

Grand Finals Guidebook

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<https://sgphysicsleague.org/>



Dear participants of SPhL,

As you probably already know, in this fifth year of SPhL, we're taking things to the next level with a brand-new, in-person event: the SPhL Grand Finals. When physics becomes physical, you know things are about to get real.

If you're reading this, chances are you've performed well in the Singapore Physics League 2025 and are gearing up for the Grand Finals. Congratulations! Even if you're simply curious about what the Grand Finals entails, you're welcome to explore this guidebook.

We wish you all the best in tackling the physics challenges we've prepared for you and hope you enjoy every moment – from solving mind-boggling problems with your teammates to connecting with fellow physics enthusiasts, and most of all, immersing yourselves in the joy and wonder of physics.

If you're in the Junior Category or didn't qualify for the Grand Finals this time, don't be discouraged. Your journey is just beginning, and we hope this competition has inspired you to keep exploring physics. And to those who have qualified, congratulations once again. See you at SUTD!

Li Xinrui & Sun Yu Chieh
Chief Organisers of SPhL 2025





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Competition Schedule

1230 – 1250

Registration

Check in and collect your goodie bags. Please have a proper meal before arriving as the competition will be pretty intense!

1300 – 1305

Opening Address

1305 – 1330

Sponsorship Segment (Hudson River Trading)

1330 – 1350

Pre-Competition Briefing

A walkthrough of the competition mechanics.

1400 – 1700

Competition

Let the games begin.

1700 – 1800

Brownian Motion (Buffet & Participants Mixer)

Refuel with delicious food, connect with fellow participants and our sponsors, or go on an SUTD school tour.

1800 – 1830

Guest Lecture

Research sharing by our Guest-of-Honor Professor Kavan Kishore Modi from SUTD.

1830 – 1900

Award Ceremony

Post-mortem presentations by Problem Setters and announcement of winners. Prizes will be given to top-performing teams.

1900

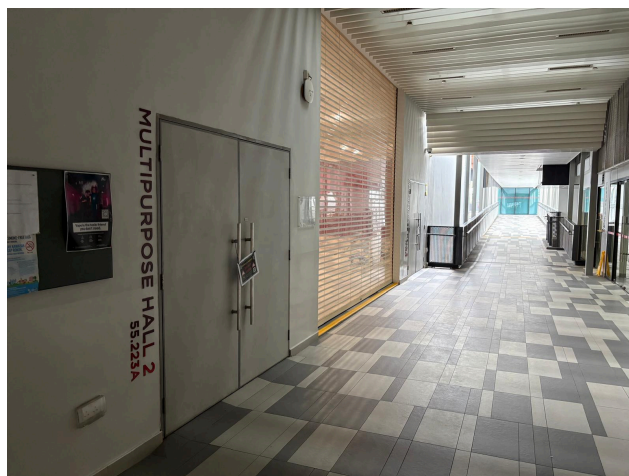
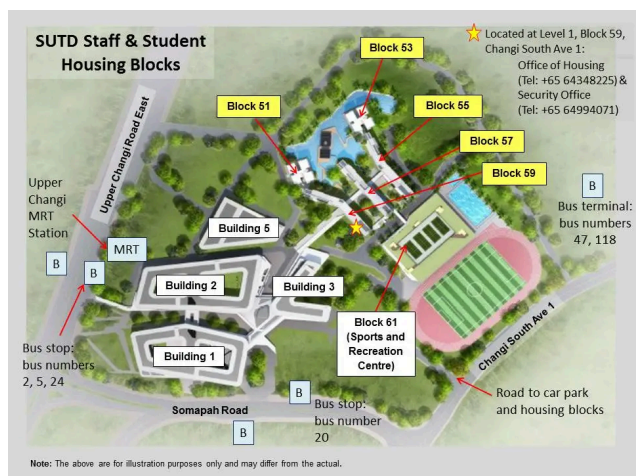
Event End 🎉





Venue

The SPHL Grand Finals will be a fully physical event held at the Singapore University of Technology and Design. Participants are to gather in teams with all members present, before registering **outside Multipurpose Hall 2 (MPH)** at **Block 57, Level 2**. Don't worry, we will put signages around the campus to guide you to the venue!



