



MESA DAY CONTEST RULES 2018 – 2019

(Version 9.13.18)

Wright Turn Glider Competition

LEVEL:	Grades 9/10 and 11/12
TYPE OF CONTEST:	Team
COMPOSITION OF TEAM:	2-3 students per team
NUMBER OF TEAMS:	Preliminary – As determined by your local MESA Center Regional – 1 for 9 th /10 th Grade, 1 for 11 th /12 th Grade per Center
SPONSOR:	Ana Rodarte, Assistant Director, UC Santa Cruz MSP

OVERVIEW: Students will design and construct a glider that, when launched by the official supplied launcher, flies through the air, makes a right turn, and lands on an “+” 12.2 meters (40 feet) from the launch area. Project must be the original work of the students. Judges may ask questions for verification. **Participation logistics, limits, and competition facilities may vary by host site. Advisors and students are responsible for verifying this information with their center director.**

An Engineering Lab Book is a required component of this competition. The purpose of the Engineering Lab Book is for students to more closely follow the practices of an engineer in the completion of their MESA Day project. The Lab Book will encourage students to take a purposeful and sustained approach to building their devices. MESA projects are not designed to be completed in a single class period or day, but to be the result of thoughtful research, planning, analysis and evaluation. The lab book should provide a written record of the thought and insight a student put into their project, from initial ideas to the final completed project. Teams that do not turn in an Engineering Lab Book will receive a 50% deduction in their overall score and will be ineligible to place. Teams with an incomplete lab book will receive a 20% deduction in the overall score. Please refer to the Engineering Lab Book Grading Matrix for specifics on what constitutes a missing or incomplete lab book.

MATERIALS: **LEGAL:** Any materials may be used to build the glider; Materials are not limited to wood. Students should consider the strength of the material needed to withstand the force of the launcher.

ILLEGAL:

- No power (thrust, lift or stored energy that assists dynamic flight) may be supplied by any means other than that provided by the official launcher • No remote control devices of any kind
- No prefabricated gliders (must be original work of students)

For the Engineering Lab Book, three format options are available for submittal; please check with your local center director for the format required for your preliminary event. **Electronic submissions will be required at the Regional/State level.**

Electronic Lab Book

Teams use an electronic portal/application such as Google Docs to keep and maintain lab book. Access to such a lab book is then given to MESA Day staff and judges OR lab book is submitted electronically (e.g. PDF file) for review.

Printed/Written Pages

Teams record their lab book entries by hand or typed through a program like Microsoft Word. Printed/handwritten loose leaf pages are then submitted (pages must all be well organized and clipped/stapled together).

Standard Lab Book

Teams use a standard notebook (composition books, spiral notebooks, subject notebooks, etc.). The lab book page size must be equivalent or greater than that of a composition book page (approx. 9.75" length x 7.5" width). Pocket sized books, post it notes, flashcards, etc. cannot not be used.

The Host Center will provide the following:

- Official launcher described in these rules
- Appropriate safety launch table and safety goggles

GENERAL RULES:

1. The students' full name, school name, grade and MESA Center must be clearly labeled on the device. A 10% penalty in the score will be assessed for failing to properly label.
2. The glider is a self-contained flying vehicle that remains intact during flight. Parts that break off during landing are permissible but are not encouraged. If parts of the glider break away during flight, the flight will be disqualified.
3. The glider must contain an easily identifiable, prominent feature on the fuselage that adapts to the launch hook to allow for a smooth launch. Please identify the adaptation with a bright red circle.
4. Any glider that alters or damages the launch hook will be disqualified.
5. The glider must have features to avoid being caught in the slot in the launch ramp. Wheels and skids must be positioned to avoid the slot.

6. The glider can be made from any materials. There are no restrictions on size or weight. The glider must be capable of being launched on the launch ramp by the hook and must have an identifiable fuselage, wing, and tail. Gliders without the required components will be disqualified.
7. Absolutely no remote-control devices of any kind may be used. Any devices that operate on the glider must be self-contained and may not provide any thrust to the glider.
8. Absolutely no power (thrust, lift, or stored energy that assists dynamic flight) may be supplied by any means other than that provided by the official launcher.
9. The glider must be capable of self-sustained flight in air with no links of any kind to the ground that provide lift, propulsion or course guidance during the flight.

