INTEGRATION

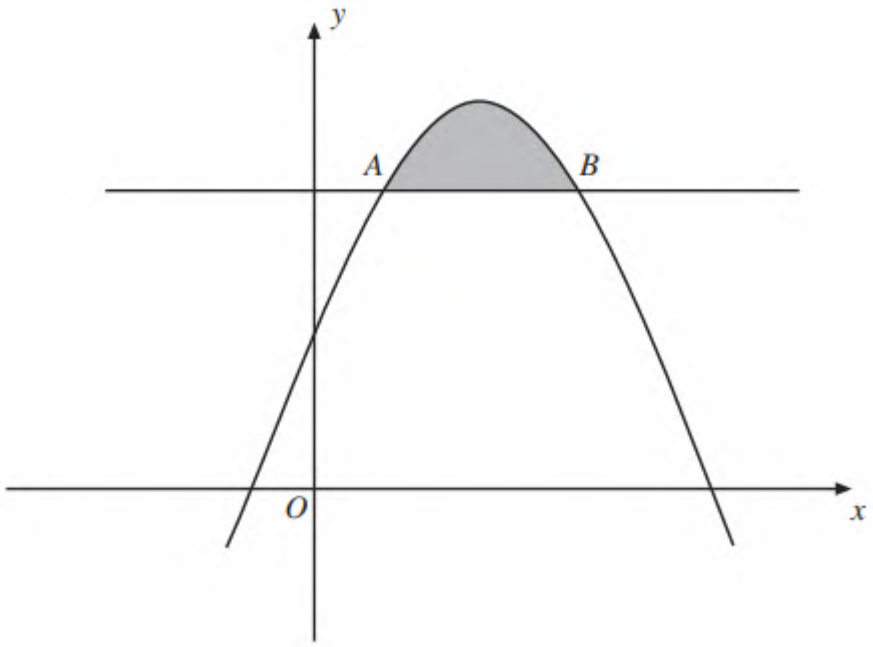
AS Unit 1: Pure Mathematics A

WJEC past paper questions: 2010 – 2017

Total marks available 140 (approximately 2 hour 50 minutes)

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

b)



The diagram shows a sketch of the curve $y = 5 + 4x - x^2$ and the line $y = 8$.
The curve and the line intersect at the points A and B.
i) Showing your working, find the x-coordinates of A and B.
ii) Find the area of the shaded region. (10)

(January 10)

2. Find $\int \left(3\sqrt{x} - \frac{6}{x^4} - 1\right) dx$ (3)

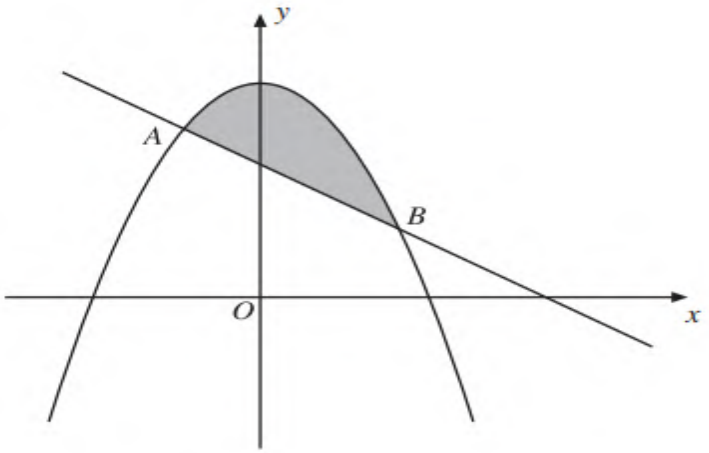
(Summer 10)

3. The region R is bounded by the curve $y = 3x + \frac{1}{5}x^3$, the x-axis and the lines $x = 1$, $x = 3$. Find the area of R. (5)

(Summer 10)

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

b)



