8.

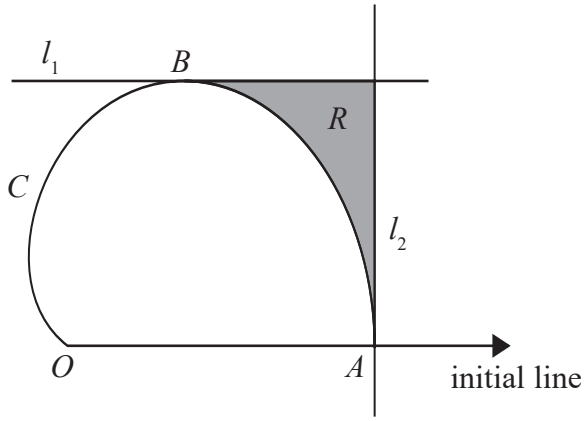


Figure 1

Figure 1 shows a sketch of the curve C with equation

$$r = 6(1 + \cos\theta) \qquad 0 \leqslant \theta \leqslant \pi$$

Given that C meets the initial line at the point A, as shown in Figure 1,

(a) write down the polar coordinates of A.

(1)

The line l_1, also shown in Figure 1, is the tangent to C at the point B and is parallel to the initial line.

(b) Use calculus to determine the polar coordinates of B.

(4)

The line l_2, also shown in Figure 1, is the tangent to C at A and is perpendicular to the initial line.

The region R, shown shaded in Figure 1, is bounded by C, l_1 and l_2

(c) Use algebraic integration to find the exact area of R, giving your answer in the form $p\sqrt{3} + q\pi$ where p and q are constants to be determined.

(8)

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Question 8 continued

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(Total for Question 8 is 13 marks)

TOTAL FOR PAPER IS 75 MARKS

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