

# STEM CAMPOREE MERIT BADGES

March 11, 2019

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## Merit Badge Procedures & Guidelines

Taking a merit badge is **not required** to participate in the camporee. Scouts may elect other programs to participate in.

### Merit Badges

1. **Animal Science** — Off camp to be announced
2. **Aviation** — At Danbury Airport with Civil Air Patrol
3. **Chess** — Held prior to the camporee.
4. **Electricity** — At Hoyt
5. **Energy** — At Hoyt
6. **Programming** — At Hoyt
7. **Railroading** — At the Danbury Railway Museum
8. **Radio** — At Hoyt
9. **Rifle** — partial only. The rifle range open for meeting qualification requirements.
10. **Robotics** — At Hoyt
11. **Space Exploration** — At Hoyt
12. **Signs, Signals, and Codes** — At Hoyt

**Merit Badge Classes will be limited to 10 to 20 Scouts** (discretion of the Merit Badge Counselors) on a first “paid” first choice basis.

- Merit Badge classes are selected through the online registration process. Once a badge class has been filled, it will be removed from the registration form.
- Please select merit badges carefully it will not be possible to switch your badge.
- Some Merit Badges will require morning and afternoon sessions and can take Scouts away from other activities.

**Merit Badge Books** are the responsibility of the Troop and/or Scouts to purchase. Scouts should read the merit badge book.

### Merit Badge Preparations:

- We recommend that Troops schedule pre-merit badge work. Scouts that complete the Merit Badges prerequisite have a greater chance of completing the badge at the camporee.
  - Use Troop Meetings and assign an adult to work with the Scouts on the prerequisite.
- Scouts should obtain the Merit Badge Book, read it and then are encouraged to complete as much of the worksheets they can prior to the weekend. This will help give the scout a better understanding of requirements and be useful notes for classroom discussions. Worksheets can be found at [meritbadge.org](http://meritbadge.org) or just “googled” for worksheets.
- Please do not start pre-work until it is verified that the Scout has been accepted into that class.
- **Alert:** It may not be possible to complete all of a merit badge requirements at the camporee. Scouts can arrange follow-up sessions with the merit badge counselors.

**Blue Cards:** Each Scout must bring a signed Merit Badge Blue Card to his class. The blue cards will then be returned to the Scoutmasters (signed by the MB Counselor) in a packet. Please make sure the Blue Card is properly completed with Troop and Troop number so that we can return it to the appropriate Scoutmasters.

**Off Camp Merit Badges requires a sign parent permission** slip found in this guidebook. There are no extra fees for these merit badges.

**Merit Badge Counselors Wanted:** We are looking for Merit Badge counselors for each of the above merit badges. We hope that as classes get filled up, we can offer a second class. Merit Badge Counselors must be properly registered, Youth Protection Trained, and have completed Merit Badge Counselor Training.

- **CYC has set up online Merit Badge Counselor Training** at [http://archive.ctyankee.org/fs/page/002641/meritbadgescounselorthe\\_essentials-2017rev0420a.pdf](http://archive.ctyankee.org/fs/page/002641/meritbadgescounselorthe_essentials-2017rev0420a.pdf) and there is a national course through [my.scouting.org](http://my.scouting.org).



**New Pond Farm**  
Education Center  
101 Marchant Rd,  
West Redding, CT 06896

**Merit Badge Counselor**  
**To Be Announced**

The trip permission form is required and we will need to recruit drivers to make this merit badge happen.

Prerequisites:

- Read the Merit Badge Book
- Complete requirements 1 to 6 and Reg. 7 using the workbook. Be prepared to discuss these requirements with the counselor.
- Download worksheet at: [http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Animal Science

1. Name four breeds of livestock in each of the following classifications: horses, dairy cattle, beef cattle, sheep, hogs. Tell their principal uses and merits. Tell where the breeds originated.
2. List five diseases that afflict the animals in each of the classifications in requirement 1. Also list five diseases of poultry. Describe the symptoms of each disease and explain how each is contracted and how it could be prevented.
3. Explain the major differences in the digestive systems of ruminants, horses, pigs, and poultry. Explain how the differences in structure and function among these four types of digestive tracts affect the nutritional management of these species.
4. Select one type of animal—beef cow, dairy cow, horse, sheep, goat, or hog, or a poultry flock—and tell how you would properly manage it. Include in your discussion nutritional (feeding) concerns, housing, disease prevention, waste control/removal, and breeding programs if appropriate.
5. Explain the importance of setting clear goals for any animal breeding program. Tell how purebred lines of animals are produced. Explain the practice of crossbreeding and the value of this practice.
6. Complete ONE of the following options: Beef Cattle, Dairying, Horse, Sheep

(We've selected the Dairying Option)

### DAIRYING OPTION

- a. Tell how a cow or a goat converts forage and grain into milk. Explain the differences in feeds typically used for dairy cows versus those fed to beef cows.
  - b. Make a chart showing the components in cow's milk or goat's milk. Chart the amount of each component.
  - c. Explain the requirements for producing grade A milk. Tell how and why milk is pasteurized.
  - d. Tell about the kinds of equipment used for milking and the sanitation standards that must be met on dairy farms.
  - e. Define the following terms: bull, cow, steer, heifer, springer; buck, doe, kid.
  - f. Visit a dairy farm or a milk processing plant. Describe what you saw and explain what you learned. If you cannot visit a dairy farm or processing plant, view a video from a breed or dairy association, or research the Internet (with your parent's permission) for information on dairying. Tell about your findings.
7. Find out about three career opportunities in animal science. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.