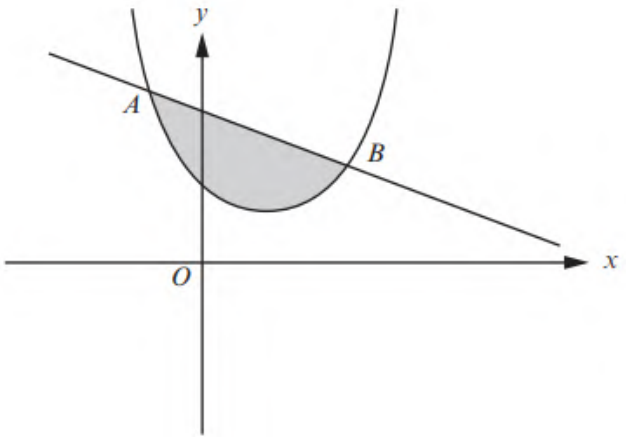
The diagram shows a sketch of the curve $y = 25 - x^2$ and the line $y = -2x + 17$. The line and the curve intersect at the points A and B.

i) Find the coordinates of A and B. (4)
ii) Find the area of the shaded region. (7)

(January 11)

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

b)



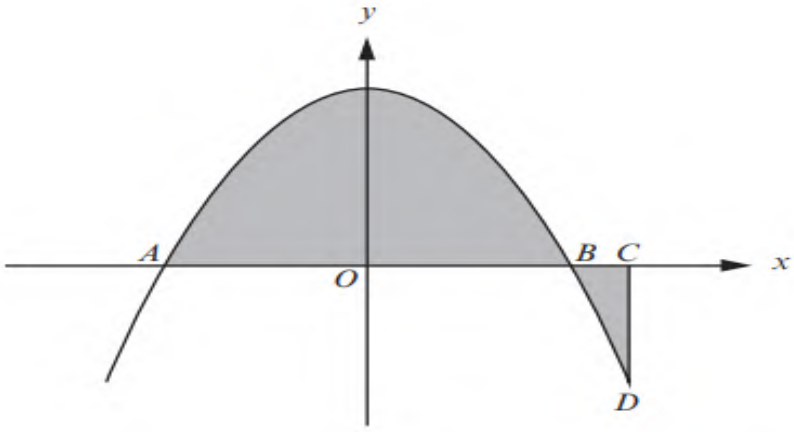
The diagram shows a sketch of the curve $y = x^2 - 4x + 6$ and the line $y = -x + 10$. The curve and the line intersect at the points A and B.

i) Showing your working, find the coordinates of A and B.
ii) Find the area of the shaded region. (11)

(Summer 11)

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

b)



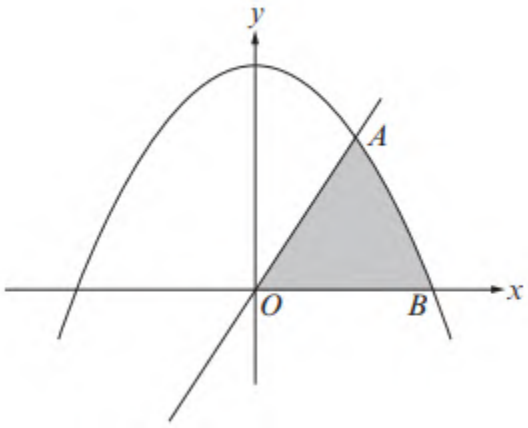
The diagram shows a sketch of the curve $y = 4 - x^2$. The curve intersects the x-axis at the points A and B. The point C has coordinates (3, 0). The point D lies on the curve and CD is parallel to the y-axis.

i) Showing your working, find the x-coordinates of the points A and B. (2)
ii) Find the **total** area of the shaded regions. (6)

(January 12)

7. a) Find $\int \left(3\sqrt{x} - \frac{2}{x^{\frac{5}{3}}}\right) dx$ (2)

b)

