



# SEKOLAH BUKIT SION – HIGH SCHOOL

## CHAPTER TEST: DIFFERENTIATION

NAME		DATE	
CLASS		SCORE	/60

1. Find  $\frac{dy}{dx}$  of the following. Express your answer in positive index, if necessary.

(a)  $y = 3(2x^2 + 1)^4$  [2]

(b)  $y = x^3(1 - x^2)^5$  [3]

(c)  $y = \frac{x^2+3x+2}{x^2-3x+2}$  [3]

(d)  $y = \frac{\sqrt{x}}{\sqrt{x+1}}$  [2]

2. The equation of the curve is  $y = x^3 - 4x + 1$ .

(a) Find the gradient of the curve at  $x = -3$ . [2]

(b) Write down the equation of the line tangent to the curve at  $x = 1$ . [3]

(c) Write down the equation of the normal line at  $x = 0$ . [3]

3. Find  $\frac{d^2y}{dx^2}$ .

(a)  $y = \frac{1}{12}x^4 - \frac{5}{6}x^3 + 3x^2 + \frac{1}{2}$  [2]

(b)  $y = \frac{x^3+3}{2x^2}$  [3]

(c)  $y = 7x^2 + 3x - 9$  [1]

4. Find the value of  $p$  for which  $\frac{d^2}{dx^2} \left( \frac{2x-3}{x+5} \right) = \frac{p}{(x+5)^3}$ . [4]

5. Find the equation of line tangent to the curve  $y = 4x^2 - x - 4$  at  $A$  where  $x = 1$ .

Find also the normal to the curve at  $A$ . [5]

6. The equation of the curve is  $y = 2x^3 + px^2 + qx + r$ .

The gradient of the curve at  $(1, -21)$  is  $-24$ .

The gradient of the curve at  $(3, -17)$  is  $36$ .

Find the value of  $p$ , of  $q$  and of  $r$ . [4]

7. Show that  $y = \frac{2}{1+x}$  has no stationary point. [3]

8. Differentiate  $(2x - 5)^{-4}(x^2 + 1)^8$  with respect to  $x$ . [5]