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Rossmoyne Senior High School

WA Exams Practice Paper D, 2015

Question/Answer Booklet

MATHEMATICS METHODS UNIT 1

Section One: Calculator-free

If required by your examination administrator, please place your student identification label in this box

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

In words _____

Your name _____

Time allowed for this section

Reading time before commencing work: five minutes
Working time for this 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.

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	8	8	50	52	35
Section Two: Calculator-assumed	13	13	100	98	65
			Total	150	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2015*. 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

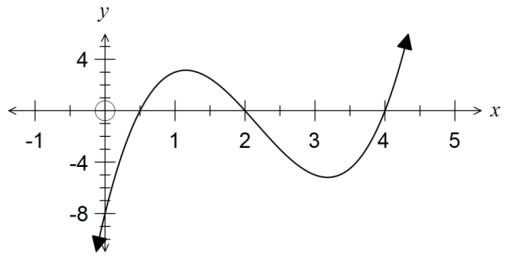
Additional working space

Question number: _____

Question 8 **(7 marks)**

(a) Expand $(2x+1)(x+1)(2x-1)$. (2 marks)

(b) The graph of $y=2x^3-13x^2+22x-8$ is shown below.



Factorise $2x^3-13x^2+22x-8$. (2 marks)

(c) Solve $x^3-2x^2-5x+6=0$. (3 marks)

End of questions

Section One: Calculator-free **(52 Marks)**

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time for this section is 50 minutes.

Question 1 **(5 marks)**

(a) Solve $2x=5x^2$. (2 marks)

(b) Solve $(x-3)(x+2)=4x$. (3 marks)

See next page

Question 2 **(4 marks)**

(a) Evaluate $\frac{12!}{5! \times 8!}$. (2 marks)

(b) Determine the sum of $\binom{6}{0}+\binom{6}{1}+\binom{6}{2}+\binom{6}{3}+\binom{6}{4}+\binom{6}{5}+\binom{6}{6}$. (2 marks)

Question 7 **(6 marks)**

(a) Determine the exact value of $\tan\left(-\frac{\pi}{3}\right)$. (1 mark)

(b) Solve $\sin^2(x)-\sin(x)=2$ for $0 \le x \le 360°$. (3 marks)

(c) Using the identity $\cos(x-y)=\cos(x)\cdot\cos(y)+\sin(x)\cdot\sin(y)$ and the substitutions $x=90-A$ and $y=B$ show that $\sin(A+B)=\sin(A)\cdot\cos(B)+\cos(A)\cdot\sin(B)$. (2 marks)

Question 6 **(8 marks)**

(a) A polynomial is given by $5 - x + 2x^2 - 4x^3 + x^4$.

(i) State the degree of this polynomial. (1 mark)

(ii) Determine the sum of all the coefficients of this polynomial. (1 mark)

(b) A row of Pascal's triangle starts with the numbers 1, 5, 10, ...

(i) Write down the numbers that complete the row. (1 mark)

(ii) Express the sum of all the numbers in the row as a power of 2. (1 mark)

(iii) Expand $(2x-1)^5$. (4 marks)

Question 3 **(7 marks)**

(a) A line has equation $5x + 2y = 8$. What is the gradient of this line? (1 mark)

(b) Is the line $3x + y = 0.5$ parallel, perpendicular, or neither, to the line $3x + y = -2$?
Justify your answer. (1 mark)

(c) Two points have coordinates P(5, -8) and Q(11, -20).

(i) Determine the coordinates of the mid-point of P and Q. (1 mark)

(ii) If Q is the mid-point of P and R, determine the coordinates of R. (2 marks)

(iii) Find the equation of the straight line passing through P and Q. (2 marks)

Question 4 **(7 marks)**

(a) A quadratic function is given by $f(x) = (x+1)^2 - 4$. For this function, determine

(i) the coordinates of the y-intercept. (1 mark)

(ii) the equation of the line of symmetry. (1 mark)

(iii) the coordinates of the turning point. (1 mark)

(b) Another quadratic function is given by $y = 2 + 1.75x - 0.25x^2$. Determine

(i) the equation of the line of symmetry. (1 mark)

(ii) the coordinates of the x-intercepts. (3 marks)

Question 5 **(8 marks)**

(a) A function is defined as $f(x) = 10 - 2x$ over the domain $\{x : x = 1,\ 3,\ 5\}$. Determine the range of $f(x)$. (1 mark)

(b) State the natural domain and corresponding range for the function $g(x) = 4 - \sqrt{x+3}$. (2 marks)

(c) The function h is given by $h(x) = 2(x+3)^2 - 1$.

(i) Determine the x-coefficient of the expanded form of this polynomial. (1 mark)

(ii) State the range of the graph of $y = 3h(x)$. (1 mark)

(d) Comment on the behaviour of the following graphs as $x \to -\infty$.

(i) $y = x^5$. (1 mark)

(ii) $y = x^{-1}$. (1 mark)

(iii) $y = \sqrt{2-x}$. (1 mark)