$$\int_0^8 \frac{2}{(x+1)(2x+3)}\,dx$$

$$\int_0^8 \frac{x^2}{(x+1)^2}\,dx$$

$$\int_{-\infty}^{\infty} \frac{x^2}{(x+1)^2} - 1\,dx$$

This one involves topics covered in the further maths curriculum

$$\int_0^8 \frac{2}{(x+1)(2x+3)}\,dx$$

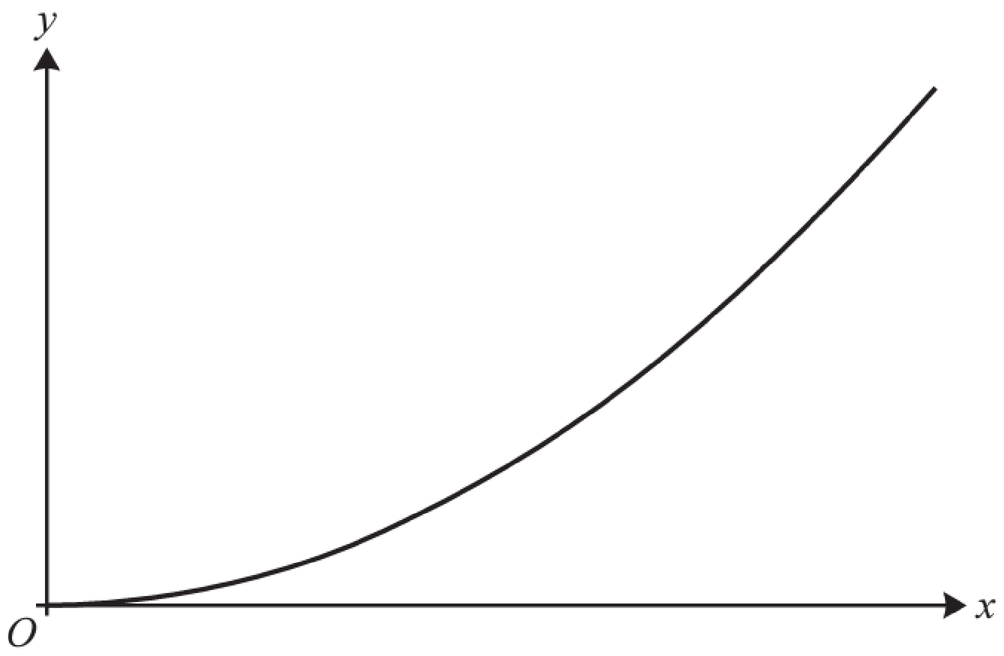
$$\int_0^8 \frac{x^2}{(x+1)^2}\,dx$$

$$\frac{80}{9} - 2ln9$$

$$\int_{-\infty}^{\infty} \frac{x^2}{(x+1)^2} - 1\,dx$$

This one involves topics covered in the further maths curriculum

In this question you must show detailed reasoning.



The graph shows part of the curve $y = \dfrac{4x^3}{\sqrt{x^2+2}}$.

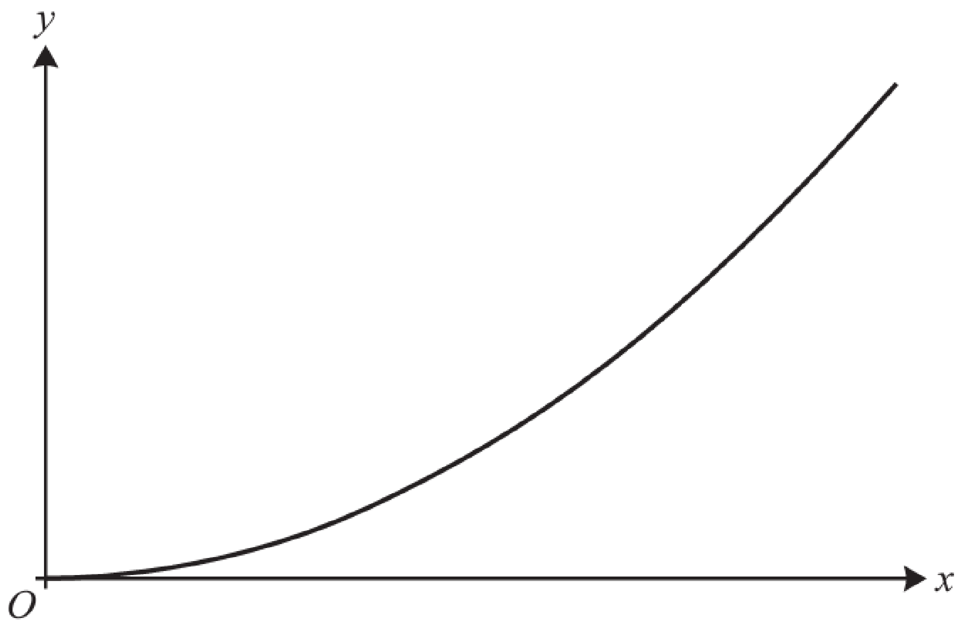
Find the exact area enclosed by the curve $y = \dfrac{4x^3}{\sqrt{x^2+3}}$, the normal to this curve at the point (1, 2) and the x-axis. [12]

(a) Use the substitution $u = x^2 + 3$ to show that $\int \frac{4x^3}{\sqrt{x^2+3}}\,dx = \frac{4}{3}(x^2-6)\sqrt{x^2+3} + c$. **[5]**

(b) Use the substitution $u^2 = x^2 + 3$ to show that $\int \frac{4x^3}{\sqrt{x^2+3}}\,dx = \frac{4}{3}(x^2-6)\sqrt{x^2+3} + c$. **[5]**

These should both give the same answer, but which substitution makes part (c) easier?

(c) **In this question you must show detailed reasoning.**



The graph shows part of the curve $y = \frac{4x^3}{\sqrt{x^2+2}}$.

Find the exact area enclosed by the curve $y = \frac{4x^3}{\sqrt{x^2+3}}$, the normal to this curve at the point (1, 2) and the x-axis. **[7]**