Shoot!

Nova Award Workbook

The work space provided for each requirement should be used by the Scout to make notes for discussing the item with his counselor, not for providing the full and complete answers. Each Scout must do each requirement.

No one may add or subtract from the official requirements found in ***Boy Scout Requirements*** (Pub. 33216 – SKU 34765).

The requirements were last issued or revised in 2012 • This workbook was updated in February 2013.

Scout's Name: _____ Unit: _____

Counselor's Name: _____ Counselor's Phone No.: _____

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1. Choose A or B or C and complete ALL the requirements.

A. Watch about three hours total of science-related shows or documentaries that involve projectiles, aviation, weather, astronomy, or space technology. Then do the following:

1. Make a list of at least five questions or ideas from the show(s) you watched.

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2. Discuss two of the questions or ideas with your counselor.

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B. Read (about three hours total) about projectiles, aviation, space, weather, astronomy, or aviation or space technology. Then do the following:

1. Make a list of at least two questions or ideas from each article.

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2. Discuss two of the questions or ideas with your counselor.

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C. Do a combination of reading and watching (about three hours total). Then do the following:

1. Make a list of at least two questions or ideas from each article or show.

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2. Discuss two of the questions or ideas with your counselor

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2. Choose ONE merit badge from the following list. (Choose one you have not already used for another Nova award.) After completion, discuss with your counselor how the merit badge you earned uses engineering

Archery _____ Astronomy _____ Athletics _____ Aviation _____
Rifle Shooting _____ Robotics _____ Shotgun Shooting _____
Space Exploration _____ Weather _____

3. Choose A or B and complete ALL the requirements.

A. Simulations. Find and use a projectile simulation applet on the Internet (with your parent's or guardian's permission). Then design and complete a hands-on experiment to demonstrate projectile motion.

1. Keep a record of the angle, time, and distance.

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2. Graph the results of your experiment. (Note: Using a high-speed camera or video camera may make the graphing easier, as will doing many repetitions using variable heights from which the projectile can be launched.)

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3. Discuss with your counselor:

a. What a projectile is

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b. What projectile motion is

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c. The factors affecting the path of a projectile

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d. The difference between forward velocity and acceleration due to gravity

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B. Discover. Explain to your counselor the difference between escape velocity (not the game), orbital velocity, and terminal velocity. Then answer TWO of the following questions. (With your parent's or guardian's permission, you may explore websites to find this information.)

1. Why are satellites usually launched toward the east, and what is a launch window?

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2. What is the average terminal velocity of a skydiver? (What is the fastest you would go if you were to jump out of an airplane?)

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3. How fast does a bullet, baseball, airplane, or rocket have to travel in order to escape Earth's gravitational field? (What is Earth's escape velocity?)

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4. Choose A or B and complete ALL the requirements.

A. Visit an observatory or a flight, aviation, or space museum.

1. During your visit, talk to a docent or person in charge about a science topic related to the site

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2. Discuss your visit with your counselor.

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B. Discover the latitude and longitude coordinates of your current position. Then discuss the following:

1. Find out what time a satellite will pass over your area. (A good resource to find the times for satellite passes is the Heavens Above website at www.heavens-above.com .)

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2. Watch the satellite using binoculars. Record the time of your viewing, the weather conditions, how long the satellite was visible, and the path of the satellite. Then discuss your viewing with your counselor

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5. Choose A or B or C and complete ALL the requirements.

A. Design and build a catapult that will launch a marshmallow a distance of 4 feet. Then do the following:

1. Keep track of your experimental data for every attempt. Include the angle of launch and the distance projected.

2. Make sure you apply the same force every time, perhaps by using a weight to launch the marshmallow. Discuss your design, data, and experiments—both successes and failures - with your counselor.

B. Design a pitching machine that will lob a softball into the strike zone. Answer the following questions, then discuss your design, data, and experiments - both successes and failures—with your counselor.

1. At what angle and velocity will your machine need to eject the softball in order for the ball to travel through the strike zone from the pitcher's mound?

