Twin Rivers - Cub Scout Nova Quest

Vincent Meunier

Apr 08, 2021

CONTENTS:

CHAPTER

ONE

WELCOME TO CUB SCOUT NOVA WEEK OF THE TRC!

Warning: Welcome to the Twin Rivers Council Cub Scout Nova Quest website!

Here you will find all the information you need for each of the 11 Cub Scout Nova Awards offered during the Nova Quest program. Each Nova Award has its own page. Only focus on those for which of you have registered!

How can you use this site? You will find contact information, the list of pre-requisites (i.e. things you should do before the Zoom meeting), a preview of the activities that will take place during the Zoom meetings, and links to submit your pre-requisites to the instructors! You will even find a few words about each instructor on each page. Isn't that cool?

Most important: you will find the Zoom link on each page to join the meetings!

If you have any question, please do not hesitate to contact us!

Contact info:

- Registration and other administrative aspects:
  - Tory Carman (email: Tory.Carman@scouting.org)
- Co-organizers:
  - Rob Pattison (email: pattison_r@yahoo.com)
  - Greg Szczesny (email: glszczesny@gmail.com)
  - Vincent Meunier (email: twinriversstem@gmail.com)

Our Mission

The mission of the STEM committee is to promote the STEM/Nova activities to all Youths of the Council by offering a rich array of STEM-related activities offered by technical experts and volunteers. The activities are positioned in large part, but are not limited to, BSA-sponsored activities. The STEM committee strives to offer a safe and inclusive atmosphere to all Cub Scouts, Scouts BSA, Venturers, and Sea Scouts.

TRC Cub Scout Nova Quest			
Nova Award	**Category**	**Date/Time**	**Instructor**
Science Everywhere	Science	04/08 at 3:30pm	Vincent Meunier
Tech Talk	Technology	04/05 at 3:30pm	Ted Sargent
Swing	Engineering	04/06 at 3:30pm	Jeff Zemsky
1-2-3 Go!	Mathematics	04/10 at 12:00pm	Rob Pattison
Down and Dirty	Science	04/07 at 3:30pm	Jeffrey Brewer & James Cascione
Nova Wild	Science	04/06 at 6:30pm	Melissa Sargent
Out of this World	Science	04/05 at 6:30pm	George Hassel
Fearful Symmetry	Mathematics	04/08 at 6:30pm	Melia Gordon
Uncovering the Past	Science	04/07 at 6:30pm	Katie McCabe
Cub Scouts Can Code	Technology	04/09 at 6:30pm	Ted Sargent
Up and Away	Engineering	04/09 at 3:30pm	Bill Clancy

Fig. 1: Shoulder Patch Offered by the Committee for all Supernova Award recipients. More on the Supernova awards can be found here.

Go to Twin Rivers Council website.

CHAPTER

TWO

SCIENCE EVERYWHERE

This module is designed to help the Cub Scout explore how science affects their life each day.

Note: General Information about this activity:

- **When?**: 04/08 at 3:30pm
- **Instructor**: Vincent Meunier
- **E-Mail address**: twinriversstem@gmail.com
- **Pre-reqs submission**: google form
- **Zoom link for activity**: https://zoom.us/j/98206883400
- **Bio-sketch**: Vincent Meunier is a Physicist with an expertise in theoretical and computational physics. He's the Head of the Physics Department at Rensselaer Polytechnic Institute where he teaches Quantum Mechanics and Thermodynamics. He's a Fellow of the American Physical Society, the Institute of Physics, and the American Association for the Advancement of Science. He has been a scouter for 35 years, first as a cub, scout, and scoutmaster while in Belgium. He has been a dean leader, assistant scoutmaster, scoutmaster, and now a Fort Orange district committee member and Chair of the STEM Committee of the Twin Rivers Council.

2.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

1. Requirement #1

   A. Watch some of the Youtube videos listed below. (if your parents do not want you to watch videos, you can complete the alternate requirement "B"!)

      (1) Make a list of at least two questions or ideas from what you watched.

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

      Note: The list below provides some examples of videos that could work for this requirement!

      - NASA Channel
      - Bill Nye the Science Guy
      - National Geographic

- Nat Geo Kids
- Periodic Videos
- Sick Science
- Sci Show Kids
- Science Max
- Kids Science
- NOVA Videos

B. (only do this if you do not want to do A.) Read (about one hour total) about anything related to science. Then do the following:

(1) Make a list of at least two questions or ideas from what you read.

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

2. Complete ONE adventure from the following list for your current rank or complete option A or B. (If you choose an Adventure, choose one you have not already earned.) Discuss with your counselor what kind of science, technology, engineering, and math was used in the adventure or option.

A. **Wolf Cub Scouts:** Collections and Hobbies; Digging in the Past; Germs Alive!; Grow Something

B. **Bear Cub Scouts:** A Bear Goes Fishing; Bear Picnic; Critter Care;

C. **Webelos Scouts:** Earth Rocks!; Maestro!

- **Option A:** Complete all of the following: (a) Explain the scientific method to your adult partner. (b) Use the scientific method in a simple science project. Explain the results to an adult. (c) Talk to a scientist about why he or she became a scientist.
- **Option B:** Complete all of the following: (a) Show how to orient a map. Find three landmarks on the map. (b) Make a simple compass with a magnet and pin. (c) Show how a compass works. (d) Use a compass on an orienteering activity with at least 3 stops.

Warning: Pre-req submissions

Finally, have your cub scouts **ENTER** their pre work in this form before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled 3:30 class. Feel free to contact the instructor (See email in blue box at the top of this page)

2.2 What will we do during the meeting?

1. We will act like a scientist!

A. We will discuss the notion of *pandemic* together!

Note: What's a pandemic?

