



Angles, Polygons and Geometrical Proof

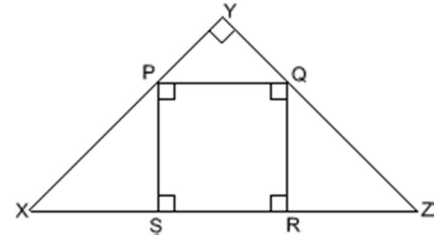
Stage 3 ★★

Mixed Selection 1

1. Square in a triangle

The diagram shows a right-angled isosceles triangle XYZ which circumscribes a square $PQRS$.

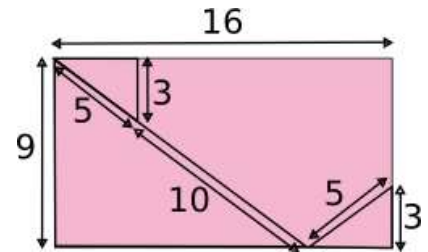
What is the ratio of the area of square $PQRS$ to the area of the triangle XYZ ?



2. Rectangle dissection

The 16 by 9 rectangle is cut as shown.

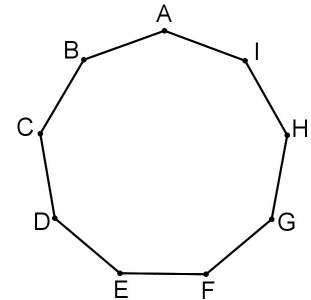
If the pieces are rearranged to form a square, what is the perimeter of the square?



3. Nonagon angle

$ABCDEFGHI$ is a regular nine-sided polygon (called a 'nonagon' or 'enneagon').

What is the size of the angle FAE ?



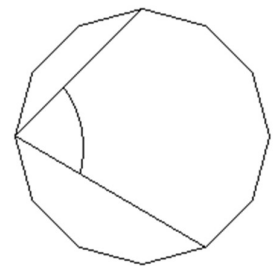
4. Handy angles

How big is the angle between the hour hand and the minute hand of a clock at twenty to five?

5. Dodecagon angles

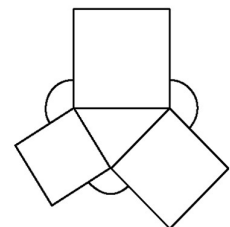
The diagram shows a regular dodecagon (a polygon with twelve equal sides and equal angles).

What is the size of the marked angle?



6. Outside the boxes

The diagram shows three squares drawn on the sides of a triangle. What is the sum of the three marked angles?



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