

The Model Rocketry Program Requirements

STAGE ONE - Redstone

1. The Written Phase

The cadet must review and study the written material sufficiently to pass an examination on the history of rockets and the lives of four great rocket pioneers.

2. Testing

The cadet must earn a minimum score of 70% on the Redstone test, administered either hard-copy or on-line through the Learning Management System (LMS). Once completed, the Qualified Senior Member (QSM) will update the results on the Progress Matrix.

3. Hands-On Phase

The cadet is required to build two rockets, with alternate sources of power. There are four options:

- (1) the rubber band powered Goddard rocket;
- (2) the AlkaSeltzer® and water rocket;
- (3) air powered rocket
- (4) combination compressed air and water pop-bottle rocket.

4. Model Rocket Flights

The cadet must have a QSM witness the launch of the two rockets and annotate the event on the progress matrix.

STAGE TWO - Titan

1. Written Phase

The cadet must review and study the written material sufficiently to pass an examination on Newton's Laws of Motion and Rocket Aerodynamics.

2. Testing

The cadet must earn a minimum score of 70% on the Titan test, administered either hard-copy or on-line through the Learning Management System (LMS). Once completed, the Qualified Senior Member (QSM) will update the results on the Progress Matrix.

3. Hands-on Phase

- (1) The cadet is required to build two rockets in this stage. If conventional solid propellant model rocketry is permitted in the cadet's locale, then he or she must build two commercially available kits, the first of which must be a minimum of Skill Level E2X, the second must be a minimum of Skill Level 1. A cadet who possesses the necessary building skills, may exceed the minimum skill levels if he or she so chooses. A detailed description of skill levels is included in the Titan instructional material.
- (2) **OR** In some states, model rockets are considered a fire hazard, or for other reasons, are outlawed. If this is the case, the cadet has the option to launch and safely recover a commercial air-powered rocket. If the cadet chooses this option, he/she must give mathematical proof of the altitude achieved in the flight. This can be done using an inclinometer (as featured on page 29 in Aerospace Dimensions, Rockets, Module 4), or one of the commercial altitude finders such as the Estes Altitrak®.

- (3) Additionally, if the cadet lives in an area where rockets are outlawed, a conventional solid propellant model rocket must be built (but not flown) that is a minimum of Skill Level E2X. The building of a conventional model rocket will give the cadet a clearer understanding of the workings of this type of rocket. Additionally, the rocket may be flown at some future activity where conventional model rocketry is permitted.

4. Rocket Flights

The cadet must prove, before flight, that the models are stable. The cadet may use the swing test described in the text for proof of stability. While a rocket built from a kit by a commercial manufacturer is inherently stable by design, the swing test provides an excellent opportunity to demonstrate stability to those who are new to model rocketry. A Qualified Senior Member (QSM) must then witness the successful launch, flight, and recovery of the model rockets required in this phase. **It is the responsibility of the Qualified Senior Member (QSM) to see that the NAR SAFETY CODE guidelines are followed in all model rocket launches. The cadet must demonstrate NAR Safety Code Proficiency, follow a set pre-flight checklist, and execute the launch and recovery in a safe manner.** Once the flights have been successfully conducted in accordance with the NAR Safety Code, the QSM will annotate the events in the Progress Matrix. NOTE that the Air Option will consist of one flight and need only follow the NAR Safety Code for those aspects which apply.

STAGE THREE - Saturn

1. Written Phase

The cadet must review and study the written material sufficiently to pass an examination on altitude determination, propulsion, and the NAR Safety Code.

2. Testing

The cadet must earn a minimum score of 70% on the Saturn test, administered either hard-copy or on-line through the Learning Management System (LMS). Once completed, the Qualified Senior Member (QSM) will update the results on the Progress Matrix.

3. The Hands-On Phase

- (1) The cadet is required to build ONE rocket that is a minimum of Skill Level 2.
- The cadet MAY ELECT TO BUILD a two-stage rocket that requires two motors to reach altitude. The rocket must reach at least 500' and be safely recovered.
 - OR** the cadet may elect to build a model rocket that is capable of carrying at least a 2-ounce payload to an altitude of 300' or more.
 - OR** the cadet may elect to build a model rocket that has a separate glider attachment. The glider and rocket must return to earth safely and within NAR safety code guidelines.
- (2) If the cadet lives in an area where solid-propellant model rockets are outlawed, he/she may elect to build an air-powered rocket of his/her own design from scratch. It may be launched by a commercial launcher such as the Estes or Air Burst, or a home-fabricated launcher (such as any of those featured in the Redstone or Titan sections). The rocket must attain a minimum altitude of 100', and the cadet must give proof of the altitude by using an inclinometer or a commercial tracker such as the Estes Altitrak®, or the timing equations described in the Titan instructional material.

4. Flight and Recovery of Rockets

Once the flights have been successfully conducted in accordance with the NAR Safety Code, the QSM will annotate the events in the Progress Matrix. NOTE that the Air Option flight need only follow the NAR Safety Code for those aspects which apply.

5. Squadron Commander

Once it is determined that the cadet has fulfilled all program requirements (that is, Stages 1, 2, and 3), the Squadron Commander will sign and present the CAP Model Rocketry certificate at an awards ceremony. The certificate is located on the Download page of eServices. The commander may also elect to present the cadet with the embroidered rocketry patch and/or the silver metallic rocketry badge.