



## MATHEMATICS METHODS Year 11

### Section Two:

### Calculator-assumed

Your name \_\_\_\_\_

Teacher name \_\_\_\_\_

### Time and marks available for this section

Reading time before commencing work: 3 minutes

Working time for this section: 25 minutes

Marks available: 25 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

### 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. The rules of conduct of the CCGS assessments are detailed in the Reporting and Assessment Policy. Sitting this assessment implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer Booklet using blue/black pen. Do not use erasable or gel pen.
3. Answer all questions.
4. 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.
5. Supplementary pages for the use of planning/continuing your answer to a question have been 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.
6. **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.
7. It is recommended that **you do not use pencil**, except in diagrams.

## Question 5

(4 marks)

The coordinates of the midpoint of  $(3k - 1, 4 - 5k)$  and  $(x, y)$  are  $(4k - 1, 3.5 - 5k)$ .

(a) Write an expression for  $x$  and  $y$ . (2 marks)

(b) Show that the midpoint lies on the line given by the equation  $5x + 4y = 9$ . (2 marks)

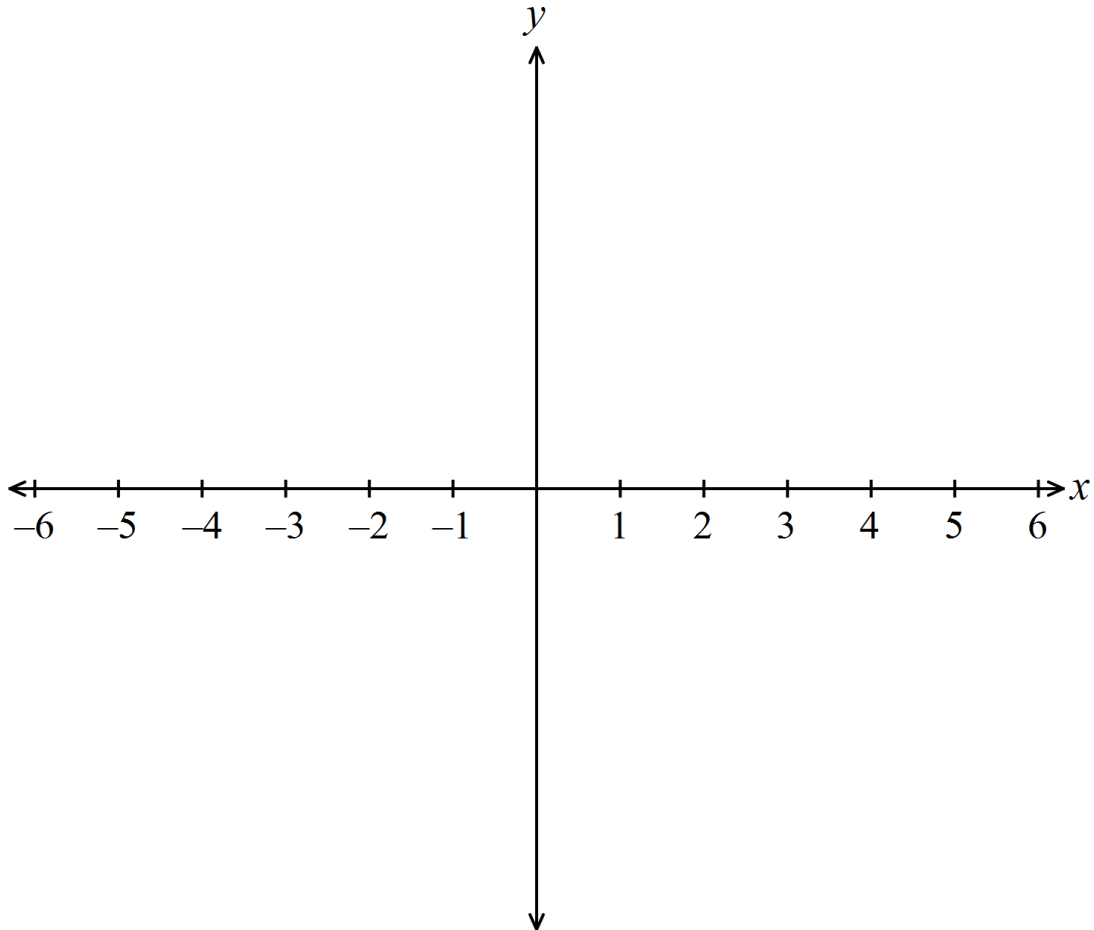
## Question 6

(8 marks)

A function  $f$  is defined by  $f(x) = ax^3 + bx^2 + cx + d$ , where  $a$ ,  $b$ ,  $c$  and  $d$  are constants. The graph of  $f$  has intercepts located at  $(3, 0)$ ,  $(-1, 0)$  and  $(0, 6)$  and a local minimum at  $(-1, 0)$ .

