Integration Area Under Graphs 2 - Edexcel Past Exam Questions

1.

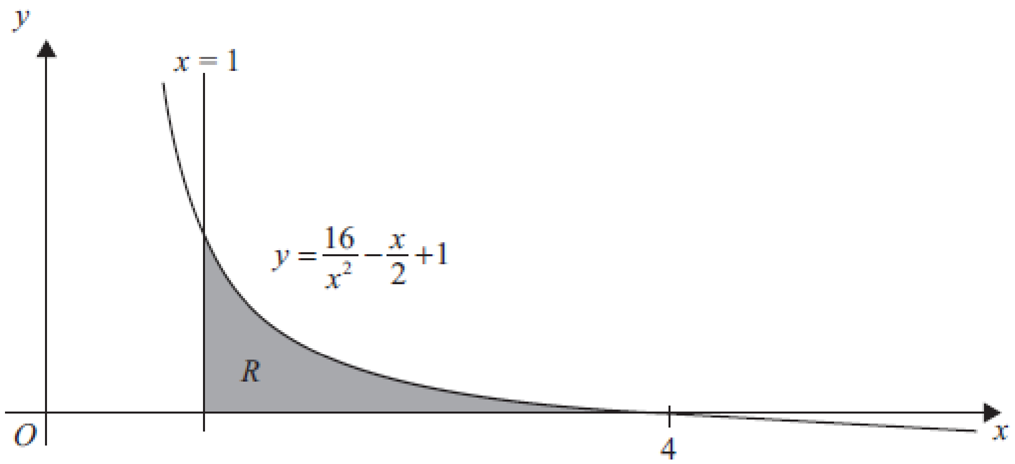

Figure 1

Figure 1 shows the graph of the curve with equation

$$y = \frac{16}{x^2} - \frac{x}{2} + 1, \qquad x > 0.$$

The finite region R, bounded by the lines $x = 1$, the x-axis and the curve, is shown shaded in Figure 1. The curve crosses the x-axis at the point (4, 0).

Use integration to find the exact value for the area of R. **(5)**

Jan 12 Q6 *(edited)*

2.

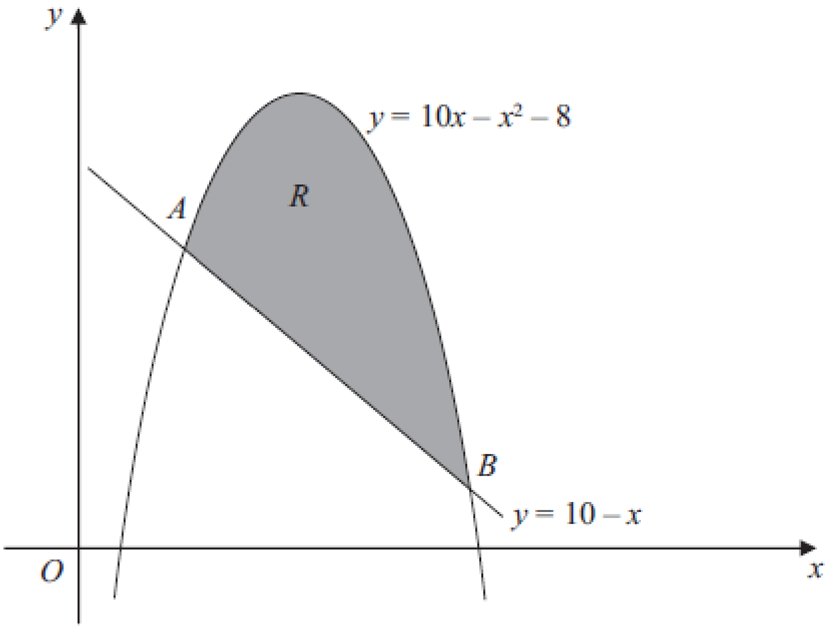

Figure 2

Figure 2 shows the line with equation $y = 10 - x$ and the curve with equation $y = 10x - x^2 - 8$.

