



AstroChallenge 2022

To: Teachers-in-charge and Participants

Dear Sir/Mdm,

On behalf of the AC Central Committee, I would like to thank you for your keen interest in **AstroChallenge 2022**. The contents of this letter include important issues and rules to take note of:

1.) Competition Dates and Format

Day 0 – **29 May**, 19 00, physical (location to be announced)

Day 1 – **4 June**, 09 00, online

Day 2 – **12 June**, 09 00 (Juniors)/14 00 (Seniors), NUS SHAW Foundation

For Day 0, the location will be finalised and announced in time to come. Schools will be notified via email upon release of detailed administrative briefing materials on the **AstroChallenge website**. Participants are expected to peruse the materials before Day 0.

Please note that **only members of each school's Observation Team** can be physically present on **Day 0**. Also rest assured that the venue will be **closed to the public** during the Observation Round.

Day 1 will be conducted over Zoom. It will be facilitated by members of the AC Organising Committee. **All participants** will be required to attend Day 1.

Day 2 will be conducted at a physical venue for **finalists only**. There will be a live stream of Day 2 set up as well.

Please refer to **Appendix A** for the schedule of events, **Appendix B** for the map of NUS SHAW Foundation (Day 2), and **Appendix C** for more information on the rounds. **Appendix D** has a memorandum from the Head Question Master. Please note that the schedule may be subject to changes.

Please also remember to register if you have not already done so. The registration link can be found on our website or [here](#). The deadline for registration has been extended to **01 May 2022, 2259 CST (GMT +8)**. However, those who have already registered or are planning to register by our original deadline will benefit from an Early Bird Discount (refer to Point 3: Payment).



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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 school will also be paired with an AC Committee Member and added into a separate group. This is to facilitate communication between participants and the AC Central Committee before and during the competition.

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):





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3.) Payment

For teams registered before the deadline of **1st May 2022 2259 CST (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 our original deadline of **31st March 2022 2259 CST (GMT +8)**, there will be an Early Bird Discount. The registration fee will be reduced by **\$10** from the rates above.

You may refer to the table at the bottom of this section for reference.

We will be accepting a few methods of payment. For the first method via **PayNow** transaction, please select UEN number and input S98SS0058J (instead of the usual NRIC/mobile). Alternatively, you can scan the following QR code:



After the transaction is done, do inform us via email at astrochallenge@gmail.com that you have sent the payment. We will then process the payment and send a confirmation.

Alternatively, we accept **PayLah** directly to Ms. Kelly Soh, our treasurer, via the following QR code:



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



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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)

Lastly, schools may choose to settle payments directly through **vendors@gov**. If the school is registered and wishes to do so, please notify us at least 15 working days before Day 0 (**by 6th May 2022**) and we will send an e-invoice via **vendors@gov** with a default payment term of 30 calendar days.

Teachers-in-charge will be receiving the invoice and other details about payment through email. 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 2022 2259 CST (GMT +8)**.

A summary of the pricings is given below:

AC2022 Signup Pricings

Date of reg	2 members	3 members	>= 4 members
Before 31st Mar 2259h	\$30	\$50	\$60
31st Mar 2259h - 1st May 2259h	\$40	\$60	\$70
From 1st May 2300h	\$55	\$75	\$85

4.) *Competition*

Please refer to **Appendix C** 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 Infosheet](#) thoroughly again prior to submission. Any instructions therein must be followed. Further instructions are as follows:

The video for the Project Round must be **submitted by Day 0 (29 May) by 1900**. You will **incur penalties** should we receive your submission late.



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You may choose any of the below methods for submission:

1. Emailing us the video file; or
2. Uploading the video onto an online server and emailing us the link.

In your email, you should advise the Committee of the question number you have attempted.

Please note that in addition to your video, you are reminded to send **a transcript of your video** if it is not subtitled, and **a list of all references in a word or pdf file**. If you do not submit the list of references, notwithstanding any credits within the video, it shall be presumed that you claim your entire video to be your original work.

Please also note that you are only allowed **one video** and it **CANNOT exceed 2 GB in size**. If you submit more than one video, the AC Central Committee will take the latest submission as your video (with corresponding penalties if it is late). If you submit more than one video at the same time, the AC Central Committee will only pick one at random to grade.

Kindly ensure that **the video can be viewed**. If the video only becomes viewable after the deadline, the **same penalties for late submission apply**. **Dead links** or otherwise **unwatchable videos** will be deemed as **a non-submission**.

Should you choose any other method to submit the video, you are required to write in to us for approval.

6.) DAQ Round (For Senior Category only)

- The submission deadline for the DAQ round is **Day 0 (29 May) 1900**. The **deadline is strict**. Late submissions may not be entertained.
- 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**.
- 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](#).



