THE PYTHAGOREAN THEOREM AND ITS CONVERSE

BUILDING ON WHAT WE KNOW SO FAR

LET'S START WITH THIS COOL PROOF!

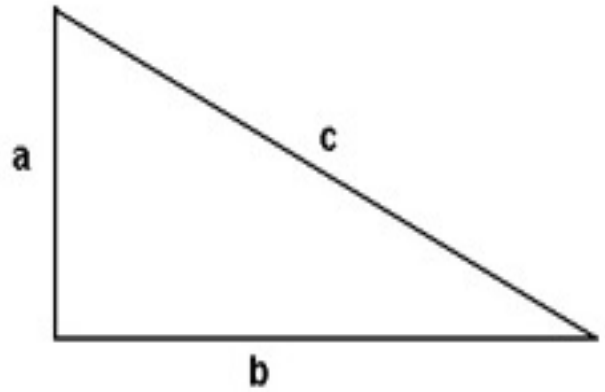
Cool graphical proof

During this video, you must write the following on a separate sheet of paper:

- 2 things that surprised you
- 2 things that confused you

THE PYTHAGOREAN THEOREM

- In a right triangle, the sum of the squares of the lengths of the legs equals the square of the length of the hypotenuse.
- If *a* and *b* are the lengths of the legs, and *c* is the length of the hypotenuse, then…



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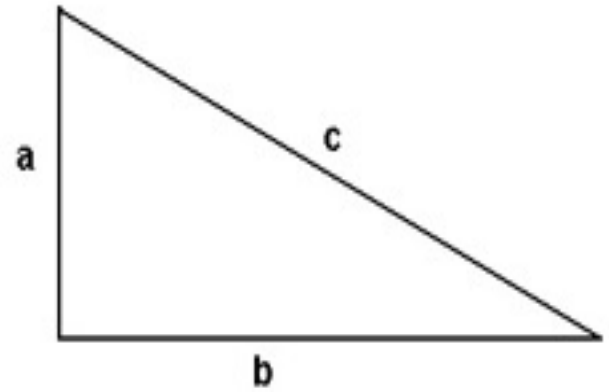
- If *a* and *b* are the lengths of the legs, and *c* is the length of the hypotenuse, then…

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



IS THE CONVERSE OF THE PYTHAGOREAN THEOREM TRUE?

1. Verify that the lengths assigned to your group satisfy the Pythagorean Theorem.

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Example: 3-4-5

$3^2+4^2=5^2$?

9+16=25

Yes, our side lengths satisfy the Pythagorean Theorem

PYTHAGOREAN TRIPLE: any combination of 3 whole numbers that satisfies the Pythagorean Theorem

Group	Side Lengths (given in cm)	Right Triangle?	Pythagorean Triple?
1	9-12-15		
3	5-12-13		
4	6-8-10		
5	10-24-26		
6	7-24-25		
7	8-15-17		
8	20-21-29		

ESSENTIAL QUESTION

Can the sides of a triangle be fractions or decimals and still satisfy the Pythagorean Theorem?

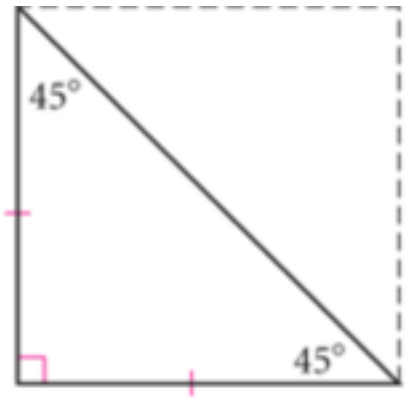
PYTHAGOREAN INEQUALITIES

If $a^2 + b^2 = c^2$, we know that the triangle is a right triangle.

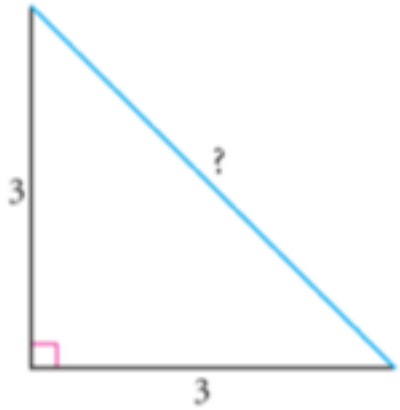
If $\mathbf{a^2 + b^2 > c^2}$, the triangle is an **acute triangle**

