O-Level
ADDITIONAL MATHEMATICS

Paper 2

Unsolved Topical

Past Papers With Marking Scheme

2014-2021

Title O-LEVEL ADDITIONAL MATHEMATICS PAPER 2

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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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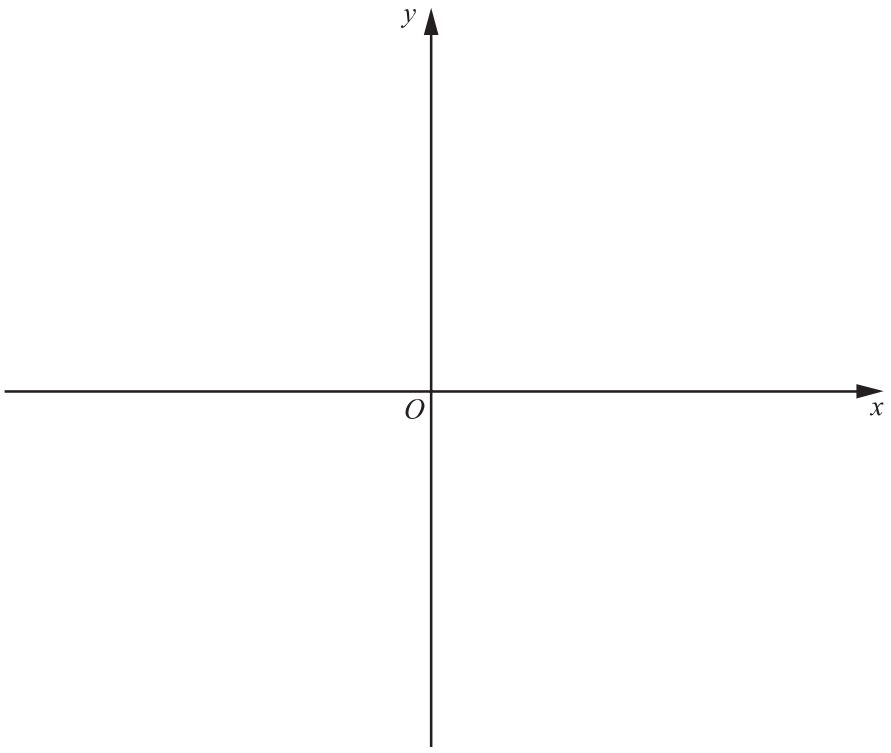
CONTENT TABLE

Functions

Q3/21/M/J/14

1 **(i)** On the axes below, sketch the graph of $y = |(x-4)(x+2)|$ showing the coordinates of the points where the curve meets the x-axis. [2]



(ii) Find the set of values of k for which $|(x-4)(x+2)| = k$ has four solutions. [3]

Q12/21/M/J/14

2 The functions f and g are defined by

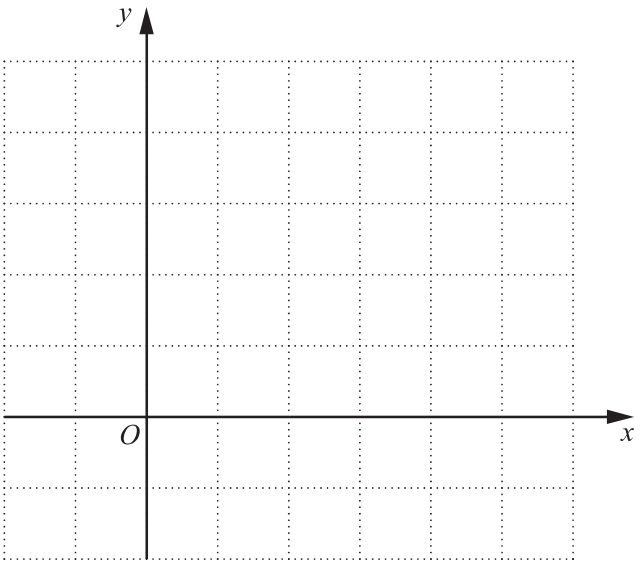
$$f(x) = \frac{2x}{x+1} \text{ for } x > 0,$$
$$g(x) = \sqrt{x+1} \text{ for } x > -1.$$

(i) Find $fg(8)$. [2]

(ii) Find an expression for $f^2(x)$, giving your answer in the form $\frac{ax}{bx+c}$, where a, b and c are integers to be found. [3]

(iii) Find an expression for $g^{-1}(x)$, stating its domain and range. [4]

(iv) On the same axes, sketch the graphs of $y = \mathrm{g}(x)$ and $y = \mathrm{g}^{-1}(x)$, indicating the geometrical relationship between the graphs. [3]