By Train

- Alight at **Upper Changi MRT Station (DT34)** and take Exit E
- Alight at **Expo MRT Station (DT35 / CG1)** and walk along Changi South Avenue 1 in the direction of Max Pavilion/Somapah Road

By Bus

- Alight at one of the bus stops along **Somapah Road** and walk:
 - ◆ B96449: SUTD. Service No: 20
 - ◆ B96441: Opposite SUTD. Service No: 20
- Alight at one of the bus stops along **Upper Changi Road East** and walk
 - ◆ B96041: Upper Changi Road East, Before Tropicana Condo. Service No: 2, 5, 24
 - ◆ B96049: Upper Changi Road East, Opposite Tropicana Condo. Service No: 2, 5, 24
- Alight at **Changi Business Park Terrace (Bus Terminal)** and walk:
 - ◆ Service No: 47, 118

For more details on getting around the SUTD campus, please visit the SUTD website [here](#).



About our Guest Lecturer

Professor Kavan Kishor Modi is a theoretical physicist and obtained his PhD from the University of Texas at Austin. He has held research positions at the Centre for Quantum Technologies (NUS) and Clarendon Labs (Oxford), and was formerly a Professor at Monash University and the Director of Centre for Quantum Technologies at Transport for New South Wales.

His research focuses on complex quantum dynamics and stochastic processes, with applications in quantum computing, quantum chaos, and quantum information geometry. He has worked across disciplines, collaborating with experimental physicists, neuroscientists, computer scientists, and mathematicians.



Rules (TL; DR)

There will be a total of **7 problems** labelled 1 to 7. Each problem will be divided into 3 sections (A, B, C), each containing sub-parts. Teams will have access to all sub-parts of a section at once.

At the beginning of the competition, each team receives an envelope containing 7 starting sections (1 from each problem: e.g. 1A, 2A, 3A etc.), and 7 accompanying answer cards. All part Bs and part Cs will be locked. At any moment in time, every team will have access to 7 sections. At the beginning of the competition, this will of course be 1A, 2A, ..., 7A.

The final answers to the problems should be written on the answer cards and delivered to the marking station assigned to your team. When you solve an entire section correctly, the next section will be unlocked. Every 30 minutes, you are also granted a free unlock to one section (See [2.3. Unlock Questions](#) below). In an exceptional case, the problem marker may ask how the team arrived at the solution. Electronic gadgets are strictly forbidden during the competition (except for calculators, see [List of Approved Calculators](#) below).



Full Rules

1. Arrival to the Competition

- Selected teams from the **Singapore Physics League (2025) Senior Category** will be invited to participate in this competition. Students are to remain in the same team of 3–5 members.
- Teams must arrive on time and complete registration **before 1250**, and Organisers reserve the right not to admit late-arriving teams to the competition.
- Teams are to register **with all members present** and provide accurate information about their full team particulars with NRIC/Singpass (team name, member name, years, schools, etc.). Teams should inform the Organisers as soon as possible in the event of any last-minute changes in the team composition or if certain members will be arriving late.
- Each team will be assigned a **Team ID**, and all participants will receive a **"Participant" lanyard**. Only those with lanyards are allowed to enter the competition venue.
- All participants are expected to be dressed in presentable attire or school uniform. The Organising Team reserves the right to deny entry to participants who are not dressed appropriately.

What you CAN bring ✓	What you CANNOT bring ✗
<ul style="list-style-type: none">• Student ID (e.g. Student Card, NRIC, Singpass) for registration and verification• Writing instruments ONLY (papers will be provided)• Electronic devices (although they have to be kept away before the competition)• Approved calculator (Scientific calculators ONLY)• Hardcopy physics-related materials (e.g. handwritten notes, textbooks, or printed materials)• Water Bottle• Sweater/Jacket (venue may be cold)• A team mascot!• Team spirit and positive energy!	<ul style="list-style-type: none">• Food items (Buffet will be provided for dinner)• Distracting items (e.g., prank items, toys, or anything that may disrupt others)• Hazardous items (sharp objects, flammable items, or anything that poses a safety risk to yourself and others)



- Please present all materials and equipment you intend to bring into the competition venue at the registration booth. These items will be checked by the Organisers before entry is permitted. If any materials are deemed inappropriate or non-compliant with competition guidelines, the Organising Team reserves the right to safekeep them temporarily until the end of the competition.

