Semester 1 (Unit 1) Examination, 2015

Question/Answer Booklet

Rossmoyne Senior High School

MATHEMATICS METHODS

Section One: Calculator-free

Student Name/Number: _____

Teacher 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	7	7	50	60	40
Section Two: Calculator-assumed	11	11	90	90	60
					100

Instructions to candidates

1. The rules for the conduct of School exams are detailed in the _____*School/College assessment policy*. 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 responses to the specific questions asked and to follow any instructions that are specific 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 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.

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Acknowledgements

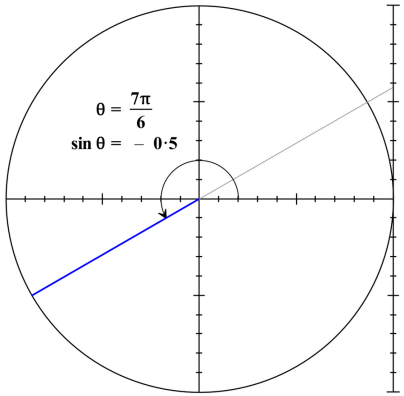
Section One: Calculator-free **(60 Marks) Weighting 35%**

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

Suggested working time: **50 minutes**.

Question 1 **(7 marks)**

The diagram below shows a unit circle with angle $\theta = \frac{7\pi}{6}$ and $\sin\theta = -0.5$ as marked.



(a) State the value of θ in degrees. (1 mark)

(b) State exact values for $\cos\theta$ and $\tan\theta$. (4 marks)

(c) Given $\cos\beta = -\frac{\sqrt{2}}{2} = -\frac{1}{\sqrt{2}}$, $-180^\circ \le \beta \le 180^\circ$, determine the value(s) for β. (2 marks)

Question 2 **(9 marks)**

Solve the following equations (exact answers)

(a) $\frac{x+3}{4} - \frac{x-3}{5} = \frac{x}{2}$ (Hint- use lowest common denominator) (3 marks)

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

(c) $x^2 - 4x + 1 = 0$ (by completing the square) (4 marks)

