Department of Mathematics: Examination Conventions 2022-23

Preliminary Examination in Mathematics

1 Introduction

This document sets out the examination conventions for the **Preliminary Examination** in Mathematics. Examination conventions are the formal record of the specific assessment standards for the course or courses to which they apply. The first part of this document is written explicitly for candidates and explains how your work will be marked and how these marks will be used to derive your overall year outcome for Prelims. The second part of the document contains additional information for assessors and moderators but some will also be of interest to candidates. So if you want to know what criteria are used in deciding the marking scheme for each examination question, then see appendix **??**. The qualitative class descriptors tell you what is level of performance is required in order to get a particular class and can be found in appendix **??**. You may also find the checklist used by question setters useful, see appendix **??**.

The Mathematics Teaching Committee directs that the Preliminary Examination be in accordance with these conventions. The Board of Moderators may only make minor deviations from these conventions in exceptional circumstances and only after the consent of the Mathematics Teaching Committee or the Proctors. This document is in all ways subsidiary to the current:

- *Examination Regulations,*

- *Examinations and Assessment Framework.*

2 Progression through University Examinations

To qualify for your BA or MMath in Mathematics you must pass a First and Second Public Examination. The First Public Examination in Mathematics is currently called the Preliminary Examination in Mathematics and is taken at the end of the first year. There is also a resit Preliminary Examination in Mathematics (Resits), which may be taken by candidates who fail to satisfy the Preliminary examiners (known as moderators). Candidates who are prevented from sitting the first Preliminary Examination by illness or other exceptional circumstances may seek permission from the Proctors instead to sit the Preliminary Examination in Mathematics (Resits). You must pass the Preliminary Examination before you can be admitted to the Second Public Examination.

The Second Public Examination has three parts: Part A taken at the end of the second year, Part B taken at the end of the third year and Part C taken at the end of the fourth year. You cannot enter for Part B until you have completed the Part A exams, and only candidates who obtain an upper second class or higher in the combined classification of Parts A & B, together with a weighted Part B average of 59.5 or higher, qualify to proceed to Part C. Candidates who satisfy the examiners in Part A and Part B only, qualify for the award of BA in Mathematics; candidates who satisfy the examiners for all three parts qualify for the award of MMath in Mathematics with two associated classifications.

3 Prelims Examination Papers

All Mathematics candidates take five examination papers, as follows:

1. Mathematics I
2. Mathematics II
3. Mathematics III
4. Mathematics IV
5. Mathematics V

and submit two projects in Computational Mathematics.

Mathematics I is 2.5 hours in duration and the paper is divided into two sections. There are four questions on Section A of which candidates should submit three answers. There are three questions on Section B of which candidates should submit two answers. Therefore candidates should submit 5 answers in total on this paper.

Mathematics II & Mathematics IV are 2.5 hours in duration and the papers are divided into three sections. There are three questions in each of Section A and Section B and one question in Section C. Candidates should submit two answers from both Sections A and B. They should also submit an answer for the question in Section C. Therefore candidates should submit 5 answers in total on each paper.

Mathematics III is 3 hours in duration and the paper is divided into three sections. There are three questions in each of the sections and candidates should submit two answers from each section. Therefore candidates should submit 6 answers in total on this paper.

Mathematics V is 2 hours in duration and the paper is divided into two sections. There are three questions in each of the sections and candidates should submit two answers from each section. Therefore candidates should submit 4 answers in total on this paper.

Each question will be marked out of 20 and should be divided into two to four parts. An indication of the raw marks available for each part of each question should be given on the question paper.

Candidates are recommended to submit no more than the number of answers, as described by a paper's rubric. Should a candidate submit further answers, all submitted work will be marked with the best answers that meet the rubric's requirements counting.

The examination syllabus for each paper can be found at

`https://courses.maths.ox.ac.uk/course/index.php?categoryid=103`

4 Examination Conduct

You will receive advice from the examiners before your examinations. These notices provide information on the conduct of the examinations including the use of calculators, when to arrive, what to take with you and how to complete and submit answer booklets.

