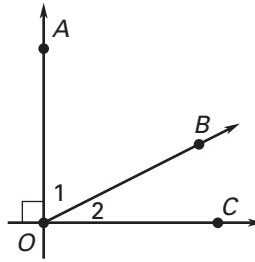


# Challenge: Skills and Applications

For use with pages 109–116

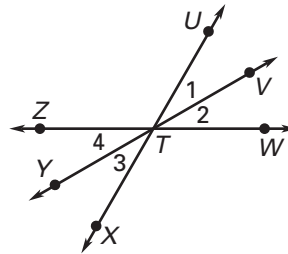
1. a. Use the diagram shown to write a two-column proof of the following theorem: If the nonshared sides of two adjacent acute angles are perpendicular, then the angles are complementary.
- b. Explain why the word *acute* is necessary in the statement of the theorem.
- c. Explain how your proof used the fact that the angles are acute.



2. Write a two-column proof.

**Given:**  $\overrightarrow{TV}$  bisects  $\angle UTW$

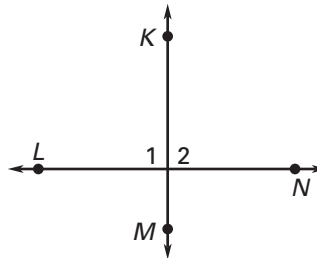
**Prove:**  $\overrightarrow{TY}$  bisects  $\angle XTZ$



3. Write a paragraph proof to show that if two lines form congruent adjacent angles, then the lines are perpendicular.

**Given:**  $\angle 1 \cong \angle 2$

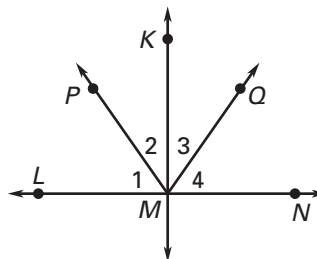
**Prove:**  $\overleftrightarrow{KM} \perp \overleftrightarrow{LN}$



4. Write a paragraph proof. You may use the result of Exercise 3.

**Given:**  $\overrightarrow{MK}$  bisects  $\angle PMQ$ ;  $\angle 1 \cong \angle 4$

**Prove:**  $\angle 1$  and  $\angle 2$  are complementary.



5. In the diagram,  $\overrightarrow{OB}$  bisects  $\angle AOC$ , and  $\overrightarrow{OD}$  bisects  $\angle COE$ .

- a. Make a conjecture about the relationship between  $\overrightarrow{OB}$  and  $\overrightarrow{OD}$ .
- b. Write a two-column proof that your conjecture is correct.

