



Designed to Crunch

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.: _____

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

A. Watch about three hours total of math-related shows or documentaries that involve scientific models and modeling, physics, sports equipment design, bridge building, or cryptography. Then do the following:

1. Make a list of at least five questions or ideas from the shows you have watched.

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

B. Research (about three hours total) several websites (with your parent's or guardian's permission) that discuss and explain cryptography or the discoveries of people who worked extensively with cryptography. Then do the following:

1. List and record the URLs of the websites you visited and the major topics covered on the websites you visited. (You may use the copy and paste function—eliminate the words—if you include your sources.).

2. Discuss with your counselor how cryptography is used in the military and in everyday life and how a cryptographer uses mathematics.

C. Read at least three articles (about three hours total) about physics, math, modeling, or cryptography. You may wish to read about how technology and engineering are changing sports equipment, how and why triangles are used in construction, bridge building, engineering, climate and/or weather models, how banks keep information secure, or about the stock market. Then do the following:

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

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

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

American Business _____ Chess _____ Computers _____ Drafting _____

Entrepreneurship _____ Orienteering _____ Personal Management _____
Radio _____ Surveying _____ Weather _____

3. Choose TWO from A or B or C or D or E and complete ALL the requirements. (Write down your data and calculations to support your explanation to your counselor. You may use a spreadsheet. Do not use someone else's data or calculations.):

A. Calculate your horsepower when you run up a flight of stairs.

1. How does your horsepower compare to the power of a horse?

2. How does your horsepower compare to the horsepower of your favorite car?

B. Attend at least two track, cross-country, or swim meets.

1. For each meet, time at least three racers. (Time the same racers at each meet.)

2. Calculate the average speed of the racers you timed. (Make sure you write down your data and calculations.)

3. Compare the average speeds of your racers to each other, to the official time, and to their times at the two meets you attended.

Share your calculations with your counselor, and discuss your conclusions about the racers' strengths and weaknesses

C. Attend a soccer, baseball, softball, or basketball game. Choose two players and keep track of their efforts during the game. (Make sure you write down your data and calculations.) Calculate their statistics using the following as examples:

1. Soccer—Goals, assists, corner kicks, keeper saves, fouls, offsides

2. Baseball or softball—Batting average, runs batted in, fielding statistics, pitching statistics

3. Basketball—Points, baskets attempted, rebounds, steals, turnovers, and blocked shots

Share your calculations with your counselor, and discuss your conclusions about the players' strengths and weaknesses

D. Attend a football game or watch one on TV. (This is a fun activity to do with a parent or friend!) Keep track of the efforts of your favorite team during the game. (Make sure you write down your data and calculations.) Calculate your team's statistics using the following as examples:

1. Kicks/punts

- a. Kickoff—Kick return yards
- b. Punt—Number, yards
- c. Field goals—Attempted, percent completed, yards
- d. Extra point—Attempted, percent completed

2. Offense

- a. Number of first downs
- b. Forward passes—Attempted, percent completed, total length of passes, longest pass, number and length of passes caught by each receiver, yardage gained by each receiver after catching a pass
- c. Running plays—Number, yards gained or lost for each run, longest run from scrimmage line, total yards gained or lost, and number of touchdowns

3. Defense—Number of quarterback sacks, interceptions turnovers, and safeties

Share your calculations with your counselor, and discuss your conclusions about your team's strengths and weaknesses.

E. How starry are your nights? Participate in a star count to find out. This may be done alone but is more fun with a group. Afterward, share your results with your counselor.

1. Visit NASA's Student Observation Network website at www.nasa.gov/audience/foreducators/son/energy/starcount/ for instructions on performing a star count.

2. Do a star count on five clear nights at the same time each night.

Date_____ Count_____

Date_____ Count_____

Date_____ Count_____

Date_____ Count_____

Date_____ Count_____

3. Report your results on NASA's Student Observation Network website and see how your data compares to others.

4. Do the following:

A. Investigate your calculator and explore the different functions.

B. Discuss the functions, abilities, and limitations of your calculator with your counselor. Talk about how these affect what you can and cannot do with a calculator. (See your counselor for some ideas to consider.)

5. Discuss with your counselor how math affects your everyday life.

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

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.