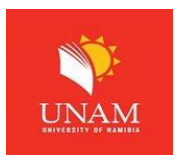


NCRST
NATIONAL COMMISSION
ON RESEARCH SCIENCE & TECHNOLOGY

Mathematics Olympiad Guide

2021



LONDON
MATHEMATICAL
SOCIETY
EST. 1865



Embassy of Italy
Pretoria



AFRICAN MATHEMATICS
MILLENNIUM
SCIENCE INITIATIVE



NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

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Introduction

The National Mathematics Olympiad (NMO) is an annual event where high school learners from all the regions compete against each other in solving mathematics problems.

The purpose of the Mathematics Olympiad is to promote mathematics in general, and popularize science and technology among our students, community and educators. It is a vehicle to encourage and challenge mathematically gifted young people to take a more active interest in the study of science by providing an opportunity for students to showcase their knowledge.

Entering a Mathematics Olympiad

Eligibility/ Limitations

High school learners (Grade 8-11) can apply and participate in the Mathematics Olympiad. Interested schools, learners and teachers should contact their nearest regional mathematics Olympiad coordinator for more information.

Ensure that entry forms are fully completed; that the information is clearly readable, and you have entered your information correctly.

Teams

Each region consists of at most six (6) participants (at most 3 boys & at most 3 girls) under the supervision of one teacher and a Mathematics Olympiad Coordinator:

- Must be a mathematics teacher;
- Each contestant must be a high school registered learner on the day of the competition;
- Contestants must not be enrolled in any post-secondary institution; and
- Each participating region must provide their contact details: postal address, phone number, and e-mail address.

There will be an online system for the event where registration will take place, each participating region should provide all required information for their team when registering as well as throughout the competition.

The day before, during and after the test

Each participating learner will be given login details to access the questions on the platform. The time will be set on the online system for the start and completion of tests. The team members will take the test individually on the virtual platform, and the overall performance of the team/region will be calculated as the average for all the team members that took the test.

Marking

The marking will be done by experts from the University of Namibia (UNAM) and the Namibia University of Science and Technology (NUST). Round 1 and 2 will take place on the online platform which marks automatically. For round 3, learners will be required to write the test and it will be marked manually. Markers are briefed during and before the marking on the rules for marking.

Rules and procedures for the markers

Rules

Markers must be briefed before the marking process starts. The following should be done during the initial briefing:

- Regional Officers, UNAM and NUST ensure round 1 and 2 went smoothly;
- There should be a head marker to oversee the marking process;
- Answer scripts should be divided amongst all the markers;
- Each marker should go through the list of assigned answer sheets to check if there are any conflict of interests and must declare it for the answer sheet(s) to be reassigned;
- Each marker must understand and sign the form of conflict of interest;
- Each marker must understand and sign the form of confidentiality;
- It should be made clear to the marker that they must not add up the marks on the form because this will be done by the Quality Assurance Committee in the spirit of fairness; and
- All markers must initial the form provided with each script.

Procedure

- The marking will be done by 2 markers and when they are done marking, communicate with each other to compare the marks given by each.
- If all the markers gave the same mark, then the given mark stands.
- However, if the mark given by the markers have a discrepancy, then they must resolve it between the two of them to come up with the final mark.
- If the markers fail to resolve the issue, then the head marker is informed for the final decision to be made.

Disputes

If disputes arise, such dispute will be resolved by the Jury committee members that comprises of the National Commission on Research, Science and Technology (NCRST), UNAM, and NUST.

Awards

At the national level, the host institution will be responsible for the awards medals, prizes and certificates of participation. Medals for the Mathematics Olympiad contestants will be gold, silver and bronze. The total number of medals awarded will not be more than half of the number of contestants.

