



AstroChallenge 2023

To: Teachers-in-charge and Participants

Dear Sir/Mdm,

On behalf of the AC Core Committee, I would like to thank you for your keen interest in **AstroChallenge 2023**. The contents of this letter includes important issues and rules to take note of:

1.) Competition Dates and Format

Day 1 – **27th May**, 09 00, NTU LT1A@North Spine

Day 2 – **29th May**, 09 00, NUS LT7A@Faculty of Engineering

Day 3 – **3rd June**, 09 00, NUS LT6@Faculty of Engineering

Please refer to **Appendix A** for the schedule of events, and **Appendix B** for more information on the rounds. **Appendix C** is a memorandum from the Head Question Master. Please note that the schedule may be subject to changes. More information about the venues will be released at a later date.

As of now, registration for AstroChallenge 2023 has been opened. The registration link can be found on our website or [here](#). The early bird period of the registration period will last till **9th April 2359 SGT**. From then till **1st May 2359 SGT**, the regular period will begin. After this period, all further registrations will be considered late and therefore incur further fees. More details will be provided under point 3.



AstroChallenge 2023

2.) Mode of Communication

Telegram will be used as the main mode of communication between participants and the AstroChallenge committee. The AstroChallenge Main Channel has been set up in order to convey key information before and during the competition. Scan the QR code on the left below to join:

Make sure that your telegram handle is as indicated in our online registration form.

Every now and then, we will be posting stories and updates on Instagram as well as Facebook. This will include behind-the-scenes moments and previews to the Post Mortem. Feel free to follow us by the scanning the QR code on the right (@astrochallenge_sg):





AstroChallenge 2023

3.) Payment

For teams registered before the deadline of **1st May 2023 2359 SGT (GMT +8)**, the registration fee for each Junior or Senior team is set at **\$70 per team OR \$20 per person** for teams with less than 4 persons.

For teams registered before **9th April 2023 2359 SGT (GMT +8)**, there will be an Early Bird Discount. The registration fee will be reduced by **\$10** from the rates above.

AC2023 Signup Pricings

Date of reg	2 members	3 members	>= 4 members
Before 9th Apr 2359h	\$30	\$50	\$60
9th Apr 2359h - 1st May 2359h	\$40	\$60	\$70
From 2st May 0000h	\$55	\$75	\$85

When you have successfully registered your teams, a confirmation email with the confirmed team details will be sent to you. Once you received this confirmation email, you will have 2 weeks to make the required payment. After the transaction is done, do inform us via email at astrochallenge@gmail.com that you have sent the payment and the method of payment used. We will then process the payment and send a final confirmation email.

We will be accepting a few methods of payment. Firstly and preferably, schools may choose to settle payments directly through **vendors@gov**. If you are using this method, please include in your payment confirmation emails

- 1) Which Ministry/Statutory Board you are in
- 2) Which Department
- 3) Which Sub-Business Unit

For payments via **PayNow** transaction, please select UEN number and input S98SS0058J. Do also include your School Name as the Bill Reference No. You can also scan the following QR code:





AstroChallenge 2023

Alternatively, we accept **PayLah** directly to Ms.Yuting She, our vice-treasurer, at 82048681.

We also accept **Giro Deduction** or **direction bank fund transfer** via the following details:

Malayan Banking Berhad Singapore, Holland Village Branch
Bank Code: 7302
Branch Code: 018
Bank Account Number: 04181062002
Holder Name: National University of Singapore Astronomical Society (NUSAS)

This registration fee serves to defray the costs of the competition (e.g., prizes, certificates, organisation and manpower). Please note that an **additional administrative fee of up to \$15** may be charged **per change in registration or new registration** if there are any changes made to team composition or any new registrations made *after* the registration deadline of **1st May 2023 2359 SGT (GMT +8)**. Registration fees are **non-refundable**.

4.) *Competition*

Please refer to **Appendix B** for the rules and regulations.

Please refer to **Appendix D** of the [Invitation Letter](#) uploaded on AstroChallenge website for the complete syllabus.