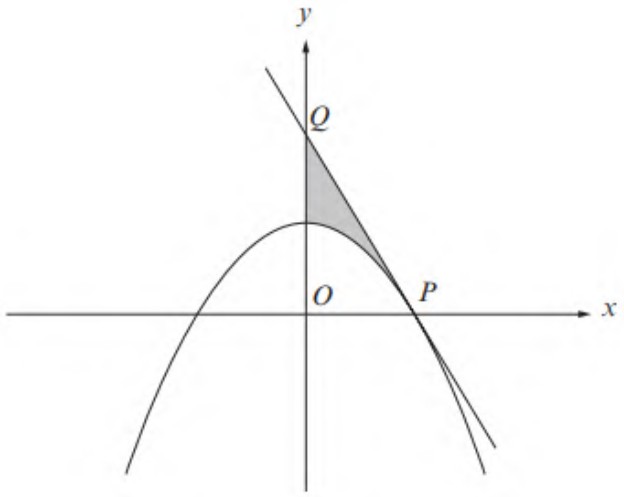


The diagram shows a sketch of the curve $y = 36 - x^2$ and the line $y = 5x$. The curve and the line intersect at the point A in the first quadrant and the curve intersects the positive x-axis at the point B.

i) Showing your working, find the coordinates of A and the coordinates of B.
ii) Find the area of the shaded region. (10)

(Summer 12)

8. a) Find $\int \left(\frac{5}{x^4} - 7x^{\frac{2}{3}}\right) dx$. (2)



b) The diagram shows a sketch of the curve $y = 9 - x^2$ which intersects the positive x-axis at the point P (a, 0).

i) Find the value of a.

The tangent to the curve at P intersects the y-axis at the point Q (0, b).

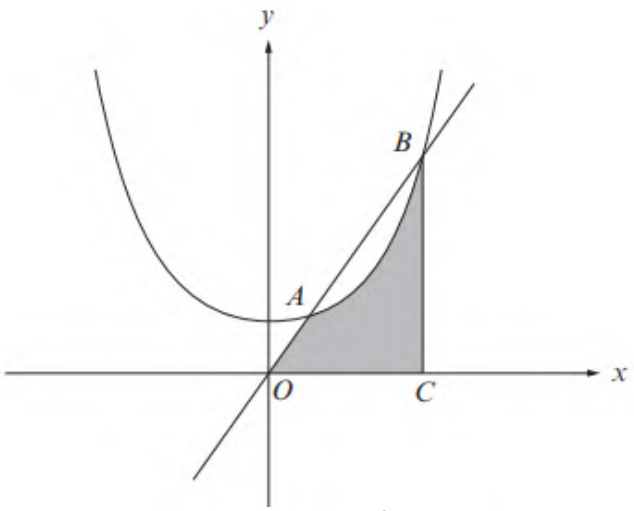
ii) Show that b = 18

iii) Find the area of the shaded region. (10)

(January 13)

9. a) Find $\int \left(\sqrt[4]{x} - \frac{2}{x^5}\right) dx$ (2)

b)



The diagram shows a sketch of the curve $y = x^2 + 3$ and the line $y = 4x$. The curve and the line intersect at the points A and B. The line BC is parallel to the y-axis.

i) Showing your working, find the x-coordinates of A and B.

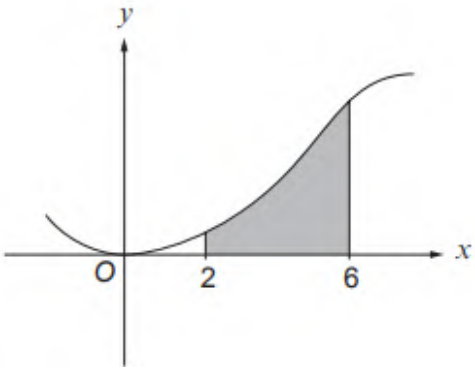
ii) Find the area of the shaded region. (9)

(Summer 13)

10. a) Find $\int \left(\frac{5}{x^3} - 2x^{\frac{1}{3}} - 4\right) dx$. (3)

b) The diagram below shows a sketch of the curve with equation $y = 3x^2 - \frac{1}{4}x^3$.

