
AS Mathematics Exam Questions by Topic Chapter 11b: Integration - Finding Areas

These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: <https://amzn.to/39umfr5> and <https://amzn.to/3hE8kBL>). There are a mixture of questions from OCR A, OCR B (MEI), Edexcel and AQA. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

<https://mathsaurus.com/>

OCR B MEI AS 2018 Paper 1 Question 8:

8 In this question you must show detailed reasoning.

Fig. 8 shows the graph of a quadratic function. The graph crosses the axes at the points $(-1, 0)$, $(0, -4)$ and $(2, 0)$.

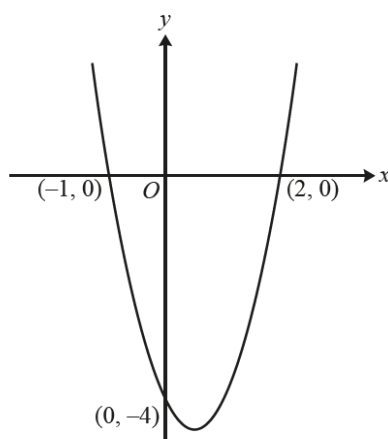


Fig. 8

Find the area of the finite region bounded by the curve and the x -axis.

[8]

15.

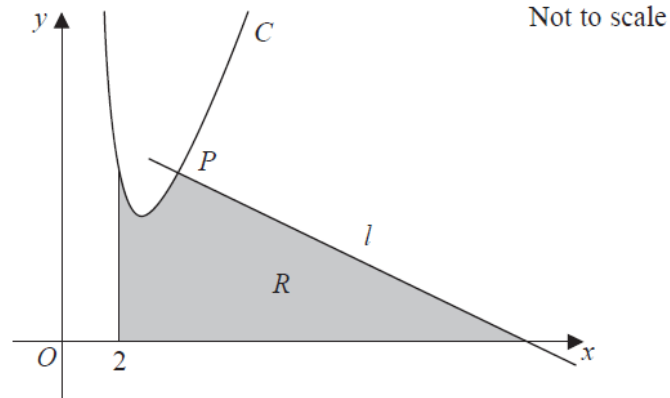


Figure 4

Figure 4 shows a sketch of part of the curve C with equation

$$y = \frac{32}{x^2} + 3x - 8, \quad x > 0$$

The point $P(4, 6)$ lies on C .

The line l is the normal to C at the point P .

The region R , shown shaded in Figure 4, is bounded by the line l , the curve C , the line with equation $x = 2$ and the x -axis.

Show that the area of R is 46

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(10)

15.

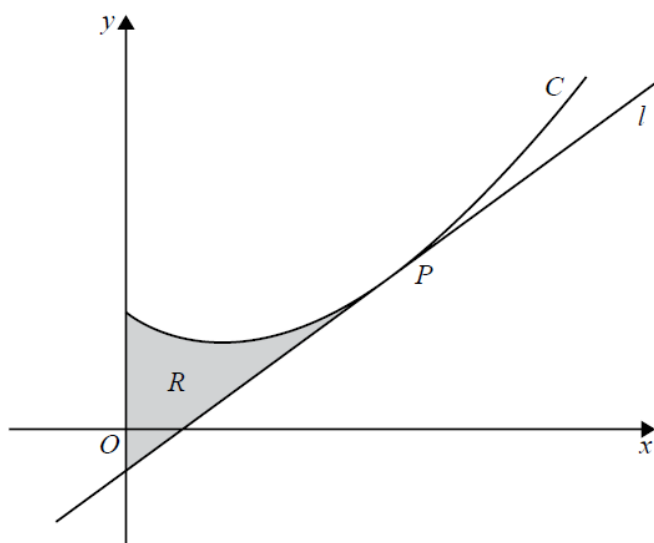


Figure 4

Figure 4 shows a sketch of the curve C with equation

$$y = 5x^{\frac{3}{2}} - 9x + 11, x \geq 0$$

The point P with coordinates $(4, 15)$ lies on C .

The line l is the tangent to C at the point P .

The region R , shown shaded in Figure 4, is bounded by the curve C , the line l and the y -axis.

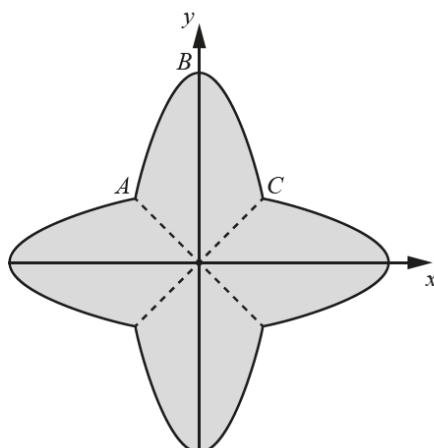
Show that the area of R is 24, making your method clear.

