Lesson 9.2 Special Right Triangles

Monday, April 3, 2023 10:43 PM

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special right

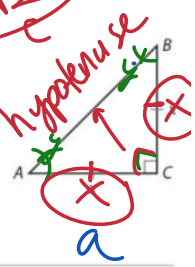
Locker

Explore 1 Investigating an Isosceles Right Triangle

Discover relationships that always apply in an isosceles right triangle.

(A) The figure shows an isosceles right triangle. Identify the base angles, and use the fact that they are complementary to write an equation relating their measures.

$y + y = 90°$



(B) Use the Isosceles Triangle Theorem to write a different equation relating the base angle measures.

$\frac{2y}{2} = \frac{90}{2}$

(C) What must the measures of the base angles be? Why?

$y = 45°$

(D) Use the Pythagorean Theorem to find the length of the hypotenuse in terms of the length of each leg, x.

$a^2 + b^2 = c^2$ $\quad x^2 + x^2 = c^2$ $\quad 2x^2 = c^2$ $\quad \sqrt{2x^2} = c$ $\quad x\sqrt{2}$

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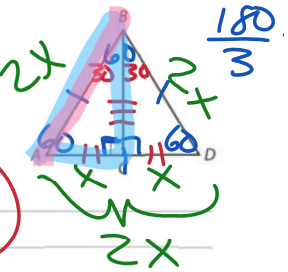
Explore 2 Investigating Another Special Right Triangle

Discover relationships that always apply in a right triangle formed as half of an equilateral triangle.

(A) $\triangle ABD$ is an equilateral triangle and $\overline{BC}$ is a perpendicular from B to $\overline{AD}$. Determine all three angle measures in $\triangle ABC$.

each $\angle = 60°$ $\quad \angle ABC = 30°$ $\quad \angle DBC$

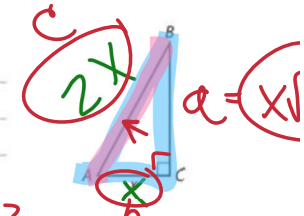


(B) Explain why $\triangle ABC \cong \triangle DBC$.

SSS SAS ASA AAS HL

(C) Let the length of $\overline{AC}$ be x. What is the length of $\overline{AB}$, and why?

$2x$



(D) Using the Pythagorean Theorem, find the length of $\overline{BC}$.

$a^2 + x^2 = (2x)^2$ $\quad a^2 + x^2 = 4x^2$

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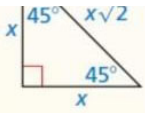
Theorem

Theorem 9.4 45°-45°-90° Triangle Theorem

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



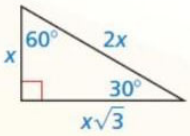
hypotenuse = leg • $\sqrt{2}$

Proof Ex. 19, p. 476

Theorem

Theorem 9.5 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 = shorter leg • 2

longer leg = shorter leg • $\sqrt{3}$

Proof Ex. 21, p. 476

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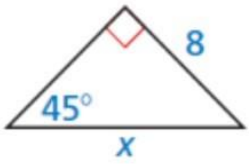
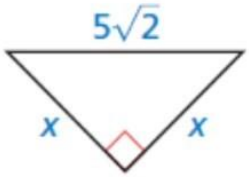
Find the value of x. Write your answer in simplest form.

a.



b.



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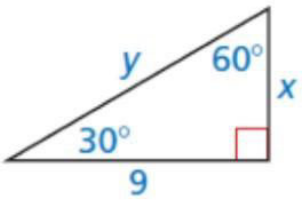
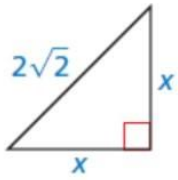
Find the values of x and y. Write your answer in simplest form.



Find the value of the variable. Write your answer in simplest form.

1.



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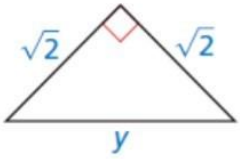

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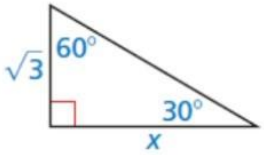

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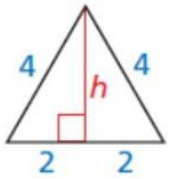

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The road sign is shaped like an equilateral triangle. Estimate the area of the sign by finding the area of the equilateral triangle.

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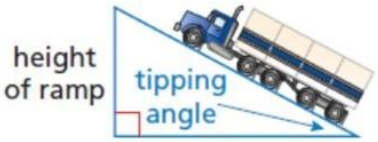
A tipping platform is a ramp used to unload trucks. How high is the end of an 80-foot ramp when the tipping angle is 30°? 45°?



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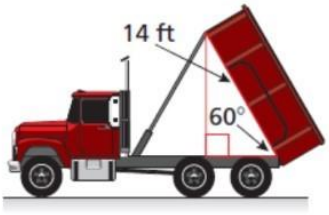
5. The logo on a recycling bin resembles an equilateral triangle with side lengths of 6 centimeters. Approximate the area of the logo.

6. The body of a dump truck is raised to empty a load of sand. How high is the 14-foot-long body from the frame when it is tipped upward by a 60° angle?



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