

Proof and Problem Solving

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Class Notes

What is a *Proof* ?

- A series of logical statements together called an ***argument*** that results in establishing the truth of a mathematical statement of fact called **lemma** or **theorem**.
- The statements should each be true and one statement should lead to the next statement.
- They should use only the **definitions** and **axioms** that have been previously stated and the **hypotheses** that have been made in the lemma or theorem to be proved.

Example: Pythagoras Theorem

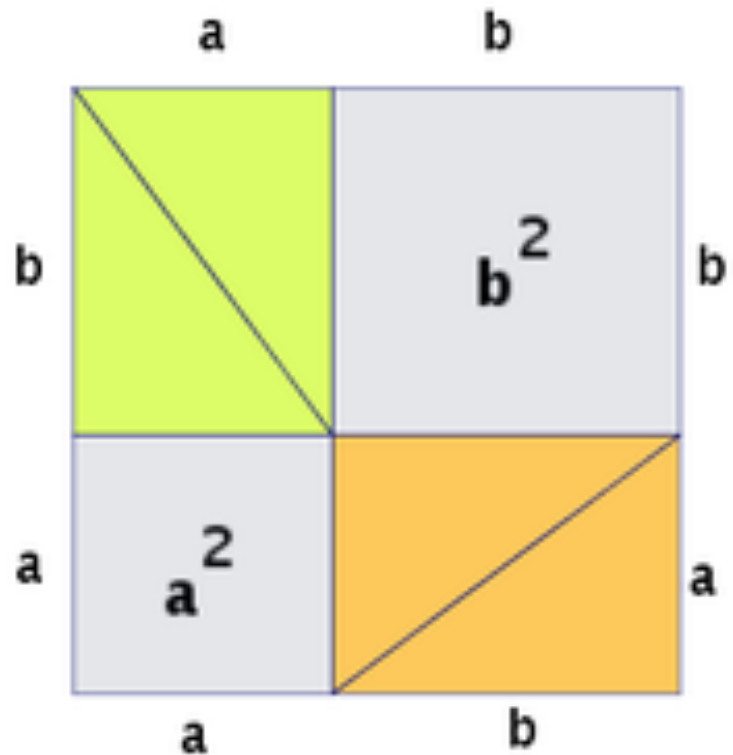
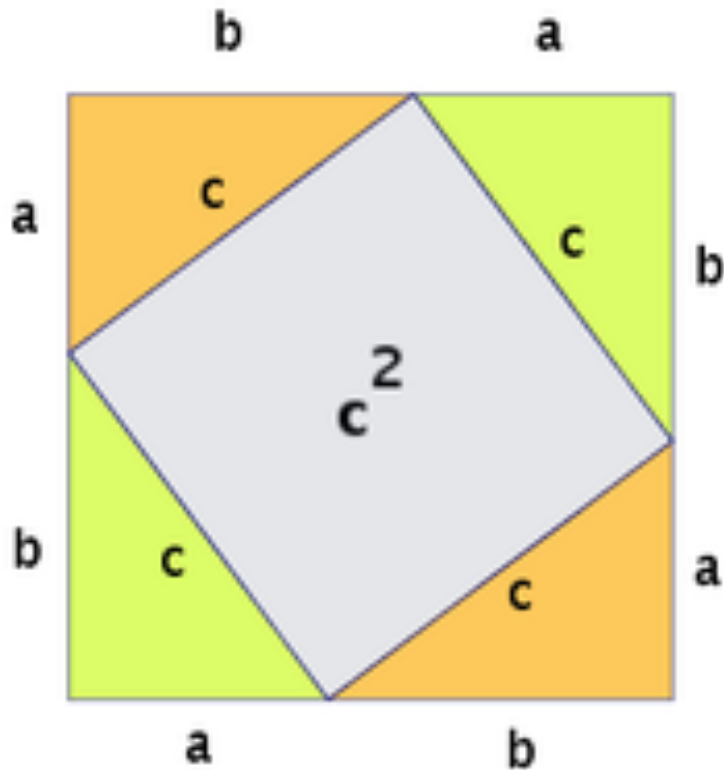
- In any right triangle, $c^2 = a^2 + b^2$

Here a , b are the sides, c is hypotenuse.

- How do you prove this?
- Is it enough to check some right triangles?

Geometrical proof

Picture thanks to <https://math.stackexchange.com>



Questions

1. Write down the step by step proof using the two pictures, stating the assumptions you made and axioms that you used.
2. Algebraic Proof: From the picture on the LHS (left hand side) give another proof using both geometry and algebra as well.