



Angles, Polygons and Geometrical Proof

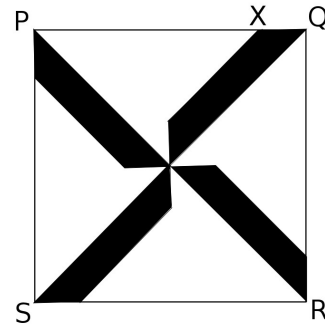
Stage 4 ★★

Mixed Selection 1

1. Quarters

Four congruent isosceles trapeziums are placed so that their longer parallel sides form the diagonals of a square PQRS, as shown. The point X divides PQ in the ratio 3:1.

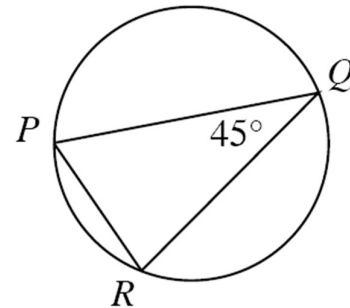
What fraction of the square is shaded?



2. Angle to chord

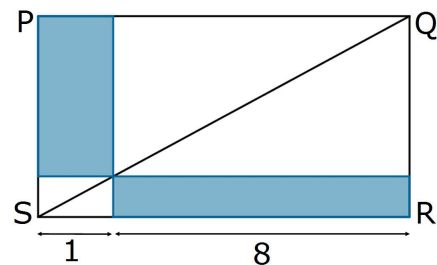
P , Q and R are points on the circumference of a circle of radius 4cm. $\angle PQR = 45^\circ$.

What is the length of chord PR ?



3. Diagonal touch

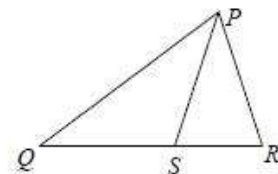
What fraction of rectangle PQRS is shaded?



4. Isosceles reduction

PQR is a triangle and S is a point on QR . $QP = QR = 9\text{cm}$ and $PR = PS = 6\text{cm}$.

What is the length of SR ?



These problems are adapted from UKMT Mathematical Challenge problems (ukmt.org.uk)



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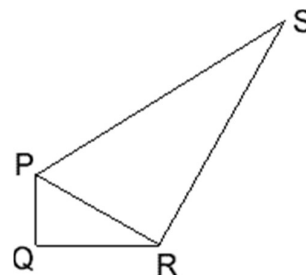
Stage 4 ★★

Mixed Selection 2

1. Two right angles

In the figure above, $PQ = 2\frac{1}{3}$, $PS = 6\frac{6}{7}$, PQR and PRS are right-angled triangles, and the angles QPR and RPS are the same.

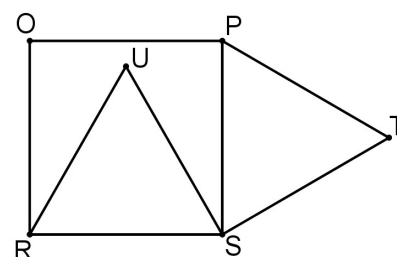
How long is PR ?



2. Internal – external

The diagram shows a square $PQRS$ and two equilateral triangles RSU and PST . PQ has length 1.

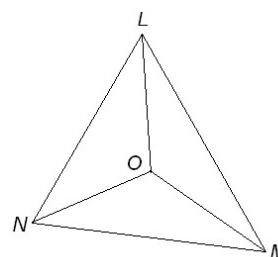
What is the length of TU ?



3. Incentre angle

The three angle bisectors of triangle LMN meet at a point O as shown. We also know $\angle LNM$ is 68° .

What is the size of $\angle LOM$?

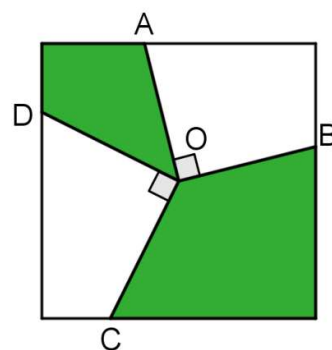


4. Shaded square

The diagram on the right shows a square with side length 2m and lines drawn to its sides from its centre O . The points A, B, C and D are all on different sides of the square.

The lines OA and OB are perpendicular, as are OC and OD .

What is the shaded area?



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