

## **Merit Badge Listing**

[Art](#)

[Aviation](#)

[Chemistry](#)

[Citizenship in the Community](#)

[Citizenship in the Nation](#)

[Citizenship in the World](#)

[Communications](#)

[Computers](#)

[Crime Prevention](#)

[Dog Care](#)

[Electricity](#)

[Electronics](#)

[Emergency Preparedness](#)

[Engineering](#)

[Farm Mechanics](#)

[Fingerprinting](#)

[Fire Safety](#)

[First Aid](#)

[Geology](#)

[Indian Lore](#)

[Law](#)

[Lifesaving](#)

[Nuclear Science](#)

[Personal Management](#)

[Photography](#)

[Plumbing](#)

[Public Speaking](#)

[Railroading](#)

[Salesmanship](#)

[Space Exploration](#)

[Swimming](#)

[Veterinary Medicine](#)

[Weather](#)

## Art

Requirements were REVISED effective January 1, 2007.

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- 1) Tell a story with a picture or pictures or using a 3-D rendering.
- 2) Do ONE of the following.
  - a) Design something useful. Make a sketch or model of your design and get your counselor's approval before you proceed. Then create a promotional piece for the item using a picture or pictures.
  - b) Design a logo. Share your design with your counselor and explain the significance of your logo. Then, with your parent's permission and your counselor's approval, put your logo on Scout equipment, furniture, ceramics, or fabric.
- 3) Render a subject of your choice in FOUR of these ways:
  - a) Pen and ink,
  - b) Watercolors,
  - c) Pencil,
  - d) Pastels,
  - e) Oil paints,
  - f) Tempera,
  - g) Acrylics,
  - h) Charcoal
  - i) Computer drawing or painting
- 4) With your parent's permission and your counselor's approval, visit a museum, art exhibit, art gallery, artists' co-op, or artist's workshop. Find out about the art displayed or created there. Discuss what you learn with your counselor.
- 5) Find out about three career opportunities in art. 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.

## Aviation

Requirements were REVISED effective January 1, 2007.

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- 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 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. Arrive at 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) On a map, mark a route for an imaginary airline trip to at least three different locations. Start from the commercial airport nearest your home. From timetables (obtained from agents or online from a computer, with your parent's permission), decide when you will get to and leave from all connecting points. Create an aviation flight plan and itinerary for each destination.
  - f) 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.
  - g) Create an original poster of an aircraft instrument panel. Include and identify the instruments and radios discussed in requirement 2f.
- 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 - a control tower, terminal radar control facility, air route traffic control center, flight service station, 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.

## Chemistry

Requirements were REVISED effective January 1, 2006

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- 1) Do EACH of the following activities:
  - a) Describe three examples of safety equipment used in a chemistry laboratory and the reason each one is used.
  - b) Describe what a material safety data sheet (MSDS) is and tell why it is used.
  - c) Obtain an MSDS for both a paint and an insecticide. Compare and discuss the toxicity, disposal, and safe-handling sections for these two common household products.
  - d) Discuss the safe storage of chemicals. How does the safe storage of chemicals apply to your home, your school, your community, and the environment?
- 2) Do EACH of the following activities:
  - a) Predict what would happen if you placed an iron nail in a copper sulfate solution. Then, put an iron nail in a copper sulfate solution. Describe your observations and make a conclusion based on your observations. Compare your prediction and original conclusion with what actually happened. Write the formula for the reaction that you described.
  - b) Describe how you would separate sand from water, table salt from water, oil from water, and gasoline from motor oil. Name the practical processes that require these kinds of separations.
  - c) Describe the difference between a chemical reaction and a physical change.
- 3) Construct a Cartesian diver. Describe its function in terms of how gases in general behave under different pressures and different temperatures. Describe how the behavior of gases affects a backpacker at high altitudes and a scuba diver underwater.
- 4) Do EACH of the following activities:
  - a) Cut a round onion into small chunks. Separate the onion chunks into three equal portions. Leave the first portion raw. Cook the second portion of onion chunks until the pieces are translucent. Cook the third portion until the onions are caramelized, or brown in color. Taste each type of onion. Describe the taste of raw onion versus partially cooked onion versus caramelized onion. Explain what happens to molecules in the onion during the cooking process.
  - b) Describe the chemical similarities and differences between toothpaste and an abrasive household cleanser. Explain how the end use or purpose of a product affects its chemical formulation.
  - c) In a clear container, mix a half-cup of water with a tablespoon of oil. Explain why the oil and water do not mix. Find a substance that will help the two combine, and add it to the mixture. Describe what happened, and explain how that substance worked to combine the oil and water.
- 5) List the four classical divisions of chemistry. Briefly describe each one, and tell how it applies to your everyday life.
- 6) Do EACH of the following activities:
  - a) Name two government agencies that are responsible for tracking the use of chemicals for commercial or industrial use. Pick one agency and briefly describe its responsibilities to the public and the environment.
  - b) Define pollution. Explain the chemical effects of ozone, global warming, and acid rain. Pick a current environmental problem as an example. Briefly describe what people are doing to resolve this hazard and to increase understanding of the problem.
  - c) Using reasons from chemistry, describe the effect on the environment of ONE of the following:
    - i) The production of aluminum cans or plastic milk cartons
    - ii) Sulfur from burning coal
    - iii) Used motor oil
    - iv) Newspaper
  - d) Briefly describe the purpose of phosphates in fertilizer and in laundry detergent. Explain how the use of phosphates in fertilizers affects the environment. Also, explain why phosphates have been removed from laundry detergents.
- 7) Do ONE of the following activities:
  - a) Visit a laboratory and talk to a practicing chemist. Ask what the chemist does, and what training and education are needed to work as a chemist.

