Hale School
2010

Question/Answer Booklet

MATHEMATICS 3CD
SEMESTER 2
Section One
(Calculator Free)

Circle your teacher's initials

GJ JIB BAH

Your name _____

Time allowed for this section

Reading time before commencing work: 5 minutes
Working time for paper: 50 minutes

Material required/recommended for this section

To be provided by the supervisor
This Question/answer booklet for Section One.
Formula sheet.

To be provided by the candidate
Standard items: pens, pencils, pencil sharpener, highlighter, eraser, ruler.

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.

See next page

Structure of this examination

	Number of questions	Working time (minutes)	Marks available
This Section (Section 1) Calculator Free	**8**	**50**	**40**
Section Two Calculator Assumed	11	100	80
		Total marks	120

Instructions to candidates

1. The rules for the conduct of WACE external examinations are detailed in the booklet *WACE Examinations Handbook*. Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions in the spaces provided.

3. Spare answer pages are provided at the end of this booklet. If you need to use them, indicate in the original answer space where the answer is continued i.e. give the page number.

4. Show all working clearly. Any question, or part question, worth more than 2 marks requires valid working or justification 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.

See next page

Question 1 (5 marks)

Consider the system of equations below;

$$\begin{aligned} x + 3y + pz &= 12 \\ x + 2y + 3z &= 2 \\ x + y + z &= 4 \end{aligned}$$

a) Show algebraically that $(p-5)z = 12$ [3]

b) Find the solution to the system of equations given that p = 7. [2]

See next page

Question 2 (5 marks)

$$F(a) = \int_0^a (2x+1)^3 dx$$

Consider the integral

Determine

i) $F(0)$ [1]

ii) $\frac{d}{da}(F(a))$ [1]

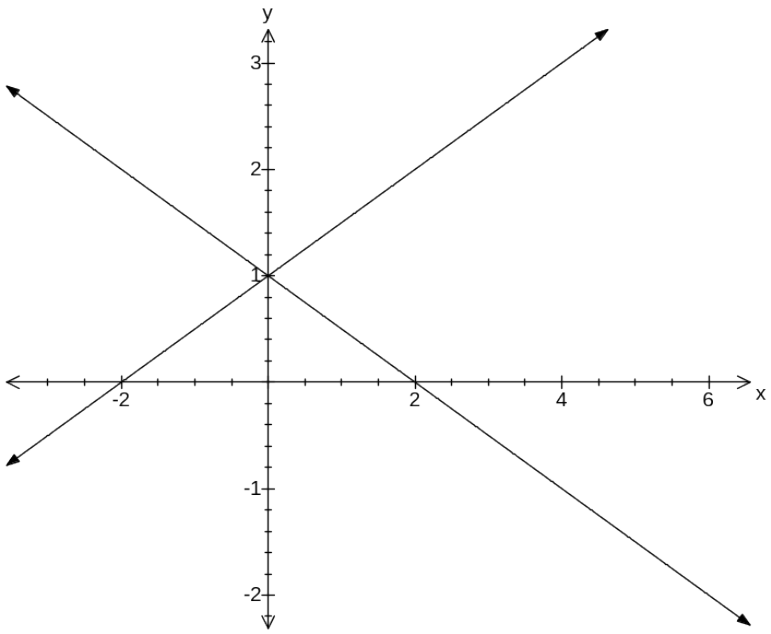
iii) the value of b if $F(b) = 10$ [3]

See next page

Question 3 (4 marks)

The graph below shows the lines

$y = f(x) = \frac{1}{2}x + 1$ and $y = g(x) = -\frac{1}{2}x + 1$



Find

i) $\int_{-2}^{2} f(x) - g(x)\,dx$ [1]

ii) $\int_{-2}^{2} \left| f(x) - g(x) \right| dx$ [1]

iii) $\int_{1}^{4} f(x) - g(x)\,dx$ [2]

See next page

Question 4 (4 marks)

