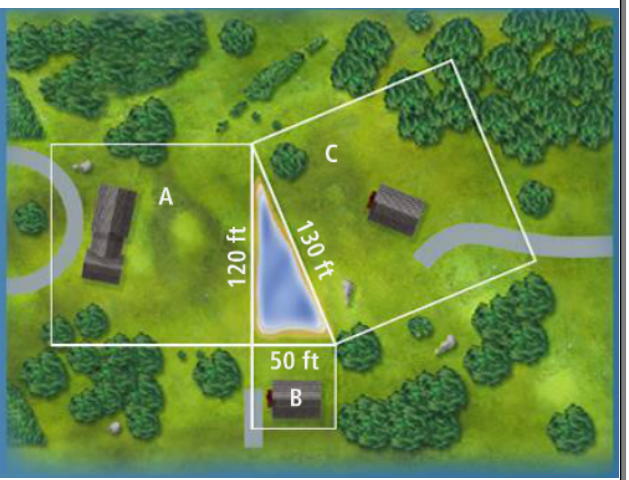
Algebra 1

Chapter 10

Section 10-1

The diagram shows three square house lots that border a pond shaped like a right triangle. What is the area of each house lot? Can you write an equation to relate all three areas? Explain.



Box A = $120 \cdot 120 = 120^2 = 14400$ ft^2

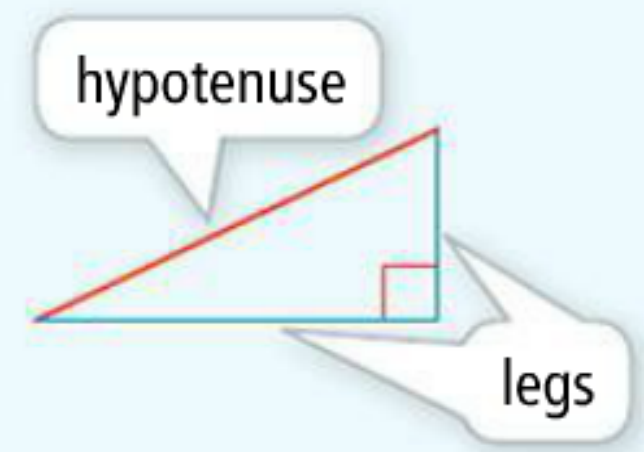
Box B = $50 \cdot 50 = 50^2 = 2500$ ft^2

Box C = $130 \cdot 130 = 130^2 = 16900$ ft^2

Box A + Box B = Box C

Right Triangles

A right triangle is a triangle with a right angle ("perfect" corner). The hypotenuse is across from the right angle and is the longest side. The other two (shorter) sides are called legs.



take note

Theorem The Pythagorean Theorem

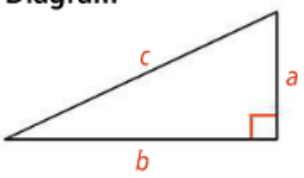
Words

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

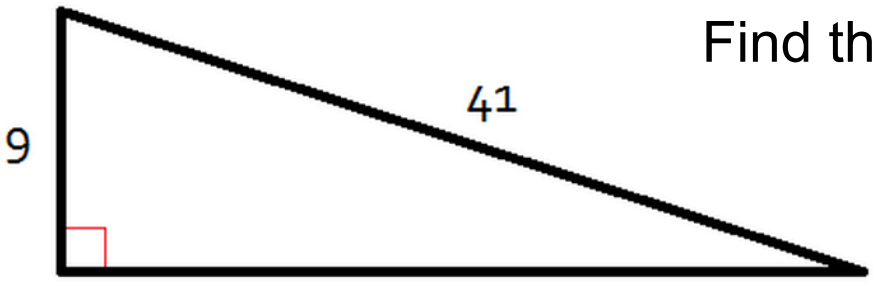
$a^2 + b^2 = c^2$

Diagram



For a triangle to be a right triangle the sides must meet this condition.

Find the value of y.



$9^2 + y^2 = 41^2$

$y^2 = 41^2 - 9^2$

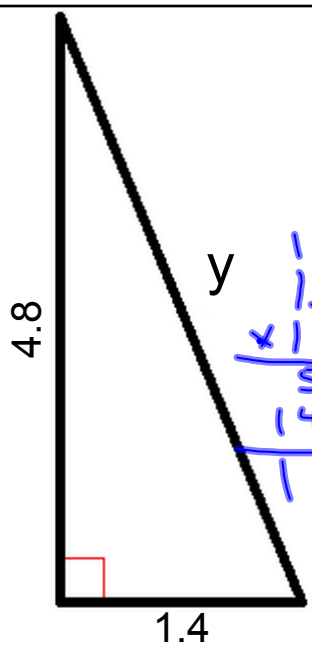
$y^2 = 1681 - 81$

$\sqrt{y^2} = \sqrt{1600}$

$y = 40$

41
×41
41
1640
1681

Find the value of y.



1
1.4
×1.4
56
140
196

$1.4^2 + 4.8^2 = y^2$

$1.96 + 23.04 = y^2$

$25 = y^2$

$5 = y$

36
4.8
·4.8
384
1920
23.04

A triangle has sides that measure 14 cm, 18 cm and 11 cm. Does the triangle have a right angle?

$14^2 + 11^2 = 18^2$

$196 + 121 = 324$

$317 \neq 324$

No right $\angle$

6
18
18
144
180
324

Pythagorean Triples

A *Pythagorean Triple* is a set of three natural numbers (positive, whole numbers) that fit the relationship $a^2 + b^2 = c^2$.

9, 40, 41

Are the following sets Pythagorean Triples?

5, 11, 12

$25+121 \stackrel{?}{=} 144$

$146 \neq 144$

No

3, 4, 5

$9+16 \stackrel{?}{=} 25$

Yes

15, 20, 25

$15^2+20^2 \stackrel{?}{=} 25^2$

$225+400 \stackrel{?}{=} 625$

Yes