- b) Using resources found at the library and in periodicals, books, and the Internet (with your parent's permission), learn about two different kinds of work done by chemists, chemical engineers, chemical technicians, or industrial chemists. For each of the four jobs, find out the education and training requirements.
- c) Visit an industrial plant that makes chemical products or uses chemical processes and describe the processes used. What, if any, pollutants are produced and how they are handled.
- d) Visit a county farm agency or similar governmental agency and learn how chemistry is used to meet the needs of agriculture ,in your county.

## Citizenship in the Community

Requirements were REWRITTEN effective January 1, 2005.

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### ***This Merit Badge is Required to earn the Eagle Scout Rank***

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- 1) Discuss with your counselor what citizenship in the community means and what it takes to be a good citizen in your community. Discuss the rights, duties, and obligations of citizenship, and explain how you can demonstrate good citizenship in your community, Scouting unit, place of worship, or school.
- 2) Do the following:
  - a) on a map of your community, locate and point out the following:
    - i) Chief government buildings such as your city hall, county courthouse, and public works/services facility
    - ii) Fire station, police station, and hospital nearest your home
    - iii) Historical or other interesting points
  - b) Chart the organization of your local or state government. Show the top offices and tell whether they are elected or appointed.
- 3) Do the following:
  - a) Attend a city or town council or school board meeting, or a municipal; county, or state court session.
  - b) Choose one of the issues discussed at the meeting where a difference of opinions was expressed, and explain to your counselor why you agree with one opinion more than you do another one.
- 4) Choose an issue that is important to the citizens of your community; then do the following:
  - a) Find out which branch of local government is responsible for this issue.
  - b) With your counselor's and a parent's approval, interview one person from the branch of government you identified in requirement 4a. Ask what is being done about this issue and how young people can help.
  - c) Share what you have learned with your counselor.
- 5) With the approval of your counselor and a parent, watch a movie that shows how the actions of one individual or group of individuals can have a positive effect on a community. Discuss with your counselor what you learned from the movie about what it means to be a valuable and concerned member of the community.
- 6) List some of the services (such as the library, recreation center, public transportation, and public safety) your community provides that are funded by taxpayers. Tell your counselor why these services are important to your community.
- 7) Do the following:
  - a) Choose a charitable organization outside of Scouting that interests you and brings people in your community together to work for the good of your community.
  - b) Using a variety of resources (including newspapers, fliers and other literature, the Internet, volunteers, and employees of the organization), find out more about this organization.
  - c) With your counselor's and your parent's approval, contact the organization and find out what young people can do to help. While working on this merit badge, volunteer at least eight hours of your time for the organization. After your volunteer experience is over, discuss what you have learned with your counselor.
- 8) Develop a public presentation (such as a video, slide show, speech, digital presentation, or photo exhibit) about important and unique aspects of your community. Include information about the history, cultures, and ethnic groups of your community; its best features and popular places where people gather; and the challenges it faces. Stage your presentation in front of your merit badge counselor or a group, such as your patrol or a class at school.

## Citizenship in the Nation

Requirements were REWRITTEN effective January 1, 2005.

