



# Category B Challenge Booklet 2022

Organised by:



Supported by:



Partners:



## SAFMC 2022 CAT B CHALLENGE BOOKLET CHANGE LOG

| Version | Release Date | Description                        |
|---------|--------------|------------------------------------|
| 1.0     | 22 Nov 2021  | Official challenge booklet release |
|         |              |                                    |
|         |              |                                    |
|         |              |                                    |
|         |              |                                    |

## SAFMC 2022 COMPETITION SCHEDULE

| Date*            | Event                        | Platform/Venue |
|------------------|------------------------------|----------------|
| 7-18 March 2022  | Pre-Challenge Submission     | Email          |
| 16-23 March 2022 | Presentation                 | Teleconference |
| 4-14 April 2022  | Category Challenges          | Singapore Expo |
| 16 April 2022    | Awards Presentation Ceremony | Singapore Expo |

*\* The competition schedule is subject to changes in accordance with the latest MOE guidelines for COVID-19. Any changes will be updated on the SAFMC Website and Facebook. Registered participants will be informed via their registered email address.*

# CONTENTS

|  |    |
|--|----|
| SINGAPORE AMAZING FLYING MACHINE COMPETITION 2021.....                 | 5  |
| 1. INTRODUCTION.....   | 5  |
| 2. CATEGORIES .....  | 5  |
| 3. GENERAL SAFMC 2022 RULES.....                                       | 6  |
| 4. FORMAT OF COMPETITION .....   | 8  |
| 4.1 PRE-CHALLENGE VIDEO & LEARNING JOURNEY SUBMISSION .....            | 8  |
| 4.2 PRESENTATION .....   | 8  |
| 4.3 CHALLENGE .....  | 9  |
| 5. CATEGORY B AWARDS.....  | 10 |
| 5.1 CHAMPIONSHIP AWARD.....  | 10 |
| 5.2 BEST PERFORMANCE AWARD.....  | 10 |
| 5.3 MOST CREATIVE & AESTHETIC AWARD.....                               | 11 |
| 5.4 THEORY OF FLIGHT AWARD .....                                       | 11 |
| 5.5 BEST PRESENTATION AWARD .....                                      | 11 |
| 5.6 BEST VIDEO AWARD.....  | 11 |
| 5.7 MERIT AWARD CERTIFICATION.....                                     | 12 |
| 5.8 PRIZES* .....  | 12 |
| 6. CATEGORY B: UNPOWERED GLIDER - LAUNCHER.....                        | 13 |
| 7. CATEGORY B: PRE-CHALLENGE.....                                      | 15 |
| 7.1 GENERAL RULES & REGULATIONS (For Pre-Challenge and Challenge)..... | 15 |
| 7.2 PRE-CHALLENGE VIDEO SUBMISSION CRITERIA .....                      | 15 |
| 7.3 SUBMISSION CRITERIA OF VIDEO EVIDENCE .....                        | 16 |
| 7.4 PRE-CHALLENGE LAUNCH PROCEDURES .....                              | 17 |
| 8. CATEGORY B - CHALLENGE.....   | 18 |
| 8.1 CHALLENGE SELECTION AND DATE .....                                 | 18 |
| 8.2 CHALLENGE - SCORING FORMAT .....                                   | 19 |
| 8.3 CHALLENGE - LAUNCHING PROCEDURES .....                             | 20 |
| 9. CATEGORY B PRESENTATION.....  | 22 |
| 9.1 PANDEMIC RESTRICTIONS .....  | 23 |

# SINGAPORE AMAZING FLYING MACHINE COMPETITION 2021

## 1. INTRODUCTION

In celebration of DSO National Laboratories' (DSO) 50<sup>th</sup> Anniversary in 2022, SAFMC is enhanced in both challenges and prizes [CAT D & E] to allow students to push the boundaries of innovation by designing and creating extraordinary flying machines. The event is organised by DSO and Science Centre Singapore, and supported by Ministry of Defence (MINDEF). Open to all schools and participants, this annual competition promises a fun-filled learning journey with special talks, workshops and live demonstrations.

## 2. CATEGORIES

### **CATEGORY A – PAPER PLANES** (*Primary Schools*)

Each team should consist of TWO (2) to THREE (3) members.

Design and fold paper planes to achieve the longest, farthest or most unique flight.

### **CATEGORY B – UNPOWERED GLIDERS** (*Secondary Schools / Integrated Programme*)

Each team should consist of TWO (2) to FIVE (5) members.

Category B will be open to a maximum number of 150 registered teams.

Design and build small unpowered bungee-launched gliders to achieve the farthest and most precise flight.

### **CATEGORY C – RADIO CONTROL FLIGHT / FIRST PERSON VIEW (FPV) FLIGHT (NOVICE, ADVANCED)**

Category C1: Radio Control Flight - Fixed Wing (*Secondary Schools / Integrated Programme / Junior Colleges / Institute of Technical Education*)

Each team should consist of TWO (2) to FIVE (5) members.

Design and build a small remote-controlled fixed-wing air platform to navigate an obstacle course.

Category C2: FPV Flight – Novice (*All Schools*)

Each team should consist of ONE (1) to TWO (2) members.

