



CHEMISTRY ONLINE
— **TUITION** —

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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	INTEGRATION
PAPER TYPE:	SOLUTION - 3
TOTAL QUESTIONS	8
TOTAL MARKS	26

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INTEGRATION – 3

$$\begin{aligned}
 1. \quad & \frac{y}{x} - \ln x = \ln c \\
 \Rightarrow & d\left(\frac{y}{x} - \ln x\right) = d(\ln c) \\
 & d\left(\frac{y}{x}\right) - d(\ln x) = 0 \\
 \Rightarrow & \left(\frac{xdy - ydx}{x^2}\right) - \frac{1}{x} dx = 0 \\
 & \left(\frac{xdy - ydx}{x^2}\right) = \frac{1}{x} dx \\
 \Rightarrow & xdy - ydx = \frac{1}{x} dx \\
 & xdy - ydx = xdx \\
 & xdy = ydx + xdx \\
 \Rightarrow & xdy = (y + x)dx \\
 & \frac{dy}{dx} = \frac{x + y}{x}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & \text{Let } y = \sqrt[4]{x} = x^{1/4} \\
 & \text{we take } x = 16 \\
 & \delta x = dx = 17 - 16 = 1 \\
 & y = (16)^{1/4} = 2 \\
 & \text{Now } y = x^{1/4} \\
 & d(y) = d(x^{1/4}) \\
 & d(y) = \frac{1}{4} x^{\frac{1}{4}-1} dx \\
 & d(y) = \frac{1}{4} x^{-\frac{3}{4}} dx \\
 & \text{Put } x = 16, dx = 1 \\
 & dy = \frac{1}{4} (16)^{-\frac{3}{4}} (1) = \frac{1}{4} (2)^{-3} \\
 & dy = \frac{1}{4} \cdot \frac{1}{8} = \frac{1}{32} = 0.03125 \\
 & \text{Thus } \sqrt[4]{17} \approx y + dy
 \end{aligned}$$

$$\sqrt[4]{17} = 2 + 0.03125$$

$$\sqrt[4]{17} = 2.03125$$

3. Let the radius of a circular disc = x cm

$$\text{Area of a disc} = \pi r^2$$

$$A = \pi r^2$$

$$d(A) = d(\pi r^2)$$

$$dA = \pi \cdot 2x dx$$

As the diameter changes from 44 to 44.4,

So the radius changes from 22 to 22.4, so

$$x = 22, dx = 22.2 - 22 = 0.2$$

$$dA = \pi(2)(22)(0.2)$$

$$dA = 27.646 \text{ cm}^2$$

4. $= \int 3x^2 dx - \int 2x dx + \int 1 dx$

$$= 3 \int x^2 dx - 2 \int x dx + \int 1 dx$$

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

$$= 3 \cdot \frac{x^3}{3} - 2 \cdot \frac{x^2}{2} + x + c$$

$$= x^3 - x^2 + x + c$$

I am Sorry !!!!!

5. $= \int (2x + 3)^{1/2} dx$
 × and ÷ by 2 to make a 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. $xy + x = 4$
 Taking differentials on both sides
 $d(xy + x) = d(4)$

$$x dy + y dx + dx = 0$$

$$x dy + (y + 1) dx = 0$$

$$x dy = -(y + 1) dx$$

$$\frac{dy}{dx} = -\frac{y+1}{x} \quad \text{and} \quad \frac{dx}{dy} = -\frac{x}{y+1}$$

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$$\begin{aligned}7. \quad &= \int \frac{e^{2x} + e^x}{e^x} dx \\ &= \int \left[\frac{e^{2x}}{e^x} + \frac{e^x}{e^x} \right] dx \\ &= \int [e^x + 1] dx \\ &= \int e^x dx + \int 1 dx \\ &= \frac{e^x}{1} + x + c \\ &= e^x + x + c\end{aligned}$$

$$\begin{aligned}8. \quad &= \int \tan^2 x dx \\ &= \int (\sec^2 x - 1) dx \\ &\therefore 1 + \tan^2 \theta = \sec^2 \theta \\ &= \int \sec^2 x dx - \int 1 dx \\ &= \tan x - x + c\end{aligned}$$

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