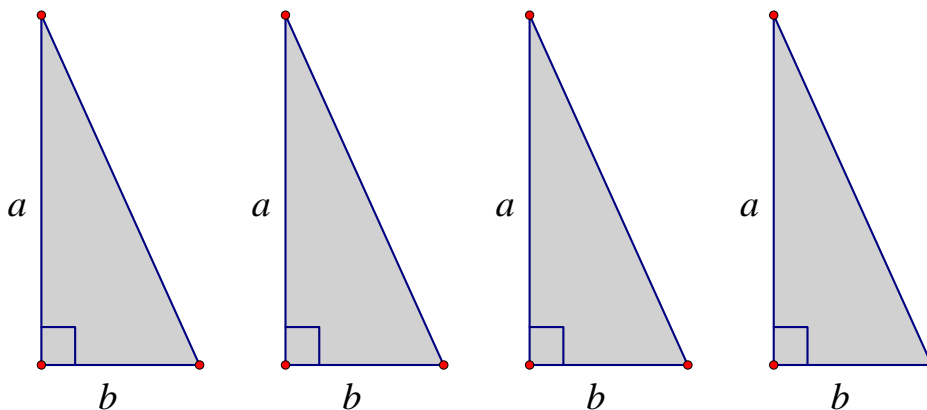


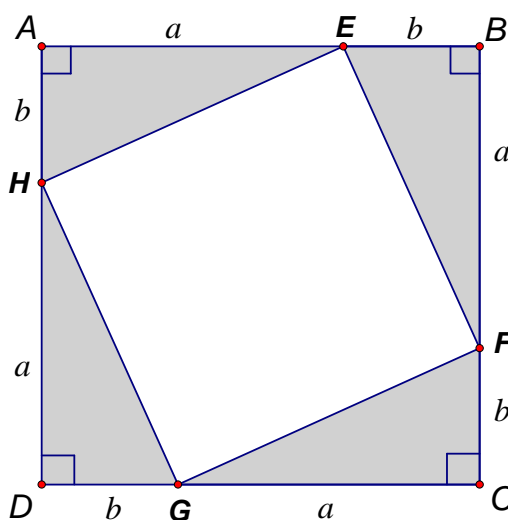
Proving Pythagoras' theorem

Theorem: In a right angled triangle with side lengths a , b and c , $a^2 + b^2 = c^2$

There are many different proofs of Pythagoras' theorem, but the following diagrams allow us to develop a proof using simple algebra.



Arrange the four congruent triangles as shown.



Proof:

1 Explain why $ABCD$ is a square.

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2 Why can we say that $EH = EF = FG = GH = c$?

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3 Using the angles of the right angled triangles, explain why the four angles EFG , FGH , GHE and HEF are right angles.

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4 What can we now say about quadrilateral $EFGH$? Explain.

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5 What is the length of each side of square $ABCD$ in terms of a and b ?

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6 What is the area of $ABCD$ in terms of a and b ? Write the expression in factorised form then in expanded form.

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7 What is the area of each of the triangles? Express this in terms of a and b .

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8 The area of $ABCD$ can also be found from the areas of the four triangles and the square $EFGH$. Use this to write another expression for the area of $ABCD$ in terms of a , b and c , where c is the length of each side of square $EFGH$. Simplify this expression as much as possible.

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9 The expressions you have obtained in 6 and in 8 both represent the area of square $ABCD$ so we can put them equal to each other. When you do this you should notice that there is a term on each side which is the same, so we can subtract this term from both sides. What are you left with?

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10 Explain in your own words what have you now proved.

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