



SEKOLAH BUKIT SION – HIGH SCHOOL

CHAPTER TEST: DIFFERENTIATION

NAME		DATE	
CLASS		SCORE	/60

ANSWER ALL QUESTIONS. PROVIDE NECESSARY WORKING.

1. Write down the first and second derivatives of each of the following functions.

[14]

FUNCTION	FIRST Derivative	SECOND Derivative
(a) $y = 5x^2 - 8x + 2$		
(b) $y = 2x^3 - 6x^2 + 4x - 7$		
(c) $y = 3x - 5$		
(d) $y = x(3x^3 - 5)$		
(e) $y = 4x^2 - y - 6$		
(f) $y = (x^2 + 5)(2x^3 - 3)$		

2.

(a) Show that $(2m^2 - 3)^3 = 8m^6 - 36m^4 + 54m^2 - 81$

[2]

(b) Find the $\frac{d^2}{dm^2} (2m^2 - 3)^3$.

Answer [3]

3. Find the stationary points of each function and determine the nature of these stationary points:

<p>(a) $y = (2x - 5)^2 - (1 - 4x)$ using the <u>first derivative test</u>. [5]</p>	<p>(b) $y = 15x^2 - 2x^3$ using the <u>second derivative test</u>. [6]</p>
<p><i>Answer:</i></p>	<p><i>Answer:</i></p>

4. Find the coordinates of the point on the curve $y = 2x^2 - 5x + 1$ at which the gradient is 3.

Answer [2]

5. The gradient of the curve $y = 2x^2 + px + q$ at the point (1,3) is 9.
Calculate the values of p and q .

Answer [3]

6. Write down the equation of the tangent to $y = 4x^2 - 11x + 5$ that is parallel to $5x = y - 7$.

Answer [3]

7. The function $f(x) = x^3 + px^2 + qx + r$ has a minimum value of -2 at the point $x = 3$ and a maximum value at $x = -1$. Find the values of p , q and r .

Answer [3]

8. The gradient function of a curve is given by $\frac{dy}{dx} = 2x^2 + x - 6$.

Given that curve has a minimum value of 12, find the equation of the curve.

Answer [4]

9.

(a) Find the stationary points of $y = x^3 - 7x^2 + 8x - 9$.

Answer [3]

(b) Hence, find the range of values of x such that the function $y = x^3 - 7x^2 + 8x - 9$ has an increasing gradient.

Answer [2]

(c) Hence, draw a sketch of the curve $y = x^3 - 7x^2 + 8x - 9$. [3]

10. Sketch the curve $y = x(x^2 - 1)$. Clearly indicate the coordinates of the stationary points and intercepts. [7]