

ST. STEPHEN'S GIRLS' COLLEGE
Mid-Year Examination 2019 – 2020

Form 4

YLN

21 students

Mathematics Extended Part Module 1 (Calculus and Statistics)

Time allowed: 45 minutes

Total marks: 35

Question/Answer Paper

Please read the following instructions very carefully.

1. Write your class, class number and name in the spaces provided on this cover.

2. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question/Answer Paper.

3. Unless otherwise specified, all working must be clearly shown.

4. Unless otherwise specified, numerical answers should be exact or given to **4 decimal places**.

Class	
Class No.	
Name	

	Marker's Use
1	
2	
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6	
7	
Total	/35

6. During a certain year, the amount of water A (in million m^3) stored in a reservoir can be modelled by $A = \frac{6e^{kt}}{2e^{kt} + a}$, where a and k are positive constants and t is the time measured in months since the beginning of the year.

The values of A when $t = 2, 4, 6, 8, 10$ are as follows:

t	2	4	6	8	10
A	1.863	2.354	2.740	2.843	2.927

(a) Show that $\ln\left(\frac{6}{A} - 2\right) = \ln a - kt$. (1 mark)

- (b) Suppose that there is a possible wrong datum in the table above. By plotting a suitable graph on the graph paper below,

- (i) find out the possible wrong datum,
- (ii) estimate the values of $\ln a$ and k .

(Give the answers correct to **1 significant figure**.)

(4 marks)

- (c) Use the estimates in (b). Find the value of t such that the value of A is twice that of the beginning of the year? (2 marks)



