



Christ Church
Grammar School

2018
TEST 2

MATHEMATICS SPECIALIST Year 12

Section Two:

Calculator-assumed

Student name _____

Teacher name _____

Time and marks available for this section

Reading time before commencing work: 3 minutes

Working time for this section: 30 minutes

Marks available: 31 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 WACE examinations

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 specified 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.

Question 4**(4 marks)**Given that $f(x) = x^2 - 2$ and $g(x) = 3x + 1$

(a) Find the functions

(i) $k(x) = f(g(x))$ (1 mark)

(ii) $h(x) = g(f(x))$ (1 mark)

(b) If $f(g(p)) = g(f(p)) + 16$, for some integer p .Find the value(s) of p . (2 marks)

Question 5**(3 marks)**

(a) Find the inverse $f^{-1}(x)$ of the function $f(x) = \frac{x+2}{2x-1}$, $x \neq \frac{1}{2}$ (1 mark)

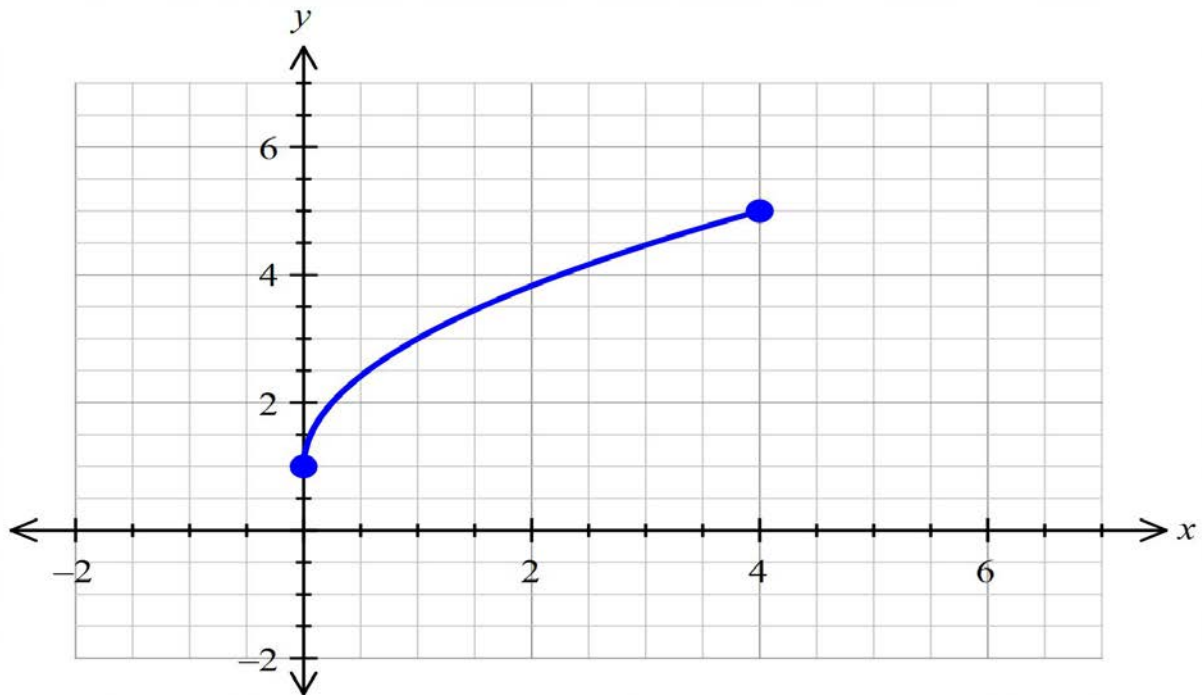
(b) What does your solution from part (a) tell you about the function? (1 mark)

(c) State the domain for $f^{-1}(x)$. (1 mark)

Question 6

(5 marks)

Shown below is the graph of $f(x) = 2\sqrt{x} + 1$, for $0 \leq x \leq 4$



(a) Plot the graph on $f^{-1}(x)$ on the same set of axes. (2 marks)

(b) Find an expression for $f^{-1}(x)$, clearly stating the domain and range for the inverse function. (3 marks)

Question 7**(4 marks)**

$(x + 3)$ is a factor of $x^3 + ax^2 + bx + 24$ and when divided by $(x - 1)$, the remainder is 12. Find the values of a and b .

Question 8**(2 marks)**

Factorise $z^4 + 2z^3 - 2z^2 + 8$ into linear factors.

Question 9**(5 marks)**

It is known that $-2 + bi$ is a solution to $z^2 + az + (3 + a) = 0$.

Find a and b , in exact form, given that they are real.

Question 10

(8 marks)

$$f(x) = \frac{x^2 - 6x + 14}{x - 1}$$

(a) Show algebraically, the graph of the the function

(i) Does not meet the x -axis, and (2 marks)

(ii) Has no horizontal points of inflection but has two turning points. (3 marks)

Question 10 continued

(b) (i) Find the equation of the oblique asymptote. (2 marks)

(ii) Show the two asymptotes of the function intersect at (1, -4). (1 mark)

End of questions

Additional working space

Question number: _____

Additional working space

Question number: _____