Revision 2

Semester Two Examination

Question/Answer Booklet

MATHEMATICS METHODS UNITS 1 AND 2

Section Two: Calculator-assumed

Student Number: In figures | | | | | | | | |

In words _____

Teacher name _____

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, notes on two unfolded sheets of A4 paper, 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.

Section Two: Calculator-assumed **65% (41 Marks)**

This section has **five (5)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time for this section is 40 minutes.

Question 1 **(6 marks)**

The quadratic function $f(x) = ax^2 + bx + c$ passes through $P(5, 9)$ and has roots at $x = -4$ and $x = 7$.

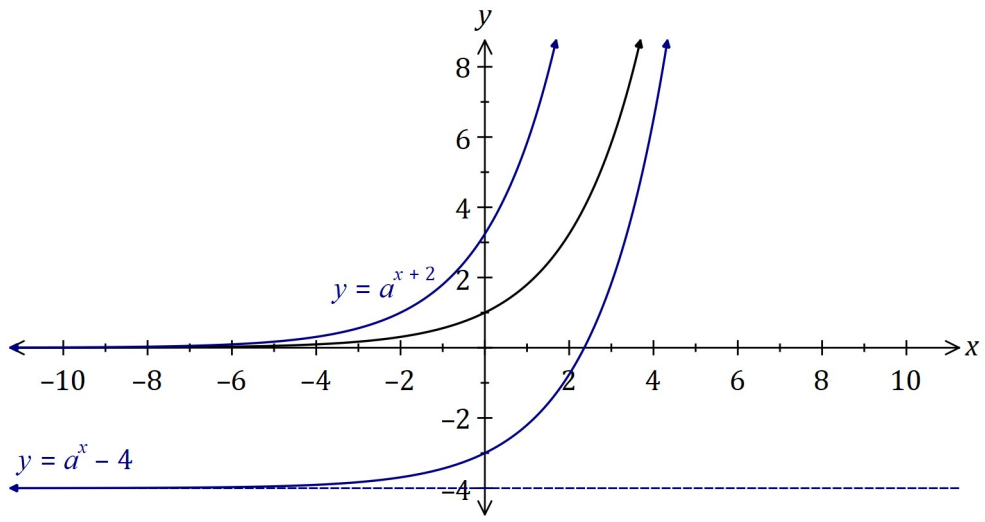
(a) Determine the values of the constants a, b and c. (3 marks)

(b) State the location of the y-intercept of the graph $y = -3f(x)$. (1 mark)

(c) State the location of the roots of the graph $y = f(4x)$. (2 marks)

Question 2 **(8 marks)**

The graph of $y = a^x$ is shown below, where a is a positive constant.



(a) On the same axes, sketch and label the graphs of

(i) $y = a^{x+2}$. (2 marks)

(ii) $y = a^x - 4$. (2 marks)

(b) The graph of $y = a^{x+3}$ intersects the graph of $y = 0.7^x$ when $x = -1.9$.

Determine, giving your answers to 3 significant figures,

(i) the y-coordinate of the point of intersection. (1 mark)

(ii) the value of the positive constant a. (3 marks)

Question 3 **(11 marks)**

Two circles of radii 10 cm and 13 cm have centres at A and B respectively. The centres are 7 cm apart and the circles intersect at P and Q.

(a) Sketch a diagram of the two circles and clearly show triangle ABP. (2 marks)

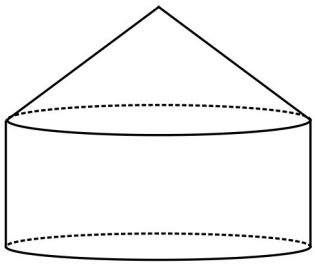
(b) Show that $\angle PBA = 49.6°$, when rounded to one decimal place. (2 marks)

(c) Determine the length of the chord PQ to the nearest millimetre. (2 marks)

(d) Determine the area common to both circles. (5 marks)

Question 4 **(8 marks)**

A composite solid is made from a cone and a cylinder, both of height h cm and radius r cm, as shown below.



The dimensions are such that the sum of h and $3r$ is 36 cm.

(a) Show that the volume of the solid is given by $V = 48\pi r^2 - 4\pi r^3$. (3 marks)

(b) Use differentiation to determine the values of r and h that will maximise the volume of the solid, and state this maximum volume. (5 marks)

Question 5 **(8 marks)**

Five different letters are selected from the eleven in the word COMRADESHIP. The order in which the letters are selected is not important, so that the selection COMRA is the same as the selection RAMOC, and so on.

(a) Determine the number of different selections

(i) of five letters. (2 marks)

(ii) of five letters that contain one vowel and four consonants. (2 marks)

(b) Determine the probability that a random selection of five different letters

(i) includes the letters M and R. (2 marks)

(ii) includes at least one vowel. (2 marks)