



Integration

Questions

Suitable for:

Pearson Edexcel International A-Level (iAL) — Pure Mathematics 3



Question 1

Find each of the following integrals:

(a)

$$\int \sin 3x \, dx$$

(1 marks)

(b)

$$\int e^{4x} \, dx$$

(1 marks)

(c)

$$\int \frac{1}{2x+1} \, dx$$

(2 marks)

(d)

$$\int \cos \frac{x}{2} \, dx$$

(2 marks)

Total for question = 6 marks





Question 2

Find each of the following integrals:

(a)

$$\int (3x + 2)^5 dx$$

(2 marks)

(b)

$$\int e^{2x-1} dx$$

(2 marks)

(c)

$$\int \frac{1}{4x-3} dx$$

(2 marks)

Total for question = 6 marks





Question 3

Evaluate each of the following:

(a)

$$\int_0^{\pi/4} \cos 2x \, dx$$

(3 marks)

(b)

$$\int_1^2 e^{3x} \, dx$$

giving your answer in exact form.

(3 marks)

Total for question = 6 marks



Question 4

Use the identity $\cos 2x = 1 - 2\sin^2 x$ to show that

$$\int \sin^2 x \, dx = \frac{x}{2} - \frac{\sin 2x}{4} + c$$

(3 marks)

Hence evaluate

$$\int_0^{\pi/2} \sin^2 x \, dx$$

(2 marks)

Total for question = 5 marks



Question 5

Use an appropriate trigonometric identity to evaluate

$$\int_0^{\pi/3} \cos^2 x \, dx$$

giving your answer in exact form.

(5 marks)

Total for question = 5 marks



Question 6

Use the identity $\sin 2x = 2 \sin x \cos x$ to find

$$\int \sin x \cos x \, dx$$

(3 marks)

Total for question = 3 marks



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Question 7

Use the identity $\sec^2 x = 1 + \tan^2 x$ to find $\int \tan^2 x dx$.

(2 marks)

Hence evaluate

$$\int_0^{\pi/4} \tan^2 x dx$$

(2 marks)

Total for question = 4 marks



Question 8

Use the reverse chain rule to find each of the following:

(a)

$$\int 2x(x^2 + 3)^4 dx$$

(2 marks)

(b)

$$\int \sin x \cos^4 x dx$$

(2 marks)

(c)

$$\int (2x + 1)e^{x^2 + x} dx$$

(2 marks)

Total for question = 6 marks





Question 9

Use the reverse chain rule to find each of the following:

(a)

$$\int \frac{2x}{x^2 + 1} dx$$

(2 marks)

(b)

$$\int \frac{\cos x}{\sin x} dx$$

(2 marks)

(c)

$$\int \frac{3x^2 + 2}{x^3 + 2x} dx$$

(2 marks)

Total for question = 6 marks



Question 10

Find the exact area enclosed between the curve $y = \sin^2 x$ and the x -axis for $0 \leq x \leq \pi$.

(5 marks)

Total for question = 5 marks



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Question 11

Evaluate

$$\int_1^2 \left(e^x + \frac{1}{x} \right) dx$$

giving your answer in exact form.

(4 marks)

Total for question = 4 marks



Question 12

(a) Show that

$$(\cos x - \sin x)^2 \equiv 1 - \sin 2x$$

(2 marks)

(b) Hence evaluate

$$\int_0^{\pi/6} (\cos x - \sin x)^2 dx$$

giving your answer in exact form.

(4 marks)

Total for question = 6 marks



Question 13

Use the reverse chain rule to find

$$\int \sin(3x) \cos^4(3x) \, dx$$

(4 marks)

Total for question = 4 marks



Question 14

Use the reverse chain rule to find

$$\int \sin 2x \cdot e^{\cos 2x} dx$$

(4 marks)

Total for question = 4 marks



Question 15

Use an appropriate trigonometric identity to evaluate

$$\int_0^{\pi/8} \tan^2(2x) \, dx$$

giving your answer in exact form.

(5 marks)

Total for question = 5 marks