



CHEMISTRY ONLINE
— **TUITION** —

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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	INTEGRATION
PAPER TYPE:	SOLUTION - 8
TOTAL QUESTIONS	8
TOTAL MARKS	21

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INTEGRATION - 8

$$\begin{aligned}
 1. \quad & \int \sin(a + b)x dx \\
 &= \frac{-\cos(a+b)x}{a+b} dx \\
 &= -\frac{1}{a+b} \cos(a + b)x + c
 \end{aligned}$$

$$2. \quad \sin 61^\circ$$

$$\text{Let } y = \sin x$$

$$\text{We take } x = 60^\circ$$

$$\delta x = dx = 61^\circ - 60^\circ = 1^\circ = 0.01745$$

$$y = \sin 60^\circ = 0.866$$

$$\text{Now } y = \sin x$$

$$d(y) = d(\sin x)$$

$$dy = \cos x \, dx$$

$$dy = \cos 60^\circ (0.01745)$$

$$dy = 0.0087$$

$$\text{Thus } \sin 61^\circ \approx y + dy$$

$$= 0.866 + 0.0087$$

$$= 0.8747$$

I am Sorry !!!!!

$$\begin{aligned}
 3. \quad & \int \frac{1-x^2}{1+x^2} dx \\
 &= \int \frac{2-1-x^2}{1+x^2} dx \\
 &= \int \frac{2-(1+x^2)}{1+x^2} dx \\
 &= \int \frac{2}{1+x^2} dx - \int \frac{1+x^2}{1+x^2} dx \\
 &= 2 \int \frac{1}{1+x^2} dx - \int 1 dx \\
 &= 2 \tan^{-1} x - x + c
 \end{aligned}$$

$$4. \quad = \int \ln x \times \frac{1}{x} dx$$

As $f(x) = \ln x$

And $f'(x) = \frac{1}{x}$, so

Using $\int [f(x)]^n = \frac{[f(x)]^{n+1}}{n+1}$

$$= \frac{(\ln x)^{1+1}}{1+1} + c$$

$$= \frac{(\ln x)^2}{2} + c$$

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$$5. \quad = \int (2x + 3)^{1/2} dx$$

× and ÷ by 2 to make derivative

$$= \frac{1}{2} \int (2x + 3)^{1/2} \cdot 2 dx$$

$$= \frac{1}{2} \cdot \frac{(2x+3)^{1/2+1}}{1/2+1} + c$$

$$= \frac{1}{2} \cdot \frac{(2x+3)^{3/2}}{3/2} + c$$

$$= \frac{1}{2} \cdot \frac{2}{3} (2x + 3)^{3/2} + c$$

$$= \frac{1}{3} (2x + 3)^{3/2} + c$$

$$6. \quad = \int \tan^2 x dx$$

$$= \int (\sec^2 x - 1) dx$$

$$= \int (\sec^2 x dx - \int 1 dx)$$

$$= \tan x - x + c$$

$$7. \quad = \int \frac{1}{(2x+3)^4} dx$$

$$= \int (2x + 3)^{-4} dx$$

$$= \frac{1}{2} \cdot \frac{(2x + 3)^{-4+1}}{-4+1} + c$$

$$= -\frac{1}{6(2x+3)^3} + c$$

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8. We know that

$$\frac{d}{dx} [\ln f(x)] = \frac{1}{f(x)} \cdot f'(x)$$

Taking integration on both sides

$$\int \frac{d}{dx} [\ln f(x)] = \int \frac{1}{f(x)} \cdot f'(x)$$

$$\Rightarrow \ln f(x) = \int \frac{f'(x)}{f(x)} dx$$

$$\Rightarrow \int \frac{f'(x)}{f(x)} dx = \ln f(x) + c \quad \text{By definition}$$

$$(\int f(x) dx = F(x) + c)$$

Hence proved.



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- Tutoring students in UK and worldwide since 2008
- Chemistry, Physics, and Math's Tutor

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