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### ***This Merit Badge is Required to earn the Eagle Scout Rank***

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- 1) Explain what citizenship in the nation means and what it takes to be a good citizen of this country. Discuss the rights, duties, and obligations of a responsible and active American citizen.
- 2) Do TWO of the following:
  - a) Visit a place that is listed as a National Historic Landmark or that is on the National Register of Historic Places. Tell your counselor what you learned about the landmark or site and what you found interesting about it.
  - b) Tour your state capitol building or the U.S. Capitol. Tell your counselor what you learned about the capitol, its function, and the history.
  - c) Tour a federal facility. Explain to your counselor what you saw there and what you learned about its function in the local community and how it serves this nation.
  - d) Choose a national monument that interests you. Using books, brochures, the Internet (with your parent's permission), and other resources, find out more about the monument. Tell your counselor what you learned, and explain why the monument is important to this country's citizens.
- 3) Watch the national evening news five days in a row OR read the front page of a major daily newspaper five days in a row. Discuss the national issues you learned about with your counselor. Choose one of the issues and explain how it affects you and your family.
- 4) Discuss each of the following documents with your counselor. Tell your counselor how you feel life in the United States might be different without each one.
  - a) Declaration of Independence
  - b) Preamble to the Constitution
  - c) The Constitution
  - d) Bill of Rights
  - e) Amendments to the Constitution
- 5) List the six functions of government as noted in the preamble to the Constitution. Discuss with your counselor how these functions affect your family and local community.
- 6) With your counselor's approval, choose a speech of national historical importance. Find out about the author, and tell your counselor about the person who gave the speech. Explain the importance of the speech at the time it was given, and tell how it applies to American citizens today. Choose a sentence or two from the speech that has significant meaning to you, and tell your counselor why.
- 7) Name the three branches of our federal government and explain to your counselor their functions. Explain how citizens are involved in each branch. For each branch of government, explain the importance of the system of checks and balances.
- 8) Name your two senators and the member of Congress from your congressional district. Write a letter about a national issue and send it to one of these elected officials, sharing your view with him or her. Show your letter and any response you receive to your counselor.

## Citizenship in the World

Requirements were REWRITTEN effective January 1, 2006.

- 1) Explain what citizenship in the world means to you and what you think it takes to be a good world citizen.
- 2) Explain how one becomes a citizen in the United States, and explain the rights, duties, and obligations of U.S. citizenship. Discuss the similarities and differences between the rights, duties, and obligations of U.S. citizens and the citizens of two other countries.
- 3) Do the following:
  - a) Pick a current world event. In relation to this current event, discuss with your counselor how a country's national interest and its relationship with other countries might affect areas such as" its security, its economy, its values, and the health of its citizens.
  - b) Select a foreign country and discuss with your counselor how its geography, natural resources, and climate influence its economy and its global partnerships with other countries.
- 4) Do TWO of the following:
  - a) Explain international law and how it differs from national law. Explain the role of international law and how international law can be used as a tool for conflict resolution.
  - b) Using resources such as major daily newspapers, the Internet (with your parent's permission), and news magazines, observe a current issue that involves international trade, foreign exchange, balance of payments, tariffs, and free trade. Explain what you have learned. Include in your discussion an explanation of why countries must cooperate in order for world trade and global competition to thrive.
  - c) Select TWO of the following organizations and describe their role in the world.
    - i) The United Nations
    - ii) The World Court
    - iii) World Organization of the Scout Movement
    - iv) The World Health Organization
    - v) Amnesty International
    - vi) The International Committee of the Red Cross
    - vii) CARE
- 5) Do the following:
  - a) Discuss the differences between constitutional and nonconstitutional governments.
  - b) Name at least five different types of governments currently in power in the world.
  - c) Show on a world map countries that use each of these five different forms of government.
- 6) Do the following:
  - a) Explain how a government is represented abroad and how the United States government is accredited to international organizations.
  - b) Describe the roles of the following in the conduct of foreign relations.
    - i) Ambassador
    - ii) Consul
    - iii) Bureau of International Information Programs
    - iv) Agency for International Development
    - v) United States and Foreign Commercial Service
  - c) Explain the purpose of a passport and visa for international travel.
- 7) Do TWO of the following (with your parent's permission) and share with your counselor what you have learned:
  - a) Visit the Web site of the U.S. State Department. Learn more about an issue you find interesting that is discussed on this Web site.
  - b) Visit the Web site of an international news organization or foreign government, OR examine a foreign newspaper available at your local library, bookstore, or newsstand. Find a news story about a human right realized in the United States that is not recognized in another country.
  - c) Visit with a student or Scout from another country and discuss the typical values, holidays, ethnic foods, and traditions practiced or enjoyed there.
  - d) Attend a world Scout jamboree.
  - e) Participate in or attend an international event in your area, such as an ethnic festival, concert, or play.

