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### Semester One Examination, 2017

### Question/Answer booklet

# MATHEMATICS

**METHODS**

**UNIT 1**

## 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 | 7 | 7 | 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.

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. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

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 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.

7. The Formula sheet is not to be handed in with your Question/Answer booklet.

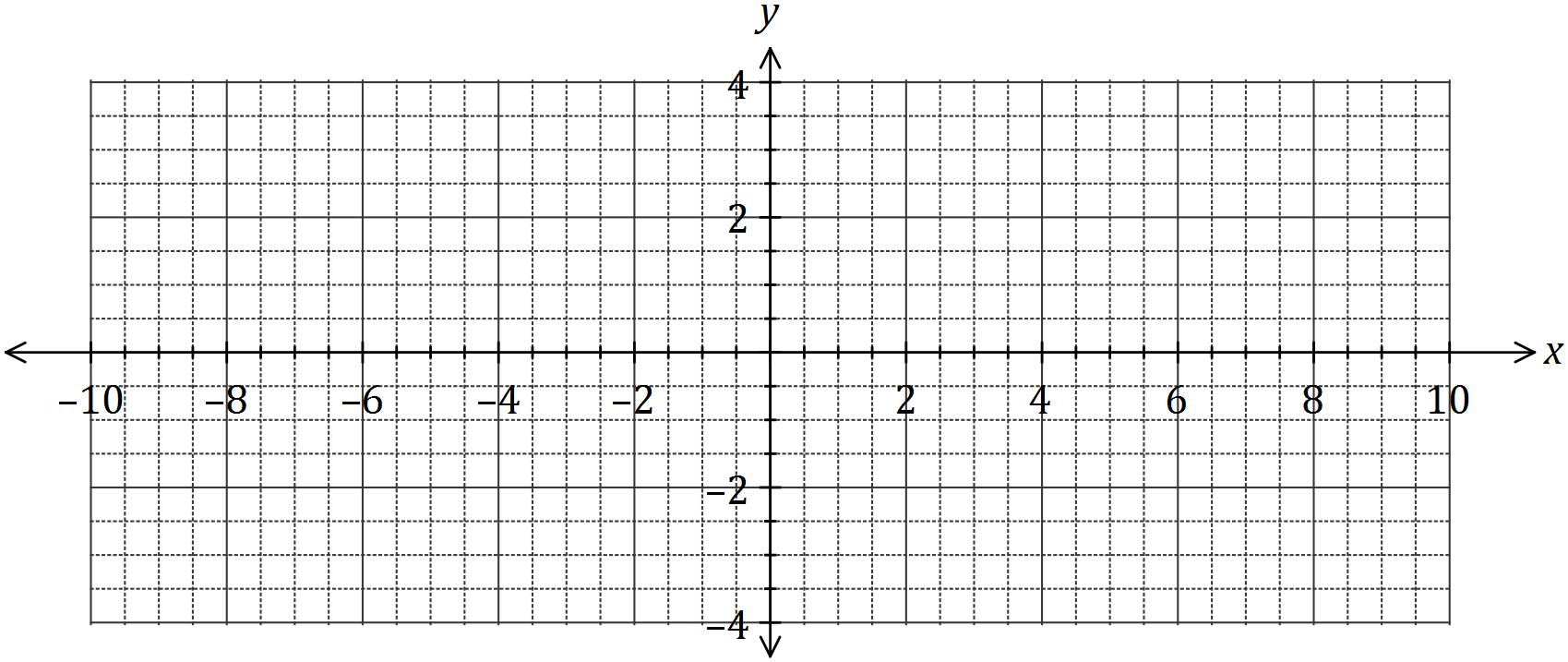
Section One: Calculator-free 35% (52 Marks)

This section has**seven (****7)** questions. Answer **all** questions. Write your answers in the spaces provided.

