Christ Church Grammar School

2015
EPW 1

Year 12 MATHEMATICS 3CD
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: 30 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
Notes on **one single side** of an A4 sheet (retained from Section One)

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. **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.

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

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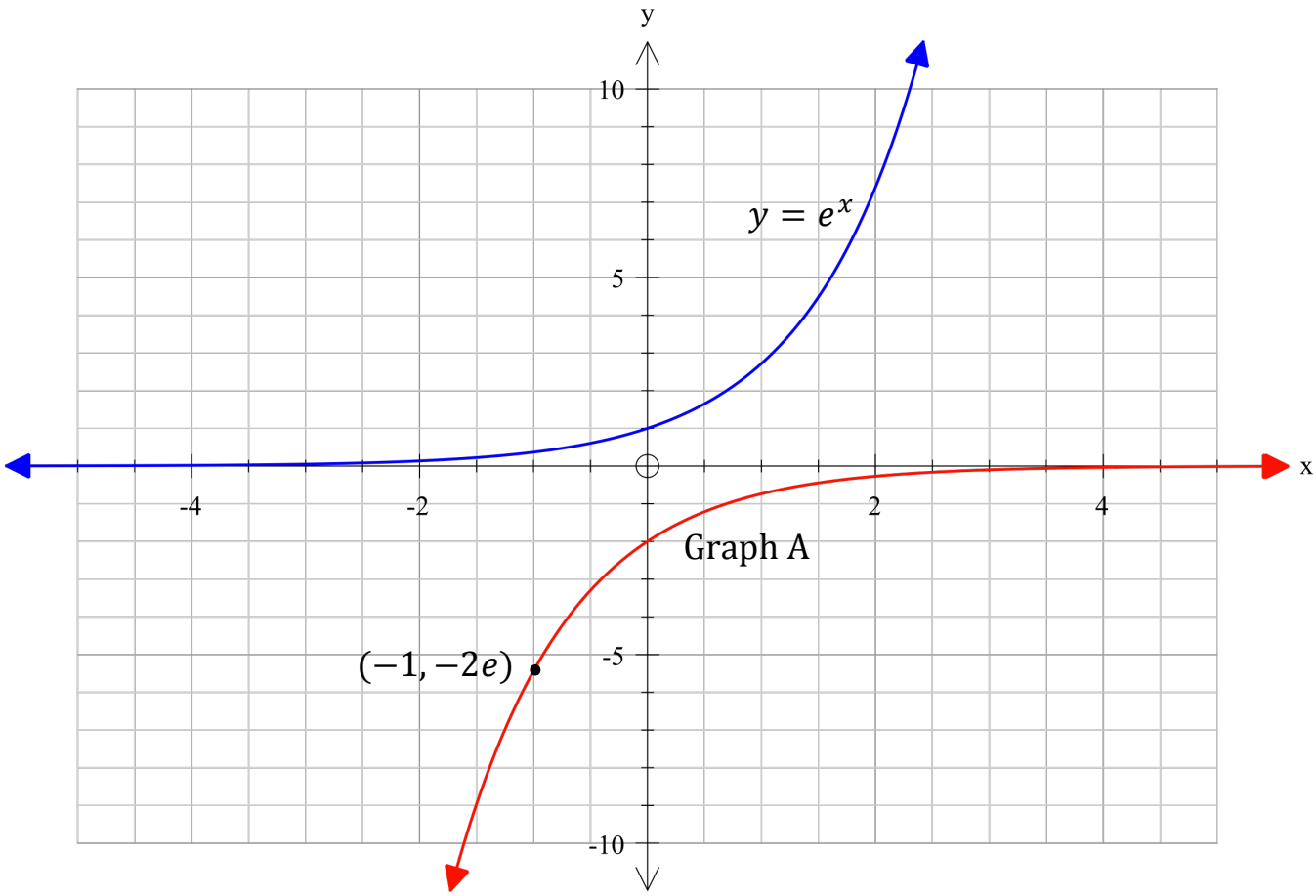
Question 5 **(3 marks)**

Using the graph of $y = e^x$ as a reference, write the exponential equation for $Graph\ A$ in the form $y = ae^{bx}$, where a and b are constants to be found.



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Question 6 **(4 marks)**

Determine the domain and range of $f(g(x))$, given that $f(x) = \sqrt{x}$ and $g(x) = 4 - 2^x$.

Question 7 **(2 marks)**

Simplify, in terms of e, each of the following.

(a) $\lim_{n\to\infty} \left(1 + \frac{1}{n}\right)^n$. (1 mark)

(b) $\lim_{n\to\infty} \left(1 + \frac{1}{5n}\right)^n$. (1 mark)

