Christ Church Grammar School

2014

EPW 1
IN-CLASS VALIDATION

MATHEMATICS 3C/3D

Section One:
Calculator-free

Your name _____

Time allowed for this section
Working time for this section: seventeen (17) minutes

Materials required/recommended for this section
To be provided by the supervisor
Nil

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

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Calculator-free **(17 marks)**

Answer all questions.

Working time: 17 minutes.

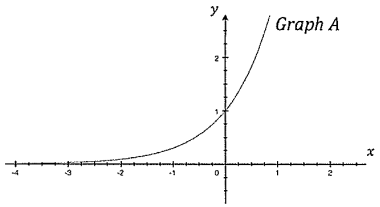
Question 1 **(3 marks)**

Match each of the following graphs below with an equation from the given list.

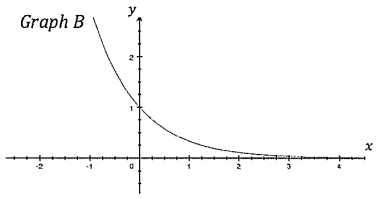
Equation 1: $y = x^3$ Equation 2: $y = -3^x$

Equation 3: $y = 0.3^{-x}$ Equation 4: $y = -0.3^x$

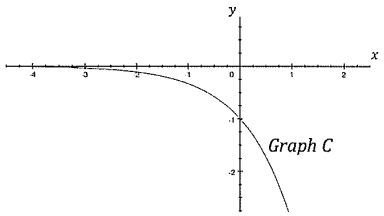
Equation 5: $y = 3^{-x}$ Equation 6: $y = -3^{-x}$



Graph A has Equation _____



Graph B has Equation _____



Graph C has Equation _____

Question 2 **(8 marks)**

Two functions are defined as $f(x) = e^{-x}$ and $g(x) = \frac{1}{1-x}$.

(a) Evaluate $f(-1)$ and $g(\frac{2}{3})$. (2 marks)

(b) Determine expressions for $f(g(x))$ and of $g(f(x))$. (2 marks)

(c) Evaluate $f(g(0))$ and of $g(f(0))$ if they exist. (2 marks)

(d) Determine the domain and range of $f(g(x))$. (2 marks)

(d) Explain why the domain of $f(x)$ has to be restricted if $g(f(x))$ is to be a function. (2 marks)

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

End of questions

Question 3 **(6 marks)**

Two functions are defined as $f(x) = e^x$ and $g(x) = e^{1-2x}$.

(a) Describe, in the correct sequence, the transformations which must be applied to the graph of $f(x)$ to obtain the graph of $g(x)$. (3 marks)

(b) Determine the domain and range of $g(f((x))$. (3 marks)

End of questions

Question 7 **(12 marks)**

Two functions are defined as $f(x) = \sqrt{x-1}$ and $g(x) = \frac{1}{x-1}$.

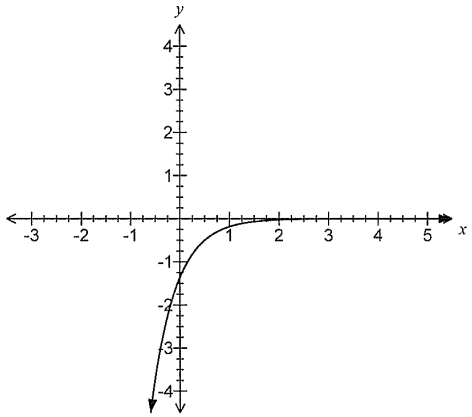
(a) Find the natural domain and range of $f(x)$ and of $g(x)$. (4 marks)

(b) Find in simplified form $g(g(x))$. (2 marks)

(c) Evaluate $g(f\left(\frac{13}{9}\right))$. (2 marks)

Question 6 **(6 marks)**

Let $f(x) = ae^{bx+c}$, where a, b and c are constants. The graph of $y = f(x)$ is shown below.



(a) Write down an asymptote for the graph of $y = f(x)$. (1 mark)

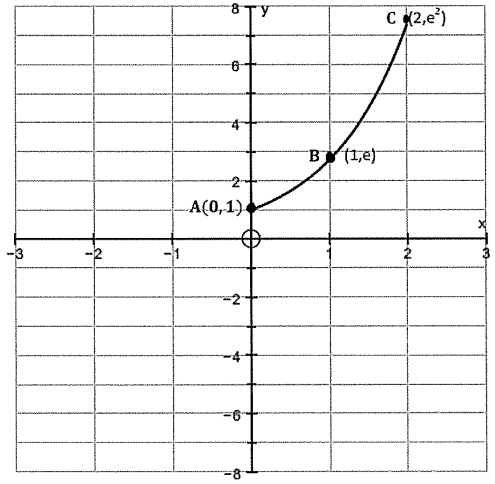
(b) Write down the range of $f(x)$. (1 mark)

(c) Determine with reason if a is negative or positive. (2 marks)

(d) Determine with reason if b is negative or positive. (2 marks)

Question 5 **(8 marks)**

The diagram shows the graph of $f(x) = e^x$ for $0 \leq x \leq 2$.



(a) Describe, in the correct sequence, the transformations which must be applied to the graph of $f(x)$ to obtain the graph of $g(x) = -f(2x + 2)$. (3 marks)

(b) Sketch, on the same diagram above, the graph of $g(x) = -f(2x + 2)$, indicating the ***images*** of A, B and C as A′ , B′ and C′ . (2 marks)

(c) Write down the co-ordinates of the images of A, B and C in the above transformations. (3 marks)

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EPW 1
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MATHEMATICS 3C/3D

Section Two:
Calculator-assumed

Your name _____

Time allowed for this section

Working time for this section: twenty-eight (28) minutes

Materials required/recommended for this section

To be provided by the supervisor
Nil

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: up to three calculators approved for use in the WACE examinations

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Calculator-assumed **(28 marks)**

Answer all questions.

Working time: 28 minutes.

Question 4 **(2 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.