

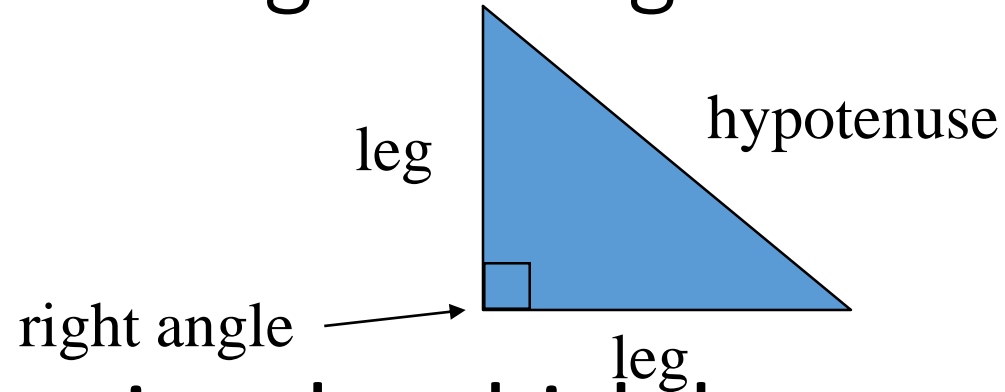


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# The Pythagorean Theorem



# What is a right triangle?



It is a triangle which has an angle that is **90** degrees.

The two sides that make up the right angle are called **legs**.

The side opposite the right angle is the **hypotenuse**.



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# The Pythagorean Theorem

In a right triangle, if  $a$  and  $b$  are the measures of the legs and  $c$  is the hypotenuse, then

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

Note: The hypotenuse,  $c$ , is always the longest side.



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Find the length of the hypotenuse if

1.  $a = 12$  and  $b = 16$ .

$$12^2 + 16^2 = c^2$$

$$144 + 256 = c^2$$

$$400 = c^2$$

Take the square root of both sides.

$$\sqrt{400} = \sqrt{c^2}$$

**20 = c**



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Find the length of the  
hypotenuse if

2.  $a = 5$  and  $b = 7$ .

$$5^2 + 7^2 = c^2$$

$$25 + 49 = c^2$$

$$74 = c^2$$

Take the square root of both sides.

$$\sqrt{74} = \sqrt{c^2}$$

**8.60 = c**



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Find the length of the hypotenuse given  $a = 6$  and  $b = 12$

1. 180
2. 324
- ✓ 3. 13.42
4. 18



Find the length of the leg, to the nearest hundredth, if

3.  $a = 4$  and  $c = 10$ .

$$4^2 + b^2 = 10^2$$

$$16 + b^2 = 100$$

Solve for  $b$ .

$$16 - \mathbf{16} + b^2 = 100 - \mathbf{16}$$

$$b^2 = 84$$

$$\sqrt{\mathbf{b^2}} = \mathbf{9.17} \sqrt{84}$$



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Find the length of the leg, to the nearest hundredth, if

4.  $c = 10$  and  $b = 7$ .

$$a^2 + 7^2 = 10^2$$

$$a^2 + 49 = 100$$

Solve for a.

$$a^2 = 100 - 49$$

$$a^2 = 51$$

$$\sqrt{a^2} = \sqrt{51}$$

$a = 7.14$





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Find the length of the missing side given  $a = 4$  and  $c = 5$

1. 1

✓ 2. 3

3. 6.4

4. 9



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The measures of three sides of a triangle are given below. Determine whether each triangle is a right triangle.

, 3, and  $8\sqrt{73}$

Which side is the biggest?

The square root of 73 (= 8.5)! This must be the hypotenuse (c).

Plug your information into the Pythagorean Theorem. It doesn't matter which number is a or b.



Sides:           , 3, and  $\sqrt{83}$

$$3^2 + 8^2 = ( \quad )^2 \quad \sqrt{73}$$

$$9 + 64 = 73$$

$$73 = 73$$

Since this is true, the triangle is a right triangle!! If it was not true, it would not be a right triangle.



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Determine whether the triangle is a right triangle given the sides 6, 9, and  $\sqrt{45}$

1. Yes ✓
2. No
3. Purple