Bring, or design and build, a ducted (shielded propeller) FPV drone to compete in an obstacle course.

### Category C3: FPV Flight – Advanced (*All Schools*)

Each team should consist of ONE (1) member.

Bring, or design and build, an FPV drone to compete in an obstacle course.

### **[ENHANCED] CATEGORY D – SEMI-AUTONOMOUS / AUTONOMOUS** (*Polytechnics / Universities*)

#### Category D1: Semi-Autonomous

Each team should consist of TWO (2) to FIVE (5) members.

Design and build up to three semi-autonomous small air platforms, controlled using wearables, to perform a multitude of tasks in an indoor course.

#### Category D2: Autonomous

Each team should consist of TWO (2) to FIVE (5) members.

Design and build three autonomous small air platforms to collaboratively perform a multitude of tasks in an indoor course.

### **[ENHANCED] CATEGORY E – SWARM** (*Open to Public*)

Each team should consist of TWO (2) to TEN (10) members.

Bring, or design and build, a swarm of TEN (10) to TWENTY-FIVE (25) drones to compete in an obstacle course.

## **3. GENERAL SAFMC 2022 RULES**

- **The deadline for registration is 18 February 2022.**
- Participants registered under a school must be a full-time student at the point of competition.
- Home-schooled participants and teams consisting of participants from different schools should be registered as “Independent teams”.
- Participants will be notified upon successful registration within two weeks of the registration deadline. The decisions made by the SAFMC organising committee are final, and are subjected to the competition schedule and availability of logistics support.
- Each person can only participate in one team within a category. However, the person can participate as a member in different categories, i.e. a person can be a member of a team

in Category B and another team in Category C but the person cannot be a member of two teams in Category B.

- Teams are allowed to take part in categories beyond the specified educational level, i.e. Primary school students are allowed to take part in Category B, C, D or E. Secondary school students are allowed to take part in Category C, D or E.
- Participants of Category C1 are also eligible to register for either Category C2 or C3 but not both.
- Participants of Category C2 are not eligible to participate in Category C3 and vice versa.
- Participants of Category D1 are also eligible to participate in Category D2 and vice versa.
- Members and family members of the organising committee are not allowed to participate in the SAFMC.
- The organisers reserve the right to amend the rules and regulations. In the event of changes, all teams will be informed at least **FOUR (4)** weeks prior to the start of the competition.
- Prizes will be issued to the Team Manager.
- A safety perimeter net will be set up at the competition field for Categories B, C, D, and E. There will be a top net approximately **EIGHT (8) meters** above the ground, which will limit the maximum flight altitude of flying machines. During the challenge attempts, teams are strongly encouraged to fly their aircraft away from the netting to avoid accidental entanglement.
- The organisers of SAFMC 2022 will not be held responsible for any damage to or the loss of any flying machine(s) throughout the entire competition.
- Participants are responsible for the safe flying of their flying machine(s) for the duration of the entire competition. The organisers reserve the right to ground the flying machine(s) of any team at any point in the competition.
- For queries regarding the competition, please send an email with the title stating the category in question (*e.g.: [CAT B] - Clarification about task locations*) to the following email address: [SAFMC@science.edu.sg](mailto:SAFMC@science.edu.sg)

## **4. FORMAT OF COMPETITION**

Once the teams have confirmed their registration for the competition, they are expected to start work on the different aspects of the competition, which consists of the Challenge and the Presentation.

Teams are encouraged to provide equal attention to both the Challenge and the Presentation aspects of the competition.

The top team from each category will be presented with the Championship Award at the SAFMC 2022 Awards Presentation Ceremony.

### **4.1 PRE-CHALLENGE VIDEO & LEARNING JOURNEY SUBMISSION**

Each team will be required to submit video evidence of their craft in flight, in accordance with the rules and criteria outlined in each category. The team shall also detail their learning journey in the making of their aircraft/drone in the video/engineer's notebook.

Teams are to note the requirements of the video, duration limit and submission deadlines for each category.

### **4.2 PRESENTATION**

The teams will be allocated a specific time slot to showcase their flying machine on a virtual platform. Teams will present their flying machine design and learning journey in this competition to a panel of judges. These teams will be assessed for a number of awards.

The presentation plays an integral part for teams who wish to vie for the SAFMC Championship Award. Teams that do not show their flying machines for the virtual presentation may be disqualified immediately. The requirements for the Presentation Segment will be detailed in Section 9.

The Chief Referee or Judge for each category reserves the right to deduct points if the flying machines used in the Challenge is drastically different from the flying machine presented at the Presentation.



### 4.3 CHALLENGE

The physical competition will be conducted in accordance with Safe Management Measures (SMM) guidelines, which will be announced closer to the competition.

For the Challenge, teams are to design, build and fly their flying machines to overcome various challenges for the different SAFMC categories. The Challenge consists of a Team Video Challenge submission, and the actual in-venue flight on Competition Day.

The Team Video Challenge serves as a prelude to the team's aircraft capabilities and flight-worthiness. The Competition Day allows teams to accomplish the mission tasks in a live capacity in front of an audience.

