

Year 4 Math Assignment 18: Integration

Q1 Integrate with respect to x :

(a) $\frac{1}{\sqrt[3]{x}}$

(b) $\sqrt{x} + 2$

(c) $2x^3 - \frac{3}{x^2}$

(d) $x(2x - 3)$

(e) $\frac{(x+3)^2}{\sqrt{x}}$

(f) $\frac{x^3 + 2x^2 - 3x}{4x}$

Q2 The curve for which $\frac{dy}{dx} = 3x + k$, where k is a constant, has a turning point at $(2, 5)$. Find

(i) the value of k

(ii) the equation of the curve.

Q3 Given that the rate of change of s with t is given by $\frac{ds}{dt} = 3t^2 - 7$ and $s = 6$ when $t = 0$, find s in terms of t .

Q4 A diver is carrying out underwater repairs to a ship. If there are 15 units of oxygen available in his oxygen tank and the rate of consumption in unit/min is given by $\frac{dV}{dt} = -0.012\sqrt{t}$,

(i) determine the amount of oxygen in the tank as a function of time.

(ii) find the time at which the oxygen tank supply is exhausted.

Q5 A curve has gradient 10 at the point $(2, 5)$ and $\frac{d^2y}{dx^2} = 6x - 4$. Find the equation of the curve.

Q6 The gradient function of a polynomial is zero at $x = 4$ and $x = -2$. Write down an expression, of the smallest degree, for the gradient function of the polynomial. If the polynomial has gradient -10 at $(3, 0)$, find the equation of the polynomial.

Q7 Given that $\int_2^3 f(x) dx = 4$ and $\int_3^5 f(x) dx = 7$, find $\int_3^2 f(x) dx + \int_2^5 f(x) dx$.