B. We will introduce the scientific method to approach the problem of a pandemic from a scientific point of vie.

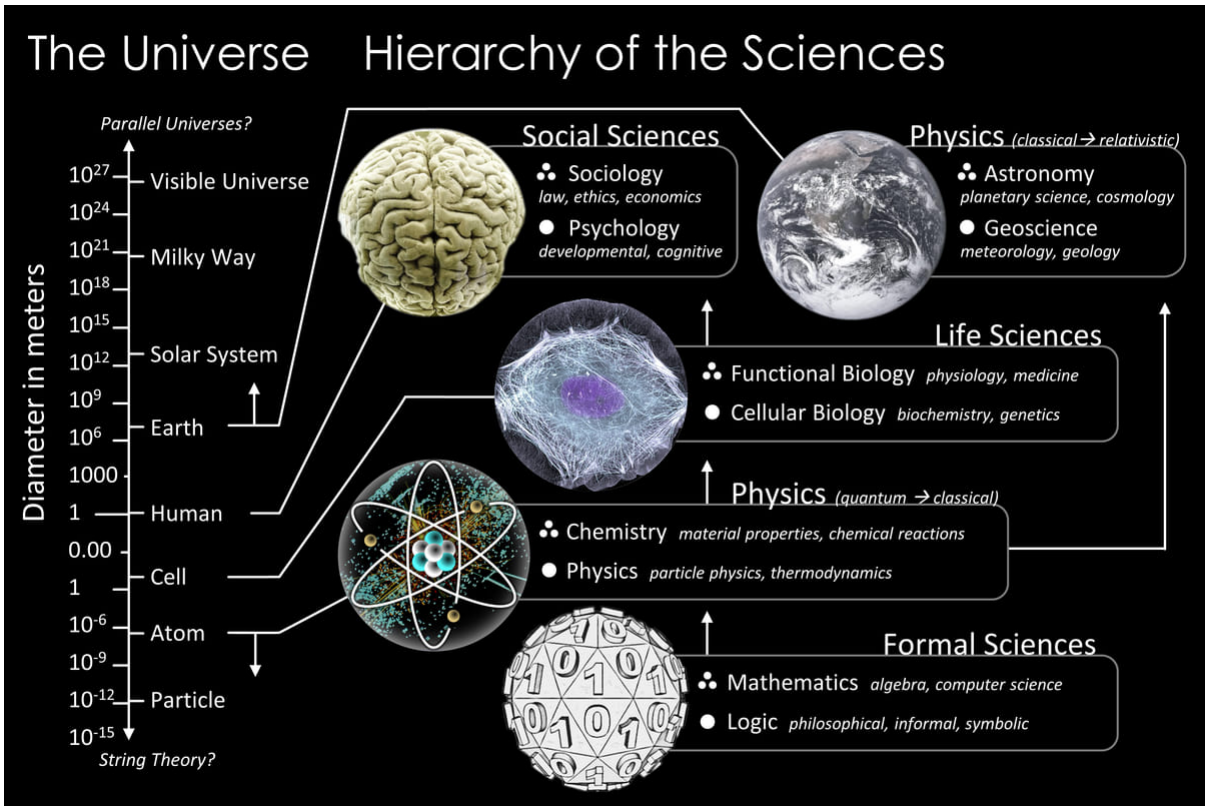
Note: The scientific method

2. We will make a virtual visit of a sewer line

Note: For younger cubs: Where does it go after you flush?

For webelos: Sewer Systems

3. We will discover how science affects our everyday life.



CHAPTER

THREE

TECH TALK

This module is designed to help the Cub Scout explore how technology affects your life each day.

Note: General Information about this activity:

- **When?**: 04/05 at 03:30pm
- **Instructor**: Ted Sargent
- **E-Mail address**: tesargent@gmail.com
- **Pre-reqs submission**: google form
- **Zoom link for activity**: https://us02web.zoom.us/j/83371388455
- **Bio-sketch**: Ted is a mechanical engineer specializing in HVAC systems for higher education, hospitals, commercial, and institutional buildings. He is a Den leader and Pack committee chair for Pack 3020 in Glenville, NY along with Assistant Scoutmaster for Troop 56 in Burnt Hills, NY. Ted also earned his Eagle Scout in 1997 in Annawon Council in South Eastern Massachusetts.

3.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

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

   A. Watch an episode or episodes (about one hour total) of a show about anything related to technology. Then do the following:

      (1) Make a list of at least two questions or ideas from what you watched.

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

      Note: Examples of Videos you can watch

      - Technology and its impact on your world
      - Past and Present technology then and now
      - Past and Present Technology Then and Now
      - Technology Evolution 100,000 BC to 2020
      - Technology in our Daily Life

- Responsible Use of Technology
- How the internet works
- How Cell phone works
- Any other video on technology

B. Read (about one hour total) about anything related to technology. Then do the following:

(1) Make a list of at least two questions or ideas from what you read.

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

C. Do a combination of reading and watching (about one hour total) about anything related to technology. Then do the following:

(1) Make a list of at least two questions or ideas from what you read and watched.

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

Warning: Pre-req submissions

Finally, have your cub scouts **ENTER** their pre work in this form before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor (See email in blue box at the top of this page).

3.2 What will we do during the meeting?

1. Complete all of the following:

   (a) Explain these parts of a personal computer: central processing unit (CPU), monitor, keyboard, mouse, modem, and printer.

   (b) Make a list of ten devices that can be found in a home that use a computer chip to function.

   (c) Use a spreadsheet program to organize some information.

2. Complete all of the following:

   (a) Point out the major features of a camera to your den or family and explain the function of each part. Parts COULD include memory card, lens, shutter, power on and off, zoom, battery, flash, display panel, case, settings, etc.

   (b) Discuss with your leader or adult partner the benefits and contributions photography makes to modern life.

   (c) Use a camera to take at least 10 pictures of your family, pet, scenery; show these to your den. Technology is the use of tools, machines, or scientific knowledge to solve problems, such as computer technology. The use of technology can help people control, adapt to, and change their environments.

3. Explore EACH of the following:

   A. Look up a definition of the word technology and discuss the meaning with your counselor.

   B. Find out how technology is used in EACH of the following fields:

   (1) Communication

   (2) Business

   (3) Construction

(4) Sports

(5) Entertainment

C. Discuss your findings with your counselor.

4. Virtually visit a place where technology is being designed, used, or explained, such as one of the following: an amusement park, a police or fire station, a radio or television station, a newspaper office, a factory or store, or any other location where technology is being designed, used, or explained.

A. During your visit, talk to someone in charge about the following:

(1) The technologies used where you are visiting

(2) Why the organization is using these technologies

B. Discuss with your counselor the technology that is designed, used, or explained at the place you visited.

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

CHAPTER

FOUR

SWING

This module is designed to help the Cub Scout explore how engineering and simple machines called levers affect your life each day.

Note: General Information about this activity:

- **When?**: 04/06 at 03:30pm
- **Instructor**: Jeff Zemsky
- **E-Mail address**: jeffzemsky@gmail.com
- **Pre-reqs submission**: google form
- **Zoom link for activity**: https://us02web.zoom.us/j/86158992384
- **Bio-sketch**: Jeff Zemsky is a Senior Director of Product Management at PTC, a software company out of Boston MA. At PTC, Jeff leads a team focused on PLM software for managing product design as they evolve through the development cycle. PTC is an industry leader in CAD, PLM, AR and IoT helping companies create and manage products of all sorts from consumer goods to aerospace and everything in between. Prior to PTC, Jeff worked at Plug Power managing fuel cell stack design and at Garden Way (Troy-bilt & Bolens) developing consumer lawn and garden products like mowers, tillers and snowthrowers. Jeff has a BSME from Lehigh University and a MEME from RPI and is an ASME member. Currently, Jeff is a Committee member with Troop 1075 in Delmar, NY and serves on the Fort Orange District Committee as was Cubmaster for Pack 232 in Glenmont, NY.

4.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

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

   A. Watch some of the videos listed below (about one hour total) of a show about anything related to motion or machines. Then do the following:

      (1) Make a list of at least two questions or ideas from what you watched.

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

Note: Some examples of videos you can watch:

- The mighty mathematics of the lever - Andy Peterson and Zack Patterson

- Simple Machines: The Lever
- What is a Lever? - Simple Machines | Science for Kids | Educational Videos by Mocomi
- Simple Machine – Lever and its types | Science | Grade-4,5 | TutWay
- Simple Machines for Kids: Science and Engineering for Children - FreeSchool
- Simple Machines (Lever) - Distance Learning Science Educational Videos (Elementary Students & Kids)
- Simple Machines:Levers
- Three Classes of Levers - Examples, Definition, Classification
- Some additional 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.
  - NASA Channel
  - Bill Nye the Science Guy
  - National Geographic
  - Nat Geo Kids
  - Periodic Videos
  - Sick Science
  - Sci Show Kids
  - Science Max
  - Kids Science
  - NOVA Videos

B. Read (about one hour total) about anything related to motion or machines. Then do the following:

(1) Make a list of at least two questions or ideas from what you read.