## Communications

Requirements were REWRITTEN effective January 1, 2004.

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### ***This Merit Badge is Required to earn the Eagle Scout Rank***

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- 1) Do ONE of the following:
  - a) For one day, keep a log in which you describe your communication activities. Keep track of the time and different ways you spend communicating, such as talking person-to-person, listening to teachers or the radio, watching television, reading books and other print media, and using any electronic communication device. Discuss with your counselor what your log reveals about the importance of communication in your life. Think of ways to improve your communications skills.
  - b) For three days, keep a journal of your listening experiences. Identify one example of each of the following, and discuss with your counselor when you have listened to:
    - i) Obtain information
    - ii) A persuasive argument
    - iii) Appreciate or enjoy something
    - iv) Understand someone's feelings
  - c) In a small-group setting, meet with other scouts or with friends. Have them share personal stories about significant events in their lives that affected them in some way. Take note of how each scout participates in the group discussion and how effectively he communicates his story. Report what you have learned to your counselor about the differences you observed in effective communication.
  - d) List as many ways as you can think of to communicate with others (face-to-face, by telephone, letter, e-mail, text messages, and so on). For each type of communication discuss with your counselor an instance when that method might not be appropriate or effective.
- 2) Do ONE of the following:
  - a) Think of a creative way to describe yourself, using, for example, a collage, short story or autobiography, drawing or series of photographs, or a song or skit. Using the aid you created, make a presentation to your counselor about yourself.
  - b) Choose a concept, product, or service in which you have great confidence. Build a sales plan based on its good points. Try to persuade the counselor to agree with, use, or buy your concept, product or service. After your sales talk, discuss with your counselor how persuasive you were.
- 3) Write a five-minute speech. Give it at a meeting of a group.
- 4) Interview someone you know fairly well, like, or respect because of his or her position, talent, career or life experiences. Listen actively to learn as much as you can about the person. Then prepare and deliver to your counselor an introduction of the person as though this person were to be a guest speaker, and include reasons why the audience would want to hear this person speak. Show how you would call to invite this person to speak.
- 5) Attend a public meeting (city council, school board, debate) approved by your counselor where several points of view are given on a single issue. Practice active listening skills and take careful notes of each point of view. Present an objective report that includes all points of view that were expressed, and share this with your counselor.
- 6) With your counselor's approval, develop a plan to teach a skill or inform someone about something. Prepare teaching aids for your plan. Carry out your plan. With your counselor, determine whether the person has learned what you intended.
- 7) Do ONE of the following:
  - a) Write to the editor of a magazine or your local newspaper to express your opinion or share information on any subject you choose. Send your message by fax, email or regular mail.
  - b) Create a web page or blog of special interest to you (for instance, your troop or crew, a hobby, or a sport).. Include at least three articles or entries and one photograph or illustration, and one link to some other Web page or blog that would be helpful to someone who visits the Web page or blog you have created. *It is not necessary*

- c) Use desktop publishing to produce a newsletter, brochure, flier or other printed material for your scout troop, class at school, or other group. Include at least one article and one photograph or illustration.
- 8) Plan a troop court of honor, campfire program, or an interfaith worship service. Have the patrol leaders' council approve it, then write the script and prepare the program. Serve as master of ceremonies.
- 9) Find out about three career opportunities in the field of communication. 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.

## Computers

Requirements were REVISED effective January 1, 2010.

