TAYLOR'S COLLEGE

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CAMBRIDGE A LEVEL PROGRAMME

AS TRIAL EXAMINATION AUGUST 2012

(January & March 2012 Intakes)

Tuesday **28 August 2012** **8.30 am – 10.30 am**

FURTHER MATHEMATICS 9231/12

PAPER 1

2 hours

Additional materials: Answer Booklet/Paper
List of formulae (MF 10)

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
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.
The use of a calculator is expected, where appropriate.
Results obtained solely from a graphic calculator, without supporting working or reasoning, will not receive credit.
You are reminded of the need for clear presentation in your answers.

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.

This document consists of **2** printed pages.

[Turn over

1 Find the sum $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+2}+\cdots+\frac{1}{\sqrt{n^2-1}+n}$. [5]

2 Prove by induction that n^3+11n is divisible by 6 for every positive integer n. [6]

3 i) If the equation $x^3+ax^2+bx+c=0$ has roots α, β, γ, and $\alpha+\beta=\gamma$, show that $8c+a^3=4ab$. [5]

ii) If $\frac{1}{x}+\frac{1}{a}+\frac{1}{b}=\frac{1}{x+a+b}$, find x. [3]

4 Find the perpendicular distance from (4, 7, 8) to the plane $2x+3y+6z=0$. [7]

Find also the equation of the plane parallel to $\mathbf{i}+5\mathbf{j}+9\mathbf{k}$ and containing the origin which is perpendicular to $2x+3y+6z=0$. [2]

5 If $\mathbf{M}=\begin{pmatrix}1 & 1 & 1\\ a & b & c\\ a^2 & b^2 & c^2\end{pmatrix}$, $a, b, c > 0$, find $\mathbf{M}^{-1}$. [10]

6 If the curve C has equation $y=\frac{3x}{4x+5}$, sketch C. [11]