

3.01 Pythagorean Theorem

Notes	Video Links & Practice Space
Vocabulary 1. Hypotenuse: the _____ of a right triangle; the side _____ the right angle 2. Legs: The two _____ sides of a right triangle; the sides form a _____ degree angle 3. Pythagorean Theorem: if a triangle is a _____ triangle, then the square of one leg (a) plus the square of the other leg (b) is _____ to the square of the hypotenuse (c), or _____ 4. Converse of Pythagorean Theorem: if the lengths a, b, and c of the three sides of a triangle satisfy the relationship, _____ then the triangle is a _____ 5. Triangle Inequality Theorem: The _____ of the lengths of any two sides of a triangle must be _____ than the length of the third side	Vocabulary (1:24)

Triangle Inequality Theorem

To determine whether three line segments create a _____, you can use the _____.

The sum of the lengths of any two sides of a triangle must be greater than the length of the third side.

Side 1 + Side 2 > Side 3

TIP: Compare the sum of the two shortest sides to the length of the longest side.

[Triangle Inequality Theorem & Practice 1 \(1:29\)](#)

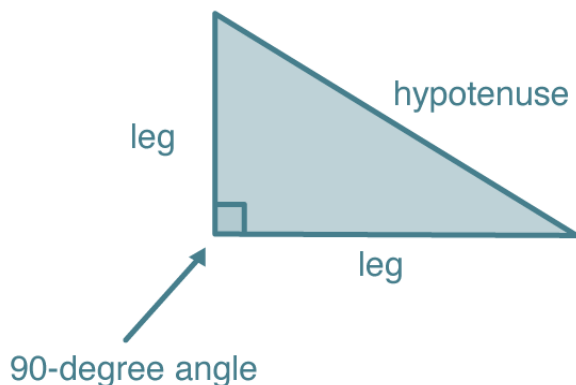
Practice 1: Can the side lengths of a triangle be 3, 9, and 8?

Right Triangles

The two sides that meet at a right angle are called the _____ legs.

The side opposite the right angle is called the _____ hypotenuse. The hypotenuse is the _____ longest side of a right triangle.

A _____ at one of the _____ of the triangle symbolizes the location of the _____-degree angle.

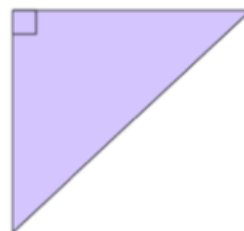


[Right Triangles & Practice 2 and 3 \(1:47\)](#)

Practice 2: Identify and label the sides of the right triangle.



Practice 3: Identify and label the sides of the right triangle.



Pythagorean Theorem

We can use the Pythagorean theorem to determine if a triangle is a right triangle. We can do this by using the _____.

Step 1: Identify the shortest sides as a and b and the longest side as c .

Step 2: Substitute the values into the Pythagorean Theorem formula, $a^2 + b^2 = c^2$.

Step 3: Simplify.

If the equation gives a true statement, then the triangle is a right triangle.

If the equation gives a false statement, then the triangle is not a right triangle.

Pythagorean Theorem & Practice 4 and 5 (3:25)

Practice 4: Is a triangle with side lengths 8, 10, and 15 a right triangle?

Practice 5: Is a triangle with side lengths $\sqrt{4}$, 3, and $\sqrt{15}$ a right triangle?

Applying the Pythagorean Theorem

We can also use the Pythagorean theorem to solve for an unknown side of a right triangle.

Step 1: _____.

Step 2:

_____, $a^2 + b^2 = c^2$.

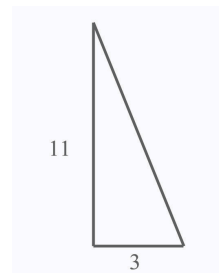
Step 3: _____.

Note: There may be times when the missing side length is not a whole number. You'll have to use your square root skills to estimate the length.

Tip: When you square the square root of a number, your answer will be the number under the radical. For example $(\sqrt{12})^2 = 12$

Applying the Pythagorean Theorem (3:47)

Practice 6: Determine the measurement of the missing side length.



Practice 7: A right triangle has one leg with a length of 16 and a hypotenuse with a length of 20. Determine the length of the other leg.

Real World Connection

Apply your problem-solving skills to solve an unknown side of a real-world problem.

Step 1: Identify the shortest sides (legs) as a and b and the longest side as c (hypotenuse).

Step 2: Substitute the known values into the Pythagorean Theorem formula,

Step 3: Solve the equation.

Tip: Draw a diagram if you can!

Real World Connection (1:44)

Practice 8: A rectangular field is 9 yards wide and 15 yards long. If you run diagonally from one corner to the other, how many yards will you run?