The line and the curve intersect at the points A and B, and O is the origin.

(a) Calculate the coordinates of A and the coordinates of B. **(5)**

The shaded area R is bounded by the line and the curve, as shown in Figure 2.

(b) Calculate the exact area of R. **(7)**

June 12 Q5

3.

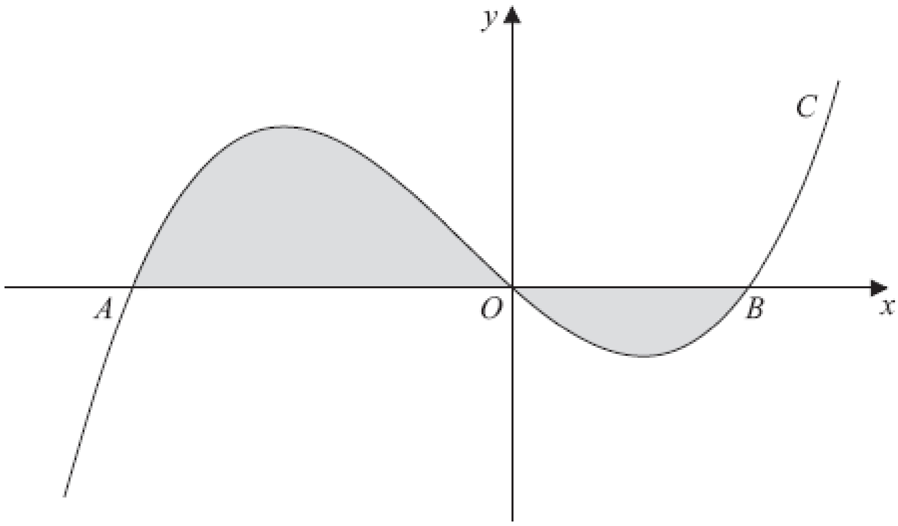

Figure 3

Figure 3 shows a sketch of part of the curve C with equation

$$y = x(x + 4)(x - 2).$$

The curve C crosses the x-axis at the origin O and at the points A and B.

(a) Write down the x-coordinates of the points A and B. **(1)**

The finite region, shown shaded in Figure 3, is bounded by the curve C and the x-axis.

(b) Use integration to find the total area of the finite region shown shaded in Figure 3.

(7)

June 13 Q6

4.