 See next page

 See next page

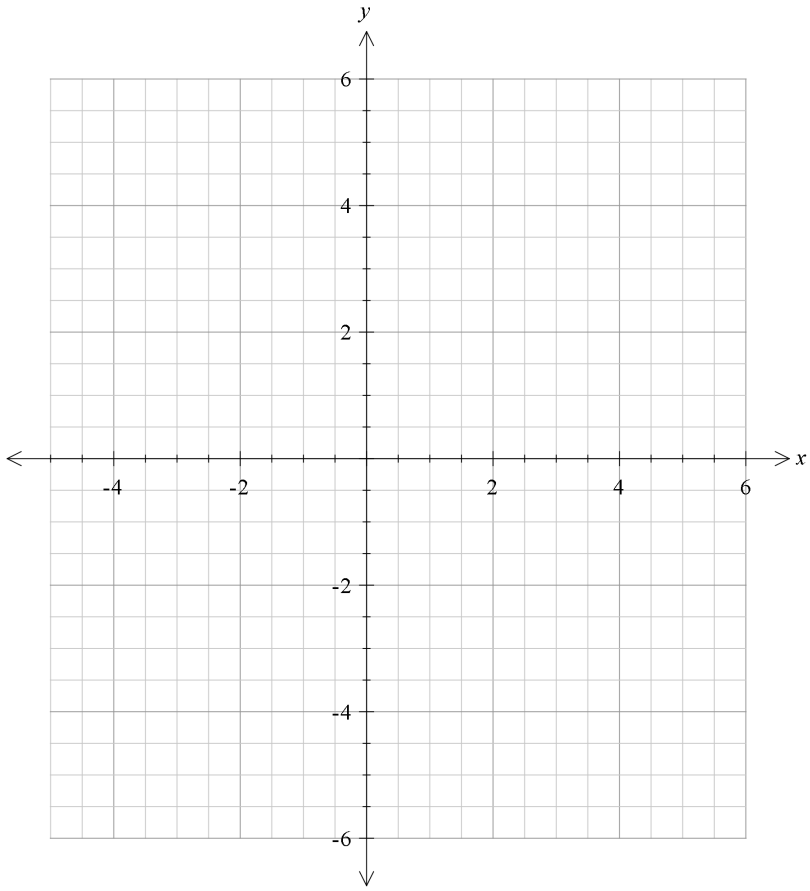
Additional working space

Question number: _____

Question 3 **(7 marks)**

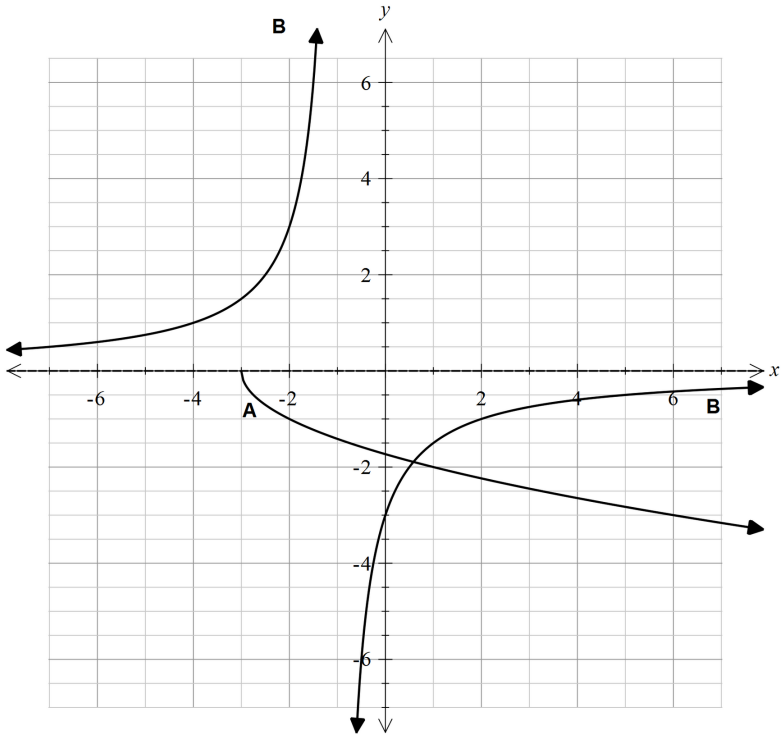
Sketch the following on the axes below showing clearly all key features.

$2x + 3y = 6$, $y = -x^2 - 4x - 3$, $(x-2)^2 + (y-4)^2 = 4$



Question 4 **(5 marks)**

Determine the equation of each of the graphs, shown below.



A: (2 marks)

B: (3 marks)

Question 7 **(12 marks)**

A bag contains 10 marbles: 7 red and 3 green. Two marbles are randomly selected from the bag, one after the other, the first marble **not** being replaced before the second is selected.

Determine the probability that the two marbles are

(a) red and green in that order, (2 marks)

(b) red and green in any order, (3 marks)

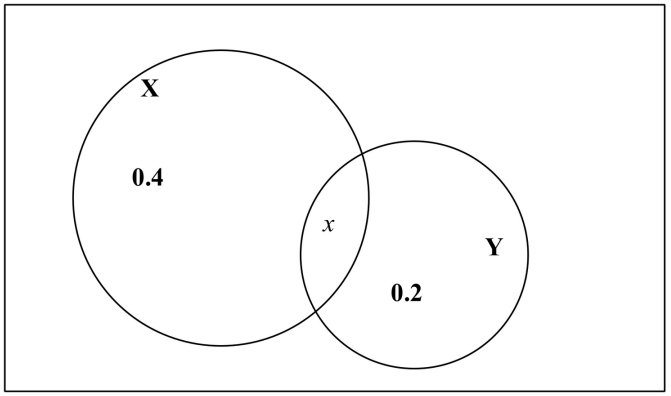
(c) of the same colour, (3 marks)

(d) two reds given they are of the same colour, (4 marks)

End of Questions

Question 5 **(11 marks)**

The Venn diagram below represents the probability sample space for two random events X and Y.



(a) If $P(X \cup Y) = 0.9$,

(i) calculate $P(X)$. (2 marks)

(ii) Does $P(X \cap Y) = P(X) \times P(Y)$? Justify your answer. (3 marks)

Now let us consider,

(b) If $P(X \mid Y) = \frac{2}{7}$, calculate

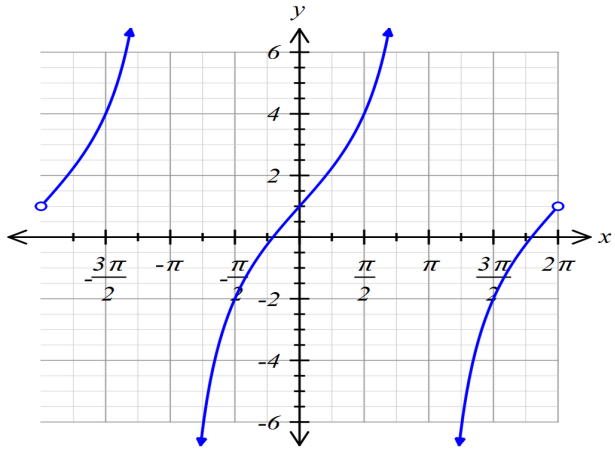
(i) $P(X)$ (4 marks)

(ii) $P(\overline{X \cup Y})$ (2 marks)

Question 6 **(9 marks)**

(a) State the equation of the graph drawn below (4 marks)

Hint- graph of form $y = a\tan bx + c$



(b) On the axes below, sketch the graph of

$$f(\theta) = 3\cos 2\left(\theta - \frac{\pi}{2}\right) \text{ for } -\pi \le \theta \le \pi$$

(5 marks)