John Wollaston Anglican Community School

Semester One Examination, 2019

Question/Answer booklet

MATHEMATICS METHODS UNIT 1

Section One: Calculator-free

If required by your examination administrator, please place your student identification label in this box

Student number: In figures | | | | | | | | |

In words _____

Your name _____

Time allowed for this section

Reading time before commencing work: five minutes
Working time: fifty minutes

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 material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of examination
Section One: Calculator-free	8	8	50	52	35
Section Two: Calculator-assumed	13	13	100	98	65
				Total	100

Instructions to candidates

1. The rules for the conduct of examinations are detailed in the school handbook. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer booklet preferably using a blue/black pen.
   Do not use erasable or gel pens.
3. You must be careful to confine your answer to the specific question asked and to follow any instructions that are specified to a particular question.
4. 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 any question, ensure that you cancel the answer you do not wish to have marked.
5. It is recommended that you do not use pencil, except in diagrams.
6. Supplementary pages for planning/continuing your answers to questions are 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.
7. The Formula sheet is not to be handed in with your Question/Answer booklet.

Markers use only		
Question	Maximum	Mark
1	5	
2	6	
3	6	
4	7	
5	7	
6	7	
7	7	
8	7	
S1 Total	52	
S1 Wt (×0.6731)	35%	
S2 Wt	65%	
Total	100%	

See next page

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Supplementary page

Question number: _____

Question 8 **(7 marks)**

(a) Evaluate $\sin\left(\frac{39\pi}{4}\right)$. (2 marks)

(b) A is an acute angle and B is an obtuse angle such that $\cos A = \frac{1}{3}$ and $\sin B = \frac{2}{3}$.

(i) Show that $\sin A = \frac{2\sqrt{2}}{3}$ and determine the value of $\cos B$. (3 marks)

(ii) Determine the value of $\sin(A + B)$ as a single fraction. (2 marks)

End of questions

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Section One: Calculator-free **35% (52 Marks)**

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time: 50 minutes.

Question 1 **(5 marks)**

Solve the following equations for x.

(a) $(2x - 9)(x + 7) = 0$. (1 mark)

(b) $\frac{x}{3} = \frac{2x - 1}{2}$. (2 marks)

(c) $4x^2 = 4x$. (2 marks)

See next page

Question 2 **(6 marks)**

(a) A circle of radius 4 has its centre at the point $(-2, 3)$. Determine the equation of the circle in the form $x^2 + y^2 = ax + by + c$. (3 marks)

(b) The graph of $x = y^2$ passes through the point $(4, q)$. Determine the value(s) of q and hence explain why y is a relation but not a function of x. (3 marks)

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Question 7 **(7 marks)**

(a) Complete the row of Pascal's triangle that starts $1, 6, 15, \ldots$ and express the sum of the numbers in this row as a power of 2. (2 marks)

(b) Determine the coefficient of

(i) the x^2 term in the expansion of $(5x - 1)^2$. (1 mark)

(ii) the x^4 term in the expansion of $(x + 1)^6$. (1 mark)

(iii) the x^3 term in the expansion of $(3 - 2x)^6$. (3 marks)

Question 6 **(7 marks)**

(a) Briefly describe the behaviour of the y values for each of the following graphs, given the behaviour of the x values:

(i) $y = x^4$, as $x \to \infty$. (1 mark)

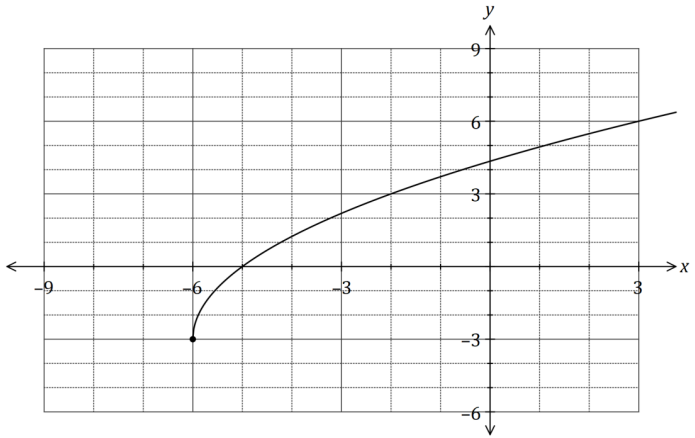
(ii) $y = (2 - x)^3$, as $x \to \infty$. (1 mark)

(iii) $y = \frac{1}{x}$, as $x \to -\infty$. (1 mark)

(b) The graph of $y = f(x)$ is shown below. On the same axes sketch the graph of

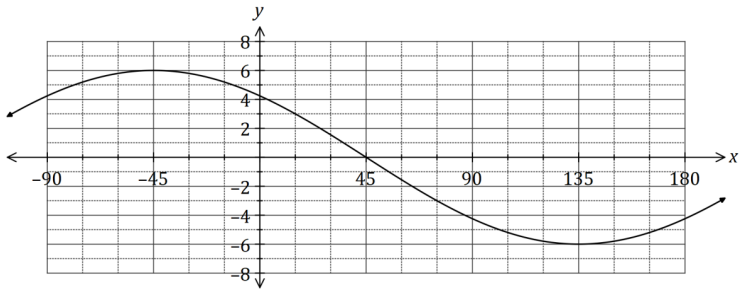
(i) $y = f(x + 3)$. (2 marks)

(ii) $y = f(3x)$. (2 marks)



Question 3 **(6 marks)**

(a) The graph of $y = a\cos(x + b)$ is shown below, where a and b are constants.



Determine the value of a and the value of b, where $-90° \leq b \leq 180°$. (2 marks)

(b) Given that $0° \leq x \leq 360°$, solve

(i) $\cos(x) = \frac{1}{2}$. (1 mark)

(ii) $8\cos(x + 30°) + 4\sqrt{3} = 0$. (3 marks)

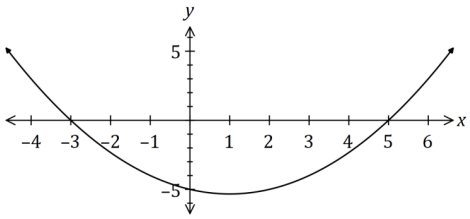
Question 4 **(7 marks)**

(a) Determine the coordinates of the

(i) y-intercept of the graph of $y = 4(x-3)^2 - 26$. (1 mark)

(ii) turning point of the graph of $y = (x+4)(x-2)$. (2 marks)

(b) The graph of $y = ax^2 + bx + c$ is shown below. Determine the value of the coefficients a, b and c. (4 marks)



Question 5 **(7 marks)**

(a) Expand $x(x+4)^2$. (2 marks)

(b) Let $f(x) = x^3 + 2x^2 - 5x - 6$.

(i) Determine $f(2)$. (1 mark)

(ii) Solve $f(x) = 0$. (4 marks)