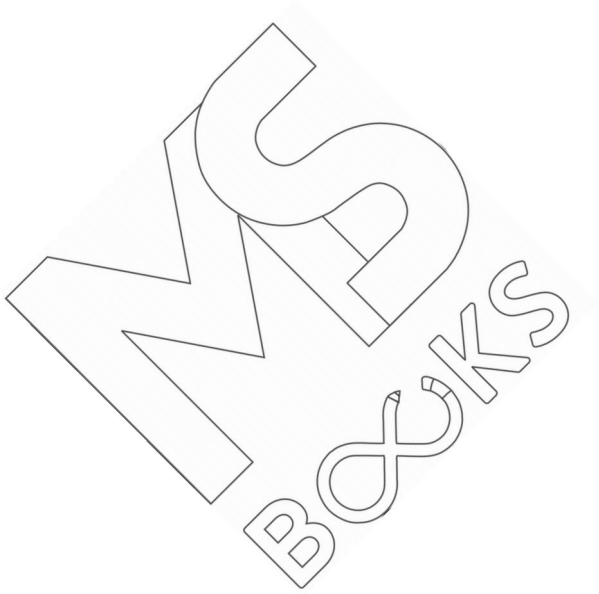
Q11/22/M/J/14

3 The functions f and g are defined, for real values of x greater than 2, by

$$f(x) = 2^x - 1,$$
$$g(x) = x(x+1).$$

(i) State the range of f. [1]

(ii) Find an expression for $f^{-1}(x)$, stating its domain and range. [4]



(iii) Find an expression for $\mathrm{gf}(x)$ and explain why the equation $\mathrm{gf}(x) = 0$ has no solutions. [4]

Q4/22/O/N/14

4 The functions f and g are defined for real values of x by

$$\mathrm{f}(x) = \sqrt{x-1} - 3 \qquad \text{for } x > 1,$$

$$\mathrm{g}(x) = \frac{x-2}{2x-3} \qquad \text{for } x > 2.$$

(i) Find gf(37). [2]

(ii) Find an expression for $\mathrm{f}^{-1}(x)$. [2]

(iii) Find an expression for $\mathrm{g}^{-1}(x)$. [2]

Q3/21/M/J/14

Question 1

Answer: **(ii)** $0 < k < 9$

Q12/21/M/J/14

Question 2

Answer: **(i)** $\frac{6}{4}$ **(ii)** $\frac{4x}{3x+1}$ **(iii)** $g^{-1}(x) = x^2 - 1$; Domain $x > 0$; Range $g^{-1}(x) > -1$

Q11/22/M/J/14

Question 3

Answer: **(i)** $f(x) > 3$ **(ii)** $f^{-1}(x) = \log_2(x+1)$, $x > 3$, $f^{-1}(x) > 2$ **(iii)** $gf(x) = 2^x(2^x - 1)$

Q4/22/O/N/14

Question 4

Answers: **(i)** $\frac{1}{3}$ **(ii)** $f^{-1}(x) = (x+3)^2 + 1$ **(iii)** $g^{-1}(x) = \frac{3x-2}{2x-1}$

Q7/23/O/N/14

Question 5

Answers: **(i)** $\frac{2}{x-1}$ **(ii)** $\left(\frac{2}{x}+1\right)^2 + 2$ **(iii)** $\frac{2}{x^2+2} + 1$ **(iv)** $x = 2$

Q2/21/M/J/15

Question 6

Answer: **(a)** $f(x) = 2x - 4$ and $f(x) = -2x + 4$

Q10(b)/22/M/J/15

Question 7

Answer: **(iii)** $x \geqslant 0$ **(iv)** $y \geqslant 1$

Q6/21/M/J/16

Question 8

Answers: **(i)** $4(x+1)^2 - 9$ **(ii)** $(-1, 9)$

Q11/22/M/J/16

Question 9

Answers: **(a)** Greatest value is $\frac{1}{4}$ when $x = \frac{1}{2}$ **(c)(i)** 1 **(ii)** $k^{-1}(x) = (x-5)^2 + 1$, $5 < x < 15$, $1 < k^{-1}(x) < 101$

Q1/22/O/N/16

Question 10

Answers: $x = 1$ and $x = 0.6$

Q10/23/O/N/16

Question 11

Answers: **(i)** $2 + \ln(2e^x + 3)$ **(ii)** $2 + \ln(2 + \ln x)$ **(iii)** $\ln\left(\frac{x-3}{2}\right)$ **(iv)** 7.39 **(v)** $x = 1.15$