A-Level Maths - Integration (Year 1)

1. Find

$$\int\left(2x^5 - \frac{1}{4x^3} - 5\right)\mathrm{d}x$$

giving each term in its simplest form.

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2. Find

$$\int\left(10x^4 - 4x - \frac{3}{\sqrt{x}}\right)\mathrm{d}x$$

giving each term in its simplest form.

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3.

(a) Find

$$\int 10x(x^{\frac{1}{2}} - 2)\mathrm{d}x$$

giving each term in its simplest form.

(4)

Figure 2

Figure 2 shows a sketch of part of the curve C with equation

$$y = 10x(x^{\frac{1}{2}} - 2), \qquad x \geqslant 0$$

The curve C starts at the origin and crosses the x-axis at the point (4, 0).

The area, shown shaded in Figure 2, consists of two finite regions and is bounded by the curve C, the x-axis and the line $x = 9$

(b) Use your answer from part (a) to find the total area of the shaded regions.

(5)

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4.

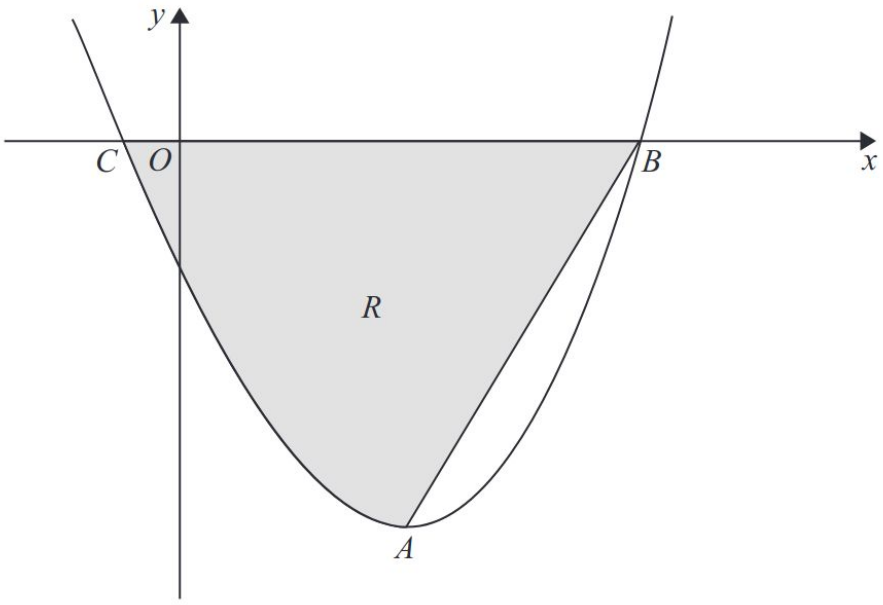

Figure 2

Figure 2 shows a sketch of part of the curve with equation

$$y = 4x^3 + 9x^2 - 30x - 8, \quad -0.5 \leqslant x \leqslant 2.2$$

The curve has a turning point at the point A.

(a) Using calculus, show that the x coordinate of A is 1

(3)

The curve crosses the x-axis at the points $B(2, 0)$ and $C\left(-\frac{1}{4}, 0\right)$

The finite region R, shown shaded in Figure 2, is bounded by the curve, the line AB, and the x-axis.

(b) Use integration to find the area of the finite region R, giving your answer to 2 decimal places.

(7)

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