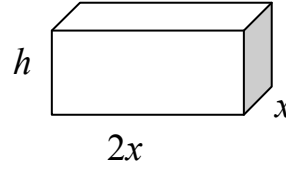


## Higher-Further Differentiation.

1. Differentiate  $(1 + 2 \sin x)^4$  with respect to  $x$ . (2)

2. An open cuboid measures internally  $x$  units by  $2x$  units by  $h$  units and has an inner surface area of  $12 \text{ units}^2$ .



- a) Show that the volume,  $V \text{ units}^3$ , of the cuboid is given by

$$V(x) = \frac{2}{3}x(6 - x^2). \quad (3)$$

- b) Find the exact value of  $x$  for which this volume is a maximum. (5)

3. Given that  $y = \sqrt{3x^2 + 2}$ , find  $\frac{dy}{dx}$  (3)

4. If  $y = \frac{1}{x^3} - \cos 2x$ ,  $x \neq 0$ , find  $\frac{dy}{dx}$  (4)

5. Given that  $f(x) = (\sin x + 1)^2$ , find the exact value of  $f'\left(\frac{\pi}{6}\right)$  (3)

*TOTAL (20)*