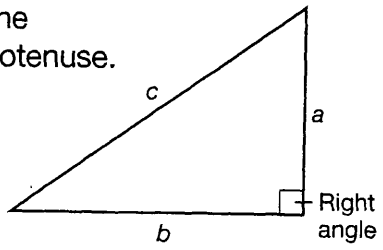
SKILL 21: The Pythagorean Theorem

The **hypotenuse** of a right triangle is the side opposite the right angle and is the longest side. The other two sides are called **legs**. In the triangle at the right, sides *a* and *b* are the legs. Side *c* is the hypotenuse.



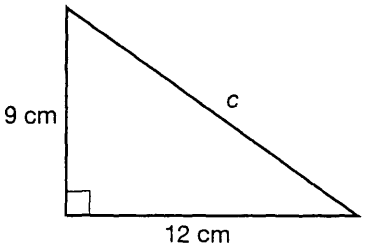
The **Pythagorean Theorem** states that the sum of the squares of the lengths of the legs of a right triangle is equal to the square of the length of the hypotenuse. This can be written algebraically as $a^2 + b^2 = c^2$.

Example 1

Find the length of side *c*.

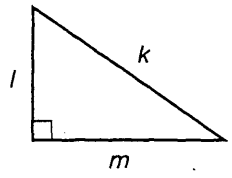
Use the Pythagorean Theorem.	$a^2 + b^2 = c^2$
Substitute 9 for *a* and 12 for *b*.	$9^2 + 12^2 = c^2$
Square 9 and 12.	$81 + 144 = c^2$
Add.	$225 = c^2$
Find $\sqrt{225}$.	$15 = c$

The length of the hypotenuse is 15 cm.



Name the hypotenuse and legs of each right triangle.

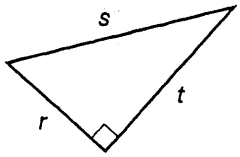
1.



Hypotenuse: ____

Legs: ____ and ____

2.

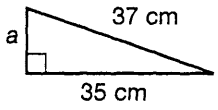


Hypotenuse: ____

Legs: ____ and ____

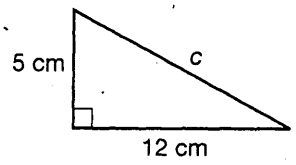
Find the missing length in each right triangle.

3.



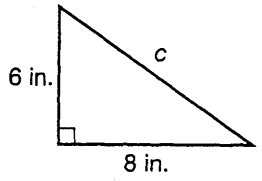
$a =$ _____

4.



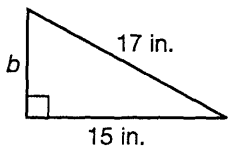
$c =$ _____

5.



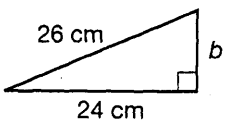
$c =$ _____

6.



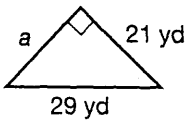
$b =$ _____

7.



$b =$ _____

8.



$a =$ _____

9. A courtyard that is 12 feet by 16 feet has a diagonal walkway. What is the length of the walkway? _____