Mike Nolan  
Aerospace Education Officer  
Civil Air Patrol  
Merit Badge Counselor  
mfnolan@aol.com

This badge will take place at the Danbury Airport. The trip permission form is required and we will need to recruit drivers to make this merit badge happen.

**Prerequisites:**

- Read the Merit Book
- Do either a or b of requirement 3 and bring to the camporee.
- Write out Requirement 5 for discussion with the counselor.

Please note we cannot do requirement 2a (there will be no actual flying in an aircraft). The Civil Air Patrol hopes to fly in one of their aircraft for show.

Download worksheet at:  
[http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

The Civil Air Patrol (CAP) is a congressionally chartered, federally supported non-profit corporation that serves as the official civilian auxiliary of the United States Air Force (USAF).

## Aviation Merit Badge

1. Do the following:
  - a. Define "aircraft." Describe some kinds and uses of aircraft today. Explain the operation of piston, turboprop, and jet engines.
  - b. Point out on a model airplane the forces that act on an airplane in flight.
  - c. Explain how an airfoil generates lift, how the primary control surfaces (ailerons, elevators, and rudder) affect the airplane's attitude, and how a propeller produces thrust.
  - d. Demonstrate how the control surfaces of an airplane are used for takeoff, straight climb, level turn, climbing turn, descending turn, straight descent, and landing.
  - e. Explain the following: the sport pilot, the recreational pilot and the private pilot certificates; the instrument rating.
  
2. Do TWO of the following:
  - a. Take a flight in an aircraft, with your parent's permission. Record the date, place, type of aircraft, and duration of flight, and report on your impressions of the flight.
  - b. Under supervision, perform a preflight inspection of a light airplane.
  - c. Obtain and learn how to read an aeronautical chart. Measure a true course on the chart. Correct it for magnetic variation, compass deviation, and wind drift to determine a compass heading.
  - d. Using one of many flight simulator software packages available for computers. "fly" the course and heading you established in requirement 2c or another course you have plotted.
  - e. Explain the purposes and functions of the various instruments found in a typical single-engine aircraft: attitude indicator, heading indicator, altimeter, airspeed indicator, turn and bank indicator, vertical speed indicator, compass, navigation (GPS and VOR) and communication radios, tachometer, oil pressure gauge, and oil temperature gauge.
  - f. Create an original poster of an aircraft instrument panel. Include and identify the instruments and radios discussed in requirement 2e.
  
3. Do ONE of the following:
  - a. Build and fly a fuel-driven or battery powered electric model airplane. Describe safety rules for building and flying model airplanes. Tell safety rules for use of glue, paint, dope, plastics, fuel, and battery pack.
  - b. Build a model FPG-9. Get others in your troop or patrol to make their own model, then organize a competition to test the precision of flight and landing of the models.
  
4. Do ONE of the following:
  - a. Visit an airport. After the visit, report on how the facilities are used, how runways are numbered, and how runways are determined to be "active."
  - b. Visit a Federal Aviation Administration facility control tower, terminal radar control facility, air route traffic control center, or Flight Standards District Office. (Phone directory listings are under U.S. Government Offices, Transportation Department, Federal Aviation Administration. Call in advance.) Report on the operation and your impressions of the facility.
  - c. Visit an aviation museum or attend an air show. Report on your impressions of the museum or show.
  
5. Find out about three career opportunities in aviation. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.



### Merit Badge Notes

We are offering this badge prior to the camporee:

Fairfield Chess Club  
710 West Avenue  
Norwalk, CT 06850  
(203) 505-6215  
Sunday, April 28, 2019  
9 AM

This merit badge class is an extra fee not included in the camporee fee — \$30.00  
Registration link

Scouts will participate in the Chess Tournament at the Spring Camporee to complete the Chess Merit Badge.

## Chess

1. Discuss with your merit badge counselor the history of the game of chess. Explain why it is considered a game of planning and strategy.
2. Discuss with your merit badge counselor the following:
  - a. The benefits of playing chess, including developing critical thinking skills, concentration skills, and decision-making skills, and how these skills can help you in other areas of your life
  - b. Sportsmanship and chess etiquette
3. Demonstrate to your counselor that you know each of the following. Then, using Scouting's Teaching EDGE\*, teach someone (preferably another Scout) who does not know how to play chess:
  - a. The name of each chess piece
  - b. How to set up a chessboard
  - c. How each chess piece moves, including castling and en passant captures

You may learn about Scouting's Teaching EDGE from your unit leader, another Scout, or by attending training.
4. Do the following:
  - a. Demonstrate scorekeeping using the algebraic system of chess notation.
  - b. Discuss the differences between the opening, the middle game, and the endgame.
  - c. Explain four opening principles.
  - d. Explain the four rules for castling.
  - e. On a chessboard, demonstrate a "scholar's mate" and a "fool's mate."
  - f. Demonstrate on a chessboard four ways a chess game can end in a draw.
5. Do the following:
  - a. Explain four of the following elements of chess strategy: exploiting weaknesses, force, king safety, pawn structure, space, tempo, time.
  - b. Explain any five of these chess tactics: clearance sacrifice, decoy, discovered attack, double attack, fork, interposing, overloading, overprotecting, pin, remove the defender, skewer, zwischenzug.
  - c. Set up a chessboard with the white king on e1, the white rooks on a1 and h1, and the black king on e5. With White to move first, demonstrate how to force checkmate on the black king.
  - d. Set up and solve five direct-mate problems provided by your merit badge counselor.
6. Do ONE of the following:
  - a. Play at least three games of chess with other Scouts and/or your merit badge counselor. Replay the games from your score sheets and discuss with your counselor how you might have played each game differently.
  - b. Play in a scholastic (youth) chess tournament and use your score sheets from that tournament to replay your games with your merit badge counselor. Discuss with your counselor how you might have played each game differently.
  - c. Organize and run a chess tournament with at least four players, plus you. Have each competitor play at least two games.