The medals will be awarded as follows:

Gold:	80%-100%
Silver:	60-79%
Bronze:	50-59%

The awards will be as follow:

- Overall winning team: N\$2,000.00 (each learner), trophy, framed certificate;
- Runner up team: N\$1,000.00 (each learner), trophy, framed certificate;
- Best performing learner overall: Laptop, trophy, framed certificate;
- Best performing female learner: Tablet, trophy, framed certificate;
- Top 10 learners after runner up team – N\$500.00, framed certificate;
- School of winning team – Mathematics or Science equipment – N\$10,000.00; and

- School of runner up team - Mathematics or Science equipment – N\$5,000.00.

Responsibilities

Host institution

The host institution takes care of all the Olympiad necessities, the awards medals, prizes and certificates of participation.

Participating regions

The participating regions in consultation with the steering committee should ensure that round 1 and 2 takes place smoothly and the 6 winners are entered to compete in round 3.

Administration

Olympiad Coordinator(s)

The Coordinator(s) will be appointed for the term of one year and must be a mathematician. The Coordinator(s) must be fluent in the official languages of the Mathematics Olympiad Competition: English.

The Coordinator(s) is required to:

- Be familiar with the NMO online platform and be able to use it to ensure the region have participated in all rounds of the competition;
- Participate in the various working meetings; and
- Provide mediation before and during the coordination process, in case of disputes between team leaders and coordinators.

Problems Committee

The Problems Committee will consist of NUST and UNAM. The Problems Committee members will meet on stipulated times to work on the problems which will cover, as far as possible, the different areas of Algebra, Combinatorics, Geometry, and Number Theory.

Jury Committee

This committee will consist of the Problems Committee and the Organizing Committee. The Jury has the responsibility to select 12 problems from the short list recommended by the Problems Committee.

Mathematics Problems

Submission of Problems

All the problems will be set by the University of Namibia as well as the University of Science and Technology, Department of Mathematics.

Syllabus

There is no official syllabus. The problems must cover, as far as possible, different areas of interest of pre-university education, in Algebra, Geometry, Number Theory, and Combinatorics.

Problems must be original. learners must be able to solve them only with basic arguments without referring to sophisticated theoretical knowledge.

Methodology

An advert will be placed in the newspapers, social media pages of partners as well as through the education regional offices. All schools that wish to participate in the Mathematics Olympiad Competition must register through their respective Ministry of Education, Arts and Culture regional offices. Regional Coordinators will be responsible for the registration process and registration will be done online on the NMO online platform on or before a date set by the organising committee as the deadline for registration. The NCRST will keep a database of all schools in the country who registered for the competition.

Participation in the Mathematics Olympiad Competition is open to all learners from grade 8 to grade 11. The Mathematics Olympiad Competition will be conducted in the following 4 stages:

Round 1: School level

During this stage of the competition learners will be required to login online and answer a multiple-choice test within one hour. The mathematics teacher who is selected as the focal person will determine the 6 best learners (3 girls and 3 boys) to represent the school at the regional level. The mathematics teacher who is selected as the focal person will determine the 6 best/top performing learners (3 girls and 3 boys), based on their scores, to represent the school at the regional level.

Round 2: Regional level

During this stage of the competition school teams will compete against each other to answer a 2-hours short structured self-marking test. school teams will be required to login online and do the test at their selected schools. Each region will be required to select a team that will represent the region at National level. Each team should be comprised of the 3 boys and 3 girls who obtained the highest scores in this round.

Round 3: National level

During this stage of the competition regional teams will compete against each other to answer a 4-hours long structured test. The regions will be responsible to submit the names of their 6 winners to the NCRST via email. UNAM will be responsible to set up and mark the question papers. This stage will be done through a webinar.

The 3 top performing boys and 3 top performing girls, based on their scores, will represent Namibia at the Pan African Mathematics Olympiad (PAMO) in March 2022, respective of the region they came from. The team will undergo training to fully prepare for the competition. Grade 11 learners are also included. In the event where a grade 11 winner is not in high school the year of the competition, the next best learner of the same gender will replace that learner.