Engineering Lab Book

The Engineering Lab Book must contain the following sections with each section divided/labeled:

- a) **Proper Labeling:** Proper labeling is required of each lab book. Students must have group member's names, grades, school, and their MESA center on the inside cover or front pages of their lab book.
- b) **Identify the Problem:** Clearly state the challenge being worked on, talk about the constraints, limits of your projects, and how to solve the problem.
- c) **Explore:** Research the work others have done on this subject. You will need to cite and describe 5 resources.
- d) **Design:** Brainstorm at least 3 ideas (sketches). Using your 3 sketches, choose 1 and create a plan (min. 5 sentences) to build your prototype and generate a list of materials.
- e) **Create:** Using the plan from the Design step, build your prototype and provide a picture of your finished work (this is not the final iteration of your glider).
- f) **Try It Out:** Conduct 3 trials for your glider. Measure the results of the trials using the performance criteria, and provide evidence of at least 2 appropriate math concepts.
- g) **Make It Better:** After conducting all 3 trials, identify a minimum of 5 modifications you will make to your glider and build the final competition-ready project.

JUDGING:

Official Launch Device

- 1) The official launcher consists of a tension spring, a launch platform and a launch hook.
- 2) The tension spring is an 11" spring with a 0.17 pound per inch spring rate. It is available from McMaster-Carr and is Part Number 9640K243. It will be stretched 30.0 inches from its final position. The estimated tension load in the spring at the start of launch is 5.87 pounds. After launch the final length of the spring is 1.25". In the final position, the spring has a load of 0.77 pounds. In the completely relaxed state, the spring has a preload of 0.73 pounds. The spring has an outer diameter of 1.00" and a wire diameter of 0.062 inches. The mass of the spring is 170 grams.
- 3) The launch platform has an overall surface size of 30.5 cm (12 inches) in width and 147 cm (58 inches) in length. The surface is hard and smooth and made from ¼" thick composite board or comparable material. A slot runs down the middle of the platform that is 5/35 mm (0.2 inches) wide and is 8cm (31.5 inches) long. The end of the slot is located 30.5 cm (12 inches) from the end of the launch ramp. The launch ramp is angled at 5 degrees above horizontal. The height of the ramp at the point where the hook stops moving is 100 cm (39.4 inches) above the target.

- 4) The launch hook is made from steel wire with a 3.4 mm (0.135 inch) diameter. It is available from McMaster-Carr and is part Number 9594T14.
- 5) The hook is screwed into a glide block mounted underneath the launch ramp. The mass of the hook and glide block is 35 ± 2 grams.

