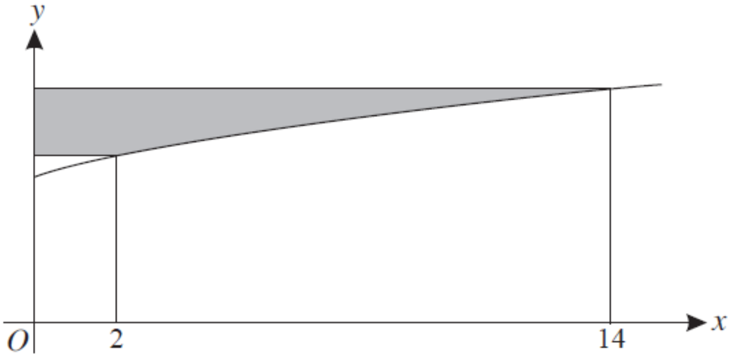
Area Between a Curve and the y-Axis

Q1, (OCR 4722, Jun 2008, Q5)



The diagram shows the curve $y = 3 + \sqrt{x + 2}$.

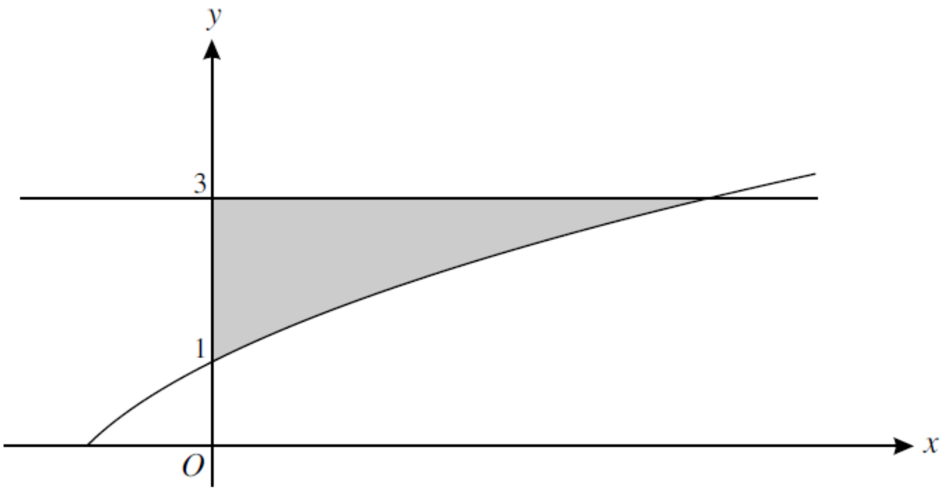
The shaded region is bounded by the curve, the y-axis, and two lines parallel to the x-axis which meet the curve where $x = 2$ and $x = 14$.

(i) Show that the area of the shaded region is given by

$$\int_5^7 (y^2 - 6y + 7)\,dy. \qquad [3]$$

(ii) Hence find the exact area of the shaded region. [4]

Q2, (OCR 4722, Jun 2011, Q4)

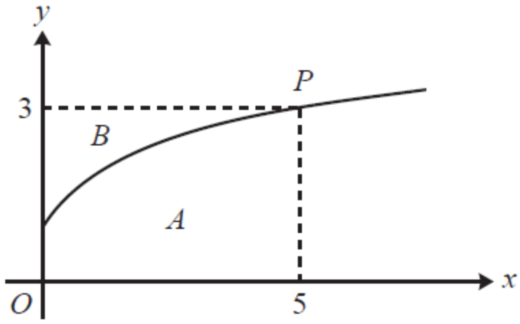


The diagram shows the curve $y = -1 + \sqrt{x + 4}$ and the line $y = 3$.

(i) Show that $y = -1 + \sqrt{x + 4}$ can be rearranged as $x = y^2 + 2y - 3$. **[2]**

(ii) Hence find by integration the exact area of the shaded region enclosed between the curve, the y-axis and the line $y = 3$. **[5]**

Q3, (OCR 4722, Jun 2014, Q9)



The diagram shows part of the curve $y = -3 + 2\sqrt{x+4}$. The point $P(5, 3)$ lies on the curve. Region A is bounded by the curve, the x-axis, the y-axis and the line $x = 5$. Region B is bounded by the curve, the y-axis and the line $y = 3$.

(i) Use the trapezium rule, with 2 strips each of width 2.5, to find an approximate value for the area of region A, giving your answer correct to 3 significant figures. **[3]**

(ii) Use your answer to part **(i)** to deduce an approximate value for the area of region B. **[2]**

(iii) By first writing the equation of the curve in the form $x = \mathrm{f}(y)$, use integration to show that the exact area of region B is $\frac{14}{3}$. **[7]**