

## Differentiation by Rule

Find the gradient function  $\frac{dy}{dx}$  when:

- (a)  $y = x^4$       (b)  $y = x^9$   
(c)  $y = x^7$       (d)  $y = x^6$   
(e)  $y = x$         (f)  $y = x^{10}$

(a)  $\frac{dy}{dx} = 4x^3$       (b)  $\frac{dy}{dx} = 9x^8$

(c)  $\frac{dy}{dx} = 7x^6$       (d)  $\frac{dy}{dx} = 6x^5$

(e)  $\frac{dy}{dx} = 1$         (f)  $\frac{dy}{dx} = 10x^9$

Find the gradient function  $\frac{dy}{dx}$  when:

- (a)  $y = 7x^2$   
(b)  $y = 3x^5$   
(c)  $y = 10x^6$   
(d)  $y = 2x^9$   
(e)  $y = \frac{1}{2}x^8$   
(f)  $y = \frac{1}{5}x^4$   
(g)  $y = 0.3x^5$   
(h)  $y = -6x^3$

(a)  $\frac{dy}{dx} = 14x$       (b)  $\frac{dy}{dx} = 15x^4$

(c)  $\frac{dy}{dx} = 60x^5$       (d)  $\frac{dy}{dx} = 18x^8$

(e)  $\frac{dy}{dx} = 4x^7$       (f)  $\frac{dy}{dx} = \frac{4}{5}x^3$

(g)  $\frac{dy}{dx} = 1.5x^4$       (h)  $\frac{dy}{dx} = -18x^2$

Find the gradient function  $\frac{dy}{dx}$  when:

- (a)  $y = x^2 + x^5$   
(b)  $y = 3x^2 + 7x^5$   
(c)  $y = 5x^4 - x^3$   
(d)  $y = 2x^3 - x^2 + 5x$   
(e)  $y = 3x + 6x^4$   
(f)  $y = 0.5x^7 + 3$   
(g)  $y = \frac{1}{4}x^5 - x^3 + 7x$   
(h)  $y = x^3 + 2x^2 - 7x + 10$

(a)  $\frac{dy}{dx} = 2x + 5x^4$

(b)  $\frac{dy}{dx} = 6x + 35x^4$

(c)  $\frac{dy}{dx} = 20x^3 - 3x^2$

(d)  $\frac{dy}{dx} = 6x^2 - 2x + 5$

(e)  $\frac{dy}{dx} = 3 + 24x^3$

(f)  $\frac{dy}{dx} = 3.5x^6$

(g)  $\frac{dy}{dx} = \frac{5}{4}x^4 - 3x^2 + 7$

(h)  $\frac{dy}{dx} = 3x^2 + 4x - 7$

(a) Expand and simplify  $(x + 3)(x^2 - 5)$

(b) Hence find the gradient function  $\frac{dy}{dx}$

when  $y = (x + 3)(x^2 - 5)$

(a)  $x^3 + 3x^2 - 5x - 15$

(b)  $\frac{dy}{dx} = 3x^2 + 6x - 5$