

Finding the Constant of Integration

Starter

1. (Review of last lesson)

Find: (a) $\int -\frac{5}{9x^8} dx$

(b) $\int \left(\frac{2x^3 - \sqrt{x}}{x} \right) dx$

2. A curve passes through the point $(2, -5)$ and satisfies $\frac{dy}{dx} = 6x^2 - 1$. Find y in terms of x .

Notes

We use the given point or condition in order to find the constant of integration.

Success Criteria – finding the constant term

1. Integrate the function —make sure the “+ c ” is included.
2. Substitute the values given in the question in order to find the value of c .

E.g. 1 The gradient function of a curve is $4x$ and it passes through $(2, 11)$. Find the equation of the curve.

Working: $y = \int 4x dx = 2x^2 + c$

Substitute $(2, 11)$: $11 = 2 \times 2^2 + c \Rightarrow c = 3$
The equation of the curve is $y = 2x^2 + 3$.

E.g. 2 A tree is growing so that, after t years, its height is increasing at a rate of $\frac{30}{\sqrt[3]{t}}$ cm per year. Assume that, when $t = 0$, the height is 5 cm.

- (a) Find the height of the tree to the nearest centimetre after 4 years.
- (b) After how many years will the height be 4.1 metres?

E.g. 3 A curve has $\frac{d^2y}{dx^2} = 12x$ and when $x = 1$, $\frac{dy}{dx} = 4$ and $y = 7$. Find the equation of the curve.

Video: [Finding the constant term](#)

[Finding the constant term EQ](#)

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

Exercise

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Summary

Finding the constant term

1. Integrate the function —make sure the “+ c ” is included.
2. Substitute the values given in the question in order to find the value of c .