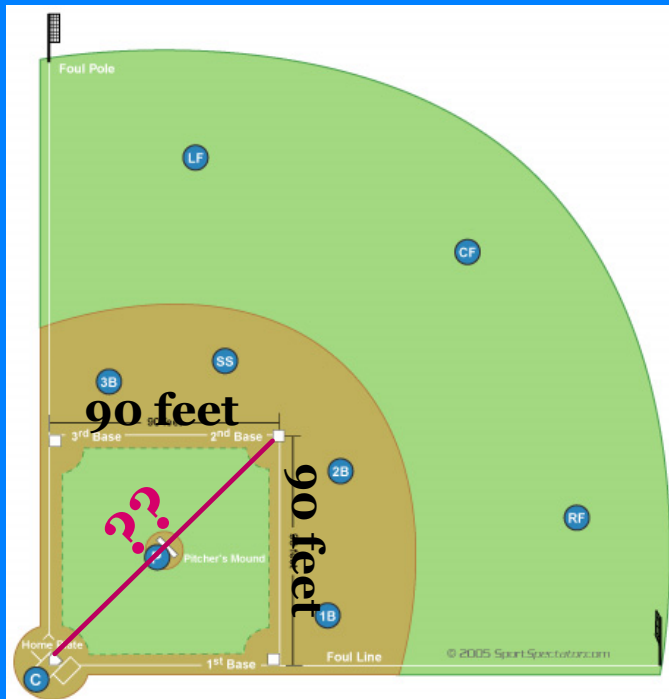
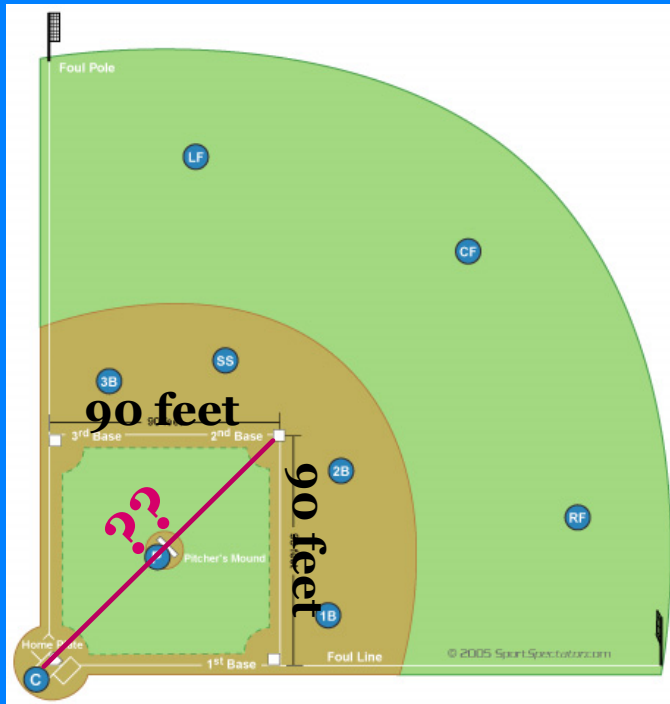


