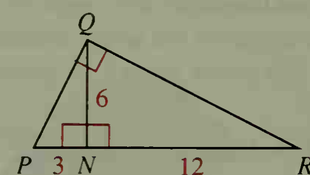
3. $A(1, 1)$, $B(3, -2)$, $C(8, 1)$

4. $D(-5, 0)$, $E(0, 7)$, $F(3, -3)$

5. Given vertices $A(3, 0)$, $B(5, 3)$, $C(-1, 7)$. Show that $\triangle ABC$ is a right triangle
 a. by using slopes.
 b. by using Theorem 8-3.

6. In Exercise 5, $\triangle ABC$ has a right angle at B.
 a. Find the coordinates of M, the midpoint of the hypotenuse.
 b. Use the distance formula to show that $MB = \frac{1}{2}AC$.
 c. What theorem does part (b) illustrate?

7. Describe how to map $\triangle PNQ$ to $\triangle QNR$ with a rotation followed by a dilation. Give the scale factor of the dilation.



8. **a.** Draw $\triangle OPQ$ where O is the origin, $\overrightarrow{OP} = (4, 3)$ and $\overrightarrow{PQ} = (-2, 11)$.
 b. Find $\overrightarrow{OQ}$.
 c. Find $|\overrightarrow{OP}|$, $|\overrightarrow{PQ}|$, and $|\overrightarrow{OQ}|$.
 d. Is $\triangle OPQ$ a right triangle? Explain.

9. Four right triangles and a small square are arranged to form a larger square as shown at the left below. What is the area of the large square? If two of the triangles are rotated about P and Q as shown, we get the figure at the right below. Show that this figure can be considered as the sum of two squares. Find the dimensions of the two squares. What theorem does this exercise suggest?