

### Semester Two Examination, 2019

### Question/Answer booklet

# MATHEMATICS

**METHODS**

**UNITS 1 AND 2**

## Section One:

## Calculator-free

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 |

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

**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 (4 marks)**

The line segment between the points and is the diameter of a circle.

Determine the equation of circle in the form , where and are constants.

**Question 2 (5 marks)**

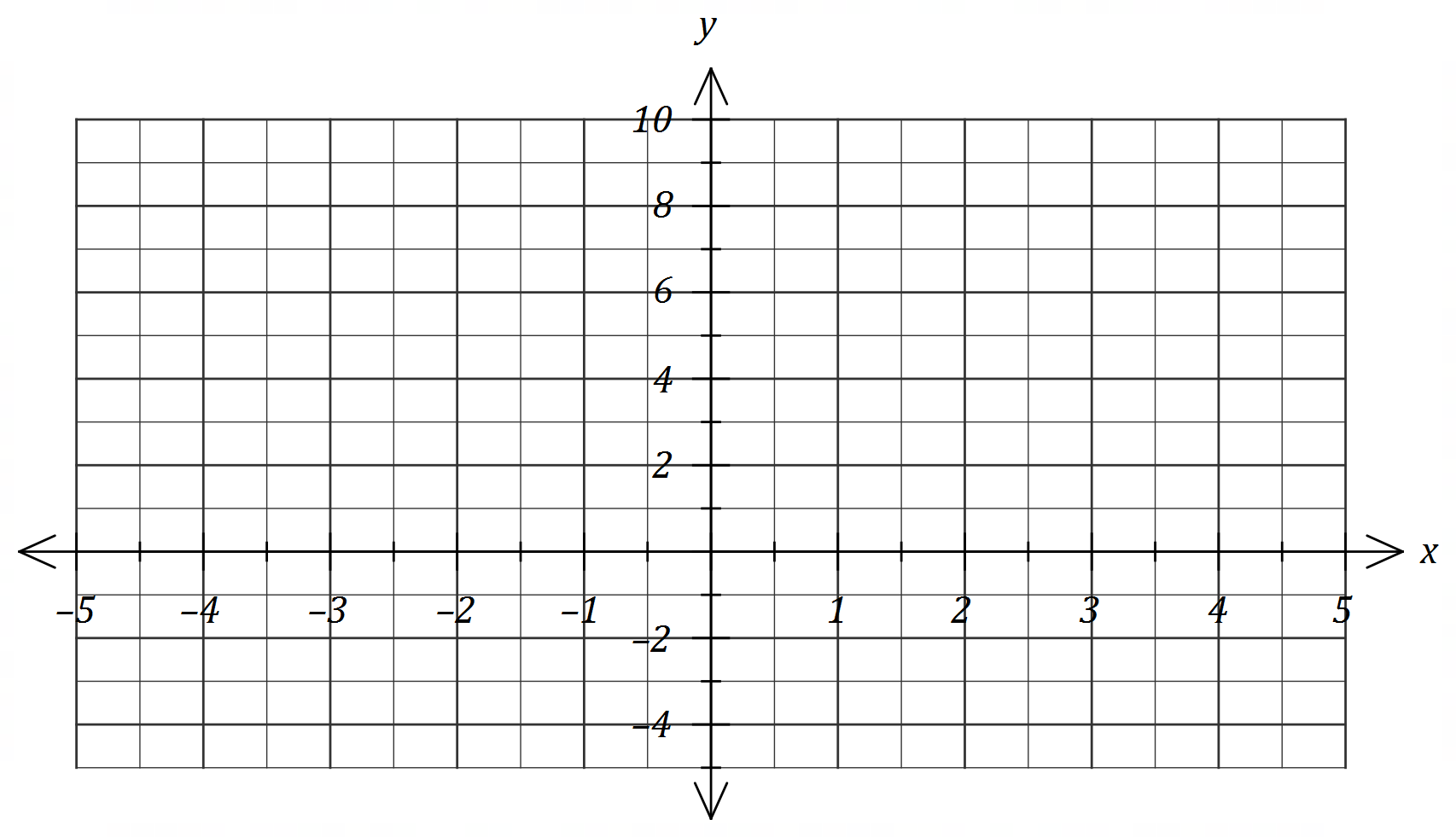
Determine the gradient of the curve at the point(s) where it crosses the -axis.

