# Chapter 7 § 2

## The Pythagorean Theorem and Its Converse

## Definitions :

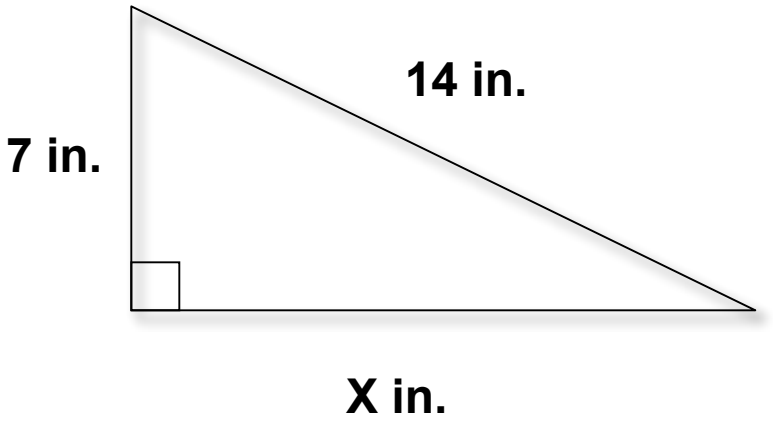
**Pythagorean Triple – a group of three whole numbers that satisfies the equation $a^2 + b^2 = c^2$, where c is the greatest number.**

## Theorems :

**Pythagorean Theorem (7-4) – In a right triangle, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse.**

**Converse of the Pythagorean Theorem (7-5) – If the sum of the squares of the measures of two sides of a triangle equals the square of the measure of the longest side , then the triangle is a right triangle.**

**Find x**




$7^2 + x^2 = 14^2$

$49 + x^2 = 196$

$x^2 = 147$

$x \approx 12.12$

**Given ∆DAR with vertices D(-3,6), A(5, 5), and R(3,2) determine if the triangle is a right triangle.**

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$\overline{DA}$

$$\sqrt{(5 - -3)^2 + (5 - 6)^2}$$

$$\sqrt{65}$$

$\overline{DR}$

$$\sqrt{(-3 - 3)^2 + (6 - 2)^2}$$

$$\sqrt{52}$$

$\overline{AR}$

$$\sqrt{(5 - 3)^2 + (5 - 2)^2}$$

$$\sqrt{13}$$

$$(\sqrt{13})^2 + (\sqrt{52})^2 = (\sqrt{65})^2$$

$$13 + 52 = 65$$

$$65 = 65$$

**Therefore ∆DAR is a right triangle**

**Determine whether each set of numbers can be the measures of the sides of a right triangle. Then determine whether they form a Pythagorean triple.**

**9, 40, 41**

$$9^2 + 40^2 = 41^2$$

$$81 + 1600 = 1681$$

$$1681 = 1681$$

**yes, yes**

$$\frac{9}{5} \quad \frac{12}{5} \quad 3$$

$$\left(\frac{9}{5}\right)^2 + \left(\frac{12}{5}\right)^2 = 3^2$$

$$\left(\frac{81}{25}\right) + \left(\frac{144}{25}\right) = 9$$

$$9 = 9$$

**yes, no**