### Merit Badge Counselor

- Read the Electricity Merit Badge Book.
- Complete the Following Requirements:
  - Req. 2: Electrical Safety Inspection Checklist
  - Req. 3: Make a simple electromagnet
  - Req. 8: Bedroom floor plan
  - Req. 9: Read an electric meter
  - Req. 11: Do any TWO

Download workbook at:  
[http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Electricity

1. Demonstrate that you know how to respond to electrical emergencies by doing the following:
  - a. Show how to rescue a person touching a live wire in the home.
  - b. Show how to render first aid to a person who is unconscious from electrical shock.
  - c. Show how to treat an electrical burn.
  - d. Explain what to do in an electrical storm.
  - e. Explain what to do in the event of an electrical fire.
2. Complete an electrical home safety inspection of your home, using the checklist found in this pamphlet or one approved by your counselor. Discuss what you find with your counselor.
3. Make a simple electromagnet and use it to show magnetic attraction and repulsion.
4. Explain the difference between direct current and alternating current.
5. Make a simple drawing to show how a battery and an electric bell work.
6. Explain why a fuse blows or a circuit breaker trips. Tell how to find a blown fuse or tripped circuit breaker in your home. Show how to safely reset the circuit breaker.
7. Explain what overloading an electric circuit means. Tell what you have done to make sure your home circuits are not overloaded.
8. Make a floor plan wiring diagram of the lights, switches, and outlets for a room in your home. Show which fuse or circuit breaker protects each one.
9. Do the following:
  - a. Read an electric meter and, using your family's electric bill, determine the energy cost from the meter readings.
  - b. Discuss with your counselor five ways in which your family can conserve energy.
10. Explain the following electrical terms: volt, ampere, watt, ohm, resistance, potential difference, rectifier, rheostat, conductor, ground, circuit, and short circuit.
11. Do any TWO of the following:
  - a. Connect a buzzer, bell, or light with a battery. Have a key or switch in the line.
  - b. Make and run a simple electric motor (not from a kit).
  - c. Build a simple rheostat. Show that it works.
  - d. Build a single-pole, double-throw switch. Show that it works.
  - e. Hook a model electric train layout to a house circuit. Tell how it works.



### Merit Badge Counselor

Prerequisite:

- 1a and B
- 4 — needs to be started now it's a 14 day log.
- 4a and b
- 5, 5a and 5b

Read the MB Book and complete as much of the worksheet .

Worksheet can be downloaded at:

[http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Energy

1. Do the following:
  - A. Find With your parent's permission, use the internet to find a blog, podcast, website, or an article on the use or conservation of energy. Discuss with your counselor what details in the article were interesting to you, the questions it raises, and what ideas it addresses that you do not understand.
  - B. After you have completed requirements 2 through 8, revisit your source for requirement 1a. Explain to your counselor what you have learned in completing the requirements that helps you better understand the article.
2. Show you understand energy forms and conversions by doing the following:
  - A. Explain how THREE of the following devices use energy, and explain their energy conversions: toaster, greenhouse, lightbulb, bow drill, cell phone, nuclear reactor, sweat lodge.
  - B. Construct a system that makes at least two energy conversions and explain this to your counselor.
3. Show you understand energy efficiency by explaining to your counselor a common example of a situation where energy moves through a system to produce a useful result. Do the following:
  - A. Identify the parts of the system that are affected by the energy movement.
  - B. Name the system's primary source of energy.
  - C. Identify the useful outcomes of the system.
  - D. Identify the energy losses of the system.
4. Conduct an energy audit of your home. Keep a 14 day log that records what you and your family did to reduce energy use. Include the following in your report and, after the 14 day period, discuss what you have learned with your counselor.
  - A. List the types of energy used in your home such as electricity, wood, oil, liquid petroleum, and natural gas, and tell how each is delivered and measured, and the current cost; OR record the transportation fuel used, miles driven, miles per gallon, and trips using your family car or another vehicle.
  - B. Describe ways you and your family can use energy resources more wisely. In preparing your discussion, consider the energy required for the things you do and use on a daily basis (cooking, showering, using lights, driving, watching TV, using the computer). Explain what is meant by sustainable energy sources. Explain how you can change your energy use through reuse and recycling.
5. In a notebook, identify and describe five examples of energy waste in your school or community. Suggest in each case possible ways to reduce this waste. Describe the idea of trade offs in energy use. In your response, do the following:
  - A. Explain how the changes you suggest would lower costs, reduce pollution, or otherwise improve your community.
  - B. Explain what changes to routines, habits, or convenience are necessary to reduce energy waste. Tell why people might resist the changes you suggest.
6. Prepare pie charts showing the following information, and explain to your counselor the important ideas each chart reveals. Tell where you got your information. Explain how cost affects the use of a nonrenewable energy resource and makes alternatives practical.
  - A. The energy resources that supply the United States with most of its energy
  - B. The share of energy resources used by the United States that comes from other countries.
  - C. The proportion of energy resources used by homes, businesses, industry, and transportation
  - D. The fuels used to generate America's electricity
  - E. The world's known and estimated primary energy resource reserves
7. Tell what is being done to make FIVE of the following energy systems produce more usable energy. In your explanation, describe the technology, cost, environmental impacts, and safety concerns.
  - Biomass digesters or waste to energy plants
  - Cogeneration plants
  - Fossil fuel power plants
  - Fuel cells
  - Geothermal power plants
  - Nuclear power plants
  - Solar power systems
  - Tidal energy, wave energy, or ocean thermal energy conversion devices
  - Wind turbines
8. Find out what opportunities are available for a career in energy. Choose one position that interests you and describe the education and training required.