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

Note: Books on many topics may be found at your local library. Examples of magazines include but are not limited to Odyssey, KIDS DISCOVER, National Geographic Kids, Highlights, and OWL or owlkids.com

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C. Do a combination of reading and watching (about one hour total) about anything related to motion or machines. Then do the following:

(1) Make a list of at least two questions or ideas from what you read and watched.

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

2. Choose one of the following – B or C

B. With your parent's **permission**, take an old or broken household or mechanical item, break it down into its component pieces, and identify the purpose of five parts. Suggested items include a keyboard, computer, telephone, DVD player, toaster, bicycle, people counter, printer or similar item. Make sure to use appropriate safety precautions.

C. Participate in two sports, either as an individual or part of a team, and identify the levers used in each sport.

3. Do the following: Visit a place that uses levers, such as a playground, carpentry shop, construction site, restaurant kitchen, or any other location that uses levers.

note – we will work on a video visit during class – if you have a chance to visit a playground before this class that would be beneficial, but not required

Warning: Pre-req submissions

Finally, have your cub scouts **ENTER** their pre work in this form before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor (See email in blue box at the top of this page).

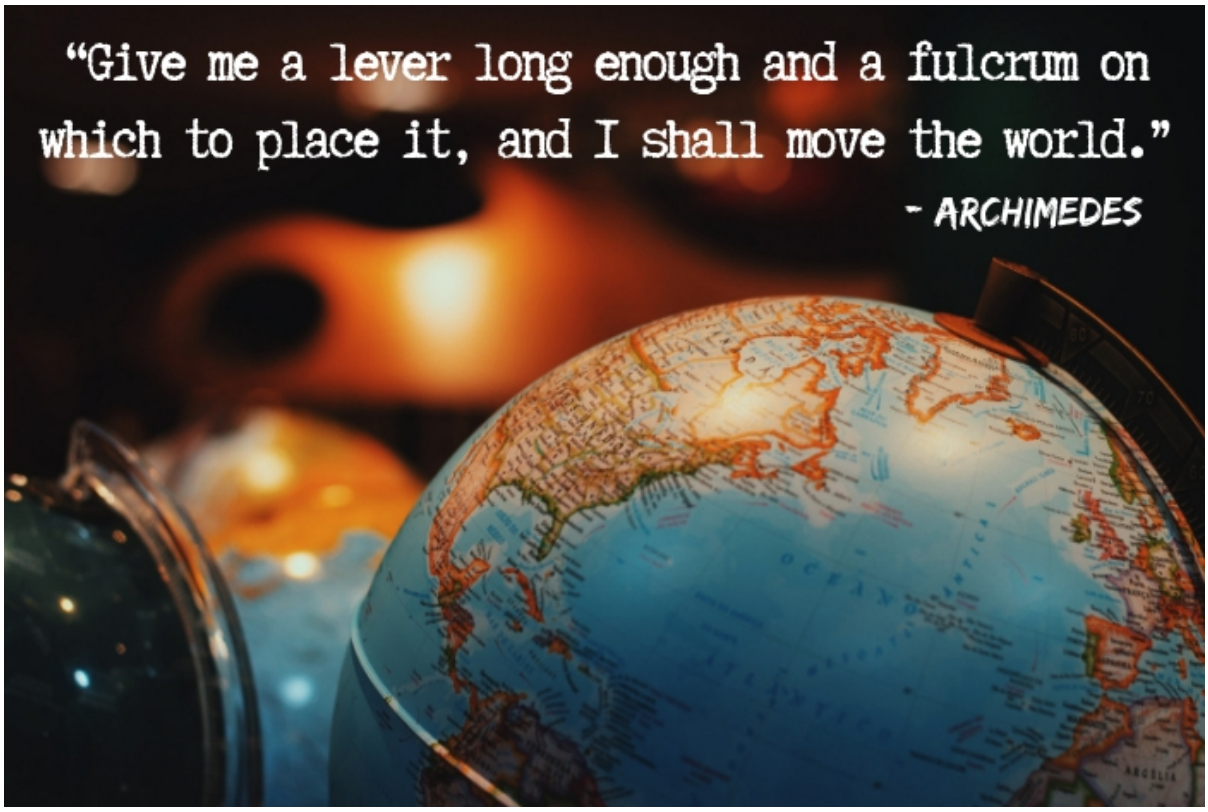
4.2 What will we do during the meeting?

1. Explore each of the following:
   A. Levers.
      1. Make a list or drawing of the three types of levers. (A lever is one kind of simple machine.)
      2. Show:
         1. How each lever works
         2. How the lever in your design will move something
         3. The class of each lever
         4. Why we use levers
   B. On your own, design, including a drawing, sketch, or model, ONE of the following:
      1. A playground fixture that uses a lever
      2. A game or sport that uses a lever
      3. An invention that uses a lever

      Be sure to show how the lever in your design will move something.
   C. Discuss your findings with your counselor.
2. Do the following
   A. Visit a place that uses levers, such as a playground, carpentry shop, construction site, restaurant kitchen, or any other location that uses levers.

      Note: We will work on a video visit during class – if you have a chance to visit a playground before this class that would be beneficial

   B. Discuss with your counselor the equipment or tools that use levers in the place you visited.
3. Discuss with your counselor how engineering and simple machines affect your everyday life.


"Give me a lever long enough and a fulcrum on which to place it, and I shall move the world."
- ARCHIMEDES

CHAPTER

FIVE

1-2-3 GO!

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

Math and physics are used in almost every kind of invention, including cars, airplanes, and telescopes. Math also includes cryptography, the use of secret codes.

Note: General Information about this activity:

- **When?**: 04/10 at 12:00pm
- **Instructor**: Rob Pattison
- **E-Mail address**: pattison_r@yahoo.com
- **Pre-reqs submission**: google form
- **Zoom link for activity**: https://us02web.zoom.us/j/85271318679
- **Bio-sketch**: Robert Pattison is an Executive Director and Head of Northeast Infrastructure at Morgan Stanley. For the past 18 years, he has led over $25 billion of bond issuances on behalf of municipal entities from across the country. Prior to working in public finance investment banking, Rob worked as a biochemical engineer for Genzyme Corporation and Regeneron Pharmaceuticals. Rob received his M.B.A from Northeastern University, his M.S. in Chemical Engineering from Tufts University and his B.S. in Chemical Engineering from Cornell University. When he was a Boy Scout, Rob earned the Arrow of Light and Eagle Scout rank as well as visited Gilwell Park (England) with his troop. Currently, he is a merit badge counselor, the Troop Committee Chair for Troops 75B & 75G, the Cubmaster and Webelos Den Leader for Pack 232, and the Twin Rivers Council VP of Finance.

5.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

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

A. Watch an episode or episodes (about one hour total) of a show that involves math or physics. Then do the following:

   1. Make a list of at least two questions or ideas from what you watched.
   2. Discuss two of the questions or ideas with your counselor.

