

TOC

8.3 Special Right TrianglesEVEN
PAGE

EQ: Can you use properties of 45-45-90 and 30-60-90 triangles?

How are you doing? Write answer next to Essential Question

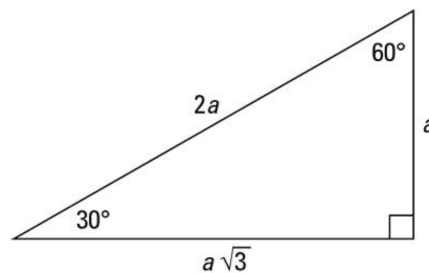
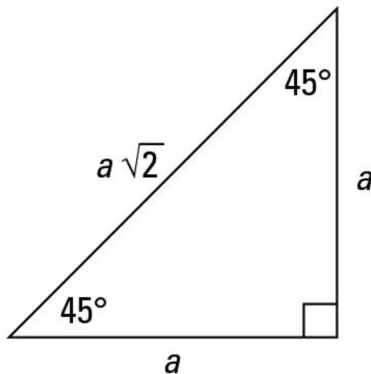
1. I don't understand the material
2. I understand a little.
3. I understand this material.
4. I could teach this to someone

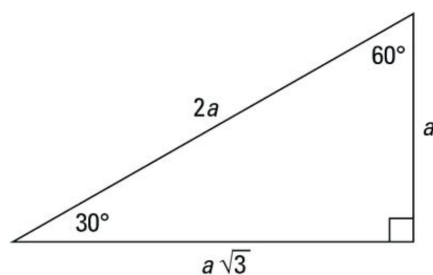
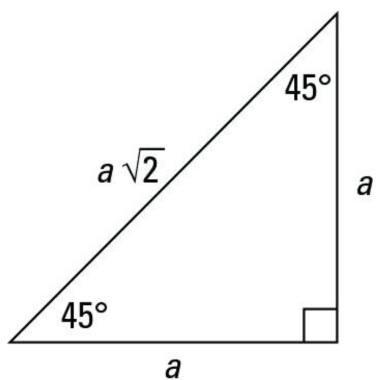


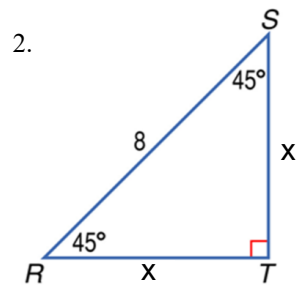
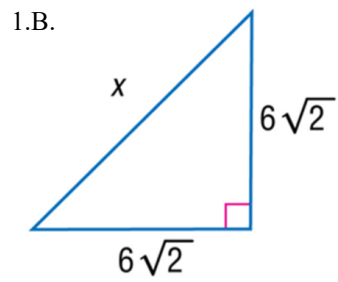
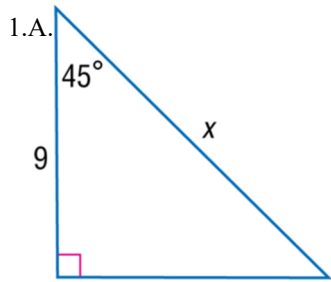
~~Use 2 post-it notes and carefully trace
45-45-90 and 30-60-90 triangles on them.~~

Optional

Summary: At least 3 sentences...

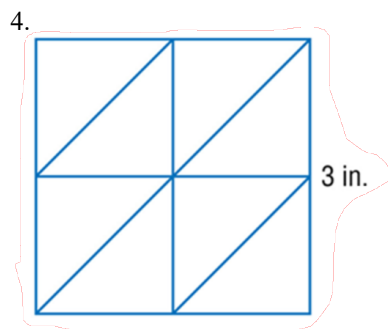
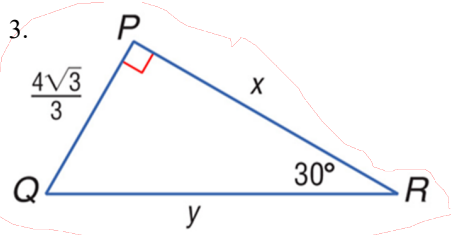