5.) *Project Round*

The QM Committee **strongly urges** you to read the [Project Round Information sheet](#) thoroughly again prior to submission. Any instructions therein must be followed. Further instructions are as follows:

The poster for the Project Round must be submitted by **1200 SGT (GMT+8)** on 14th May 2023 by email to astrochallenge@gmail.com. You will incur penalties should we receive your submission late.



AstroChallenge 2023

6.) DAQ Round (For Senior Category only)

The submission deadline for the DAQ round is on **20th May 2359 SGT (GMT+8), BEFORE Day 1**. The deadline is strict. Late submissions may be rejected or penalised accordingly.

Each team is expected to work on this question on their own and you are reminded of the need to credit all non-original sources.

You are required to zip all your deliverables into one zip folder for submission and you should name your submission in the following format:

- **[Full School Name]_[Team Number]_DAQ_Submission.zip.**
- For example: Lower Kent School_1_DAQ_Submission.zip

Failure to conform to the above instructions may result in your submission being rejected and being awarded 0 for this portion.

For a list of deliverables, refer to the question paper which will be uploaded onto to AstroChallenge website within the next few weeks.

Please note that for this year's DAQ round, there are no additional files to be downloaded apart from the question paper. All materials required are publicly accessible, and the instructions for accessing them are provided in the question paper.

Do email us at astrochallenge@gmail.com if you encounter any technical difficulties with the DAQ round.



AstroChallenge 2023

7.) Things to bring along for the competition

- a. **Student Card/NRIC** for identification.
- b. **Writing materials** and **scientific calculator** (graphic calculators are **NOT** allowed). We will be following the list of approved (**scientific**) calculators for national examinations which is available on the [SEAB website](#).
- c. **Project Round deliverables** on **27th May (Day 1)**.
- d. **Telescope** for participants in the Observation Round (Senior category only) on **27th May (Day 1)**. You should have already indicated on the registration form if you wish to loan a telescope.
- e. The AstroChallenge [Formula Booklet](#) will be provided on the day itself.

Yours sincerely,
Chong Ka Shing (Mr.)
Chairman
AstroChallenge 2023 Core Committee



AstroChallenge 2023

Appendix A – Schedule of Events for AstroChallenge

Day 1: 27th May 2023 – NTU LT1A@North Spine

	Junior	Senior
0900 – 0930	*Registration/Attendance Checks	
0930 – 1000	Briefing for Project Round	
1000 – 1200	Project Round (Junior)	
1200 – 1300	Lunch Time	
1300 – 1330		
1300 – 1330		*Registration/Attendance Checks
1330 – 1430	Opening Address	
1430 – 1500	Team Round Briefing	Project Round Briefing
1500 – 1700	Team Round	Project Round (Senior)
1700 – 1900		Dinner Time
1900 – 2000		Setting up scopes (Senior Category only)
2000 – 2230		Observation Round – Practical Component (Senior Category only)



AstroChallenge 2023

Day 2: 29th May 2023 - NUS (LT7A & EA)

	Junior	Senior
0900 – 0930		Registration/Attendance Checks
0930 – 1000		Briefing for Observation Round
1000 – 1200		Observation Round – Theory Component (Senior Category only)
1200 – 1330		Lunch Time
1330 – 1500		Team Round (Data Response Questions)
1500 – 1530		
1530 – 1600	Briefing for Individual Round (MCQs)	
1600 – 1800	Individual Round (MCQs)	
1800 – 1930	Dinner	
1930 onwards	Stargazing (Optional)	

Note: Stargazing is dependent on weather conditions



AstroChallenge 2023

Day 3: 3th June 2023 – NUS (LT6)

0900 – 0930	Registration/Attendance Checks
0930 – 1200	Finals 1 (Junior Category)
1200 – 1215	Prize Presentation (Junior Category)
1215 – 1345	Lunch
1345 – 1400	Registration/Attendance Checks
1400 – 1630	Finals 2 (Senior Category)
1630 – 1645	Prize Presentation (Senior Category)
1645 – 1830	Post-Mortem



AstroChallenge 2023

Appendix B – Rules and Regulations for AstroChallenge

The AC Core Committee and the QM Committee reserves the right to amend any of the rules contained herein. Participants will be notified of the relevant changes.