On the Competition Day, tables will be provided within the main competition hall for teams to work on their flying machines. Alternatively, teams may be assigned a designated area instead.

Teams should expect the following during the Competition Day:

- Only registered team members of the participating teams can enter the playing field and team booths/holding areas.
- Teams are expected to fully comply with safety rules. Failure to comply with safety rules after the initial warning will result in immediate disqualification and potential blacklisting from the competition. The organizer will also not be responsible for any injuries or mishaps if any participant has disregarded the safety rules.
- No trials will be allowed in the flying area unless specified by the officials.
- The participants will acknowledge that there will be variations in environmental conditions between teams, despite best efforts to control them
- Additional rules and regulations specific to Category B are detailed in Sections 8 and 9. Participants will acknowledge that they have read the rules.

## 5. CATEGORY B AWARDS

Award winners will be selected based on either presentation scores, performance on the competition day, or a combination of both.

There is no limit to the number of awards that a team can win, but there may not be a winner for every award. Awards may not be given out if the teams do not meet the minimum standard determined by the SAFMC organising committee, or if there are insufficient participants for each category.

All scoring decisions made by the judges are **final**. For arbitrary cases, the organising committee will have the **final** say.

### 5.1 CHAMPIONSHIP AWARD

This is the pinnacle award that any team can win. It is bestowed on the team that embodies the spirit of SAFMC. Teams are considered for the Championship Award based on their overall excellence and total learning experience during the course of the competition.

| Scoring*                | Weightage   |
|-------------------------|-------------|
| Performance (Challenge) | 40%         |
| Pre-Challenge video     | 15%         |
| Creativity              | 15%         |
| Theory of Flight        | 15%         |
| Presentation            | 15%         |
| <b>Total</b>            | <b>100%</b> |

\*Scoring may be subjected to changes due to unforeseen circumstance that prevents the execution of the physical challenge.

### 5.2 BEST PERFORMANCE AWARD

This is awarded to the team that attains the highest score in the flight challenge. The total score from the two scoring rounds will be used to vie for this award. In the event there is more than one team having the same highest score after the two scoring rounds, there will be one final tie-breaker challenge. The teams will attempt to launch their glider and the team who scores the highest points in the attempt wins The Best Performance Award.

### 5.3 MOST CREATIVE & AESTHETIC AWARD

For the team that shows the most innovative, aesthetically decorated, and original design in their unpowered glider.

| Criteria   | Areas of Consideration   |
|------------|--|
| Creativity | Unique Design or Strategy<br>Flair and Appearance<br>Functionality |

### 5.4 THEORY OF FLIGHT AWARD

For the team that best demonstrates a sound understanding and appropriate application of aerodynamic design principles, as shown by their unpowered glider.

| Criteria     | Areas of Consideration  |
|--------------|---|
| Aerodynamics | Aerodynamics<br>Control & Stability<br>Design and Integration |

### 5.5 BEST PRESENTATION AWARD

For the team that best exhibits creativity, fluency, confidence and flair in the presentation of their team's work, and demonstrates that "**WOW**" factor during the interview sessions.

| Criteria     | Areas of Consideration         |
|--------------|--------------------------------|
| Presentation | Fluency<br>Confidence<br>Flair |

### 5.6 BEST VIDEO AWARD

For the team that demonstrated the most rewarding and interesting learning journey, starting from learning to fabrication, resulting in optimised flight of their glider.

## 5.7 MERIT AWARD CERTIFICATION

For teams that exhibit high quality in Design and Flight performance. Overall scores are taken into consideration for this Merit Award.

## 5.8 PRIZES\*

| CATEGORY B                                       |  |        |              |  |
|--|--|--------|--------------|--|
| Award  | Medal  | Trophy | Cash Prizes  | Remarks  |
| <b>Cat B Championship Award*</b>                 | √  | √      | <b>\$900</b> |  |
| <b>Cat B 1<sup>st</sup> Runner Up</b>            | √  |        | <b>\$700</b> | <b>1<sup>st</sup> and 2<sup>nd</sup> runner up will receive <u>only</u> medals</b> |
| <b>Cat B 2<sup>nd</sup> Runner Up</b>            | √  |        | <b>\$500</b> |  |
| <b>Cat B Best Performance Award*</b>             | √  |        | <b>\$150</b> |  |
| <b>Cat B Most Creative &amp; Aesthetic Award</b> | √  |        | <b>\$150</b> |  |
| <b>Cat B Best Theory of Flight Award</b>         | √  |        | <b>\$150</b> |  |
| <b>Cat B Best Presentation Award</b>             | √  |        | <b>\$150</b> |  |
| <b>Cat B Best Video Award</b>                    | √  |        | <b>\$100</b> |  |
| <b>Cat B Merit Award</b>                         | <b>Certificate of Merit will be given to teams exhibiting a high quality in design and performance</b> |        |              |  |

\*In the event that the challenge event could not be executed due to unforeseen circumstances, the committee reserved the right to make changes to the awards.

## 6. CATEGORY B: UNPOWERED GLIDER LAUNCHER

The unpowered glider launcher for the challenge is shown in Figure 1.

