Christ Church Grammar School

2019
TEST 4

MATHEMATICS METHODS Year 11

Section One:
Calculator-free

Your name _____

Teacher's name _____

Time and marks available for this section

Reading time for this section:	3 minutes
Working time for this section:	15 minutes
Marks available:	17 marks

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.

Instructions to candidates

1. The rules of conduct of the CCGS assessments are detailed in the Reporting and Assessment Policy. Sitting this assessment implies that you agree to abide by these rules.

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

3. Answer all questions.

4. 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.

5. Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

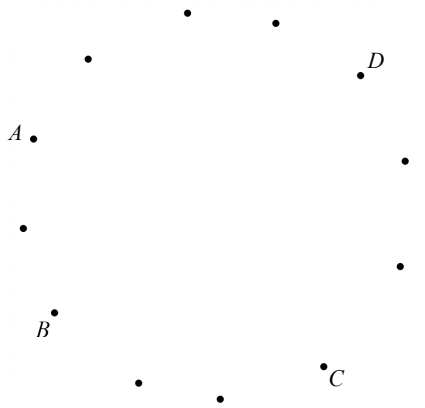
6. **Show all your working clearly**. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than 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.

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

See next page

Question 7 **(2 marks)**

The diagram below shows 12 points where no three points are collinear. Points A, B, C and D define a quadrilateral.



Quadrilateral $ABCD$ is one of the many quadrilaterals that can be formed.
Determine the number of quadrilaterals that can be formed.

End of Questions

Question 1 **(2 marks)**

In Australia, the probability of having blue eyes is approximately 35% and the probability of having fair hair is approximately 24%. The probability of having both blue eyes and fair hair is approximately 17%.

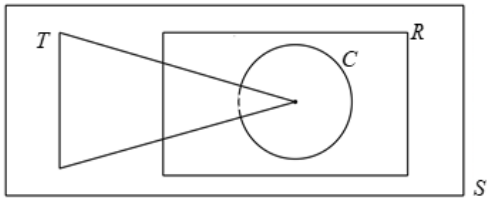
Determine the probability that someone with blue eyes will have fair hair.

See next page

Question 2 **(9 marks)**

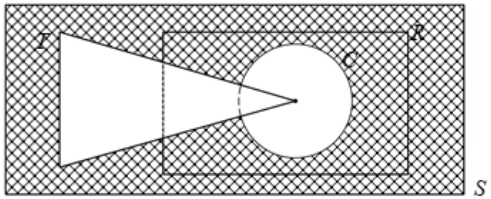
Sets T, R and C are defined in a sample space S. No region within the sample space S is empty.

(a) Shade the appropriate region to represent the set $T \cap R \cap C$. (1 mark)



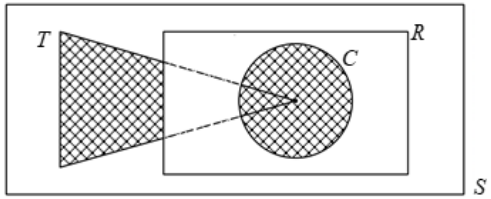
(b) Use set notation to represent the shaded region in the following diagrams:

(i)



(2 marks)

(ii)



(2 marks)

Question 6 continued

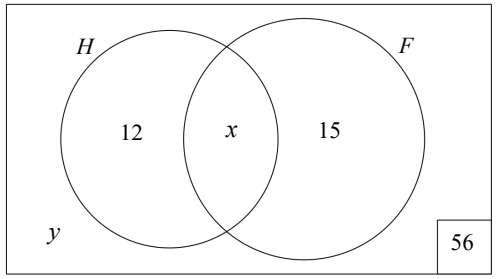
(c) A student is selected at random from the group of 56 students.
Write an expression for the **probability** that this student plays hockey given that they play football.

(2 marks)

(d) If playing hockey and playing football are independent events, determine the possible value(s) of x. (3 marks)

Question 6 **(8 marks)**

For a particular group of 56 Year 11 students, the Venn diagram shown below indicates the number of students who play either hockey, football or both.



