

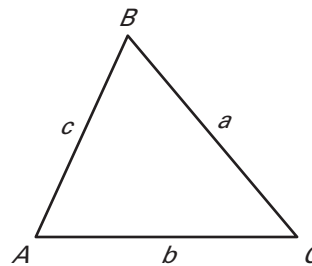
**LESSON**  
**7.7**

# Challenge Practice

*For use with pages 483–489*

- 1. Law of Sines** The proportional statement below is known as the *Law of Sines*. Use the diagram of  $\triangle ABC$  to prove the Law of Sines. (*Hint*: First draw an altitude.)

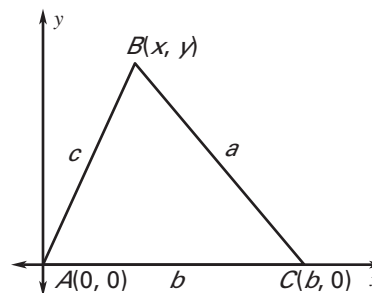
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



- 2. Law of Cosines** The statement below is part of the *Law of Cosines*. Use the diagram of  $\triangle ABC$  and the steps below to prove the statement from the Law of Cosines.

$$a^2 = b^2 + c^2 - 2bc \cos A$$

- Step 1** Write an expression for  $c^2$  in terms of  $x$  and  $y$  and an expression for  $x$  in terms of  $c$  and  $\angle A$ .
- Step 2** Write and simplify an expression for  $a^2$  in terms of  $b$ ,  $x$ , and  $y$ .
- Step 3** Use the results from Steps 1 and 2 to write an expression for  $a^2$  in terms of  $c$ ,  $b$ , and  $\angle A$ .



- 3.** Use the diagram and steps similar to the ones in Exercise 2 to prove the other two parts of the Law of Cosines below.

- a.  $b^2 = a^2 + c^2 - 2ac \cos B$   
 b.  $c^2 = a^2 + b^2 - 2ab \cos C$

- 4. Machine Part** A machine part is in the shape of a half-circle with a radius of 10 inches. Small holes are drilled as shown in the figure. Find the coordinates of each hole.