Notices from moderators from previous years can be found on the Mathematical Institute's website at `https://www.maths.ox.ac.uk/members/students/undergraduate-courses/examinations-assessments/examination-conventions` , past notices will be superseded by this year's notices.

5　Penalties for Non-attendance

Rules governing non-attendance at examinations and any consequent penalties are set out in full in the Examination Regulations (Regulations for the Conduct of University Examinations, Part 14).If you will be prevented by illness or other urgent cause from attending one of your examinations you should contact your college office or college tutors as soon as possible.

In cases where the Proctors do not believe there are satisfactory reasons for non-attendance or an application to the Proctors has not been submitted, this will result in the technical failure of that exam paper. The examiners will award a mark of 0 for that paper.

Failure to attend an examination, without an accepted reason, will result in failure of the assessment. The mark for any resit of the assessment will be capped at a pass.

6　Marking of Mathematics Examinations

All mathematics examinations are marked by a single assessor or moderator according to a pre-agreed mark scheme which is strictly adhered to. The examination scripts are then checked by an independent checker to ensure that all work has been marked, and that the marks have been correctly totalled and recorded. Please see appendix **??** for the qualitative descriptors of the bands of marks awarded to examination answers.

7　Computational Mathematics

Marks for the Computational Mathematics projects will be communicated to the moderators early in Trinity Term. The raw marks will consist of two marks out of 20 but will be incorporated into the average Prelims USM (Av_1) as the equivalent of one third of a paper.

7.1　Penalties for Late Submission of Coursework

The Examination Regulations stipulate specific dates for submission of coursework to the examiners, this includes the Computational Mathematics projects. Rules governing late submission and any consequent penalties are set out in full in the Examination Regulations (Regulations for the Conduct of University Examinations, Part 14).

If you will be prevented by illness or other urgent cause from submitting your coursework on time you should contact your college office or college tutor as soon as possible. Your college is able to submit an application for an extension of time to the Proctors on your behalf.

The scale of penalties agreed by the board of examiners in relation to late submissions of assessed items, without an accepted reason, is set out below.

Lateness	Penalty, % point reduction
Up to 4 hours	1 %
4–24 hours	10%
24–48 hours	20%
48–72 hours	30%
72 hours – 14 days	35%
More than 14 days late	Fail

Table 1: Late Submission Tariff of Coursework

Note: The penalty will be a percentage reduction of the maximum total mark available for the work. For example, if a 10% penalty is applied to an assessment given a USM out of 100 then 10 marks would be deducted. The final mark awarded after application of the penalty cannot be below 0.

Failure to submit a required element of assessment, without an accepted reason, will result in the failure of the assessment. In this case, the mark for any resit of the assessment will be capped at a pass.

8 Plagiarism

You are reminded of the importance of avoiding any plagiarism, please see `http://www.ox.ac.uk/students/academic/guidance/skills/plagiarism` for further guidance. Depending on their severity, cases of suspected plagiarism may be referred to the Proctors for investigation or may be dealt with by the board of examiners. If dealt with by the board of examiners as a case of poor academic practice, the examiners may deduct marks (for lack of adequate referencing, poor use of citation conventions etc.) of up to 10% of the marks available for the assessment. Where the consequence of the marks deduction would result in both the failure of the assessment and of the programme the case must be referred to the Proctors.

9 Year Outcome and University Standardised Marks

The Preliminary Examination is an unclassified examination in which candidates are awarded overall either a distinction, pass or fail. However, marks for each individual examination paper will be reported as University Standardised Marks (USMs). The object of the USMs is to allow direct comparison between the results of examinations in different subjects.

The moderators may scale the raw marks when translating them into USMs The scaling algorithm used by the mathematics examiners is explained in detail in the 2022 moderators' report which can be found at

`https://www.maths.ox.ac.uk/members/students/undergraduate-courses/examinations-assessments/examiners-reports`.