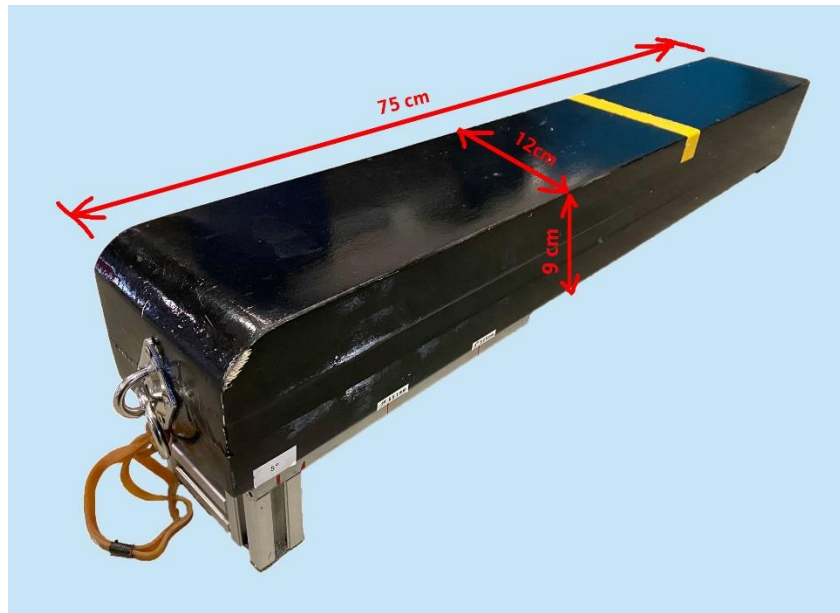


Figure 1: Unpowered Glider Launcher

Teams are strongly encouraged to fabricate and build their own launcher. The launcher consists of the structure (wooden block or other suitable material), flat rubber band and aluminium frame legs for propping up the angle of the launcher. The angle of inclination is kept at **5 +/- 1 degree** from horizontal. The dimensions and angle of inclination of the launcher are shown in Figures 1 and 2.

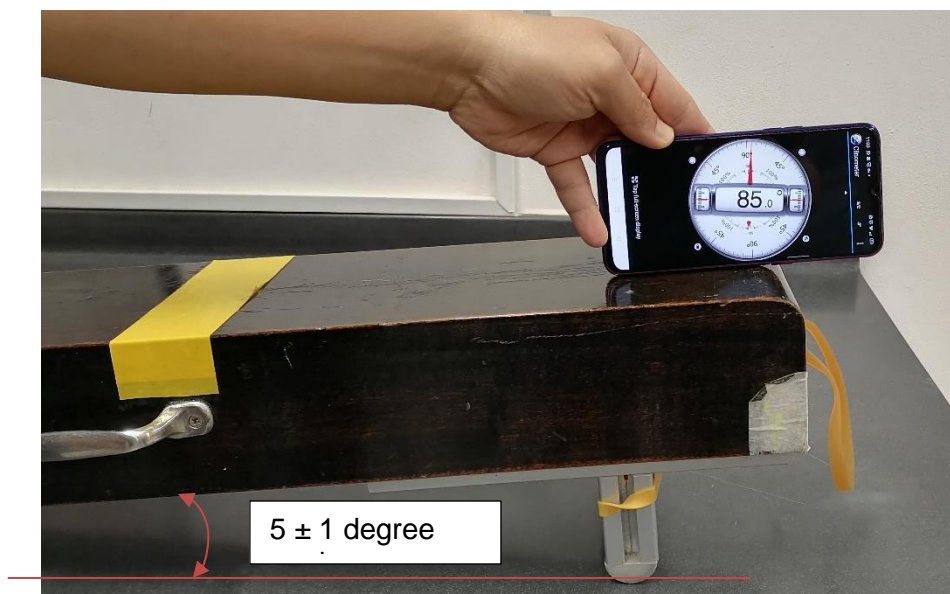


Figure 2: Unpowered Glider Launcher Platform Dimensions

## Launch of the glider

The launcher will be placed on top of a table of approximately **0.75m** in height. The recommended launch force is approximately **4 ± 0.5 kgf**. The launch force is a recommendation, you can adjust the force that you need by using a force gauge or spring gauge and mark out a designated line on the platform as shown in Figure 3.



Figure 3: Unpowered Glider Launcher Launching Line

During the launch, teams will hook their glider on the rubber band and draw back the glider. The hook position from the glider will be used as a reference when the glider is being drawn back to the marked line on the platform. Upon tension to the marked line, the glider can be released.

Each team is required to incorporate a hook or slot onto the underbelly of their glider. An illustration of examples of hook attachment and slot is shown in Figure 4.

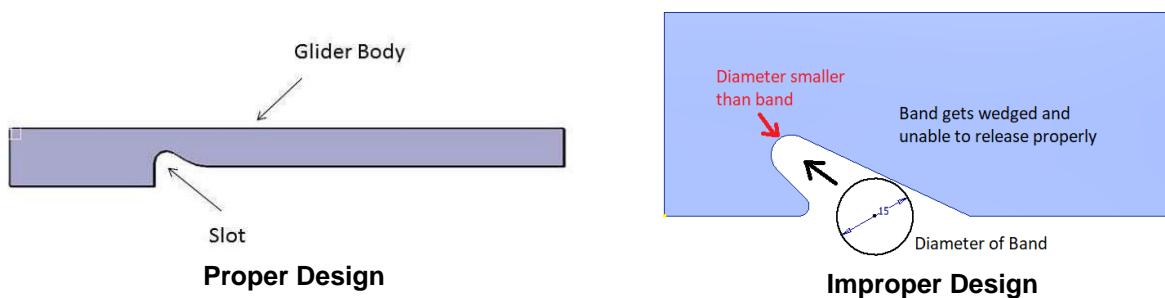


Figure 4: Examples of Hook Attachment and Slot

It is the responsibility of the team to ensure that the hook or slot design on the glider is sturdy to withstand the tension force of the rubber band without giving way when the glider is being drawn back. The team must also ensure that in the design of the glider, there are no components of the glider that come into contact with the launcher at any time during the launch.

## **7. CATEGORY B: PRE-CHALLENGE**

The team is expected to design and build a small unpowered glider (of limited wingspan) to be bungee-launched from a designated launcher (as shown in Fig. 1 or similar)

### **7.1 GENERAL RULES & REGULATIONS (For Pre-Challenge and Challenge)**

Each team is to design and build **ONE (1)** unpowered glider based on the following guidelines:

1. All parts of the glider must be fabricated by the teams. Kits or off-the-shelf models or parts, i.e. servo motor, receiver, transmitter are not allowed.
2. The glider must
  - have a minimum wingspan (tip to tip) of **0.30m**
  - maximum dimension of **0.60m (wing tip to tip) x 0.60m (long or length of body)**
  - have a wing with an aspect ratio (span to mean chord) of **6.0 or more**
  - weighs no more than **0.25 kilograms**
3. The glider design must incorporate a hook or slot at the base of the glider that allows the glider to be hooked onto the rubber band of the launcher.
4. Metallic materials and fibre reinforced materials (carbon fibre, glass fibre, etc.) are not allowed for the fuselage (main body of glider). E.g. Carbon wing spars and metal ballast are allowed.
5. Balloon or airship designs are not allowed. No gaseous substances lighter than air are allowed.
6. Propellers of any form are not allowed.
7. Teams cannot re-use past winning designs. Points will be deducted or, in the worst case, disqualified if any team is caught re-using past planes.

### **7.2 PRE-CHALLENGE VIDEO SUBMISSION CRITERIA**

Each team will be required to submit video evidence of their glider in flight, in accordance with the rules as outlined in Section 7.1. The team shall also detail their learning journey in the video. A panel of judges will judge the submitted videos.

### 7.3 SUBMISSION CRITERIA OF VIDEO EVIDENCE

1. Video to show the glider meets the requirements listed in section 7.1, tape measurement of the wing tip to tip measurement, overall length of the plane and weight of no more than 0.25kg.
2. Video to include the set-up, capture the angle of the launcher of 5 degrees, the table height of about 0.75m. The set-up must **not** be placed on a stage or elevated place whereby the glider can unfairly gain additional distance.
3. Video recording of the moment of release and the landing of the glider. The video must be a continuous recording from the launcher till the glider first point of contact with the floor. The video should not be edited to improve the quality or performance of the glider. Any team found guilty of editing the flight video will be disqualified from the competition.
4. The video should be taken from an angle, where it best captures the flight path of the glider. Video must be at least 720p quality and in mp4 format.
5. The video should also include the main points of their learning journey and the team members with the glider.
6. The entire video should not be longer than 10 minutes.
7. Upload the video to YouTube (set as unlisted, **not private**) or other secure video sharing platforms that allow access using the links provided. Use the following format to name the uploaded video '[SAFMC CAT B]-[School]-[Team Name]' e.g. 'SAFMC CAT B – Epic Pri – Gilder X'.
8. School coordinator to collate the links on an excel spreadsheet and submit it to [safmc@science.edu.sg](mailto:safmc@science.edu.sg) , please use the following filename 'SAFMC2022 CAT B [Name of school]' e.g. SAFMC2022 CAT B Epic Pri.xlsx
9. Video must NOT be created with professional assistance. Any team found guilty of engaging professional help will be disqualified.
10. Submission deadline is **17th March 2022**.



## 7.4 PRE-CHALLENGE LAUNCH PROCEDURES

1. Mark out a distance of **5,10 and 15m** on the floor using brightly coloured tapes or small plastic cones. The distance is measured perpendicular to the launching table. (see Figure 5).

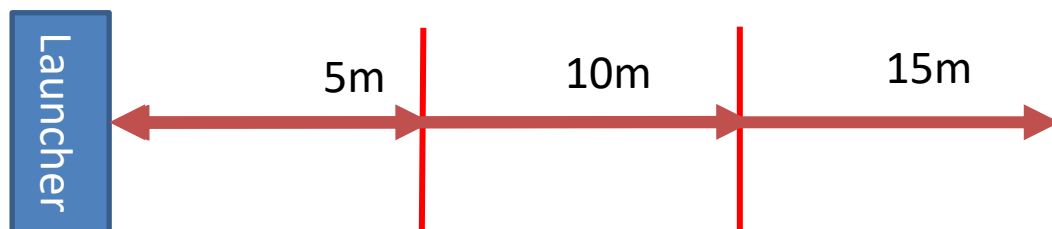


Figure 5: Marking of distance

2. Place the launcher (see section 6) on a table (0.75m in height).
3. Ensure that the table set-up is placed on a flat ground or similar elevation as the launching field. Do not place the set-up on an elevated platform or stage.
4. Hook the glider, pull and release it for launch when it has reached the marking (4kgf mark) on the launcher.

