

**O-Level**  
**ADDITIONAL MATHEMATICS**

**Paper 1**

**Unsolved Topical**

**Past Papers With Marking Scheme**

**2014-2021**

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## **PREFACE**

Excellence in learning cannot be claimed without application of concepts in a dexterous way. In this regard one of the logical approach is to start in chunks; like chapter wise learning and applying the concept on exam based questions.

This booklet provides an opportunity to candidates to practice topic wise questions from previous years to the latest. Extensive working of Team MS Books has tried to take this booklet to perfection by collaborating with top of the line teachers.

We have added answer key / marks scheme at the end of each topic for the candidate to compare the his/her answer to the best.

MS Books strives to maintain actual spacing between consecutive questions and within options as per CAIE format which gives students a more realistic feel of attempting question.

Review, feedback and contribution in this booklet by various competent teachers of a subject belonging to renowned school chains make it most valuable resource and tool for both teachers and students.

With all belief in strength of this resource material I can confidently claim that it is worth in achieving brilliance.

Our sincere thanks and gratification to **Mr. Zafar Iqbal** who took out special time to help compile and manage this booklet. We would also like to appreciate Mathematics faculty for reviewing and indorsing it.

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## CONTENT TABLE

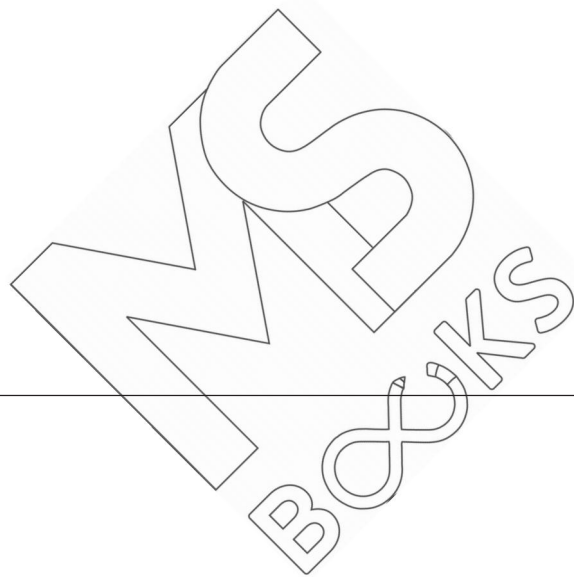
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Functions

Q3/12/M/J/14

- 1 (i) Sketch the graph of  $y = |(2x + 1)(x - 2)|$  for  $-2 \leq x \leq 3$ , showing the coordinates of the points where the curve meets the  $x$ - and  $y$ -axes. [3]

- (ii) Find the non-zero values of  $k$  for which the equation  $|(2x + 1)(x - 2)| = k$  has two solutions only. [2]

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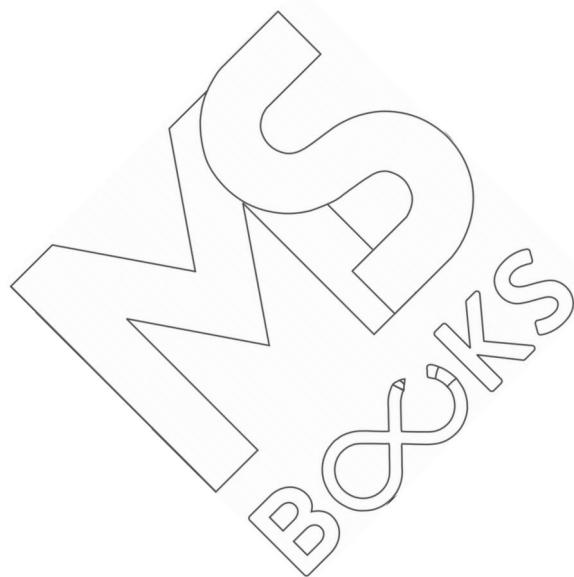
Q8/11/M/J/15

2 It is given that  $f(x) = 3e^{2x}$  for  $x \geq 0$ ,  
 $g(x) = (x + 2)^2 + 5$  for  $x \geq 0$ .

(i) Write down the range of  $f$  and of  $g$ . [2]

