9.

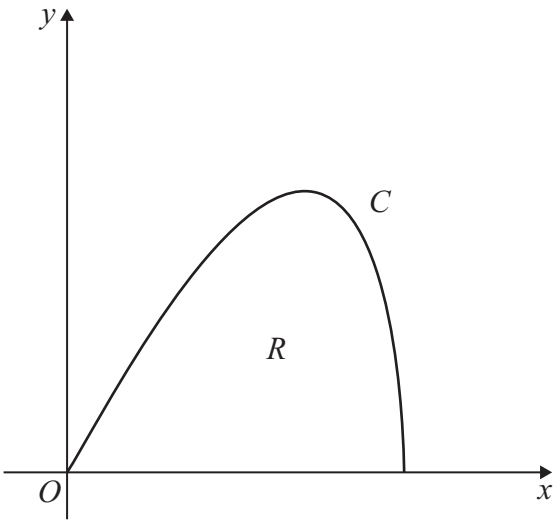

Figure 3

The curve C, shown in Figure 3, has parametric equations

$$x = 6\sin t \qquad y = 5\sin 2t \qquad 0 \leqslant t \leqslant k$$

where k is a constant.

The region R, also shown in Figure 3, is bounded by C and the x-axis.

This region is rotated through 2π radians about the x-axis to form a solid.

(a) Show that the volume, V, of this solid is given by

$$V = P\int_0^k \sin^m t \cos^n t \, \mathrm{d}t$$

where k, P, m and n are constants to be found.

(4)

(b) Hence, using algebraic integration, find the exact value of V.

(4)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 9 continued

Question 9 continued

(Total for Question 9 is 8 marks)

TOTAL FOR PAPER IS 75 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA