Final Honour School of Physics
Examination Conventions in June 2020

1 Introduction

The purpose of the Examination Conventions is to help students understand how their work will be marked and how the marks will be used to arrive at a year outcome this year. Please read it carefully.

Candidates must not under any circumstances contact the Examiners directly.

2 Papers

Candidates are required to start each question (other than Section A questions on A papers) in a new booklet. These booklets should be numbered in sequence. Examiners will mark the script booklets in numerical order until the number of questions specified in the rubric has been marked, any other answers being treated as rough work. Consequently, if you do attempt more than the specified number of questions, you should decide which attempts are the weakest, mark the corresponding booklets as "rough work", and turn them in with any other rough work at the end of your script.

When permission has been granted to replace a paper from the Physics FHS by an equivalent paper from another FHS, the mark used will be the mark provided by the Examiners of that FHS.

For students returning to do Part B under old Regulations, please see the Examination Conventions for the academic year 2018-2019.

2.1 Second Year (A Papers)

Each A paper will be marked numerically, with a maximum mark of 100. Each paper is divided into two sections. Section A contains relatively short but compulsory questions totalling 40 marks. Section B contains longer questions each marked out of 20, and three questions should be attempted. Each A paper is allocated 3 hours. BA and MPhys candidates must do all three A papers.

The effects of a particular A paper proving excessively easy or difficult may be ameliorated by scaling the marks for that paper. The Examiners expect to scale each A paper to a mean mark of approximately 65%, by a quadratic algorithm that leaves 0 and 100 invariant, as described in Appendix A.

2.2 Third Year (B Papers)

Each B paper will be marked numerically, with a maximum mark of 50. Each written paper contains 4 questions, out of which 2 questions will be marked, each out of 25. Each written B paper is allocated 2 hours. The first 10 minutes are intended as 'reading time', during which candidates are advised to read through the questions before writing anything. The exact number and combination of B papers required for both the MPhys and BA courses is detailed in the University's Examination Regulations (http://www.admin.ox.ac.uk/examregs/) and explained in the Physics Course Handbooks. Papers B8 and B9 will be marked in two parts. There will be an oral examination, contributing 25% to the total mark and an assessment of the written report, contributing 75% to the total mark. The final version of the B8 and/or B9 report(s) must be handed into Examination Schools on Monday 12 noon of 1st week of Trinity Term. The B8 and B9 oral examinations will take place in week 6 of Trinity Term, and the exact

times will be communicated to the candidates early in Trinity Term. The oral examination is a formal University examination, and as such **candidates must wear sub-fusc**.

The structure of the B papers complicates the scaling of marks, since the mean calibre of the candidates who sit a particular paper may be significantly different from that of those who sit another paper. In these circumstances, it would be unfair to scale marks such that the mean mark on every B paper is around 65%. Therefore, the Examiners expect that the marks of B papers will be scaled relative to the performance in the A papers: after scaling with a quadratic algorithm, the mean mark on a given B paper will be based on the mean in the A papers of the students taking that particular B paper. The target means used in previous years can be found in the corresponding Chair's Report.

2.3 Fourth Year (C Papers)

Each C paper will be marked numerically, with a maximum mark of 100. Each paper contains 6 questions, out of which 4 questions will be marked, each out of 25. Each C paper is allocated 3 hours. The first 10 minutes are intended as 'reading time', during which candidates are advised to read through the questions before writing anything. MPhys candidates must do two C papers.

The structure of C papers complicates the scaling of marks, since the mean calibre of the candidates who sit a particular paper may be significantly different from that of those who sit another paper. In these circumstances, it would be unfair to scale marks such that the mean mark on every C paper is around 65%. Therefore, the Examiners expect that the marks of C papers will be scaled relative to the performance in the B papers: after scaling with a quadratic algorithm, the mean mark on a given C paper will be based on the mean in the B papers of the students taking that particular C paper. The target means used in previous years can be found in the corresponding Chair's Report.

2.4 Short Options

Each short option paper will be marked numerically, with a maximum mark of 50. Apart from some essay-based options every paper contains 3 questions, out of which 2 will be marked, each out of 25. Each short option paper is allocated 1 hour 30 minutes.

Short option papers are not normally scaled.

2.5 Errors on Papers

Mistakes in exam papers are rare, but they do happen. Usually the setter of the paper is present at the beginning of the exam; if not, the Invigilator will know how to contact the setter. Thus if you believe there is a mistake in a question, raise your query immediately. If the error is confirmed then all candidates (including candidates taking the examination in colleges) will be informed as soon as possible.

Candidates occasionally seek clarification about the precise meaning of a question. If any clarification is given to one candidate then all candidates must receive the same advice, and providing this can be disruptive to other candidates. For this reason clarification will only be provided if a question is genuinely unclear and a competent candidate could not reasonably be expected to deduce the meaning of the question. Similarly advice will not normally be provided on what (if any) approximations you are expected to make, as deducing the appropriate approximations is frequently part of the problem to be solved.

If you remain uncertain about the precise meaning of a question then you should indicate clearly your understanding of the question in your answer book before answering it.

2.6 Marking and Checking of Paper Marks

Scripts are marked numerically using a prepared marking scheme. This scheme may be modified if this is necessary in the academic judgment of the marker, but a consistent mark scheme will

be used for all scripts. Markers are instructed *not* to write on the scripts except to indicate (a) marks awarded, (b) mark subtotals and totals, and (c) pages that have been checked which received no marks.

Papers are not generally double-marked, but every paper is centrally checked to ensure that (a) every page has been scanned by the marker, (b) the marks noted in the margin were summed up and entered correctly on the cover sheet, and (c) these marks have been entered correctly on the spreadsheets. In addition, the papers of candidates near class boundaries may be specially examined.

3 Practicals

In Parts A and B, practical marks are available as follows:

	Part A	Part B
Completing experiments[a]	30	30
Assessed Practical[b]	20	20
Total	50	50

Notes:
[a] **30 marks** for completing the required quota of experiments to a satisfactory standard (2-5). Failure to complete the practical quota will attract the following penalty: (i) A penalty of 5 marks will be deducted for each missed day of experiments. (ii) If 6 days or more of experiments are missed, the Examiners may further penalise the student by lowering the final degree by one class.
[b] **Up to 20 marks** awarded by the Senior Demonstrator, based on both the quality of the entire logbook and the understanding of the Assessed Practical (chosen at random in advance for Part A, and chosen by the student in Part B) demonstrated by the student.

More detail about practical work is published in the Practical Course Handbook. Marks will affect the award of practical prizes and commendations by the Examiners. It is important that students **consult their tutors early** in the event of difficulty with practical work.

4 Projects and Presentations

4.1 Part A Individual Presentations

These will be marked by Tutors in colleges as a percentage, using the USM scheme described in section 6.2, based on both content and style of the presentation.

4.2 BA Group Presentation

A maximum of 25 marks is awarded for the BA Group Presentation. These are given by a panel listening to all the group presentations.

4.3 Mini-Projects

These will be marked by Tutors in colleges as a percentage, using the USM scheme described in section 6.2, based on both content and presentation of the write-up.

4.4 BA Projects and MPhys Projects

A maximum of 100 marks is awarded for the BA and MPhys project.

BA and MPhys projects are independently graded by two Assessors, an expert Assessor and a non-expert Assessor. For the BA projects, the non-expert Assessor will also be a Finals

Examiner. While the expert Assessor will be chosen to have more specialist knowledge of the field, the non-expert Assessor will generally work in a different area of physics from the subject of the report.

Copies of the project assessment form on which the Assessors grade each report are available on the Examination Matters webpages. From these forms you can see what the marking criteria are and how much weight will attach to each. Before entering grades, the Assessors will read the student supervisor's report on the project, to learn what special difficulties were encountered, the extent of the initiative shown by the candidates, and so on.

Each MPhys candidate will also be expected to attend a meeting with the two Assessors of his/her project to discuss the written report. The meeting will last about 20 minutes, beginning with a short summary of the project, lasting no more than 5 minutes. The rest of the meeting will consist of a question and answer period, which has the primary purpose of clarifying any issues that the Assessors have with the written report. *The meeting does not form part of the assessment process and no mark is given for it.* Candidates must take a copy of their report to the meeting, and may also bring their logbook if appropriate. No other materials or visual aids will be allowed in the meeting.

- For BA projects, the two Assessors' marks will be weighted equally.
- For MPhys projects, the final project mark will be made up by adding 0.6 times the non-expert Assessor's total and 0.4 times the expert Assessor's total.

