Name_____ Date _____

9.2 Special Right Triangles

For use with Exploration 9.2

Essential Question What is the relationship among the side lengths of 45°-45°-90° triangles? 30°-60°-90° triangles?

1 EXPLORATION: Side Ratios of an Isosceles Right Triangle

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

a. Use dynamic geometry software to construct an isosceles right triangle with a leg length of 4 units.

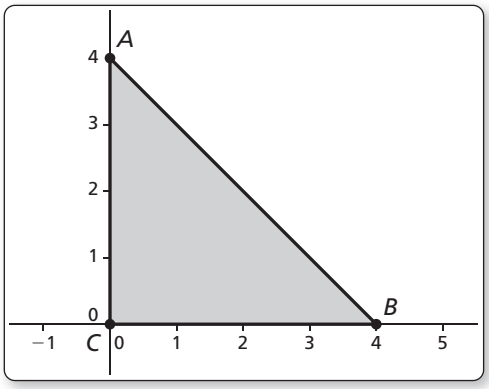
b. Find the acute angle measures. Explain why this triangle is called a 45°-45°-90° triangle.

c. Find the exact ratios of the side lengths (using square roots).

$\frac{AB}{AC} =$ _____

$\frac{AB}{BC} =$ _____

$\frac{AC}{BC} =$ _____



Sample
Points
$A(0, 4)$
$B(4, 0)$
$C(0, 0)$
Segments
$AB = 5.66$
$BC = 4$
$AC = 4$
Angles
$m\angle A = 45°$
$m\angle B = 45°$

d. Repeat parts (a) and (c) for several other isosceles right triangles. Use your results to write a conjecture about the ratios of the side lengths of an isosceles right triangle.

Name _____ Date _____

2 EXPLORATION: Side Ratios of a 30°-60°-90° Triangle

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

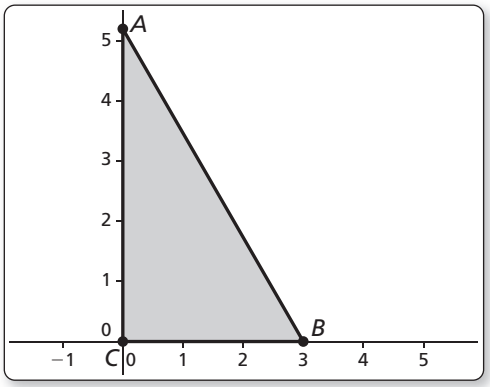
a. Use dynamic geometry software to construct a right triangle with acute angle measures of 30° and 60° (a 30°-60°-90° triangle), where the shorter leg length is 3 units.

b. Find the exact ratios of the side lengths (using square roots).

$\frac{AB}{AC} =$ _____

$\frac{AB}{BC} =$ _____

$\frac{AC}{BC} =$ _____



Sample
Points
$A(0, 5.20)$
$B(3, 0)$
$C(0, 0)$
Segments
$AB = 6$
$BC = 3$
$AC = 5.20$
Angles
$m\angle A = 30°$
$m\angle B = 60°$

c. Repeat parts (a) and (b) for several other 30°-60°-90° triangles. Use your results to write a conjecture about the ratios of the side lengths of a 30°-60°-90° triangle.

Communicate Your Answer

3. What is the relationship among the side lengths of 45°-45°-90° triangles? 30°-60°-90° triangles?

Name_____ Date _____

9.2 Notetaking with Vocabulary

For use after Lesson 9.2

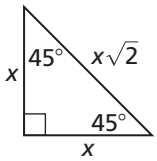
In your own words, write the meaning of each vocabulary term.

isosceles triangle

Theorems

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.

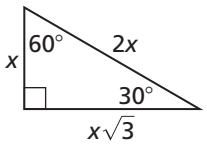


hypotenuse $=$ leg $\bullet \sqrt{2}$

Notes:

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 $\bullet$ 2

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

Notes:

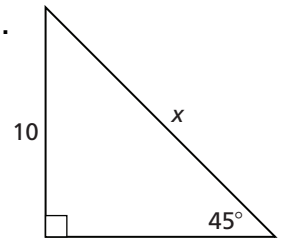
Name _____ Date _____

9.2 Notetaking with Vocabulary (continued)

Extra Practice

In Exercises 1–4, find the value of *x*. Write your answer in simplest form.

1.



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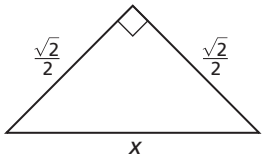

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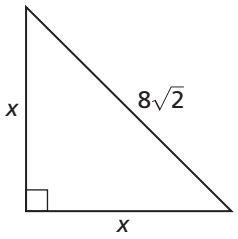

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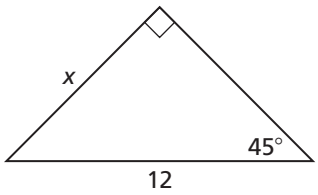
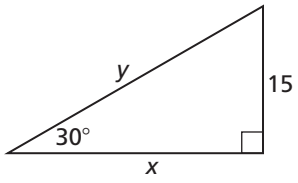


In Exercises 5–7, find the values of *x* and *y*. Write your answers in simplest form.

5.



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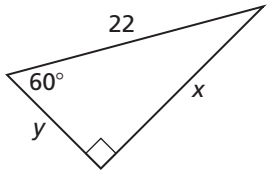
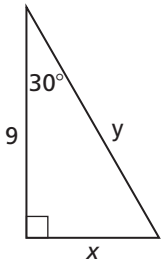


7.



Name_____ Date _____

9.2 Notetaking with Vocabulary (continued)

In Exercises 8 and 9, sketch the figure that is described. Find the indicated length. Round decimal answers to the nearest tenth.

8. The length of a diagonal in a square is 32 inches. Find the perimeter of the square.

9. An isosceles triangle with $30°$ base angles has an altitude of $\sqrt{3}$ meters. Find the length of the base of the isosceles triangle.

10. Find the area of $\triangle DEF$. Round decimal answers to the nearest tenth.