



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.

This Workbook can help you organize your thoughts as you prepare to meet with your counselor.

You still must satisfy your counselor that you can demonstrate each skill and have learned the information.

You should use the work space provided for each requirement to keep track of which requirements have been completed, and to make notes for discussing the item with your counselor, not for providing full and complete answers.

If a requirement says that you must take an action using words such as "discuss", "show", "tell", "explain", "demonstrate", "identify", etc, that is what you must do.

Counselors may not require the use of this or any similar workbooks.

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 revised in 2015 • This workbook was updated in January 2018

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.

Workbook © Copyright 2018 - U.S. Scouting Service Project, Inc. - All Rights Reserved
Requirements © Copyright, Boy Scouts of America (Used with permission.)

This workbook may be reproduced and used locally by Scouts and Scouters for purposes consistent with the programs of the Boy Scouts of America (BSA), the World Organization of the Scout Movement (WOSM) or other Scouting and Guiding Organizations. However it may NOT be used or reproduced for electronic redistribution or for commercial or other non-Scouting purposes without the express permission of the U. S. Scouting Service Project, Inc. (USSSP).

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.	
6.	

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

Helpful Link
 "The Mathematics of Cryptology": University of Massachusetts
 Website: <http://www.rmath.umass.edu/~gunnells/talks/crypt.pdf>

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.)

URL	Major Topics

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

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*.

about the stock market.

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..

Then do the following:

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

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

1.	
2.	

2. Complete ONE merit badge from the following list. (Choose one that you have not already used toward another Nova award.)

- | | | |
|---|--|--|
| <input type="checkbox"/> American Business | <input type="checkbox"/> Drafting | <input type="checkbox"/> Radio |
| <input type="checkbox"/> Chess | <input type="checkbox"/> Entrepreneurship | <input type="checkbox"/> Signs, Signals, and Codes |
| <input type="checkbox"/> Computers | <input type="checkbox"/> Orienteering | <input type="checkbox"/> Surveying |
| <input type="checkbox"/> Digital Technology | <input type="checkbox"/> Personal Management | <input type="checkbox"/> Weather |

After completion, discuss with your counselor how the merit badge you earned uses mathematics.

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?

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 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. 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

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

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:

Date Teams:

1. Kicks/punts

- a. Kickoff—Kick return yards

Kicks	
Return Yards	

- b. Punt—Number, yards

Punts	
Yards	
Return Yards	

- c. Field goals—Attempted, percent completed, yards

Attempts	
Completed	
Yards	

- d. Extra point—Attempted, percent completed

Attempts	
Completed	

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. Afterwards, share 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.)

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

When working on Nova and Supernova awards, Scouts and Scouters should be aware of some vital information in the current edition of the *Guide to Advancement* (BSA publication 33088). Important excerpts from that publication can be downloaded from <http://usscouts.org/advance/docs/GTA-Excerpts-nova.pdf>. You can download a complete copy of the *Guide to Advancement* from <http://www.scouting.org/filestore/pdf/33088.pdf>.