



CHEMISTRY ONLINE
— **TUITION** —

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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	INTEGRATION
PAPER TYPE:	SOLUTION - 6
TOTAL QUESTIONS	8
TOTAL MARKS	26

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INTEGRATION - 6

1. $\sin 61^\circ$

Let $y = \sin x$

We take $x = 60^\circ$

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

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

Now $y = \sin x$

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

$dy = \cos x \, dx$

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

$dy = 0.0087$

Thus $\sin 61^\circ \approx y + dy$

$= 0.866 + 0.0087$

$= 0.8747$

2.

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

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

$$= \int \frac{2 - (1 + x^2)}{1 + x^2} dx$$

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

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

I am Sorry !!!!!

$$= 2\tan^{-1} x - x + c$$

3.
$$\int \sin(a + b)x dx$$

$$= \frac{-\cos(a+b)x}{a+b} dx$$

$$= -\frac{1}{a+b} \cos(a + b)x + c$$

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

As $f(x) = \ln x$

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

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

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

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

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

× 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.
$$= \int \tan^2 x dx$$

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

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

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

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

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

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

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

8. We know that

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

Taking integration 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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