ANNEX B

RVHS H2 Maths Preliminary Examination Paper 2

Qn/No	Topic Set	Answers
1	Differential Equation	$\mathrm{f}(x)=\frac{1}{3}x^3$
2	Application of Integration	(a) $-\mathrm{e}^{-x}-\tan^{-1}(\mathrm{e}^{x})+C$ (b) $\pi\mathrm{e}(\mathrm{e}-1)$
3	Transformation	$x^2-\frac{y^2}{4}=1\xrightarrow{A}x^2-y^2=1\xrightarrow{B}x^2-(y-1)^2=1$ A: Scaling parallel to the y-axis with a scale factor of $\frac{1}{2}$. B: Translation of 1 unit in the positive direction of the y-axis.
4	Complex Numbers	(i) $z=2\mathrm{e}^{i\left(\frac{2k}{3}\right)\pi}, k=0,\pm1$ (iii) Since $z=z_1$ satisfy the equation $\lvert z-z_2\rvert=\lvert z-z_3\rvert$ with $\lvert z_1-z_2\rvert=\lvert z_1-z_3\rvert=2\sqrt{3}$, thus locus of P passes through the point Z_1. (v) $(-1+\sqrt{3})+\mathrm{i}(-\sqrt{3}+3)$
5	Sampling Methods	(i) The age group may be classified as 21 – 30, 31 – 40, 41 – 50 and last group with age more than 50. For each age group, interview 25 people which add up to 100. (ii) The sample selected is biased and not representative of the district. (iii) Stratified random sampling
6	P&C	72, 432, 255
7	Correlation & Regression	(b)(i) , r ≈ 0.970 (b)(ii) y = 1.46 + 4.30 ln$x$ (b)(iii) $x=3.17$
8	Normal Distribution	(i) Least $\alpha=925$ (ii) 0.375 (iii) 0.0974 (iv) $P(R\geq1080)=0.115$. There is a probability of 0.115 that the Regular bottle of cooking oil will not fall within the bottle, hence using a normal distribution is not appropriate.

9	Hypothesis Testing	(i) $H_0 : \mu = \mu_0$ vs $H_1 : \mu > \mu_0$ (ii) It means that there is a probability of 0.025 that the test concludes that the mean time spent by a technician of Open Network to install a fibre optic cable unit in a household unit is more than μ_0 minutes when in fact it is not true. (iii) $\mu_0 \geq 18.4$ The time spent by a technician of Open Network to install a fibre optic cable unit in a household unit, is assumed to be normally distributed. (iv) 5.56%.
10	Probability	(a) 0.49 (b) (i) $\frac{2}{15}$ (b) (ii) $\frac{2}{3}$, 0.177
11	Poisson distribution	(i) 0.554 (ii) 0.836 (iii) 0.967 (iv) The Poisson distribution may not be a good model for a day as the mean number of customers entering the café may fluctuate, with more customers during the lunch and dinner period.