TAYLOR'S UNIVERSITY COLLEGE
Wisdom · Integrity · Excellence

CAMBRIDGE 'A' LEVEL PROGRAMME

SEMESTER ONE EXAMINATION JUNE 2007

(Jan 07 Intake)

Monday **11 June 2007** **1.15 pm – 2.45 pm**

MATHEMATICS 9709/1

PAPER 1 Pure Mathematics 1 (P1) 1 hour 30 minutes

Additional materials: Answer Booklet/Paper
List of formulae (MF9)

READ THESE INSTRUCTIONS FIRST

Write your name and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

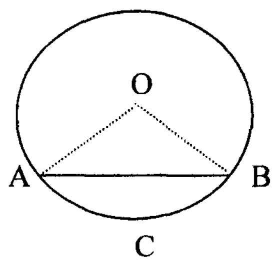
Answer **all** the questions.
Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total marks for this paper is 60.
Questions carrying smaller numbers of marks are printed earlier in the paper, and questions carrying larger numbers of marks later in the paper.
The use of an electronic calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.

This document consists of 4 printed pages.

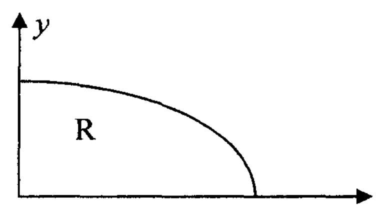
[Turn over

1. Diagram below is a circle with centre O radius 2cm.Given that chord AB = 2 cm; find the area of the segment ACB of the circle. [3 marks]



2. Expand $(1+2x)^8$ in ascending powers of x up to and including the term of x^4 [3 marks]

3. Diagram below shows the region R in the first quadrant bonded by the curve $y=\frac{1}{2}(4-x^2)$ and the axes.. Calculate the volume of the solid formed when R is rotated through 360 ^{0} about the y axis. [5 marks]



4. The points A, B have the coordinates (2,2) and (- 4,3) respectively. Find the equation of the perpendicular bisector of the line AB [5 marks]

5. Find the intersection points of $3x^2-2y^2+5=0$ and $3x-2y=1$ [6 marks]

6. Find the exact solutions of the equation $2\cos^2 x=3(1+\sin x)$ for $0\le x\le 2\pi$ [6 marks]

7. The functions f and g are defined by

$f : x \rightarrow 1 + \sqrt{x}$, $x \geq 0$

$g : x \rightarrow x^2$, . x $\in$ R

(i) Find the domain of the inverse function f^{-1} [1 mark]

(ii) Find f^{-1} [3 marks]

(iii) Find and simplify an expression for $fg(x)$ for the case where $x \geq 0$

[2 marks]

8. A rope is cut into 10 pieces whose lengths are in geometrical progression measured 20metres, 18 metres, 16.2 metres in decreasing order.

(i) find the length of the rope to the nearest metres [3 marks]

(ii) Find the length of the last piece that is more than 10 metres long

[4 marks]

9.

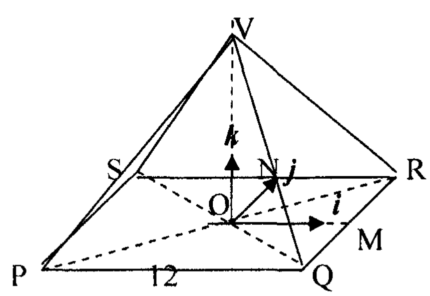


Diagram above shows a right pyramid with a square base PQRS and centre O. Given VQ = 10 cm and PQ = QR = 12 cm , and that $\boldsymbol{i}, \boldsymbol{j}, \boldsymbol{k}$ are the unit vectors along the directions of $\overrightarrow{OM}$, $\overrightarrow{ON}$ and $\overrightarrow{OV}$ respectively with M, N being the mid points of RQ and SR.

(i) Show that OV = $2\sqrt{7}$ cm [2 marks]

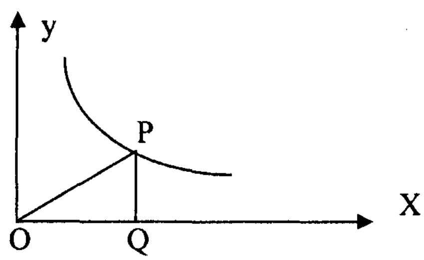
(ii) Find $\overrightarrow{RP}$, $\overrightarrow{RV}$ in terms of $\boldsymbol{i}, \boldsymbol{j}, \boldsymbol{k}$ [3 marks]

(iii) Evaluate $\overrightarrow{RP} \bullet \overrightarrow{RV}$. Hence calculate the angle PRV [4 marks]

[Turn over

10. Point P moves on the graph of $y = f(x)$ where $f(x) = \frac{4}{x}$ for $x > 0$

O is the origin and point Q is on the x-axis. Let OQ be x units long and OP be L units long.



(i) Show that $L^2 = x^2 + \frac{16}{x^2}$ [1 mark]

(ii) Find the position of P at which L^2 is minimized [4 marks]

(iii) Show that when L^2 is minimized, OP is normal to $y = f(x)$ [5 marks]