Geometry

Chapter 8
Section 8-1

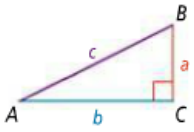
Pythagorean Theorem

take note

Theorem 8-1 Pythagorean Theorem

Theorem
If a triangle is a right triangle, then the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.

If . . .
$\triangle ABC$ is a right triangle



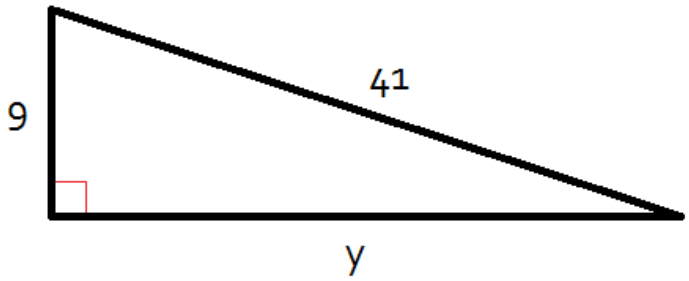
Then . . .
$(\text{leg}_1)^2 + (\text{leg}_2)^2 = (\text{hypotenuse})^2$

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

*** Converse is also true

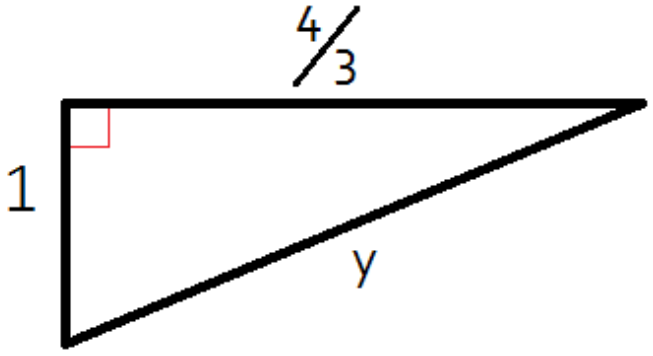
A pythagorean triple is a set of whole numbers (not zero) that fit the equation $a^2 + b^2 = c^2$.

Using the Pythagorean Theorem



$9^2 + y^2 = 41^2$
$81 + y^2 = 1681$
$y^2 = 1600$
$y = 40$

Using the Pythagorean Theorem



$1^2 + (4/3)^2 = y^2$
$1 + 16/9 = y^2$
$25/9 = y^2$
$y = 5/3$

Pythagorean Triples

Are the following Pythagorean Triples

5, 11, 12

15, 20, 25

7, 24, 25

3, 4, 5

NO

YES

YES

YES

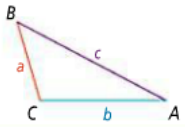
Obtuse and Acute Triangles

take note

Theorem 8-3

Theorem
If the square of the length of the longest side of a triangle is greater than the sum of the squares of the lengths of the other two sides, then the triangle is obtuse.

If . . .
$c^2 > a^2 + b^2$

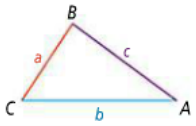


Then . . .
$\triangle ABC$ is obtuse

Theorem 8-4

Theorem
If the square of the length of the longest side of a triangle is less than the sum of the squares of the lengths of the other two sides, then the triangle is acute.

If . . .
$c^2 < a^2 + b^2$



Then . . .
$\triangle ABC$ is acute

Using the Theorems

Are the following triangles acute, obtuse or right?

Sides: 7, 5, 10

Sides: 9, 15, 13

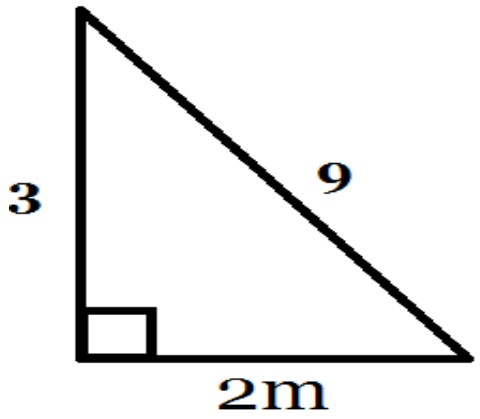
Sides: 1, 1.2, 2

Obtuse

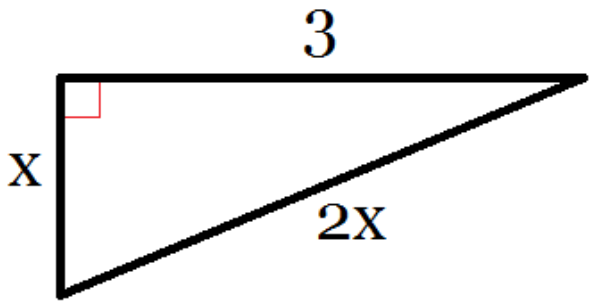
Acute

Obtuse

Finding an Unknown Side



Finding Multiple Unknown Sides



$x^2 + 3^2 = (2x)^2$
$x^2 + 9 = 4x^2$
$9 = 3x^2$
$3 = x^2$
x = square root of 3

Homework

Pages 495 - 496
7 - 31 odd