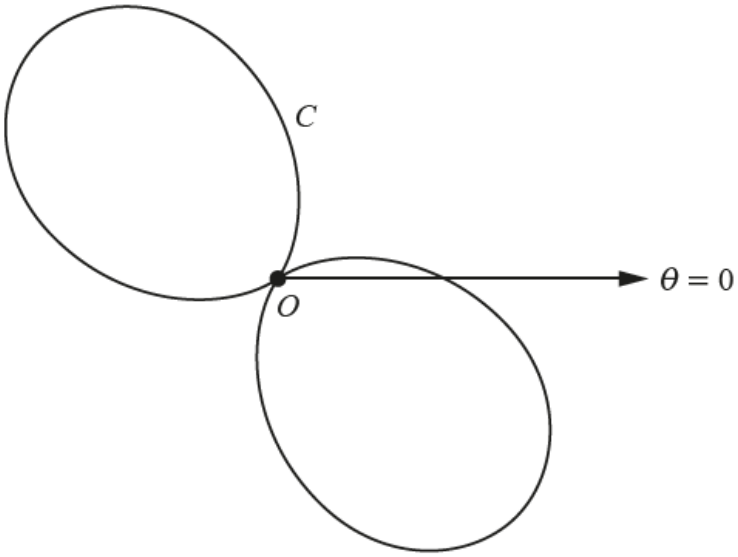
Proof – 2022 GCE Pure Core 1 Further Math A Y540

1. June/2022/Paper_ Y540/01/No.5

The diagram below shows the curve C with polar equation $r = 3(1 - \sin 2\theta)$ for $0 \leqslant \theta \leqslant 2\pi$.



(a) Show that a cartesian equation of C is $(x^2 + y^2)^3 = 9(x - y)^4$. **[3]**

(b) Show that the line with equation $y = x$ is a line of symmetry of C. **[2]**

(c) **In this question you must show detailed reasoning.**

Find the exact area of each of the loops of C. **[6]**