The moderators may choose to scale marks where in their academic judgement:

- a paper was more difficult or easier than in previous years, and/or

- an optional paper was more or less difficult than other optional papers taken by students in a particular year, and/or

- a paper has generated a spread of marks which are not a fair reflection of student performance on the University's standard scale for the expression of agreed final marks, i.e. the marks do not reflect the qualitative marks descriptors.

Such scaling is used to ensure that all papers are fairly and equally rewarded.

When scaling the raw marks on a paper the moderators will consider the following:

- the total sum of the marks for all questions on the paper, subject to the rules above on numbers of questions answered;

- the relative difficulty of the paper compared to the other Prelims papers;

- the report submitted by the moderator/assessor who set and marked the paper.

Moderators will use their academic judgement to ensure that appropriate USMs are awarded and may use further statistics to check that the marks assigned fairly reflect the students' performances on a paper. Moderators will also review a sample of papers either side of the classification borderlines to ensure that the outcome of scaling is consistent with the qualitative marks descriptors.

The correspondence between the USM ranges and classes *in a classified examination* is according to the following rules:

- 70-100: First Class
- 60-69: Upper Second Class
- 50-59: Lower Second Class
- 40-49: Third Class
- 0-39: Fail

These marks reflect the qualitative descriptors given in appendix **??**.

Marks for formally assessed coursework will be similarly standardised.

Candidates shall be deemed to have passed the examination if they have satisfied the moderators in all five papers and the practical assessment. The overall outcome (distinction/pass/fail) is calculated from the USMs for individual papers according to the following. Weighted averages are calculated hence, the first including CM (the Computational Mathematics USM) and the second without.

$$Av_1 = \frac{MI + MII + \frac{6}{5}(MIII) + MIV + \frac{4}{5}(MV) + \frac{1}{3}CM}{5\frac{1}{3}},$$

$$Av_2 = \frac{MI + MII + \frac{6}{5}(MIII) + MIV + \frac{4}{5}(MV)}{5},$$

each symmetrically rounded. [62.49 will be rounded down and 62.50 would be rounded up]

Year outcomes in 2022–23 will be awarded according to the following conventions:

Distinction: Both $Av_1 \geqslant 70$ and $Av_2 \geqslant 70$, and a mark of at least 40 on each paper and for the practical assessment.

Pass: Not meriting a distinction and a mark of at least 40 on each paper and for the practical assessment.

Partial Pass: A partial pass is awarded to candidates who obtain a standardised mark of at least 40 on three or more of Papers I-V but do not meet the criteria for a pass or distinction. Such candidates will be required to resit the failed paper(s) and/or practical assessment before being awarded their final year outcome (see section **??** below).

Fail: A mark of less than 40 on three or more papers.

10 Alternative Examination Arrangements and Mitigating Circumstances Notices to Examiners

A candidate in any University Examination with specific learning difficulties or disability/illness may apply through the Senior Tutor of their college for alternative examination arrangements relating to

their condition. Please see `http://www.ox.ac.uk/students/academic/exams/arrangements` for further information on the process.

Candidates who would like the examiners to be aware of any mitigating circumstances that may have affected their performance before or during an examination are advised to discuss their circumstances with their college and consult the Examination Regulations (Part 13). The candidate's college will submit the Mitigating Circumstances Notice to Examiners for forwarding to the relevant chair of examiners.

Where a candidate or candidates have made a submission, under Part 13 of the Examination Regulations, that unforeseen circumstances may have had an impact on their performance in an examination, a subset of the board will meet to discuss the individual applications and band the seriousness of each application on a scale of 1–3 with 1 indicating minor impact, 2 indicating moderate impact, and 3 indicating very serious impact. When reaching this decision, examiners will take into consideration the severity and relevance of the circumstances, and the strength of the evidence. Examiners will also note whether all or a subset of papers were affected, being aware that it is possible for circumstances to have different levels of impact on different papers. The banding information will be used at the final board of examiners to adjudicate on the merits of candidates. Further information on the procedure is provided in the *Examinations and Assessment Framework* and information for students is provided at `https://www.ox.ac.uk/students/academic/exams/problems-completing-your-assessment`.