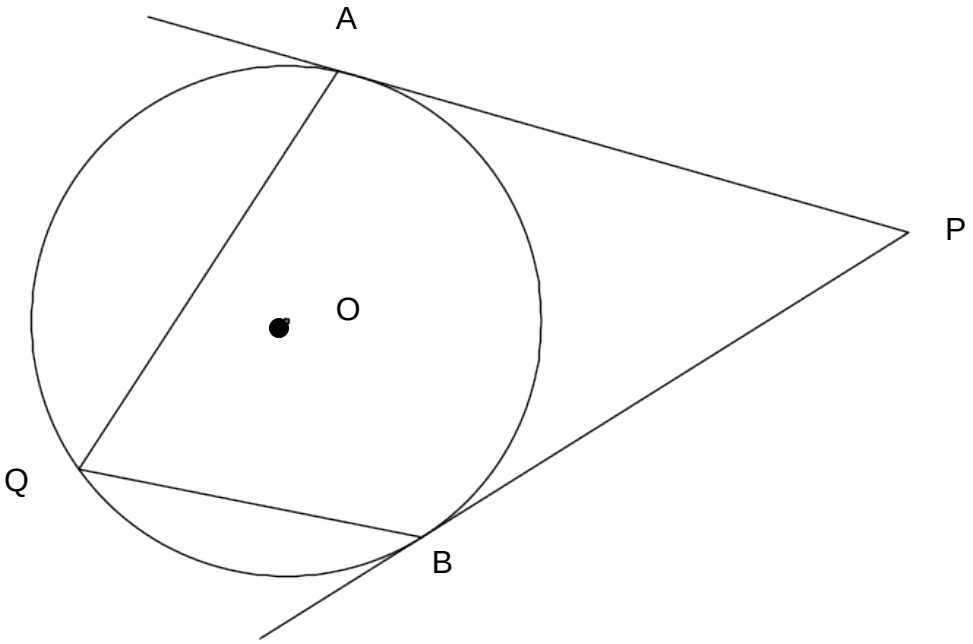
A rectangular metal box has sides in the ratio 1 : 2 : 3.

When heated the volume expands at the rate of 20 cm^3 per second with the sides of the box remaining in the same ratio.

Find the rate at which the shortest side of the box is expanding when it is 10 cm long.

See next page

Question 5 (5 marks)



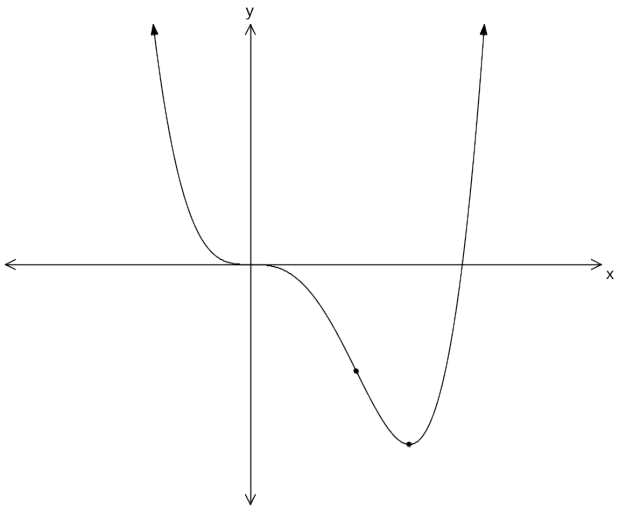
The tangents from points A and B meet at the point P and angle APB is known to be 70°.

Find, with full reasoning, the size of angle AQB.

See next page

Question 6 (5 marks)

The graph of the polynomial $y = ax^4 + bx^3$ is shown below.



a) Find $\frac{d^2y}{dx^2}$ for the curve. [2]

b) Given that (1 , -1) is a point of inflection, determine the values of a and b. [3]

See next page

Question 7 (6 marks)

Find the exact values of

i) $\int_1^{\sqrt{3}} \frac{x^2 + x^8}{x^5}\, dx$ [4]

ii) $\int_0^1 x^2 e^{(x^3)}\, dx$ [2]

See next page

Question 8 (6 marks)

A piece of wire 360 cm long, is used to make the twelve edges of a rectangular box in which the length is twice the breadth. If the breadth of the box is x cm and the height is h cm,

i) Express h in terms of x and hence show that the volume of the box is given by $V = 180x^2 - 6x^3$ [2]

ii) Find the maximum volume of the box, justifying that it is indeed a maximum. [4]

End of paper

Spare page