Integration – Year 12 - Answers

Exercise A

1 **a** $\frac{1}{2}x^4 + x^3 + c$ **b** $2x - \frac{3}{x} + c$

c $\frac{4}{3}x^3 + 6x^2 + 9x + c$ **d** $\frac{2}{3}x^3 + \frac{1}{2}x^2 - 3x + c$

e $\frac{4}{5}x^{\frac{5}{2}} + 2x^{\frac{3}{2}} + c$

2 **a** $\frac{1}{3}x^3 + 2x^2 + 4x + c$ **b** $\frac{1}{3}x^3 + 2x - \frac{1}{x} + c$

c $\frac{1}{2}x^2 + \frac{8}{3}x^{\frac{3}{2}} + 4x + c$ **d** $\frac{2}{5}x^{\frac{5}{2}} + \frac{4}{3}x^{\frac{3}{2}} + c$

e $\frac{2}{3}x^{\frac{3}{2}} + 4x^{\frac{1}{2}} + c$ **f** $2x^{\frac{1}{2}} + \frac{4}{3}x^{\frac{3}{2}} + c$

3 **a** $2x^{\frac{1}{2}} - \frac{1}{x} + c$ **b** $4x^{\frac{1}{2}} + x^3 + c$

c $\frac{3}{5}x^{\frac{5}{3}} - \frac{2}{x^2} + c$ **d** $-\frac{1}{x^2} - \frac{1}{x} + 3x + c$

e $\frac{1}{4}x^4 - \frac{1}{3}x^3 + \frac{3}{2}x^2 - 3x + c$

f $4x^{\frac{1}{2}} + \frac{6}{5}x^{\frac{5}{2}} + c$ **g** $\frac{1}{3}x^3 - 3x^2 + 9x + c$

h $\frac{8}{5}x^{\frac{5}{2}} + \frac{8}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + c$

i $3x + 2x^{\frac{1}{2}} + 2x^3 + c$ **j** $\frac{2}{5}x^{\frac{5}{2}} + 3x^2 + 6x^{\frac{3}{2}} + c$

Exercise B

1 **a** $5\frac{1}{4}$ **b** 10 **c** $11\frac{5}{6}$ **d** $8\frac{1}{2}$ **e** $60\frac{1}{2}$

2 **a** $16\frac{2}{3}$ **b** $6\frac{1}{2}$ **c** $46\frac{1}{2}$ **d** $\frac{11}{14}$ **e** $2\frac{1}{2}$

Exercise C

1 **a** $y = x^3 + x^2 - 2$ **b** $y = x^4 - \frac{1}{x^2} + 3x + 1$

c $y = \frac{2}{3}x^{\frac{3}{2}} + \frac{1}{12}x^3 + \frac{1}{3}$ **d** $y = 6\sqrt{x} - \frac{1}{2}x^2 - 4$

e $y = \frac{1}{3}x^3 + 2x^2 + 4x + \frac{2}{3}$ **f** $y = \frac{2}{5}x^{\frac{5}{2}} + 6x^{\frac{1}{2}} + 1$

2 $f(x) = \frac{1}{2}x^4 + \frac{1}{x} + \frac{1}{2}$

3 $y = 1 - \frac{2}{\sqrt{x}} - \frac{3}{x}$

4 **a** $f_2(x) = \frac{x^3}{3}$; $f_3(x) = \frac{x^4}{12}$ **b** $\frac{x^{n+1}}{3 \times 4 \times 5 \times \ldots x(n+1)}$

5 $f_2(x) = x + 1$; $f_3(x) = \frac{1}{2}x^2 + x + 1$;
$f_4(x) = \frac{1}{6}x^3 + \frac{1}{2}x^2 + x + 1$

Exercise D

1 **a** 8 **b** $9\frac{3}{4}$ **c** $19\frac{2}{3}$ **d** 21 **e** $8\frac{5}{12}$
2 4
3 6
4 $10\frac{2}{3}$
5 $21\frac{1}{3}$
6 $1\frac{1}{3}$

Exercise E

1 $1\frac{1}{3}$
2 $20\frac{5}{6}$
3 $40\frac{1}{2}$
4 $1\frac{1}{3}$
5 $21\frac{1}{12}$

Exercise F

1 **a** $A(-2, 6), B(2, 6)$ **b** $10\frac{2}{3}$
2 **a** $A(1, 3), B(3, 3)$ **b** $1\frac{1}{3}$
3 $6\frac{2}{3}$
4 4.5
5 **a** (2, 12) **b** $13\frac{1}{3}$
6 **a** $20\frac{5}{6}$ **b** $17\frac{1}{6}$
7 **c** $y = x - 4$ **d** $8\frac{3}{5}$
8 $3\frac{3}{8}$
9 **b** 7.2
10 **a** $21\frac{1}{3}$ **b** $2\frac{5}{9}$
