BOY SCOUT NOVA AWARD - DESIGNED TO CRUNCH (MATHEMATICS)

Additional requirement sheets and helps are available from ScouterMom.com.

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.

1A. Watch about three hours total math-related shows or documentaries that involve scientific models and modeling, physics, sports equipment design, bridge building, or cryptography. Then do the following:

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

1A-2. Discuss two of the questions or ideas with your counselor

1B. 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:

1B-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.)

1B-2. 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.)

1C. 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:

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

1C-2. Discuss two of the questions or ideas with your counselor.

1D. Do a combination of reading, watching, or researching (about three hours total). Then do the following:

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

1D-2. Discuss two of the questions or questions with your counselor.

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

2A. American Business

2B. Chess

2C. Computers

2D. Digital Technology

2E. Drafting

2F. Entrepreneurship

2G. Orienteering

2H. Personal Management

2I. Radio

2J. Signs, Signals, and Codes

2K. Surveying

2L. 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.)

3A. Calculate your horsepower when you run up a flight of stairs. Share your calculations with your counselor, and discuss what you learned about horsepower.

3A-1. How does your horsepower compare to the power of a horse?

3A-2. How does your horsepower compare to the horsepower of your favorite car?

3B. Attend at least two track, cross-country, or swim meets. Share your calculations with your counselor, and discuss your conclusions about the racers' strengths and weaknesses.

3B-1. For each meet, time at least three racers. (Time the same racers at each meet.)

3B-2. Calculate the average speed of the racers you timed. (Make sure you write down your data and calculations.)

3B-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.

3D. 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. Share your calculations with your counselor, and discuss your conclusions about your team's strengths and weaknesses.

3D-1. Kicks/punts

3D-1a. Kickoff—Kick return yards

3D-1b. Field goals—Attempted, percent completed, yards

3D-1c. Field goals—Attempted, percent completed, yards

3D-1d. Extra point—Attempted, percent completed

3D-2. Offense

3D-2a. Number of first downs

3D-2b. 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

3D-2c. Running plays—Number, yards gained or lost for each run, longest run from scrimmage line, total yards gained or lost, and number of touchdowns

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

3E. 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.

3E-1. Visit the website of the Astronomical Society of the Pacific at http://www.astrosociety.org/education/hands-on-astronomy-activities/ for instructions on performing a star count.

3E-2. Do a star count on five clear nights at the same time each night.

4. Do ALL of the following.

4A. Investigate your calculator and explore the different functions.

4B. 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.