Mathematical Problem Solving
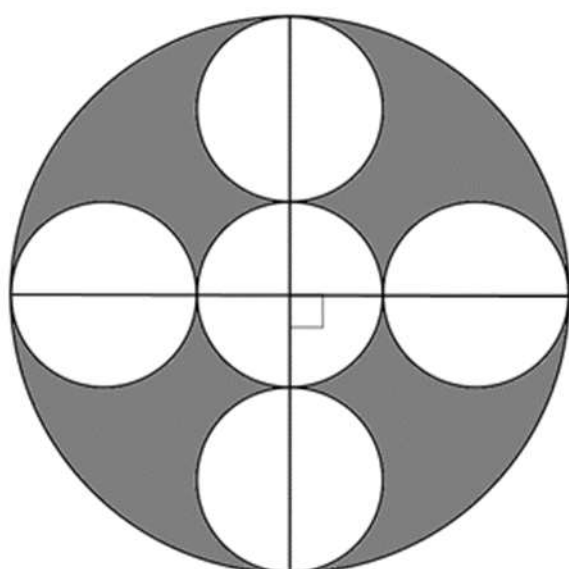## GCSE example

Solution to example 25

Five identical small circles are drawn inside one large circle as shown in the diagram.

The centres of the small circles all lie on one or both of the diameters shown.

The diameters are at $90°$ to each other.

Find the fraction of the large circle that is shaded.

As all circles are similar to each other, this problem can be solved using any numerical value for the radius of one of the smaller circles. The shaded fraction would be the same whatever radius is used.

A sensible starting point would be to pick an easy radius for one of the small circles so let the radius of a small circle be 1 unit.

The radius of the large circle is the same as three radii of the small circles i.e. 3 units.

The area of a circle is given by the formula πr^2

The area of the large circle is $\pi \times 3^2 = 9\pi$ square units.

The total area of the 5 small circles is $5 \times \pi \times 1^2 = 5\pi$ square units

The shaded area is therefore $9\pi - 5\pi = 4\pi$ square units

The shaded fraction is $\frac{4}{9}$ of the large circle.