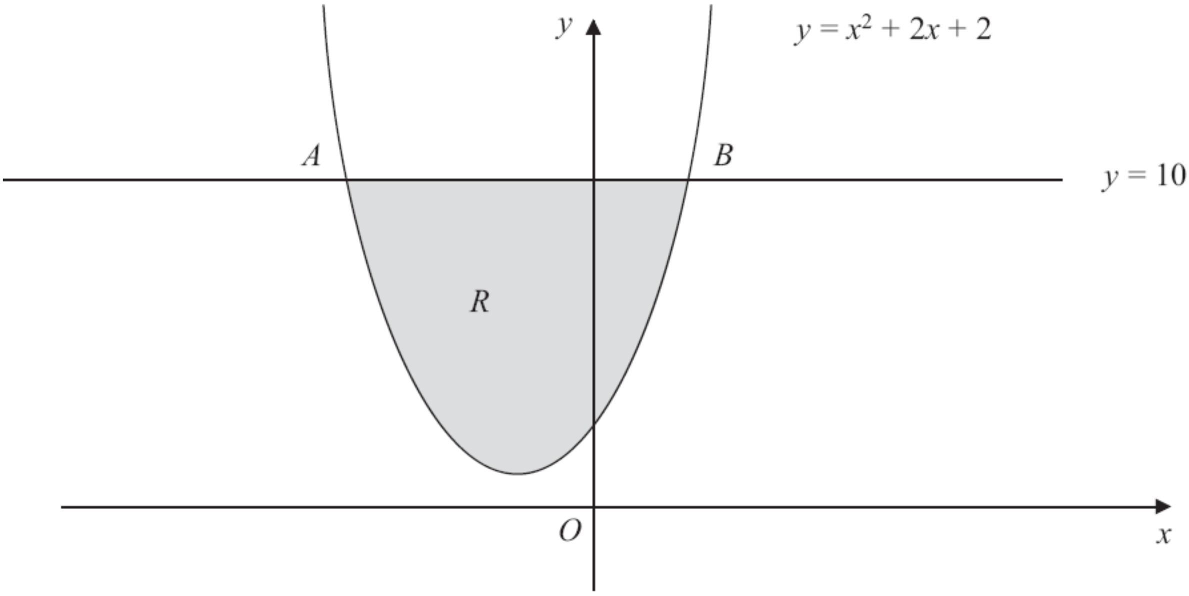

Figure 1

The line with equation $y = 10$ cuts the curve with equation $y = x^2 + 2x + 2$ at the points A and B as shown in Figure 1. The figure is not drawn to scale.

(*a*) Find by calculation the x-coordinate of A and the x-coordinate of B. **(2)**

The shaded region R is bounded by the line with equation $y = 10$ and the curve as shown in Figure 1.

(*b*) Use calculus to find the exact area of R. **(7)**

June 13 (R) Q7

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5. Use integration to find

$$\int_1^{\sqrt{3}} \left(\frac{x^3}{6} + \frac{1}{3x^2} \right) \mathrm{d}x,$$

giving your answer in the form $a + b\sqrt{3}$, where a and b are constants to be determined.

(5)

June 14 Q4

6.

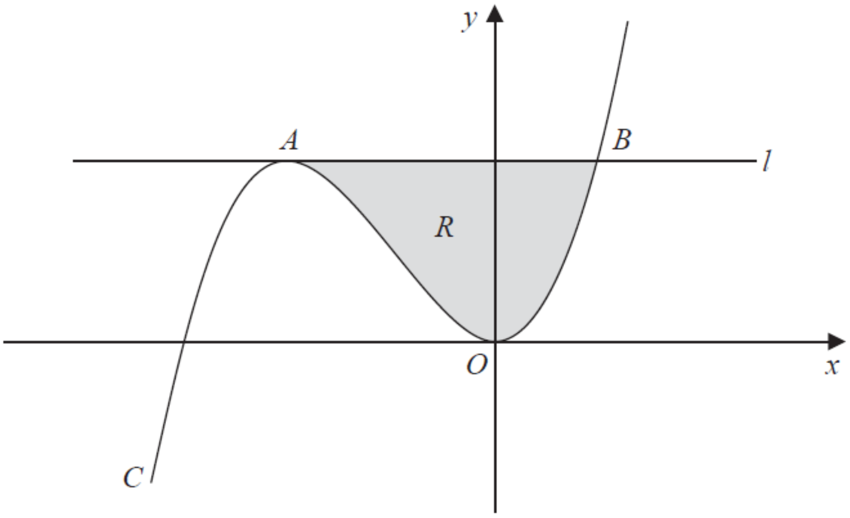

Figure 3

Figure 3 shows a sketch of part of the curve *C* with equation

$$y = \frac{1}{8}x^3 + \frac{3}{4}x^2, \qquad x \in \mathbb{R}$$

The curve *C* has a maximum turning point at the point *A* and a minimum turning point at the origin *O*.

The line *l* touches the curve *C* at the point *A* and cuts the curve *C* at the point *B*.

The *x* coordinate of *A* is –4 and the *x* coordinate of *B* is 2.

The finite region *R*, shown shaded in Figure 3, is bounded by the curve *C* and the line *l*.