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If you wish to use our recommended method of solving, the google drive files can be found [here](#). Read the question paper carefully. You are supposed to download the folder and put it into your own drive. As such, only the Team Leads will have access to this folder.

If you have not already done so, Team Leads are to provide us, via astrochallenge@gmail.com or the registration form, at least one **Google** Account address for us to share the questions with on Google Drive. If you are sending us an email, put the **subject** as:

[Full School Name] [Team Number] DAQ Google Account

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. **Trace-Together token or app** for entry into venues.
- d. **Telescope and insect repellent** for participants in the Observation Round (Senior category only) on **29 May (Day 0)**. You should have already indicated on the registration form if you wish to loan a telescope.
- e. **Completed Project** (Seniors and Juniors) and **DAQ** (Seniors only) on **29 May 1900**.
- f. The Astrochallenge [Formula Booklet](#) either in printed form or pdf.



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8.) *Safe management measures*

- a. Please note that failure to comply with any of the following SMMs or any relevant instruction within this information letter before, during or after the competition may result in you being **barred or disqualified from participating** in the competition.
- b. **Do not come if you are feeling unwell.** We will be conducting temperature checks before the competition.
- c. It is **mandatory to keep your masks on at all times.** Unless otherwise instructed, masks can only be removed if you are hydrating yourself. Masks should adhere to guidelines set by the Ministry of Health.
- d. Please observe **safe physical distancing of at least 1 meter** from other teams and refrain from interacting with other teams.
- e. For Day 0 (Observation Round), you are required to **keep to your allocated area** and avoid wandering to other teams' spaces.

9.) *COVID-19 Contingency Plans*

The committee is closely monitoring the COVID-19 situation in line with national SMMs and MOE's advisories. Please note that in the event of new heightened measures, the **following measures may be taken** (non-exhaustive):

1. Practical Observation round being held online, substituted or cancelled;
2. Practical Observation round being held at decentralized locations; and/or
3. Day 2 to be held online.

Please look out for a **confirmation closer to Day 0.** We seek your understanding that the situation is volatile and last-minute changes may be unavoidable. Once again, we hope to have a physical AC as far as possible to preserve the integrity of the competition, if the situation allows for it.

More details and updates on the aforementioned events will be provided on AstroChallenge website at <https://www.astrochallenge.org>.

Please read the appendixes below carefully and contact us at astrochallenge@gmail.com if you have further enquiries. Note that subject to the complexity of your queries and the prevailing requirements for formalities, if you contact us informally on certain issues, we may ask you to email us formally and we will then reply from there.

Thank you and we look forward to seeing you at AstroChallenge 2022.

Yours sincerely,
Khoh Yek How (Mr.)
Chairman
AstroChallenge 2022 General Committee



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Appendix A – Schedule of Events for AstroChallenge

Day 0: 29 May 2022 – Physical (TBA)

1900 – 1930	Registration + Briefing
1930 – 2000	Setting up scopes (Senior Category only)
2000 – 2230	Observation Round – Practical Component (Senior Category only)

* Note that there will be 2 Tutorials on Practical Observational Astronomy held on this day, before 1600. The location will be fixed by email. For more information on what the Tutorial entails, please refer to the [AC2022 Changes Outchit](#).

Day 1: 4 June 2022 – Online

0900 – 0930	Registration/Attendance Checks
0930 – 1000	Opening Address
1000 – 1200	Individual Round
1200 – 1330	Lunch
1330 – 1400	Briefing for Team Round
1400 – 1600	Team Round
1600 – 1630	Briefing for Observation Round
1630 – 1900	Observation Round – Theory Component (Senior Category only)
From 1900	QM fireside chat (Upon Request)

NB: QM fireside chat are informal sessions in breakout rooms for the QMs and the Central Committee to collect feedback from you for this competition as well as your experience in Astronomy before coming in. Additionally, you will be able to ask us any questions regarding the competition and Astronomy in general.

Teams may indicate their interest to the AC committee member assigned to their school before 1830 on Day 1. Subject to availability on a first come, first served basis.

Day 2: 12 June 2022 – Physical, NUS SHAW Foundation

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

NB: Day 2 is by invitation only. The committee will attempt to setup a livestream of the Finals.



