ST. PAUL'S COLLEGE

FORM 6 INTERNAL EXAMINATION 2021 - 2022

MATHEMATICS Compulsory Part

PAPER 1

Section A2

Question-Answer Book

2¼ hours

This paper must be answered in English.

INSTRUCTIONS

1. Write your Name, Class and Class number in the spaces provided on the right. Circle your Group Number.

2. This paper consists of THREE sections, A(1), A(2) and B.

3. Attempt **ALL** questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.

4. Graph paper and supplementary answer sheets will be supplied on request. Write your Name, Class and Class number in the spaces provided, mark the question number box, and fasten them with string INSIDE this book.

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

6. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

7. The diagrams in this paper are not necessarily drawn to scale.

A2

Name	
Class	( )
Group	G1 FBL G2 LMW G3 WHP G4 TH G5 PSK G6 LTN G7 HL

Question No.	Marks
10	/6
11	/6
12	/7
13	/7
14	/9
Total	/35

SECTION A(2) (35 marks)

10. The cost of design for an apartment of area $d\,\text{m}^2$ is \$$C$. C is partly constant and partly varies as $(d+10)^2$. When $d=15$, $C=5500$. When $d=20$, $C=7700$.

    (a) Find the cost of design of an apartment of area $17.5\,\text{m}^2$. (4 marks)

    (b) For $d \geq 100$, a 10% discount will be offered. Peter has two apartments. He claims that the design cost for his apartment of area $100\,\text{m}^2$ is lower than that of the one of area $95\,\text{m}^2$. Do you agree with him? Explain your answer. (2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

11. A sphere of radius 6 cm is melted and recast into two similar cones. The ratio of the base radii of the two cones is 1 : 2 .

(a) Find the volume of the larger cone, express your answer in terms of π . (3 marks)

(b) If the ratio of the base radius to the height of the cones is 2 : 3, find the difference between the curved surface areas of the two cones. (3 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

12. Straight lines L_1 and L_2 are perpendicular to each other. They intersect at a point *P*. The equation of the straight line L_1 is $3x+4y+12=0$ and L_2 passes through $Q(3,26)$.

(a) Find the equation of L_2. (3 marks)

(b) Given that L_2 cuts the *y*-axis at *S* and *R* is a moving point such that $PR = RS$. Denote the locus of *R* by Γ.

(i) Describe the geometric relationship between Γ and *PS*.

(ii) Find the equation of Γ.

(4 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Page total

13. The stem-and-leaf diagram below shows the distribution of the scores of some students in a test.

Stem (tens)	Leaf (units)				
4	x				
5	3	6			
6	1	3	7		
7	2	5	7	7	
8	0	n	n	6	8
9	y				

It is given that the inter-quartile range of the distribution is 18 marks.

(a) Find n. (2 marks)

(b) It is given that the mean of the distribution is 72.5 marks and the range of the distribution does not exceed 49 marks. Find

(i) x and y,

(ii) the greatest possible standard deviation of the distribution. (5 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Page total

14. Let $f(x)$ be a cubic polynomial. When $f(x)$ is divided by $2x^2+3x+1$ the remainder is $4x+4$.

(a) Find the remainder when $f(x)$ is divided by $2x+1$. (2 marks)

(b) When $f(x)$ is divided by $2x^2-x-1$, the remainder is $kx+12$.

(i) Find k.

(ii) When $f(x)$ is divided by x, the remainder is 7. Find $f(x)$.

(iii) Someone claims that all the roots of $f(x)+7x+7=0$ are real roots. Do you agree? Explain your answer. (7 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

End of Section A2

Answers written in the margins will not be marked.

Page total