General rules

1. Unless otherwise explicitly specified, any communication devices or devices with storage and/or display capabilities are not to be used during all the rounds.
2. Unless otherwise explicitly stated, only text written/typed/spoken in English shall be marked and scored.
3. You are not restricted from using any other language for purposes other than to be marked or scored.
4. Only scientific calculators found in SEAB's approved list of calculators are permitted. No other calculators will be allowed in this competition.
5. Any team caught cheating will be subjected to disciplinary/remedial action, including but not limited to being reprimanded, having score deductions or being immediately disqualified. The teacher-in-charge and their respective school will be notified in the event of cheating. After investigation, the Core Committee may, at its discretion, denounce the actions of the said team publicly as a deterrence as well as make known of any punishments awarded.
6. The tabulation of the points at any stage in the competition, including the total score, is final. No correspondence or representation will be entertained.
7. At the discretion of the QM Committee, the Top 50% of Individual Round, Team Round, Observation, and Project scores may be released. Unreleased results will only be made upon the Teacher-in-Charge's or an authorized agent's (who has to be a participant) request. Each school may only view its own students' scores.



AstroChallenge 2023

Rules and Regulations for Specific Rounds:

Individual Round

Duration: 2 hours

- A maximum of **5 members per team** can take part. Participants may leave before the time limit, but may not leave within the last 15 minutes of the paper.
- The overall points for the Individual Round will be the average of the marks from the best 4 scorers within the team.
- Cooperation among team members during the Individual Round is strictly prohibited and will be considered cheating.
- There will be a total of 50 MCQs in this round. Each MCQ contains 5 options and there will only be one correct option.
- Each participant will start off with 50 points. Marks will be awarded as such:
 - 2 marks will be **given** for each correct answer.
 - 1 mark will be **deducted** for each wrong answer.
 - 0 marks will be given for blanks.

A maximum of **7 blank** answers are allowed from each individual, after which all other blank answers will be considered as wrong answers.

- A “*Best Astronomer*” from each category will be selected based on the individual scores for this round. In the event of a tie, several tiebreakers (e.g., most correct answers) will be used to break the tie.
- The Junior Category Individual Round paper will not be the same as the Senior Category Individual Round paper. Ensure you have the correct and complete question paper before working on the questions.
- Scripts with illegible names or schools will be similarly not marked.
- Absent member(s) within a team is considered to have submitted a blank answer sheet and will be marked accordingly.



AstroChallenge 2023

Team Round

Duration: 2 hours

- Most of the questions are on applications in Astronomy.
- The team reserve cannot take part, unless one member of the team is absent and/or unwell. Only 4 participants per team may take part in the Team Round.
- There will be a total of 5 structured questions. Each structured question will contain around 20 marks, up to a total of 100 marks.
- In the interests of fairness, the points awarded to the team for this round is the total sum of marks awarded across all questions, capped at a maximum of 80 marks.
- The first structured question will contain short open-ended questions that focus on testing factual understanding and recall of astronomical basics.
- In addition, for the **Seniors**, 1 structured question (DAQ) has been released on the website and will be due for submission by **20th May 2359 SGT (GMT+8), BEFORE Day 1**. The deadline is strict. For further instructions such as how to format the submission, refer to point number 6 above.
- The use of a cheat sheet is permitted for this round. Each participant is allowed to prepare a single piece of A4-sized paper (double sided) with **handwritten** materials. Participants are also allowed to share their cheat sheets within the team during the round.