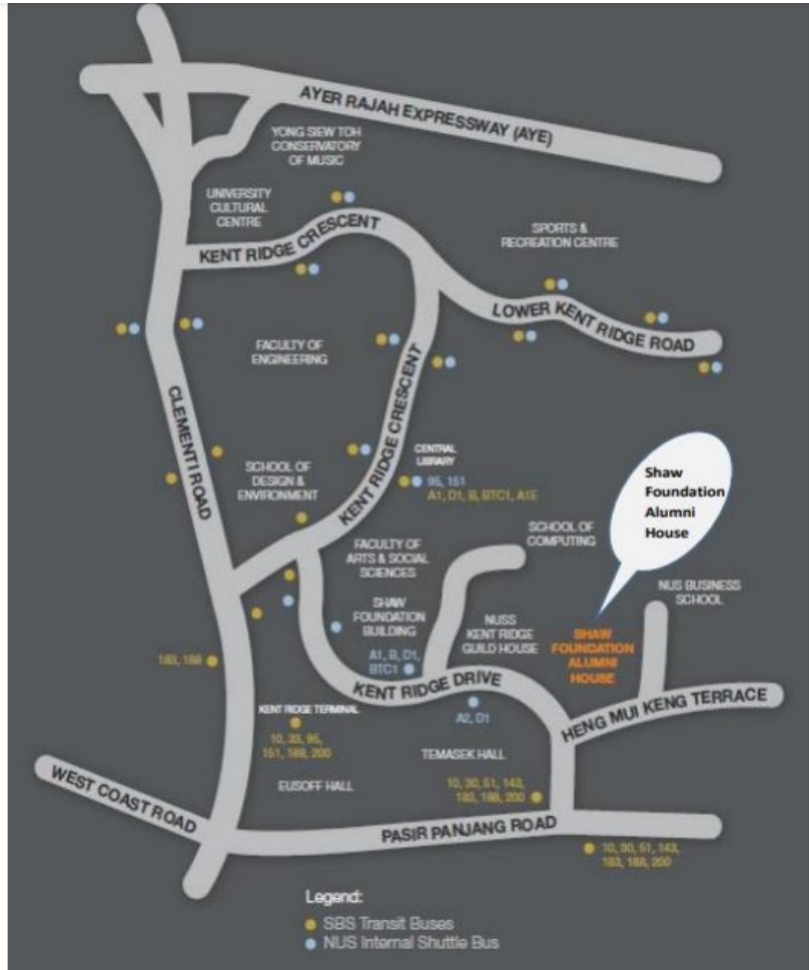
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Appendix B – Map of Competition Venues

Day 0 - TBA

Day 2 – NUS SHAW Foundation

Address: 11 Kent Ridge Dr, Singapore 119244



More detailed directions to get there:

<https://www.nus.edu.sg/research/docs/librariesprovider7/default-document-library/directions-to-shaw-foundation-alumni-house.pdf>



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Appendix C – Rules and Regulations for AstroChallenge

The AC Central 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. Notwithstanding point 2 above, the languages as stated within Article 153A of the Constitution of the Republic of Singapore (2020 Rev Ed) may be used PROVIDED THAT an English transcription/translation is provided. In the absence of an English transcription/translation, no marks will be awarded. If there are any inaccuracies in terms used or otherwise in either the original language or the English translation/transcription, the QM committee may penalize according to the extent of the inaccuracy in either language.
4. You are not restricted from using any other language for purposes other than to be marked or scored.
5. Only scientific calculators found in SEAB's approved list of calculators are permitted. No other calculators will be allowed in this competition.
6. 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 Central 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.
7. The tabulation of the points at any stage in the competition, including the total score, is final. No correspondence or representation will be entertained.
8. 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.



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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 individuals in the team.
- There will be a total of 50 MCQs in this round. Each MCQ contains 5 options.
- Participants start off with 50 points.
 - 2 marks will be given for a correct answer.
 - 1 mark will be deducted for a 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.

- There will be 5 to 10 questions in the Senior/Junior Individual Round exclusively focusing on astronomical basics and recall of fundamental Astronomy facts.
- 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.
- Submit a photo of your answers on one sheet of paper. For submissions with multiple sheets of paper, we will only mark the first sheet (even if it is blank or is without answers). More instructions will be given on the day of the competition.
- Scripts with illegible names or schools will be similarly not marked.
- If you refuse to show up on the day or if your script is not marked for any reason whatsoever, you will be deemed to have submitted a blank answer sheet and it will be marked as such.



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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 1900 on Day 0 (29 May). 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.



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Observation Round (Senior Category only)

Relative Weightages:

Round Name	Weightage
Theoretical Observation	40%
Practical Observation	60%

Duration:

Theory: 2 – 3 hours

Practical: as long as it takes until not later than 2230

Venues:

Theory – Online

Practical – TBA

- This is an inter-school round.
- Each school may send **up to a certain number of 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 Night Sky Tour must present themselves for the Theory Component and the Practical Component. There will be no changing of members.
- The exact maximum cap on the number of participants will be revealed at a later date when the situation becomes clearer but traditionally, the cap has been set at 4, 5 or 6 persons.
- Participants are expected to be familiar with the remote-control function on Zoom and/or other methods of remotely controlling a computer.
- 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.