In cases where there are significant discrepancies between the marks of two Assessors, the sources of the discrepancies are identified and, if deemed appropriate, the marks are adjusted in consultation with the two Assessors.

4.5 B8 and B9 Assessment and Reports

B8 and B9 project reports will be graded independently by two Assessors, an expert Assessor and a non-expert Assessor, who will also be a Finals Examiner. While the expert Assessor will be chosen to have more specialist knowledge of the field, the non-expert Assessor will generally work in a different area of physics from the subject of the report. The length and style of the written report will be the same as that for the MPhys project, and full details of how to prepare a report such as this are on the physics website in the projects handbook.

The oral examination will take place in week 6 and will be 25 minutes in duration. The first 10 minutes will be devoted to a Powerpoint or equivalent presentation of your project, followed by up to 15 minutes of questioning. The same Assessors will be present as those marking the written report. Candidates must take a copy of their report to the meeting, and may also bring their logbook if appropriate. Note: **sub-fusc must be worn**.

4.6 Plagiarism

We note that, following the section on "Good academic practice and avoiding plagiarism" in the *Physics Undergraduate Course Handbook*, all reports will be checked for plagiarism, including poor referencing practices. Detected instances of plagiarism will be penalised by the Examiners, and serious offences will be forwarded to the Proctors for possible official sanctions.

5 Late Submission of Work

Work that is submitted after the submission deadline (Monday noon) will be penalised according to the standard University tariff shown in the table below.

Lateness	Submitted by	Cumulative penalty
Up to 4 hours	Monday 4pm	1%
4 – 24 hours	Tuesday noon	5%
24 – 48 hours	Wednesday noon	10%
48 – 72 hours	Thursday noon	20%
72 – 96 hours	Friday noon	30%
96 – 168 hours	Monday+1 noon	40%
168 – 192 hours	Tuesday+1 noon	50%
192 – 216 hours	Wednesday+1 noon	60%
216 – 240 hours	Thursday+1 noon	70%
240 – 264 hours	Friday+1 noon	80%
264 – 336 hours	Monday+2 noon	90%

Note that the cumulative penalties will be **deducted** from the marks (when expressed out of 100%) as percentage points, but the overall mark cannot go below 0%. For example, if a student hands in a piece of work 20 hours late, and that work in itself is worth 65%, the tariff indicates a deduction of 5% leading to a final mark of 60%. If the same work were handed in 220 hours late the final mark would be 0%.

This penalty may be reduced or waived, in particular when, in view of exceptional circumstances, the Proctors have given prior permission for late submission. Therefore if special factors make it likely that you will not make a deadline, you should ensure that well before the deadline you follow the procedure laid out in the *University Student Handbook* (formerly the *Proctors' and Assessor's Memorandum*) to seek permission to submit late (see http://www.admin.ox.ac.uk/proctors/info/handbook/).

Work submitted more than 14 days late will only be considered if the candidate has obtained permission from the Proctors for it to be considered by the Examiners. **If such permission is not received the candidate will fail the entire Part of the Finals Examination.**

6 Classification

6.1 Paper Weights

Following Part B of the BA or Part C of the MPhys, the scaled marks scored on papers, projects, practicals, etc., are added up after multiplication by the weightings in the table below.

BA Course Component	Possible marks	Weighting factor	Maximum weighted marks
Part A paper (3)	(3×) 100	1.0	300 (3 papers)
Part A Short Option	50	0.5	25
Part A full practicals (or Part A half practicals 0.5 + second short option 0.5)	50	1.0	50
Part A Individual Presentations	100	0.25	25
Part B paper (5 or 3 + Industrial Proj. and Pres.)	(5×) 50	2.0	500 (5 papers)
Part B Short Option	50	0.5	25
Part B practicals	50	1.0	50
Mini-Project	100	0.25	25
BA Industrial Project Report	100	1.5	150
BA Industrial Presentation	25	2.0	50
Total			1000

