

Integration One

1. The graph of $y = f(x)$ passes through the point $(\frac{\pi}{9}, 1)$.
If $f'(x) = \sin(3x)$ express y in terms of x . 4

2. Find $\int \frac{(x^2 - 2)(x^2 + 2)}{x^2} dx, x \neq 0$. 4

3. A point moves in a straight line such that its acceleration a is given by $a = 2(4 - t)^{\frac{1}{2}}, 0 \leq t \leq 4$. If it starts at rest, find an expression for the velocity v where $a = \frac{dv}{dt}$. 4

4. A curve for which $\frac{dy}{dx} = 3 \sin(2x)$ passes through the point $(\frac{5\pi}{12}, \sqrt{3})$.
Find y in terms of x . 4

5. Find $\int \frac{1}{(7 - 3x)^2} dx$. 2

6. Find $\int \sqrt{1 + 3x} dx$ and hence find the exact value of $\int_0^1 \sqrt{1 + 3x} dx$. 4

7. Find $\int \frac{1}{(7 - 3x)^2} dx$. 2

8. (a) By writing $\sin 3x$ as $\sin(2x + x)$, show that $\sin 3x = 3 \sin x - 4 \sin^3 x$. 4
(b) Hence find $\int \sin^3 x dx$. 4

9. Differentiate $\sin^3 x$ with respect to x .

Hence find $\int \sin^2 x \cos x \, dx$.

4

10. Evaluate $\int_{-3}^0 (2x + 3)^2 \, dx$.

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