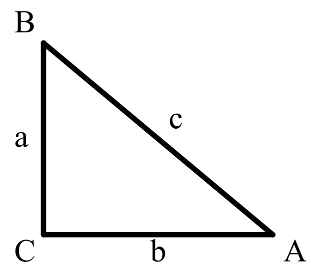
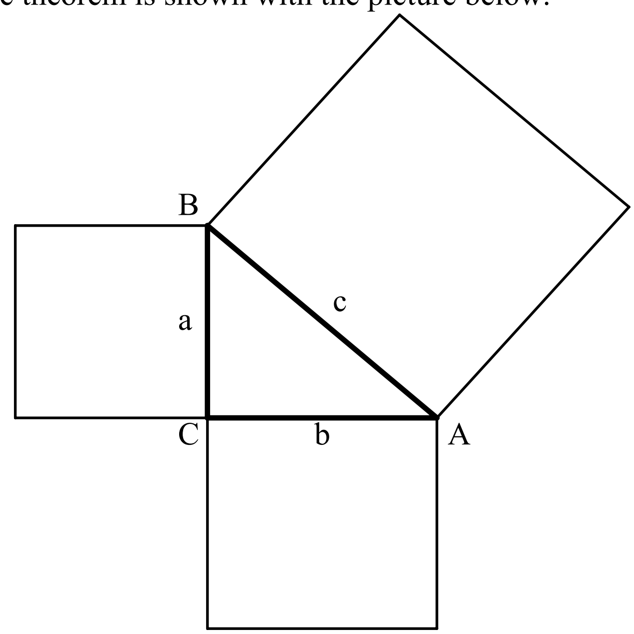
Write about the Pythagorean Theorem.

First, we start with a statement of the theorem: Let ABC be a right triangle with sides of lengths *a*, *b*, and *c*. Let the sides with lengths *a* and *b* be the legs, and let *c* be the hypotenuse. Then *a*^2 + *b*^2 = *c*^2. Also, if *a*^2 + *b*^2 = *c*^2, then ABC is a right triangle.



An illustration of the theorem is shown with the picture below.



The theorem tells us that if the angle at C is a right angle then the sum of the areas of the squares with sides *a* and *b* is equal to the area of the square with sides *c*.

We can give some examples of the theorem.
3^2 + 4^2 = 5^2, so a square with sides of length 3, 4, and 5 is a right triangle.
Similarly 5, 12, 13 is the side lengths of a right triangle. These sets of numbers are called Pythagorean Triples.

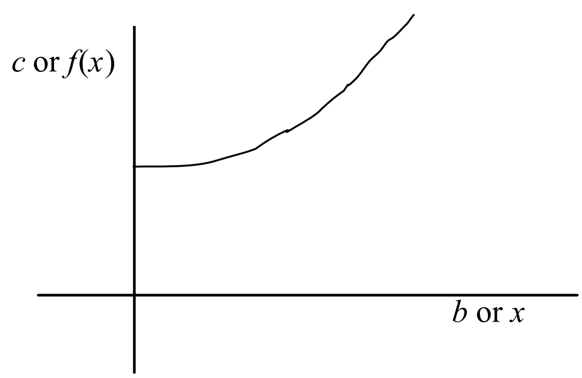
Also, all multiples of Pythagorean Triples are Pythagorean triples. For example,
3, 4, 5
6, 8, 10 (times 2)
9, 12, 15 (times 3)
1.5, 2, 2.5 (times 0.5)
These are all Pythagorean Triples.

Let's see what happens if we have a triangle that is not a right triangle. I know that equilateral triangles are not right. So if I take a triangle with sides all 1 and I try to use the Pythagorean Theorem, I get 1^2 + 1^2 = 1^2 or 2 = 1, which is nonsense. So I have shown that if a triangle does not have a right angle, then we do not always get a^2 + b^2 = c^2.

If I know any two sides of a right triangle, then I can always find the third. Let's see what happens if we fix $a = 1$

b	x	0	1	2	3	4	5	6	7	8
c	$\sqrt{(x^2 + 1)}$	1	$\sqrt{2}$	$\sqrt{3}$	2	$\sqrt{5}$	$\sqrt{6}$	$\sqrt{7}$	$\sqrt{8}$	3

So if $a = 1$, then we can think of c as a function of b, namely c is $f(x) = \sqrt{(x^2 + 1)}$.



(Note that this is about 350 words.)