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School Curriculum and Standards Authority

WACE
Western Australian Certificate of Education

Western Australian Certificate of Education Examination, 2014

Question/Answer Booklet

MATHEMATICS 3A/3B

Section One: Calculator-free

Place one of your candidate identification labels in this box.

Ensure the label is straight and within the lines of this box.

Student Number: In figures | | | | | | | | |

In words _____

_____

Number of additional answer booklets used (if applicable):

Time allowed for this section

Reading time before commencing work: five minutes
Working time for section: fifty minutes

Materials 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 (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: nil

Important note to candidates

No other items may be taken into the examination room. 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.

Ref: 14-081
MAT3AB-S1

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of exam
Section One: Calculator-free	7	7	50	50	33⅓
Section Two: Calculator-assumed	12	12	100	100	66⅔
				Total	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2014*. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in this Question/Answer Booklet.

3. You must be careful to confine your response to the specific question asked and to follow any instructions that are specified to a particular question.

4. 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 that you are continuing to answer at the top of the page.

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. 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 any question, ensure that you cancel the answer you do not wish to have marked.

6. It is recommended that you **do not use pencil**, except in diagrams.

7. The Formula Sheet is **not** to be handed in with your Question/Answer Booklet.

See next page

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Additional working space

Question number: _____

Additional working space

Question number: _____

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Section One: Calculator-free **(50 Marks)**

This section has **seven (7)** questions. Answer **all** questions. Write your answers in the spaces provided.

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 that you are continuing to answer at the top of the page.

Working time: 50 minutes.

Question 1 **(4 marks)**

(a) Determine $\frac{dy}{dx}$, given $y = \frac{7x^4 - 5x}{x}$. (2 marks)

(b) Determine $\frac{dy}{dx}$ using the product rule, given $y = (3x^2 + 2)(5x - x^3)$.

(Do not simplify your answer.) (2 marks)

See next page

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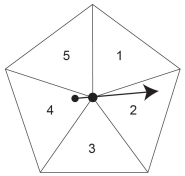
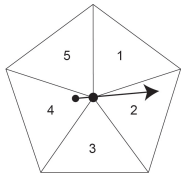
Question 2 **(7 marks)**

Two spinners, one red and one green, are spun. Some of the outcomes are shown in the table below.



Red spinner



Green spinner

Red spinner

Green spinner		**1**	**2**	**3**	**4**	**5**
	1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
	2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
	3					
	4		(4,2)			
	5			(5,3)		(5,5)

(a) Complete the table above. (1 mark)

(b) What is the probability that both spinners show the same number? (1 mark)

(c) What is the probability that the number on the red spinner is higher than the number on the green spinner? (1 mark)

(d) What is the probability that the green spinner shows a prime number? (1 mark)

(e) What is the probability of spinning a four on one spinner and a number greater than three on the other spinner? (1 mark)

(f) What is the probability that the total of the two spinners is even, given that the green spinner shows a number larger than the red spinner? (2 marks)

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Question number: _____

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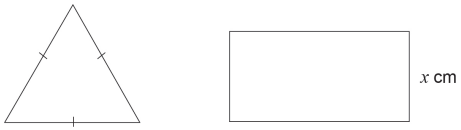
Additional working space

Question number: _____

Question 3 **(6 marks)**

(a) Solve the inequality $3 - 2x \leq x + 4$. (2 marks)

(b) In the diagram below, the perimeter of the equilateral triangle is less than the perimeter of the rectangle.



(i) Write an inequality and solve it to determine the possible values of x. (3 marks)

(ii) What is the smallest possible integer value of x? (1 mark)

