Geometry
Special Right Triangles Task/Notes
45°–45°–90° Triangles

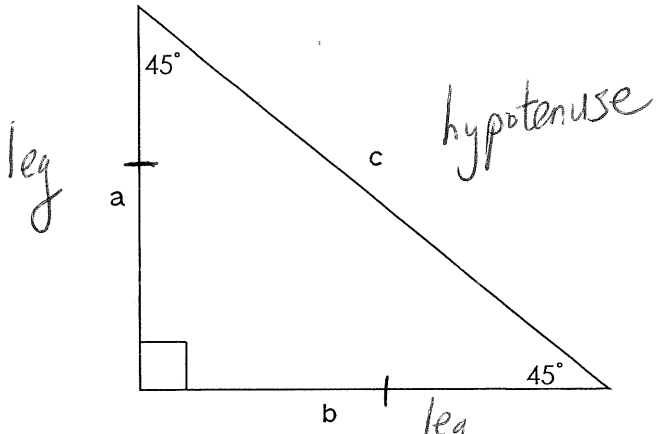
Key

HOW DO THE SIDES OF A 45-45-90 RIGHT TRIANGLE RELATE TO EACH OTHER?

A 45-45-90 triangle is an isosceles, right triangle.

1.) Complete the table for the special right triangle below. Express irrational values in simplest radical form.

$5^2+5^2=c^2$
$25+25=c^2$
$50=c^2$
$\sqrt{50}=c$
$5\sqrt{2}=c$

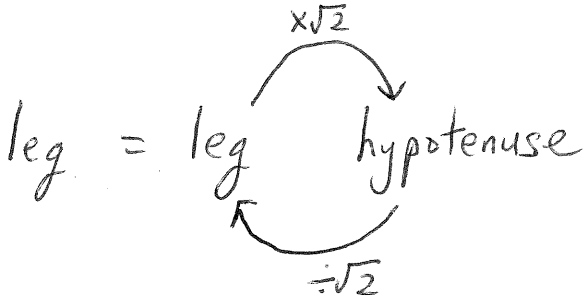


a	b	c
5	5	$5\sqrt{2}$
3	3	$3\sqrt{2}$
10	10	$10\sqrt{2}$
26	26	$26\sqrt{2}$
15	15	$15\sqrt{2}$
$5\sqrt{2}$	$5\sqrt{2}$	10

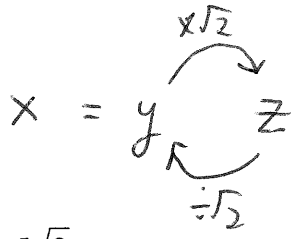
$5\sqrt{2}\cdot\sqrt{2}=5(2)=10$

2.) Do you notice a relationship between the lengths of the sides of this special right triangle?

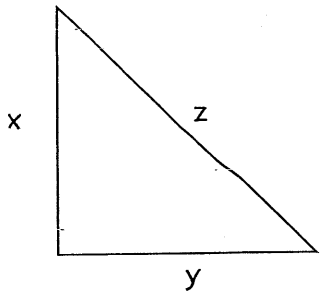
3.) What conclusion can you make about 45°–45°–90° right triangles?



Examples:



1. Find the missing sides for the 45°–45°–90° triangle below.



a. $x = 9$

$y = 9$

$z = 9\sqrt{2}$

b. $y = 5\sqrt{2}$

$x = 5\sqrt{2}$

$z = 10$

c. $z = 32\sqrt{2}$

$y = 32$

$x = 32$

d. $x = \frac{19}{2}$

$y = \frac{19}{2}$

$z = \frac{19\sqrt{2}}{2}$

e. $y = \frac{\sqrt{3}}{2}$

$x = \frac{\sqrt{3}}{2}$

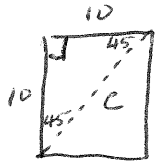
$z = \frac{\sqrt{6}}{2}$

f. $z = 10$

$y = \frac{10}{\sqrt{2}} = 5\sqrt{2}$

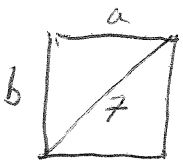
$x = 5\sqrt{2}$

2. A square has an area of 100 inches^2. Find the length of the diagonal.



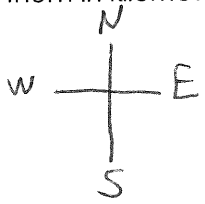
$c = 10\sqrt{2}$

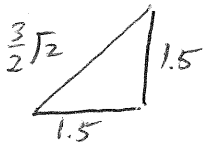
3. You have a piece of cardboard that you want to cut into a square. You want the diagonal to be approximately 7 inches long. How long should each side be in inches?



$a = \frac{7}{\sqrt{2}} = \frac{7\sqrt{2}}{2}$ $\quad a = \frac{7\sqrt{2}}{2}, \; b = \frac{7\sqrt{2}}{2}$

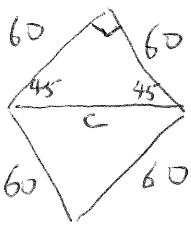
4. Two people are standing beside each other, each one standing due North and due West respectively. They both begin walking AT THE SAME SPEED in perfectly straight lines in the direction which they are facing. After 15 minutes, they both stop and each has gone approximately 1.5 kilometers. What is the distance between them in kilometers?





$c = \frac{3\sqrt{2}}{2} \approx$ **2.121 km**

5. The bases on a softball field form a square with a side length of 60 feet. You throw a softball from first base to third base. How far do you throw the softball?



$c = 60\sqrt{2}$ ft ≈ 84.853 ft.