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- 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.
 - 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.

Practical Component

- The Practical Component of the observation round is held on a separate day (Day 0).
- Usually, we would allow other team members and visitors from schools to be silent observers for the practical component upon prior written request. However, due to the circumstances this year, we would be unable to allow any other persons to be present at the venue except for the 4 persons nominated for the observation round.
- Participants may bring along any reference materials, subjected to checks. These materials must be submitted for checking to the quizmasters beforehand for review.
- Only 1 person from each school's Observation Team is allowed to proceed with setting up the telescope. This person will be randomly selected from each school's Observation Team.



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- Only telescope set-ups not deemed to be a danger to anyone around by the AC Central Committee are allowed to be used for the Practical Component.
- At any one time, only **1 person** from each school's Observation Team is allowed to handle the scope. Members must remain **a minimum of 1 meter apart** from each other **at all times**.
- 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 Central 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 Central Committee reserves the right to call off or replace the round.
- For the avoidance of doubt, the AC Central Committee cannot be held liable for the weather or other such frustrating events beyond their control.

Project Round

Please refer to the [AstroChallenge 2022 Project Round Information Sheet](#) for Entry Rules and Regulations. There are further instructions above at point number 5.

Do note that we will NOT be having the exhibition segment for AC2022. There will be no replacement round declared.

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



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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.

- 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.



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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	If Online	If Physical
Preliminaries	40%	30%
Finals	60%	70%
Total	100%	100%

The round weightages for AstroChallenge 2022 are provided to serve as a strategic guide for participants. The Central Committee and/or the QM Committee reserve the right to amend the weighting should it be decided necessary or expedient at any point in the competition, with or without prior notice.



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Appendix D: Memorandum from the Head Question Master

Dear Participants,

To those of you joining AC for the first time, welcome. To those of you who have participated in AC before, welcome back. I hope that the above instructions aren't too overwhelming for those newly here.

As those who have participated in AC before would tell you, there is nothing to be afraid of. This is not an exam. It is merely a platform for you to learn. Winning is a bonus and you should aim to learn and not to win. With that in mind, my team and I have started a new tutorial initiative as outlined in the changes outchit. Newer schools especially, read that carefully.

I know that it has been trying on all of us these few years. We feel it too. We have not been having a completely physical AC since 2019. While we have been holding AC online for several years now, there will nonetheless still be teething problems and some inconveniences brought about by the online system. We hope to seek your understanding in this issue. At the end, we will be asking for feedback and we do sincerely wish that you write in frankly.

My team this year has been very hardworking. Both my QMs and Additional QMs are of diverse backgrounds. Over the course of AC, you will see the results of all this hard work: a very exciting competition for all of you, new and returning. The syllabus has been revised. There will be some differences in the rounds and I personally think it will be more fun.

Especially to those new to AC, I say this to you particularly: My team and I are there to help you along at any point in time should you feel lost. If you are, raise your hand and ask for help. You can ask to speak with us and there really is no limit as to the thing you can ask us. As I said before, this is not an exam. We would not fault you for asking any question at all but we do hope that you will understand that there will be questions which we simply cannot answer. While the experience is much richer in a Physical AC, it can be done online as well. You will be allocated into individual rooms by team. If you need assistance, call for help and we will be there.

For those afraid of a steep learning curve or trying to struggle though the updated syllabus, not to worry. You are not expected to know or learn everything in the syllabus before the competition. Know what is the most important. You can refer to past year papers to see what our focus is on and you should look at the past Post Mortems also on the same page. Back when I was a participant, I personally found Post-Mortems hilarious and enriching. It would tell you of our priorities and aims.

Let me say to all of you: while we may be more experienced than you are in Astronomy and be your “teachers” of some sort, we are not all knowing as well. There will be things which we simply did not get correct and there will be things which are inaccurate because they are simplified for the purposes of AC. If you are sure that you do spot any of them, you can write it out. You may be rewarded for doing so at our discretion.

Lastly, let me end off with an appeal to all of you. If you enjoy Astronomy and AC, do apply to join us. There are some of us who are not STEM students. I, for one, am not. (There is a reason why the rules are particularly strict since AC2021.) We will of course have to evaluate each and every one of you and we do have entry requirements. Particularly, you would have to have graduated from your JC for 8 months or more and have a keen interest in Astronomy.

Let me just say yet again that I look forward to seeing all of you for AC2022, virtually or physically. I am pleased that many of you keep returning to AC year after year. I will next be seeing you at the end of AC to deliver the (in)famous Post-Mortem. Look out for that and all the best in AC2022. I do hope you will enjoy the process and learn something from it.

Nicholas Phung (Mr)

Head Question Master of AC2022