### Merit Badge

#### Off Camp Microsoft Store Danbury Mall

#### Code Your Own Video Game with MakeCode Arcade

In this workshop, Scouts learn fundamental game and coding concepts—like sprites, variables, and coordinates—and use their new skills to create and customize a playable game.

#### Prerequisites:

- Read the Programming Merit Badge Book and bring for the weekend.
- Print and use the Programming Merit Badge Workbook.
- Bring a signed Blue Card from your Scoutmaster.
- Bring your laptop to the Camporee ready to run your programs without Internet. •
- codecademy.com is a good online free service to learn languages. Create an account with your parents permission and start hacking. The below items and its numbers (1.a, 1.b, ...) refer to the official requirements as stated on pages 4 and 5 of the Programming Book and on all the pages of the Workbook mentioned above. It details for each requirement what you are responsible for ahead of the Camporee and what we will offer you during the Camporee:
- 1. Safety A. Bring your Cyber Chip if less than one year old; otherwise, you will be offered the Cyber Chip training at the Camporee. B. We will cover this item in class
- 2. History A. You cover this item B. You cover this item
- 3. General Knowledge A. You cover this item B. You cover this item
- 4. Intellectual Property A. You cover this item B. You cover this item C. You cover this item
- 5. Projects A. Ahead of the Camporee, select a sample program from <http://www.boyslife.org/programming>, study its programming language, modify the program, and email it to [bassam.elabid@gmail.com](mailto:bassam.elabid@gmail.com), [pabloa@aol.com](mailto:pabloa@aol.com), and your Scoutmaster. In class, bring a printout of your program and be ready to debug and demonstrate your program on your laptop. B. Do the same as above but with a second sample program in a second language from a second industry. C. Do the same as above but with a third sample program in a third language from a third industry. D. Explain the program in class to us.
- 6. Careers • You cover this item • Discuss your interest in this career with us.

### Programming

1. Safety. Do the following:
  - a. Show your counselor your current, up-to-date Cyber Chip.
  - b. Discuss first aid and prevention for potential injuries, such as eyestrain and repetitive stress injuries, that could occur during programming activities.
2. History. Do the following:
  - a. Give a brief history of programming, including at least three milestones related to the advancement or development of programming.
  - b. Discuss with your counselor the history of programming and the evolution of programming languages.
3. General knowledge. Do the following:
  - a. Create a list of 10 popular programming languages in use today and describe which industry or industries they are primarily used in and why.
  - b. Describe three different programmed devices you rely on every day.
4. Intellectual property. Do the following:
  - a. Explain the four types of intellectual property used to protect computer programs.
  - b. Describe the difference between licensing and owning software.
  - c. Describe the differences between freeware, open source, and commercial software, and why it is important to respect the terms of use of each.
5. Projects. Do the following:
  - a. With your counselor's approval, choose a sample program. Modify the code or add a function or subroutine to it. Debug and demonstrate the modified program to your counselor.
  - b. With your counselor's approval, choose a second programming language and development environment, different from those used for requirement 5a and in a different industry from 5a. Then write, debug, and demonstrate a functioning program to your counselor, using that language and environment.
  - c. With your counselor's approval, choose a third programming language and development environment, different from those used for requirements 5a and 5b and in a different industry from 5a or 5b. Then write, debug, and demonstrate a functioning program to your counselor, using that language and environment.
  - d. Explain how the programs you wrote for requirements 5a, 5b, and 5c process inputs, how they make decisions based on those inputs, and how they provide outputs based on the decision making.
6. Careers. Find out about three career opportunities that require knowledge in programming. Pick one and find out the education, training, and experience required. Discuss this with your counselor and explain why this career might be of interest to you.





This badge will take place at Hoyt

Perquisites:

Read the book

Complete Radio Merit Badge Requirement 3a/3b/3c "Making an Electromagnetic Spectrum Chart"

Complete Requirement 8: Three career opportunities in Radio.

Study the Phonetic Alphabet (A = Alpha to Z = Zulu)

Download the worksheet at [http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Radio

1. Explain what radio is. Then discuss the following:
  - a. The differences between broadcast radio and hobby radio.
  - b. The differences between broadcasting and two-way communications.
  - c. Radio call signs and how they are used in broadcast radio and amateur radio
  - d. The phonetic alphabet and how it is used to communicate clearly.
2. Do the following:
  - a. Sketch a diagram showing how radio waves travel locally and around the world.
  - b. Explain how the broadcast radio stations, WWV and WWVH can be used to help determine what you will hear when you listen to a shortwave radio?
  - c. Explain the difference between a distant (DX) and a local station.
  - d. Discuss what the Federal Communications Commission (FCC) does and how it is different from the International Telecommunication Union.
3. Do the following:
  - a. Draw a chart of the electromagnetic spectrum covering 300 kilohertz (kHz) to 3000 megahertz (MHz).
  - b. Label the MF, HF, VHF, UHF, and microwave portions of the spectrum on your diagram.
  - c. Locate on your chart at least eight radio services such as AM and FM commercial broadcast, citizens band (CB), television, amateur radio (at least four amateur radio bands), and public service (police and fire).
  - d. Explain how radio waves carry information. Include in your explanation: transceiver, transmitter, receiver, amplifier, and antenna.
5. Do the following:
  - a. Explain the differences between a block diagram and a schematic diagram.
  - b. Draw a block diagram for a radio station that includes a transceiver, amplifier, microphone, antenna, and feed line.
  - c. Discuss how information is sent when using amplitude modulation (AM), frequency modulation (FM), continuous wave (CW) Morse Code transmission, single sideband (SSB) transmission, and digital transmission.
- d. Explain how NOAA Weather Radio (NWR) can alert you to danger.
- e. Explain how cellular telephones work. Identify their benefits and limitations in an emergency.
6. Explain the safety precautions for working with radio gear, including the concept of grounding for direct current circuits, power outlets, and antenna systems.
7. Visit a radio installation (an amateur radio station, broadcast station, or public communications center, for example) approved in advance by your counselor. Discuss what types of equipment you saw in use, how it was used, what types of licenses are required to operate and maintain the equipment, and the purpose of the station.
8. Find out about three career opportunities in radio. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.

