

## Methods Lesson 1

Antidifferentiation warm up.

2. Determine the following indefinite integrals.

a.  $\int (2x + 5) dx$

b.  $\int (3x^2 + 4x - 10) dx$

c.  $\int (10x^4 + 6x^3 + 2) dx$

d.  $\int (-4x^5 + x^3 - 6x^2 + 2x) dx$

e.  $\int (x^3 + 12 - x^2) dx$

Do as many as you can in 5 minutes.

**1 Find:**

**a**  $\int \frac{1}{2}x^3 dx$

**b**  $\int 3x^2 - 2 dx$

**c**  $\int 5x^3 - 2x dx$

**d**  $\int \frac{4}{5}x^3 - 2x^2 dx$

**e**  $\int (x - 1)^2 dx$

**f**  $\int x(x + \frac{1}{x}) dx, x \neq 0$

**g**  $\int 2z^2(z - 1) dz$

**h**  $\int (2t - 3)^2 dt$

### Reverse Chain Rule

1. **WE10** Antidifferentiate each of the following.

a.  $(x + 3)^2$

b.  $(x - 5)^3$

c.  $2(2x + 1)^4$

d.  $-2(3x - 4)^5$

e.  $(6x + 5)^4$

### Antidifferentiation of exponentials

1. **WE4** Determine the following.

a.  $\int e^{2x} dx$

b.  $\int e^{4x} dx$

c.  $\int e^{-x} dx$

d.  $\int e^{-3x} dx$

e.  $\int 5e^{5x} dx$

## Antidifferentiation of sine and cosine

1. **WE8** Antidifferentiate the following.

a.  $\sin(3x)$

b.  $\sin(4x)$

c.  $\cos(7x)$

d.  $\frac{\cos(2x)}{3}$

e.  $\sin(-2x)$

Try this..

1. **WE6** Determine the following.

a.  $\int \frac{3}{x} dx$

## Further Antidifferentiation

2. Antidifferentiate the following.

a.  $\int \frac{1}{x+3} dx$

b.  $\int \frac{3}{x+3} dx$

c.  $\int \frac{-2}{x+4} dx$

d.  $\int \frac{-6}{x+5} dx$

e.  $\int \frac{4}{3x+2} dx$

## More Questions

9. Determine the equation of the curve that passes through the point  $(0, 3)$  if the gradient is given by  $\frac{dy}{dx} = 2e^{2x} + e^{-x}$ .

13. A curve has a gradient function  $f'(x) = 4e^{-2x} + k$ , where  $k \in \mathbb{R}$ . The function has a stationary point when  $x = 0$ .

a. Determine the value of  $k$ .

b. Hence, determine the general rule for the function  $f(x)$ .

14. If it is known that  $\int ae^{bx} dx = -3e^{3x} + c$ , determine the exact values of the constants  $a$  and  $b$ .