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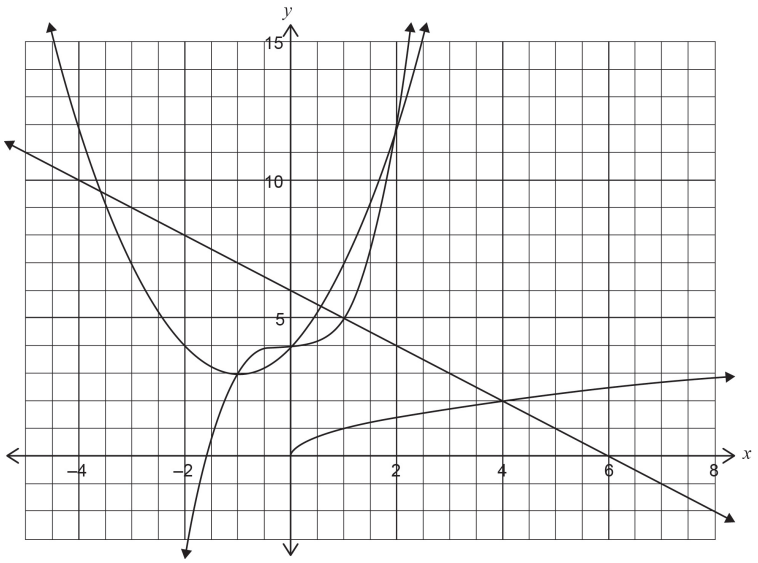
Question 4 **(9 marks)**

The functions $y = x^3 + 4$, $y = \sqrt{x}$, $x + y = 6$ and $y = (x + 1)^2 + 3$ are graphed below.



Use the graph to solve the following equations.

(a) $\sqrt{x} = 6 - x$, for $-5 \leq x \leq 8$. (1 mark)

See next page

Question 7 **(5 marks)**

For the function $f(x) = ax^2 - 2bx^3$, where a and b are positive constants, $f(1) = 2$ and $f'(2) = -24$.

(a) Establish the simultaneous equations $a - 2b = 2$ and $a - 6b = -6$. (3 marks)

(b) Solve the simultaneous equations from part (a) to determine the values of a and b. (2 marks)

End of questions

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Question 6 **(10 marks)**

Solve the following equations for x.

(a) $x^2 + x - 72 = 0$. (2 marks)

(b) $-2x(x + 2)(1 - 3x) = 0$. (2 marks)

(c) $2x^{\frac{1}{3}} + 1 = 5$. (3 marks)

(d) $2^{x+1} = 4^{1-2x}$. (3 marks)

See next page

(b) $(x + 1)^2 + 3 = x^3 + 4$, for $x > 0$. (2 marks)

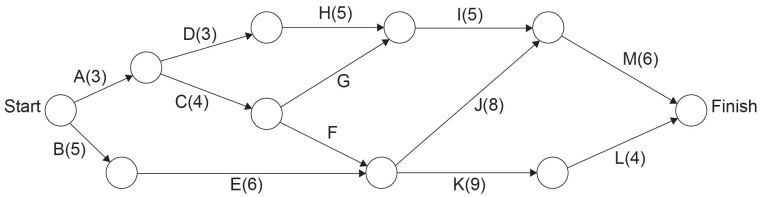
(c) $(x + 1)^2 + 3 = 4$, for $-5 \leq x \leq 8$. (2 marks)

(d) $x + (x + 1)^2 + 3 = 8$, for $-5 \leq x \leq 8$, by drawing a suitable straight line on the graph. (4 marks)

See next page

Question 5 **(9 marks)**

(a) The project network below consists of 13 tasks, from task A to task M, with completion times in hours.

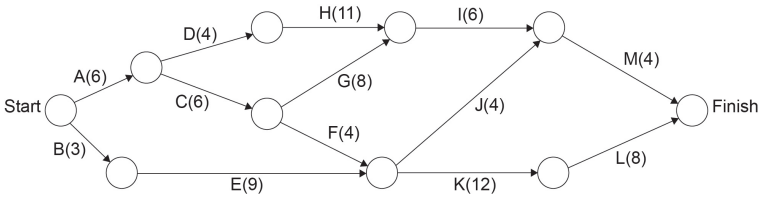


The minimum completion time for this project is 26 hours and task F is on the critical path.

(i) Determine the completion time for task F. (2 marks)

(ii) Determine the possible completion times for task G. (2 marks)

(b) The project network below has different completion times, in hours, to that of part (a).



(i) Determine the critical path and the minimum completion time. (2 marks)

(ii) Describe the effect of delaying task D by 6 hours on the minimum completion time. (1 mark)

(iii) A new task, Q, with a completion time of 24 hours is added to the network. It has an immediate predecessor of task B. Task L has immediate predecessors of tasks K and Q. Draw task Q on the network and state what effect it would have on the minimum completion time. (2 marks)