

Year 12 MATHEMATICS METHODS

Section One:
Calculator free

Teacher:

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Name:

Time allowed for this section

Reading time before commencing work: 5 minutes
Working time for this section:

Material required/recommended for this section

To be provided by the supervisor

This Question/Answer Booklet

Formula Sheet

To be provided by the candidate

Standard items: pens, pencils, pencil sharpener, eraser, correction fluid, ruler, highlighters
Special items: nil

Important note to candidates

No other items may be used in this section of the examination. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available
Section One: Calculator-free	8	8	50	52
Section Two Calculator-assumed	14	14	100	91
				143

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in the spaces provided in this Question/Answer Booklet. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
 - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
 - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.
3. **Show all your working clearly.** Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.
4. It is recommended that you **do not use pencil** except in diagrams.

Question 1. [4,4 = 8 marks]

a) Differentiate the following:

i) $y = 4x + \frac{3}{x^2}$

ii) $y = (x + 2)^2(4x + 6)$

b) Integrate the following:

i) $\int 24x^2(4x^3 + 8)^3 . dx$

ii) $\int (x^2 + \frac{3x^2}{5}) . dx$

Question 2. [3 marks]

Determine the equation of a tangent to the curve $y=3x^3+4x$ at the point $(3,93)$

EXTRA WORKING SPACE.

-----End Of Section
1-----
EXTRA WORKING SPACE.

Question 3. [4 marks]

Determine the exact area enclosed by the graph of $y = -2x^2 + 6$ and the x axis.

Question 4. [12 marks]

- (a) Find the derivative of each of these functions with respect to x , simplifying your answers where possible.

(i) $y = \ln((x^2 - 3)^3)$ (2)

(ii) $y = x^2 e^{2x}$ (2)

(iii) $y = \sin^3\left(\frac{3\pi x}{4}\right)$ (2)

Question 8. [2,2,3 = 7 marks]

Consider the general form of a parabolic graph $y = ax^2 + bx + c$.

- a) Using calculus, show that the turning point of any parabola is where the x value is $\frac{-b}{2a}$.

- b) Determine the y coordinate of this turning point in terms of a, b and c .

- c) If it is known that the turning point of a particular parabola is also the y intercept and that the ' a ' value is $\frac{1}{2}$, determine all possible values of b .

(a) Solve the following equations for x .

(i) $\log_2 x = -3$

(ii) $2(3^{-x}) = 50$

(1)

(2)

(b) For the equation $2(4^x) = 5(2^x) - 2$
(i) Let $y = 2^x$, and show that $(y - 2)(2y - 1) = 0$

(3)

(iii) Solve the equation for x .

(2)

(iv) $y = \sqrt{\tan x}$

(3)

(b) Evaluate the following integral:

$$\int \cos^3 x \sin x \, dx$$

(3)

Question 5. [6 marks]

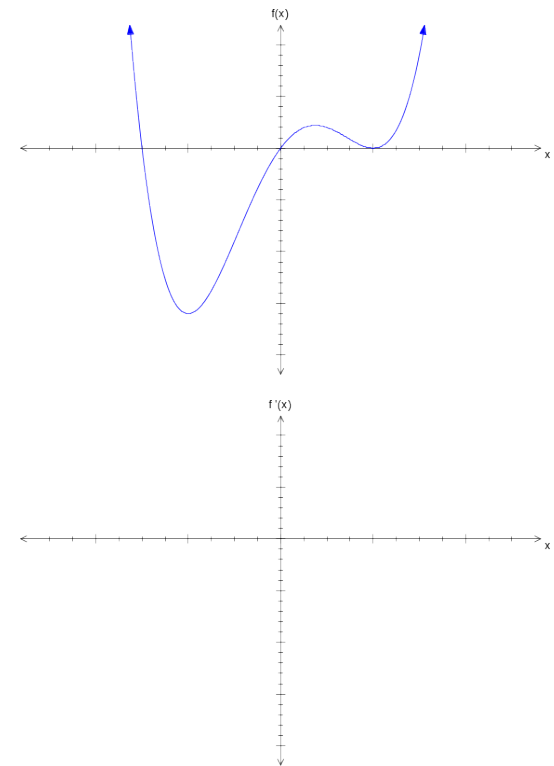
(a) Given $y = \frac{1}{4} \sin(2t) + \frac{t}{2} + \sin(t)$, $0 \leq t \leq 2\pi$, determine $\frac{dy}{dt}$

(3)

- (b) If $x = \sin 3t$ and $y = 3e^{2t}$, find $\frac{dy}{dx}$ when $t = 0$.
(3)

Question 6. [4 marks]

Given the graph of $f(x)$ draw the graph of it's derivative on the axis given.



Question 7. [3,5 = 8 marks]