Teams can improvise and build their own test launcher based on the following guidelines:

1. Structure of the launcher can be made from the same material or a combination such as wood, aluminium frame, or sheet metal.
2. Flat rubber band can be purchased from any stationery shop. Figure 1 shows a typical flat rubber band that can be used.
3. Mark out the launching position by using a pocket balance to pull on the middle of the rubber band till it sports reads **4+/-0.5 kgf** on the balance scale. Figure 3 shows a pictorial illustration.
4. Ensure the angle of inclination is kept at around **5 ± 1 degree**. The protractor or clinometer app can be used to check the inclination angle. Shims can be used to increase/decrease the angle as required. Figure 2 shows the illustration.
5. For the blueprint sample of the launcher, you can access through the link below:  
<https://tinyurl.com/3hvjin36f>

## 8. CATEGORY B - CHALLENGE

In the main challenge event, teams will launch their gliders into scoring zones (for main challenge) to see how far their unpowered glider can reach. Figure 6 shows the competition set-up for Category B.

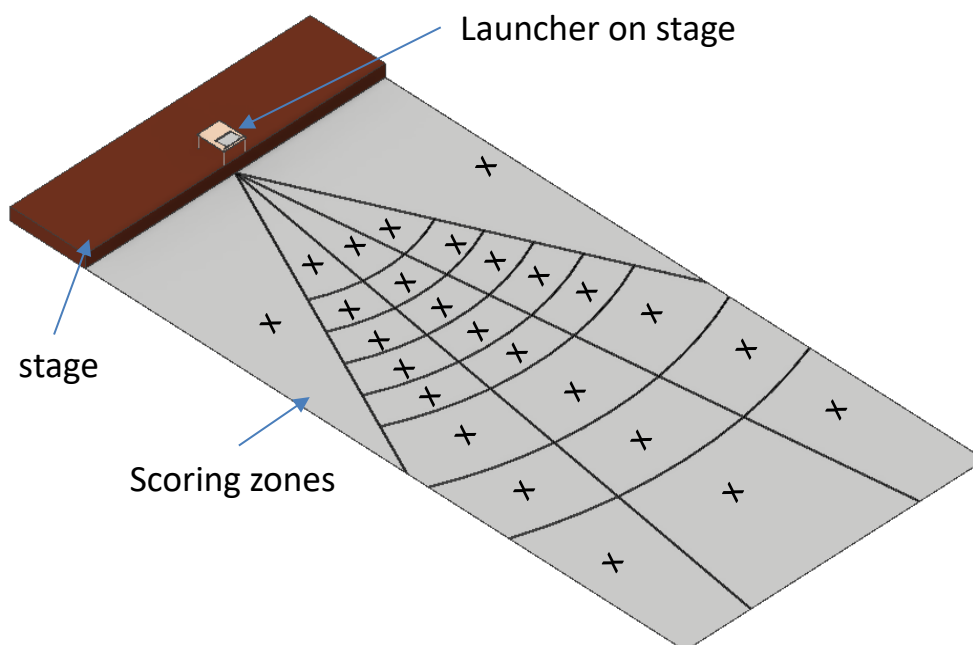


FIGURE 6: COMPETITION SET-UP OF CATEGORY B CHALLENGE

### 8.1 CHALLENGE SELECTION AND DATE

Only selected teams will be invited to compete in the main challenge event. Selection will be based upon the scores obtained from video submission, presentation and MOE guidelines on pandemic measures.

The challenge date is during **4 – 14 April 2022**.

Maximum of \*60 teams subject to changes on pandemic measures.

#### **Safe Management Measures**

For the physical challenge, safety measures will be in place to adhere to Safe Management guidelines. Teams will be rostered in small groups to perform the pre-flight check, launching and repairing of gliders. There will be no intermingling between groups as per pandemic guidelines.

## 8.2 CHALLENGE - SCORING FORMAT

The competition floor will be segregated into different scoring zones with respective allocated scores for each zone as shown in Figure 6. The dimension of the floor layout is shown in Figure 7.

