

Indefinite Integration

Starter

1. The poetry for differentiating polynomials is:

*The power multiplies the coefficient,
And decrease the power by 1.*

Write the poetry for integrating polynomials.

Working: Increase the power by one and divide by the new power.

2. Using your poetry from question 1, find an expression for $\int kx^n dx$.

Working:
$$\int kx^n dx = \frac{k}{n+1} x^{n+1}$$

(**N.B.** Students will not include "+c" at this stage)

3. Write down three different functions that differentiate to $2x$.

Working: Any function of the form $x^2 + c$, where c is a number.

E.g. 1 Find:

(a) $\int 21x^2 dx$ (b) $\int (3x^4 - 2) dx$ (c) $\int 12x^{-3} dx$ (d) $\int x^{\frac{1}{2}} dx$

Working: (a) $\int 21x^2 dx = \frac{21}{3} x^{2+1} + c = 7x^3 + c$

(b) $\int (3x^4 - 2) dx = \frac{3}{5} x^{4+1} - 2x + c = \frac{3}{5} x^5 - 2x + c$

(c) $\int 12x^{-3} dx = \frac{12}{-2} x^{-3+1} + c = -6x^{-2} + c = -\frac{6}{x^2} + c$

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

N.B. The first step above can be missed out without loss of marks

Video: [Integrating polynomials](#)

[Solutions to Starter and E.g.s](#)

Exercise

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