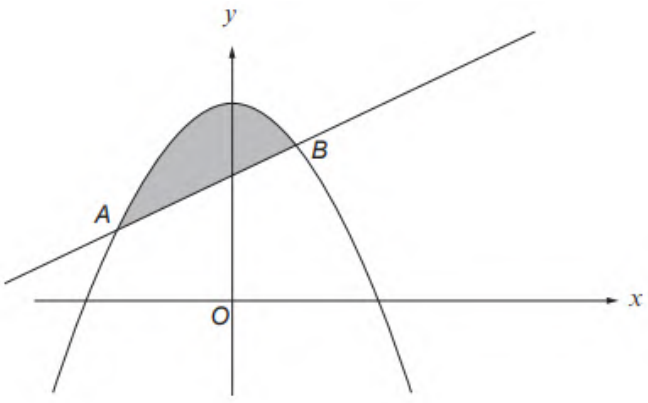
The shaded region is bounded by the curve, the x-axis and the lines $x = 2, x = 6$.
Find the area of this shaded region. (4)



(January 14)

11. a) Find $\int \left(\frac{5}{x^{\frac{3}{4}}} - 7\sqrt{x}\right) dx$. (2)

b)



The diagram shows a sketch of the curve $y = 16 - x^2$ and the line $y = x + 10$. The line and the curve intersect at the points A and B.

i) Find the coordinates of A and B.
ii) Find the area of the shaded region. (10)

(Summer 14)

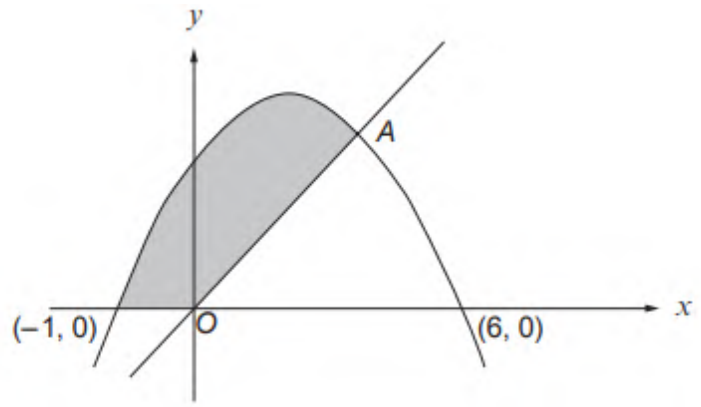
12. a) Find $\int \left(\frac{3}{\sqrt[4]{x}} - 9x^{\frac{5}{2}}\right) dx$. (2)

b) The region R is bounded by the curve $y = 2x^2 + \frac{6}{x^2}$, the x-axis and the lines $x = 1,\ x = 4$. Find the area of R. (5)

(Summer 16)

13. a) Find $\int \left(\frac{3}{\sqrt{x}} - 6x^{\frac{4}{3}}\right) dx$. (2)

b)



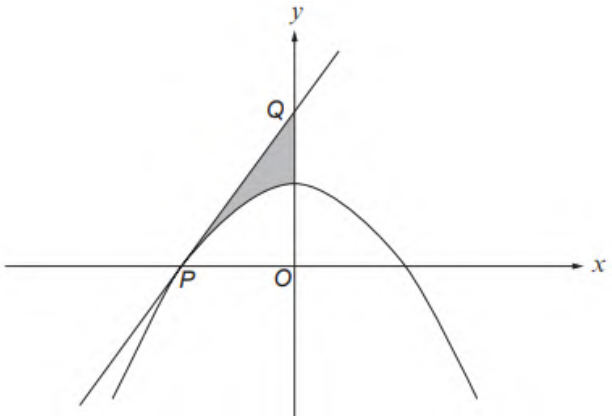
The diagram shows a sketch of the curve $y = 6 + 5x - x^2$ and the line $y = 4x$. The curve and the line intersect at the point A in the first quadrant and the curve intersects the x-axis at the points (-1, 0) and (6, 0)

i) Showing your working, find the x-coordinate of A.
ii) Find the area of the shaded region. (9)

(Summer 15)

14. a) Find $\int \left(\frac{2}{x^5} - 6x^{\frac{3}{4}}\right) dx$. (2)

b)



The diagram shows a sketch of the curve $y = 16 - x^2$ which intersects the negative x-axis at the point P (a, 0).

i) Write down the value of a.

The tangent to the curve at P intersects the y-axis at the point Q (0, b).

ii) Show that b = 32.
iii) Find the area of the shaded region. (10)

(Summer 17)