Online rules and procedures

Markers and participants must login on time for the process as per the time indicated on the programme.

The regional coordinator is responsible for the participants. Therefore, they must assist and ensure that the participants to have access to the site.

All participants are expected to remain logged in for the entire prescribed test duration. Participant can submit and log-out if they finish before the set time and wait for the results. For round one and two, questions will be loaded in the system and marking will be automatic by the system. Therefore, participant will receive their individual marks soon after submitting their work online. However, the combined team marks will be announced at a later stage.

The final team marks will be determined by the responsible committee. After the committee logged into the system, all marks will be available for assessment to determine the teams scores.

Participants may only leave the system after the team results are announced by the committee on the NMO platform.

No persons, other than participants, officials and special guests will be allowed on the system during the test.

Confidentiality

All results are CONFIDENTIAL until announced at the Awards Ceremony.

markers must:

- Be discreet when discussing projects or making critical comments;
- Keep confidential any privileged information or ideas that were conveyed as part of the judging process and do not disclose such information or ideas to third parties;
- Not inform learners of the scores they have received; and
- After the Jury Committee meeting not communicate with the contestant until after test.

Conflict of Interest

A jury will be appointed to lead the process. The jury will be responsible for all judging assignments. This include ensuring that all teams are judged fairly, ensuring that there is no conflict of interest with marking such as marking your school's question papers, marking your own child's question paper or that of his/her classmates or judging a child from a family that you know, etc.

Annexure(s)

NATIONAL MATHEMATICS OLYMPIAD (NMO)

CONFLICT OF INTEREST FORM

As an official of the Mathematics Olympiad, I understand that I am entrusted with a duty to supervise/assist/mark/ set question papers, without any personal bias.

I will declare any conflict of interest before or during marking sheets. Conflict of interest is amongst others:

- Marking answer scripts of relatives;
- Marking answer scripts of friends;
- Marking answer scripts of learners from your current school; and
- Marking answer scripts of learners that are in the same class as your child.

I am aware that should it arise that I have marked scripts that fall within the above-mentioned restrictions, I will be disqualified as a marker and all my scores will be disregarded.

NAME PRINTED

DATE

SIGNATURE

NATIONAL MATHEMATICS OLYMPIAD (NMO)
CONFIDENTIALITY AGREEMENT

As an official for the Mathematics Olympiad, I understand that I am entrusted with information of a confidential nature. The Following information is confidential and cannot be revealed to or discussed with anyone other than the relevant committee/ person assigned to deal with it:

- Score sheets
- Scores
- Names of winners, etc.

I am aware that I have access to information that is strictly confidential and that I will handle and retain information in a secure manner, free from view of others, at all times, while in my possession.

NAME PRINTED

DATE

SIGNATURE

NATIONAL MATHEMATICS OLYMPIAD (NMO)

MARKERS BRIEFING

Markers will consist of the following groups:

- 1x Head marker
- 2x Assistant marker
- 10x Markers

The Head marker must have an initial briefing with all the markers before the marking process starts. The following should be done during the initial briefing:

- Head Marker, 2 Assistant Head Markers and the Quality Assurance Committee should be introduced to the markers;
- Answer scripts should be assigned to markers and the projects of any no-show markers should be reassigned to another marker;
- Each marker should go through the list of assigned answer scripts to check if there are any **conflicts of interest** and **must declare it** for the project(s) to be reassigned;
- **Each marker must understand and sign the form of conflict of interest;**
- **Each marker must understand and sign the form of confidentiality;**
- Each marker should check the content of their clipboard/ file;
- The marking procedures, criteria and guidelines should be reviewed;
- It should be made clear to the markers that they **must not** do the calculations on the form because this will be done by the Quality Assurance Committee in the spirit of fairness; and
- All markers who marked the script must initial on the script and put a sticker on the script to indicate that the script was mark.