(a) Sketch the function  $y = f(x)$  on the axes below.

(3 marks)



See next page

**Question 6 continued**

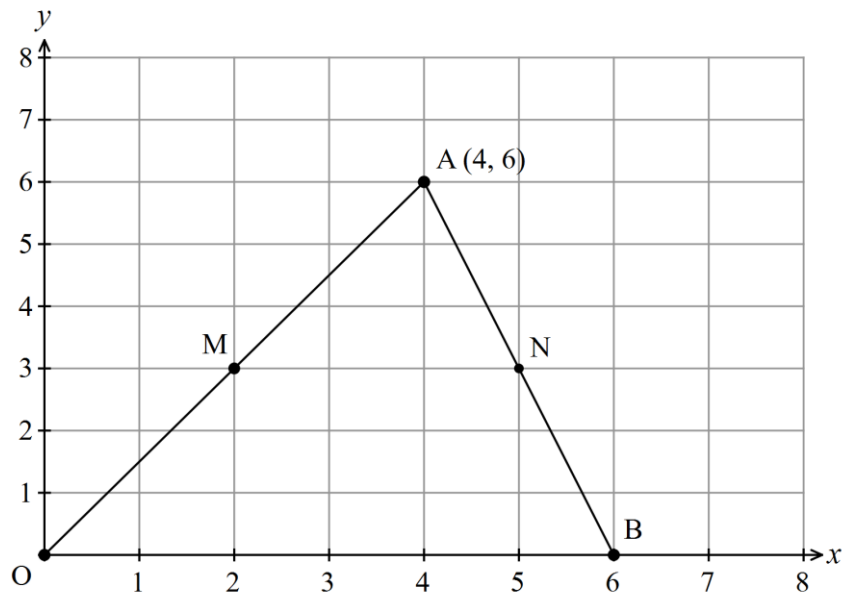
(b) Determine the values of  $a$ ,  $b$ ,  $c$  and  $d$ . (4 marks)

(c) Comment on the behaviour of the function as  $x \rightarrow \infty$ . (1 mark)

Question 7

(5 marks)

Consider the diagram below, where  $M$  is the midpoint of  $OA$  and  $N$  is the midpoint of  $AB$ .



- (a) Determine the gradient of the perpendicular bisector of  $OA$ . (1 mark)

Let point  $W$  be the point where the perpendicular bisectors of  $OA$  and  $AB$  intersect.

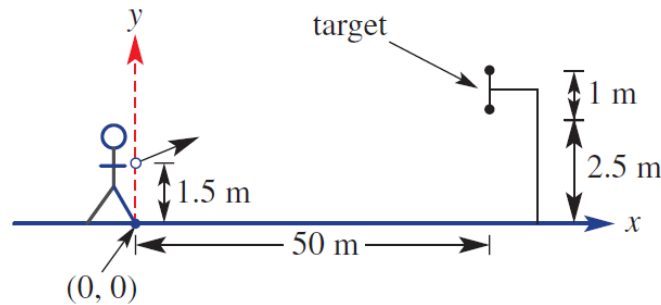
- (b) Determine the equation of the line  $MW$ . (2 marks)

- (c) Determine the coordinates of point  $W$ . (2 marks)

Question 8

(4 marks)

An archer's target is located 50 m away from her feet which are standing at  $(0,0)$  on a Cartesian plane. A circular target, of diameter 1 m, is 2.5 m off the ground, as shown below. She fires arrows at the target from a height of 1.5 m.



