8. **In this question you must show all stages of your working.**

Solutions relying entirely on calculator technology are not acceptable.

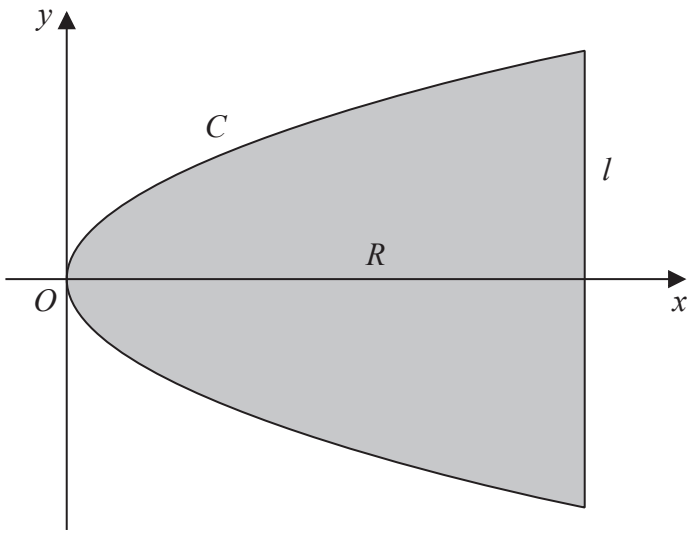


Figure 2

Figure 2 shows a sketch of part of the curve C with equation $y^2 = 8x$ and part of the line l with equation $x = 18$

The region R, shown shaded in Figure 2, is bounded by C and l

(a) Show that the perimeter of R is given by

$$\alpha + 2\int_0^{\beta} \sqrt{1 + \frac{y^2}{16}}\, \mathrm{d}y$$

where α and β are positive constants to be determined.

(3)

(b) Use the substitution $y = 4\sinh u$ and algebraic integration to determine the exact perimeter of R, giving your answer in simplest form.

(6)

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Question 8 continued

Question 8 continued

(Total for Question 8 is 9 marks)

TOTAL FOR PAPER IS 75 MARKS

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