DIFFERENTIATION

GRADIENT AND TURNING POINTS

Ref: G989. 7R2

A1 Differentiate $x^3 + 3x^2 - 5$	**A2** Differentiate $x^4 + 5x^2 + 4x$	**A3** Differentiate $2x^3 + 6x - 3$	**A4** Differentiate $5x^3 + \sqrt{x} - \frac{4}{x^2}$
B1 For the curve $y = x^3 - 6x + 3$ Find the gradient when $x = 2$	**B2** For the curve $y = 100 - 4x^2$ Find the gradient when $x = 3$	**B3** For the curve $y = 2x^3 - 12x^2 + 7x$ Find the gradient at point $(4, -36)$	**B4** For the curve $y = x^3 - \frac{3}{2}x^2 + 5$ Find the gradient when $x = -2$
C1 For the curve $y = 2x^2 - 3x$ Find the coordinates when the gradient is 9	**C2** For the curve $y = 4x^2 + 9x$ Find the coordinates when the gradient is -7	**C3** For the curve $y = 4x^3 - 2x^2 + 1$ Find the coordinates of the two points where the gradient is 1	**C4** For the curve $y = 15 + 6x - x^2$ Find the coordinates when the gradient is 4
D1 Find the turning points of the curve $y = x^3 - 12x + 17$	**D2** Find the turning points of the curve $y = x^3 + 6x^2 + 5$	**D3** Find the turning points of the curve $y = x^3 + 3x^2 - 24x$	**D4** Find the turning point of the curve $y = x^2 + \frac{16}{x}$

REVIEW

Maths4Everyone.com — Enjoy • Improve • Succeed

DIFFERENTIATION

GRADIENT AND TURNING POINTS

Ref: G989. 7R2

A1 Differentiate

$x^3 + 3x^2 - 5$

$3x^2 + 6x$

A2 Differentiate

$x^4 + 5x^2 + 4x$

$4x^3 + 10x + 4$

A3 Differentiate

$2x^3 + 6x - 3$

$6x^2 + 6$

A4 Differentiate

$5x^3 + \cdot\ x^{\frac{1}{2}} - 4x^{-2}$

$15x^2 + \frac{1}{2}x^{-\frac{1}{2}} + 8x^{-3}$

B1 For the curve

$y = x^3 - 6x + 3$

$\frac{dy}{dx} = 3x^2 - 6$

$= 3(2)^2 - 6 = 6$

B2 For the curve

$y = 100 - 4x^2$

$\frac{dy}{dx} = -8x$

$= -8 \times (3) = -24$

B3 For the curve

$y = 2x^3 - 12x^2 + 7x$

$\frac{dy}{dx} = 6x^2 - 12x + 7$

$= 6(4)^2 - 12(4) + 7 = 55$

B4 For the curve

$y = x^3 - \frac{3}{2}x^2 + 5$

$\frac{dy}{dx} = 3x^2 - 3x$

$= 3(-2)^2 - 3(-2) = 18$

C1 For the curve

$y = 2x^2 - 3x$

$\frac{dy}{dx} = 4x - 3$

$4x - 3 = 9$

$x = 3$ $\quad (3,9)$

C2 For the curve

$y = 4x^2 + 9x$

$\frac{dy}{dx} = 8x + 9$

$8x + 9 = -7$

$x = -2$ $\quad (-2,-2)$

C3 For the curve

$y = 4x^3 - 2x^2 + 1$ $\quad \left(\frac{1}{2}, 1\right)$

$\frac{dy}{dx} = 12x^2 - 4x$

$12x^2 - 4x = 1$ $\quad \left(-\frac{1}{6}, \frac{25}{27}\right)$

C4 For the curve

$y = 15 + 6x - x^2$

$\frac{dy}{dx} = 6 - 2x$

$6 - 2x = 4$

$x = 1$ $\quad (1,20)$

D1 Find the turning points of the curve

$y = x^3 - 12x + 17$

$3x^2 - 12 = 0$

$(-2,33)$ and $(2,1)$

D2 Find the turning points of the curve

$y = x^3 + 6x^2 + 5$

$3x^2 + 12x = 0$

$(-4,37)$ and $(0,5)$

D3 Find the turning points of the curve

$y = x^3 + 3x^2 - 24x$

$3x^2 + 6x - 24 = 0$

$(-4,80)$ and $(2,-28)$

D4 Find the turning point of the curve

$y = x^2 + \frac{16}{x}$

$2x - \frac{16}{x^2} = 0$ $\quad (2,12)$