Paper weights for those taking Part C in Trinity 2020

MPhys Course Component	Possible marks	Weighting factor	Maximum weighted marks
Each Part A paper (3)	(3×) 100	1.0	300 (3 papers)
Part A Short Option	50	0.5	25
Part A practicals (or Part A half practicals 0.5 + second short option 0.5)	50	1.0	50
Part A Individual Presentations	100	0.25	25
Part B paper (6)	(6 ×) 50	1.4	420 (6 papers)
Part B Short Option	50	0.70	35
Part B practicals (or Part B half practicals 0.5 + second short option 0.5)	50	1.4	70
Part B Mini-Project	100	0.35	35
Sub-total			960
Part C Major Option paper (2)	(2×) 100	2.0	400 (2 papers)
MPhys Project	100	2.0	200
Total			1560

Thus, for example, full marks in A1 of the MPhys will yield 100 marks, while full marks in a Part B short option will yield $0.7 \times 50 = 35$ marks. Note that these weightings only apply for classification in the academic year 2019–20, and weightings will be modified in future years, to reflect changes in the course (see below).

Where candidates do not have a mark for a particular topic it is normally excluded from the sum. Any variations in the maximum number of marks candidates could have scored during their course are handled by finally ranking candidates by the ratio of marks scored to the maximum that the candidate could have scored. However the Examiners may apply alternative weighting schemes when, in their academic judgment, this is appropriate: for example when a candidate is missing marks for a large portion of the course.

Paper weights for those taking Part C in Trinity 2021

MPhys Course Component	Possible marks	Weighting factor	Maximum weighted marks
Each Part A paper (3)	(3×) 100	1.0	300 (3 papers)
Part A Short Option	50	0.5	25
Part A practicals (or Part A half practicals 0.5 + second short option 0.5)	50	1.0	50
Part A Individual Presentations	100	0.25	25
Part B paper (5)	(5 ×) 50	2.0	500 (5 papers)
Part B Short Option	50	0.50	25
Part B practicals (or Part B half practicals 0.5 + second short option 0.5)	50	1.0	50
Part B Mini-Project	100	0.25	25
Sub-total			1000
Part C Major Option paper (2)	(2×) 100	2.0	400 (2 papers)
MPhys Project	100	2.0	200
Total			1600

6.2 Class Assignment

Cumulative marks for each candidate are calculated to at least two decimal places. Preliminary class boundaries will be drawn on the ranked list of candidates at locations that are not predefined, but determined by looking for evident break points in the distribution of marks that reflect the following quality descriptors (as also given in the undergraduate handbook) and by the assessment of scripts near possible boundaries.

Class	Descriptor
Class I:	the candidate shows excellent problem-solving skills and excellent knowledge of the material, and is able to use that knowledge in unfamiliar contexts;
Class II.1:	the candidate shows good problem-solving skills and good knowledge of the material;
Class II.2:	the candidate shows basic problem-solving skills and adequate knowledge of most of the material;
Class III:	the candidate shows some problem-solving skills and adequate knowledge of at least part of the material;
Pass:	the candidate has made a meaningful attempt of at least one question.

The following table (the USM scheme) gives **approximate** relations between the percentage mark m and the FHS class:

Mark	$m \geq 70$	$60 \leq m < 70$	$50 \leq m < 60$	$40 \leq m < 50$	$30 \leq m < 40$	$m < 30$
Class	I	II.1	II.2	III	Pass	Fail

Candidates just below a class boundary may be raised to the higher class by individual consideration. The award of a Pass or Fail will, in all cases, be by individual consideration.

In the assignment of the final class for a given cohort, the Examiners aim to ensure that there should be no in-built advantage in final class by choosing the MPhys course over the BA course, or vice versa. The percentages of candidates awarded the various classes in the past five years are given below:

BA degree							MPhys degree						
Year	I	II.1	II.2	III	Pass	Fail	Year	I	II.1	II.2	III	Pass	Fail
2019	40.0	35.0	20.0	5.0			2019	51.0	38.0	10.0	5.0		
2018	12.5	46.9	34.2	6.3			2018	48.4	47.3	4.3			
2017	9.1	45.5	40.9	4.5			2017	46.6	45.5	8.0			
2016	10.6	38.3	46.8	4.3			2016	50.0	44.3	5.7			
2015	7.0	30.2	46.5	14.0		2.3	2015	61.6	37.4	1.0			

Note that variations in the fraction of candidates in each class are strongly dependent on the choices made by individual candidates between the BA and MPhys course, and the possibility of transferring to the MMathPhys course.

