



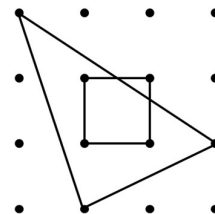
# Angles, Polygons and Geometrical Proof

## Stage 4 ★★★ Mixed Selection 1

### 1. Griddy region

The dots are one unit apart.

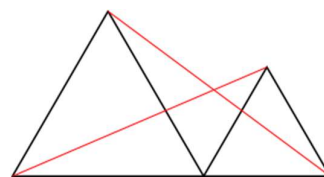
What is the area of the region common to both the triangle and the square (in square units)?



### 2. Two equilateral triangles

The two black triangles are both equilateral, and their bases form a straight line segment.

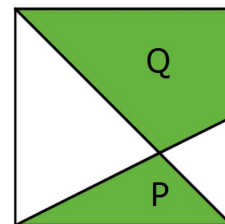
Prove that the two red lines are of equal length.



### 3. Cut-up square

The diagram shows a square, a diagonal and a line joining a vertex to the midpoint of a side.

What is the ratio of area P to area Q?



### 4. Garden fence

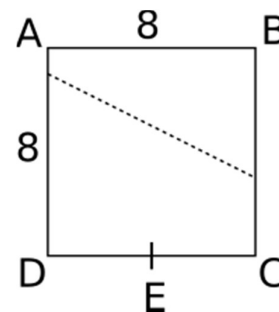
A garden has the shape of a right-angled triangle with sides of length 30, 40 and 50. A straight fence goes from the corner with the right-angle to a point on the opposite side, dividing the garden into two sections which have the same perimeter.

How long is the fence?

### 5. Folded square

This 8 cm by 8 cm square of paper has been folded so that the corner at B lies exactly on top of E, the midpoint of CD. The dotted line shows the crease left by this fold.

How far from A does the dotted line reach the side AB?



*These problems are adapted from UKMT Mathematical Challenge problems ([ukmt.org.uk](http://ukmt.org.uk))*