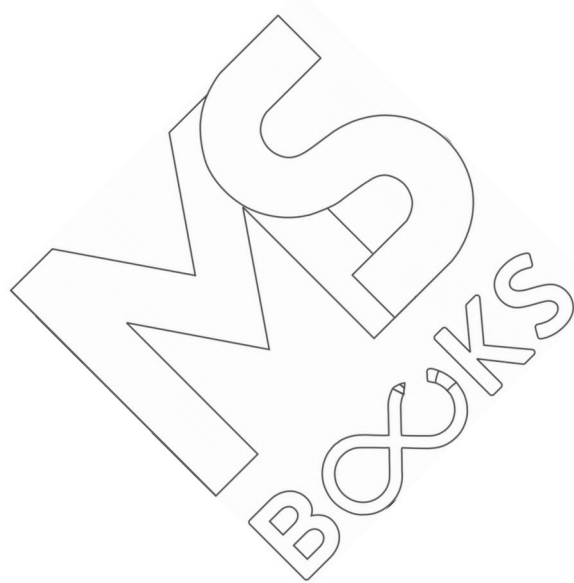
(ii) Find  $g^{-1}$ , stating its domain. [3]

(iii) Find the exact solution of  $gf(x) = 41$ . [4]



(iv) Evaluate  $f'(\ln 4)$ .

[2]



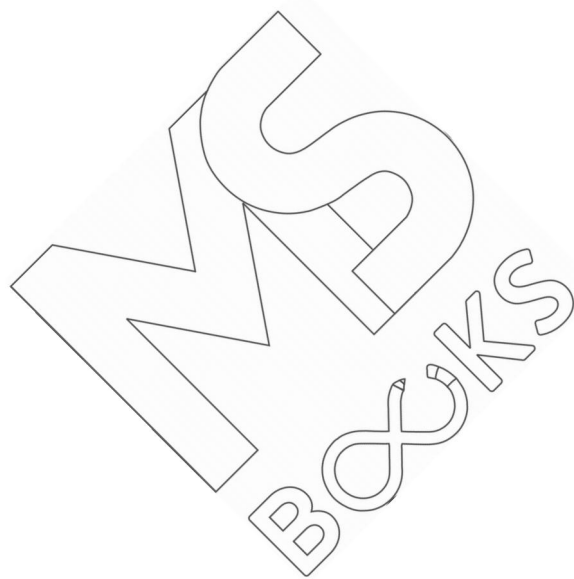
Q11/12/O/N/15

3 (a) A function  $f$  is such that  $f(x) = x^2 + 6x + 4$  for  $x \geq 0$ .

(i) Show that  $x^2 + 6x + 4$  can be written in the form  $(x + a)^2 + b$ , where  $a$  and  $b$  are integers. [2]

(ii) Write down the range of  $f$ . [1]

(iii) Find  $f^{-1}$  and state its domain. [3]