   Note: Examples of videos:

- Mathematics is the queen of Sciences
- BBC Magic Numbers Mysterious World of Maths 1/3
- BBC Magic Numbers Mysterious World of Maths 2/3
- BBC Magic Numbers Mysterious World of Maths 3/3
- Donald Duck - Golden Mean
- How big is infinity?
- How does math guide our ships at sea?
- Enigma Machine
- Flaw in the Enigma Code
- Math And The Rise Of Civilization. Ep.01

B. Read (about one hour total) about anything that involves math or physics. Then do the following:
   1. Make a list of at least two questions or ideas from what you read.
   2. Discuss two of the questions or ideas with your counselor.

Note: Books on many topics may be found at your local library. Examples of magazines include but are not limited to Odyssey, KIDS DISCOVER, National Geographic Kids, Highlights, and OWL or owlkids.com .

C. Do a combination of reading and watching (about one hour total) about anything that involves math or physics. Then do the following:
   1. Make a list of at least two questions or ideas from what you read and watched.
   2. Discuss two of the questions or ideas with your counselor.

Warning: Pre-req submissions

Finally, have your cub scouts **ENTER** their pre work in this form before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor (See email in blue box at the top of this page).

5.2 What will we do during the meeting?

1. Requirement #2:
   (a) Conduct an opinion survey through which you collect data to answer a question and then show your results with a chart or graph. For example, what is the favorite food of the scouts in your den (chart how many like pizza, how many like cookies, etc.).
   (b) Conduct and keep a record of a coin toss probability experiment. Keep track of at least 25 tosses.

Note: For this Requirement, cub scouts should have a pen or pencil and paper available as well as a coin to flip for the experiment

2. Requirement #3:

   Explore the two options below and complete ALL the requirements for those options. Keep your work to share with your counselor. The necessary information to make your calculations can be found in a book or on the Internet. (See the Helpful Links box for ideas.) You may work with your counselor on these calculations.

   A. Choose TWO of the following places and calculate how much you would weigh there.

      1. On the moon
      2. On Jupiter

   B. Calculate the volume of air in your bedroom. Make sure your measurements have the same units—all feet or all inches—and show your work.

   Hint: Volume=Length x Width x Height

   Note: For this requirement, cub scouts need to know their weight in lbs and should have a pen or pencil and paper available as well as a ruler or tape measure to measure their room.

3. Requirement #4: **secret codes**

   A. Look up, then discuss with your counselor each of the following:

      1. Cryptography
      2. At least three ways secret codes or ciphers are made
      3. How secret codes and ciphers relate to mathematics

   B. Design a secret code or cipher. Then do the following:

      1. Write a message in your code or cipher.
      2. Share your code or cipher with your counselor.

   Note: For this requirement, cub scouts should have their scout manual available and have pen or pencil and paper

4. Requirement #5: Discuss with your counselor how math affects your everyday life.

Fig. 1: Military Enigma machine, model “Enigma 1”, used during the late 1930s and during the war (from https://brilliant.org/wiki/enigma-machine/)

CHAPTER

SIX

DOWN AND DIRTY

This module is designed to help you explore how earth science affects your life each day.

Hello Cubs and Families, we have an exciting lesson planned, full of interesting information about the Earth, Rocks and Volcanoes. In order to complete this NOVA award in one evening you need to complete several pre-work items. Our evening will be filled with information, discussion, flying around the Earth, and experiments.

Note: General Information about this activity:

- **When?**: 04/07 at 03:30pm
- **Instructor**: Jeffrey Brewer and James Cascione
- **E-Mail address**: Jeffrey.Brewer@acphs.edu and jk.cascione@gmail.com
- **Pre-req submissions**: google form
- **Zoom link for activity**: https://us02web.zoom.us/j/83178709212
- **Bio-sketches**: **James Cascione** is a Consultant and Environmental Scientist. His work supports the development and management of numerous air pollution control systems at manufacturing facilities for compliance with federal and state regulations. James received his M.A. in Secondary Science Education, M.S. and B.S. in Geology from Lehigh University in Bethlehem, PA. While earning his graduate degrees he worked for the US Army Corps of Engineers as a field researcher at the Matanuska Glacier near Sutton, AK. As a Boy Scout James earned the rank of Eagle and was a member of the Order of the Arrow, and was a staff member at Yawgoog Scout Reservation. Mr. Cascione is currently the Asst. Cubmaster for Pack 1232 in Glenmont, NY.

  Jeffrey Brewer is a Doctor of Pharmacy and Associate Professor of Pharmacy at the Albany College of Pharmacy and Health Sciences. He has worked in private physician offices for the last 22 years and likes nothing better than digging around in the dirt in his garden. He is an Eagle Scout and has been involved in scouting at various levels since 1983.

6.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

1. Complete ALL the requirements.

WATCH the PBS NOVA episode Making North America: Origins. In it, host Kirk Johnson (Director of Smithsonian National Museum of Natural History) introduces you to the geology of North America. There are two other 1 hour shows in the series that are just as cool, but not required. If you or your parents would rather read or watch another show please keep to the Earth Science topic of Volcanoes or Plate Tectonics for a duration of one hour.

Once you are done watching, enter at least two questions or ideas from what you watch on the Google form referenced below.

2. Your second task is to **COMPLETE** one of the following options described in the second requirement. You can choose a new adventure for your Cub Rank that you have not yet completed, please talk with your den leader, OR you can explain what geology means. The Adventure options are listed below. Please document your choice in the Google Form below.
    - **Wolf Scouts:** Collections and Hobbies, or Digging in the Past, or Grow Something
    - **Bear Scouts:** Super Science
    - **Webelos Scouts:** Adventure in Science, Earth Rocks!

Warning: Pre-req submissions

Finally, have your cub scouts **ENTER** their pre work in this form before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our April 7th 3:30 class.

6.2 What will we do during the meeting?

Note: Supplies Needed for the Meeting

1. **Lava lamp convection current experiment:**
    - Tall clear jar, glass, or bottle
    - 1qt light vegetable oil (the lighter the color the better)
    - Food coloring
    - 1/2 cup white vinegar
    - 2 tablespoons baking soda mixed with small amount of water to form a paste
    - Plastic tablecloth or tray to catch the "lava" overflow
2. **Drawing a volcano cross-section**
    - Large bland page of light colored (white) paper
    - Colored pencils, crayons or markers

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1. PowerPoint, Google Earth Tour, and Hands On Experiments
    A. We'll Learn About How Volcanoes are Formed: Investigate the structure of the earth How heat generates Convection Cells Create a model of a Convection Cell by conducting the "LAVA LAMP EXPERIMENT" (as explained in this video: https://youtu.be/nqSUy5PyY_k)
    B. We'll Learn the Difference Between Lava and Magma
    C. We'll Learn about how a Volcano can form both when land is being created at a Divergent Plate Boundary and when land is being destroyed at a Convergent Plate Boundary. We'll use Google Earth to fly to locations on the earth and investigate these topics (See box at the bottom of this page). We will use this video: Volcano Odyssey: Birth of an Island.