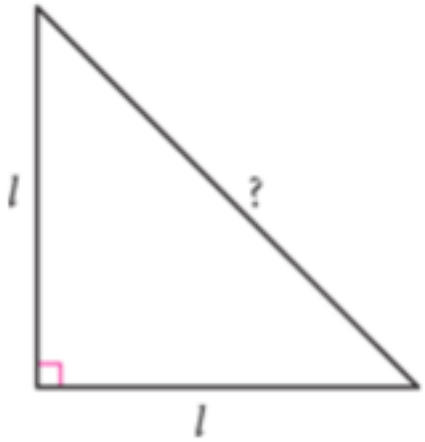
If $\mathbf{a^2 + b^2 < c^2}$, the triangle is an **obtuse triangle**

SPECIAL RIGHT TRIANGLES



An isosceles right triangle





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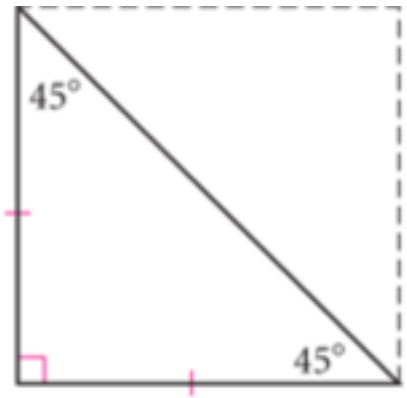

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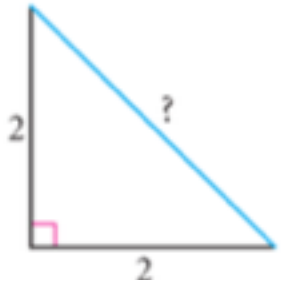

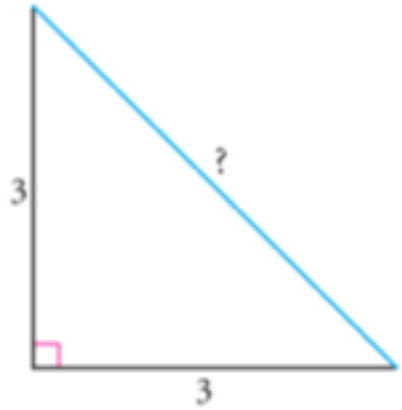

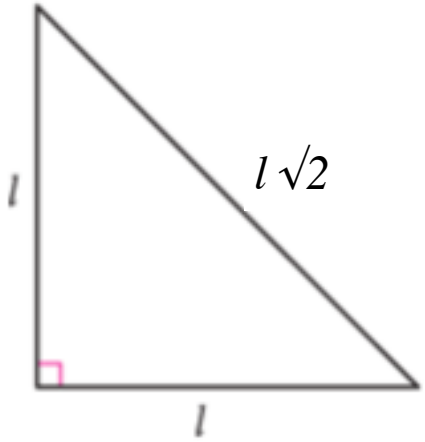

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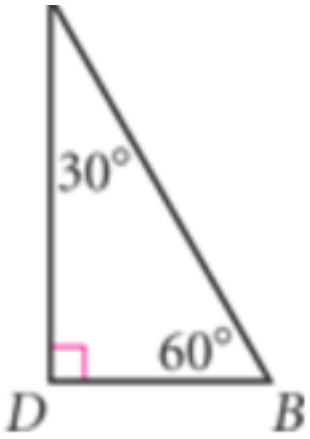
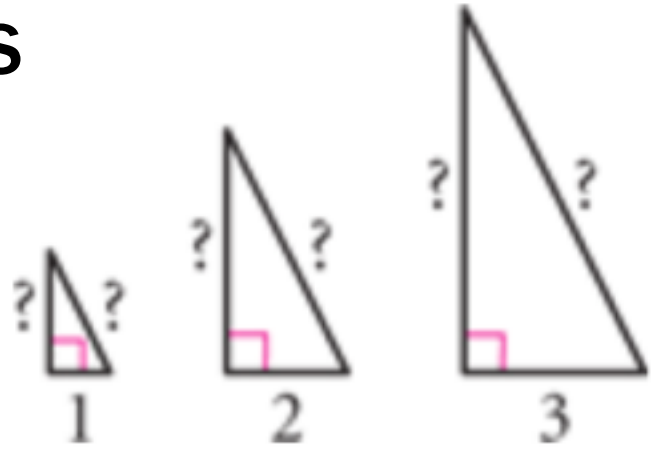
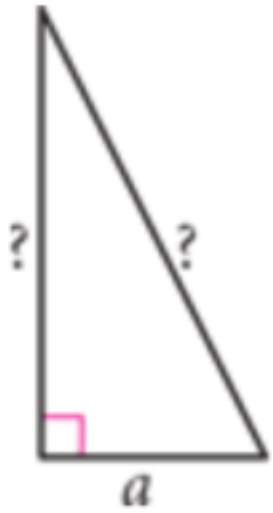