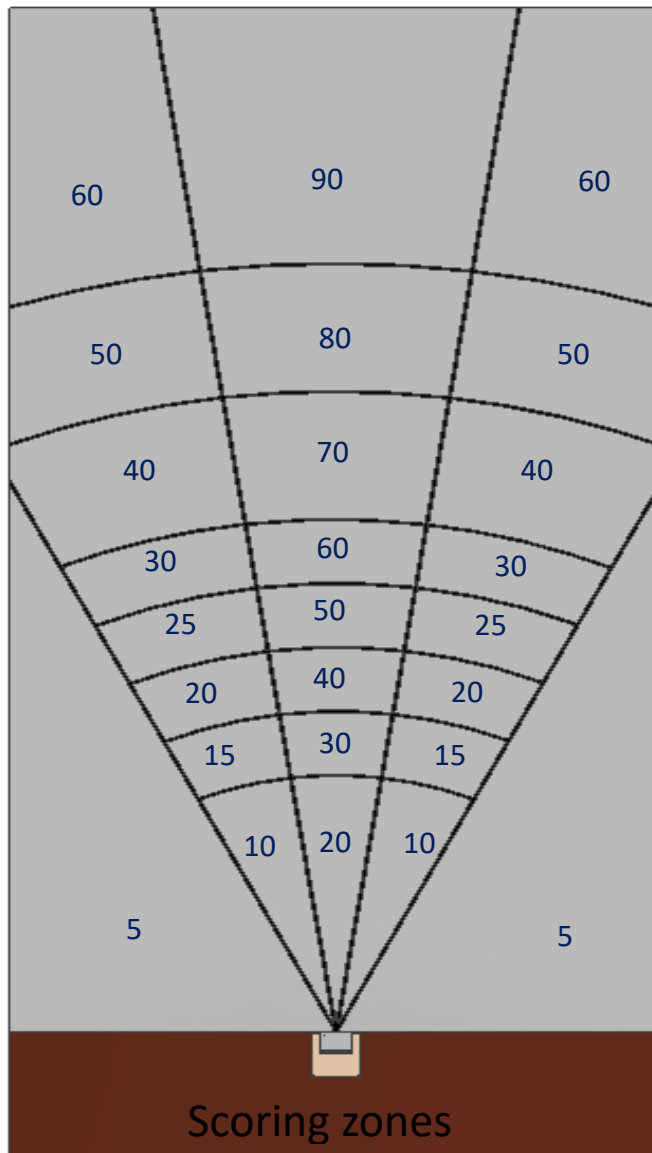


FIGURE 7: Floor Layout with scoring zones and respective allocated scores

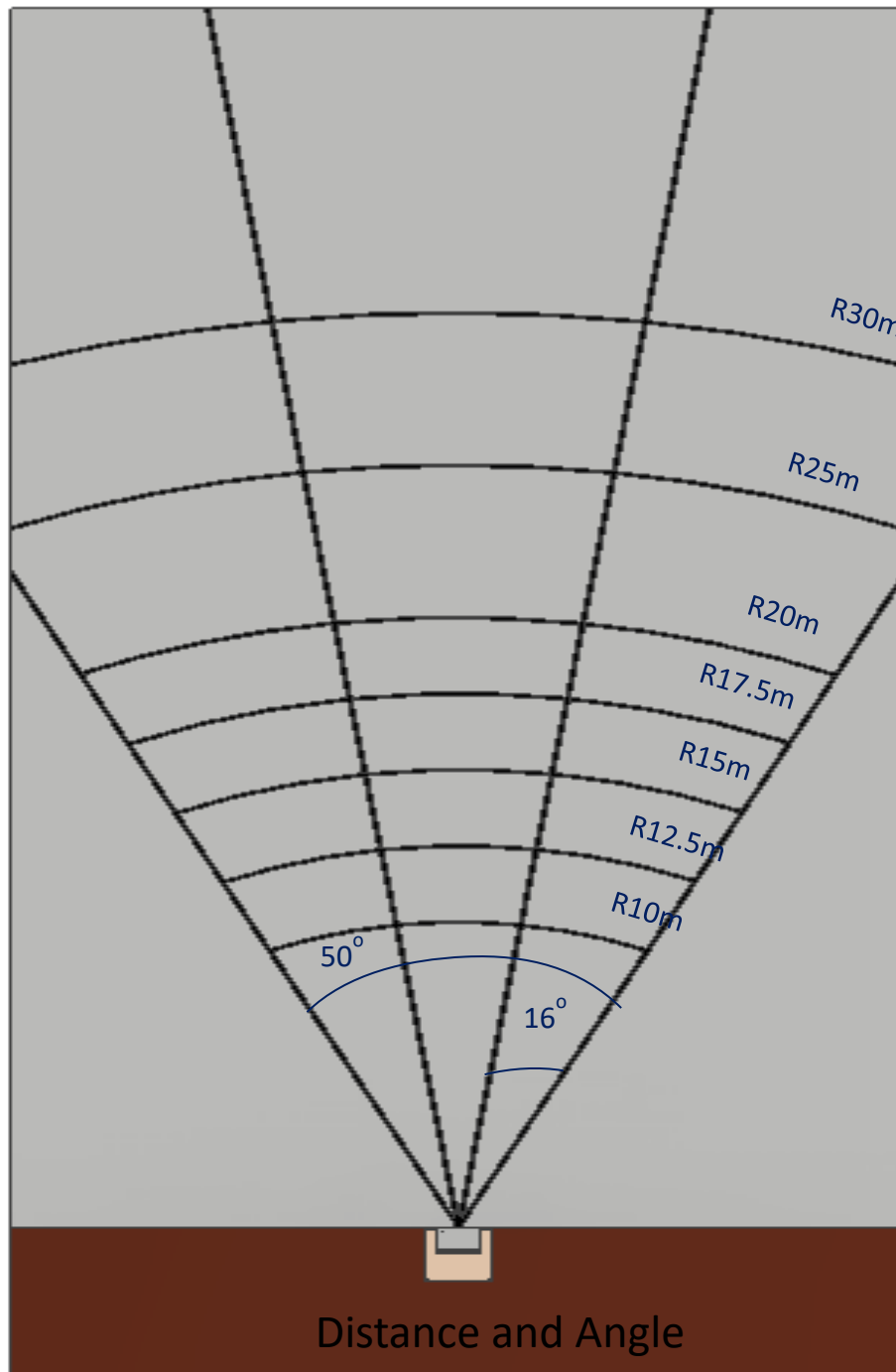


FIGURE 8: Dimensions of competition scoring zones

### 8.3 CHALLENGE - LAUNCHING PROCEDURES

1. Gliders that qualify for the main challenge event will be allowed some minor modification. The glider, however, must not be dissimilar in shape from the pre-challenge video.

2. Teams will place their glider onto the launcher platform and hook on to the rubber band before drawing back the glider to the designated launching line.
3. Teams will release their glider for launch whenever they are ready. Teams will be given up to **THREE (3)** minutes to launch the glider and they are to adhere to the instructions given by the referees during launching.
4. After the unpowered glider is launched, the **first contact of the glider** with the landing zone will be the landing spot (assuming the glider remains intact).

*Note: In the event that the glider breaks into pieces or drops any loose parts during the flight, the nearest landing spot will be taken to be the glider part contact point.*

5. A team member will accompany the referees to determine the landing spot of the glider after the launch.
6. Teams will be awarded the score allocated to the scoring zone where the landing spot of the glider is determined to be.
7. If the glider landing spot falls on the intersection lines between various scoring zones, the highest score of the affected scoring zones will be awarded.
8. If the glider hits and stays stuck to the netting, the score allocated will be the scoring zone directly below the glider. If it is on the intersection lines between various scoring zones, the highest score will be awarded.

### **FOR SECOND SCORING ROUND ONLY**

9. Teams will be given an opportunity to score bonus points in the second scoring round
10. A **big object** (e.g. orange traffic cone) will be placed at the centre of the scoring zone of the team's choice. Teams will launch their glider as per normal.
11. Teams with gliders that hit the object will be awarded **2 times** the allocated score of the scoring zone which the object is placed at. A hit is awarded when the **first contact point** of the glider is on the object.
12. Teams with gliders that do not score a hit on the object but manage to have the landing spot of the glider within the same scoring zone will be awarded **1.5 times** the score allocated to the scoring zone where the landing spot is determined to be.
13. Teams with the landing spot of the glider falling outside the scoring zone where the object is placed will be awarded the **same** score allocated to the scoring zone where the landing spot is determined to be.

14. Summary of point #8 – #11 as reflected in the table below.