D. We'll Draw a Cross Section of Volcano While we learn about the cycles of eruption and dormancy, we'll draw our model volcano, and watch video clips of Eruptions and Lava Flows and learn about Igneous rocks that cool from lava, including a demonstration of the amazing properties of volcanic Pumice and Granite

   - Lake of Fire: Drone Footage of Icelandic Lava River
   - Krakatoa volcano eruptions at night 2018
   - Sailing through Pumice near VaVa'u 2019

E. We'll share our drawings with other scouts and discuss the difference between Stratovolcanoes and Shield Volcanoes

2. Google Earth Tour: We'll take a Virtual Tour of a Copper Mine in Mexico and discuss how geologic resources are concentrated in locations where volcanoes form. We'll talk about why scientists study earth science and we'll watch a video of scientist studying an active volcano and discuss what information they can learn. We will watch this video on Volcano Diver.
3. Finally, we'll discuss how earth science affects everyday life and show for example how geology determines where skyscrapers are built in New York City using Google Earth.

Note: A Google Earth Tour is available with a complete tour for the NOVA Down and Dirty Award presented on March 21st, 2021, available here. It is the Intellectual Property of Dr. Brewer and is available for use for any scouting family who is completing the NOVA Down and Dirty award this weekend and at any point in the future. If you are not in scouting, please contact me at jmhlbrewer@yahoo.com for approval.

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CHAPTER

SEVEN

NOVA WILD

This module is designed to help you learn about wildlife and the natural world around you.

Note: General Information about this activity:

- **When?**: 04/06 at 06:30pm
- **Instructor**: Melissa Sargent
- **E-Mail address**: masargent@gmail.com
- **Pre-reqs submission**: send directly to masargent@gmail.com
- **Zoom link for activity**: https://us02web.zoom.us/j/82678580269
- **Bio-sketch**: *not available at this time*

7.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

1. Requirement #1: Watch and episode or read about wildlife, endangered species, invasive species, food chains, biodiversity, ecosystems, or wildlife habitats. Then make a list of at least two questions or ideas from what you read and watched.

   Note: 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.

   - NASA Channel
   - Bill Nye the Science Guy
   - National Geographic
   - Nat Geo Kids
   - Periodic Videos
   - Sick Science

- Sci Show Kids
- Science Max
- Kids Science
- NOVA Videos

2. Gather the following items for the event
    a. small nature items, leaves, small sticks, feathers, etc. (should include at least one flatter item such as leaves)
    b. Paper
    c. Crayons with wrappers removed (any bolder or darker color)
    d. Glue (not glue stick) and or tape
    e. Cardboard piece or thicker paper
    f. Pine cone or toilet paper tube
    g. Piece of string (1-3 ft. long)
    h. Peanut butter (1 cup)
    i. Bird seed (1 cup)

Warning: Pre-req submissions

Finally, have your cub scouts **SEND** their pre work directly to Melissa Sargent to her email address: before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor if you have any question.

7.2 What will we do during the meeting?

1. Digging the Past
    a. Dinosaur Match Game: *Name the Dinosaur PowerPoint presentation* will be shown during the meeting.
    b. Create an imaginary dinosaur: https://mrnussbaum.com/dinosaur-maker-online
    c. Make a fossil cast: Make a crayon rubbing of a leaf or some other flatter object
2. Explore
    a. Talk about what wildlife is
    b. Use gathered nature items to collage
    c. Talk about items found
3. Act like a Naturalist
    a. Discuss endangered species Activity: play Endangered Species kahoot: https://embed.kahoot.it/205dede6ddd9-4983-86bf-050a9e91bbfc
    b. Investigate your Neighbor: Make bird feeder
4. Visit a place to observe wildlife .... Watch live bird cam such as: https://wwwallaboutbirds.org/cams/
5. Talk about what they learned and liked.

CHAPTER

EIGHT

OUT OF THIS WORLD

This module is designed to help the Cub Scout discover the wonders of space exploration.

Note: General Information about this activity:

- **When?**: 04/05 at 06:30pm
- **Instructor**: George Hassel
- **E-Mail address**: ghassel@siena.edu
- **Pre-reqs submission**: google form
- **Zoom link for activity**: https://us02web.zoom.us/j/88216954674
- **Bio-sketch**: George is an instructor of Physics and Astronomy at Siena College and enjoys outreach events with the Breyo Observatory. He is the Webelos Den Leader for Pack 1701 in Latham, and earned the rank of Eagle Scout in 1995 in Valley Forge Council (PA).

8.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

1. Requirement #1. Watch an episode or episodes (about one hour total) of a show about the planets, space, space exploration, NASA, or astronomy. Then do the following:

   A. Make a list of at least two questions or ideas from what you watched.

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

   Note: Here are some examples of appropriate videos:

   - Jupiter
   - Jupiter's Moons
   - Saturn
   - Uranus & Neptune
   - Comets
   - Project Voyager

- Voyager Mission
- Voyager Journey to the Stars

Warning: Pre-req submissions

Finally, have your cub scouts **ENTER** their pre work in this **`form < https://forms.gle/yPmg4Zv1mAwDY9Pf7>`__** before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor (See email in blue box at the top of this page).

8.2 What will we do during the meeting?

1. We'll talk about how to focus, make a diagram of the solar system, and draw some constellations. We will use a planetarium software to then try to find them.

   Note: If you want to practice with something ahead of time, https://stellarium-web.org/. and http://skymaps.com/. are free

2. We will talk about Revolution, Orbit, Rotation and eclipses. Please bring a flashlight and some different sized balls to the online meeting.
3. We'll do a presentation of the observatory and some of the research that is done there.

Fig. 1: Prof. Hassel pointing his telescope safely to project an image of the Sun. As a rule: never point a telescope or binoculars directly toward the Sun! In fact, if you watch the Sun, never do this without protective gear!

CHAPTER

NINE

FEARFUL SYMMETRY

This module is designed to help the Cub Scout explore how symmetry affects your life each day.

Note: General Information about this activity:

- **When?**: 04/08 at 06:30pm
- **Instructor**: Melia Gordon
- **E-Mail address**: boyscouts@meliagordon.com
- **Pre-reqs submission**: google form
- **Zoom link for activity**: https://zoom.us/j/93949066800
- **Bio-sketch**: Melia Gordon is an electrical engineer turned yoga teacher. She has been involved in Girl Scouts for 17 years and BSA Scouts for almost 10 years, helping with fundraising for Cub Scouts and Scouts BSA and as Assistant Scoutmaster for her oldest's girl troop. When not teaching, she coaches FIRST robotics teams for her 3 kids to keep her engineering skills sharp.

9.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

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

   A. Watch an episode or episodes (about one hour total) of a show that involves symmetry, mirrors, or artistic patterns (see suggested channels below). Then do the following:

      1. Make a list of at least two questions or ideas from what you watched.
      2. Discuss two of the questions or ideas with your counselor.

      Note: Examples of videos you can watch:

      - Intro to Symmetry
      - Insights into Mathematics
      - Line designs

B. Read (about one hour total) about anything that involves symmetry, mirrors, or artistic patterns. Then do the following:

   1. Make a list of at least two questions or ideas from what you read.
   2. Discuss two of the questions or ideas with your counselor.

C. Do a combination of reading and watching (about one hour total) about anything that involves symmetry, mirrors, or artistic patterns. Then do the following:

   1. Make a list of at least two questions or ideas from what you read and watched.
   2. Discuss two of the questions or ideas with your counselor.

Warning: Pre-req submissions

Finally, have your cub scouts **ENTER** their pre work in this form before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor (See email in blue box at the top of this page).