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- 1) Discuss with your counselor the tips for online safety.
- 2) Give a short history of the computer. Explain how the invention of the computer has affected society, science, and technology.
- 3) Do the following:
  - a) Describe four uses of computers outside the home.
  - b) Describe three ways you and your family could use a personal computer other than for games and entertainment.
- 4) Explain the following to your counselor:
  - a) The five major parts of a computer.
  - b) How text, sound, pictures, and video files are stored in a computer's memory
  - c) How file compression works and how compression affects the quality of the file.
  - d) Describe two computer chip-based devices, and describe how they are "smarter" because of the chip and its program.
- 5) Do the following:
  - a) Explain what a program or software application is and how it is developed.
  - b) Name three programming languages, and describe their uses.
  - c) Name four software packages you or your family could use, and explain how you would use them.
  - d) Discuss ways you can help protect a computer from viruses and how to protect the information stored on a computer.
  - e) Describe how computers are linked to generate and access the Internet and the World Wide Web.
- 6) Do THREE of the following:
  - a) Using a spreadsheet program, develop a food budget for a patrol weekend campout.
  - b) Using a word processor, write a letter to the parents of your troop's Scouts inviting them to a court of honor.
  - c) Using a computer graphics program, design and draw a campsite plan for your troop.
  - d) Using a computer graphics program, create a flier for an upcoming troop event, incorporating both text and some type of visual such as a photograph or illustration.
  - e) Using an Internet search engine (with your parent's permission), find ideas about how to conduct a troop court of honor or campfire program. Print out a copy of the ideas from at least three different Web sites. Share what you found with your counselor, and explain how you used the search engine to find this information.
  - f) Using a presentation software program of your choice, develop a report about a topic that has been approved by your counselor. For your presentation, create at least 10 slides.
  - g) Using a digital camera, take a picture of a troop activity. Transfer the picture file to a computer and use photographic software to make it small enough to send easily as an e-mail attachment. Then, using a computer connected to the Internet (with your parent's permission), send an e-mail to someone you know. In your message, include the photograph as an attachment. Verify that the person received your e-mail and was able to view the attachment.
  - h) Using a database manager, create a troop roster that includes the name, rank, patrol, and telephone number of each Scout. Show your counselor that you can sort the register by each of the following categories: rank, patrol, and alphabetically by name.
- 7) Do ONE of the following:
  - a) Using a database program of your choice, create a troop roster that includes the name, rank, patrol, and telephone number of each Scout. Create a form within the database manager to access each Scout's information individually. Show your counselor how the form works.
  - b) Using a software package of your choice for computer aided design (CAD), create an engineering-style drawing of a simple object. Include the top, bottom, and at least one side view and the dimensions.
  - c) Create a blog and use it as an online journal of your Scouting activities, including group discussions and meetings, campouts, and other events. Your blog should have at least five entries and two photographs or

- d) Create a Web page for your troop, patrol, school, or place of worship. Include at least three articles and two photographs or illustrations. Your Web page should have at least one link to a Web site that would be of interest to your audience. You need not post the page to the Internet. However, if you decide to do so, you must first share it with your parents AND counselor and get their approval.
  - e) Visit a business or an industrial plant that uses computers. Observe what tasks the computers accomplish, and be prepared to discuss what you have learned.
- 8) Explain the following to your counselor:
- a) Why copyright laws exist
  - b) Why it is not permissible to accept a paid, copyrighted computer game or program from a friend unless the game or program is considered freeware or shareware. Explain the concepts of freeware and shareware.
  - c) The restrictions and limitations of downloading music from the Internet
- 9) Find out about three career opportunities in the computer industry. 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. Report what you learn to your counselor.

## Crime Prevention

Requirements were REVISED effective January 1, 2006.