*The diagram shows a typical baseball field.*



*Suppose we want to know how far the home plate is from second base...*

*What could we do to find this out?*

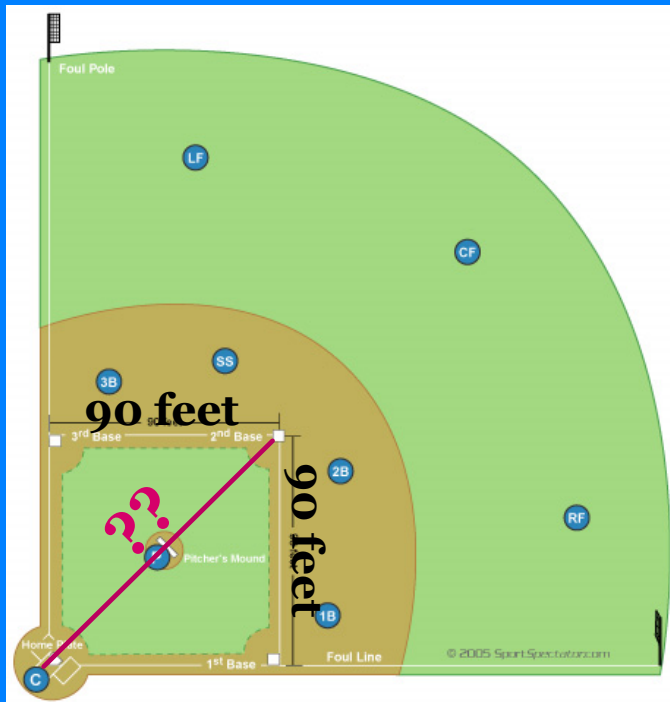


*The Pythagorean Theorem!*

*What represents...*

*...the legs?*

*...the hypotenuse?*

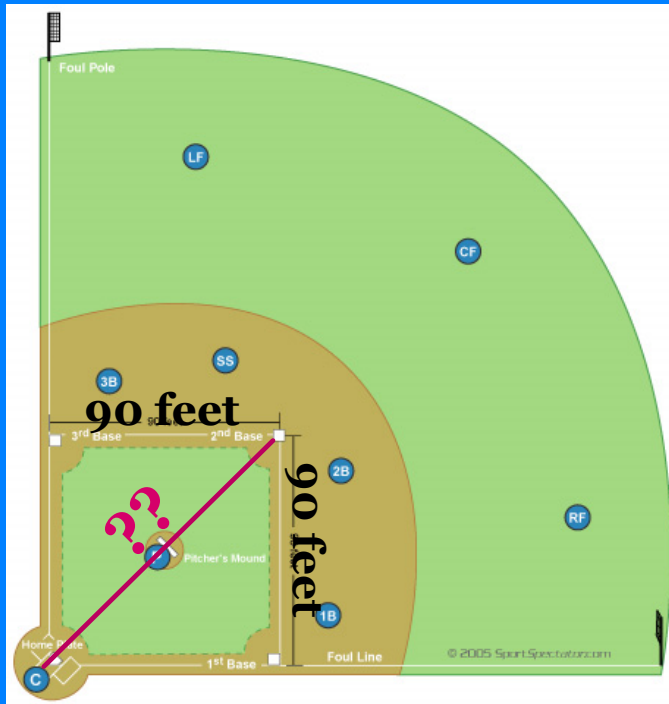


*What kind of triangle is this? Think carefully...there are **two** answers.*

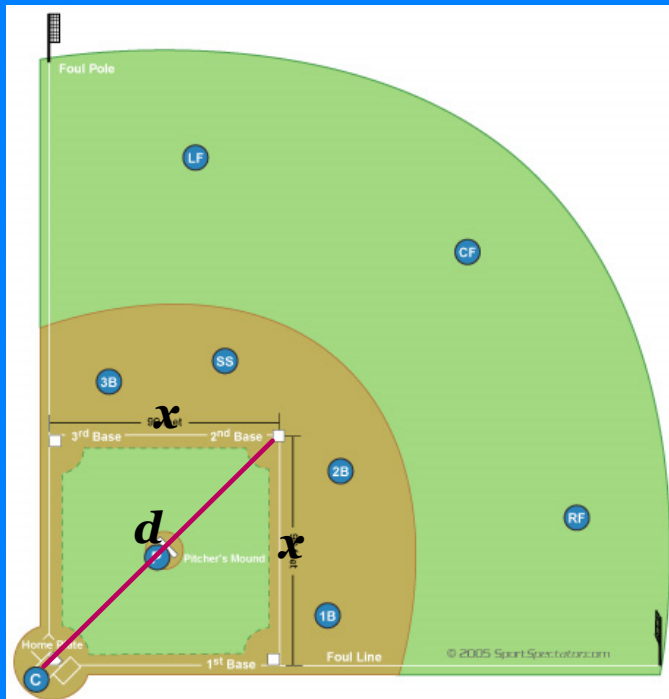
isosceles

&

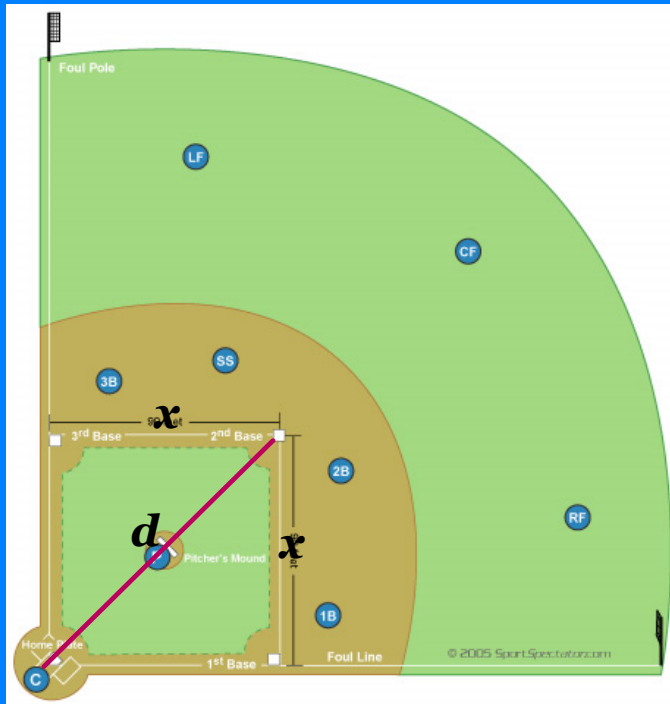
right



So that means the measures of the angles of this triangle are **45-45-90 degrees**.