9.2 What will we do during the meeting?

1. Complete all of the following:
   (a) Using toothpicks and colored marshmallows, or other appropriate materials, make a model of the crystal structure of olivine.
   (b) Using toothpicks and colored marshmallows, or other appropriate materials, make a model of the crystal structure of halite.
   (c) Use your models to guess which of the two minerals is harder.

   Note: For this, Cubs will need toothpicks and small marshmallows (or something similar - gum drops, gummy bears, skewers and big marshmallows, etc)

2. We will complete the following two activities:
   A. Make a paper lantern
      1. Fold a large piece of paper in quarters lengthwise.
      2. Cut decorative or symbolic shapes into the two folded edges.
      3. Unfold, tape the two edges of the paper together, and smooth into a cylinder. Hang by a string.

      Note: For this, Cubs should have a piece of construction paper, scissors and 3 pieces of string or yarn that are 8-12” long.

   B. Learn about the design of Navajo rugs.
      1. Look at some pictures of Navajo rugs. Find as many similarities as possible within each rug. Is there a repeated pattern? Is there a mirror image? How many?
      2. Using different colors of paper, or other materials, make your own Navajo-like rug.

Note: For this, Cubs should have graph paper and some different colored markers, pencils, etc.

3. Visit a place where symmetry is important (such as an art exhibit, building site, or printer) or visit with a person who works with symmetry (such as an artist, interior designer, or landscape architect). Discuss with your counselor the symmetry or ideas of balance involved.

   We will take a virtual tour of Jason Nemec's wood shop in Charlton, NY. He will show us how he uses symmetry to sculpt bowls out of trees!

4. Discuss with your counselor how symmetry impacts your everyday life.

CHAPTER

TEN

UNCOVERING THE PAST

This module is designed to help the Cub Scout explore the wonders of archaeology.

Note: General Information about this activity:

- **When?**: 04/07 at 06:30pm
- **Instructor**: Katie McCabe
- **E-Mail address**: mccabk@rpi.edu
- **Pre-reqs submission**: send directly to mccabk@rpi.edu
- **Zoom link for activity**: https://us02web.zoom.us/j/89238412594
- **Bio-sketch**: Katie is currently a senior biology major at Rensselaer Polytechnic Institute, and is also currently a 1/C Midshipman in the NROTC program there. Katie will be holding the meeting with the aid of a few of her fellow Midshipmen: Jonathan Beck, Jillian Kasun, Christopher Kang, Matthew Farr, and Michael Mendez.

10.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

1. Choose either A or B and complete ALL the requirements.
   A. Watch an episode or episodes (about one hour total) of a show about anything related to archaeology. Then do the following:
      1. Make a list of at least two questions or ideas from what you watched.
      2. Discuss two of the questions or ideas with your counselor.
   B. Read (about one hour total) about anything related to archaeology. Then do the following:
      1. Make a list of at least two questions or ideas from what you read.
      2. Discuss two of the questions or ideas with your counselor.
2. Complete ONE adventure from the following list for your current rank or complete option A or option B. (If you choose an adventure, choose one you have not already earned.) Discuss with your counselor what kind of science, technology, engineering, and math was used in the adventure or option.
   - Wolf Scouts: Collections and Hobbies
   - Bear Scouts: Beat of the Drum

- Webelos Scouts: Looking Back, Looking Forward; Project Family

OPTIONS:

A. Some of the objects archaeologists find have been preserved in various ways. Experiment with preserving a hot dog with baking soda. Measure each dimension, then completely surround and cover the hot dog in baking soda. Let sit in a safe place for seven days, and measure again. Then cover the hot dog again, let it sit another seven days, and measure it a third time. Make note of any changes in size, shape, color, and other properties. Compare it to a hot dog that has not been preserved. Discuss your experiment with your counselor.

Note: Note: Do not eat the hot dog, and make sure to store your experiment in a safe place and dispose of it properly when you are done.

Useful Links

- https://www.scientificamerican.com/article/bring-science-home-mummification/
- https://www.sciencebuddies.org/science-fair-projects/project-ideas/human-biology-health

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B. Use plaster of paris to create a "rock" mold at least half an inch thick. Once it is set, create a dark surface like a patina on the rock, possibly by using tempera paint. Use a carving tool, such as a screw or push pin, to create one or more petroglyphs on your rock.

Note: Search online for "plaster of paris petroglyphs" for instructions.

Warning: Pre-req submissions

Finally, have your cub scouts **SEND** their pre work directly to Katie to her email address: mccabk@rpi.edu before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor if you have any question.

10.2 What will we do during the meeting?

1. **Explore**. Do EACH of the following:

A. We will look up the definition of the word *archaeology* and discover what an archaeologist does on a dig site, and what other activities are involved in their work.

Hint: Archaeology is the study of the human past by recovering and analyzing materials that people left behind.

B. Discover the differences between physical remains, artifacts, and ecofacts. Discuss with your counselor examples of each that archaeologists can find for a prehistoric people group.

Hint:

- An artifact is any object made by a human being. Usually, it refers to an object that has cultural or historical interest.

- An ecofact, or biofact, is any organic material that has been recovered and has cultural or historical significance. This might be bones, animal horns, plants, and so on. If the item has been manipulated or modified by humans, it becomes an artifact.
- Physical remains are things left behind that were part of an animal- for example, body parts or fossils of body parts.

2. **Look around your house.** Make a list of 10 artifacts from your home that serve as clues to the way you live. Discuss what you discovered with your counselor. ***We will take time during the meeting for a miniature scavenger hunt for the scouts to find potential artifacts in their houses.**

Note: Artifacts could include anything found lying around the Scout's house. A dog crate could indicate the family has kept domesticated animals. A hammer could indicate they know how to use tools. Ask the Scouts to pretend they have never seen a particular item before, and what might they think it is.

