PERTH MODERN SCHOOL

Exceptional schooling. Exceptional students.

Year 12 Mathematics Methods
Semester One 2017
Basic antidifferentiation
Differentiation , applications and Optimisation.

Test 1

Calculator Free

Name:

Teacher:

Mr Staffe	
Mrs. Carter	
Mr Gannon	
Mr Rooth	
Ms Cheng	
Mr McClelland	
Ms Skoda	
Mr Strain	

Date Monday 20ᵗʰ February 7.45am

You may have a formula sheet for this section of the test.

Total ____/19   20 Minutes

Question 1   (4 marks)

Find y in terms of x given that $\dfrac{dy}{dx} = 15x(5x^2 - 1)^2$
and $y = 40$ when $x = 1$

(b)   (i)   Given the graph of the function $y = g'(x)$ sketch a possible graph of the function $y = g(x)$.   (3)
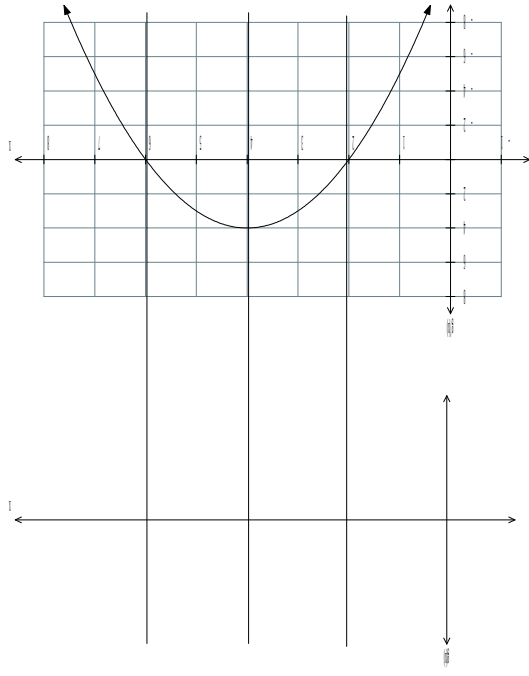
(ii)   Find the equation of $y = g(x)$ given that $g(1) = -8$.   (4)

Question 2   (6 marks)

Clearly showing your use of the product, quotient or chain rule differentiate the following. (YOU MAY LEAVE YOUR ANSWERS IN AN UNSIMPLIFIED FORM) .
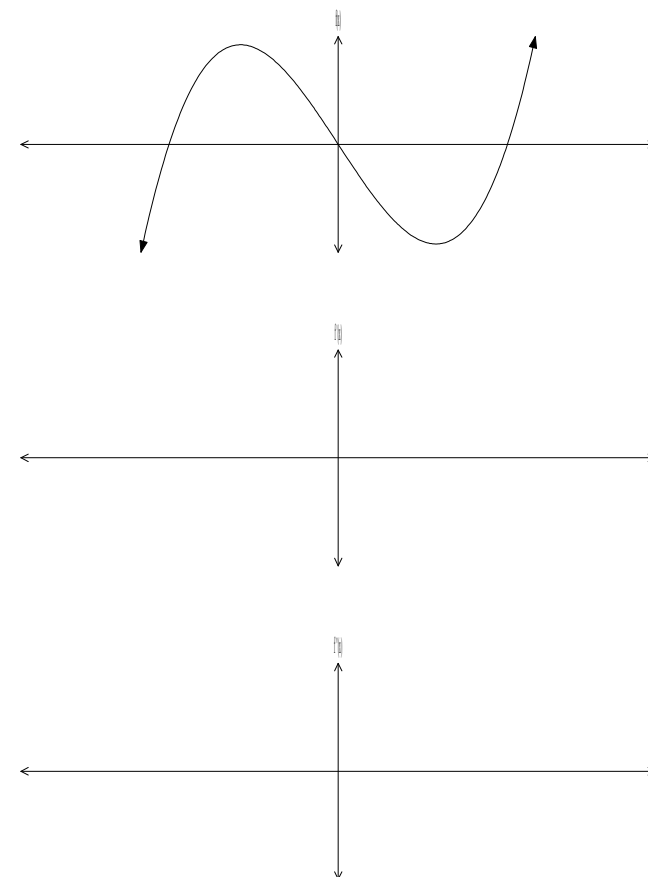
a) $y=(\sqrt{x}+1)(x^2-1)$ (2)

b) $y=\dfrac{1-t}{1-2t^2}$ (2)

c) $y=(3x^2+5)^3$ (2)

