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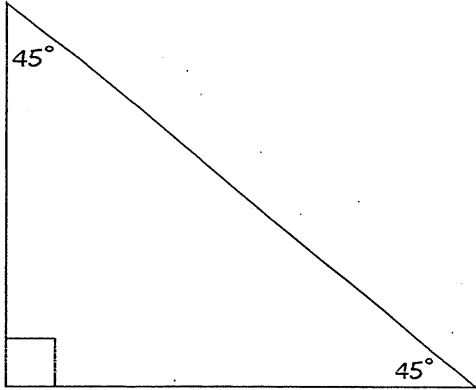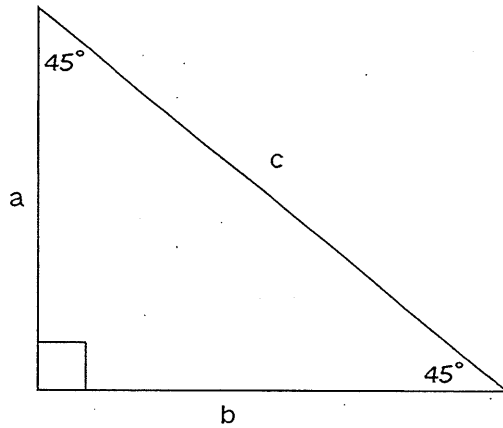
45-45-90 Triangle
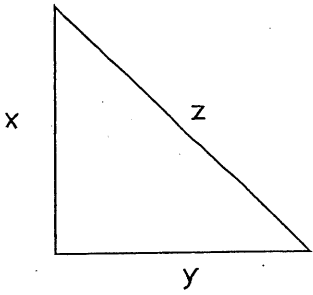

1. Complete the table for the special right triangle below. Express irrational values in simplest radical form.

a	b	c
5		
	3	
10		
	26	

Examples:

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

a. x = 9

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

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

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

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

f. z = 10

2. A square has an area of 100 inches². Find the length of the diagonal.

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?

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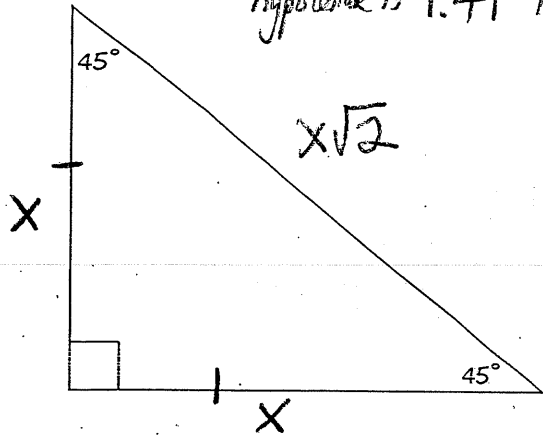
5. The bases on a softball field form a square with a side length of 60 feet. You throw a softball from first base to third base. How far do you throw the softball?

Yang

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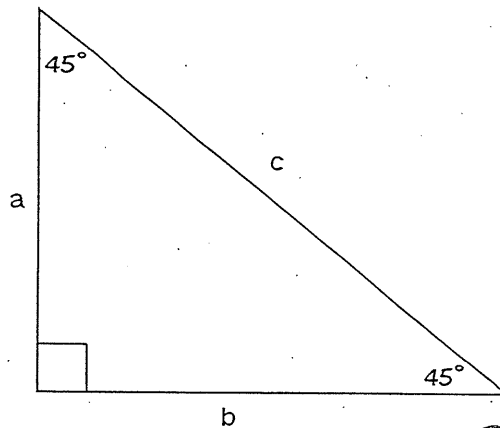
45-45-90 Triangle

$\sqrt{2} =$
hypotenuse is 1.41 times longer than the legs

1) multiply by $\sqrt{2}$ to convert from leg to hypotenuse.

2) divide by $\sqrt{2}$ to convert from hypotenuse to leg

Triangle with sides x, x, and $x\sqrt{2}$, angles 45°, 45°, 90°

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

Triangle with legs a, b, hypotenuse c, angles 45°, 45°

multiply by $\sqrt{2}$

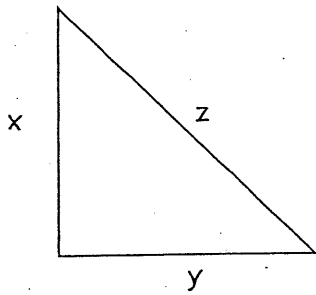| a	b	c
5	5	$5\sqrt{2}$
3	3	$3\sqrt{2}$
10	10	$10\sqrt{2}$
26	26	$26\sqrt{2}$
15	15	$15\sqrt{2}$
$5\sqrt{2}$	$5\sqrt{2}$	10

$\dfrac{10}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} \quad \dfrac{10\sqrt{2}}{2}$

$\dfrac{15\sqrt{2}}{\sqrt{2}} = 15$

divide by $\sqrt{2}$

Examples:

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

(triangle diagram with vertical side labeled x, hypotenuse labeled z, horizontal bottom labeled y)

a. $x = 9$

$y = 9$

$9\sqrt{2}$

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

$x = 5\sqrt{2}$

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

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

$y = 32$

$x = 32$

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

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

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

$z = \dfrac{\sqrt{\frac{3}{4}}}{2}$

f. $z = 10$

$\dfrac{10}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}}$

$\dfrac{10\sqrt{2}}{2}$

$y = 5\sqrt{2}$

2. A square has an area of 100 inches². Find the length of the diagonal.

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?

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?

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