x

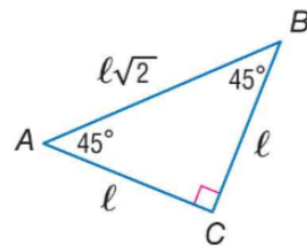
x



Theorem 8.8 45°-45°-90° Triangle Theorem

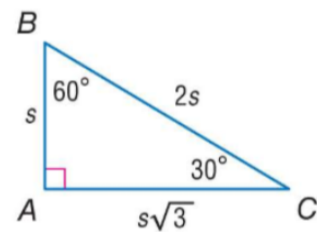
In a 45°-45°-90° triangle, the legs ℓ are congruent and the length of the hypotenuse h is $\sqrt{2}$ times the length of a leg.

Symbols In a 45°-45°-90° triangle, $\ell = \ell$ and $h = \ell\sqrt{2}$.

**Theorem 8.9** 30°-60°-90° Triangle Theorem

In a 30°-60°-90° triangle, the length of the hypotenuse h is 2 times the length of the shorter leg s , and the length of the longer leg ℓ is $\sqrt{3}$ times the length of the shorter leg.

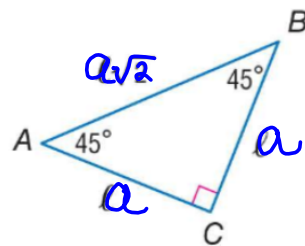
Symbols In a 30°-60°-90° triangle, $h = 2s$ and $\ell = s\sqrt{3}$.



Theorem 8.8 45°-45°-90° Triangle Theorem

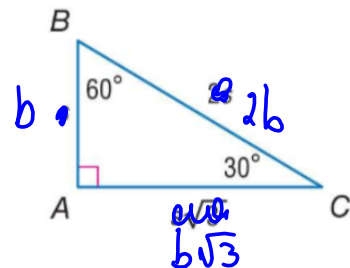
In a 45°-45°-90° triangle, the legs a are congruent and the length of the hypotenuse h is $\sqrt{2}$ times the length of a leg.

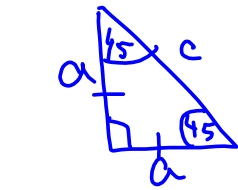
Symbols In a 45°-45°-90° triangle, $a = a$ and $h = a\sqrt{2}$

**Theorem 8.9** 30°-60°-90° Triangle Theorem

In a 30°-60°-90° triangle, the length of the hypotenuse h is 2 times the length of the shorter leg b and the length of the longer leg ℓ is $\sqrt{3}$ times the length of the shorter leg.

Symbols In a 30°-60°-90° triangle, $h = 2b$ and $\ell = b\sqrt{3}$





$$a^2 + a^2 = c^2$$

$$\sqrt{2a^2} = c$$

$$a\sqrt{2} = c$$



$$a^2 + b^2 = (2b)^2$$

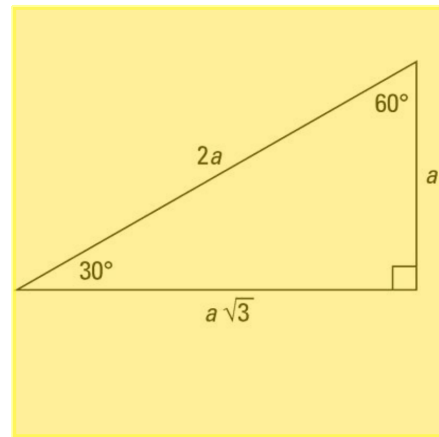
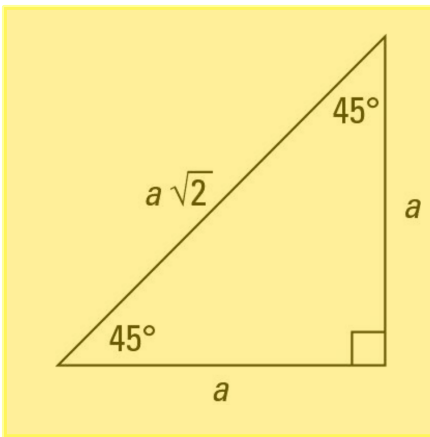
$$a^2 + b^2 = 4b^2$$

