7.4 Special Right Triangles

Goal • Use the relationships among the sides in special right triangles.

Lesson 7.4 teaches us characteristics of two special right triangles.

45-45-90 and 30-60-90 triangles

A 45°-45°-90° triangle is an *isosceles right triangle* that can be formed by cutting a square in half as shown.

THEOREM

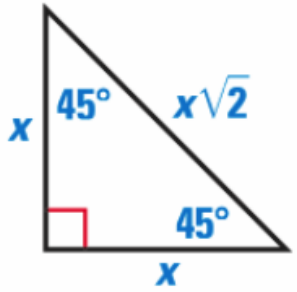
For Your Notebook

THEOREM 7.8 45°-45°-90° Triangle Theorem

In a 45°-45°-90° triangle, the hypotenuse is $\sqrt{2}$ times as long as each leg.

hypotenuse = leg • $\sqrt{2}$

Proof: Ex. 30, p. 463



EXAMPLE 1 Find hypotenuse length in a 45°-45°-90° triangle

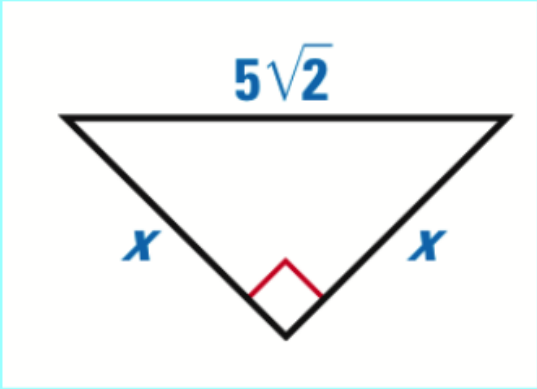
Find the length of the hypotenuse.

a.

b.

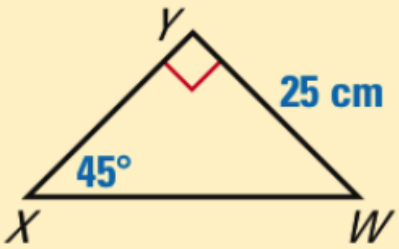
EXAMPLE 2 Find leg lengths in a 45°-45°-90° triangle

Find the lengths of the legs in the triangle.



EXAMPLE 3 Standardized Test Practice

Triangle *WXY* is a right triangle. Find the length of $\overline{WX}$.



A 50 cm

B $25\sqrt{2}$ cm

C 25 cm

D $\frac{25\sqrt{2}}{2}$ cm

A 30°-60°-90° triangle can be formed by dividing an equilateral triangle in half.

THEOREM

For Your Notebook

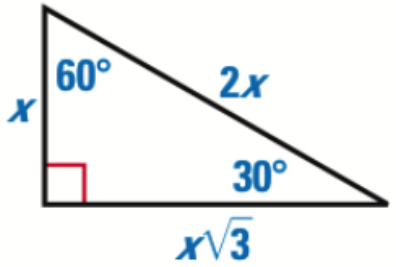
THEOREM 7.9 30°-60°-90° Triangle Theorem

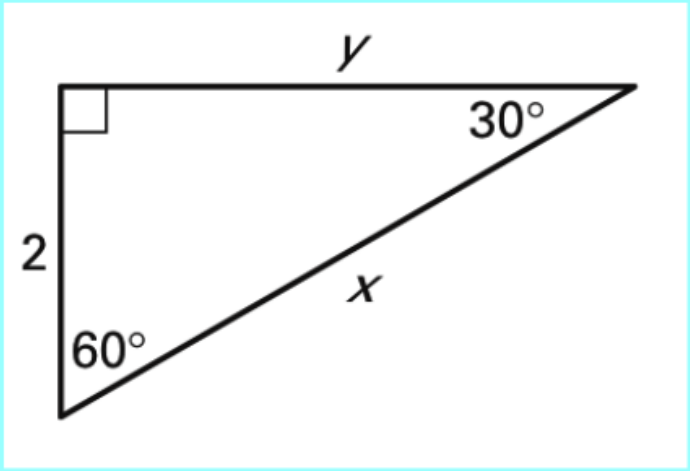
In a 30°-60°-90° triangle, the hypotenuse is twice as long as the shorter leg, and the longer leg is $\sqrt{3}$ times as long as the shorter leg.

