Test 1
Differentiaton , applications and Optimisation.
Basic antidifferentiation
Semester One 2017
Year 12 Mathematics Methods
Calculator Free

PERTH MODERN SCHOOL
Exceptional schooling. Exceptional students.

Name:

Date Monday 20ᵗʰ February 7.45am

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

Total_____/19   20 Minutes

Teacher:

_____Mr Staffe

_____Mrs. Carter

_____Mr Gannon

_____Mr Roohi

_____Ms Cheng

_____Mr McClelland

_____ Ms Skoda

_____Mr Strain

Question 1   (4 marks)

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

and $y = 40$ when $x = 1$

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 $\sqrt[3]{1006}$.

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 $x \rightarrow \pm \infty$

    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)
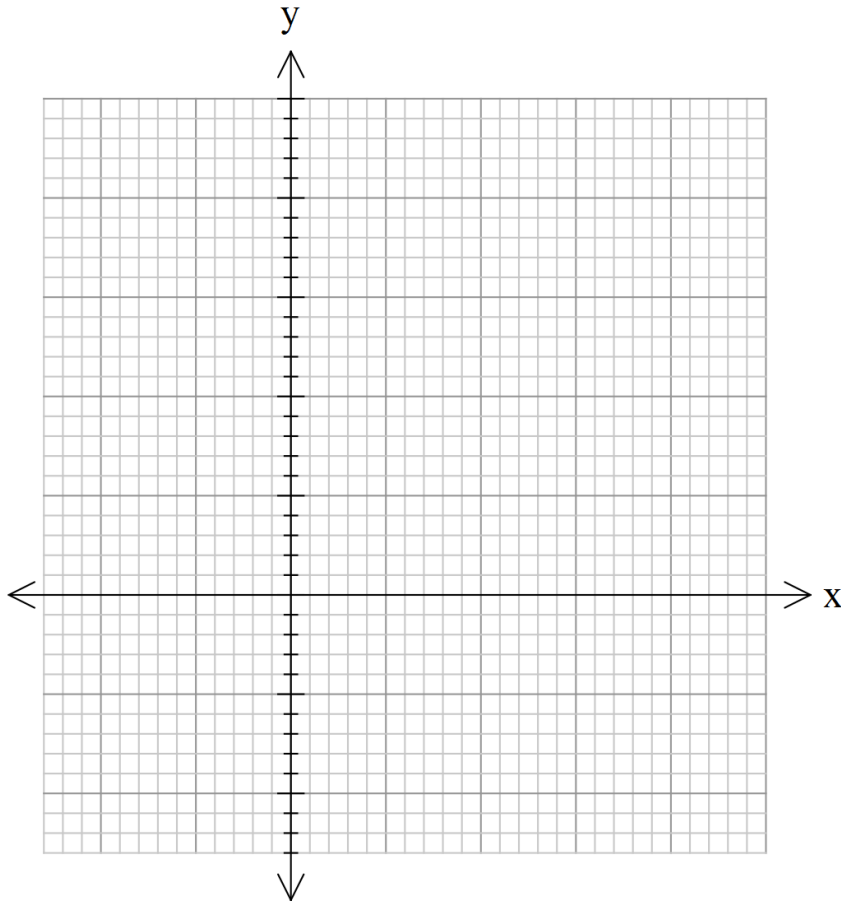
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Name:

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

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_____Mr Staffe

_____Mrs. Carter

_____Mr Gannon

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_____Ms Cheng

_____Mr McClelland

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_____Mr Strain

- 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 m^2.