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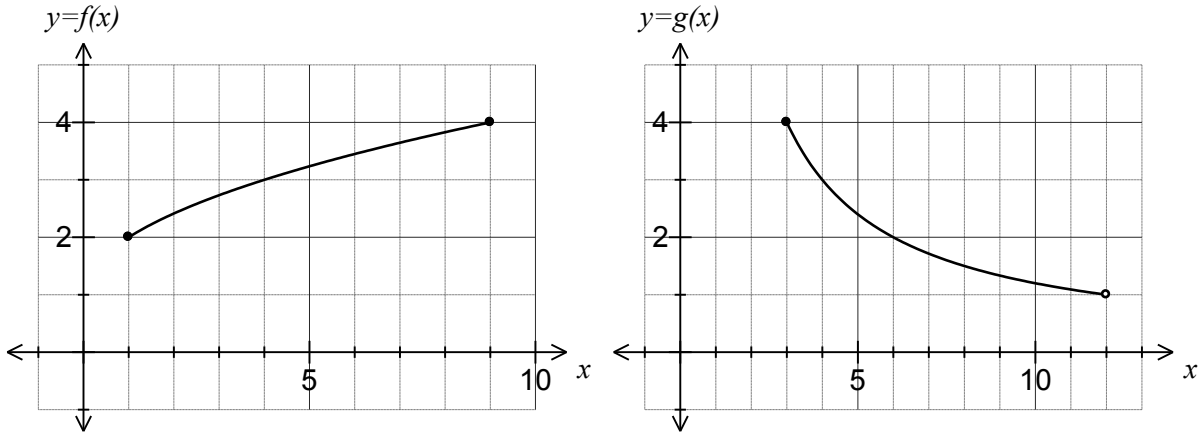
Question 8 **(7 marks)**

The graphs of $y = f(x)$ and $y = g(x)$ are shown below over their respective domains.



(a) Determine $g(6)$. (1 mark)

(b) Determine $g \circ f(9)$. (1 mark)

(c) Determine the range of $g(x)$. (1 mark)

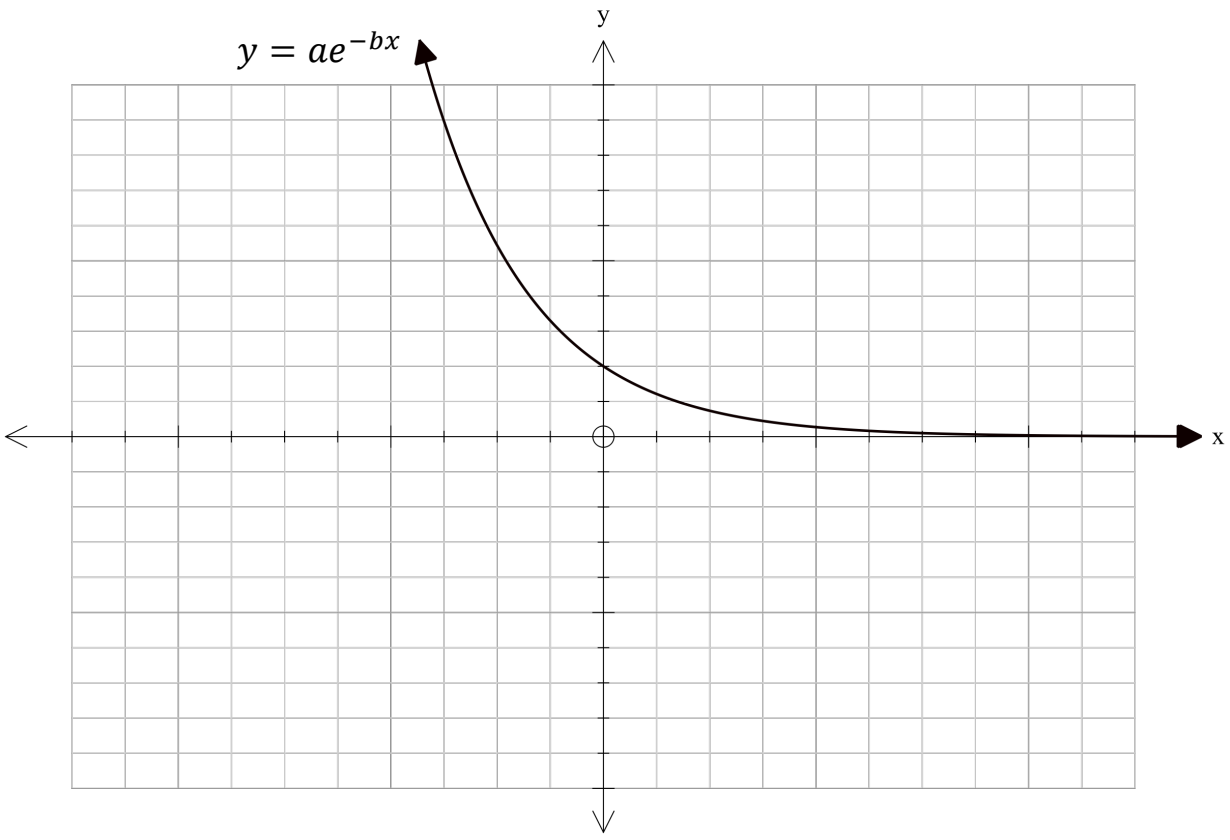
(d) Determine the range of $f \circ g(x)$. (2 marks)

(e) Determine the domain of $g \circ f(x)$. (2 marks)

Question 9 **(6 marks)**

(a) Describe, in order, the transformations required to sketch the graph of $y = e^{1-3x}$ from the graph of $y = e^{x}$. (3 marks)

(b) The graph of $y = ae^{-bx}$ is shown below, where a and b are constants. On the same axes below, sketch the graph of $y = -ae^{bx}$. (3 marks)



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Question 10 **(3 marks)**

Let $f(x) = \sqrt{3x + 3}$ and $g(x) = 2^x - 3$.

Determine a simplified expression for $f(g(x))$ and hence state the domain of $f(g(x))$.

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Question 11 **(5 marks)**

Let $f(x) = \sqrt{2 - x}$. Determine the domain of $f \circ f(x)$.

End of questions