2. Competition Mechanics

2.1. Problem Format

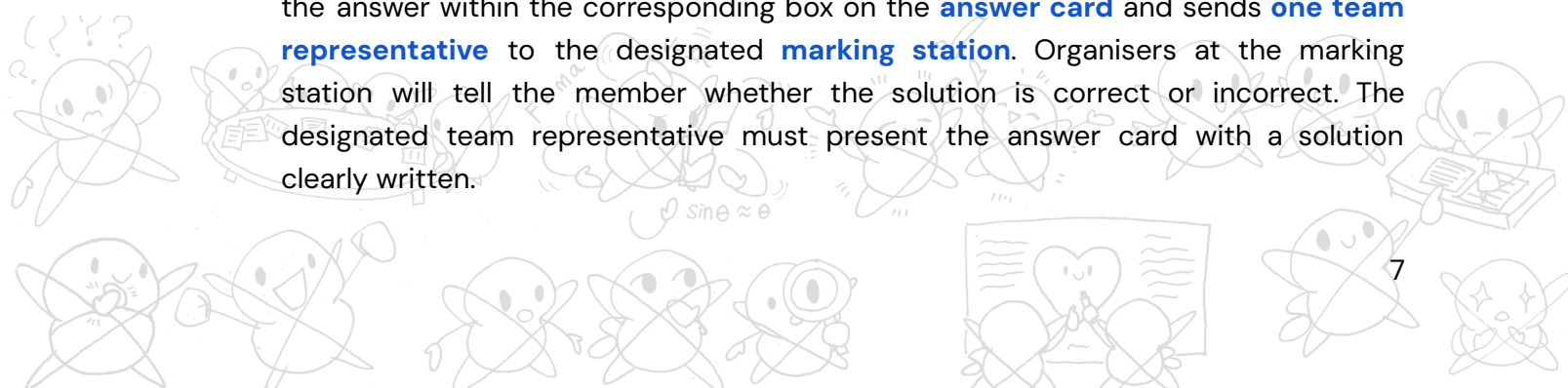
- The competition will be 3 hours long, from 1400 to 1700.
- There will be a total of **7 problems** labelled 1 to 7, each delving into a particular physics concept or phenomenon. Each problem will be divided into 3 sections (A, B, C), each containing sub-parts. For instance, **section B of problem 1** will be labelled as **1B**, which can contain up to a number of **4 sub-parts**. For instance, if problem 1B has 3 sub-parts, it will be labelled as 1B.1, 1B.2, and 1B.3. Teams will have access to all sub-parts of a section at once.
- Before the start of the competition, each team will receive an **envelope** with their Team ID. This envelope contains the 7 starting problems (1A, 2A, ..., 7A) and 7 accompanying answer cards. Do not open this envelope until you are told to do so.

Problem 1	Problem 2	...	Problem 6	Problem 7
1A	2A	...	6A	7A
1B	2B	...	6B	7B
1C	2C	...	6C	7C

Figure 1. All teams will have access to the 7 starting sections (1A, 2A,...,7A) at the beginning of the competition. All subsequent sections will be locked.

2.2. Answer Submissions

- If the team thinks it has arrived at the correct solution to a problem, the team writes the answer within the corresponding box on the **answer card** and sends **one team representative** to the designated **marking station**. Organisers at the marking station will tell the member whether the solution is correct or incorrect. The designated team representative must present the answer card with a solution clearly written.





