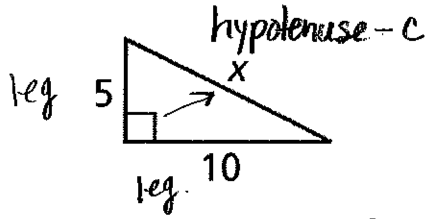
NAME Mrs. Bietler HOUR 2

5.8 NOTES AND PRACTICE—SPECIAL RIGHT TRIANGLES

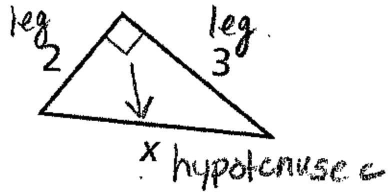
Warm Up

For the following exercises, find the value of *x*. Give your answer in simplest radical form.



$a^2+b^2=c^2$
$5^2+10^2=x^2$
$25+100=x^2$
$\sqrt{125}=\sqrt{x^2}$
$\boxed{5\sqrt{5}=x}$

$\sqrt{125}$
5 25
5 5
$\boxed{5\sqrt{5}}$



$a^2+b^2=c^2$
$2^2+3^2=x^2$
$4+9=x^2$
$\sqrt{13}=\sqrt{x^2}$
$\boxed{\sqrt{13}=x}$

Simplify each expression.

cannot have a radical in denominator.

$\frac{12\sqrt{3}}{\sqrt{3}\sqrt{3}}=\frac{\cancel{12}^{4}\sqrt{3}}{\cancel{3}_{1}}=\boxed{4\sqrt{3}}$

$\frac{\sqrt{20}}{2}=\frac{\cancel{2}\sqrt{5}}{\cancel{2}}=\boxed{\sqrt{5}}$

$\sqrt{20}$
2 10
2 5
$2\sqrt{5}$

$\sqrt{1{,}056}\cdot\sqrt{1056}=1{,}056$

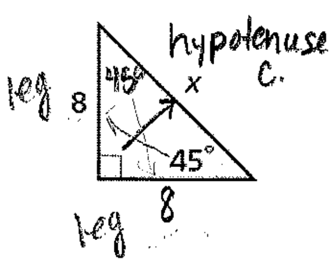
Objectives

- **Justify and apply properties of 45°-45°-90° triangles.**
- **Justify and apply properties of 30°- 60°- 90° triangles.**

Use Pythagorean Theorem to find the value of x. Give your answer in simplest radical form.

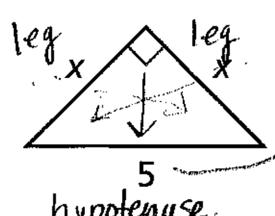
$90-45=45°$

1.



$a^2+b^2=c^2$
$8^2+8^2=x^2$
$64+64=x^2$
$\sqrt{128}=\sqrt{x^2}$
$\sqrt{128}=x$
2 64
8 8
$\boxed{8\sqrt{2}=x}$

2.



$a^2+b^2=c^2$
$x^2+x^2=5^2$
$\frac{2x^2}{2}=\frac{25}{2}$
$\sqrt{x^2}=\frac{\sqrt{25}}{\sqrt{2}}$
$x=\frac{5\sqrt{2}}{\sqrt{2}\sqrt{2}}$
$\boxed{x=\frac{5\sqrt{2}}{2}}$

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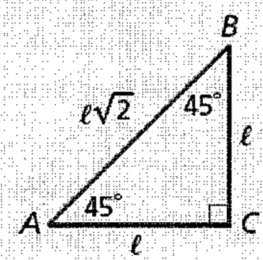
5.8 NOTES AND PRACTICE—SPECIAL RIGHT TRIANGLES

Theorem 5-8-1 **45°-45°-90° Triangle Theorem**

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

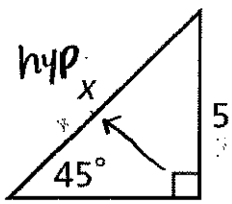
$AC = BC = \ell$ $\quad\quad$ $AB = \ell\sqrt{2}$

Hypotenuse = Leg • $\sqrt{2}$



Use the "shortcut" 45-45-90 Triangle Theorem to find the value of x. Give your answers in simplest radical form.

3.

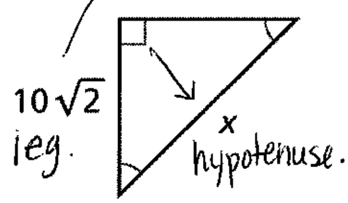


$H = L \cdot \sqrt{2}$

$x = 5 \cdot \sqrt{2}$

$x = 5\sqrt{2}$

5.



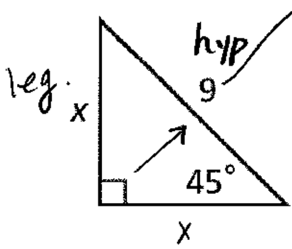
$H = L \cdot \sqrt{2}$

$x = 10\sqrt{2} \cdot \sqrt{2}$

$x = 10 \cdot 2$

$\boxed{x = 20}$

4.



$H = L \cdot \sqrt{2}$

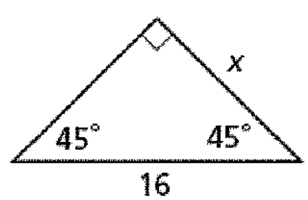
$\frac{9}{\sqrt{2}} = \frac{x \cdot \sqrt{2}}{\cancel{\sqrt{2}}}$

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

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

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

6.