A 30°-60°-90° triangle





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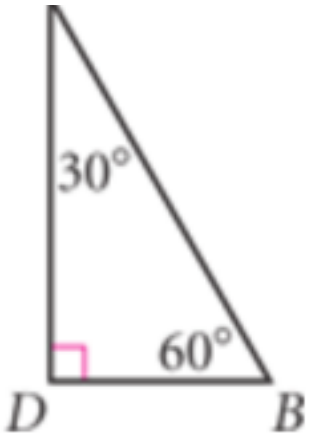

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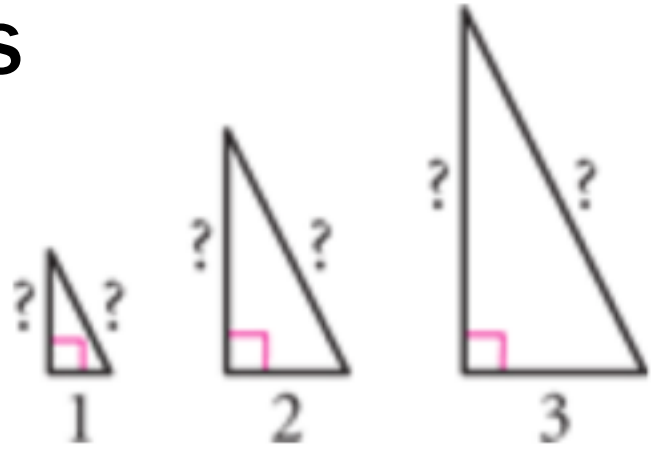
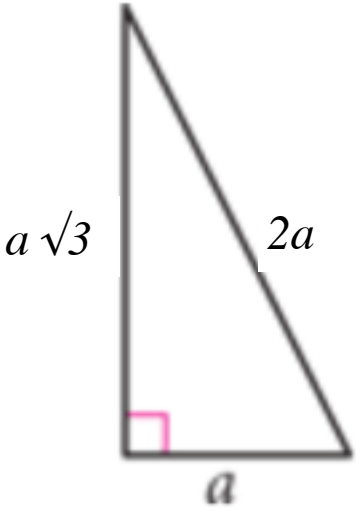
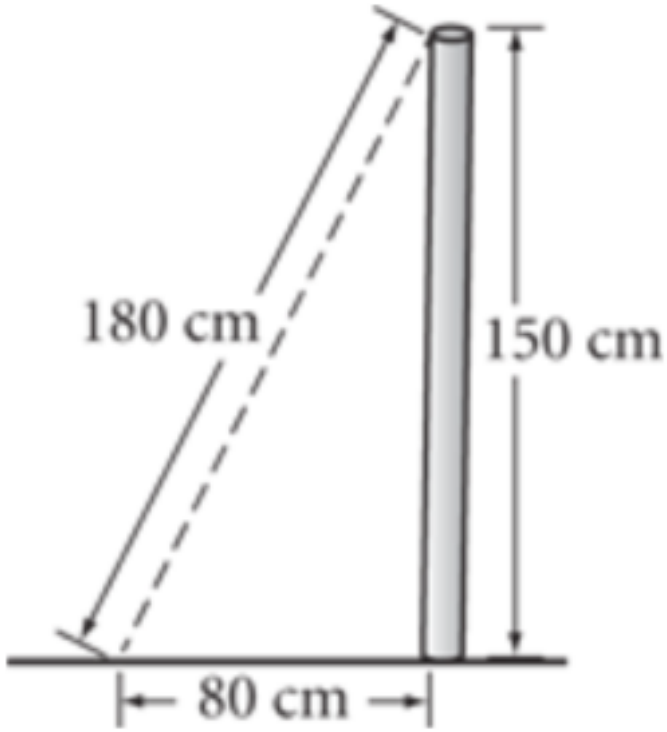




EXAMPLES

A steel pole 150 cm in length has been placed in the ground ready for cement to seal it in place. To check to see if it is perpendicular to the ground, the contractor has measured a distance of 180 cm from the top of the pole to 80 cm from the base of the pole on the ground. Is the pole perpendicular to the ground?



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