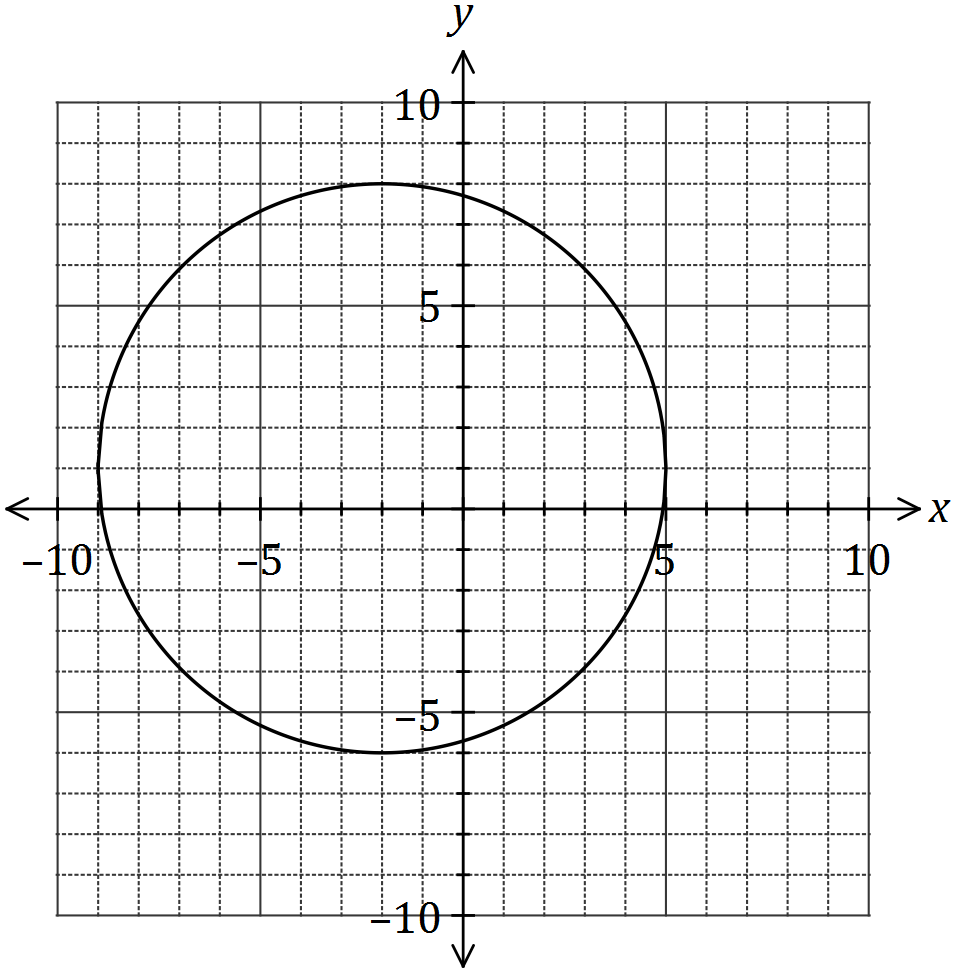
Working time: 50 minutes.

Question 1 (6 marks)

(a) On the axes below, sketch the graph of the relation , labelling all key features with their coordinates or equations. (3 marks)



(b) Determine the equation of the circle shown below. (3 marks)



Question 2 (9 marks)

(a) The point is the midpoint of and . Determine the coordinates of .

(2 marks)

(b) A relationship between and is given by .

(i) Determine when . (1 mark)

(ii) State, with justification, whether is a function of . (2 marks)

(c) A straight line passes through points and . Determine the equation of the straight line that is perpendicular to this line and passes through , expressing your answer in the form , where , and are integers. (4 marks)

Question 3 (7 marks)

Solve each of the following equations for the variable .

(a) . (2 marks)