11 Preliminary Examination (Resits)

The 'Preliminary Examination', held at the end of the long vacation, is intended for candidates who clearly need to do more work before proceeding to the second year, as well as candidates who, for some good reason, are unable to sit the Preliminary Examinations in Trinity Term.

A candidate who failed to satisfy the moderators in one or two of Papers I-V at their first attempt may offer those papers on one subsequent occasion. A candidate who failed to satisfy the moderators in three or more of Papers I-V at their first attempt may resit all five papers on one subsequent occasion. A candidate who failed to satisfy the moderators in the practical work assessment may also offer the assessment on one subsequent occasion. The Preliminary Examination (Resits) held at the end of the long vacation will be of the same format as the Preliminary Examination in Trinity Term (see Section 3).

Where a candidate has failed an assessment unit as a result of poor academic performance the mark for the resit of the assessment unit will be awarded on the merits of the work.

Where a candidate has failed an assessment unit as a result of non-submission of an assessment item or as a result of non-attendance at a timed examination the mark for the resit of the assessment unit will be capped at a pass (USM of 40).

Candidates who have failed an assessment unit will not be eligible to be considered for a distinction.

12 Moderators for 2022–23

The moderators for 2022–23 are:
Prof. Andrew Dancer (Chair),
Prof. Christina Goldschmidt,
Prof. Andras Juhasz,
Prof. Renaud Lambiotte,
Prof. Tom Sanders,
Prof. Dominic Vella,
Dr Cath Wilkins.

It must be stressed that to preserve the independence of the moderators, you should not make contact directly with them about matters relating to the content or marking of papers. Any communication must be via the Senior Tutor of your college, who will, if they deem the matter of importance, contact the Proctors. The Proctors in turn communicate with the Chair of Moderators.

Appendices

Further Information for Examiners

A   Chair of Examiners

'Regulations for the conduct of examinations, Part 6', in the *Examination Regulations* covers the appointment of the Chair. The Committee for the Nomination of Examiners will usually appoint a Chair in Trinity Term of the preceding year.

B   Examiners

Moderators should ensure that they are equipped with the following documents which will be provided by the Maths Institute's administration, in electronic copy.

- The *Examination Regulations*.

- The *Examinations and Assessment Framework*.

- The *Aims and Objectives* of the mathematics courses, as agreed by the Teaching Committee.

- The *Course Handbook* and the *Lecture Synopses*.

- The examination papers from the preceding two years.

- The Examiners' Reports on these examinations.

- Reports to the Teaching Committee on individual papers where appropriate.

- The published tables of *Class Percentage Figures* for both Prelims and Finals for the last two years (as published in the Examiners' Reports) referring to guidelines from Education Committee.

C   Form of Questions

Each question will be marked out of 20 and should be divided into two to four parts. An indication of the raw marks available for each part of each question should be given on the question paper. There should be sufficient elementary straightforward material to make the question inviting and aid in the assessment of weaker students.

D   Checklist for Setters and Checkers

The moderators should provide those asked to supply draft questions with a checklist of important considerations.

1. Is the question on the syllabus (as in the *Exam Regulations* or *Course Handbook* (including the *Lecture Synopses*))?

2. Is the mathematics correct?

3. Is the notation and terminology standard/obvious/defined? (Standard usage from the course is acceptable without explanation but phrases such as 'as in the lectures' should be avoided.)

4. Is it unambiguous?

5. Is it clear what may be assumed, what detail is required, and what would constitute a complete answer?

6. Is the form of presentation familiar/inviting/readable?

7. Does each question have an easy start, worth around 8 marks, which might be readily and routinely completed? This should not wholly be testing memory of previous material explicitly seen.

8. Is there material designed to differentiate at the class borderlines?

   (a) For the II(i)/II(ii) borderline is there a part that tests understanding of standard concepts/techniques (whilst still being rather straightforward) which tests whether a candidate can do any more than merely memorise the bookwork?

   (b) For the I/II(i) borderline is there a part for which a full solution requires truly excellent understanding and skill?

