Notes for Pythagorean proof

Teaching notes	Teaching points
It is very important that pupils attempt the geometric proof, preferably in pairs. Start by opening the Pythagoras Geometric spreadsheet. You will need to 'enable macros' if asked. (If the software does not run, you will need to change your 'macro security level'.) Ensure that each pair of pupils has the appropriate equipment to accurately construct the triangle. Click Next, and invite the pupils to add the two squares. Add the third square, ensuring that angles are right angles. Extend the large square, as shown, and draw the perpendicular line as shown. Shade or label the resulting shapes, cut them out and attempt to arrange them with the other square into the square on the hypotenuse. When pupils have managed it (or not), show the rest of the animation to demonstrate that it works. Ask pupils if that is a proof of Pythagoras' theorem. Give a counter argument, i.e. that we have only shown it works for one triangle. Open the Pythagoras Algebraic spreadsheet. This works in a similar way, but pupils will need squared paper to help follow the reasoning and complete the constructions. Follow the presentation through the early constructions. Invite an expression for the area of the resulting large square, and multiply out if necessary. Invite an expression for the area of the four right-angled triangles, simplifying. Some pupils may now see what is going to happen – that we can create an expression for the area of the red square by subtracting the area of the four triangles from that of the large square.	• Stress the need for accurate constructions. • Pupils will gain valuable construction practice through this exercise, or it may highlight the need for more. • Allow plenty of time for this. Pupils may assume that the square sits in a corner at right angles – it doesn't. • This activity is also suited to paired work, as the understanding is challenging and discussion is helpful. • Encourage pupils to draw their triangle any size (but they will need to be able to replicate it).

Algebraically this leaves us with Pythagoras' Theorem. Now there can be a discussion about the difference between the demonstration (worked with one triangle) and the proof (works with all right-angled triangles because a, b and c are variables).	• This discussion is a key point of the lesson.