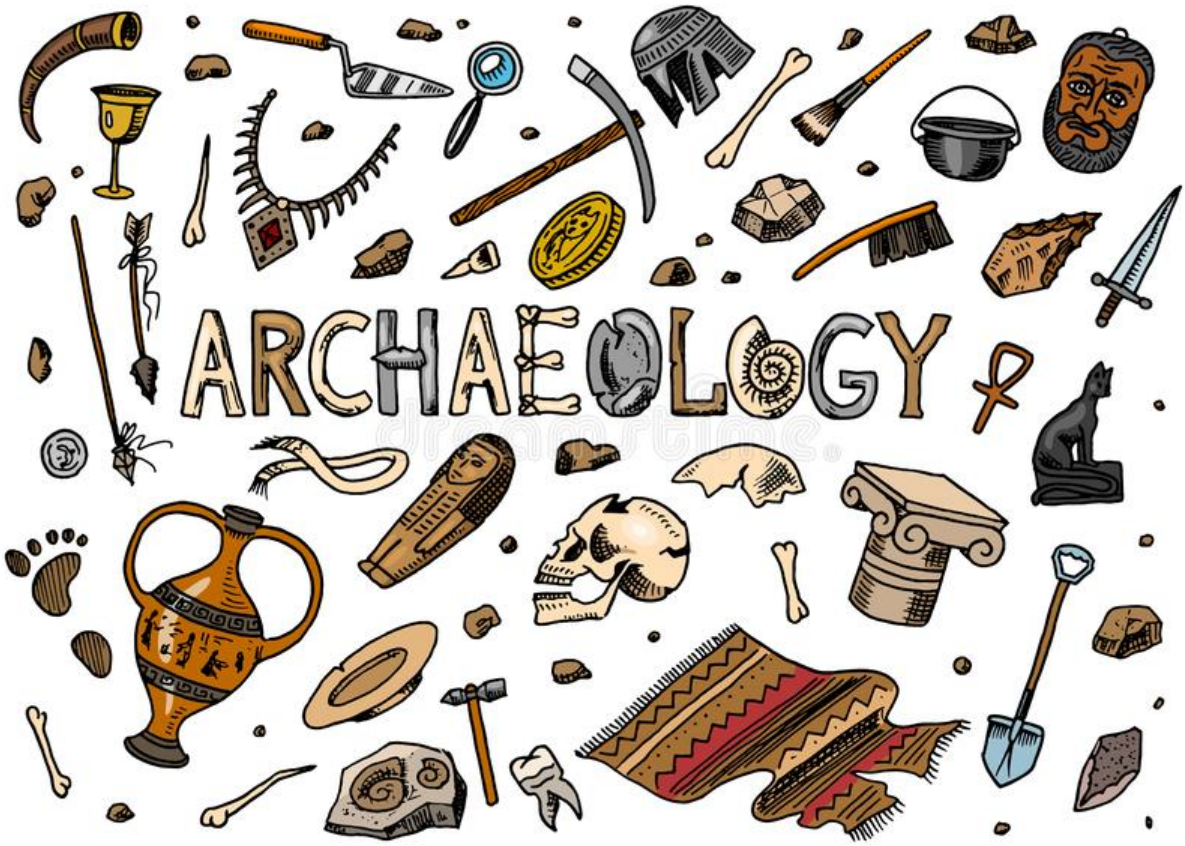
3. **Be an archaeologist!** You will create your own layers of artifacts and ecofacts. Gather some small items that would show future archaeologists how you and your family lived. Use a plastic bottle or glass jar as the vessel and Play-Doh sand, dirt, etc., to form layers. Place the gathered items in different layers. Think about which layers would hold the older items compared to newer ones. Show it to your counselor, and discuss with your counselor why you chose these items and what they would show archaeologists about how you lived. Excavate your items when you're done.

Warning: *Parents**: make sure you have a tall, clear cup or jar, some small items, and playdough or sand ready for the scouts to build their layers. Put down some cloths or newspaper to avoid any mess during the excavation portion.

4. Visit a place that has items that have been excavated, such as a museum, dig site, historical society, etc. Talk to someone who works there about the displays. If you can't visit in person, use resources in your school or local library or on the internet (with your parent's or guardian's permission and guidance) to take a virtual visit. Discuss with your counselor what you saw, how the archaeologists helped uncover those items, and what questions you had.

Hint: We will do this virtually!

5. Discuss with your counselor what you have learned about archaeology while working on this award.


ARCHAEOLOGY

CHAPTER

ELEVEN

CUB SCOUTS CAN CODE

Did you ever wonder how computers know what to do? This module is designed to help you explore how people instruct computers and how they affect your everyday life.

Note: General Information about this activity:

- **When?**: 04/09 at 06:30pm
- **Instructor**: Ted Sargent
- **E-Mail address**: tesargent@gmail.com
- **Pre-reqs submission**: google form
- **Zoom link for activity**: https://zoom.us/j/97385205758
- **Bio-sketch**: Ted is a mechanical engineer specializing in HVAC systems for higher education, hospitals, commercial, and institutional buildings. He is a Den leader and Pack committee chair for Pack 3020 in Glenville, NY along with Assistant Scoutmaster for Troop 56 in Burnt Hills, NY. Ted also earned his Eagle Scout in 1997 in Annawon Council in South Eastern Massachusetts.

11.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

1. Requirement #1

   A. Watch some of the Youtube videos listed below. (if your parents do not want you to watch videos, you can complete the alternate requirement "B"!)

      1. Make a list of at least two questions or ideas from what you watched.
      2. Discuss two of the questions or ideas with your counselor.

         - CrashCourse - Computers
         - What is an Algorithm
         - Binary Explained
         - Basics Explained
         - Hour Of Code Series
         - BrainPop - Computer Programing

- See how a CPU Works
- Intro: How to Program in C#

B. (only do this if you do not want to do A.) Read (about one hour total) about anything related to computers, coding, and careers that involve computers. Then do the following:

1. Make a list of at least two questions or ideas from what you read.
2. Discuss two of the questions or ideas with your counselor.

2. Be a programmer! With your parent's or guardian's permission and using proper internet safety, explore the world of coding using a tablet or computer. Make sure that your Cyber Chip is up to date. Complete ALL the requirements.

A. Spend at least one hour creating instructions for a computer to execute, then testing and debugging them. There are many free applications for computers, tablets, and smartphones.

B. Discuss with your counselor what you were able to create. Explain what you liked best about it and what was difficult.

Note: What you need for class?

1) 3x5 Note Cards
2) Blank white paper
3) Ruler
4) Pencil or pen
5) Coin

Warning: Pre-req submissions

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11.2 What will we do during the meeting?

1. Complete all of the following:
   (a) Define what a computer is and research how computers have changed over time.
   (b) Create a timeline of important dates and include images to show the different computer designs.
   (c) Talk to your parent, counselor, or other adult about the changes they have seen in computers over their lifetime.
   (d) Record at least 10 devices in your home that use some kind of computer to operate.
2. Complete all of the following:
   (a) Research what binary code is, and how computers use it to store information. Find out what an ASCII table is.
   (b) Write a message to another Scout, your parent, or your counselor in binary code. See if they can decode it.

(c) Create a set of binary cards. Take 5 notecards and write a zero on one side of each. Then on the other side write one of the following numbers along with dots of that number: 1, 2, 4, 8, 16.