### Amateur Radio

- a. Tell why the FCC has an amateur radio service. Describe some of the activities that amateur radio operators can do on the air, once they have earned an amateur radio license.
- b. Explain differences between the Technician, General, and Extra Class license requirements and privileges. Explain who administers amateur radio exams.
- c. Explain at least five Q signals or amateur radio terms.
- d. Explain how you would make an emergency call on voice or Morse code.
- e. Explain the differences between handheld transceivers and home "base" transceivers. Explain the uses of mobile amateur radio transceivers and amateur radio repeaters.
- f. Using proper call signs, Q signals, and abbreviations, carry on a IO-minute real or simulated amateur radio contact using voice, Morse code, or digital mode. (Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with five amateur radio operators. Properly log the real or simulated ham radio contact, and record the signal report.)



120 White St., Danbury

This is an off-camp merit badge. Scouts will hike to train station near Hoyt for a short ride to the Danbury Railway Museum.

Camporee Permission form must be completed and signed by a parent.

**Prerequisites:**

- Read the book
- Using the merit badge worksheet complete requirements 1 to 5 for a review during the merit badge class.

**Train To Danbury**

- Depart Redding 9:45AM
  - Arrive Danbury 10:10AM
- Return to Redding**
- Depart Danbury 1:37 PM
  - Return Redding 1:53 PM

Download the workbook at [http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Railroading Merit Badge

1. Do THREE of the following:
    - a. Name three types of modern freight trains. Explain why unit trains are more efficient than mixed freight trains.
    - b. Name one Class I or regional railroad. Explain what major cities it serves, the locations of major terminals, service facilities, and crew change points, and the major commodities it carries.
    - c. Using models or pictures, identify 10 types of railroad freight or passenger cars. Explain the purpose of each type of car.
    - d. Explain how a modern diesel or electric locomotive develops power. Explain the terms dynamic braking and radial steering trucks.
  2. Do the following:
    - a. Explain the purpose and formation of Amtrak. Explain, by the use of a timetable, a plan for making a trip by rail between two cities at least 500 miles apart. List the times of departure and arrival at your destination, the train number, and the type of service you want.
    - b. List and explain the various forms of public/mass transit using rail.
  3. Do ONE of the following:
    - a. Name four departments of a railroad company. Describe what each department does.
    - b. Tell about the opportunities in railroading that interest you most and why.
    - c. Name four rail support industries. Describe the function of each one.
    - d. With your parent's and counselor's approval, interview someone employed in the rail industry. Learn what that person does and how this person became interested in railroading. Find out what type of schooling and training are required for this position.
  3. Explain the purpose of Operation Life-saver and its mission.
  4. Do THREE of the following:
    - a. List five safety precautions that help make trains safer for workers and passengers.
    - b. Explain to your merit badge counselor why safety around rights-of-way are important.
    - c. List 10 safety tips to remember when you are near a railroad track (either on the ground or on a station platform) or aboard a train.
  - d. Tell your counselor about the guidelines for conduct that should be followed when you are near or on railroad property. Explain the dangers of trespassing on railroad property.
  - e. Tell what an automobile driver can do to safely operate a car at grade crossings, and list three things an automobile driver should never do at a grade crossing.
  - f. Tell how to report a malfunction of grade crossing warning devices.
  - g. List safety precautions a pedestrian should follow at a public crossing.
  - h. Explain the appearance and meaning of the following warning signs and devices: advance warning sign, pavement markings, crossbucks, flashing red lights, crossing gates.
5. Do EACH of the following:
    - a. Explain how railroad signals operate and show two basic signal types using color and configuration.
    - b. Explain the meaning of three horn signals.
    - c. Describe a way to signal a train for an emergency stop.
    - d. Explain the use and function of the EOTD (end-of-train device) or FRED (Flashing rear end device) used on the last car of most freight trains.
  6. Select ONE of the following special-interest areas and complete the requirements:
    1. Model Railroading

**Railfanning**  
With your parent's and counselor's approval, do TWO of the following:

    - a. Visit a railroad museum, historical display, or a prototype railroad-sponsored public event. With permission, photograph, videotape, or sketch items of interest. Explain what you saw and describe your photos, sketches, or videotape.
    - b. Purchase tickets and ride a scenic or historic railroad. Under supervision, photograph the equipment and discuss with your counselor the historic significance of the operation.
    - c. Locate the Web site of four rail historical groups, then find information on the history of the rail preservation operations and purpose of each group. Talk with a member of one of the groups and find out how you might help.
    - d. Plan a trip by rail between two points. Obtain a schedule and explain when the train should arrive at two intermediate points. Purchase the tickets and make the trip. Explain to your counselor what you saw.



