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A LEVEL MATHS

(73) Integration (Basic Expressions (x^n))

WORKING AT D/E

(1) Find a simplified expression for y, including a constant of integration for each:

(a) $\frac{dy}{dx} = 4x$ (b) $\frac{dy}{dx} = 2x^2$ (c) $\frac{dy}{dx} = 4x^3 - 8x$

(d) $\frac{dy}{dx} = 5x^2 - x + 3$ (e) $\frac{dy}{dx} = \frac{5}{6}x^{\frac{1}{2}}$

(2) Find a simplified expression for $f(x)$, including a constant of integration for each:

(a) $f'(x) = x^{\frac{3}{2}}$ (b) $f'(x) = 5x^{-2}$ (c) $f'(x) = \sqrt{x}$

(3) $\frac{dy}{dx} = (3x+2)^2$

(a) Show that $\frac{dy}{dx}$ can be written in the form $Ax^2 + Bx + C$

(b) Hence find a simplified expression for y.

WORKING AT B/C

(1) Find a simplified expression for y, including a constant of integration for each:

(a) $\frac{dy}{dx} = \frac{2}{x^2} + \sqrt[3]{x}$ (b) $\frac{dy}{dx} = 8x^{-0.25} - x^{2.5}$

(c) $\frac{dy}{dx} = x\sqrt{x}$ (d) $\frac{dy}{dx} = \frac{24}{x^{\frac{2}{3}}} + 3x^{\frac{2}{5}}$

(2) $f'(x) = \frac{x^2-3x+8}{\sqrt{x}}$

(a) Show that $f(x)$ can be written in the form $f'(x) = Ax^p + Bx^q + Cx^r$

(b) Hence, find $f(x)$ giving each coefficient as a simplified fraction.

(3) Given that $\frac{dy}{dx} = \frac{(x^3-1)^2}{x^3}$ show that $y = \frac{1}{4}x^4 - 2x - \frac{1}{2x^2} + c$

WORKING AT A*/A

(1) $\frac{dy}{dx} = \frac{(\sqrt{x}+2)^2}{x^3}$

Find a simplified expression for y.

(2) $g(x)$ has gradient function $\frac{3}{x\sqrt{x}} - x$.

Find a general solution for $g(x)$.

(3) Given that $f'(x) = (x + x^{\frac{1}{3}})^3$

Find a general solution for $f(x)$ giving each coefficient as a simplified fraction.