6.3 Consideration of mitigating circumstances by Examiners

The University provides a procedure for the consideration of mitigating circumstances by Examiners, see https://www.ox.ac.uk/students/academic/exams/guidance. Before 2018 this procedure was know as "Factors Affecting Performance". A brief summary is given below, and more details are available in the *University Student Handbook*, see https://www.ox.ac.uk/students/academic/student-handbook. The text below reflects advice issued in late 2019, and you should check for updates before making any submission.

If, whilst preparing for or during your examinations (or in preparing other assessed work), you have a problem that you think will have seriously affected your performance, you can submit a notice to the examiners to make them aware of your mitigating circumstances. Notices should only be submitted when you have suffered a significant problem. There should be independent evidence, such as a medical certificate, to support your notice.

6.4 Detailed Results

After each Part of the examination, your tutor will be told the scaled marks (in percentages) that you obtained in each paper and your overall rank amongst candidates in that Part. The university is currently considering how best this rank information might be made available to candidates, but as an interim measure it will be provided to your tutors to enable them to give you some confidential feedback and guidance. Note that ranks are only correct at the time they are calculated, and will not normally be updated to reflect changes in the marks of other candidates.

6.5 Final Classification Mark

Students in their last year will be provided with a classification mark that strictly adheres to the USM scheme shown in the table in Section 6.2 above. This is achieved by a piecewise linear mapping of the percentage class boundaries onto the USM scheme. Formal classification marks are not calculated for interim examination results, such as Part A, but informal classification marks are calculated by an equivalent process and will be provided to your tutors.

6.6 Year Outcome after Part B of the MPhys

After Part B, MPhys candidates will be given a 'Year Outcome' (I, II.1, II.2, III, Pass, Fail) and a classification mark on their student record that is based on their cumulative overall percentage mark for Part A and Part B that strictly adheres to the USM scheme shown in the table above. This is achieved by a piecewise linear mapping of the percentage class boundaries (which will be determined by the Examiners in an analogous manner to that described in Section 6.2) onto the USM scheme.

The Year Outcome will be included in each MPhys Part B candidate's student record. Together with the information mentioned in Section 6.4, this is intended to assist any MPhys candidate who is considering withdrawing with a BA degree *after* the Part B results have been announced. The procedure for the BA exit route is: inform your College, normally the Academic or Tutorial College Office, that it is your intention of leaving the MPhys 4 year course after year 3 with a BA. The Year Outcome in the MPhys Part B will be the classification of the BA should you exit the MPhys year 4 year course. This exit route is available to all MPhys students until they complete Part C, but, as you would expect, the award of the BA precludes the possibility of ever taking Part C and obtaining an MPhys.

6.7 Eligibility for the MPhys Course

From 2018–19 onwards the Department of Physics does not intend to apply a Part A requirement to determine eligibility to proceed to the MPhys course; as a consequence all students will be eligible and the only possible result in Part A Physics is "Pass". However the Examiners will calculate a classification mark for the year, and the weightings of the contributing papers, practicals, etc., are as shown below:

Part A Course Component	Possible marks	Weighting factor	Maximum weighted marks
Part A paper (3)	(3×) 100	1.0	300 (3 papers)
Part A Short Option	50	0.5	25
Part A full practicals (or Part A half practicals 0.5 + second short option 0.5)	50	1.0	50
Part A Individual Presentation	100	0.25	25
Total			400

Candidates achieving a classification mark below a nominal II.1, that is a mark below 60%, are strongly advised to discuss their options with their college tutors before deciding to proceed to the MPhys course.

7 Student Self Service

Examination results, including Year Outcome, will be released via the Student Self Service system. You will be able to view them at Student Self Service, http://www.ox.ac.uk/students/academic/exams/results. All marks are displayed as percentages.

8 Prizes

Prizes may be awarded for excellence in various aspects of the BA and MPhys final examinations, and the list or prizes which the Examiners currently expect to award is provided as Appendix B. However, details of prizes and their monetary values may be varied without notice, and the Examiners retain the right not to award any prizes when no candidate of sufficient merit is available, or to share prizes between candidates where this is appropriate. The Examiners may also publish commendations for excellent work which falls short of the level of a prize.

