SOLUTIONS

Christ Church Grammar School

2018
UNIT TEST 4

MATHEMATICS METHODS Year 11
Section One:
Calculator-free

Student name _____

Teacher name _____

Time and marks available for this section
Reading time before commencing work: 2 minutes
Working time for this section: 15 minutes
Marks available: 19 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. Write your answers in this Question/Answer Booklet.

2. Answer all questions.

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

4. 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.

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 an answer to 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.

See next page

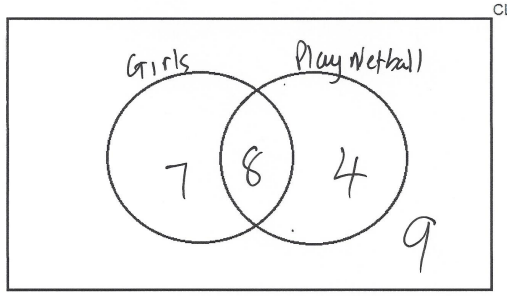
Additional working space

Question number:_____

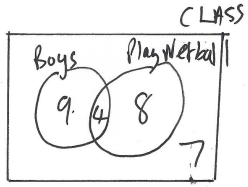
Question 4 **(7 marks)**

In a class of 28 students there are 15 girls. In the class 8 girls and 4 boys play netball.

(a) Consider the Venn diagram below. Choose suitable labels for the two sets in the Venn diagram and fully complete the diagram using the information given above. (2 marks)



or



✓(correct labels for sets)
✓(all 4 correct values in diagram)

A student is chosen at random from the class. Calculate the following:

(b) $P(student\ is\ a\ boy)$. (1 mark)

$= \frac{13}{28}$ ✓(correct answer)

(c) $P(student\ is\ a\ girl, given\ that\ they\ play\ netball)$. (2 marks)

$= \frac{8}{12}$ $(or\ \frac{2}{3})$ ✓(for correct numerator) ✓(for correct denominator)

(d) $P(student\ is\ a\ boy, given\ that\ they\ do\ not\ play\ netball)$. (2 marks)

$= \frac{9}{16}$ ✓(for correct numerator) ✓(for correct denominator)

End of questions

Question 1 **(7 marks)**

(a) Evaluate $\frac{10!}{7!\,3!}$ (2 marks)

$= \frac{10\times9\times8\times7!}{7!\ 3!}$

$= \frac{10\times9\times8}{3\times2}$ ✓(initial simplification)

$= 5\times3\times8 = 15\times8 = 120$ ✓(final answer)

(b) Expand and simplify $(x-2y)^5$ (3 marks)

$1\times x^5 + 5\times x^4\times(-2y) + 10\times x^3(-2y)^2 + 10\times x^2\times(-2y)^3$
$+ 5x\times(-2y)^4 + (-2y)^5$

✓(use of Pascal's triangle row)
✓(initial calculation of powers correct)

$= x^5 - 10x^4y + 40x^3y^2 - 80x^2y^3 + 80xy^4 - 32y^5$
✓(final simplified answer)

(c) **Show the use of Pascal's triangle** to factorise $x^3 - 6x^2 + 12x - 8$ (2 marks)

$= 1\times x^3 + 3\times x^2(-2) + 3\times x(-2)^2 + 1\times(-2)^3$
✓(interpreted to use row of Pascal's triangle)

$= (x-2)^3$ ✓(final factorised answer)

See next page

Question 2 **(3 marks)**

In a random experiment:

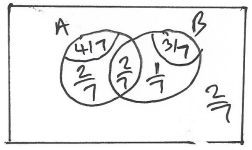
$$P(A) = \frac{4}{7} \quad P(B) = \frac{3}{7} \quad \text{and} \quad P(A \cap \overline{B}) = \frac{2}{7}$$

Determine the following:

(a) $P(A \cap B)$. (1 mark)

$= \frac{2}{7}$

✓(correct answer)

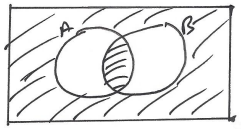


(b) $P(A|B)$. (1 mark)

$= \frac{2/7}{3/7} = \frac{2}{3}$ ✓(correct answer)

(c) $P((\overline{A \cup B}) \cup (A \cap B))$. (1 mark)

Shaded area →

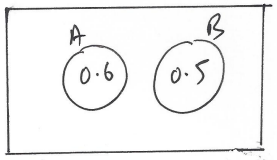


answer $= \frac{2}{7} + \frac{2}{7}$

$= \frac{4}{7}$ ✓(correct answer)

Question 3 **(2 marks)**

In a particular experiment $P(A) = 0.6$ and $P(B) = 0.5$. Comment on whether A and B can be mutually exclusive. You must give a justification for your answer.



A and B cannot be mutually exclusive as then the sets are disjoint (see diagram)

So $Pr(A \cup B) = 0.6 + 0.5$

$= 1.1 > 1$

which is not possible

✓✓ (for correct answer with valid justification)

(N.B. zero marks for answer without valid justification)