Let's suppose that we don't know how far the bases are from each other. So we'll call them  **$x$** . Use the Pythagorean Theorem to solve for the distance between the home plate and second base (we'll call it  **$d$** ).



$$x^2 + x^2 = d^2$$

$$2x^2 = d^2$$

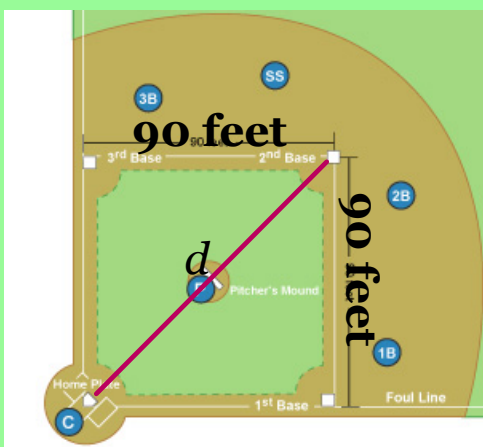
$$\sqrt{2x^2} = \sqrt{d^2}$$

$$\sqrt{2 \cdot x \cdot x} = \sqrt{d \cdot d}$$

$$x\sqrt{2} = d$$

### Theorem 9.8

In a  $45^\circ - 45^\circ - 90^\circ$  triangle, the hypotenuse is  $\sqrt{2}$  times as long as a leg.



### Example 1

Let's use this theorem to find the distance between the home plate and second base. Write your answer as a radical.

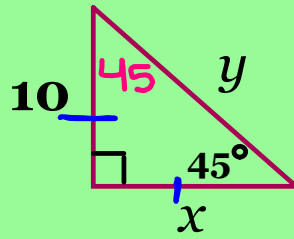
$$90\sqrt{2} \text{ ft}$$

Example 2

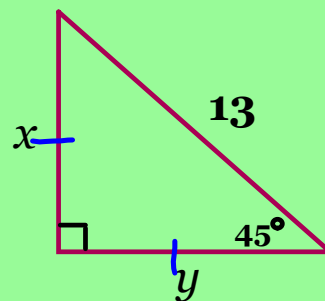
Find the value of  $x$  and  $y$ .  
Leave your answer in radical form.

$$x = 10$$

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

Example 3

Find the value of  $x$  and  $y$ .  
Leave your answer in radical form.



Hmm...



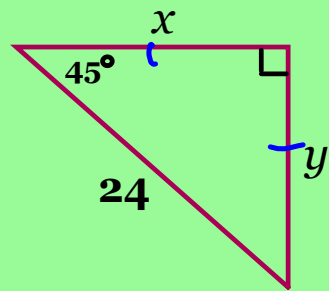
*How is this problem different??*

rationalizing the denominator

$$\frac{13}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{13\sqrt{2}}{2} = x \text{ \& } y$$

short side to long side  $\longrightarrow$  multiplication

long side to short side  $\longrightarrow$  division

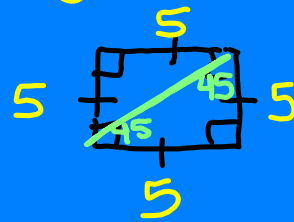


Example 4  
Find the value of  $x$  and  $y$ .  
Leave your answer in radical form.

$$\frac{24}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{24\sqrt{2}}{2} = 12\sqrt{2} = x \& y$$

- 1 The perimeter of a square is 20 cm.  
Find the length of a diagonal.

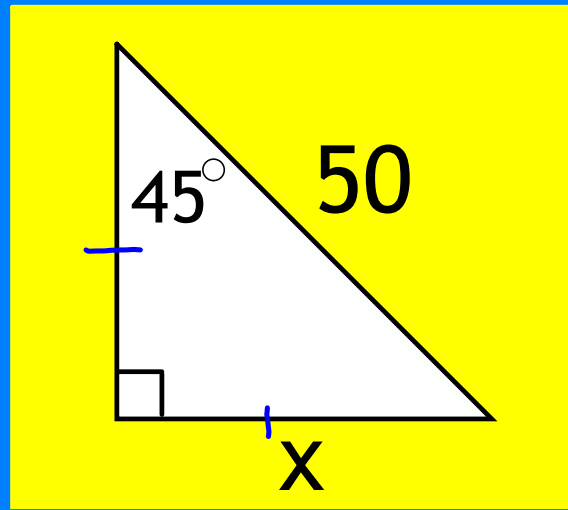
- A  $\sqrt{10}$  cm
- B  $5\sqrt{2}$  cm
- C  $2\sqrt{5}$  cm
- D 4 cm



2 Find the value of  $x$ .

- A  $50\sqrt{2}$
- B  $\frac{50\sqrt{2}}{2}$
- C  $\frac{25\sqrt{2}}{2}$
- D  $25\sqrt{2}$

$$\frac{50}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{50\sqrt{2}}{2} = 25\sqrt{2}$$



3 The area of a square is  $64 \text{ cm}^2$ .  
Find the length of a diagonal.

- A 8 cm
- B  $8\sqrt{3}$  cm
- C  $8\sqrt{2}$  cm
- D 32 cm

