KNOX GRAMMAR SCHOOL

TRIAL HIGHER SCHOOL CERTIFICATE

1999

MATHEMATICS

3 UNIT (ADDITIONAL)
AND
3/4 UNIT (COMMON)

YEAR 12

Time allowed: Two hours
(Plus five minutes reading time)

INSTRUCTIONS

ALL questions should be attempted.
ALL questions are of equal value.
ALL necessary working should be shown in every question.
Full marks may not be awarded if work is careless or badly arranged.
Approved calculators may be used.
Standard integrals are printed on page 2.
Each question should be started in a new booklet.
You may ask for extra writing booklets if you need them.

Name: _____ Class: _____

QUESTION 1 **12 marks** **Use a separate writing booklet** **Mark**

(a) Simplify completely $(x+y)^2 - \dfrac{x^3 - y^3}{x-y}$. **2**

(b) Evaluate $\int_0^1 \dfrac{2x}{(2x+1)^2}dx$ using the substitution $u = 2x + 1$. **3**

(c) By making suitable substitutions for A and B in the expansion of $\cos(A + B)$ find the exact value of $\cos 75°$. **2**

(d) If $\sqrt{3}\cos x - \sin x = R\cos(x+\alpha)$ determine the values of R and α if α is acute. **3**

(e) Given that $x = \cos\theta + 1$ and $y = \sin\theta - 2$. eliminate θ to determine a relationship between x and y. **2**

QUESTION 2 **12 marks** **Use a separate writing booklet**

(a) Solve $\dfrac{2x}{x-3} \leq 1$. **3**

(b) Solve $\sec^2 x + \tan x - 7 = 0$ for $0° \leq x \leq 360°$ giving your answers to the nearest minute. **4**

(c) You are given that $f(x) = \sin^{-1}x + \cos^{-1}x$ and $0 \leq x \leq 1$. **5**

(i) Find $f'(x)$

(ii) From your answer to (i). what can you say about the function $f(x)$.

(iii) Evaluate $\int_0^1 f(x)dx$.