Christ Church Grammar School

SPECIALIST MATHEMATICS Year 12
Section One:
Calculator-free

Student name _____

Teacher name _____

Time and marks available for this section
Reading Time: 2 minutes
Working time for this section: 15 minutes
Marks available: 15 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 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 1   **(4 marks)**

If $f(x) = 3x(x - 2)$, sketch the graphs

(a) $y = |f(x)|$ (2 marks)
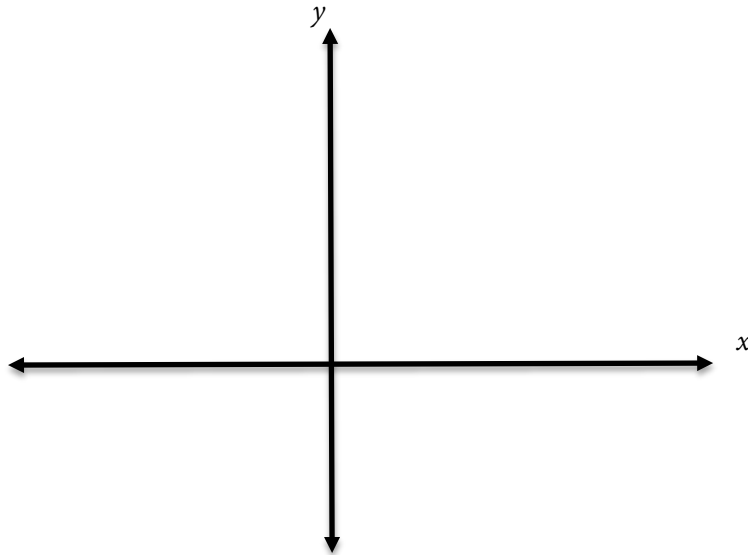
(b) $y = f(|x|)$,   (2 marks)
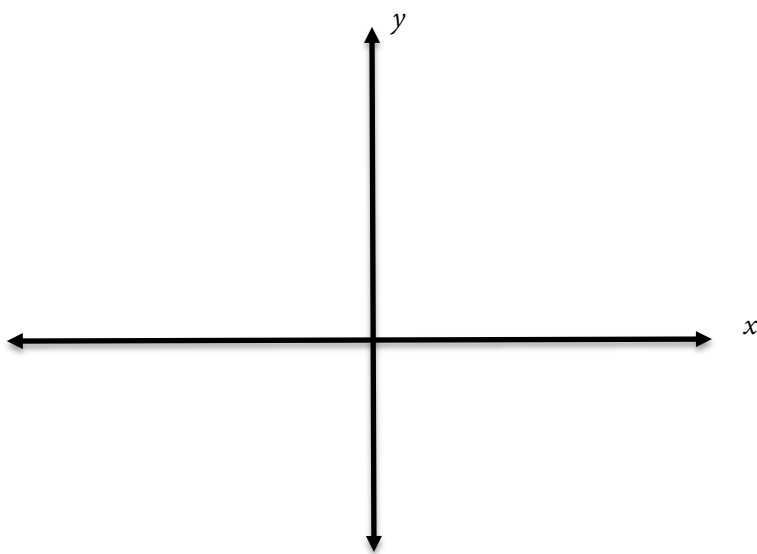
See next page

Question 2   **(3 marks)**

The horizontal line test says:
"For a function to have an inverse function, no horizontal line can cut its graph more than once:

(a)   Explain why this is a valid test for the existence of an inverse function.

                                                               (2 marks)

(b)   Sketch an example of a function that would have an inverse.   (1 mark)

Question 3   **(2 marks)**

If $g(f(x)) = \dfrac{x+2}{3x}$ and $g(x) = x - 2.$

Find the function defined as $f(x)$.

Question 4 **(6 marks)**

Sketch the following graph

$$y = \frac{4x - 5}{x^2 - 1}$$

End of questions

Additional working space

Question number: _____

Additional working space

Question number: _____