

# INTEGRATION: A2

## A2 Unit 3: Pure Mathematics B

### WJEC past paper questions: 2010 – 2017

Total marks available 124 (approximately 2 hours 30 minutes)

1. (a) Find

$$(i) \int \sqrt{7x-9} \, dx, \quad (ii) \int e^{\frac{x}{6}} \, dx, \quad (iii) \int \frac{4}{5x-1} \, dx. \quad [6]$$

$$(b) \text{ Evaluate } \int_2^4 \frac{8}{(3x-4)^3} \, dx. \quad [4]$$

(Summer 10)

2. (a) Find

$$(i) \int \cos 4x \, dx, \quad (ii) \int 5e^{2-3x} \, dx, \quad (iii) \int \frac{3}{(6x-7)^5} \, dx. \quad [6]$$

$$(b) \text{ Evaluate } \int_1^4 \frac{9}{2x+5} \, dx, \text{ giving your answer correct to three decimal places.} \quad [4]$$

(January 11)

3. (a) Find

$$(i) \int \frac{9}{4x+3} \, dx, \quad (ii) \int 3e^{5-2x} \, dx, \quad (iii) \int \frac{5}{(7x-1)^3} \, dx. \quad [6]$$

$$(b) \text{ Evaluate } \int_0^{\frac{\pi}{3}} \cos\left(3x - \frac{\pi}{6}\right) \, dx. \quad [4]$$

(Summer 11)

4. (a) Find each of the following, simplifying your answer wherever possible.

$$(i) \int \sin\left(\frac{x}{4}\right) \, dx, \quad (ii) \int e^{\frac{2x}{3}} \, dx, \quad (iii) \int \frac{7}{8x-2} \, dx. \quad [6]$$

$$(b) \text{ Evaluate } \int_1^9 \frac{3}{\sqrt{5x+4}} \, dx. \quad [4]$$

(January 12)

5. Find

(a) (i)  $\int 3e^{2-\frac{x}{4}} dx$       (ii)  $\int \frac{9}{(2x-3)^6} dx$       (iii)  $\int \frac{7}{3x+1} dx$       [6]

(b) Given that  $0 < a < \frac{\pi}{2}$  and that

$$\int_0^a \sin 2x dx = \frac{1}{4},$$

find the value of the constant  $a$ .

[5]

(Summer 12)

6. (a) Find

(i)  $\int \cos\left(\frac{4x+5}{3}\right) dx$ ,      (ii)  $\int e^{2x+9} dx$ ,      (iii)  $\int \frac{3}{(7-2x)^6} dx$ .      [6]

(b) Express  $\int_2^{44} \frac{1}{3x-4} dx$

in the form  $\ln k$ , where  $k$  is an integer whose value is to be found.

[4]

(January 13)

7. (a) Find

(i)  $\int \cos\left(3x + \frac{\pi}{2}\right) dx$ ,      (ii)  $\int e^{3-4x} dx$ ,  
 (iii)  $\int \frac{7}{8x+5} dx$ .      [6]

(b) Evaluate  $\int_1^2 \frac{9}{(2x-1)^4} dx$ .      [4]

(Summer 13)

8. (a) Find each of the following, simplifying your answer wherever possible.

(i)  $\int e^{\frac{5x}{6}} dx$ ,      (ii)  $\int \sqrt[3]{8x+1} dx$ ,      (iii)  $\int \sin\left(1 - \frac{x}{3}\right) dx$ .      [6]

(b) Given that  $a > 2$ , and that

$$\int_2^a \frac{1}{4x-1} dx = 0.284,$$

find the value of the constant  $a$ . Give your answer correct to one decimal place.      [5]

(January 14)

9. (a) Find each of the following, simplifying your answer wherever possible.

(i)  $\int \cos(2 - 5x) dx,$       (ii)  $\int \frac{4}{e^{3x-2}} dx,$       (iii)  $\int \frac{5}{\frac{1}{6}x - 3} dx.$  [6]

(b) Evaluate  $\int_2^6 \sqrt{4x+1} dx.$  [4]

(Summer 14)

10. (a) Find each of the following integrals, simplifying your answer wherever possible.

(i)  $\int \frac{(7x^2 - 2)}{x} dx$       (ii)  $\int \sin\left(\frac{2x}{3} - \pi\right) dx$  [5]

(b) Evaluate  $\int_3^6 \frac{1}{\sqrt[4]{(5x-14)}} dx.$  [4]

(Summer 15)

11. (a) Find each of the following, simplifying your answer wherever possible.

(i)  $\int 7e^{5-\frac{3}{4}x} dx$       (ii)  $\int \sin\left(\frac{2x}{3} + 5\right) dx$       (iii)  $\int \frac{8}{(9-10x)^3} dx$  [6]

(b) Given that  $a > 0$  and that

$$\int_a^6 \frac{1}{4x+3} dx = 0.1986,$$

find the value of the constant  $a$ . Give your answer correct to one decimal place. [5]

(Summer 16)

12. (a) Find each of the following integrals, simplifying your answer wherever possible.

(i)  $\int 8e^{2-5x} dx$       (ii)  $\int \frac{6}{\sqrt[3]{4x-7}} dx$

(iii)  $\int \cos\left(\frac{7x-9}{3}\right) dx$  [6]

(b) (i) Differentiate  $\ln(3x^2 - 8)$  with respect to  $x$ .

(ii) Use your answer to (b)(i) to evaluate

$$\int_2^6 \frac{3x}{3x^2 - 8} dx.$$

Give your answer in the form  $\ln k$ , where  $k$  is an integer whose value is to be found. [6]

(Summer 17)