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- 1) Discuss the role and value of laws in society with regard to crime and crime prevention. Include in your discussion the definitions of "crime" and "crime prevention."
- 2) Prepare a notebook of newspaper and other clippings that addresses crime and crime prevention efforts in your community.
- 3) Discuss the following with your counselor:
  - a) The role of citizens, including youth, in crime prevention
  - b) Gangs and their impact on the community
  - c) When and how to report a crime
- 4) After doing EACH of the following, discuss with your counselor what you have learned.
  - a) Inspect your neighborhood for opportunities that may lead to crime. Learn how to do a crime prevention survey.
  - b) Using the checklist in this (*the merit badge*) pamphlet, conduct a security survey of your home and discuss the results with your family.
- 5) Teach your family or patrol members how to protect themselves from crime at home, at school, in your community, and while traveling.
- 6) Help raise awareness about one school safety issue facing students by doing ONE of the following:
  - a) Create a poster for display on a school bulletin board.
  - b) With permission from school officials, create a page long public service announcement that could be read over the public address system at school or posted on the school's Web site.
  - c) Make a presentation to a group such as a Cub Scout den that addresses the issue.
- 7) Do ONE of the following:
  - a) Assist in the planning and organization of a crime prevention program in your community such as Neighborhood Watch, Community Watch, or Crime Stoppers. Explain how this program can benefit your neighborhood.
  - b) With your parent's and counselor's approval, visit a jail or detention facility or a criminal court hearing. Discuss your experience with your counselor.
- 8) Discuss the following with your counselor:
  - a) How drug abuse awareness programs, such as "Drugs: A Deadly Game," help prevent crime
  - b) Why alcohol, tobacco, and marijuana are sometimes called "gateway drugs" and how "gateway drugs" can lead to the use of other drugs
  - c) Three resources in your city where a person with a drug problem or drug-related problem can go for help
  - d) How the illegal sale and use of drugs lead to other crimes
  - e) How to recognize child abuse
  - f) The three R's of Youth Protection
- 9) Discuss the following with your counselor:
  - a) The role of a sheriff's or police department in crime prevention.
  - b) The purpose and operation of agencies in your community that help law enforcement personnel prevent crime, and how those agencies function during emergency situations.
  - c) Explain the role private security plays in crime prevention.
  - d) Choose a career in the crime prevention or security industry that interests you. Describe the level of education required and responsibilities of a person in that position. Tell why this position interests you.

## Dog Care

Requirements were REVISED effective January 1, 2004.

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- 1) Do the following:
  - a) Briefly discuss the historical origin and domestication of the dog.
  - b) Describe some common characteristics of the dogs that make up each of the seven major dog groups.
  - c) Tell some specific characteristics of seven breeds of dogs (one from each major group), OR give a short history of one breed.
- 2) Point out on a dog or a sketch at least 10 body parts. Give the correct name of each one.
- 3) Do the following:
  - a) Explain the importance of house-training, obedience training, and socialization training for your dog.
  - b) Explain what "responsible pet ownership" means.
  - c) Explain what issues (including temperament) must be considered when deciding on what breed of dog to get as a family pet.
- 4) For two months, keep and care for your dog.\* Maintain a log of your activities during this period that includes these items: feeding schedule, types of food used, amount fed, exercise periods, training schedule, a weekly body weight record, grooming and bathing schedules, veterinary care, if necessary, and costs. Also include a brief description of the type of housing/shelter arrangements you have for your dog.
- 5) Explain the correct way to obedience train a dog and what equipment you would need. Show with your dog any three of these commands: "come", "sit", "down", "heel", "stay", "fetch" or "get it", and "drop it".
- 6) Do the following:
  - a) Discuss the proper vaccination schedule for a dog in your area from puppyhood through adulthood.
  - b) Discuss the control methods for preventing fleas, ticks, heartworms, and intestinal parasites (worms) for a dog in your area from puppyhood through adulthood.
  - c) Explain the importance of dental care and tooth brushing to your pet's health.
  - d) Discuss the benefits of grooming your dog's coat and nails on a regular basis.
  - e) Discuss with your counselor any seasonal conditions (like hot summers, cold winters, or extreme humidity) where you live that need to be considered for your dog.
- 7) Do the following:
  - a) Explain the precautions to take in handling a hurt dog.
  - b) Show how to put on an emergency muzzle.
  - c) Explain how to treat wounds. Explain first aid for a dog bite.
  - d) Show how to put on a simple dressing and bandage the foot, body, or head of your dog.
  - e) Explain what to do if a dog is hit by a car.
  - f) List the things needed in every dog owner's first-aid kit.
  - g) Tell the dangers of home treatment of a serious ailment.
  - h) Briefly discuss the cause and method of spread, the signs and symptoms and the methods of prevention of rabies, parvovirus, distemper, and heartworms in dogs.
- 8) Visit a veterinary hospital or an animal shelter and give a report about your visit to your counselor.
- 9) Know the laws and ordinances involving dogs that are in force in your community.

\* The activities used to fulfill the requirements for the Dog Care merit badge may not be used to help fulfill the requirements for other merit badges.

# Electricity

Requirements were REWRITTEN effective January 1, 2005.

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- 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) On a floor plan of a room in your home, make a wiring diagram of the lights, switches, and outlets. 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.

## Electronics

Requirements were REVISED effective January 1, 2004.

