

Simon Marais Mathematics Competition Rules

20 August 2021

1. Definitions

- 1.1. "Rules" refers to this "Simon Marais Mathematics Competition Rules" document only, except if explicitly indicated otherwise.
- 1.2. "Division" refers to any single geographical subdivision of the Simon Marais Mathematics Competition, with its own exam date, paper(s) and prize pool.
- 1.3. "Competition" refers to the Simon Marais Mathematics Competition held in all Divisions.
- 1.4. "Organisers" refers to the Organising Committee of the Competition, as constituted by the Board of Simon Marais Mathematics Competition Limited.
- 1.5. "Universities" are defined in 2.1.1.
- 1.6. "Eligible Grouping" is defined in 5.5.

2. Eligibility

2.1. Institutional Eligibility:

- 2.1.1. Institutions that are recognised as tertiary education institutions in their home country, and accepted as such by the Organisers, will qualify as "Universities" for the purposes of the Competition.
- 2.1.2. Universities that are between the designated time zones for a Division on the date of the relevant Competition, can submit an application to the Organisers for their students to participate. Designated time zones for the East Division are UTC +5.30 to UTC +13.00 (inclusive) and for the West Division UTC -2.30 to UTC +5.00 (inclusive). The Organisers will only accept the application if, among other criteria, the University undertakes to abide by the Rules and to enforce those Rules when administering the Competition.

2.2. **Individual Eligibility:** A person who, at the Competition date, is enrolled in a course or unit of study at a University that has been accepted into the Competition, can participate in the Competition through that University, provided:

- 2.2.1. They have not participated more than three times previously (through any University). Participation in the 2020 Competition will not count in this regard.
- 2.2.2. At the Competition date, they have been a tertiary student for less than four full time equivalent years, counting the total

duration of all the student's periods of study at tertiary education institutions. The Organisers may grant exemptions on request, for example in a case where a student has a previous degree which did not involve any study of mathematics.

2.2.3. Their enrolment at the University through which they are participating in the Competition is equivalent to at least 10% of a full-year enrolment.

3. Registration

3.1. University application

3.1.1. Universities have to complete and submit a University Application Form (found at <http://www.simonmarais.org>) to the Organisers by the date determined by the Organisers and published on the website.

3.1.2. The Organisers will inform each University whether their application has been accepted by the date determined by the Organisers and published on the website.

3.1.3. Each University must nominate one responsible person (the "local coordinator"), who has to be an academic staff member (not a student).

3.1.4. The local coordinator will be responsible for the individual registration process and for the administration of the exam at the University.

3.1.5. If possible, any assistants the local coordinator wishes to use must be named to the Organisers prior to the examination. The local coordinator will assume full responsibility for all assistants' conduct.

3.1.6. The local coordinator will, along with the University and as part of the University application, undertake to abide by the Rules.

3.1.7. Local coordinators at nearby Universities may decide to collaborate in hosting the exam at just one University for the collaborating Universities.

3.2. Individual and Pairs registration

3.2.1. Students at a registered University who wish to participate must register themselves with the designated local coordinator at their University, so that a list of participants is received by the Organisers by the date determined by the Organisers and published on the website.

3.2.2. The student has to demonstrate to the satisfaction of the University and the Organisers that they satisfy the Individual Eligibility conditions under 2.2.

3.2.3. The student has to indicate whether they will be

participating individually or as a member of a pair; in the latter case the other member of the pair has to be accepted for registration by the University and Organisers as well, and also state that they will be a member of that pair. The two members of a pair must be students at the same University.

3.2.4. At the time of registration, the student has to certify, using the *pro forma* registration form, that they will

3.2.4.1. adhere to the rules of the Competition and in particular

3.2.4.2. not communicate exam questions or solutions to anyone except their partner (if they are part of a pair) before the end of each exam, or to anyone outside their exam centre before the end of the final exam.

3.2.5. Universities will keep a record of the identifying information and any other information gathered with respect to 2.2.1–2.2.3.

3.2.6. Local coordinators should ensure that they submit complete and verified participant information, as requested by the Organisers, by the designated student registration deadline, otherwise none of the students from that University will be considered officially entered.

3.2.7. The Organisers reserve the right to impose an entry fee on a University where the number of entrants as at the deadline for registrations from that University exceeds a number to be determined by the Organisers. The entry fee and the determined number will be updated on the website each year.

4. Exam

4.1. The Organisers will determine the date of the examination for each Division annually and make it public before entries are invited.

4.2. Organisers reserve the right to attend and observe the administration of the exam at any exam centre unannounced.

4.3. The examination shall consist of up to two periods of exactly three hours each (including reading time), with a 90-minute break between the two sessions.

4.4. Each session will be a three-hour closed book exam. One of these may include one open problem, which will be identified as such.

4.5. The examination papers will only be available to the local coordinator for downloading 60 minutes before the start of the examination. Each local coordinator will be responsible for downloading, printing and distributing the papers by the official starting time, and keeping the contents of the exam confidential before the starting time. The Organisers will not be responsible for any local difficulties in downloading/copying/distributing examination

papers.

4.6. Exams will commence in a staggered fashion across time zones, with the intent that no session commences anywhere after that equivalent session has already ended in another time zone within the same Division (the only exception is listed in 4.7). Final exam times will be published on the website in accordance with the schedule also available on the website.

4.7. Students who, for religious reasons, cannot take the examination during the scheduled hours may take the examination starting at sundown on the scheduled Saturday, upon request by the local coordinator and with the approval of the Organisers. Such students must remain under the supervision of a faculty member or relevant religious office holder from the official starting time for that time zone on the day of the examination. Apart from the usual exam conditions, they must not have in their possession any device that can receive electronic communication at any time from the official starting time for that time zone until the beginning of their own agreed exam period. The supervising faculty member or relevant religious office holder will assume responsibility for ensuring that the students do not receive outside information about the exam by any other means.

4.8. The local coordinator will conduct the Competition exam under stringent University examination conditions and ensure that there is no collaboration or outside assistance of any kind. The only exception to the non-collaboration rule is within each pair.

4.9. The Organisers will provide local coordinators with contact details to which to refer any student requests for mathematical clarifications or explanations regarding Competition problems during the exam. Local coordinators, and any other persons who assist in supervising the exam, may not provide students with any clarifications or explanations of the Competition problems, except with the explicit consent of the Organisers via this designated contact.

4.10. Local coordinators should ensure that the members of a pair can communicate without being overheard by or disturbing other entrants. For on-site exams, this will probably entail a separate room for each pair, or at least a density much lower than usual exam conditions. For off-site exams, this may entail different invigilation for pairs. Pairs entrants will very likely imply the need for assistants to the local coordinators (see 3.1.5).

4.11. Students sitting the exam on-site must relinquish any devices capable of communication, computation or storage for the duration of each examination session, with the exception of tablets which may be used solely for writing worked solutions, with internet access switched off. Students sitting the exam off-site may use such devices during a session only for the purposes of accessing the exam papers, undergoing invigilation, writing and

submitting their worked solutions, and (for pairs entrants) communicating with the other member of the pair.

4.12. Because the competition is held across multiple time-zones, students will not be allowed to enter a session after it has commenced, nor will they be permitted to leave before the end of a session. In cases where this is unavoidable (e.g. apparent medical emergency), the student will notify the local coordinator who will note the name of the student entering late or leaving early and the time they arrive or leave, as applicable. (This excludes toilet breaks, which can be taken as usual under University examination conditions).

4.13. After the examination, local coordinators are responsible for returning electronic copies of students' papers to the Organisers for marking. The Organisers will notify the local coordinators of a cut-off date for receipt of these electronic copies and of more detailed procedures for uploading. Students who have written their solutions on a tablet must immediately email an electronic copy to their local coordinator at the conclusion of each exam session. Students who have written their solutions on paper may regain access to their mobile phones or other devices at the conclusion of each exam session in order to immediately scan their solutions and email an electronic copy to their local coordinator. For on-site exam sessions, local coordinators may alternatively collect all papers (including rough work) at the conclusion of each exam session and subsequently scan the worked solutions themselves. Local coordinators must not accept solutions, either electronically or on paper, after the conclusion of the exam session.

4.14. As soon as possible after the conclusion of the examination, local coordinators must inform the Organisers by email of:

- 4.14.1. any possible breaches of exam conditions, including instances where students have not relinquished devices as required by 4.11;
- 4.14.2. any students who entered into the sessions late or left early according to 4.12;
- 4.14.3. instances where one member of a registered student pair was absent for both sessions, while the other student was present and thus needs to be treated as an individual entrant; and
- 4.14.4. anything else that may compromise the equity and integrity of the competition.

4.15. Students are able to submit complaints regarding how the examination was conducted to their local coordinator (within one week of the examination) or directly to the Organisers (within two weeks of the examination).

5. Scoring

- 5.1. Grading and scoring decisions are final and no correspondence will be entered into.
- 5.2. Each problem is graded on a scale from 0 to 7, with the possible exception of the open problem, which is intended to separate the top students.
- 5.3. Scores will be computed for each participating individual and each pair and will be the sum of scores for the solutions submitted to each problem by that individual or pair.
- 5.4. Multiple solutions or attempted solutions to problems may be submitted and will be considered by markers. No marks will be deducted for multiple attempts at the same problem, nor will marks be deducted for incorrect work.
- 5.5. A University score will be calculated for each University based on the performance of its participating students, as follows. The University score will be the maximum over all possible Eligible Groupings for that University. An Eligible Grouping consists of at most 3 individuals and at most 2 pairs, such that at most 4 of the students involved are of the same gender. An Eligible Grouping score is the sum of up to five scores: one for each individual and each pair in that Eligible Grouping.

6. Results

- 6.1. The Organisers reserve the right to perform statistical analysis on results by location, as well as relying on other reasonable means to identify suspected irregularities.
- 6.2. In case of suspected irregularities, the Organisers will have the right to withhold individual, pair and/or University scores from the overall results pool until the matter is resolved.
- 6.3. Where the Organisers are satisfied that an individual, pair or University has broken one of the Rules, they retain the right to disqualify the individual, pair or University. If a University is disqualified, all individual and pair entries from that University are automatically disqualified.
- 6.4. Where a person has previously been disqualified whether entered as an individual or in a pair, or where a University has previously been disqualified, the Organisers reserve the right to refuse registration for future Competitions by that person or University.
- 6.5. Within each Division the names and Universities of the top quartile individual contestants, the top quartile pairs, the top quartile Universities, as well as the top individual, pair and University in each country will be posted on the website as soon as possible. In cases where the student did not consent to the use

of their name, an entry of "Anonymous" will be displayed alongside the University name.

6.6. Further summary information that does not identify particular individuals or Universities may be posted on the website.

6.7. A report giving ranking information regarding individuals and pairs at a participating University and the University ranking will be communicated to the local coordinator of the examination at the University. Contestants may obtain information related to their own rank only from their local coordinator.

6.8. Local coordinators will be encouraged to submit the listing outlined in 6.5 to applicable professional mathematics publications, e.g. in the case of Australia to the Gazette of the Australian Mathematical Society.

6.9. Problems and solutions will be published on the website in due course.

7. Prizes

7.1. In addition to the prizes listed below, corporate internship opportunities may be available to some high-performing entrants. Any such opportunities will be listed on the website each year.

7.2. Prizes listed in 7.3 to 7.6 apply to the East Division. For 2021 only, equivalent prizes for the West Division will be determined as follows

7.2.1. For prizes listed in 7.3 to 7.5: in the range of 20 to 50 percent of the given amounts, with the exact percentage to be determined by the Organisers and published on the website before the exam date.

7.2.2. For prizes listed in 7.6: amounts will be unchanged, but the Organisers will determine and publish the cap on the number of such prizes before the exam date.

7.3. Individual prizes are

7.3.1. First: A\$5,000

7.3.2. Second: A\$3,500

7.3.3. Third: A\$1,500

7.3.4. Fourth to Tenth: A\$1,000 each

- 7.4. Pairs prizes are
 - 7.4.1. First: A\$10,000
 - 7.4.2. Second: A\$7,000
 - 7.4.3. Third: A\$3,000
 - 7.4.4. Fourth to Tenth: A\$2,000 each
- 7.5. University prizes are
 - 7.5.1. First: A\$15,000
 - 7.5.2. Second: A\$12,000
 - 7.5.3. Third: A\$8,000
- 7.6. Merit prizes for creative or insightful work on any problem, including the open problem: a maximum of 4 prizes of A\$1,000 for individuals and 4 prizes of A\$2,000 for pairs (A\$1,000 for each entrant), excluding the winner(s) of the Hofflin Prize, up to a maximum total amount of A\$10,000.
- 7.7. Hofflin Prize for most creative solution to any problem in the Competition: A\$3,000 (A\$1,500 for each entrant if won by a pair).
- 7.8. Australia-wide prizes
 - 7.8.1. Best individual entry: A\$1,500
 - 7.8.2. Best pairs entry: A\$3,000
- 7.9. In the event of a draw in a category, the Organisers will determine awards at their absolute discretion. In general, the awards will be based on three principles:
 - 7.9.1. total prize money in that category will remain unchanged.
 - 7.9.2. competitors with the same score will be awarded the same place and the same amount of prize money.
 - 7.9.3. no competitor will receive a larger amount of prize money than any higher-placed competitor in the same category.

8. Miscellaneous

- 8.1. The Organisers may, without notice, amend the Rules at any time by posting an amended version at <http://www.simonmarais.org>.
- 8.2. Simon Marais Mathematics Competition Limited retains all rights to the exam questions, answers and responses. Without limitation, this material cannot be reproduced for commercial gain.
- 8.3. Unless otherwise specified, all exam papers will be set in English, and all submitted responses must be in English.