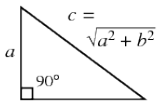
Right triangles and a ladder

A right triangle was noticed by many before a Greek man named Pythagoras was credited for the equation $a^2 + b^2 = c^2$ around 569-500 BC. The Pythagorean theorem states that the sum of the squares of the lengths of the two other sides of any right triangle will equal the square of the length of the hypotenuse, or, in mathematical terms, for the triangle shown at right, $a^2 + b^2 = c^2$.

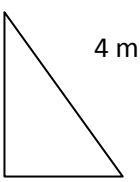
A right triangle consists of: a, b, the legs; and c, the largest side or the hypotenuse.



general right triangle

The problem:

There is a hole in the roof caused by rain. The grounds man has to get on the roof that is about 2 stories high (about 20 feet or 6.096 m.). The ladder the length of 4 meters is leaning against the wall of the building. The distance from the foot of the ladder to the base of the building is 2 m. Is the ladder tall enough for the grounds man to get on top of the roof to fix the hole?



1. Using the equation $a^2 + b^2 = c^2$. Plugging the numbers into the equation we get:
   $2^2 + b^2 = 4^2$
   $4+b^2 = 16$
   -4 -4

   $b^2 = 12$
   $\sqrt{b^2} = \sqrt{12}$
   B = $2\sqrt{3}$ =3.4641 meters

2. The conclusion is the roof has to be 3.4641 meters in order for a 4 foot ladder to reach it. The roof is 6.096 meters, so the ladder will not reach the roof.

3. Other applications could include angles, and using sin, cosine, or tangent functions to find the height of buildings or length of the ladder or pole.