- Simultaneous submissions to different parts **for any questions** will be allowed, and all solutions written will be marked. Organisers will not mark the problems with no new attempts. For example, if you have written answers for 1A.1, 5A.2 and 6A.3, we will mark all 3 parts at once. For a particular section (e.g. 1A), there are 3 possibilities:

All sub-parts submitted correct¹	The team earns points and unlocks a new section right away if all sub-parts of the section are answered correctly. For example, if a team submits 1A and gets all sub-parts correct (e.g. 1A.1, 1A.2, & 1A.3), the team will unlock 1B (including all sub-parts concurrently). Organisers will collect the answer card and distribute problem 1B with a new accompanying answer card.
Some sub-parts correct	The team will earn points for the correct parts, but will not be able to unlock a new section until all sub-parts are correct upon resubmission.
All sub-parts wrong	The team will not earn any points and will not be able to unlock a new section.

- Answers are to be written entirely within the box on the answer card in non-erasable dark blue or black ink. No cancellations of answers are allowed. Ensure handwriting is clear and unambiguous.
- In the case that an answer is in the form of an algebraic expression, simplify them as much as possible. Organisers reserve the right not to mark answers that are illegible or ambiguous as incorrect.
- There will be no time penalty between each submission. Only in the last 45 minutes of the competition (1615 – 1700) will a time penalty of 5 minutes be implemented to avoid last minute spamming if there are any incorrect answers submitted.

2.3. Unlocking Questions

- Each team is granted one free unlock every 30 minutes, starting from the beginning of the competition. Unused unlocks carry over (i.e. a team will have two unlocks after an hour if none were used).
- Approach the problem markers at the marking station assigned to your team should your team decide to unlock a new section.
- After unlocking a new section, submissions to the previous section will still be marked. For instance, if your team cannot solve all sub-parts of 1A and decides to use the free unlock after 30 minutes to unlock 1B, you can still submit answers to 1A.

¹ You need not submit all sub-parts at once. It may be more strategic sometimes to confirm the answer for one sub-part before working on other sub-parts.



2.4. Miscellaneous

- During the competition, the up-to-date results of all teams are displayed on a **live leaderboard**. However, these will be hidden 45 minutes before the end of the competition.
- If a serious issue is discovered with a competition problem, organisers reserve the right to modify or eliminate it without compensation.
- During the competition, all competitors are allowed to communicate only with their team members or the Organisers. Any interaction with other teams is strictly prohibited.
- Each team will store all electronic devices (mobile phones, tablets, laptops, smartwatches, etc.) within a Tamper-Proof bag before the start of the competition. This bag is to be placed next to the team within the team's view at all times during the competition, and Organisers will not be responsible for any loss of items during the event.
- Teams are permitted to use any literature in printed form, calculators, and writing supplies. See our [List of Approved Calculators](#) in the appendix. Graphing calculators are **not** allowed.

2.4. Bonus Mechanics

- This will only be revealed before the start of the competition.

3. Determination of Winners

- Each of the 7 problems will be worth 100 points. The maximum attainable score² during the competition will be **700 points**. Since each problem is split into 3 sections (A, B, and C), each section is worth approximately 33 points on average.
- Each incorrect attempt will receive an arithmetic penalty of 20% of the original score, rounded to the nearest 0.1 pt. For example, if a sub-part is worth a maximum of 10 pt, the points obtained if a team gets the sub-part correct on their first, second, and third attempts will be 10 pt, 8 pt and 6 pt, respectively. At the 5th incorrect attempt, no further penalties will be applied, so the points will be floored at 20% of the original score.

² This excludes the additional scores from the Bonus Mechanics.



Problem 1A	Number of Submissions						Final Score	Unlock Problem 1B 🎉
	1st	2nd	3rd	4th	5th	6th		
1A.1 (5 pt)	5 pt						5.0 pt	
1A.2 (15 pt)	No attempt	12 pt	9.6 pt (-20%)				9.6 pt	
1A.3 (10 pt)	10 pt	8 pt (-20%)	6 pt (-20%)	4 pt (-20%)	2 pt (-20%)	2 pt (-0%)	2.0 pt	

- After the announcement of the end of the competition, no team is allowed to send a member to the marking station. If a presenting member was standing in a queue to a marking station when the end was announced, the member is allowed to stay there and have their answers marked.
- In the unlikely case of ties between teams, the ranking will be determined based on several criteria in the following order: total number of sub-parts solved, average number of incorrect attempts, and time of submission.