$$-b^2 = -b^2$$

$$\sqrt{a^2} = \sqrt{3b^2}$$

$$a = \sqrt{3b^2}$$

$$a = b\sqrt{3}$$

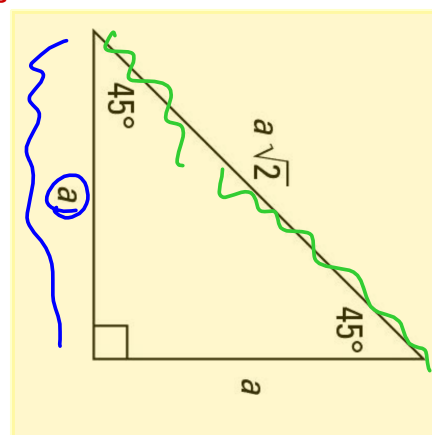


Example 1 Find the Hypotenuse Length in a 45° - 45° - 90° Triangle**A. Find x .**

$$a = 9$$

$$x = a\sqrt{2}$$

$$x = 9\sqrt{2}$$



Example 1 Find the Hypotenuse Length in a 45° - 45° - 90° TriangleB. Find x .

$$a = 6\sqrt{2}$$

$$a = 6\sqrt{2}$$

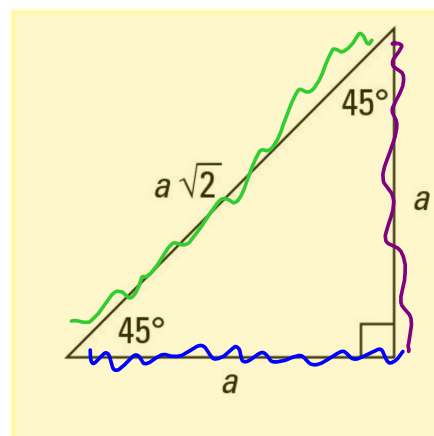
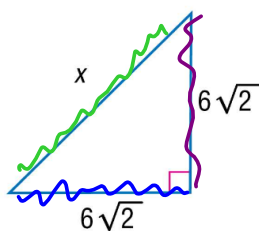
$$x = a\sqrt{2}$$

$$x = (6\sqrt{2})\sqrt{2}$$

$$x = 6\sqrt{4}$$

$$x = 6 \cdot 2$$

$$x = 12$$



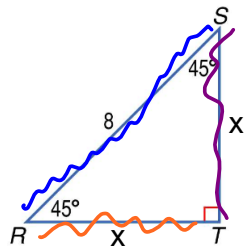
Example 2Find the Leg Lengths in a 45° - 45° - 90° TriangleFind x.

$$a\sqrt{2} = 8$$

$$\frac{a\sqrt{2}}{\sqrt{2}} = \frac{8}{\sqrt{2}}$$

$$a = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{\sqrt{4}} = \frac{8\sqrt{2}}{2}$$

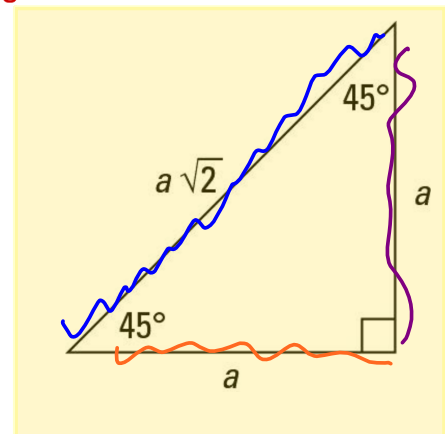
$$a = 4\sqrt{2}$$

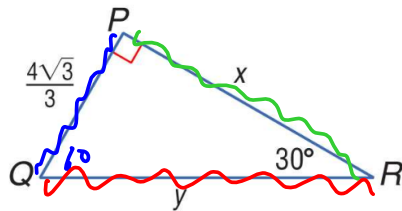


$$x = a$$

$$x = a$$

$$x = 4\sqrt{2}$$



Example 3**Find Lengths in a 30°-60°-90° Triangle**Find x and y .