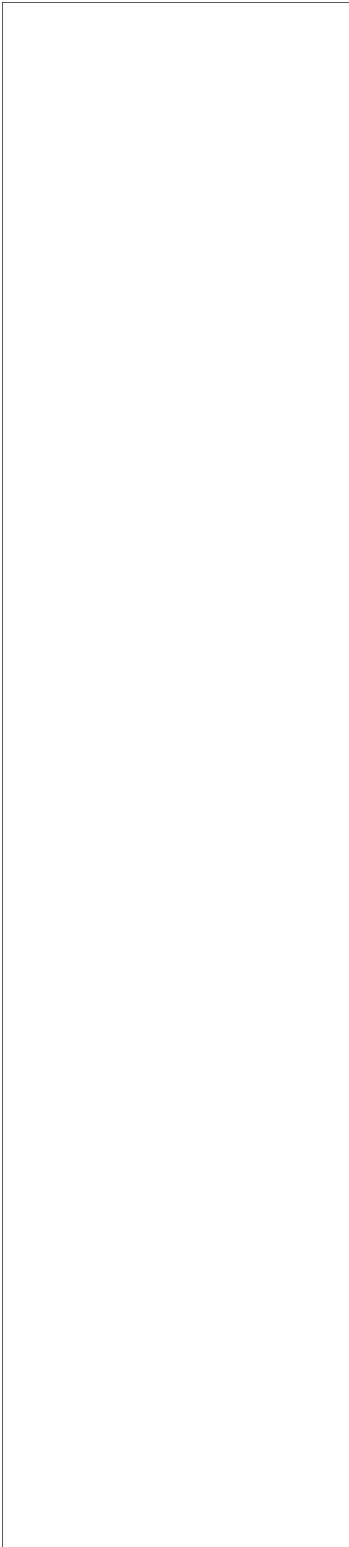
## RIFLE SHOOTING WORKSHOP

This is a badge for Scouts that have a partial from Summer Camp or for those that would like practice to meet the shooting requirements.

We are offering the following requirements:

- L. Using a .22 caliber rimfire rifle and shooting from a bench rest or supported prone position at 50 feet, fire five groups (three shots per group) that can be covered by a quarter. Using these targets, explain how to adjust sights to zero.
- M. Adjust sights to center the group on the target\* and fire five groups (five shots per group). According to the target used, each shot in the group must meet the following minimum score: (1) A-32 targets—9; (2) A-17 or TQ-1 targets—7; (3) A-36 targets—5.

Rifle Merit Badge Counselors will be available to review other partial requirements needed to complete the badge.





This badge will take at Hoyt. Robotic kits will be provided but must be returned after the class.

**Prerequisites:**

- Read the entire Robotics Merit Badge book prior to the event.
- Scouts who have done all the research required to complete items 1, 2, 3, 6 and 7 will be able to work on item 4 at the event.
- Make sure to create a robot engineering notebook (see pg. 35 of the merit badge book) and bring it with you. To aid in preparing for items 1, 2, 3, 6, and 7 scouts can use the worksheets
- Scouts who have not completed the above will be able to work on items 1, 2, 3, 6b and 7 but not 4. Item 4 will have to be completed at a later date.

**NOTE:**

- Scouts are welcome to bring their own robots and kits, however we cannot be responsible for items that are lost or damaged at the event.

Download the workbook at [http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Robotics

1. Safety. Do each of the following:
  - a. Explain to your counselor the most likely hazards you may encounter while working with robots and what you should do to anticipate, mitigate and prevent, and respond to these hazards. Describe the appropriate safety gear and clothing that should be used when working with robotics.
  - b. Discuss first aid and prevention for the types of injuries that could occur while participating in robotics activities and competitions, including cuts, eye injuries, and burns (chemical or heat).
2. Robotics industry. Discuss the following with your counselor:
  - a. The kinds of things robots can do and how robots are best used today.
  - b. The similarities and differences between remote-control vehicles, telerobots, and autonomous robots.
  - c. Three different methods robots can use to move themselves other than wheels or tracks. Describe when it would be appropriate to use each method.
3. General knowledge. Discuss with your counselor three of the five major fields of robotics (human-robot interface, mobility, manipulation, programming, sensors) and their importance to robotics development. Discuss either the three fields as they relate to a single robot system OR talk about each field in general. Find pictures or at least one video to aid in your discussion.
4. Design, build, program, test. Do each of the following:
  - a. With your counselor's approval, choose a task for the robot or robotic subsystem that you plan to build. Include sensor feedback and programming in the task. Document this information in your robot engineering notebook.
  - b. Design your robot. The robot design should use sensors and programming and have at least 2 degrees of freedom. Document the design in your robot engineering notebook using drawings and a written description.
  - c. Build a robot or robotic subsystem of your original design to accomplish the task you chose for requirement 4a.
  - d. Discuss with your counselor the programming options available for your robot. Then do either option 1 OR option 2.
    - Option 1. Program your robot to perform the task you chose for your robot in 4a. Include a sample of your program's source code in your robot engineering notebook.
    - Option 2. Prepare a flowchart of the desired steps to program your robot for accomplishing the task in 4a. Include procedures that show activities based on sensor inputs. Place this in your robot engineering notebook.
    - Test your robot and record the results in your robot engineering notebook. Include suggestions on how you could improve your robot, as well as pictures or sketches of your finished robot.
5. Demonstrate. Do the following:
  - a. Demonstrate for your counselor the robot you built in requirement 4.
  - b. Share your robot engineering notebook with your counselor. Talk about how well your robot accomplished the task, the improvements you would make in your next design, and what you learned about the design process.
6. Competitions. Do ONE of the following.
  - a. Attend a robotics competition and report to your counselor what you saw and learned about the competition and how teams are organized and managed.
  - b. Learn about three youth robotics competitions. Tell your counselor about these, including the type of competition, time commitment, age of the participants, and how many teams are involved.
7. Careers. Name three career opportunities in robotics. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.