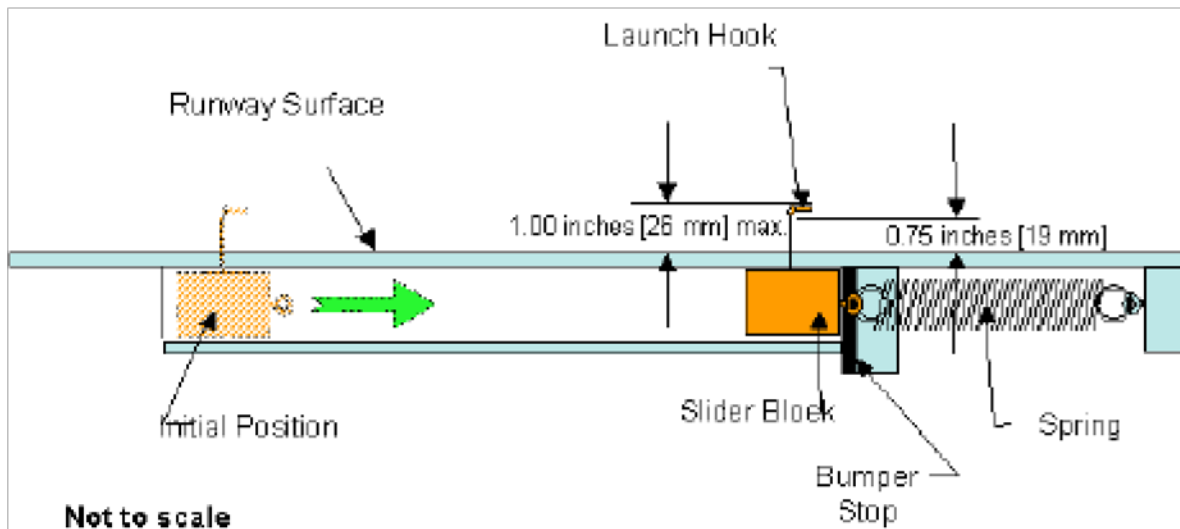


Figure 1: Launch Device – Side View

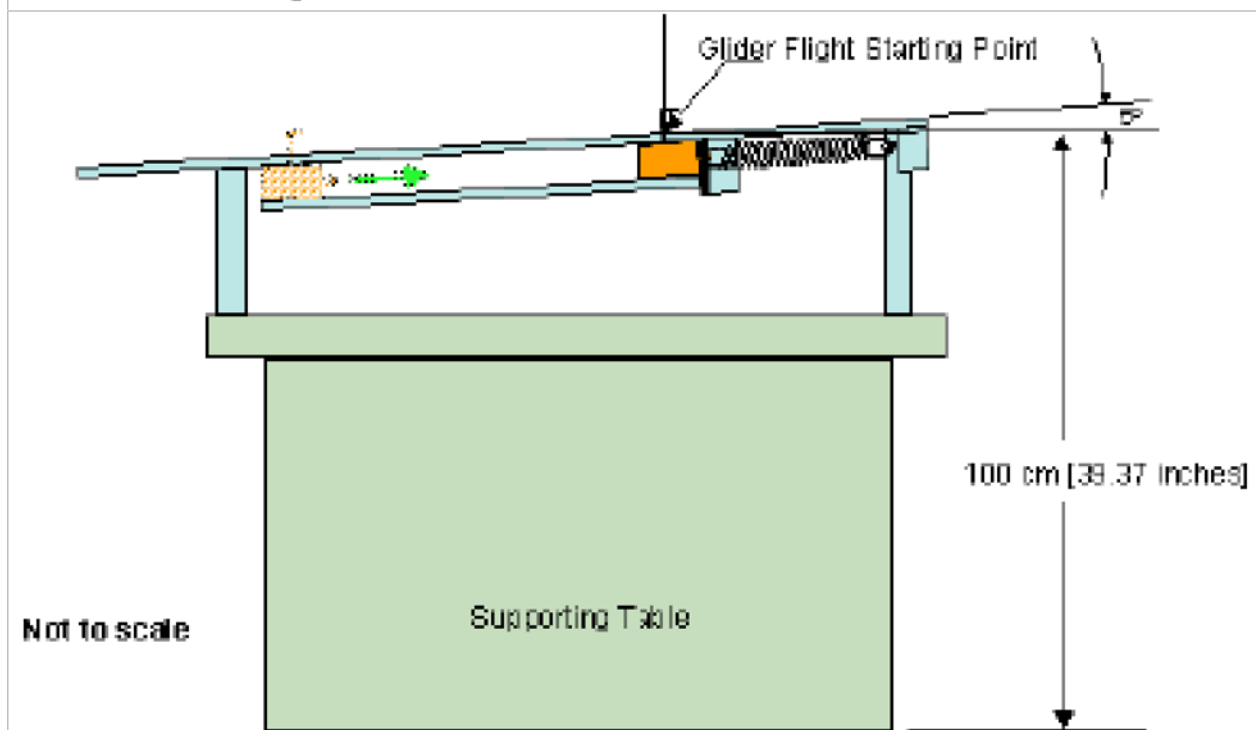
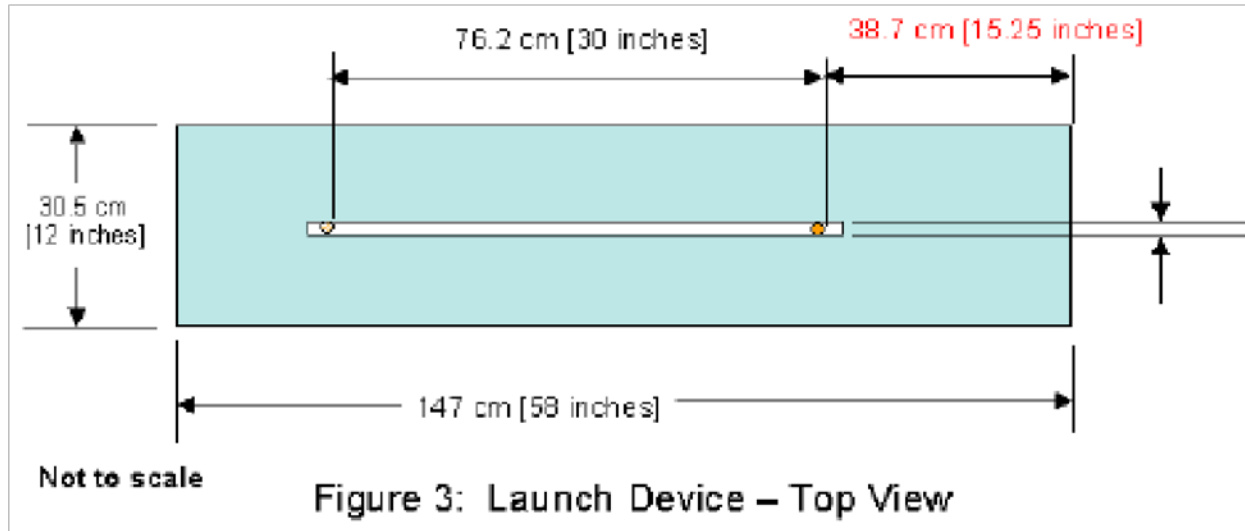


Figure 2: Launch Device Set-up – Side View



Target and Launch:

- 1) The target is located at a distance of 8.6 meters (29feet 3 inches) in front of the position where the hook stops on the launch ramp and 8.6 meters (28 feet 3 inches) to the right of the position where the hooks stops on the launch ramp for a total distance of 12.2 meters (40 feet) from the position where the hook stops on the launch ramp. The target is 100cm (39.4 inches) below the position where the hook stops on the launch ramp. The target is a “+” sign wherein each leg is 3cm wide and 20cm long comprised of black plastic tape.
- 2) Each team shall have 2 opportunities to land their glider the closest to the target. The launches may not be consecutive depending on schedule limitations. The team will be given a 2 minute window to set-up their glider. A 30-second countdown will be given prior to pulling the release pin to initiate flight.
- 3) The duration of the flight will be timed to the nearest 100th of a second by the time keepers. The flight ends when the first part of the glider touches the ground. Official observers will carefully note where the glider first touches down (wheel, skid, or other feature) using 2 different colored pieces of post-it markers. Markers can be purchased at Office Depot (Item No. 265333).
- 4) The decision of the observers on the location of the post-its marking the touchdown point is final and not subject to debate. The team will then remove their glider from the contest area.
- 5) After completion of the first trial, the contestant will be asked to place their entry in an impound (an area designated by contest officials) or a repair station, where repairs and alterations can be made under supervision. During repairs/alterations, new parts cannot be added to the glider, but repairs or alterations can be made to existing parts including using glue or tape to affix pieces that have broken off.
- 6) The distance between the target center (middle of the “+” sign) and the glider’s first touch-point (middle of marker) will be measured to the nearest 2 cm (0.75 inches). In case of a tie, the longer flight duration (hang-time) will be used as a tie-breaker. If the entries are still tied, equal medals will be awarded.

SCORING:

MESA Day Contest Rules 2018-2019 (Version 8.29.18)

Master Set

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These rules are for the internal use of MESA staff and teachers only and should not be forwarded or used outside of MESA.

- 1) Launch #1 = Distance from the "+" target after first launch
- 2) Launch #2 = Distance from the "+" target after second launch
- 3) Score of the best launch= _____ minus possible deductions (50% for a missing lab book, 20% for an incomplete lab book, and/or 10% for improper labeling)
- 4) Final Score = Best launch – deductions (50% for a missing lab book, 20% for an incomplete lab book, and/or 10% for improper labeling)

AWARDS:

- Awards will be given per grade level: 9th/10th grade and 11th/12th grade.
- For the preliminary competition, only the first place teams from each grouping (i.e. 9th/10th and 11th/12th) will advance to the regional competition.

ATTACHMENTS/APPENDIX:

- Wright Turn Glider Specification Checklist and Score Sheet
- Engineering Lab Book Grading Rubric

**WRIGHT TURN GLIDER
SPECIFICATIN CHECK AND SCORE SHEET**

- Glider has no remote controls

- Glider has no power thrusts- the only power is provided by the launcher

- Capable of self-sustained flight without links to the ground for lift, propulsion or guidance

- Device adapts to launch hook on official launcher.

Scoring

Launch #1 Distance from the "+" target = _____

Launch #2 Distance from the "+" target = _____

Score of the best launch= _____ minus possible deductions (50% for a missing lab book, 20% for an incomplete lab book, and/or 10% for improper labeling)

FINAL SCORE: _____

MESA DAY 2018-19

Engineering Lab Book Requirement Rubric

Please use this rubric to assess lab book entries. Projects with missing lab books will receive a 50% reduction in their overall score and will be ineligible to place. Incomplete lab books will receive a 20% deduction in the overall score.

Criteria		Yes	No
1	Is the lab book properly labeled? <i>(Names, Grades, School, MESA Center)</i>		
2	Identify the Need <i>(at least 2 sentences for each)</i> State what the challenge being worked on is. What are the limits/constraints? How do you think you can you solve it?		
3	Explore: Research (cite/reference 5) sources, gather, and use materials.		
4	Design: Brainstorm at least 3 ideas (sketches, drawings or pictures). Select one, create a prototype plan (min 5 sentences), and provide a list of materials.		
5	Create: Build a prototype, describe the building of the prototype (min 5 sentences), and include a final picture of the prototype.		
6	Try it Out Conduct at least 3 trials. Measuring each trial result using specific performance criteria (distance traveled, time, etc.). Providing evidence of the use and application of at least 2 appropriate mathematical concepts in the tests.		
7	Make Better Evaluate results by listing at least 5 ways your project can be improved		

TOTAL

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Is this considered an **incomplete** lab book – missing 1 or 2 criteria listed?.....**NO** **YES (-20%)**

Is this considered a **missing** lab book – missing 3 or more criteria listed?**NO** **YES (-50%)**

Please refer to the Grading Matrix for specifics on missing and incomplete lab books