

- 1 a Find $\int (2x + 1) dx$.
- b Given that $\frac{dy}{dx} = 2x + 1$ and that $y = 5$ when $x = 1$, find an expression for y in terms of x .
- 2 Use the given boundary conditions to find an expression for y in each case.
- a $\frac{dy}{dx} = 3 - 6x$, $y = 1$ at $x = 2$ b $\frac{dy}{dx} = 3x^2 - x$, $y = 41$ at $x = 4$
- c $\frac{dy}{dx} = x^2 + 4x + 1$, $y = 4$ at $x = -3$ d $\frac{dy}{dx} = 7 - 5x - x^3$, $y = 0$ at $x = 2$
- e $\frac{dy}{dx} = 8x - \frac{2}{x^2}$, $y = -1$ at $x = \frac{1}{2}$ f $\frac{dy}{dx} = 3 - \sqrt{x}$, $y = 8$ at $x = 4$
- 3 The curve $y = f(x)$ passes through the point $(3, 5)$.
Given that $f'(x) = 3 + 2x - x^2$, find an expression for $f(x)$.
- 4 Given that
$$\frac{dy}{dx} = 10x^{\frac{3}{2}} - 2x^{-\frac{1}{2}},$$
and that $y = 7$ when $x = 0$, find the value of y when $x = 4$.
- 5 The curve $y = f(x)$ passes through the point $(-1, 4)$. Given that $f'(x) = 2x^3 - x - 8$,
- a find an expression for $f(x)$,
- b find an equation of the tangent to the curve at the point on the curve with x -coordinate 2.
- 6 The curve $y = f(x)$ passes through the origin.
Given that $f'(x) = 3x^2 - 8x - 5$, find the coordinates of the other points where the curve crosses the x -axis.
- 7 Given that
$$\frac{dy}{dx} = 3x + \frac{2}{x^2},$$
- a find an expression for y in terms of x .
Given also that $y = 8$ when $x = 2$,
- b find the value of y when $x = \frac{1}{2}$.
- 8 The curve C with equation $y = f(x)$ is such that
$$\frac{dy}{dx} = 3x^2 + kx,$$
where k is a constant.
Given that C passes through the points $(1, 6)$ and $(2, 1)$,
- a find the value of k ,
- b find an equation of the curve.