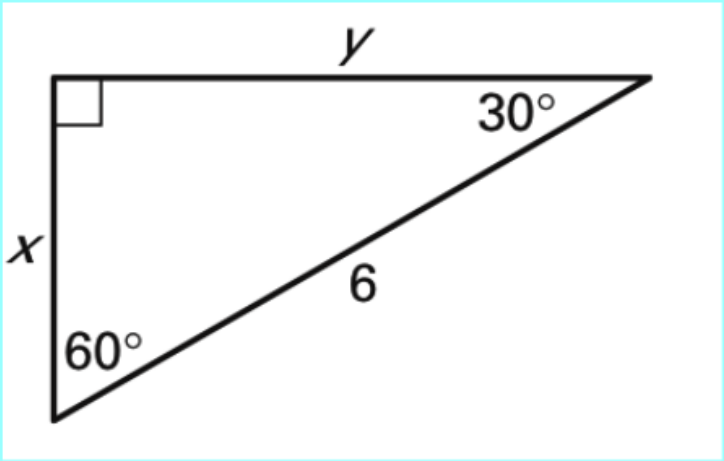
hypotenuse = 2 • shorter leg

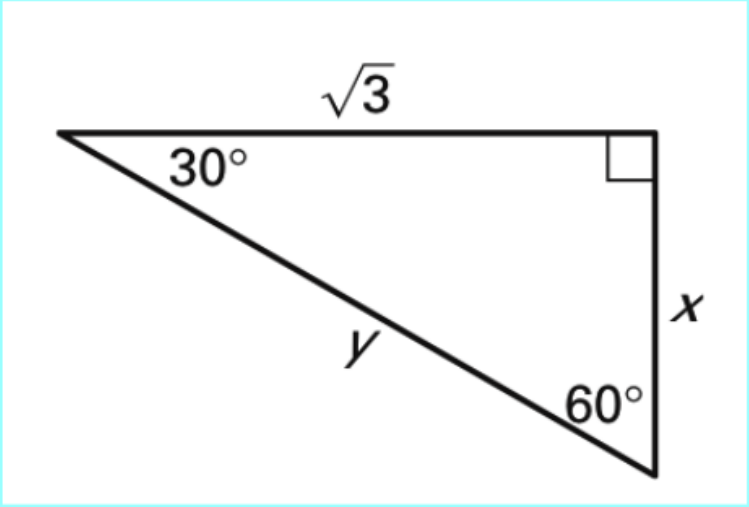
longer leg = shorter leg • $\sqrt{3}$

Proof: Ex. 32, p. 463

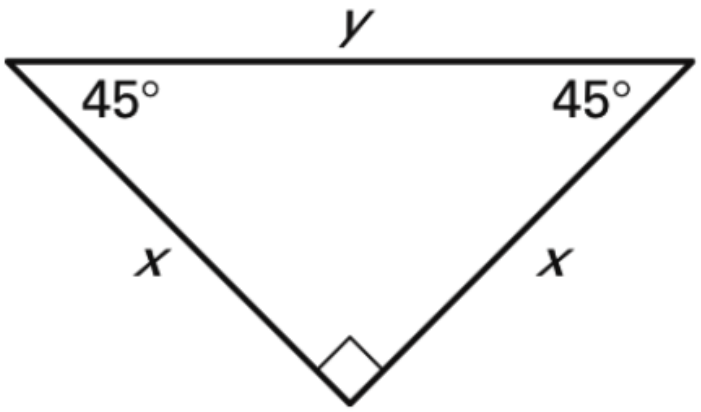



y
30°
2
x
60°


y
30°
x
6
60°

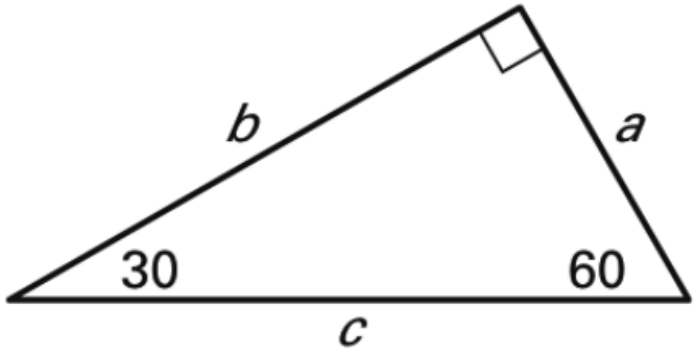

√3
30°
x
y
60°

Copy and complete the table.



