

**Integration Exam Questions (From OCR 4722 unless otherwise stated)**

**Q1, (Jun 2007, Q6)**

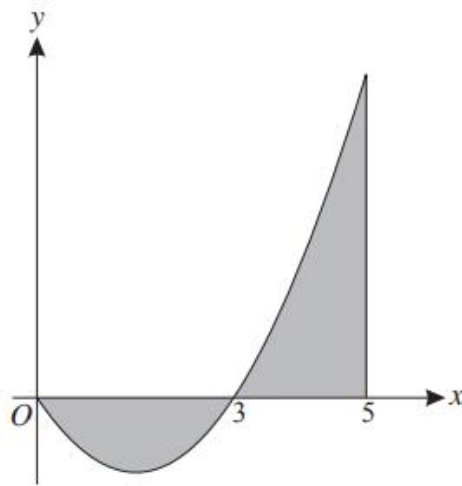
(a) (i) Find  $\int x(x^2 - 4) dx$ . [3]

(ii) Hence evaluate  $\int_1^6 x(x^2 - 4) dx$ . [2]

(b) Find  $\int \frac{6}{x^3} dx$ . [3]

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**Q2, (Jan 2008, Q7)**



The diagram shows part of the curve  $y = x^2 - 3x$  and the line  $x = 5$ .

(i) Explain why  $\int_0^5 (x^2 - 3x) dx$  does not give the total area of the regions shaded in the diagram. [1]

(ii) Use integration to find the exact total area of the shaded regions. [7]

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**Q3, (Jan 2009, Q1)**

Find

(i)  $\int (x^3 + 8x - 5) dx$ , [3]

(ii)  $\int 12\sqrt{x} dx$ . [3]

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**Q4, (Jun 2011, Q2)**

(i) Find  $\int (6x^{\frac{1}{2}} - 1) dx$ . [3]

(ii) Hence find the equation of the curve for which  $\frac{dy}{dx} = 6x^{\frac{1}{2}} - 1$  and which passes through the point (4, 17). [3]

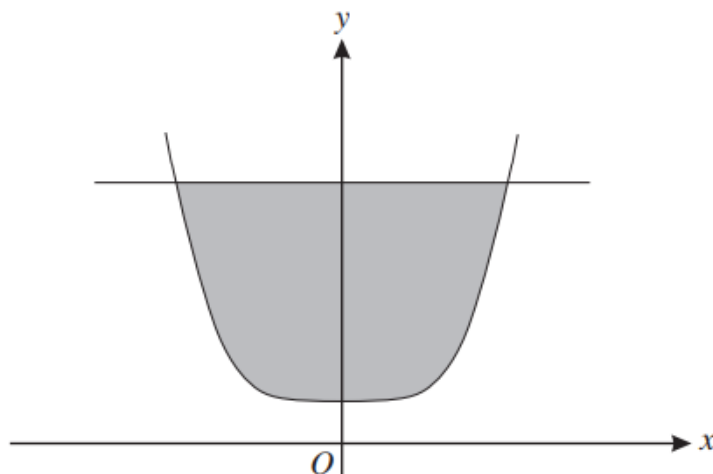
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**Q5, (Jun 2015, Q5)**

A curve has an equation which satisfies  $\frac{d^2y}{dx^2} = 3x^{-\frac{1}{2}}$  for all positive values of  $x$ . The point  $P(4, 1)$  lies on the curve, and the gradient of the curve at  $P$  is 5. Find the equation of the curve. [7]

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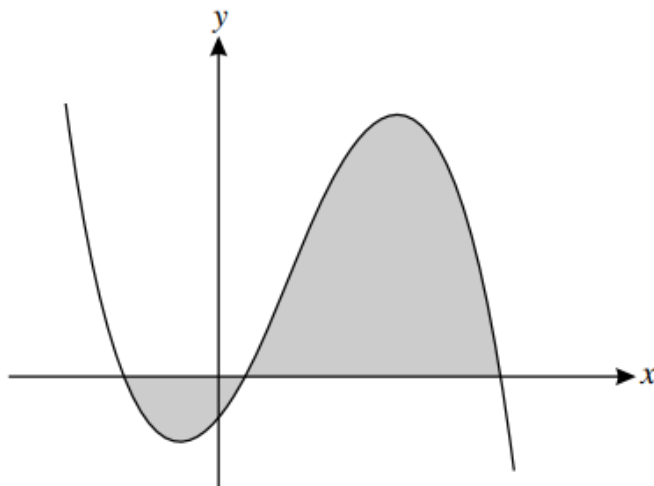
**Q6, (Jan 2009, Q4)**



The diagram shows the curve  $y = x^4 + 3$  and the line  $y = 19$  which intersect at  $(-2, 19)$  and  $(2, 19)$ . Use integration to find the exact area of the shaded region enclosed by the curve and the line. [7]

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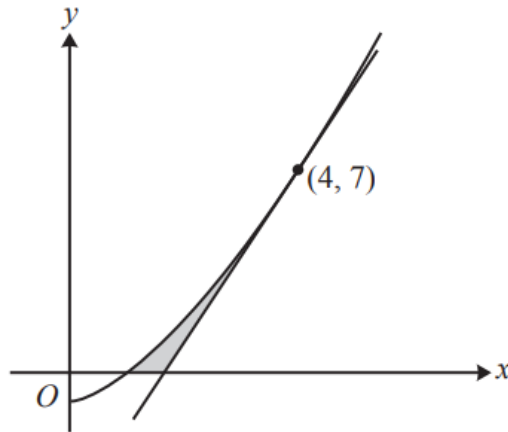
**Q7, (Jan 2011, Q9)**



The diagram shows the curve  $y = f(x)$ , where  $f(x) = -4x^3 + 9x^2 + 10x - 3$ .

- (i) Verify that the curve crosses the  $x$ -axis at  $(3, 0)$  and hence state a factor of  $f(x)$ . [2]
  - (ii) Express  $f(x)$  as the product of a linear factor and a quadratic factor. [3]
  - (iii) Hence find the other two points of intersection of the curve with the  $x$ -axis. [2]
  - (iv) The region enclosed by the curve and the  $x$ -axis is shaded in the diagram. Use integration to find the total area of this region. [5]
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**Q8, (Jun 2013, Q7)**



The diagram shows the curve  $y = x^{\frac{3}{2}} - 1$ , which crosses the  $x$ -axis at  $(1, 0)$ , and the tangent to the curve at the point  $(4, 7)$ .

(i) Show that  $\int_1^4 (x^{\frac{3}{2}} - 1) dx = 9\frac{2}{5}$ . [4]

(ii) Hence find the exact area of the shaded region enclosed by the curve, the tangent and the  $x$ -axis. [5]

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**Q9, (OCR H230/01, Practice Papers Set 1, Q6)**

(i) Find  $\int (x^3 - x^2 - 2x) dx$ . [3]

(ii) **In this question you must show detailed reasoning.**

Find the area enclosed by the curve  $y = x^3 - x^2 - 2x$  and the positive  $x$ -axis. [4]

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