

8 (a) Show that

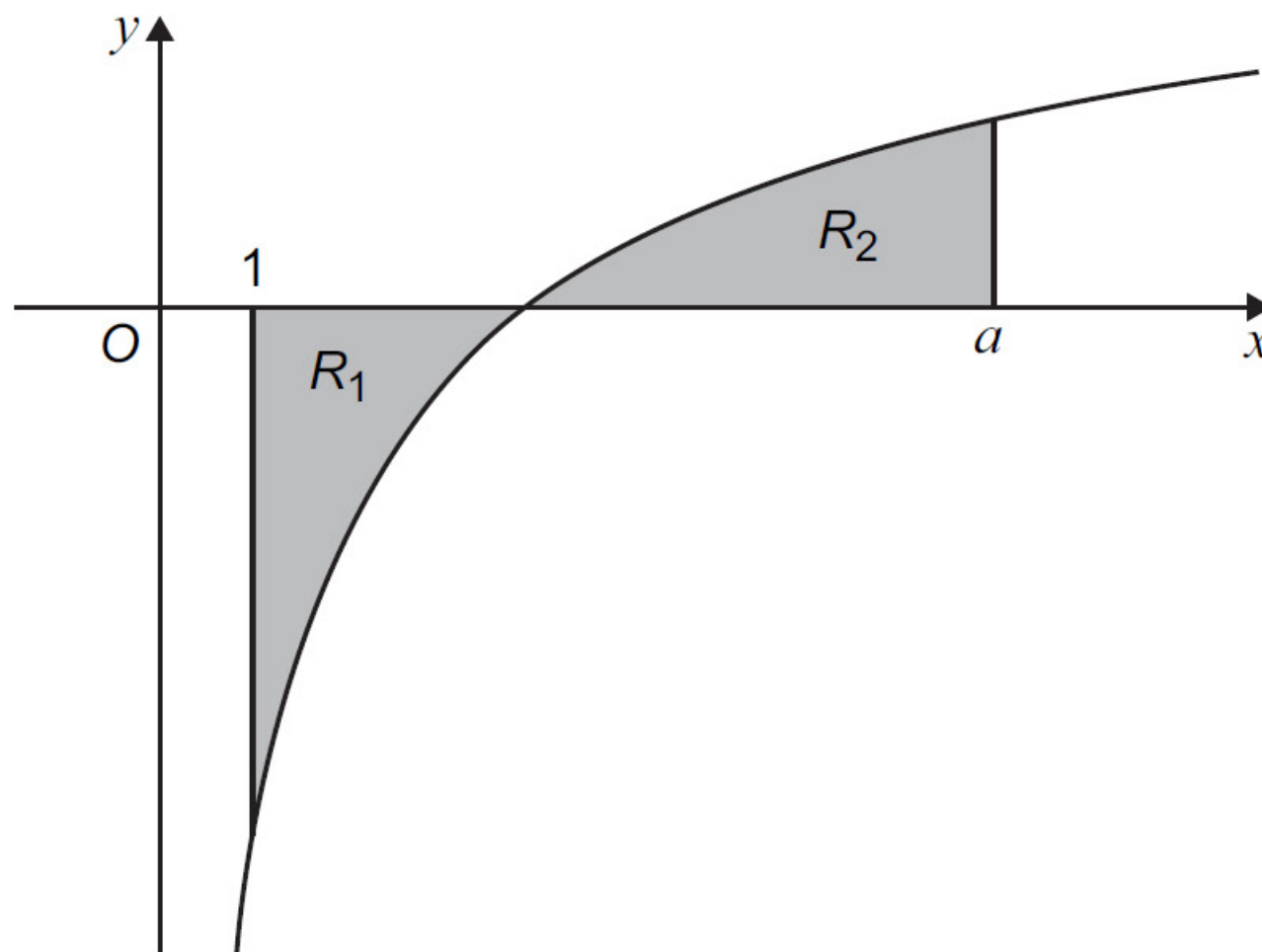
$$\int_1^a \left(6 - \frac{12}{\sqrt{x}}\right) dx = 6a - 24\sqrt{a} + 18$$

[3 marks]

8 (b) The curve  $y = 6 - \frac{12}{\sqrt{x}}$ , the line  $x = 1$  and the line  $x = a$  are shown in the diagram below.

The shaded region  $R_1$  is bounded by the curve, the line  $x = 1$  and the  $x$ -axis.

The shaded region  $R_2$  is bounded by the curve, the line  $x = a$  and the  $x$ -axis.



It is given that the areas of  $R_1$  and  $R_2$  are equal.

Find the value of  $a$

Fully justify your answer.

[4 marks]