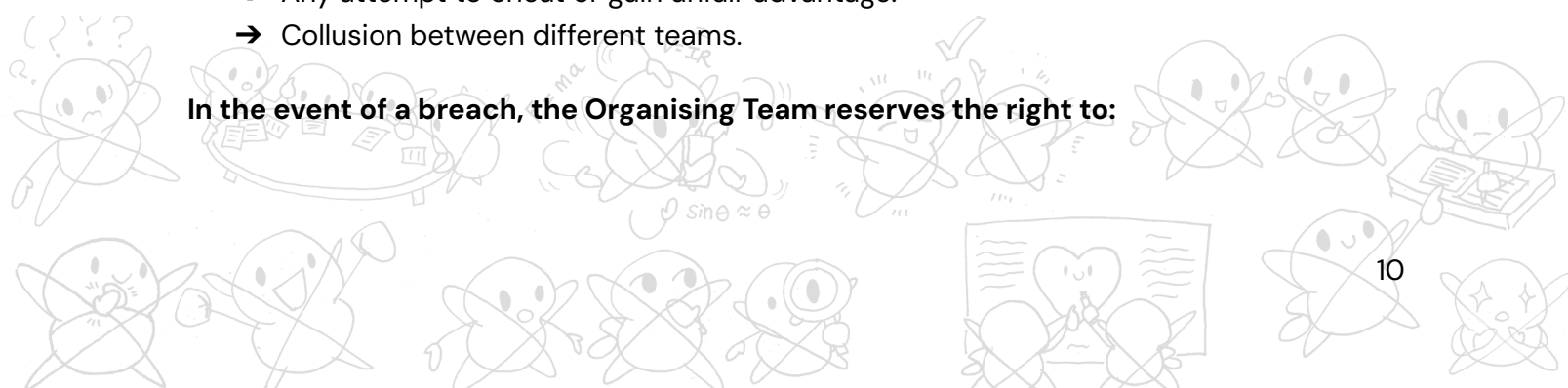
4. Breach of Rules

All participants are expected to uphold the values of fairness, respect, and integrity throughout the competition. Any breach of rules will be taken seriously and may result in penalties.

Breaches of rules include but are not limited to the following:

- Use of unauthorised materials or assistance during the competition (e.g., mobile phones, internet access, external help).
- Disruptive behaviour that interferes with the smooth running of the competition.
- Disrespectful conduct towards organisers, volunteers, guests, or other participants.
- Tampering with competition materials or equipment.
- Any attempt to cheat or gain unfair advantage.
- Collusion between different teams.

In the event of a breach, the Organising Team reserves the right to:





- Issue a warning to the team or individual involved;
- Deduct points from the offending team;
- Disqualify the team from the competition.

If a team disagrees with a decision made by the Organising Team, they have the right to appeal within 2 days after the competition **before 21 July 2359hrs**. We seek your cooperation in maintaining a fair and positive environment for everyone. Let's work together to make this a meaningful and enjoyable experience for everyone!

About Our Sponsors

Institute of Physics Singapore



The Institute of Physics Singapore (IPS) is the leading scientific body for physics in Singapore, with elected members from local institutes; namely, the National University of Singapore's Physics Department, the Nanyang Technological University's School of Physical and Mathematical Sciences, the National Institute of Education's Faculty of Natural Sciences and Science Education and also the Singapore University of Technology and Design. The Institute hopes to raise awareness and interest in physics amongst the general public through the organisation of physics-related activities and events in conjunction with other institutions in Singapore.

Micron

Micron is a world leader in innovative memory solutions that transform how the world uses information to enrich life for all. For over 45 years, Micron has been instrumental to the world's most significant technology advancements, delivering optimal memory and storage systems for a broad range of applications.