9. Would a II(i)/II(ii) borderline candidate on average achieve around 11/20 marks for the question? Is a mark of 16+ unlikely to be achieved by a significant number of candidates who are not of first-class standard?

10. Is it the case that only exceptional first-class students are capable of gaining full marks?

11. Is each question overall of a straightforward character?

12. Are the questions as a whole fairly spread across the syllabus?

13. Are the questions of comparable difficulty to one another?

14. Are the questions sufficiently different from those set in recent years?

15. Is the question formatted using the oxmathexam.cls file?

16. Does the question, adequately spaced, fit on a single page?

Setters should aim to make at least 6 marks accessible to candidates with some basic knowledge of the topic examined in that question and to make a further 4-6 marks available for straightforward material. However, the hardest part of the question should be sufficiently demanding only to be accessible to those candidates who meet the descriptors for a First. Setters are reminded that candidates on the borderline for a Pass should typically obtain about 8 marks per question. The median mark per question should be around 13. As a guide, moderators should note that a complete answer should take approximately 30 minutes to produce under examination conditions.

Moderators and assessors are asked to note that **all comment lines should be removed** from examination questions submitted to prepare the camera ready copy. This is important as examination papers are supplied in various formats to candidates with special needs. We recommend that macros are not used.

E   Protocols

For the Preliminary Examination, each paper should be set by a moderator (or assessor) and checked by another, the whole paper being reviewed and approved by the whole examining board. Moderators and assessors are reminded of the need for security of examination papers. Examinations papers must be passed via the Academic Administration Office either in person, by hand or via the secure SharePoint Online site only.

F   Model Solutions

Those setting questions are asked to provide complete model solutions, annotated so as to indicate what is considered bookwork and standard material, what has been seen before on problem sheets and what is considered to be new and unseen, and with a draft marking scheme for the approval of the moderators; the solution, with additional comments, should also make clear how much of the question is accessible to less strong candidates.
Those setting questions should be aware that solutions may be released to students in the future.

G   Aims of Marking Schemes

Marking schemes for the questions should aim to ensure that the following qualitative criteria hold:

16–20 marks A completely, or almost completely, correct answer, showing excellent understanding of the concepts and skill in carrying through the arguments and/or calculations; minor slips or omissions only.

11–15 marks A good though not complete answer, showing understanding of the concepts and competence in handling the arguments and/or calculations, and some evidence of problem-solving ability. Such an answer might consist of an excellent answer to a substantial part of the question, or a good answer to the whole question which nevertheless shows some flaws in calculation or in understanding or in both.

6–10 marks Standard material has been substantially and correctly answered with some possible minor progress on to other parts of the question.

0–5 marks Some progress has been made with elementary, accessible material.

Assessors should classify the parts of each question under the headings:

B: bookwork/routine material: either explicitly seen before, or easily synthesized from such.
S: similar to material seen before;
N: new, demanding good command of concepts and/or methods.

H   Approval of Marking Schemes

The marking schemes are approved by the moderators alongside the papers.

I   Attendance at Examinations

Attendance of Assessors will not be possible in the examination. If a candidate believes there is an error in the examination paper, they should state their assumption of the exam question within their exam script. This will then enable the Exam Board to investigate and if necessary take the error into consideration in the normal way.

J   Marking

The moderators should provide each marker with the marking scheme approved by the Examining Board. Letters to markers in previous years are commended; the following points must be made:

Marking Schemes Moderators have seen and approved the marking schemes. It is the responsibility of the marker to use the approved marking scheme. Markers (usually moderators) should apply the schemes consistently, however, it may become clear while marking that the allocation of marks should be changed. If such a change is made, then please make sure that you do so consistently, and that the moderators are informed that this has been done.

Mark Ranges in Prelims In all Prelims papers, questions are to be marked out of 20 marks. Setters should aim to make at least 6 marks accessible to candidates with some basic knowledge of the topic examined in that question and to make a further 4-6 marks available for straightforward material. However, the hardest part of the question should be sufficiently demanding to be only accessible to those candidates who meet the descriptors for a First. Setters are reminded that candidates on the borderline for a Pass should typically obtain about 8 marks per question. The median mark per question should be around 13.

