Lesson 7.3:

The Pythagorean Theorem

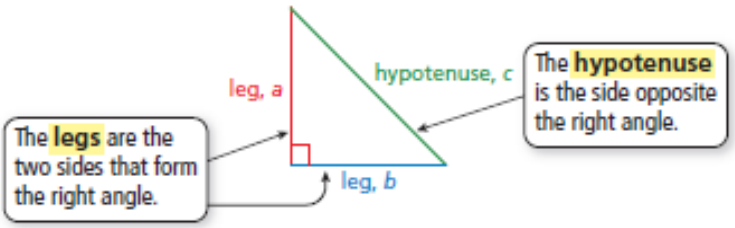
Essential Question

How are the lengths of the sides of a right triangle related?

Key Ideas

Sides of a Right Triangle

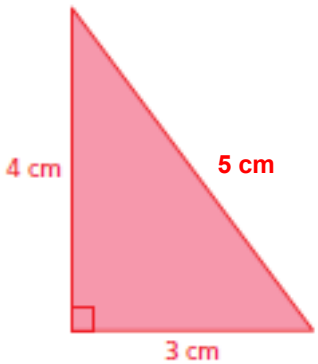
The sides of a right triangle have special names.

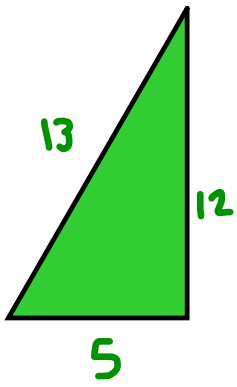


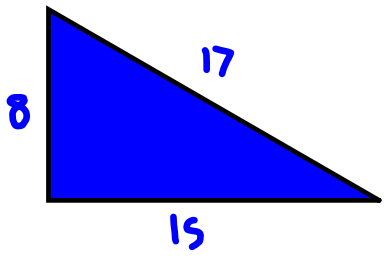
The Pythagorean Theorem

Words In any right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.

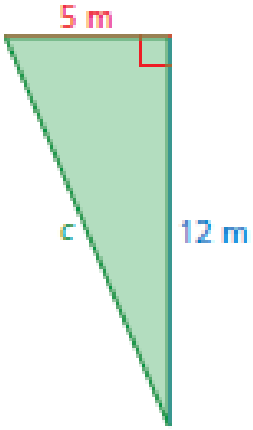
Algebra $a^2 + b^2 = c^2$







Find the length of the hypotenuse of the triangle.



$(5m)^2 + (12m)^2 = c^2$

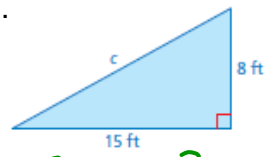
$25m^2 + 144m^2 = c^2$

$169m^2 = c^2$

$13m = c$

Find the length of the hypotenuse of the triangle.

1.



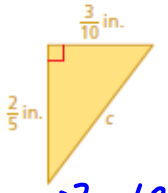
$(8ft)^2 + (15ft)^2 = c^2$

$64ft^2 + 225ft^2 = c^2$

$\sqrt{289ft^2} = \sqrt{c^2}$

$17ft = c$

2.



$\left(\frac{2}{5}in\right)^2 + \left(\frac{3}{10}in\right)^2 = c^2$

$\frac{4}{25}in^2 + \frac{9}{100}in^2 = c^2$

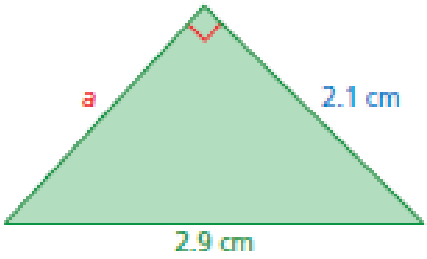
$\frac{16}{100}in^2 + \frac{9}{100}in^2 = c^2$

$\sqrt{\frac{25}{100}in^2} = \sqrt{c^2}$

$\frac{\sqrt{25}}{\sqrt{100}}$

$\frac{5}{10}in^2 = \frac{1}{2}in^2$

Find the missing length of the triangle.



$a^2 + (2.1\text{cm})^2 = (2.9\text{cm})^2$

$a^2 + 4.41\text{cm}^2 = 8.41\text{cm}^2$

$-4.41\text{cm}^2 \quad -4.41\text{cm}^2$

$\sqrt{a^2} = \sqrt{4\text{cm}^2}$

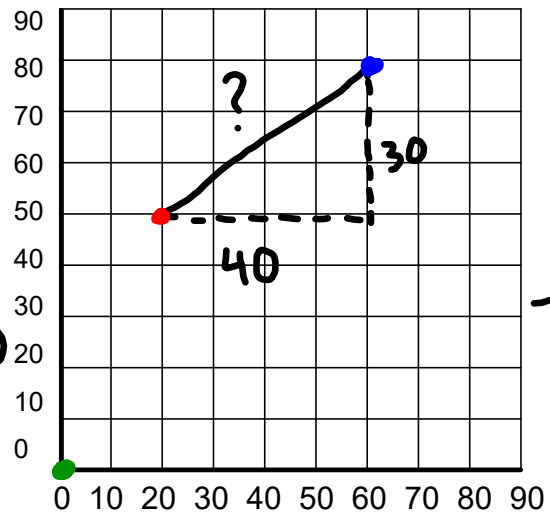
$a = 2\text{cm}$

You are playing capture the flag. You are 50 yards north and 20 yards east of your team's base. The other team's base is 80 yards north and 60 yards east of your base. How far are you from the other team's base?

3-4-5

×10

30-40-50



$30^2 + 40^2 = x^2$

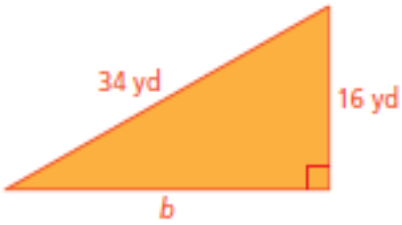
$900 + 1600 = x^2$

$\sqrt{2500} = \sqrt{x^2}$

$50\text{yds} = x$

Find the missing length of the triangle.

3.



$16^2 + b^2 = 34^2$

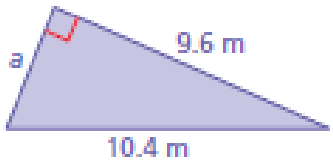
$256 + b^2 = 1156$

$-256 \quad -256$

$\sqrt{b^2} = \sqrt{900}$

$b = 30\text{ yd}$

4.



$a^2 + 9.6^2 = 10.4^2$

$a^2 + 92.16 = 108.16$

$-92.16 \quad -92.16$

$\sqrt{a^2} = \sqrt{16}$

$a = 4\text{m}$