**Chester Wickett**  
**Merit Badge Counselor**  
 cwickett@optonline.net

**Assisted by**  
**Karen Caiati Troop 19**

This badge will take place at Hoyt.

Prerequisites:

- Read the Merit Badge Book.
- Req. 7 cannot be completed at the camporee. Scouts will need to bring a note from the Scoutmaster that this requirement was completed on a troop outing or be prepared to complete after the camporee.

Download the workbook at:  
[http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Signs, Signals, and Codes

1. Discuss with your counselor the importance of signs, signals, and codes, and why people need these different methods of communication. Briefly discuss the history and development of signs, signals, and codes.
2. Explain the importance of signaling in emergency communications. Discuss with your counselor the types of emergency or distress signals one might use to attract airborne search-and-rescue personnel if lost in the outdoors or trying to summon assistance during a disaster. Illustrate these signaling examples by the use of photos or drawings.
3. Do the following:
  - a. Describe what Morse code is and the various means by which it can be sent. Spell your first name using Morse code. Send or receive a message of six to 10 words using Morse code.
  - b. Describe what American Sign Language (ASL) is and how it is used today. Spell your first name using American Sign Language. Send or receive a message of six to 10 words using ASL.
4. Give your counselor a brief explanation about semaphore, why it is used, how it is used, and where it is used. Explain the difference between semaphore flags and nautical flags. Then do the following:
  - a. Spell your first name using semaphore. Send or receive a message of six to 10 words using semaphore.
  - b. Using illustrations or photographs, identify 10 examples of nautical flags and discuss their importance.
5. Explain the braille reading technique and how it helps individuals with sight impairment to communicate. Then do the following:
  - a. Either by sight or by touch, identify the letters of the braille alphabet that spell your name. By sight or touch, decode a braille message at least six words long.
  - b. Create a message in braille at least six words long, and share this with your counselor.
6. Do the following:
  - a. Describe to your counselor six sound-only signals that are in use today. Discuss the pros and cons of using sound signals versus other types of signals.
  - b. Demonstrate to your counselor six different silent Scout signals. Use these Scout signals to direct the movements and actions of your patrol or troop.
7. On a Scout outing, lay out a trail for your patrol or troop to follow. Cover at least one mile in distance and use at least six different trail signs and markers. After the Scouts have completed the trail, follow no-trace principles by replacing or returning trail markers to their original locations.
8. For THREE of the following activities, demonstrate five signals each. Tell what the signals mean and why they are used:
  - a. Sports official's hand signs/signals
  - b. Heavy-equipment operator's hand signals
  - c. Aircraft carrier catapult crew signals
  - d. Cyclist's hand signals
  - e. An activity selected by you and your counselor
9. Share with your counselor 10 examples of symbols used in everyday life. Design your own symbol. Share it with your counselor and explain what it means. Then do the following:
  - a. Show examples of 10 traffic signs and explain their meaning.
  - b. Using a topographical map, explain what a map legend is and discuss its importance. Point out 10 map symbols and explain the meaning of each.
  - c. Discuss text-message symbols and why they are commonly used. Give examples of your favorite 10 text symbols or emoticons. Then see if your counselor or parent can identify the meaning or usage of each symbol.
10. Briefly discuss the history of secret code writing (cryptography). Make up your own secret code and write a message of up to 25 words using this code. Share the message with a friend or fellow Scout. Then share the message and code key with your counselor and discuss the effectiveness of your code.

NOTE: To satisfy the braille writing requirement 5b for this merit badge, you do not need to emboss braille dots in thick paper. Rather, you may use a pencil or pen to draw the dots on ordinary paper, copying the characters of the braille alphabet to spell out your message letter by letter.



### Merit Badge Counselor To Be Announced

This badge will take place at Hoyt.

Scouts will be provided a model rocket kit to build and launch a rocket.

Prerequisites:

- Read the Merit Badge Book.
- Req. 2
- Download the worksheet and complete requirements 5, 6, 7, 8 and be prepared to discuss with the counselor.

Download workbook at [http://meritbadge.org/wiki/index.php/Scouts\\_BSA\\_Portal](http://meritbadge.org/wiki/index.php/Scouts_BSA_Portal)

## Space

1. Tell the purpose of space exploration and include the following:
  - a. Historical reasons
  - b. Immediate goals in terms of specific knowledge
  - c. Benefits related to Earth resources, technology, and new products.
  - d. International relations and cooperation
  
2. Design a collector's card, with a picture on the front and information on the back, about your favorite space pioneer. Share your card and discuss four other space pioneers with your counselor.
  
3. Build, launch, and recover a model rocket.[1] Make a second launch to accomplish a specific objective. (Rocket must be built to meet the safety code of the National Association of Rocketry. See the "Model Rocketry" chapter of the Space Exploration merit badge pamphlet.) Identify and explain the following rocket parts:
  - a. Body tube
  - b. Engine mount
  - c. Fins
  - d. Igniter
  - e. Launch lug
  - f. Nose cone
  - g. Payload
  - h. Recovery system
  - i. Rocket engine
  
4. Discuss and demonstrate each of the following:
  - a. The law of action-reaction.
  - b. How rocket engines work
  - c. How satellites stay in orbit
  - d. How satellite pictures of Earth and pictures of other planets are made and transmitted.
  