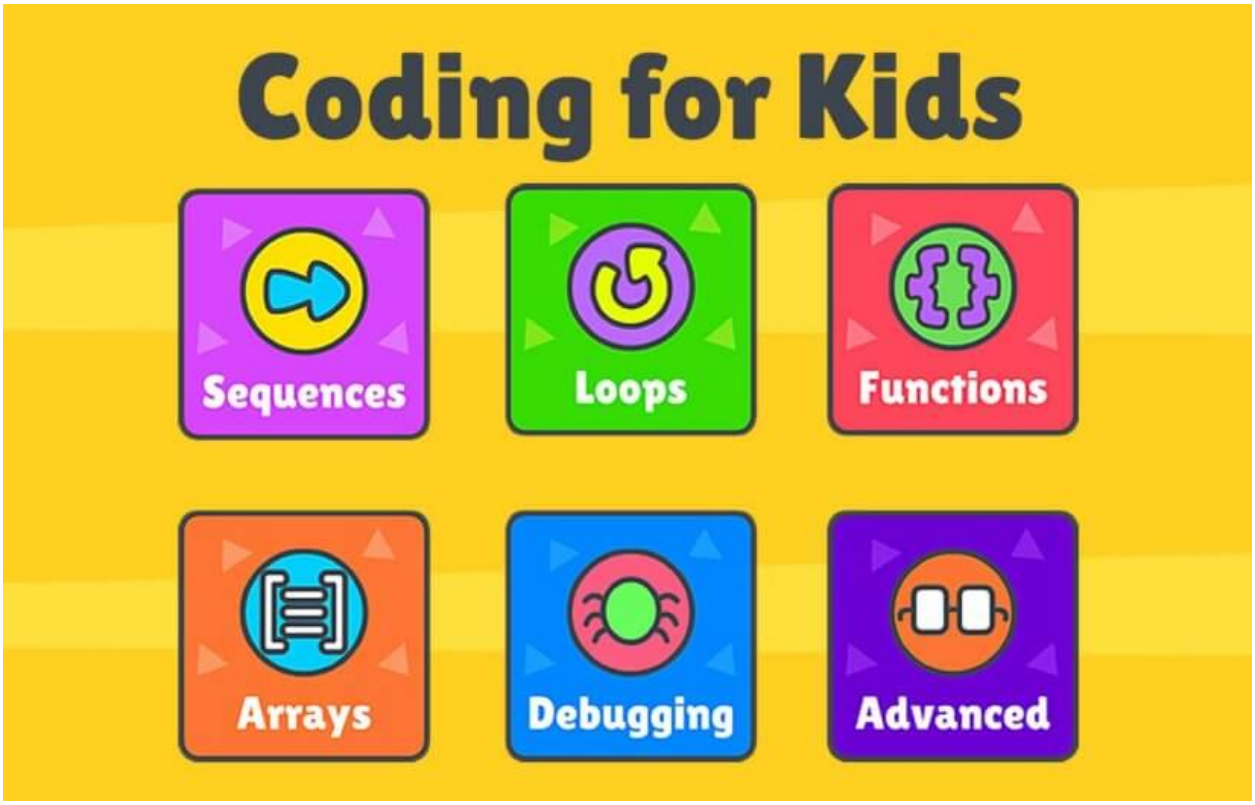
(d) Line the cards up in number order with 16 on the far left and 1 on the far right. Turn them over so that zeros are facing up. So 0 = 00000 in 5-bit binary.

(e) Now show how to represent the numbers 1-31 by flipping the correct combination of cards that produce the correct number of dots. Convert each number into a 5-bit binary code by using a zero for each 0 card and a 1 for each dotted card in order. HINT: 20 = 10100

3. Computer Science Unplugged: Follow the Algorithm

    1. With grid paper or a checkerboard, select one square as the start space and another to be the finish space. Use a coin or other small object as the token to move between these spaces.
    2. Create flashcards with one direction on each card. For example: Move one space up, Move one space down, Move one space right, Move one space left, etc. You can use the cards multiple times or create copies of them.
    3. Produce the series of instructions that move your token from start to finish on the grid. Make sure that there are at least three steps involved. This is called an algorithm. Write the steps down. Test your algorithm and have another person try it as well. Can you find a different series of steps that move the token between start and finish?
    4. Move the start and finish spaces and create a new set ofinstructions for this path. Test your algorithm and fix any errors.
    5. Add a few "blackout" squares to the board, that cannot be used,then create a new series of instructions to move without crossing any of them.
    6. Research how computers use algorithms to work. Discuss what you learn with your counselor.

5. Discuss with your counselor what you have learned about how computers



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CHAPTER

TWELVE

UP AND AWAY

Up and Away is the Cub Scout Nova Award for investigating how fluids such as liquids and gasses affect everyday life.

Note: General Information about this activity:

- **When?**: 04/09 at 03:30pm
- **Instructor**: Bill Clancy
- **E-Mail address**: wsclancy@aol.com
- **Pre-reqs submission**: send directly to wsclancy@aol.com
- **Zoom link for activity**: https://zoom.us/j/93407572420
- **Bio-sketch**: Bill Clancy is a retired Nuclear Engineer with degrees in Nuclear Engineering and Management as well as a Professional Engineers Credentials. Bill has extensive experience in the defense (Naval Submarine) and power industry and holds several Nuclear Power Supervisor Licenses. He is presently engaged as a consultant building training for personnel constructing submarines at the Groton Naval Shipyard. He has been a scouter for 40 years, as an Eagle scout, Cubmaster, Scoutmaster and Commissioner. He is now an Assistant Council Commissioner and the Chairman of the Yankee Doodle District in Rensselaer and Columbia counties. He is also a member of the STEM Committee of the Twin Rivers Council.

12.1 Pre-requisites

What is a pre-requisite? It is an activity you should complete *before* the meeting! Here is a list of pre-requisites you should do to complete this Award. If you do not have time to complete it **before** the day of the activity, do not despair! You can always send your work later to your instructor at the address listed above!

1. Requirement #1 (Choose A or B or C and complete ALL of the requirements)
   A. Watch not less than one hour total of shows or documentaries that discuss fluid dynamics or a show related to fluid dynamics. Then do the following
      1. Make a list of at least two questions or ideas from the show(s) you watched.
      2. Discuss two of the questions with or ideas with your counselor.
   B. Read not less than one hour total about a topic related to fluid dynamics. Then do the following:
      1. Make a list of at least two questions or ideas from the article(s) you read.
      2. Discuss two of the questions with or ideas with your counselor.
   C. Do a combination of reading and watching (not less than one hour total). Then do the following:

1. Make a list of at least two questions or ideas from each article or show.
2. Discuss two of the questions or ideas with your counselor.

Note:

Some examples of shows to watch include—but are not limited to—The STEM of Indoor Skydiving; documentaries produced by PBS (such as "NOVA"), the Discovery Channel, Science Channel, National Geographic Channel, and the History Channel; or lectures or presentations focused on science, technology, engineering, or math (such as TED Talks) using some search terms you might think of using could include "fluid dynamics for kids" or "the science of skydiving for kids." You may watch online productions with your counselor's approval and under your parent's or guardian's supervision. You may choose to watch a live performance or movie at a planetarium or science museum instead of watching a media production.

If you are a fan of Bill Nye the Science Guy... a couple of other videos you could watch would include:

1. Bill Nye the Science Guy Sea 05 Epis 13 Fluids
2. Bill Nye the Science Guy S02E19 Atmosphere
3. Bill Nye The Science Guy on Wind (Full Clip)

If watching videos is not your thing you may select an article and read for an hour. A couple of good places to look include:

1. Fluid dynamics Facts for Kids (kiddle.co)
2. What Is Fluid Dynamics? (Live Science)

In both cases prepare at least to jot down at least 2 questions based on your study for us to discuss in class.

Warning: Pre-req submissions

Finally, have your cub scouts **SEND** their pre work directly to Bill Clancy to his email address: wsclancy@aol.com before April 5th to allow us to create a truly interactive and personalized learning experience. If you are late that is OK, please still fill it out up to our scheduled class. Feel free to contact the instructor if you have any question.

12.2 What will we do during the meeting?

Among other things, we will study airplanes:

We will be using both a pin wheel and a paper airplane as part of studying Bernoulli's Law and Fluid Dynamics.

Scouts should make their pinwheel and airplane before the event as outlined in the following:

1. How to Make a Paper Airplane | HGTV
2. How to Make Pinwheels | Easy Paper Pinwheel Tutorial -One Little Project

We will fly our paper airplane several times during our session so plan on having about a 10 foot long unobstructed area in which to fly where if your airplane hits anything there will not be any damage