Question 3   **(4 marks)**

Given that $y=x^{\frac{1}{3}}$, use $x=1000$ and the increments formula $\delta y \approx \dfrac{dy}{dx}\delta x$ to determine an approximate value for $\sqrt[3]{1006}$.

Page **2** of **8**

Page **7** of **8**

Question 4 (5 marks)

For the function $y = x^4 - 4x^3 + 1$ determine

a) The coordinates of the y- intercept

b) The behaviour of the function as $x \to \pm\infty$

c) The location and nature of any turning points

d) Any points of inflection and what type of inflection they are. Hence sketch the curve on the axes provided. (Ensure you label all parts)

Question 3 (10 marks)

(a)   Given the sketch of the function y = f(x) on the set of axes below, use it to sketch the functions $y = f'(x)$ and $y = f''(x)$.   (3)

(b)   Express the volume V, in terms of x   (2)

(c)   Find the maximum Volume using Calculus techniques.   (3)
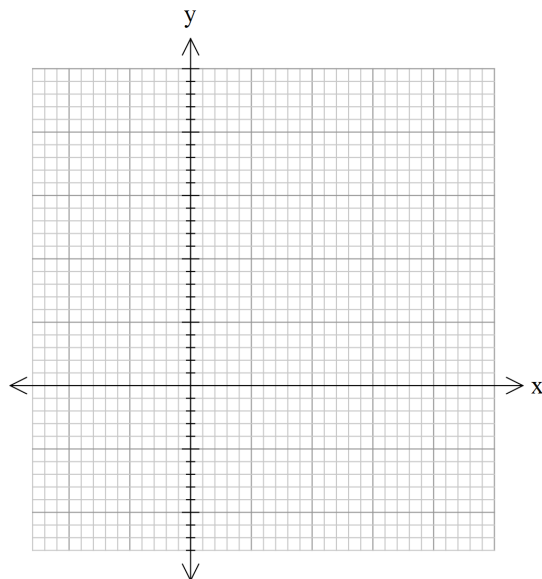
Test 1

Differentiaton , applications and Optimisation.
Basic antidifferentiation

Semester One 2017
Year 12 Mathematics Methods
Calculator Assumed

PERTH MODERN SCHOOL
Exceptional schooling. Exceptional students.

Name:

Teacher:

_____ Mr Staffe

_____ Mrs. Carter

_____ Mr Gannon

_____ Mr Roohi

_____ Ms Cheng

_____ Mr McClelland

_____ Ms Skoda

_____ Mr Strain

Date Monday 20ᵗʰ February 7.45am

You may have
- a formula sheet
- one page of A4 notes, one side

- a scientific calculator
- a classpad

Total_____/24   25 minutes

Question 1   (7 marks)

A small object is moving in a straight line with acceleration $a = 6t + k$ ms⁻², where t is the time in seconds and k is a constant. When $t = 1$ the object was stationary and had a displacement of 4 metres relative to a fixed point O on the line. When $t = 2$ the object had a velocity of 1 ms⁻¹.

(a)   Determine the value of k and hence an equation for the velocity of the object at time t.

(4 marks)

(b)   Determine the displacement of the object when $t = 2$.   (3 marks)

Question 2   (7 marks)

An open cuboid container for holding fishing equipment, is made with a base length twice as long as its width. It is to be made from a sheet of metal with an area of 36 m².

(a)   Show that its height is given by the expression $h = \dfrac{6}{x} - \dfrac{x}{3}$,

where x is the width of the base.   (2)