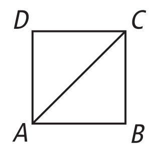
8-2 Special Right Triangles

UNIT 6

Vocabulary

Review

1. Circle the segment that is a *diagonal* of square *ABCD*.



$\overline{AB}$ $\overline{AC}$ $\overline{AD}$ $\overline{BC}$ $\overline{CD}$

2. Underline the correct word to complete the sentence.

A *diagonal* is a line segment that joins two sides / vertices of a polygon.

Vocabulary Builder

complement (noun) KAHM **pluh munt**

Other Word Form: complementary (adjective)

Math Usage: When the measures of two angles have a sum of 90, each angle is a **complement** of the other.

Nonexample: Two angles whose measures sum to 180 are supplementary.

Use Your Vocabulary

Complete each statement with the word *complement* or *complementary*.

3. If $m\angle A = 40$ and $m\angle B = 50$, the angles are _?_.

4. If $m\angle A = 30$ and $m\angle B = 60$, $\angle B$ is the _?_ of $\angle A$.

5. $\angle P$ and $\angle Q$ are _?_ because the sum of their measures is 90.

Complete.

6. If $\angle R$ has a measure of 35, then the *complement* of $\angle R$ has a measure of ___.

7. If $\angle X$ has a measure of 22, then the *complement* of $\angle X$ has a measure of ___.

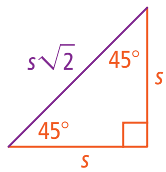
8. If $\angle C$ has a measure of 65, then the *complement* of $\angle C$ has a measure of ___.

9. Circle the *complementary* angles.

take note

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

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



Complete each statement for a 45° – 45° – 90° triangle.

10. hypotenuse $= \square \cdot$ leg

11. If leg $= 10$, then hypotenuse $= \square \cdot \square$.

Problem 1 Finding the Length of the Hypotenuse

Got It? What is the length of the hypotenuse of a 45°-45°-90° triangle with leg length $5\sqrt{3}$?

12. Use the justifications to find the length of the hypotenuse.

hypotenuse $= \square \cdot$ leg	45°-45°-90° Triangle Theorem
$= \sqrt{2} \cdot \square$	Substitute.
$= \square \cdot \square$	Commutative Property of Multiplication.
$= \square$	Simplify.

Problem 2 Finding the Length of a Leg

Got It? The length of the hypotenuse of a 45°-45°-90° triangle is 10. What is the length of one leg?

13. Will the length of the leg be *greater than* or *less than* 10? Explain.

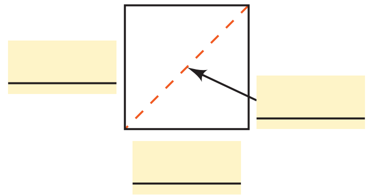
____

14. Use the justifications to find the length of one leg.

hypotenuse $= \sqrt{2} \cdot$ leg	45°-45°-90° Triangle Theorem
$\square = \sqrt{2} \cdot$ leg	Substitute.
$\dfrac{\square}{\sqrt{2}} = \dfrac{\sqrt{2}}{\sqrt{2}} \cdot$ leg	Divide each side by $\sqrt{2}$.
leg $= \dfrac{\square}{\sqrt{2}}$	Simplify.
leg $= \dfrac{\square}{\sqrt{2}} \cdot \dfrac{\square}{\sqrt{2}}$	Multiply by a form of 1 to rationalize the denominator.
leg $= \dfrac{\square}{2}$	Simplify.
leg $= \square$	Divide by 2.

Problem 3 Finding Distance

Got It? **You plan to build a path along one diagonal of a 100 ft-by-100 ft square garden. To the nearest foot, how long will the path be?**



15. Use the words *path, height,* and *width* to complete the diagram.

16. Write L for *leg* or H for *hypotenuse* to identify each part of the right triangle in the diagram.

____ path   ____ height   ____ width

17. Substitute for hypotenuse and leg. Let h = the length of the hypotenuse.

$$\text{hypotenuse} = \sqrt{2} \cdot \text{leg}$$
$$\square = \sqrt{2} \cdot \square$$

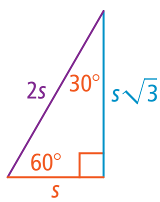
18. Solve the equation. Use a calculator to find the length of the path.

19. To the nearest foot, the length of the path will be ____ feet.

take note

Theorem 8-6 30°-60°-90° Triangle Theorem

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



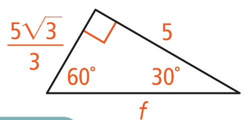
Complete each statement for a 30°-60°-90° triangle.

20. hypotenuse = $\square$ · shorter leg

21. longer leg = $\square$ · shorter leg

Problem 4 Using the Length of One Side

Got It? **What is the value of *f* in simplest radical form?**

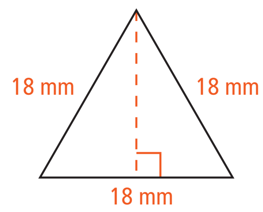


22. Complete the reasoning model below.

Think	Write
f is the length of the hypotenuse. I can write an equation relating the hypotenuse and the shorter leg $\frac{5\sqrt{3}}{3}$ of the 30°-60°-90° triangle.	hypotenuse = $\square$ · shorter leg $f = \square \cdot \frac{\square}{\square}$
Now I can solve for *f*.	$f = \frac{\square}{\square}$

Problem 5 Applying the 30°-60°-90° Triangle Theorem

Got It? **Jewelry Making** **An artisan makes pendants in the shape of equilateral triangles. Suppose the sides of a pendant are 18 mm long. What is the height of the pendant to the nearest tenth of a millimeter?**



23. Circle the formula you can use to find the height of the pendant.

hypotenuse $=$ 2 $\cdot$ shorter leg   longer leg $=$ $\sqrt{3}$ $\cdot$ shorter leg

24. Find the height of the pendant.

25. To the nearest tenth of a millimeter, the height of the pendant is ______ mm.

Lesson Check • Do you UNDERSTAND?

Reasoning **A test question asks you to find two side lengths of a 45°-45°-90° triangle. You know that the length of one leg is 6, but you forgot the special formula for 45°-45°-90° triangles. Explain how you can still determine the other side lengths. What are the other side lengths?**

26. Underline the correct word(s) to complete the sentence. In a 45°-45°-90° triangle, the lengths of the legs are different / the same.

27. Use the Pythagorean Theorem to find the length of the longest side.

28. The other two side lengths are ______ and ______.

Math Success

Check off the vocabulary words that you understand.

☐ leg ☐ hypotenuse ☐ right triangle ☐ Pythagorean Theorem

Rate how well you can *use the properties of special right triangles.*

Need to review | 0 2 4 6 8 10 | Now I get it!