

XAVIER HIGH SCHOOL
MATHEMATICS DEPARTMENT

YEAR 11 PRELIMINARY COURSE

May 2008

EXTENSION 1

MATHEMATICS

Extension 1

Time allowed – One hour
(Plus 5 minutes reading time)

DIRECTIONS TO CANDIDATES

- ALL questions may be attempted.
- ALL questions are of equal value.
- All necessary working should be shown in every question. Full marks may not be awarded for careless or badly arranged work.
- Approved calculators may be used.
- Each question must be answered on a new sheet of paper and must clearly show your **student number**.
- **In Question 3, please answer the circle geometry questions in the space provided on the examination paper.**

QUESTION 1. (Please start a new page.)

Marks

- a. Divide the interval joining A(-2, -1) and B (1, 5) externally in the ratio 2: 5 **2**
- b. Simplify $1 - (1 - k)^2$ **1**
- c. Factorise completely: (i) $m^4 - 1$ **2**
(ii) $n^4 - n$ **2**
- d. Solve $|2x + 1| \geq 5$ **2**
- e. Solve $\frac{x}{x - 3} \geq 2$ **3**

QUESTION 2. (Please start a new page.)

- a. Simplify $\sin(x + y) + \sin(x - y)$ **2**
- b. If $\cos A = \frac{2}{3}$, what are the values of:
(i) $\sin^2 A$ (ii) $\cot^2 A$ **2**
- c. By writing 15° as $45^\circ - 30^\circ$ show that $\sin 15^\circ = \frac{\sqrt{6} - \sqrt{2}}{4}$ **2**
- d. Prove that $\frac{1 - \cos 2A}{\sin 2A} = \tan A$ **2**
- e. Prove that $\sin 2A = (\sin A + \cos A)^2 - 1$ **2**
- f. If $t = \tan \frac{\theta}{2}$ express $\operatorname{cosec} \theta + \cot \theta$ in terms of t **2**

QUESTION 3. (Please start a new page.)

Marks

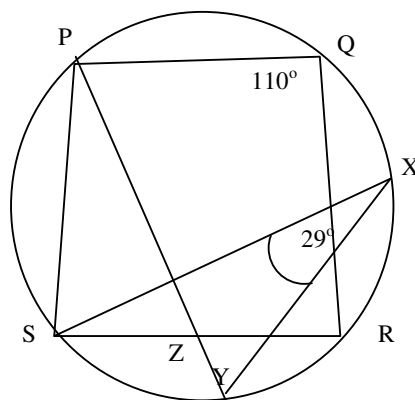
a. Solve: (i) $\tan x = 1$ for $0^\circ \leq x \leq 360^\circ$

2

(ii) $\cos x(2 \sin x + 1) = 0$ for $0^\circ \leq x \leq 360^\circ$

2

- b. PQRS is a cyclic quadrilateral. X and Y are two points on the circle. Point Z is the intersection of PY and SR. $\angle SXY = 29^\circ$ and $\angle PQR = 110^\circ$. Find the size of $\angle SZP$, giving reasons for your answer.



4

QUESTION 3. (Continued)

Marks

- c. The points P, Q, S and T lie on the circumference of a circle. SQ is a diameter of the circle and $TP \parallel SQ$. $\angle PSQ = x^\circ$
Find an expression for $\angle TSP$ in terms of x .

4