$$b = \frac{4\sqrt{3}}{3}$$

$$x = b\sqrt{3}$$

$$x = \left(\frac{4\sqrt{3}}{3}\right)\sqrt{3}$$

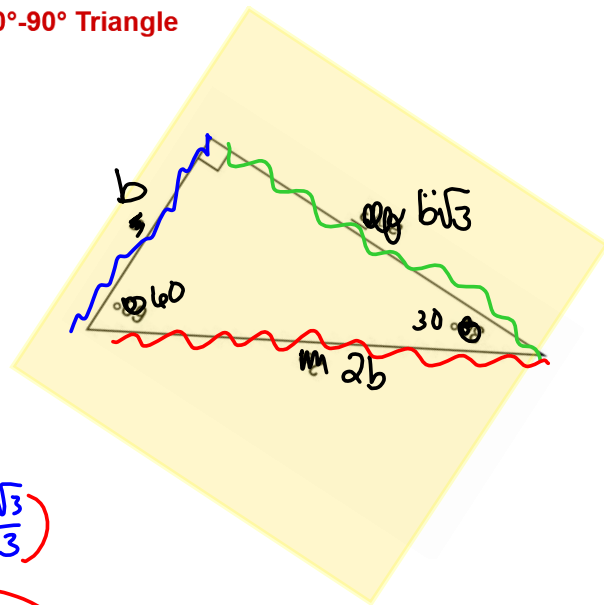
$$x = \frac{4\sqrt{9}}{3} = \frac{4 \cdot 3}{3} = 4$$

$$x = 4$$

$$y = 2b$$

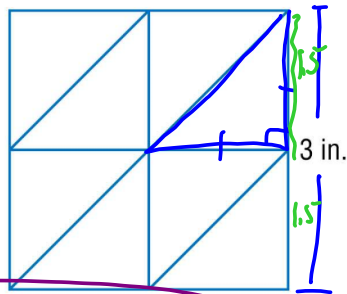
$$y = 2\left(\frac{4\sqrt{3}}{3}\right)$$

$$y = \frac{8\sqrt{3}}{3}$$



Real-World Example 4 Use Properties of Special Right Triangles

QUILTING A quilt has the design shown in the figure, in which a square is divided into 8 isosceles right triangles. If the length of one side of the square is 3 inches, what are the dimensions of each triangle?

