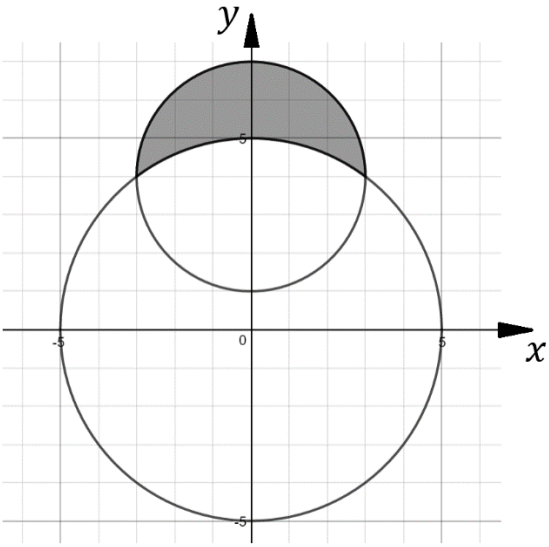
Churchill AQA GCSE mathematics question



The diagram shows two circles on a centimetre square grid.

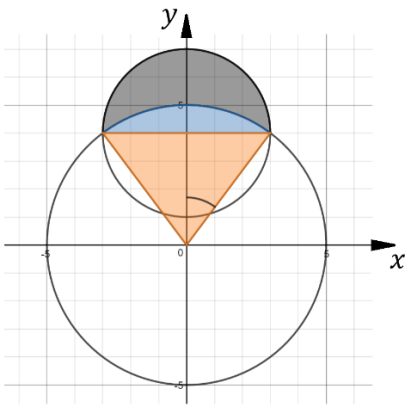
One circle has a radius of 5 cm and centre (0,0).

The other circle has radius 3 cm and centre (0,4).

The two circles intersect at the points (3,4) and (-3,4).

Find the area of the shaded shape.

Solution



The area of the orange triangle is $\frac{6\times4}{2} = 12$ cm².

The angle indicated in the diagram is $\tan^{-1}\left(\frac{3}{4}\right) = 36.869..°$

The sector angle is $2 \times 36.869..° = 73.739..°$

The area of the sector is $\frac{73.739..°}{360} \times \pi \times 5^2 = 16.087..$ cm².

The area of the segment (in blue) is
the sector area – the triangle area
$= 16.087.. - 12 = 4.087..$ cm².

The required area is
the area of a semi-circle – the area of the segment
$= \frac{1}{2} \times \pi \times 3^2 - 4.087..$
$= 10.04$ cm² correct to 4 significant figures.