2. How much force will you need to apply in order to power the ball to the plate?

3. If you were to use a power supply for your machine, what power source would you choose and why?

C. Design and build a marble run or roller coaster that includes an empty space where the marble has to jump from one part of the chute to the other. Do the following, then

discuss your design, data, and experiments—both successes and failures—with your counselor.

1. Keep track of your experimental data for every attempt. Include the vertical angle between the two parts of the chute and the horizontal distance between the two parts of the chute.

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2. Experiment with different starting heights for the marble. How do the starting heights affect the velocity of the marble? How does the starting height affect the jump distance

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6.Discuss with your counselor how engineering affects your everyday life.

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Requirement resources can be found here:
http://meritbadge.org/wiki/index.php/NOVA_Awards#Whoosh.21

Attachment – (NOTE: It is not necessary to print this page.)

Important excerpts from the *'Guide To Advancement'*, No. 33088:

Effective January 1, 2012, the *'Guide to Advancement'* (which replaced the publication *'Advancement Committee Policies and Procedures'*) is now the *official* Boy Scouts of America source on advancement policies and procedures.

- [Inside front cover, and 5.0.1.4] — Unauthorized Changes to Advancement Program
  No council, committee, district, unit, or individual has the authority to add to, or subtract from, advancement requirements. (There are limited exceptions relating only to youth members with disabilities. For details see section 10, "Advancement for Members With Special Needs".)

- [Inside front cover, and 7.0.1.1] — The *'Guide to Safe Scouting'* Applies
  Policies and procedures outlined in the *'Guide to Safe Scouting'*, No. 34416, apply to all BSA activities, including those related to advancement and Eagle Scout service projects. [Note: Always reference the online version, which is updated quarterly.]

- [7.0.3.1] — The Buddy System and Certifying Completion
  Youth members must not meet one-on-one with adults. Sessions with counselors must take place where others can view the interaction, or the Scout must have a buddy: a friend, parent, guardian, brother, sister, or other relative —or better yet, another Scout working on the same badge— along with him attending the session. When the Scout meets with the counselor, he should bring any required projects. If these cannot be transported, he should present evidence, such as photographs or adult certification. His unit leader, for example, might state that a satisfactory bridge or tower has been built for the Pioneering merit badge, or that meals were prepared for Cooking. If there are questions that requirements were met, a counselor may confirm with adults involved. Once satisfied, the counselor signs the blue card using the date upon which the Scout completed the requirements, or in the case of partials, initials the individual requirements passed.

- [7.0.3.2] — Group Instruction
  It is acceptable—and sometimes desirable—for merit badges to be taught in group settings. This often occurs at camp and merit badge midways or similar events. Interactive group discussions can support learning. The method can also be attractive to "guest experts" assisting registered and approved counselors. Slide shows, skits, demonstrations, panels, and various other techniques can also be employed, but as any teacher can attest, not everyone will learn all the material.

  There must be attention to each individual's projects and his fulfillment of *all* requirements. We must know that every Scout — actually and *personally*— completed them. If, for example, a requirement uses words like "show," "demonstrate," or "discuss," then every Scout must do that. It is unacceptable to award badges on the basis of sitting in classrooms *watching* demonstrations, or remaining silent during discussions. Because of the importance of individual attention in the merit badge plan, group instruction should be limited to those scenarios where the benefits are compelling.

- [7.0.3.3] — Partial Completions
  Scouts need not pass all requirements with one counselor. The Application for Merit Badge has a place to record what has been finished — a "partial." In the center section on the reverse of the blue card, the counselor initials for each requirement passed. In the case of a partial completion, he or she does not retain the counselor's portion of the card. A subsequent counselor may choose not to accept partial work, but this should be rare. A Scout, if he believes he is being treated unfairly, may work with his Scoutmaster to find another counselor. An example for the use of a signed partial would be to take it to camp as proof of prerequisites. Partials have no expiration except the 18th birthday.