| Scenario                             | Score                              |
|--------------------------------------|------------------------------------|
| <b>Hitting the big object</b>        | <b>2 x scoring zone points</b>     |
| <b>Land in the same scoring zone</b> | <b>1.5 x scoring zone points</b>   |
| <b>Land in other scoring zones</b>   | <b>Points of that scoring zone</b> |

15. **It will be at the teams’ own discretion and decision to go for the bonus point’s opportunity.** Teams will need to inform the referees of their decision of opting for the bonus point opportunity before launching their glider in the second scoring round.
16. Teams that do not opt for the bonus point opportunity will be awarded scores as per normal for the second scoring round, i.e. score allocated to the scoring zone where the landing spot is determined to be.
17. The total score from the two scoring rounds will be taken to vie for “**The Performance Award**”.

*The referees make all scoring decisions and their decision is **FINAL**. For arbitrary cases, the Chief Referee will have the **FINAL** say.*

## **9. CATEGORY B PRESENTATION**

During the presentation, teams will be allocated a specific time slot to present their flying machine using online video applications such as Zoom Meeting or Microsoft teams etc. They will be assessed by a panel of judges on the work they have done for this competition for the following awards:

1. Most Creative & Aesthetic Award
2. Theory of Flight Award
3. Best Presentation Award

Each team is given only a total of **TEN (10) minutes** - [FIVE (5) minutes for presentation, FIVE (5) minutes for Questions & Answers] for the presentation.

Each team from Category B will be allowed a maximum of **8 slides** as visual aid for their presentation. The video camera must be turned on for the entire duration of the

presentation.

The presentation plays an integral part for those teams who wish to vie for the Championship award. Category B teams are required to bring their flying machines that they are using in the competition for their presentation. Teams that do not bring their flying machines for the presentation will be disqualified immediately.

The Committee reserves the right to deduct points in each of the award categories if the flying machine used in the video submission is drastically different from the flying machine presented at the Presentation.

## **9.1 PANDEMIC RESTRICTIONS**

In the event that the physical challenge could not be conducted due to tighter pandemic restrictions, the online video submission will be used to determine the awards. The Performance, Championship and runner-up awards will be nullified.

The organisers reserved the right to make amendments to CAT B competition.