NR5	I can solve differential equations of the form $\frac{dy}{dx} = f(x)$ and give a particular solution.

1. Given the gradient $\frac{dy}{dx}$ of the curve at the point (x, y) and a point on the curve, find the equation of each curve:

    a) $\frac{dy}{dx} = 3x^2 - 6x + 1$ (3,4)

    b) $\frac{dy}{dx} = 4x^3 - 6x^2$ (1,9)

2. Find the solution to the following differential equations:

    a) $\frac{dy}{dx} = 4x^3 + \frac{2}{x^3}$ and $y = 0$ when $x = 1$

    b) $\frac{dy}{du} = \frac{u^2+1}{u^2}$ and $y = 4$ when $u = 2$

3. A curve has gradient given by $\frac{dy}{dx} = \frac{1}{\sqrt{x}}$. The curve passes through the point (9,10). Find the equation of the curve.

4. The graph of $y = f(x)$ passes through the point $\left(\frac{\pi}{9}, 1\right)$.

    If $f'(x) = \sin(3x)$, express y in terms of x.

5. A curve for which $\frac{dy}{dx} = 3\sin(2x)$ passes through the point $\left(\frac{5}{12}\pi, \sqrt{3}\right)$.

    Find y in terms of x.

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

7. The curve $y = f(x)$ is such that $\frac{dy}{dx} = 4x - 6x^2$. The curve passes through the point (−1, 9). Express y in terms of x.