(a) The diagram indicates that $n\left(\overline{H \cup F}\right) = y$.

Describe in words what this means in this specific context. (1 mark)

(b) A student is selected at random from the group of 56 students.
Write an expression for the **probability** that this student plays hockey or football.
(2 marks)

Question 2 continued

(c) State whether the following statements are true or false. Justify your answer.

(i) R and $\overline{R}$ are mutually exclusive. (2 marks)

(ii) R and C are independent events. (2 marks)

Question 3 **(6 marks)**

The 6th, 7th and 8th rows of Pascal's triangle are shown below. This information may be used to answer the questions that follow.

Row 6		1	6	15	20	15	6	1	
Row 7	1	7	21	35	35	21	7	1	
Row 8	1	8	28	56	70	56	28	8	1

(a) Evaluate $\binom{8}{2}$. (1 mark)

(b) Evaluate $\binom{9}{4}$. (2 marks)

(c) If $(1-2x)^6 = a+bx+cx^2+ \ldots$ determine the value for a, b and c. (3 marks)

End of Questions

See next page

Question 5 continued

(c) Determine the following probabilities:

(i) $P(W_2 \mid R_1)$ (2 marks)

(ii) $P(R_1 \cap W_2)$ (2 marks)

(iii) $P(W_2)$ (2 marks)

(d) Determine the probability that a white ball was selected from Bag 1, given that a white ball is selected from Bag 2. (2 marks)

See next page

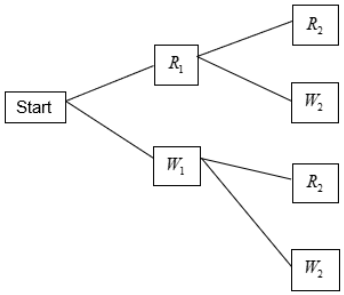
Question 5 **(11 marks)**

An experiment is conducted using two separate bags, Bag 1 and Bag 2.

Bag 1 has 3 red and 2 white balls.
Bag 2 has 2 red and 4 white balls.

A ball is randomly selected from Bag 1 and is then placed into Bag 2.
Then a ball is randomly selected from Bag 2.

A tree diagram can be drawn showing the possibilities:



Note: R_1 is the event a red ball was selected from Bag 1.
R_2 is the event a red ball was selected from Bag 2.

(a) Explain why events R_1 and W_1 are considered to be both mutually exclusive and complementary events. (2 marks)

(b) Determine $P(R_1)$ (1 mark)

See next page

Christ Church Grammar School

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TEST 4

MATHEMATICS METHODS Year 11

Section Two:
Calculator-assumed

Your name _____

Teacher's name _____

Time and marks available for this section

Reading time for this section:	4 minutes
Working time for this section:	25 minutes
Marks available:	26 marks

Materials required/recommended for this section

To be provided by the supervisor
This Question/Answer Booklet
Formula Sheet (retained from Section One)

To be provided by the candidate
Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: drawing instruments, templates and up to three calculators approved for use in the ATAR examinations

Important note to candidates

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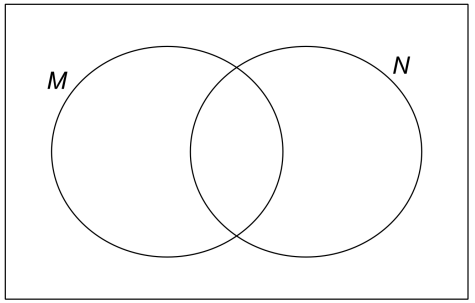
Question 4 **(5 marks)**

Two events M and N are such that:

$P(M) = 0.675$ $P(M \cap N) = 0.25$ $P(\overline{M} \cap N) = 0.15$

(a) Complete the Venn diagram below. (2 marks)



(b) Determine $P(M \cup N)$ (1 mark)

(c) Determine $P(N|M)$ (2 marks)