13. The curve *C* with equation

$$y = \frac{p-3x}{(2x-q)(x+3)}$$
 $x \in \mathbb{R}, x \neq 1, x \neq -3$

where p and q are constants, passes through the point $(2, \frac{3}{2})$ and has two vertical asymptotes with equations x = 1 and x = -3

(a) (i) Explain why you can deduce that q = 2

(ii) Show that p = 21.

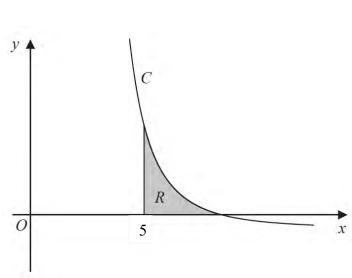


Figure 4

Figure 4 shows a sketch of part of the curve C. The region R, shown shaded in Figure 4, is bounded by the curve C, the x-axis and the line with equation x = 5

(b) Show that the exact value of the area of R is $a \ln 2 + b \ln 3 + c \ln 5$, where a, b and c are rational constants to be found.

(8)