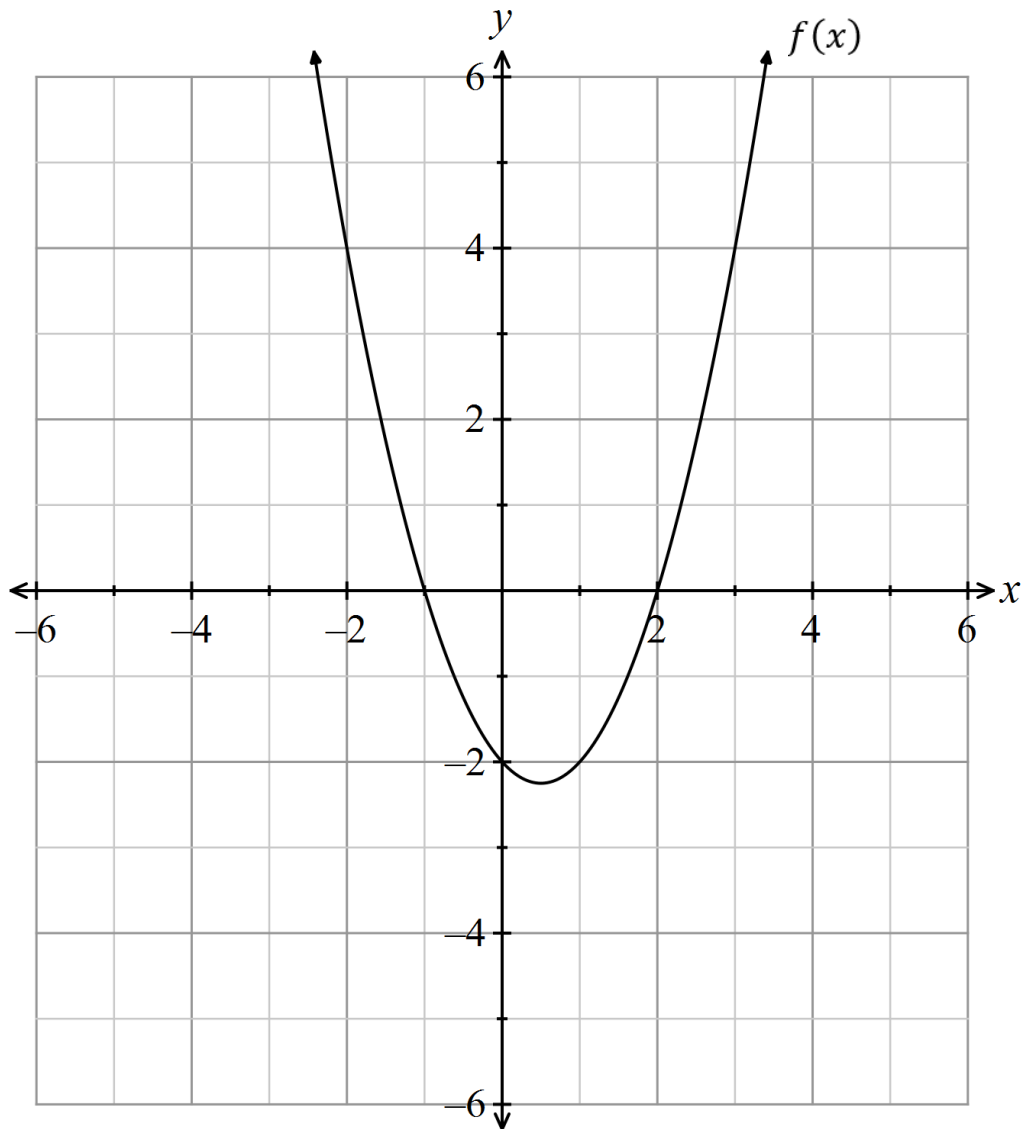
Assume that the distance travelled by the arrow can be represented using a linear function.

- (a) Determine the gradient of the arrow's path to the bottom of the target. (1 mark)
  
- (b) Determine the equation of the line for the arrow's path to the centre of the target. (2 marks)
  
- (c) Write an expression for the possible values of the gradient of the arrow's path for it to successfully hit the target. (1 mark)

Question 9

(4 marks)

The graph of  $f(x) = (x + 1)(x - 2)$  is shown on the set of axes below.



- (a) Draw the graph of  $g(x) = -(x + 1)^2 + 4$  on the above set of axes. (3 marks)
  
- (b) Explain how the graph can be used to show that a solution to the equation  $(x + 1)(x - 2) = -3$  does not exist. (1 mark)

End of questions



**Additional working space**

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

**Additional working space**

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