



MATHEMATICS METHODS Year 11

Section Two:

Calculator-assumed

Student name _____

Teacher name _____

Time and marks available for this section

Reading time before commencing work: 3 minutes

Working time for this section: 30 minutes

Marks available: 34 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. Write your answers in this Question/Answer Booklet.
2. Answer all questions.
3. You must be careful to confine your response to the specific question asked and to follow any instructions that are specific to a particular question.
4. 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.
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 an answer to 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.

Question 4**(4 marks)**

The values of the first four terms of a geometric sequence are as follows:

$$6, 6\sqrt{2}, 12, 12\sqrt{2}$$

Calculate the value of the first term in this sequence that exceeds 1400.

Question 5**(7 marks)**

A school hall has 50 seats in row *A*, 54 seats in row *B*, 58 seats in row *C* and so on. That is, there are four more seats in each subsequent row.

(a) How many seats are in row *K*? (2 marks)

(b) How many seats are there altogether if the back row is row *Z*? (2 marks)

(c) The hall is extended by adding more rows at the back of the hall, taking the same pattern. If the final seating capacity of the hall is 3410, how many more rows were added? (3 marks)

Question 6**(5 marks)**

The curve $w(x)$ has the gradient function:

$$w'(x) = ax^2 + bx - 4$$

where a and b are constants. The curve $w(x)$ passes through the origin and has turning points at $x = -2$ and $x = 3$. Determine the values of a and b and give the equation of $w(x)$.

Question 7**(5 marks)**

Peter can swim 200 *metres* in 188.6 *seconds*. He is about to start a training program and he aims to reduce his time by 4% week on week after each week's training (that is, he wants his time at the end of the first week of training to be 4% less than his time at the start of the program and his time at the end of the second week of training to be 4% less than his time at the end of the first week, etc.).

(a) Give the following for Peter's times for the 200 *metres* after n weeks of training:

(i) a recursive equation, (2 marks)

(ii) the equation for the n^{th} term in the sequence in terms of n . (1 mark)

(b) During which week of training would Peter expect his 200 *metres* to first reach 143 *seconds*. (2 marks)

Question 8**(8 marks)**

The displacement of a particle moving along the x -axis is given by:

$$x(t) = t^3 - 9t^2 + 24t$$

where x is in metres and t is in seconds, $t \geq 0$.

Calculate the following:

- (a) The displacement of the particle after 3 seconds of motion. (1 mark)
- (b) An expression for the velocity of the particle in terms of t . (1 mark)
- (c) The displacement of the particle at the times when its velocity is zero. (3 marks)
- (d) The total distance travelled by the particle in the first five seconds of its motion. (3 marks)

Question 9**(5 marks)**

Consider the recurring decimal $0.\overline{16}$.

- (a) Show that this recurring decimal can be written as an infinite geometric series with first term $\frac{16}{100}$ and common ratio $\frac{1}{100}$. **(3 marks)**

- (b) **Using your answer from part (a)**, show how $0.\overline{16}$ can be written as a fraction in its simplest form. **(2 marks)**

End of questions

Additional working space

Question number: _____

Additional working space

Question number: _____