AstroChallenge 2023

Observation Round (Senior Category only)

Relative Weightages:

Round Name	Weightage
Theoretical Observation	50%
Practical Observation	50%

Duration:

Theory: 2 hours

Practical: as long as it takes but only until 2230

Instructions:

- This is an inter-school round.
- Each school may send **up to 5 participants** to participate in this round. The school can choose these number of participants out of all its participating teams to form the observation team. The score obtained by this observation team will be the observation score for all teams for that school.
- **The same persons** who appeared for the Practical Component must present themselves for the Theory Component. There will be no changing of members.
- The two components will be explained further in detail below:

Theory Component

- The Theory Component will be held after the Team Round. This round mainly tests Participant's knowledge of how to stargaze in theory. As such, other than the fact that no scope handling is tested, anything else under the universe can be tested.
- Teams might be split into two for some or all components of the paper.
- The Theory Component shall be **closed book**. You may not bring in any material for the test to refer to. Doing so will result in your disqualification and related investigative procedures.
- The stargazing software that may be used in the theoretical observation round is Stellarium (<https://stellarium.org/>). The question may involve finding deep sky objects or pointing out particular stars and constellations (analogous to practical observation round).
- Participants are highly recommended to familiarize themselves with the program prior to the competition, and take note of the following additional settings:
 - Unless otherwise stated, time zone and location are set to those of Singapore.



AstroChallenge 2023

- Time may or may not be paused.
- What will be shown: stars, planets and deep sky objects (subject to sky condition settings), the ground.
- What will NOT be shown: labels for celestial objects, constellation lines, celestial coordinates grid.
- Only keyboard navigation – directional arrow keys, PgUp & PgDown to zoom – is allowed.
- Unless otherwise stated, viewing options will be standardized as follows:
 - Atmosphere: On.
 - Light pollution: 3.
 - Labels and Markers: All off.
 - Projection: Stereographic.
- If tested, the telescope and miscellaneous settings in the Oculars plugin will be revealed on the day itself. If the Oculars plugin is not used, participants may switch between Equatorial and Azimuthal Mount mode as they deem fit.
- For further information, please see our website for a briefing about the Observation Round closer to the date.
- Participants are encouraged to practice finder chart drawings and finding using Oculars mode.

Practical Component

- The Practical Component of the observation round is held on Day 1.
- Only telescope set-ups not deemed to be a danger to anyone around by the AC Core Committee are allowed to be used for the Practical Component.
- Teams are to keep to their allocated areas.
- Participants are expected to complete their observation log sheets (provided). They will also be tested on their telescope handling and alignment skills. Judges will verify each object found by the team.
- GOTO-enabled mounts/scopes and any form of computerized mounts/scopes are **NOT allowed** to be used during this round, **unless the motor and computer are switched off and the scope operated manually**.
- Participants are expected to pack their equipment in shock-absorbing material to ensure it will not be damaged during transportation.
- The organizers, the AC Core Committee, the judges, NTU and/or NUS will **not** be liable for any loss or damage of equipment at any point of time during the competition.
- This round is dependent on the weather and in case of bad weather, the AC Core Committee reserves the right to call off or replace the round.
- For the avoidance of doubt, the AC Core Committee cannot be held liable for the weather or other such frustrating events beyond their control.



AstroChallenge 2023

Project Round

Please refer to the [AstroChallenge 2023 Project Round Information Sheet](#) for the specific rules and requirements for the round.

Exhibition round

- Do note that the AC Core Committee may choose to amend any of the below instructions as necessary. Notice will be given to you if the instructions are changed.
- Teams will be given a strict window of 30 minutes to set up. If teams are still setting up beyond this strict window, the AC Core Committee may impose a 20% overall penalty on your total project round score without notice.
- The time limit for each presentation is set to 5 minutes. All team members must participate in the presentation as well as the making of the project presentation. Thereafter, Judges may ask questions for up to 3 minutes.
- Ensure that someone is at your project booth at all times. Seek permission from the AC Committee if no one can be present at the booth at a certain time. Penalties may be imposed if booth is deserted without permission.
- Do note that the instructions for the Exhibition segment may be amended with notice due to unexpected circumstances or other conditions imposed by, inter alia, the government, NUS, NTU, our venue sponsors and/or the AC Core Committee.

You are reminded of the seriousness of passing off any other person's work as your own.



AstroChallenge 2023

Final Round

Duration: 2.5-3 hours (projected)

The **top five teams per category** (based on all preceding rounds) will take part in this round. Only 1 team from each school per category can qualify for the Final Round. In addition, there will be a **sixth team** composed of 4 individuals with the highest MCQ scores from different schools that are not already represented in the finals. Should there be less schools than available slots, the next highest scoring individuals will be selected.