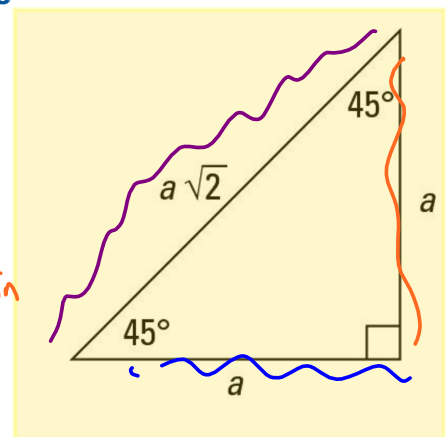


$$a = 1.5 \text{ in} \quad a = 1.5 \text{ in}$$

$$x = a\sqrt{2}$$

$$x = (1.5)\sqrt{2}$$

$$x = 1.5\sqrt{2} \text{ in}$$



Dimensions
1.5 in, 1.5 in, $1.5\sqrt{2}$ in

Example 1**Guided Practice**

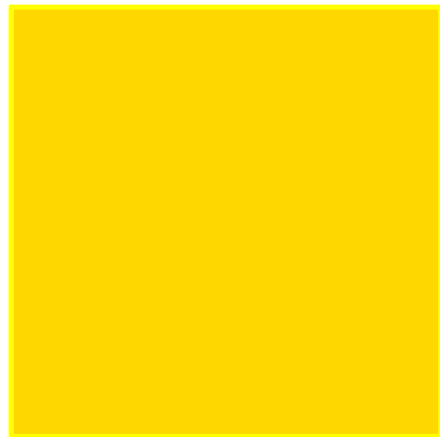
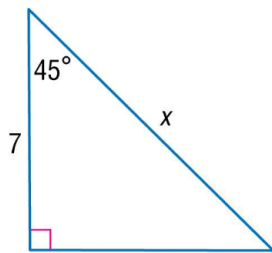
A. Find x .

A. 3.5

B. 7

C. $7\sqrt{2}$

D. $2\sqrt{7}$



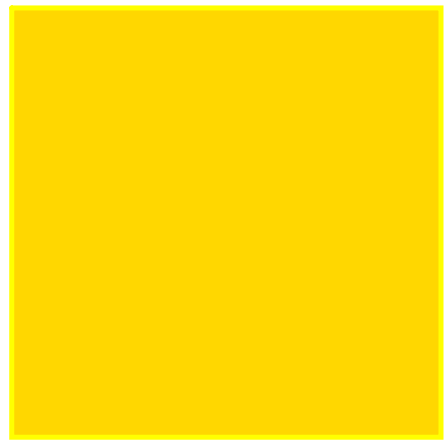
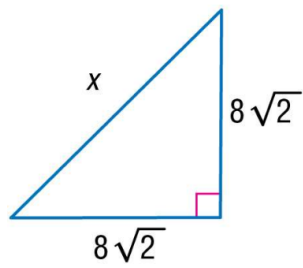
Example 1**Guided Practice****B. Find x .**

A. $4\sqrt{2}$

B. $16\sqrt{2}$

C. 16

D. 32



Example 2**Guided Practice**

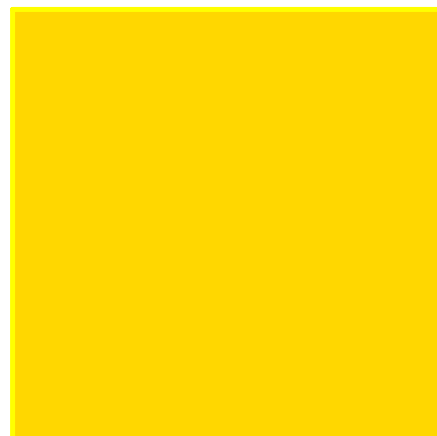
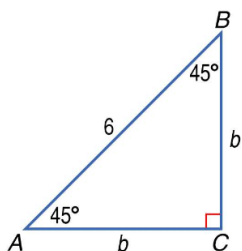
Find b .

A. $3\sqrt{2}$

B. 3

C. $6\sqrt{2}$

D. $3\sqrt{3}$



Example 3**Guided Practice**

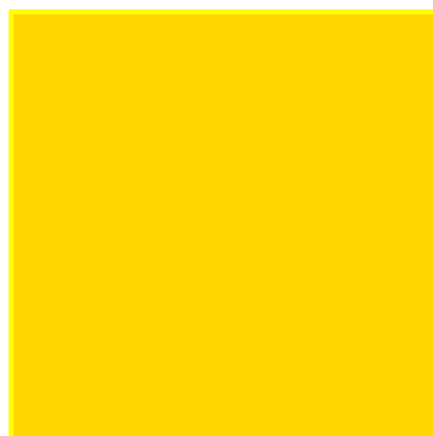
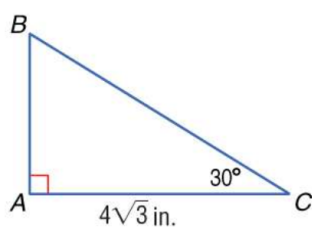
Find BC .