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(10)

OCR A 2018 Paper 2 Question 7:

- 7 The diagram shows a part ABC of the curve $y = 3 - 2x^2$, together with its reflections in the lines $y = x$, $y = -x$ and $y = 0$.



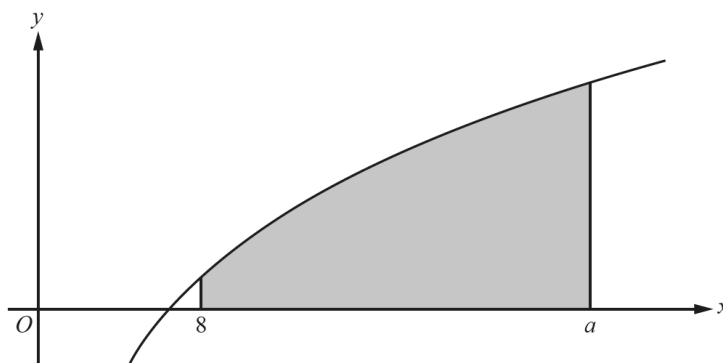
Find the area of the shaded region.

[7]

OCR A AS 2018 Paper 2 Question 8:

- 8 In this question you must show detailed reasoning.

The diagram shows part of the graph of $y = 2x^{\frac{1}{3}} - \frac{7}{x^3}$. The shaded region is enclosed by the curve, the x -axis and the lines $x = 8$ and $x = a$, where $a > 8$.



Given that the area of the shaded region is 45 square units, find the value of a .

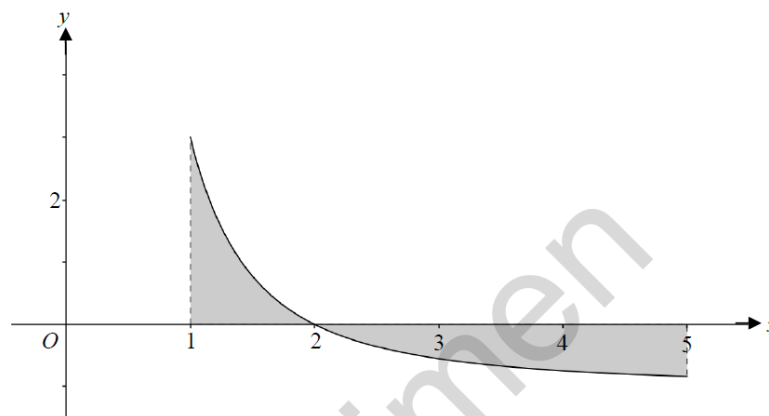
[9]

OCR A AS Sample Paper 1 Question 5:

5 (i) Find $\int (x^3 - 6x) dx$. [3]

(ii) (a) Find $\int \left(\frac{4}{x^2} - 1 \right) dx$. [3]

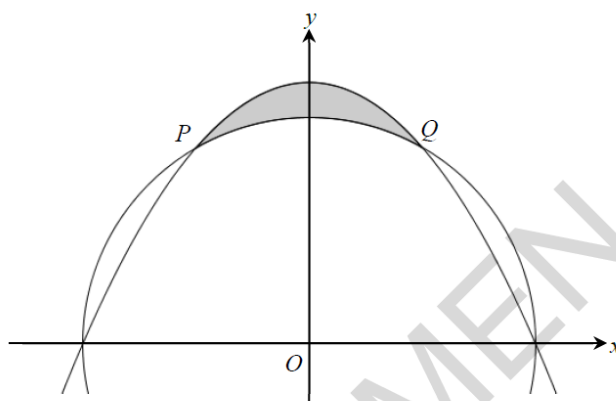
(b) The diagram below shows part of the curve $y = \frac{4}{x^2} - 1$. The curve crosses the x -axis at $(2, 0)$. The shaded region is bounded by the curve, the x -axis, and the lines $x=1$ and $x=5$.



Calculate the area of the shaded region. [3]

OCR A Sample Paper 2 Question 5:

5



The circle with centre O and radius 2 meets the parabola $y = \frac{1}{\sqrt{3}}(4 - x^2)$ at points P and Q , as shown in the diagram.

(i) Verify that the coordinates of Q are $(1, \sqrt{3})$. [3]

(ii) Find the **exact** area of the shaded region enclosed by the arc PQ of the circle and the parabola. [8]