LESSON MAKER PRO

Triangle Shortcuts

Use angle patterns to find exact side lengths.

HIGH SCHOOL · G.RT.1.2

G.RT.1.2 "Verify and apply properties of right triangles, including properties of 45-45-90 and 30-60-90 triangles, to solve problems using algebraic and logical reasoning."

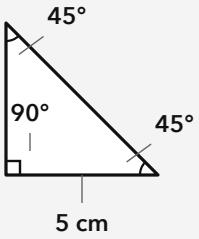
NAME _____ DATE _____

TWO USEFUL RATIOS

In a 45°-45°-90° triangle, the legs are equal, and the hypotenuse is a leg times sqrt(2). In a 30°-60°-90° triangle, the short leg, long leg, and hypotenuse have lengths in the ratio 1 : sqrt(3) : 2.

WORKED EXAMPLE

Find the hypotenuse of the triangle shown.

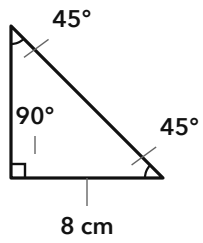


1. The 45° angles make the legs equal, so each leg is 5 cm.
2. Hypotenuse = 5 × sqrt(2) = 5sqrt(2) cm.

Answer: 5sqrt(2) cm

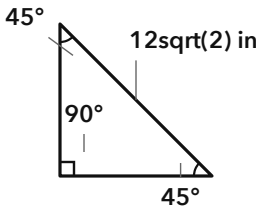
PRACTICE 6 problems

1 Find the hypotenuse of the triangle shown.



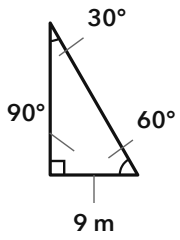
ANSWER _____

2 Find the length of each leg of the triangle shown.



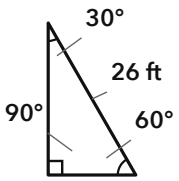
ANSWER _____

3 Find the long leg of the triangle shown.



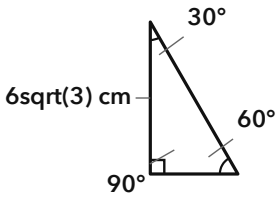
ANSWER _____

4 Find the short leg of the triangle shown.



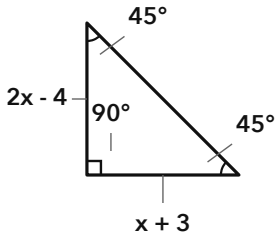
ANSWER _____

5 Find the hypotenuse of the triangle shown.



ANSWER _____

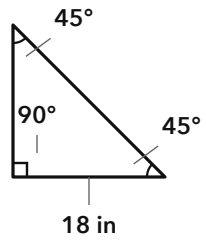
6 Find x and the length of each leg of the triangle shown.



ANSWER _____

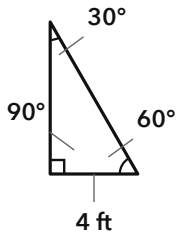
APPLY IT Show your work

1 A square LED panel at an esports event is cut along a diagonal. The diagram shows one of the two pieces. How long is the diagonal cut?



ANSWER _____

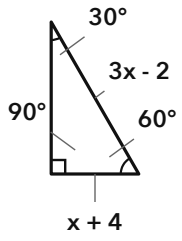
2 A skate ramp rises to a platform. Use the diagram to find the length of the ramp.



ANSWER _____

CHALLENGE One step up

Find x and all three side lengths of the triangle shown. Then verify the lengths using the Pythagorean theorem.



WORK SPACE AND ANSWER

ANSWER KEY

Triangle Shortcuts

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the hypotenuse of the triangle shown.	**8sqrt(2) cm**
2	Find the length of each leg of the triangle shown.	**12 in**
3	Find the long leg of the triangle shown.	**9sqrt(3) m**
4	Find the short leg of the triangle shown.	**13 ft**
5	Find the hypotenuse of the triangle shown.	**12 cm**
6	Find x and the length of each leg of the triangle shown.	**x = 7; each leg is 10**

PART 2 · APPLY IT

1. **18sqrt(2) in** The diagonal is the hypotenuse of a 45°-45°-90° triangle. Multiply the leg length by sqrt(2).
2. **8 ft** The 4 ft height is opposite the 30° angle, so it is the short leg. The ramp is the hypotenuse, twice that length.

CHALLENGE

x = 10; short leg = 14, long leg = 14sqrt(3), hypotenuse = 28. Check: $14^2 + (14\sqrt{3})^2 = 196 + 588 = 784 = 28^2$.

Accept equivalent exact radical forms. For the challenge, the verification must use the squares of both legs and the hypotenuse.