Physics Finals Examiners
Robert Taylor (chair), Steve Andrews (External, Bath), Achillefs Kapanidis, Jonas Rademacker (External, Bristol), Matt Jarvis, Andrew Steane.

February 20, 2020

APPENDICES

A Scaling of Physics papers

Under the Examination Conventions the Examiners are permitted to use scaling to correct for the systematic effects of one paper being harder or easier than another paper. Decisions on whether to use scaling and on the details of the scaling applied are decided by the Examiners on a case by case basis using their academic judgment, but we anticipate that scaling will be applied systematically to all core examination papers in parts A, B and C, but not to short option papers, practical papers, or project reports.

The scaling algorithm normally used is a quadratic transformation from raw marks to scaled marks, where the parameters are chosen such that marks of 0 and 100 are fixed points, while all other marks are transformed such that the mean mark of the scaled distribution matches some desired target mean. More precisely we will calculate scaled marks s from raw marks r using

$$s = ar^2 + (1 - 100a)r$$

where a is calculated as

$$a = \frac{\overline{r} - \tau}{100\overline{r} - \overline{r^2}}$$

and τ is the *target* mean.

This transformation will, of course, slightly change the shape of the distribution, but this effect is small as long as the scaling is modest, that is as long as the mean of the raw marks is not too far from the target mean. It is essential to check that $|a| < 0.01$, as outside this range the shape can be seriously distorted, and such checks are automatically made as part of the scaling process.

We anticipate that target means will be set as follows. For A papers the target mean will normally be set to about 65. For B papers the target mean on a given B paper will be based on the mean in the A papers of the students taking that particular B paper. For C papers the target mean on a given C paper will be based on the mean in the B papers of the students taking that particular C paper. However final target means are set using the academic judgment of the Examiners. The Examiners may also apply alternative scaling algorithms when, in their academic judgment, the mark distribution is unsuitable for quadratic scaling.

Target means and scaling parameters are calculated using only the main cohort of Physics candidates, but scaling is applied (using the same parameters) to marks achieved by candidates from Physics and Philosophy and from other Final Honours Schools. Scaling of papers taken only by Physics and Philosophy candidates will be performed on request from the Examiners in Physics and Philosophy. Such scaling will normally use the same basic algorithm with target means determined by the academic judgment of the Examiners in Physics and Philosophy.

B Anticipated List of Prizes

- The Scott Prize for the best performance in the MPhys examination, £750
- The Gibbs Prize for performance in the MPhys examination, £450
- Scott Prize for best performance in the BA examination £650
- Scott Prize for performance in the BA examination, £350
- Scott Prize for the performance in the MPhys Part B examination £400
- The Winton Capital Prize for Outstanding Performance in the Part A examination, £250
- Scott Prize for performance in the Part A examination, £200
- Scott Prize for performance in the Part A examination, £150
- The Winton Capital Prize for the Best MPhys Research Project, £500
- The Gibbs Prize for the best use of experimental apparatus in an MPhys Project, £200
- A Physics Prize for an MPhys Project in Atomic and Laser Physics, £150
- The BP Prize for an MPhys Project in Theoretical Physics, £150
- The Johnson Memorial Prize for an MPhys Project in Astrophysics, £150
- The Johnson Memorial Prize for an MPhys Project in Atmospheric, Oceanic and Planetary Physics, £150
- The Met Office Prize for a Project in Atmospheric, Oceanic and Planetary Physics, £100
- A Physics Prize for an MPhys Project in Condensed Matter Physics, £150
- The John Thresher Prize for an MPhys Project in Particle and Nuclear Physics, £150
- The Metaswitch Prize for the best use of software in an MPhys Project, £150
- The Rolls-Royce Prize for Innovation in an MPhys Project, £150
- The Tessella Prize for Programming in Software in an MPhys Project, £150
- A Physics Prize for the best BA project report, £150
- A Physics Prize for the BA project, £100
- The Gibbs Prize for the best BA group project presentation, up to £375 shared
- The Scott Prize for performance in Teaching and Learning Physics in Schools, £150
- The Head of Department's Prize for the best performance in the Physics Department Speaking Competition, £200
- The Gibbs Prize for performance in the Physics Department Speaking Competition, £150
- Two Gibbs Prizes for practical work in Part B of the Physics examination, £200 each
- Two Gibbs Prizes for practical work in Part A of the Physics examination, £150 each