5

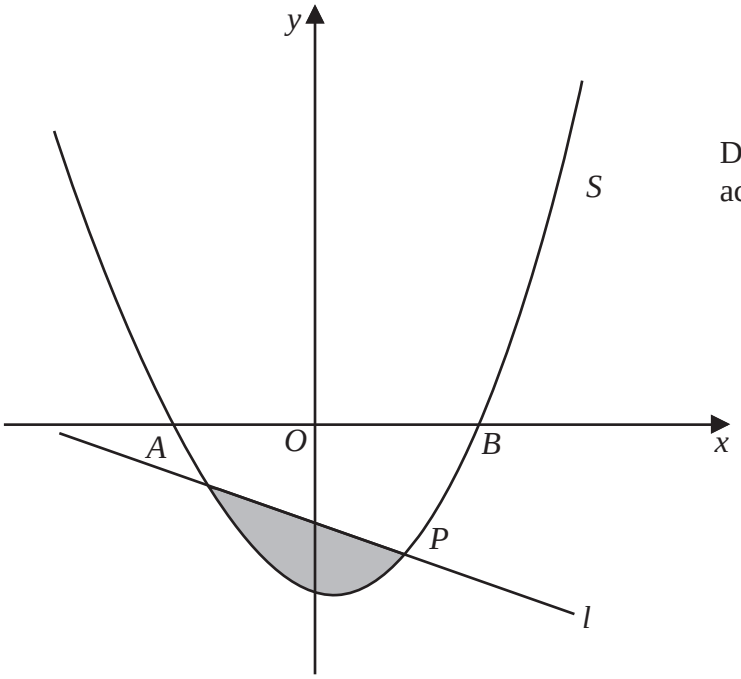

Diagram **NOT** accurately drawn

Figure 1

Figure 1 shows part of the curve S with equation $y = px^2 + qx + r$ where p, q and r are constants.

The points A, B and P with coordinates $(-2, 0)$, $(6, 0)$ and $(4, -6)$ respectively lie on S

(a) Show that an equation of S is $y = \frac{x^2}{2} - 2x - 6$

(3)

The line l is the normal to S at the point P

(b) Show that an equation of l is $2y + x + 8 = 0$

(5)

The finite region shown shaded in Figure 1 is bounded by S and l

(c) Use algebraic integration to find the exact area of the shaded region.

(7)

Question 5 continued

Question 5 continued

Question 5 continued

(Total for Question 5 is 15 marks)