A. 4 in.

B. 8 in.

C. $8\sqrt{3}$ in.

D. 12 in.



Real-World Example 4**Guided Practice**

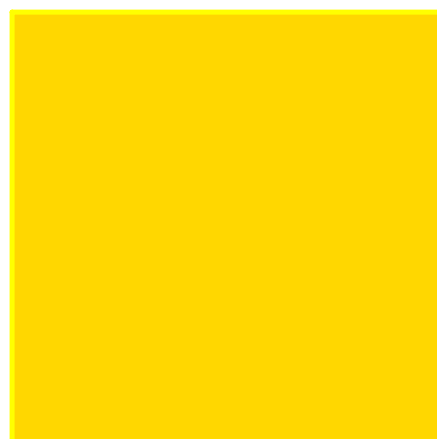
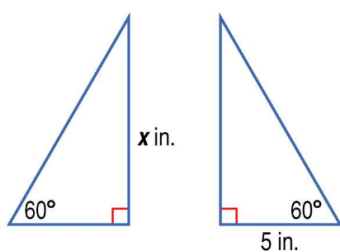
BOOKENDS Shaina designed 2 identical bookends according to the diagram below. Use special triangles to find the height of the bookends.

A. $5\sqrt{3}$

B. 10

C. 5

D. $10\sqrt{3}$



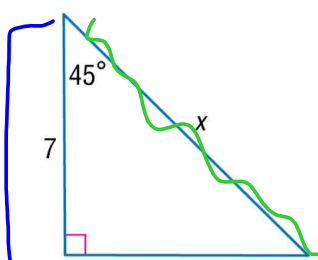
Example 1

Guided Practice

A. Find x .

A. 3.5

B. 7

C. $7\sqrt{2}$ D. $2\sqrt{7}$ 

$$a=7$$

$$x = a\sqrt{2}$$

$$x = 7\sqrt{2}$$



Example 1

Guided Practice

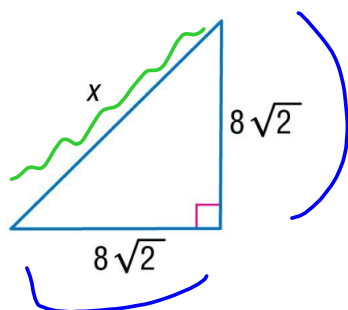
B. Find x .

A. $4\sqrt{2}$

B. $16\sqrt{2}$

C. 16

D. 32



$$a = 8\sqrt{2}$$

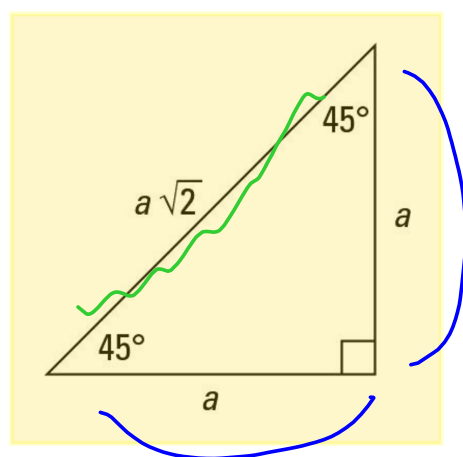
$$x = a\sqrt{2}$$

$$x = 8\sqrt{2}\sqrt{2}$$

$$x = 8\sqrt{4}$$

$$x = 8 \cdot 2$$

$$x = 16$$



Example 2

Guided Practice

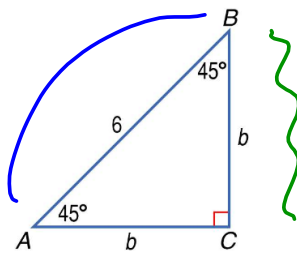
Find b .