x	2		4		7
y		$\sqrt{2}$		$3\sqrt{2}$	

Copy and complete the table.



a	5			6	
b		$2\sqrt{3}$			
c			8		22

Day 1

Assignment:

7.4 ws

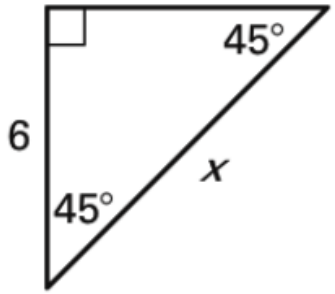
LESSON 7.4

Practice B

For use with pages 457–464

Find the value of x. Write your answer in simplest radical form.

1.



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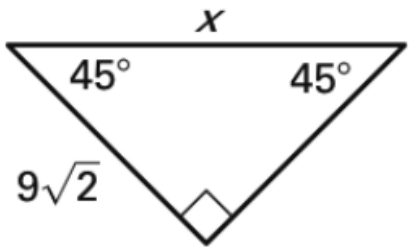

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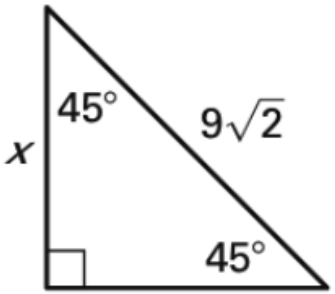

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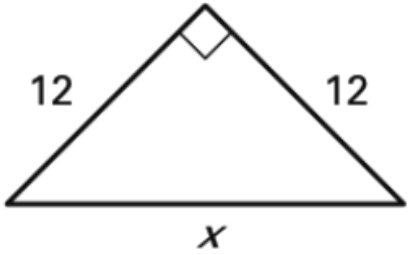

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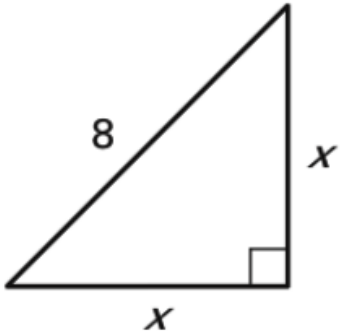
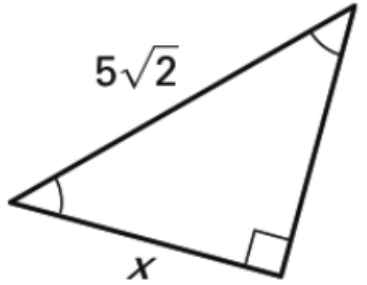
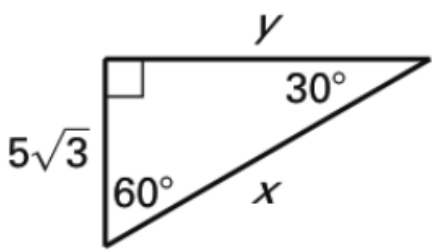


6.



Find the value of each variable. Write your answers in simplest radical form.

7.



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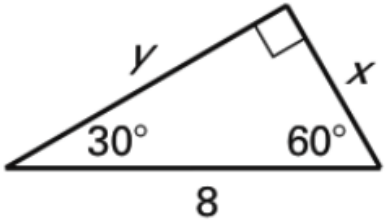

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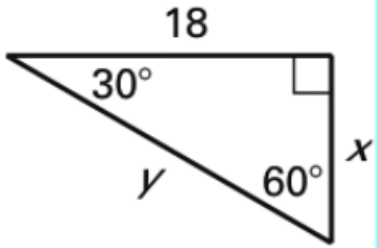

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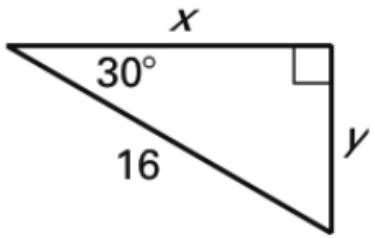

