



QUESTION WORKBOOK

Integration by substitution and by parts

Integration · Year 12–13

8 questions · 32 marks

PRINT EDITION

SECTION A · Warm-up

A1 Find $\int 2x(x^2 + 1)^3 dx$ by recognising a reverse chain pattern. [2]

A2 Find $\int 2x/(x^2 + 3) dx$. [2]

SECTION B · Standard

B1 Use the substitution $u = x^2 + 1$ to find the exact value of $\int_0^2 x(x^2 + 1)^3 dx$. [5]

B2 Use integration by parts to find $\int xe^{2x} dx$. [4]

B3 Use integration by parts to find $\int x \ln x \, dx$. [4]

B4 Find the exact value of $\int_0^{\pi/2} x \sin x \, dx$. [4]

SECTION C · Stretch

C1 Use the substitution $u = 1 + \sqrt{x}$ to show that $\int_1^4 \frac{1}{(1 + \sqrt{x})} \, dx = 2 - 2 \ln(3/2)$. [6]

C2 Find the exact value of $\int_0^1 x^2 e^x dx$, giving your answer in terms of e .

[5]