

# 6.1 Integration

## Question Paper

Course	CIEAS Maths
Section	6. Integration
Topic	6.1 Integration
Difficulty	Very Hard

**Time allowed:** 50  
**Score:** /39  
**Percentage:** /100

**Question 1**

Use calculus to find

$$\int (2\sqrt{x} + 5x^{\frac{1}{3}}) dx$$

[3 marks]

**Question 2**

Use calculus to find the value of

$$\int_2^4 \frac{x^3 + \sqrt[3]{x}}{2\sqrt{x}} dx$$

giving your answer correct to 3 significant figures.

[5 marks]

**Question 3**

Find the equation of the curve passing through the point (4, -8) and given by

$$y = \int \left( \frac{2}{\sqrt{x}} - x - 3 \right) dx$$

[4 marks]

**Question 4a**

(a) Show that

$$\left( 3 - \frac{1}{2}x \right)^3 = 27 - \frac{27}{2}x + \frac{9}{4}x^2 - \frac{1}{8}x^3$$

[3 marks]

**Question 4b**

(b) Hence, or otherwise, work out

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

[3 marks]

**Question 5**

Given

$$\int_q^{4q} 5x\sqrt{x} dx = 15\,066$$

find the value of the constant  $q$ .

[5 marks]

**Question 6**

A function,  $f(x)$ , has second derivative given by

$$f''(x) = 2(18x - 5).$$

Given that  $(2x - 1)$  and  $(3x + 2)$  are factors of  $f(x)$ , find  $f(x)$ .

[6 marks]

**Question 7a**

(a) Given that

$$\int_p^{\infty} \frac{3}{x\sqrt{x}} dx = \sqrt{3}$$

where  $p$  is a real constant, find the value of  $p$ .

[5 marks]

**Question 7b**

(b) Given that

$$\int_0^{50} \frac{q + 3x}{\sqrt{x}} dx = 750\sqrt{2}$$

where  $q$  is a real constant, find the value of  $q$ .

[5 marks]