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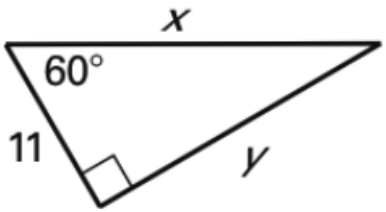

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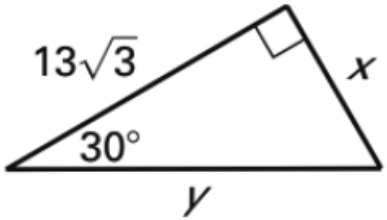
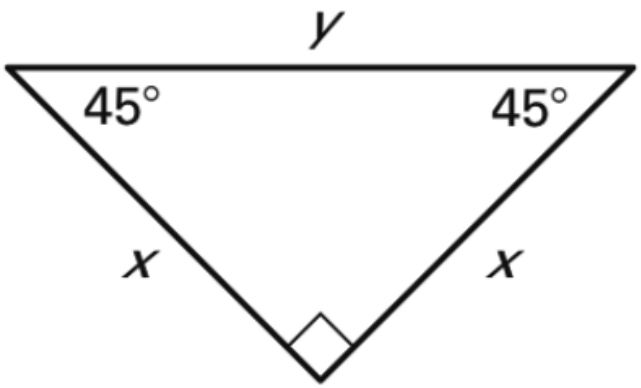


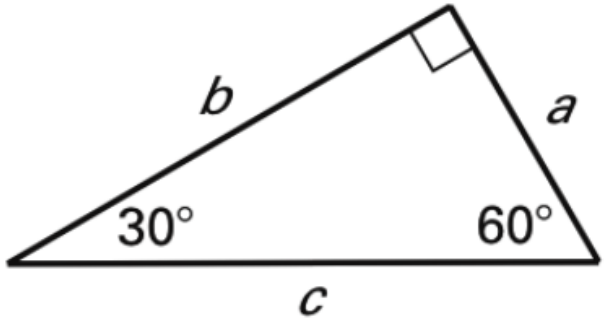
Complete the table.

13.



x	5		$\sqrt{2}$	9	
y		$4\sqrt{2}$			24

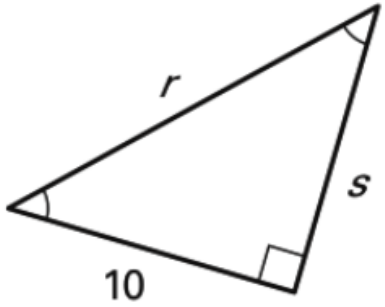
14.



a	9			11	
b		9	$5\sqrt{3}$		
c					16

Find the value of each variable. Write your answers in simplest radical form.

15.



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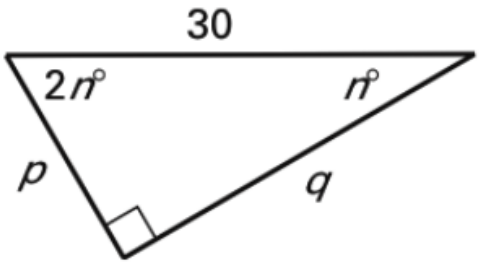

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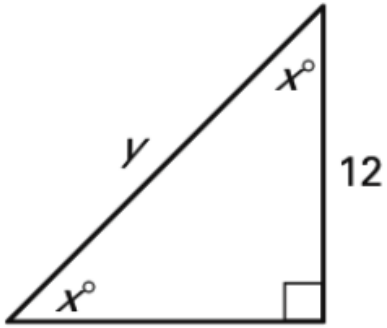

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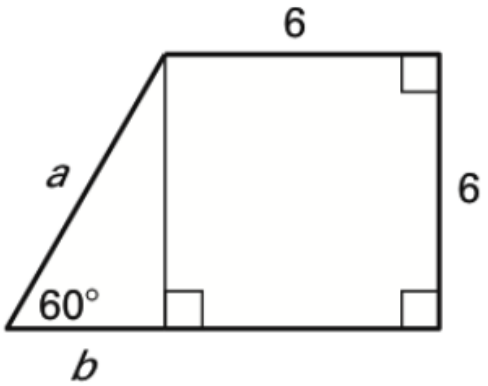