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

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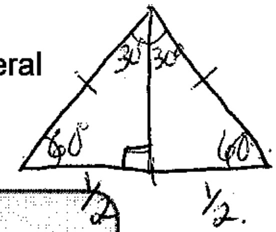
5.8 NOTES AND PRACTICE—SPECIAL RIGHT TRIANGLES

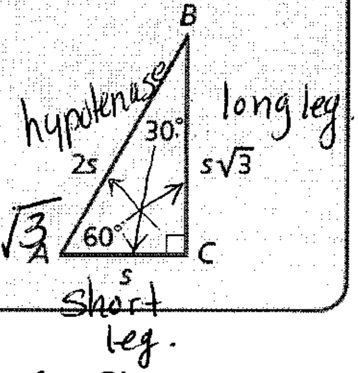
A 30°-60°-90° triangle is another special right triangle. You can use an equilateral triangle to find a relationship between its side lengths.



Theorem 5-8-2 **30°-60°-90° Triangle Theorem**

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

~~$AC = s$~~ ~~$AB = 2s$~~ ~~$BC = s\sqrt{3}$~~

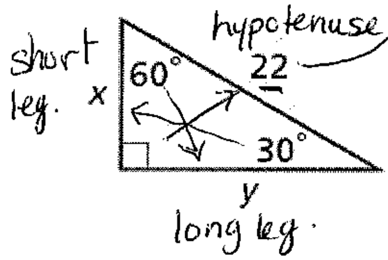


Hypotenuse = 2 · short leg. LongLeg = short leg · $\sqrt{3}$

$H = 2 \cdot S$ $L = S \cdot \sqrt{3}$

Use the "shortcut" 30-60-90 Triangle Theorem to find the value of x. Give your answers in simplest radical form.

7. 2nd easiest.



$H = 2 \cdot S$

$\frac{22}{2} = \frac{2 \cdot x}{2}$

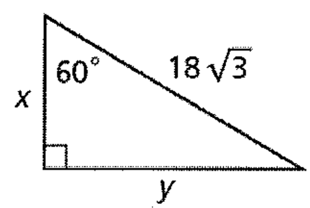
$\boxed{11 = x}$

$L = S \cdot \sqrt{3}$

$y = 11 \cdot \sqrt{3}$

$\boxed{y = 11\sqrt{3}}$

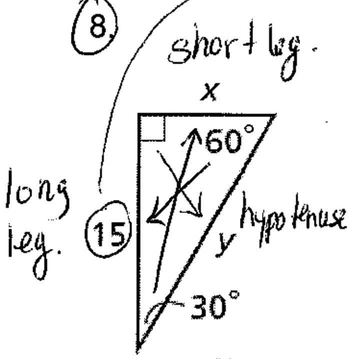
9.



$\boxed{x = 9\sqrt{3}}$

$\boxed{y = 27}$

8.



$L = S \cdot \sqrt{3}$

$\frac{15}{\sqrt{3}} = \frac{x \cdot \cancel{\sqrt{3}}}{\cancel{\sqrt{3}}}$

$x = \frac{15\sqrt{3}}{\sqrt{3}\sqrt{3}}$

$x = \frac{\cancel{15}^{5}\sqrt{3}}{\cancel{3}^{1}}$

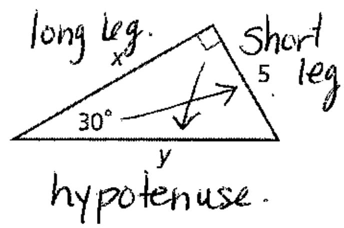
$\boxed{x = 5\sqrt{3}}$

$H = 2 \cdot S$

$y = 2 \cdot 5\sqrt{3}$

$\boxed{y = 10\sqrt{3}}$

10. Easiest.



$H = 2 \cdot S$

$y = 2 \cdot 5$

$\boxed{y = 10}$

$L = S \cdot \sqrt{3}$

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

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

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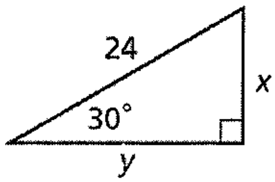
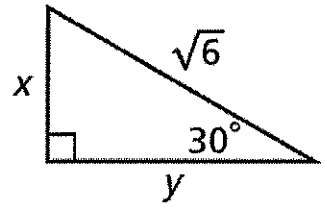
11.



$\boxed{x = 12}$

$\boxed{y = 12\sqrt{3}}$

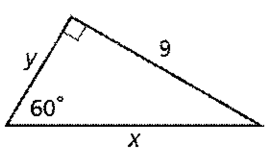
13.



$\boxed{x = \frac{\sqrt{6}}{2}}$

$\boxed{y = \frac{3\sqrt{2}}{2}}$

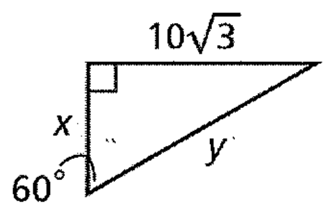
12.



$\boxed{x = 6\sqrt{3}}$

$\boxed{y = 3\sqrt{3}}$

14.



$\boxed{x = 10}$

$\boxed{y = 20}$