- Only 4 participants are allowed for each team. The reserve member is not allowed to take part.
- In the event that 2 or more teams from a school qualify for the Final Round, only the top team will participate in the Final Round. The next team will be bumped up.

Illustration: The rankings for AC are as follows

1. Lower Kent School Team 1
2. Lower Kent School Team 2
3. Upper Kent School Team 1
4. South Holland School Team 3
5. Upper Serangoon Institute Team 4
6. South Holland School Team 2
7. Upper Kent School Team 3
8. Lower Thomson School Team 1
9. Lim Chu Kang Institute Team 3

The Qualifications for the final round will be as follows:

1. Lower Kent School Team 1
2. Upper Kent School Team 1
3. South Holland School Team 3
4. Upper Serangoon Institute Team 4
5. Lower Thomson School Team 1

Lower Kent School Team 2 is not in the finals because Lower Kent School Team 1 is already in the finals and was ranked higher. South Holland School Team 2 is bumped up but since South Holland School Team 3 had already qualified, it is similarly not in the finals. So on and so forth.

- The Final Round components will be changed this year and the details will not be released as of now.



AstroChallenge 2023

Score Weighting for Preliminary Rounds

Round Name	Junior	Senior
Individual	30%	20%
Team	30%	20%
Observation	N/A	30%
Project	40%	30%
Total	100%	100%

Score Weighting for Grand Total (for both Juniors and Seniors)

Round Name	Weightages
Preliminaries	30%
Finals	70%
Total	100%

The round weightages for AstroChallenge 2023 are provided to serve as a strategic guide for participants.



AstroChallenge 2023

Appendix C: Memorandum from the Head Question Master

Dear Participants,

Hello and welcome to AstroChallenge 2023! Before I go on and on, let me briefly introduce myself, My name is Janani Ramachandran, and I am this year's AstroChallenge Head Question Master. I am a year 2 NUS student studying Physics, and this is my first time in AstroChallenge and in the NUS Astronomical Society. I have 2 passions in life-Science and Teaching and AstroChallenge is this beautiful union of my two loves.

After 2 years we are finally able to hold this year's AstroChallenge live and in person! Even though this is my first time, I can feel the enthusiasm through my team's excitement for this year! Until I took over the position of AstroChallenge HQM, I was completely unaware of what AstroChallenge even was. So now, after seeing the inner workings and the behind-the-scenes of how AstroChallenge works, I am extremely grateful to be part of this journey.

When I was young, I had this giant science encyclopedia and I would always find myself flipping and reading through its space section. Every time I read it, I felt as if I was transported into a completely different world! Floating amongst stars and spinning on planets! But I never had any formal opportunity to engage in a competition like this. Even though AstroChallenge is a competition, at its heart, it is a journey. A journey of learning more deeply about the universe and its confounding mysteries. So, for those coming back to participate in AstroChallenge, welcome back! And for those first-timers like myself, Welcome! This journey is going to be nothing short of amazing! You might get lost, but my team and I are always there to guide you and make sure that this journey is a memorable one.

Much like the previous AstroChallenges, please don't be afraid of the syllabus. You are not expected to know the syllabus inside and out before the competition. To prepare do look at the past year's papers. They are a great way to build up knowledge and the know-how to answer the questions. As always, towards the end, the post-mortems will take place, and the discussion of the questions and common errors, if any, will be undertaken by our team.

Since it is the first fully-physical AstroChallenge in 2 years, we hope the experience of attempting the questions will be new and exciting. Our OICs and QMs have worked very hard to come up with new and intriguing questions. The competition is a great way to pique your interest in astronomy and will be a great place to learn new things and concepts you may not have known. If you find that the questions are hard, don't fret and try your best! We don't wish to put you down but instead, challenge your thinking!

Once again, thank you for signing up for AstroChallenge 2023. We hope that this AstroChallenge brings back the old charm and fun we had before the pandemic, a chance for like-minded individuals with a passion towards the stars to come together! I can't wait to see you guys!

Clear skies,
Janani Ramachandran (Ms.)
Head Question Master of AstroChallenge 2023