

## Outcome 1 - Solving Differential Equations

## Example



## Example...

A curve for which  $\frac{dy}{dx} = 3x^2 + 4$   
 passes through the point  $(-1, 5)$ .  
 Express  $y$  in terms of  $x$ .

$$y = \int 3x^2 + 4 \, dx = \frac{3x^3}{3} + 4x + c$$

$$y = x^3 + 4x + c \quad \text{1. Integrate}$$

$$5 = -1 - 4 + c \quad \text{2. Sub the point in}$$

$$5 = -5 + c \quad c = 10$$

$$y = x^3 + 4x + 10$$

## Questions

## Outcome 1 - Solving Differential Equations

Solve the following differential equations...

1  $\frac{dy}{dx} = 7 - 6x$  passing through  $(2, 1)$ .

Express  $y$  in terms of  $x$ .

2  $f'(x) = 8x^3 + 9$  passing through  $(1, 9)$ .

Find  $f(x)$ .

3  $\frac{dy}{dx} = 3x^2 - 8x$  passing through  $(-1, 5)$ .

Express  $y$  in terms of  $x$ .


4  $f'(x) = 5x^2 + 11x + 2$  passing through  $(0, 0)$ .


Find  $f(x)$ .


5  $\frac{dy}{dx} = x^3 + \frac{1}{x^6} - \frac{1}{6}$  passing through  $(1, 4)$ .


Express  $y$  in terms of  $x$ .


## Answers

  $y = 7x - 3x^2 - 1$

  $f(x) = 2x^4 + 9x - 2$

  $y = x^3 - 4x^2 + 10$

  $f(x) = \frac{5x^3}{3} + \frac{11x^2}{2} + 2x$

  $y = \frac{1}{4}x^4 - \frac{1}{5x^5} - \frac{1}{6}x + \frac{247}{60}$