**Question 3 (8 marks)**

(a) Simplify . (2 marks)

(b) Solve the equation for . (3 marks)

(c) Sketch the graph of on the axes below. (3 marks)



**Question 4 (7 marks)**

Small body is moving along a straight line so that at any time seconds, its displacement relative to a fixed point on the line is given by cm.

(a) Determine the velocity of when . (2 marks)

(b) Determine the displacement of relative to at the instant(s) that it is stationary.

(3 marks)

Small body has velocity given by cm/s and when it has a displacement of cm relative to .

(c) Determine an expression for the displacement of relative to at any time . (2 marks)

**Question 5 (7 marks)**

(a) Using Pascal's triangle, or otherwise, determine . (1 mark)

(b) Expand . (2 marks)

(c) Hence, or otherwise, determine the equation of the tangent to the curve at the point where . (4 marks)

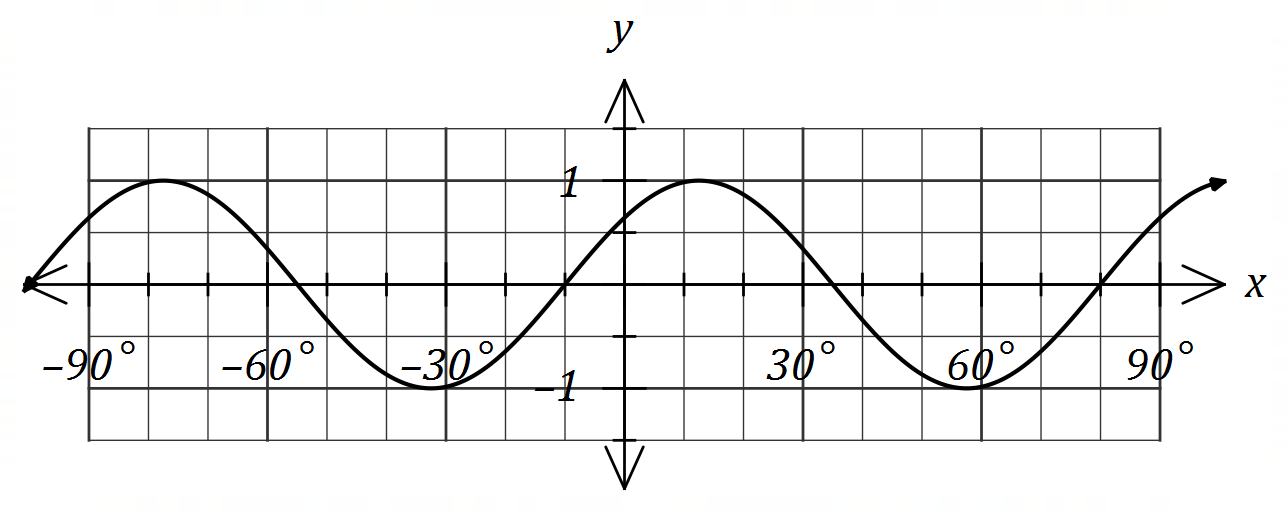
**Question 6 (8 marks)**

(a) Solve the following equations.

(i) , . (2 marks)

(ii) , . (4 marks)

(b) The graph of is shown below, where and are positive constants.



Determine the minimum possible value of each of the constants. (2 marks)

**Question 7 (6 marks)**

Determine the coordinates of all stationary points of the curve .

**Question 8 (7 marks)**

An arithmetic sequence has a recursive definition given by . It has third term of and tenth term of .

(a) Determine the value of the constant and the constant . (2 marks)

(b) Determine . (2 marks)

(c) The sum of the first terms of the sequence is . Determine the value(s) of the integer constant . (3 marks)

Supplementary page

Question number: \_\_\_\_\_\_\_\_\_

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