Singapore University of Technology and Design

The Singapore University of Technology and Design is a specialised research-intensive university, with a multi-disciplinary human-centric and design-focused curriculum. SUTD



SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

offers unique degree programmes in fields such as architecture and engineering, as well as the world's first design and artificial intelligence programme. These programmes equip students with the skills needed to create products, systems and services that can address complex real-world challenges confronting the world today.

Grounded in Science, Technology, Engineering and Mathematics (STEM), SUTD's hands-on curriculum includes exposure to the liberal arts, humanities and social sciences with the purpose of training critical thinkers, and incorporates elements of entrepreneurship, management and design thinking.

Hudson River Trading

Hudson River Trading is a multi-asset class quantitative trading firm that provides liquidity on global markets and directly to our clients. The firm has built one of the world's most advanced computing environments for research and development, modeling, and risk management. At the forefront of technical innovation in financial markets, Hudson River Trading is a thoughtful market leader dedicated to the health and longevity of global markets.



hudson river trading

Final Remarks

The SPhL Grand Finals will be a day filled with exciting physics challenges, collaborative spirit, and creative thinking. We hope this experience deepens your love for physics and leaves you with meaningful memories. If you have any questions, please don't hesitate to email us at contact@sgphysicsleague.org. See you at SUTD on 19th July 2025!





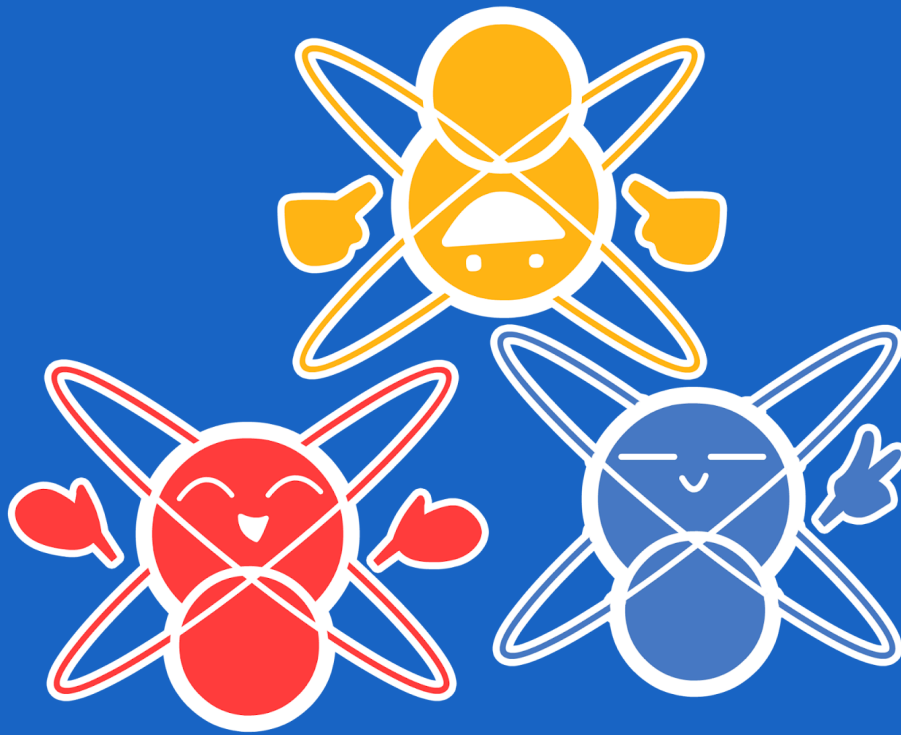
Appendix

1. List of Approved Calculators

Only Scientific Calculators will be allowed during the competition. **Graphing calculators are NOT allowed.** The list of approved models is similar to those permitted in national examinations, such as the A-Levels.

Calculator Brand	Calculator Model
CASIO	FX 82MS
	FX 85MS
	FX 95MS
	FX 96SG Plus
	FX 97SG X
	FX 350MS
CANON	F-960SG
HEWLETT PACKARD	HP 10S+
SHARP	EL W531S II
	EL W531S II Silver Edition





See you @ **SUTD** on
19 July 2025!

Are you excited?