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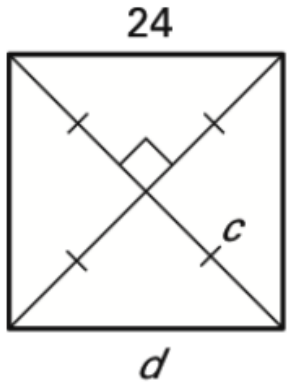

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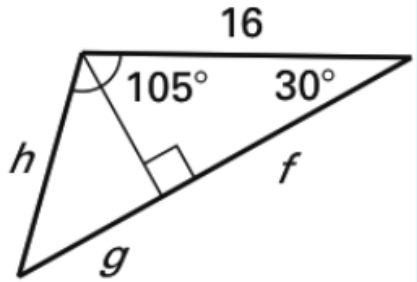


The side lengths of a triangle are given. Determine whether it is a *45°-45°-90° triangle,* a *30°-60°-90° triangle,* or *neither.*

21. $5, 10, 5\sqrt{3}$

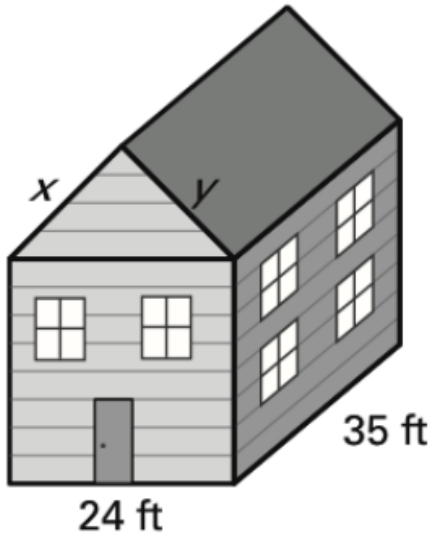
22. $7, 7, 7\sqrt{3}$

23. $6, 6, 6\sqrt{2}$

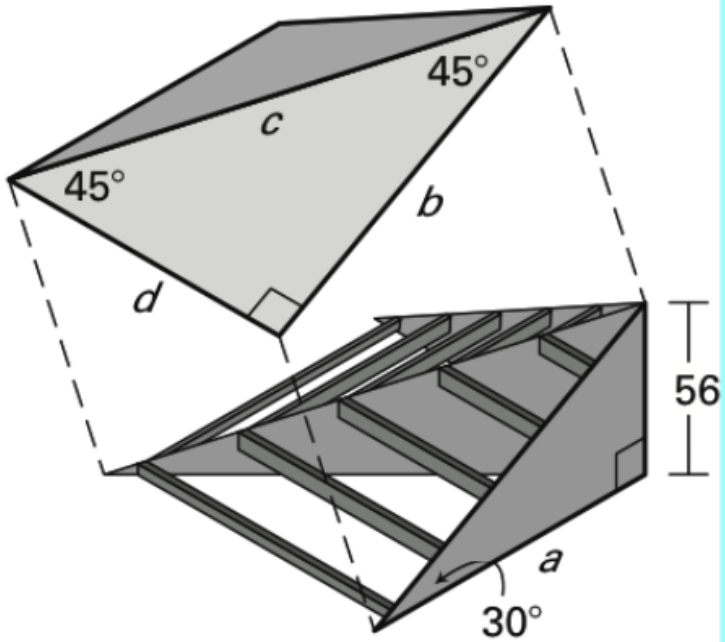
24. Roofing You are replacing the roof on the house shown, and you want to know the total area of the roof. The roof has a 1-1 pitch on both sides, which means that it slopes upward at a rate of 1 vertical unit for each 1 horizontal unit.

a. Find the values of x and y in the diagram.

b. Find the total area of the roof to the nearest square foot.



25. Skateboard Ramp You are using wood to build a pyramid-shaped skateboard ramp. You want each ramp surface to incline at an angle of 30° and the maximum height to be 56 centimeters as shown.



a. Use the relationships shown in the diagram to determine the lengths a, b, c, and d to the nearest centimeter.

b. Suppose you want to build a second pyramid ramp with a 45° angle of incline and a maximum height of 56 inches. You can use the diagram shown by simply changing the 30° angle to 45°. Determine the lengths a, b, c, and d to the nearest centimeter for this ramp.

Day 2 Assignment:

p. 461 (3-18, 27, 36-44 all)