Marking The moderators will want to review at least some of the scripts during the classification process. They will not want to re-mark (since they cannot do so consistently across all candidates). They will want to be able to see quickly where marks have been gained. They will also want to be sure that all a candidate's work has been taken into consideration. Markers are therefore asked:

- indicate on the mark sheets, using whole numbers, the available marks awarded for each part of a question.
- Include the total mark awarded for each questions in the highlighted sections of the marksheet, enter the integral numerical mark for each question, taking care to distinguish between an attempt scoring zero marks (enter "0") and a non-attempt (enter "-").
- not to write comments on the scripts, but, if necessary on the mark sheets provided, (markers may indicate briefly to the moderators where arguments are flawed).

Mark Sheets Electronic mark sheets will be supplied.

In entering into the electronic mark sheets the numerical mark for a question, care must be taken to distinguish between 0 marks for an attempt and a blank cell for a non-attempt.

Assessors will be asked to return the marksheet electronically through the marking site on SharePoint.

Reports The moderators must give a brief report on the overall performance of the candidates on each paper (or part-paper) to assist them in their deliberation on recalibration.

K   Checking the Marks

The moderators should ensure that their procedures allow for:

- an independent arithmetic check of the correctness of the addition of the partial marks for each question;
- an independent check of the marks entered into the marks database for each candidate;
- an audit trail for these checks.

Graduate research students are employed to carry out such checks. The standard document 'Instructions for Graduate Checkers' is kept in the Academic Office, and gives details.

L Recalibration of Marks

Examination marks will be reported to candidates in the form of University Standardised Marks. The object of the USM is to allow direct comparison between the results of examination in different subjects. Moderators may recalibrate raw marks to arrive at the USMs reported to candidates. On each paper, any recalibration of marks should be done without disturbing the order of candidates. In order to ensure fair treatment moderators are reminded that they may exercise individual consideration in assigning USMs for candidates whose marks lie outside the standard pattern.

Moderators should take note of the distribution of USMs above 70 in the examination in a normal year and not depart from it without good reason. Information about the distribution of USMs in the examination for recent matriculation years will be provided by the Teaching Committee.

The USMs reported to candidates for each paper should be symmetrically rounded.

M Class Descriptors

Whilst the Preliminary Examination is not classified, the average USM ranges reflect the following general **Qualitative Class Descriptors** agreed by the Teaching Committee:

First Class: the candidate shows excellent skills in reasoning, deductive logic and problem-solving. They demonstrate an excellent knowledge of the material, and can use that in unfamiliar contexts.

Upper Second Class: the candidate shows good or very good skills in reasoning, deductive logic and problem-solving. They demonstrate a good or very good knowledge of much of the material.

Lower Second Class: the candidate shows adequate basic skills in reasoning, deductive logic and problem-solving. They demonstrate a sound knowledge of much of the material.

Third Class: the candidate shows reasonable understanding of at least part of the basic material and some skills in reasoning, deductive logic and problem-solving.

Fail: little evidence of competence in many of the topics examined; the work is likely to show major misunderstanding and confusion, coupled with inaccurate calculations; the answers to questions attempted are likely to be fragmentary only.

N Mitigating Circumstances Notices to Examiners

The University's policy on the use of medical and other certificates is available at `https://academic.admin.ox.ac.uk/examiners`.

O Post Examination

Moderators should ensure that the following are deposited with the Head of Academic Administration (or Undergraduate Studies Officer), Mathematical Institute:

- a definitive record of individual USMs, signed off by one of the moderators (to be kept on file at the Institute for reference and for use in later examinations);

- all records of the Examination not otherwise destroyed and declarations relating to the destruction of examination material (as requested by the Proctors);

- full marking schemes, including any subsequent amendments;

- LaTeX source files for the papers incorporating any corrections.

Chair

on behalf of the Teaching Committee.