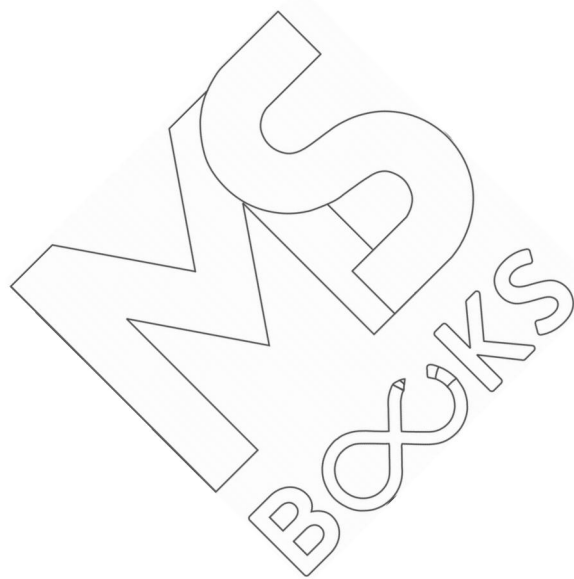


(b) Functions  $g$  and  $h$  are such that, for  $x \in \mathbb{R}$ ,

$$g(x) = e^x \quad \text{and} \quad h(x) = 5x + 2.$$

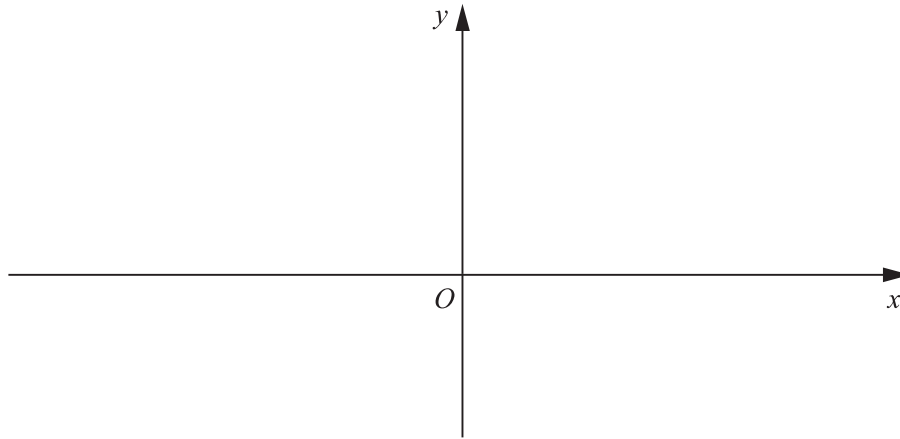
Solve  $h^2g(x) = 37$ .

[4]



Q6/13/O/N/15

- 4 (i) On the axes below, sketch the graph of  $y = |x^2 - 4x - 12|$  showing the coordinates of the points where the graph meets the axes. [3]



- (ii) Find the coordinates of the stationary point on the curve  $y = |x^2 - 4x - 12|$ . [2]

- (iii) Find the values of  $k$  such that the equation  $|x^2 - 4x - 12| = k$  has only 2 solutions. [2]

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Q3/12/M/J/14

**Question 1**

Solution: (ii)  $k > \frac{25}{8}$

Q8/11/M/J/15

**Question 2**

Answers: (i)  $f(x) \geq 3$ ,  $g(x) \geq 9$  (ii)  $-2 + \sqrt{x-5}$ ,  $x \geq 9$  (iii)  $\frac{1}{2} \ln\left(\frac{4}{3}\right)$  (iv) 96

Q11/12/O/N/15

**Question 3**

Answer: (i)  $(x+3)^2 - 5$  (ii)  $f \geq 4$  (iii)  $f^{-1}(x) = \sqrt{x+5} - 3$ ,  $x \geq 4$  (iv)  $x = 0$

Q6/13/O/N/15

**Question 4**

Answers: (ii) (2, 16) (iii)  $k = 0$   $k > 16$

Q6/11/M/J/16

**Question 5**

Answers: (i)  $2 - \sqrt{5} < f(x) \leq 2$  (ii)  $f^{-1}(x) = (2-x)^2 - 5$ ,  $2 - \sqrt{5} < x \leq 2$ ,  $-5 \leq f^{-1}(x) < 0$  (iii) -4

Q4/11/M/J/17

**Question 6**

Answers: (a)(i)  $f(x) > 5$  (ii)  $f^{-1}(x) = \frac{1}{4} \ln \frac{x-5}{3}$ ,  $x > 5$  (b) 1.55

Q8/11/M/J/17

**Question 7**

Answers: (ii)  $\frac{9}{2}$ ,  $\frac{1}{2}$  (iv)  $\frac{1}{2} \leq x \leq \frac{9}{2}$

Q6/12/O/N/17

**Question 8**

Answers: (i)  $f \in \mathbb{R}$  (ii)  $g > 3$  (iii)  $e^{35}$  (iv)  $g^{-1}(x) = \sqrt{\frac{x-3}{2}}$ ,  $x > 3$

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