



Designed to Crunch

Boy Scout Nova Award Workbook



This workbook can help you but you still need to read the Boy Scout Nova Awards Guidebook.

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 the Boy Scout Nova Awards Guidebook (Pub. 34033 – SKU 614936).

The requirements were issued in 2012 • This workbook was updated in February 2015.

Scout's Name: _____ Unit: _____

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



<http://www.USScouts.Org> • <http://www.MeritBadge.Org>

Please submit errors, omissions, comments or suggestions about this **workbook** to: Workbooks@USScouts.Org
Send comments or suggestions for changes to the **requirements** for the **Nova Award** to: Program.Content@Scouting.Org

This module is designed to help you explore how math affects your life each day

1. Choose A or B or C or D 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.

What was watched?	Date	Start Time	Duration

Some examples include—but are not limited to—shows found on PBS ("NOVA"), Discovery Channel, Science Channel, National Geographic Channel, TED Talks (online videos), and the History Channel. You may choose to watch a live performance or movie at a planetarium or science museum instead of watching a media production. You may watch online productions with your counselor's approval and under your parent's supervision.

Then do the following:

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

1.	
2.	
3.	

4. _____

5. _____

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

1. _____

2. _____

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.

Date	Start Time	End Time	Duration

Then do the following:

1. List and record the URLs of the websites you visited and 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.

Examples of magazines include—but are not limited to—Odyssey, Popular Mechanics, Popular Science, Science Illustrated, Discover, Air & Space, Popular Astronomy, Astronomy, Science News, Sky & Telescope, Natural History, Robot, Servo, Nuts and Volts, and Scientific American.

What was read?	Date	Start Time	Duration

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.

1.	
2.	

D Do a combination of reading, watching, and researching (about three hours total).

What was watched or read?	Date	Start Time	Duration

Then do the following:

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

3. Choose TWO from A or B or C or D or E or E and complete ALL the requirements for the two you choose. (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?

Share your calculations with your counselor, and discuss what you learned about horsepower.

Helpful Links "How to Calculate Your Horsepower": wikiHow Website: http://www.wikihow.com/Calculate-Your-Horsepower Haplosciences.net Website: http://onlinephys.com/labpower1.html

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

Date	Type of Meet	Competitors

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

Date	Distance	Racer	Time

- 2. Calculate the average speed of the racers you timed. (Make sure you record 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. Then choose two players. Keep track of their efforts during the game. (Make sure you record 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

Date	<input type="text"/>	Sport:	<input type="text"/>	Teams:	<input type="text"/>
					<input type="text"/>
Player 1:	<input type="text"/>	Player 2:	<input type="text"/>		<input type="text"/>

2. Offense

a. Number of first downs

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

Attempted		
Completed		
Yards		
Longest		

Receptions				
Yards gained after				

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

Plays	
Yards Gained	
Yards Lost	
Longest run	
Total Yards	
Touchdowns	

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

Sacks	
Interceptions	
Turnovers	
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 and discuss your results with your counselor.
 1. Visit NASA's Student Observation Network website at <http://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:	Number

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

4. Do ALL of 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.)

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.