
MATHEMATICS ADMISSIONS TEST

For candidates applying for Mathematics, Computer Science or one of their joint degrees at OXFORD UNIVERSITY and/or IMPERIAL COLLEGE LONDON and/or UNIVERSITY OF WARWICK

Time Allowed: 2½ hours

This paper contains 7 questions of which you should attempt 5. There are directions throughout the paper as to which questions are appropriate for your course.

A: Oxford Applicants: if you are applying to Oxford for the degree course:

- Mathematics or Mathematics & Philosophy or Mathematics & Statistics, you should attempt Questions **1,2,3,4,5**.
- Mathematics & Computer Science, you should attempt Questions **1,2,3,5,6**.
- Computer Science or Computer Science & Philosophy, you should attempt **1,2,5,6,7**.

Directions under A take priority over any directions in B which are relevant to you.

B: Imperial or Warwick Applicants: if you are applying to the University of Warwick for Mathematics BSc, Master of Mathematics, or if you are applying to Imperial College for any of the Mathematics courses: Mathematics, Mathematics (Pure Mathematics), Mathematics with a Year in Europe, Mathematics with Applied Mathematics/Mathematical Physics, Mathematics with Mathematical Computation, Mathematics with Statistics, Mathematics with Statistics for Finance, Mathematics Optimisation and Statistics, you should attempt Questions **1,2,3,4,5**.

Further credit cannot be obtained by attempting extra questions. **Calculators are not permitted.**

Question 1 is a multiple choice question with ten parts. Marks are given solely for correct answers but any rough working should be shown in the space between parts. Each part is worth 4 marks.

Each of Questions 2-7 is worth 15 marks.

Do NOT turn over until told that you may do so.

1. For **ALL APPLICANTS**.

For each part of the question on pages 3-7 you will be given **five** possible answers, just one of which is correct. Indicate for each part **A-J** which answer (a), (b), (c), (d), or (e) you think is correct with a tick (✓) in the corresponding column in the table below. *Please show any rough working in the space provided between the parts.*

	(a)	(b)	(c)	(d)	(e)
A					
B					
C					
D					
E					
F					
G					
H					
I					
J					

- A. Let $N = 3^a \times 9^b \times 27^c$ where a, b, c are positive whole numbers.
Then N will definitely be a square number whenever

- (a) a is even, (b) c is even, (c) $a + c$ is odd,
(d) a is odd but $b + c$ is even, (e) $a + c$ is even

- B. The functions f, g and h are related by

$$f'(x) = g(x + 2), \quad g'(x) = h(x - 2).$$

It follows that $f''(4x) =$

- (a) $16h'(4x)$, (b) $h(4x)$, (c) $16h(4x)$, (d) $4h'(4x)$, (e) $h(4x - 2)$