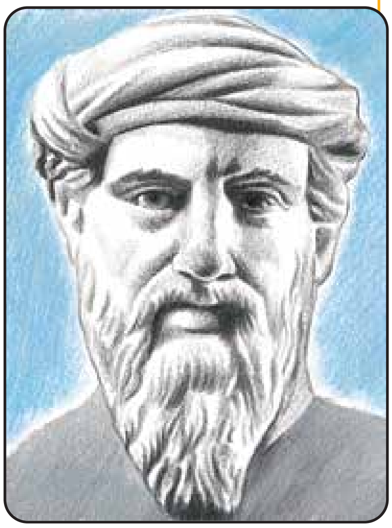
ACTIVITY ONE

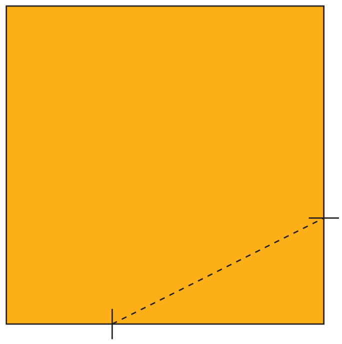
Pythagoras Power

You need: a calculator, coloured card, square grid paper, scissors, a ruler, a classmate

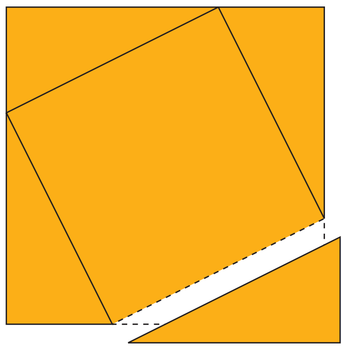


Pythagoras was a Greek mathematician born around 569 BC, nearly 2 600 years ago. He is best remembered for the rule known as Pythagoras' theorem. Here is one way of demonstrating this rule:

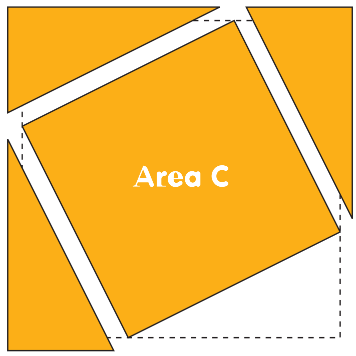
a. **i.** Take a square of card and mark a point about a third of the way up from the bottom right corner. Mark another point exactly the same distance along from the bottom left corner. Join these 2 points to give a right-angled triangle.



ii. Cut the triangle off, then rotate it and trace its position in the other 3 corners of the square.

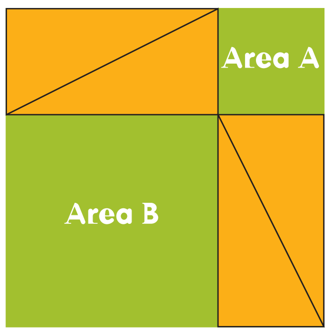


iii. Cut off the 3 triangles you have just marked.

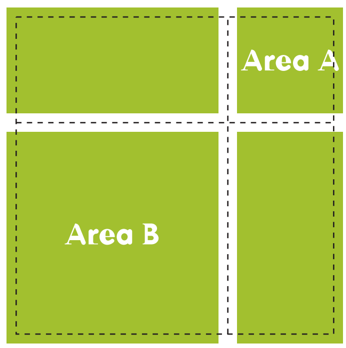


iv. Take a second square of card, the same size as the first.

v. Arrange your 4 triangles on it in the pattern shown.



vi. Mark the lines that divide the squares and the rectangles and cut along them.



b. Compare the total area of A and B with the area of C. What do you notice?

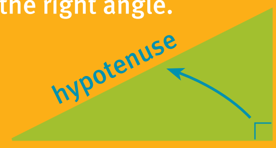
c. Take the triangle you started with in **a i** and arrange the 3 squares (A, B, and C) around its edges so that the sides match. Draw a diagram showing this arrangement.

d. Write in words what your arrangement seems to prove.

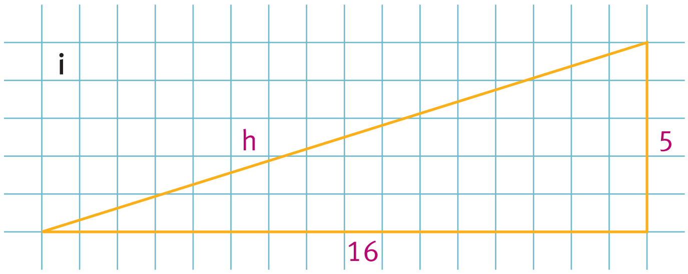
ACTIVITY TWO

Pythagoras' theorem says:
"In any right-angled triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides."
This is often written as $a^2 + b^2 = h^2$.

Any triangle that has a 90° angle is called a right-angled triangle. The longest side is called the hypotenuse. The hypotenuse is always opposite the right angle.



1. The table below gives the two shorter sides of five right-angled triangles.
   a. On square grid paper, make accurate drawings of the triangles, like this:



   b. Complete the table for each triangle:
      - Square the lengths of the two shorter sides and add the results. This gives you $a^2 + b^2$.
      - Measure the length of the hypotenuse. This is h.
      - Calculate h^2. (Round the result to the nearest whole number.)
      - Does $a^2 + b^2 = h^2$? Write "yes" or "no" in the last column.

Triangle	Side a	Side b	Side h	$a^2 + b^2$	h^2	$a^2 + b^2 = h^2$?
i	5	16		25 + 256 = 281		
ii	9	7				
iii	5	6				
iv	12	4				
v	5	12				

2. The two shorter sides of a right-angled triangle are 15 centimetres and 26 centimetres. Without doing a scale drawing, find the length of the longest side.

INVESTIGATION

When the sides of a right-angled triangle are all whole numbers, those three numbers are known as a Pythagorean triple. One of the triangles in question **1** is a Pythagorean triple. Which one? Can you find others?