

IAL A'LEVEL PURE MATHEMATICS (P3) TOPIC WISE QUESTIONS PAPERS
Algebraic Methods

1.
$$f(x) = \frac{2x^4 + 15x^3 + 35x^2 + 21x - 4}{(x + 3)^2} \quad x \in \mathbb{R} \quad x > -3$$

(a) Find the values of the constants A , B , C and D such that

$$f(x) = Ax^2 + Bx + C + \frac{D}{(x + 3)^2} \quad (4)$$

(b) Hence find,

$$\int f(x) dx \quad (3)$$

January 2023/Q4

2. (i) Find

$$\int \frac{12}{(2x - 1)^2} dx$$

giving your answer in simplest form.

(2)

(ii) (a) Write $\frac{4x + 3}{x + 2}$ in the form

$$A + \frac{B}{x + 2} \quad \text{where } A \text{ and } B \text{ are constants to be found}$$

(b) Hence find, using algebraic integration, the exact value of

$$\int_{-8}^{-5} \frac{4x + 3}{x + 2} dx$$

giving your answer in simplest form.

(6)

June2021/Q3

3. Given that

$$\frac{3x^2 + 4x - 7}{(x + 1)(x - 3)} \equiv A + \frac{B}{x + 1} + \frac{C}{x - 3}$$

(a) find the values of the constants A , B and C .

(4)

January 2019/Q2

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4.

$$g(x) = \frac{2x^2 - 5x + 8}{x - 2}$$

(a) Write $g(x)$ in the form

$$Ax + B + \frac{C}{x - 2}$$

where A , B and C are integers to be found.

(3)

(b) Hence use algebraic integration to show that

$$\int_4^8 g(x) dx = \alpha + \beta \ln 3$$

where α and β are integers to be found.

(4)

June2024/Q2

5. (a) Given that

$$\frac{x^4 - x^3 - 10x^2 + 3x - 9}{x^2 - x - 12} \equiv x^2 + P + \frac{Q}{x - 4} \quad x > -3$$

find the value of the constant P and show that $Q = 5$

(4)

October 2020/Q9

6.

$$f(x) = \frac{2x^3 - 4x - 15}{x^2 + 3x + 4}$$

(a) Show that

$$f(x) \equiv Ax + B + \frac{C(2x + 3)}{x^2 + 3x + 4}$$

where A , B and C are integers to be found.

(4)

(b) Hence, find

$$\int_3^5 f(x) dx$$

giving your answer in the form $p + \ln q$, where p and q are integers.

(5)

October 2022/Q1

IAL A'LEVEL PURE MATHEMATICS (P3) TOPIC WISE QUESTIONS PAPERS
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7.

$$g(x) = \frac{x^4 + x^3 - 7x^2 + 8x - 48}{x^2 + x - 12}, \quad x > 3, \quad x \in \mathbb{R}$$

(a) Given that

$$\frac{x^4 + x^3 - 7x^2 + 8x - 48}{x^2 + x - 12} \equiv x^2 + A + \frac{B}{x - 3}$$

find the values of the constants A and B .

(4)

(b) Hence, or otherwise, find the equation of the tangent to the curve with equation $y = g(x)$ at the point where $x = 4$. Give your answer in the form $y = mx + c$, where m and c are constants to be determined.

(5)

June2016/Q4

8.
$$\frac{6 - 5x - 4x^2}{(2 - x)(1 + 2x)} \equiv A + \frac{B}{(2 - x)} + \frac{C}{(1 + 2x)}$$

(a) Find the values of the constants A , B and C .

(4)

June2017/Q5

9. (a) Given

$$\frac{9}{t^2(t - 3)} \equiv \frac{A}{t} + \frac{B}{t^2} + \frac{C}{(t - 3)}$$

find the value of the constants A , B and C .

(3)

June2019/Q11

10. The function f is defined by

$$f(x) = \frac{6}{2x + 5} + \frac{2}{2x - 5} + \frac{60}{4x^2 - 25}, \quad x > 4$$

(a) Show that $f(x) = \frac{A}{Bx + C}$ where A , B and C are constants to be found.

(4)

June2018/Q2

IAL A'LEVEL PURE MATHEMATICS (P3) TOPIC WISE QUESTIONS PAPERS
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11.

$$f(x) = \frac{x^4 + x^3 - 3x^2 + 7x - 6}{x^2 + x - 6}, \quad x > 2, x \in \mathbb{R}$$

(a) Given that

$$\frac{x^4 + x^3 - 3x^2 + 7x - 6}{x^2 + x - 6} \equiv x^2 + A + \frac{B}{x - 2}$$

find the values of the constants A and B .

(4)

(b) Hence or otherwise, using calculus, find an equation of the normal to the curve with equation $y = f(x)$ at the point where $x = 3$

(5)

June2016/Q

12. Given that

$$\frac{2x^4 - 3x^2 + x + 1}{(x^2 - 1)} \equiv (ax^2 + bx + c) + \frac{dx + e}{(x^2 - 1)},$$

find the values of the constants a, b, c, d and e .

(4)

January 2008/Q1

13. (a) Simplify fully

$$\frac{2x^2 + 9x - 5}{x^2 + 2x - 15}$$

(3)

Given that

$$\ln(2x^2 + 9x - 5) = 1 + \ln(x^2 + 2x - 15), \quad x \neq -5,$$

(b) find x in terms of e .

(4)

June2010/Q8

14. Given that

$$\frac{3x^4 - 2x^3 - 5x^2 - 4}{x^2 - 4} \equiv ax^2 + bx + c + \frac{dx + e}{x^2 - 4}, \quad x \neq \pm 2$$

find the values of the constants a, b, c, d and e .

(4)

June2013/Q1