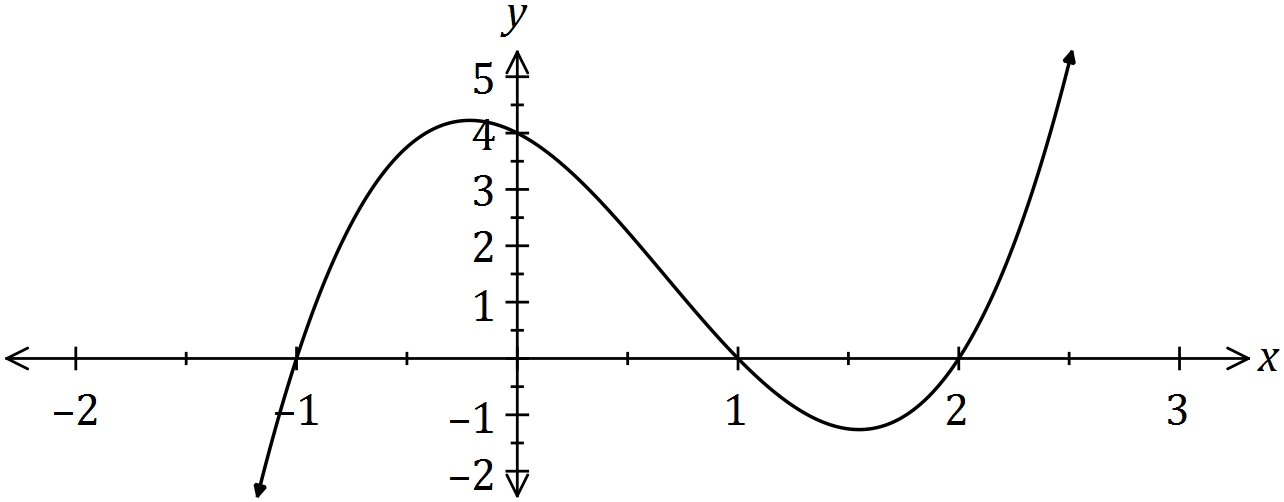
(b) . (2 marks)

(c) . (3 marks)

Question 4 (8 marks)

(a) Solve the equation . (4 marks)

(b) The graph of is shown below. Determine the values of the constants , , and . (4 marks)



Question 5 (6 marks)

A function is defined as .

(a) Evaluate . (1 mark)

(b) Factorise . (3 marks)

(c) Hence, or otherwise, solve (2 marks)

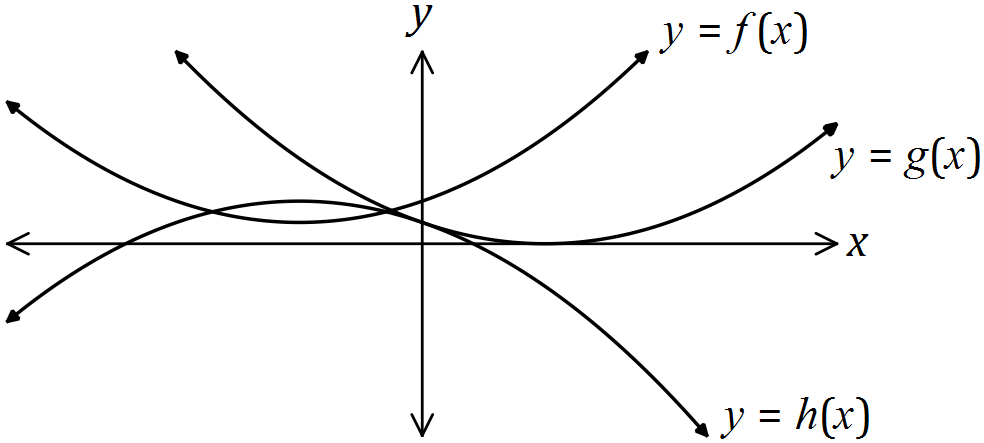
Question 6 (8 marks)

(a) For the graph with equation , determine the coordinates of

(i) all axes intercepts. (2 marks)

(ii) the turning point. (2 marks)

(b) The graphs of three quadratic functions with discriminants of 0, 1 and -2 are shown below.



(i) Underneath each function in this table, write the value of it's discriminant.

(2 marks)

|  |  |  |  |
| --- | --- | --- | --- |
| Function |  |  |  |
| Discriminant |  |  |  |

(ii) Clearly explain your choices in part (i). (2 marks)

Question 7 (8 marks)

(a) If and are acute angles such that and , determine the value of as a single fraction. (4 marks)

(b) Solve the following equations.

(i) where . (2 marks)

(ii) where and given that . (2 marks)

Additional working space

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

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