A. $3\sqrt{2}$

B. 3

C. $6\sqrt{2}$

D. $3\sqrt{3}$

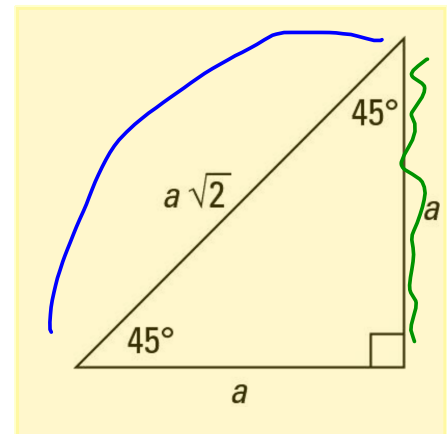


$$a\sqrt{2} = 6$$

$$\frac{a\sqrt{2}}{\sqrt{2}} = \frac{6}{\sqrt{2}}$$

$$a = \frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{2} = \frac{3\sqrt{2}}{1}$$

$$a = 3\sqrt{2}$$



$$b = a$$

$$b = 3\sqrt{2}$$

Example 3

Guided Practice

Find BC .

A. 4 in.

B. 8 in.

C. $8\sqrt{3}$ in.

D. 12 in.

$$a\sqrt{3} = 4\sqrt{3}$$

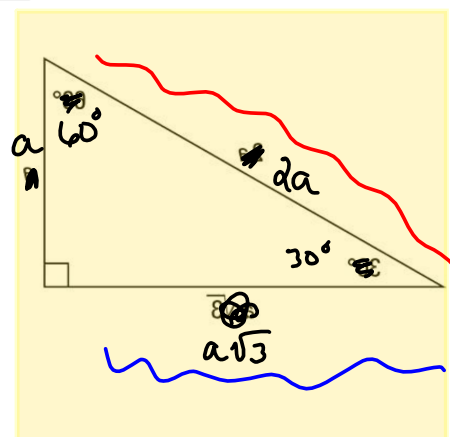
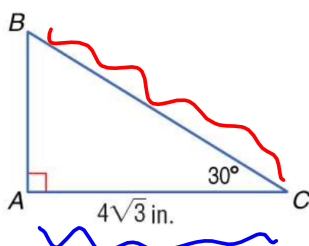
$$\frac{a\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{3}}{\sqrt{3}}$$

$$a = 4$$

$$BC = 2a$$

$$BC = 2(4)$$

$$BC = 8$$

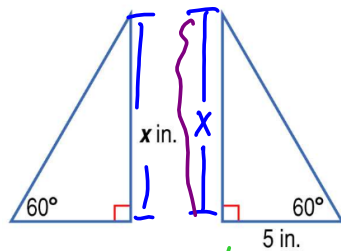


Real-World Example 4

Guided Practice

BOOKENDS Shaina designed 2 identical bookends according to the diagram below. Use special triangles to find the height of the bookends.

- A. $5\sqrt{3}$
- B. 10
- C. 5
- D. $10\sqrt{3}$

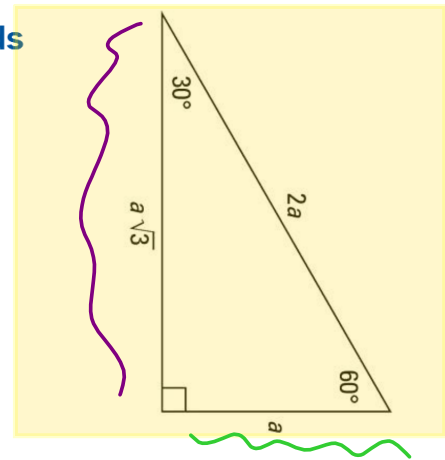


$$a = 5$$

$$x = a\sqrt{3}$$

$$x = (5)\sqrt{3}$$

$$x = 5\sqrt{3}$$



TOC **8.3 Special Right Triangles**

EVEN
PAGE

EQ: Can you use properties of 45-45-90 and 30-60-90 triangles?

Write 3 Questions for this section on the left page

1. How are you doing?

Write answer next to the Summary

- 1: I don't understand the material.
- 2: I understand a little.
- 3: I understand this material.
- 4: I could teach this to someone.

Summary: At least 3 sentences...

Write this now.