Use integration to find the area of the finite region *R*. **(7)**

June 14(R) Q6

7. (*a*) Find

$$\int 10x(x^{\frac{1}{2}} - 2)\ \ dx\,,$$

giving each term in its simplest form. **(4)**

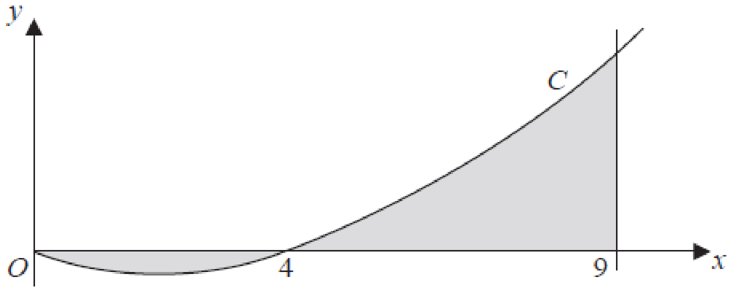

Figure 2

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

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

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)**

June 15 Q6

8.

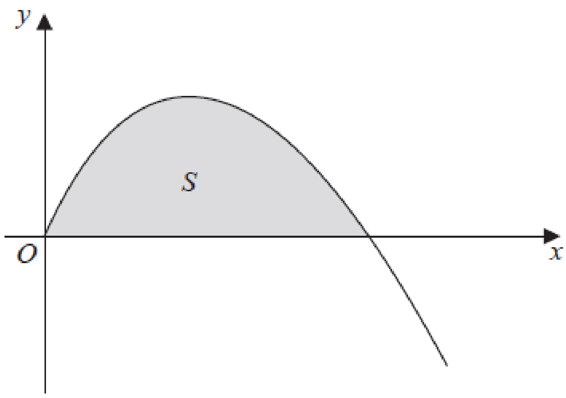

Figure 3

Figure 3 shows a sketch of part of the curve with equation

$$y = 3x - x^{\frac{3}{2}} \qquad x \geq 0.$$

The finite region S, bounded by the x-axis and the curve, is shown shaded in Figure 3.

(*a*) Find

$$\int \left(3x - x^{\frac{3}{2}}\right) \mathrm{d}x.$$ **(3)**

(*b*) Hence find the area of S. **(3)**

June 16 Q7

9.

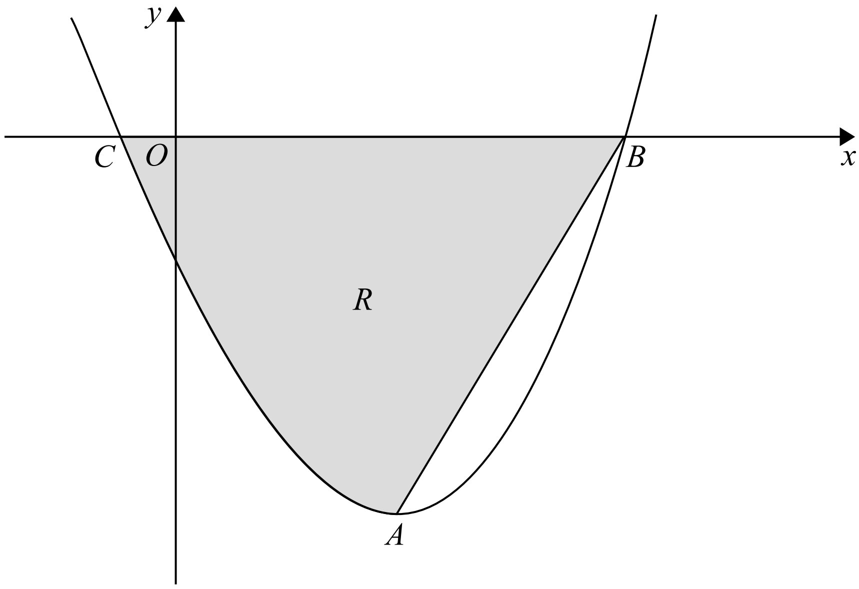

Figure 2

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

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

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)**

June 17 Q10