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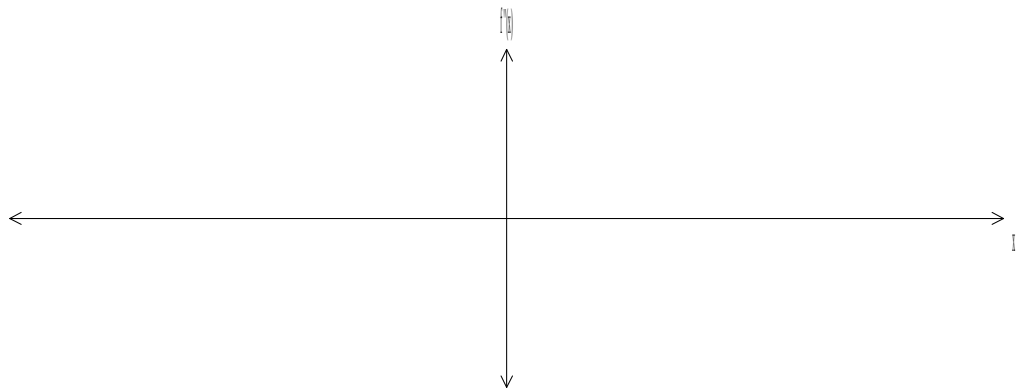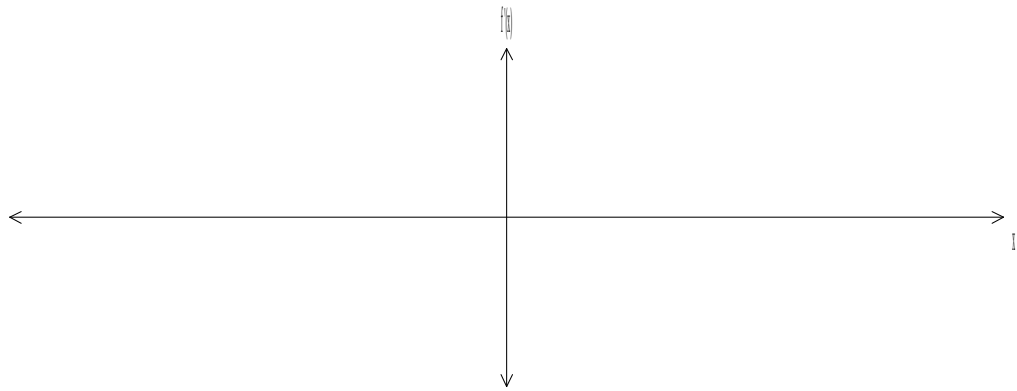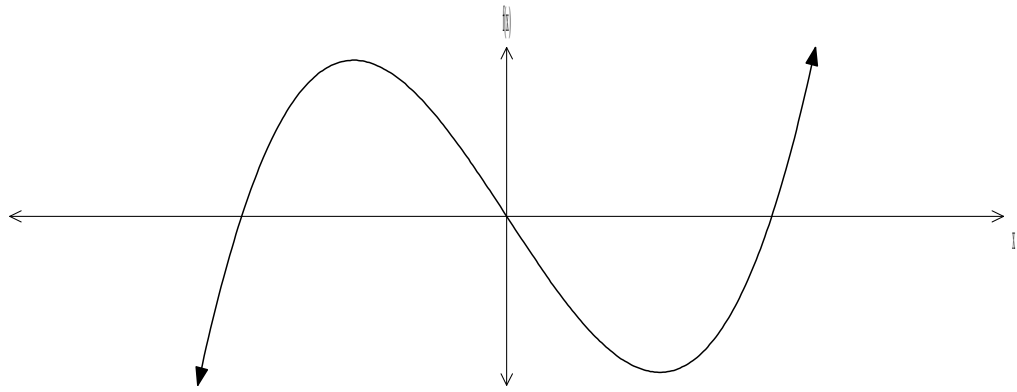
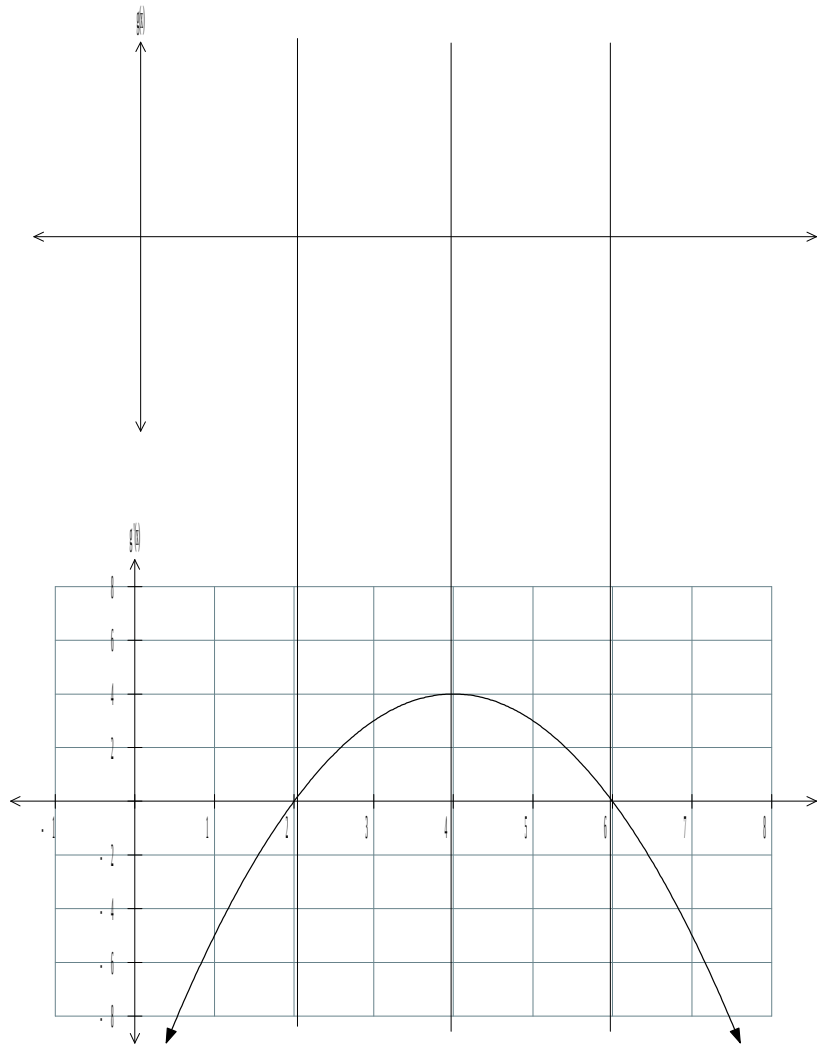(b)   Express the volume V, in terms of x   (2)

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

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)

$f(x)$

x

$f'(x)$

x

$f''(x)$

x

(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)