



## **MATHEMATICS: SPECIALIST 3CMAS/3DMAS SAMPLE EXAMINATION RESOURCE-FREE**

Section 7 of the *New WACE Manual: General Information 2006–2009* outlines the policy on WACE examinations.

Further information about the WACE Examinations policy can be accessed from the Curriculum Council website at [http://newwace.curriculum.wa.edu.au/pages/about\\_wace\\_manual.asp](http://newwace.curriculum.wa.edu.au/pages/about_wace_manual.asp)

The purpose for providing a sample examination is to provide teachers with an example of how the course will be examined. Further finetuning will be made to this sample in 2007 by the examination panel following consultation with teachers, measurement specialists and advice from the Assessment, Review and Moderation (ARM) panel.

The examination is in two parts, in line with recommendations of the ARM panel--a resource-free examination of 50 minutes, worth 40 marks, and a resource-rich examination of 100 minutes, worth 80 marks. CAS (Computer Algebra System) calculators are excluded in the resource-free part and included in the resource-rich part.





**Western Australian Certificate of Education, Sample External Examination  
Question/Answer Booklet**

**MATHEMATICS:  
SPECIALIST  
3CMAS/3DMAS  
WRITTEN PAPER**

**RESOURCE-FREE**

Please place one of your student identification labels in this box.

Student Number: In figures

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In words

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***Time allowed for this paper***

Reading time before commencing work:

Ten minutes

Working time for paper:

Fifty minutes

***Material required/recommended for this paper***

**To be provided by the supervisor**

This Question/Answer Booklet

**To be provided by the candidate**

Standard items: Pens, pencils, eraser, correction fluid, highlighter

***Important note to candidates***

The standard items listed above and the Resource-free examination paper are the only items permitted on your table during the Resource-free examination. When directed, you will place all other items and the Resource-rich examination paper under your chair.

**This paper is for students who have completed Units 3CMAS and 3DMAS as their last pair of units.**

**Structure of this paper**

Working time	Number of questions available	Number of questions to be attempted	Marks
50 minutes	6	6	40
[Total marks]			40

This paper has **SIX (6)** questions. Attempt **ALL** questions.

<b>Question</b>	<b>Marks</b>
1	04
2	06
3	07
4	10
5	06
6	07
<b>Total marks</b>	<b>40</b>

**Instructions to candidates**

1. The rules for the conduct of Curriculum Council examinations are detailed in the *Student Information Handbook*. 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 may be found at the end of the booklet. If you need to use them, indicate in the original answer space where the answer is continued (i.e. give the page number).
3. A blue or black ballpoint or ink pen should be used.
4. It is recommended that you **do not use pencil** except in diagrams.
5. **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. Correct answers given without supporting reasoning may not be allocated full marks. Incorrect answers given without supporting reasoning cannot be allocated any marks. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.

**RESOURCE-FREE**

This paper has **SIX (6)** questions. Attempt **ALL** questions.

**Question 1 [4 marks]**

Given  $m = 2\mathbf{i} + 3\mathbf{j} + \mathbf{k}$ ,  $p = \mathbf{i} - \mathbf{j}$  and  $n = 7\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}$ :

(a) Find  $2m - 3n$ .

[2 marks]

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(b) Find  $|n|$

[2 marks]

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**Question 2 [6 marks]**

(a) Find  $\int (e^x + x^e) dx$

[3 marks]

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(b) Show that  $\int_0^1 \frac{x}{1+x^2} dx = \ln\sqrt{2}$ .

[3 marks]

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**Question 3 [7 marks]**

A curve has parametric equations:

$$x = 2 \sin \theta \quad \text{and} \quad y = 3 \sin^2 \theta.$$

- (a) Find an expression for  $\frac{dy}{dx}$  and hence find the equation of the tangent to the curve at the point where  $\theta = \pi$ .

[5 marks]

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- (b) Determine the Cartesian equation of the curve.

[2 marks]

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**Question 4 [10 marks]**

- (a) Find the solution to  $\frac{dy}{dx} = 4y - 2yx$  satisfying  $y(0) = 3$ .

[5 marks]

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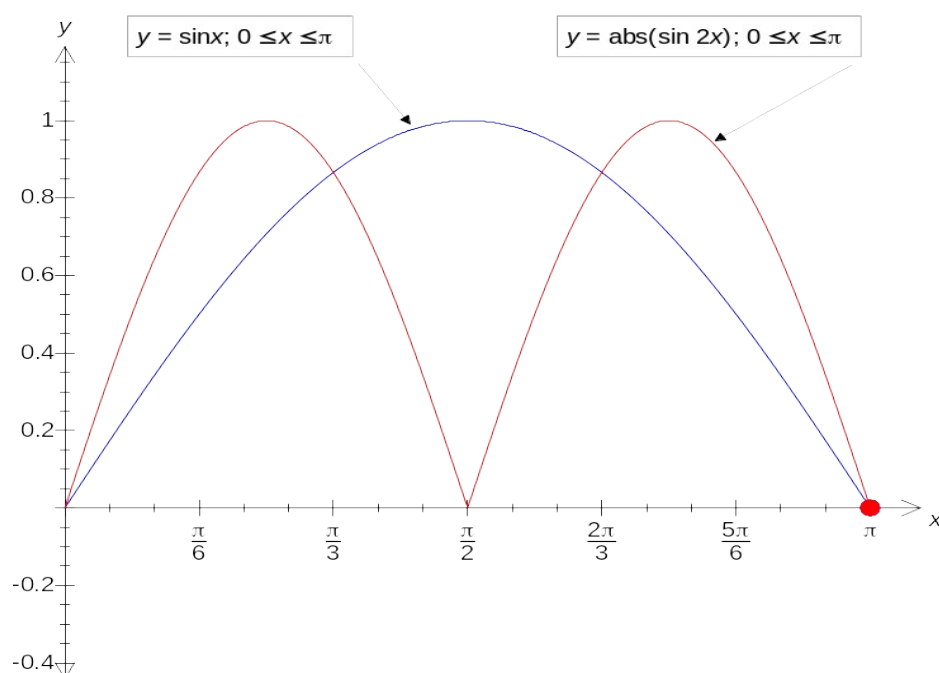
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(b) The graphs of the functions  $\sin x$  and  $|\sin 2x|$  for  $0 \leq x \leq \pi$  are shown.



Use algebra and explaining your reasoning, solve *exactly* the inequality  $|\sin 2x| \leq \sin x$  over the interval  $0 \leq x \leq \pi$

[5 marks]

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### Question 5 [6 marks]

(a) Verify that:

$$[z - \operatorname{cis}(\theta)][z - \operatorname{cis}(-\theta)] = z^2 - 2z \cos \theta + 1$$

[3 marks]

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## ACKNOWLEDGEMENTS