5. Do TWO of the following:
  - a. Discuss with your counselor a robotic space exploration mission and a historic crewed mission. Tell about each mission's major discoveries, its importance, and what was learned from it about the planets, moons, or regions of space explored.
  - b. Using magazine photographs, news clippings, and electronic articles (such as from the Internet), make a scrapbook about a current planetary mission.
  - c. Design a robotic mission to another planet or moon that will return samples of its surface to Earth. Name the planet or moon your space-
  
6. Describe the purpose and operation of ONE of the following:
  - a. Space shuttle or any other crewed orbital vehicle, whether government owned (U.S. or foreign) or commercial
  - b. International Space Station
  
7. Design an inhabited base located within our solar system, such as Titan, asteroids, or other locations that humans might want to explore in person. Make drawings or a model of your base. In your design, consider and plan for the following:
  - a. Source of energy
  - b. How it will be constructed
  - c. Life-support system
  - d. Purpose and function
  
8. Discuss with your counselor two possible careers in space exploration that interest you. Find out the qualifications, education, and preparation required and discuss the major responsibilities of those positions.

craft will visit. Show how your design will cope with the conditions of the planet's or moon's environment.



# STEM/NOVA AWARDS

Working with their troop, Scouts can earn:

- Shoot
- Let it Grow
- Start Your Engines
- Woosh
- Design to Crunch

For worksheets: <http://www.ctyankee.org/districts/powahay/stemcamp>

We are not offering STEM/NOVA Award classes at the STEM Camporee. We encourage Troops to have each Scout complete one by working on before the camporee weekend and to finish up during troop free time at the camporee.

Troops will need to recruit a NOVA Counselor:

- A Nova counselor can be any registered adult age 21 or older. They must be registered under the new nonunit position and no fee is required. The Nova counselor code is 58. All Nova counselors must have current BSA Youth Protection training. NOVA Counselor training can be taken online at <http://www.scouting.org/Training/Adult.aspx>.

Troops will be responsible for the signing off of their Scouts NOVA/STEM Award (not district), processing, purchasing and presentation of the award.

- Q: Once a youth has fulfilled the requirements for the Nova Award, what is the next step? Fill out an advancement form with the proper signatures, or use internet advancement to record this and submit a copy to your local council.
- Q: What does a Scout receive when a Nova award is completed? A: When a Scout completes their first Nova award they should be presented the Nova Emblem for their program level. For each Nova award earned after the first they should be presented a Pi pin to wear on their emblem.
- Q: Where can I obtain the "presentation items" (emblems, pins, and medals)? A: These items are available at your local Scout shop. You can also order online at [www.scoutstuff.org](http://www.scoutstuff.org).

For More Information on STEM/NOVA: <http://www.scouting.org/stem/Awards.aspx>

Chart: STEM/NOVA Merit Badges (Yellow shows Merit Badges being offered.)

Woosh-Engineering	Design To Crunch-Math	Start Your Engine-Technology	Shoot-Science
Archery	American Business	Automotive Maintenance	Archery
<b><i>Aviation</i></b>	<b><i>Chess</i></b>	<b><i>Aviation</i></b>	Astronomy
Building Shotgun Shooting		Canoeing	Athletics
Composite Materials	Digital Technology	Cycling	<b><i>Aviation</i></b>
Drafting	Drafting	Drafting	Game Design
Electronics	Entrepreneurship	<b><i>Electricity</i></b>	Rifle Shooting
Engineering	Orienteering	<b><i>Energy</i></b>	<b><i>Robotics</i></b>
Inventing	Personal Management	Farm Mechanics	Shotgun Shooting
Model Design	<b><i>Radio</i></b>	Kayaking	<b><i>Space Exploration</i></b>
Railroading	<b><i>Signs, Signals, and Codes</i></b>	Motorboating	Sustainability
Rifle Shooting	Surveying	Nuclear Science	Weather
<b><i>Robotics</i></b>	Weather	<b><i>Programming</i></b>	
		<b><i>Railroading</i></b>	
		Small-Boat Sailing	
		<b><i>Space Exploration</i></b>	
		Truck Transportation	

***Bold Italics*** = Merit Badges offered at the STEM Camporee

**Trip Permission Form** is required for Scouts participating in off-site merit badges including: Animal Science, Aviation, and Railroading. Please distribute to parents and bring to the camporee.

## Powahay District — Trip Permission Form

For STEM Camporee — May 18, 2019 at Hoyt Scout Reservation

Scout's Name: \_\_\_\_\_

Troop #: \_\_\_\_\_ Town: \_\_\_\_\_

Some merit badge classes and camp program require scouts to leave the camp property. At all time while off site, proper adult/staff supervision will be provided. (A minimum of 2 adults over the age of 18.) Transportation will be by foot, chartered bus, train or private car with a driver over the age of 21, most likely from your son's troop. All BSA Youth Protection Rules will be followed.

In consideration of the benefits to be derived, and in view of the fact that the Boy Scouts of America is an educational institution, membership in which is voluntary, and having full confidence that every precaution will be taken to ensure the safety of my son(s) activity, I hereby agree to his (their) participation and waiver all claims against the leaders of this trip and officers, agents, and representatives of the Boy Scouts of America.

**Circle One:**

I DO / DO NOT give my child permission to participate in off property trips.

Signature of Parent or Legal Guardian: \_\_\_\_\_ Date: \_\_\_\_\_

## Powahay District — Trip Permission Form

For STEM Camporee — May 18, 2019 at Hoyt Scout Reservation

Scout's Name: \_\_\_\_\_

Troop #: \_\_\_\_\_ Town: \_\_\_\_\_

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Signature of Parent or Legal Guardian: \_\_\_\_\_ Date: \_\_\_\_\_