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- 1) Describe the safety precautions you must exercise when using, building, altering, or repairing electronic devices.
- 2) Do the following:
  - a) Draw a simple schematic diagram. It must show resistors, capacitors, and transistors or integrated circuits. Use the correct symbols. Label all parts.
  - b) Tell the purpose of each part.
- 3) Do the following:
  - a) Show the right way to solder and desolder.
  - b) Show how to avoid heat damage to electronic components.
  - c) Tell about the function of a printed circuit board. Tell what precautions should be observed when soldering printed circuit boards.
- 4) Discuss each of the following with your merit badge counselor, and then choose ONE of the following and build a circuit to show the techniques used:
  - a) Tell how you can use electronics for a control purpose, and then build a control device circuit.
  - b) Tell about the basic principles of digital techniques, and then build a digital circuit. Show how to change three decimal numbers into binary numbers, and three binary numbers into decimal numbers.
  - c) Tell about three audio applications of electronics, and then build an audio circuit.

Show how to read the schematic diagram of the project you choose and, to the best of your ability, explain to your counselor how the circuit you built operates.

- 5) Do the following:
  - a) Show how to solve a simple problem involving current, voltage, and resistance using Ohm's law.
  - b) Tell about the need for and the use of test equipment in electronics. Name three types of test equipment. Tell how they operate.
- 6) Find out about three career opportunities in electronics that interest you. Discuss with and explain to your counselor what training and education are needed for each position.

## Emergency Preparedness

Requirements were REVISED effective January 1, 2009.

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### ***Either this Merit Badge or Lifesaving MB is Required to earn the Eagle Scout Rank***

- 1) Earn the First Aid Merit Badge.
- 2) Do the following:
  - a) Discuss with your counselor the aspects of emergency preparedness:
    - 1) **Prepare** for emergency situations
    - 2) **Respond** to emergency situations
    - 3) **Recover** from emergency situations
    - 4) **Mitigate and prevent** emergency situations

Include in your discussion the kinds of questions that are important to ask yourself as you consider each of these.

- b) Make a chart that demonstrates your understanding of each of the three aspects of emergency preparedness in requirement 2a (prepare, respond, recover, mitigate) with regard to 10 of the situations listed below. **You must use situations 1, 2, 3, 4, and 5 below in boldface** but you may choose any other five listed here for a total of 10 situations. Discuss this chart with your counselor.
    - 1) **Home kitchen fire**
    - 2) **Home basement/storage room/garage fire**
    - 3) **Explosion in the home**
    - 4) **Automobile accident**
    - 5) **Food-borne disease (food poisoning)**
    - 6) Fire or explosion in a public place
    - 7) Vehicle stalled in the desert
    - 8) Vehicle trapped in a blizzard
    - 9) Flash flooding in town or in the country
    - 10) Mountain/backcountry accident
    - 11) Boating accident
    - 12) Gas leak in a home or a building
    - 13) Tornado or hurricane
    - 14) Major flood
    - 15) Nuclear power plant emergency
    - 16) Avalanche (snowslide or rockslide)
    - 17) Violence in a public place
  - c) Meet with and teach your family how to get or build a kit, make a plan, and be informed for the situations on the chart you created for requirement 2b. Complete a family plan. Then meet with your counselor and report on your family meeting, discuss their responses, and share your family plan.
- 3) Show how you could safely save a person from the following:
    - a) Touching a live household electric wire.
    - b) A room filled with carbon monoxide
    - c) Clothes on fire.
    - d) Drowning using nonswimming rescues (including accidents on ice).
  - 4) Show three ways of attracting and communicating with rescue planes/aircraft.
  - 5) With another person, show a good way to transport an injured person out of a remote and/or rugged area, conserving the energy of rescuers while ensuring the well-being and protection of the injured person.
  - 6) Do the following:

- a) Tell the things a group of Scouts should be prepared to do, the training they need , and the safety precautions they should take for the following emergency services:
  - 1) Crowd and traffic control
  - 2) Messenger service and communication.
  - 3) Collection and distribution services.
  - 4) Group feeding, shelter, and sanitation.
- b) Identify the government or community agencies that normally handle and prepare for the emergency services listed under 6a, and explain to your counselor how a group of Scouts could volunteer to help in the event of these types of emergencies.
- c) Find out who is your community's emergency management director and learn what this person does to **prepare, respond to, recover from, and mitigate and prevent** emergency situations in your community. Discuss this information with your counselor and apply what you discover to the chart you created for requirement 2b.
- 7) Take part in an emergency service project, either a real one or a practice drill, with a Scouting unit or a community agency.
- 8) Do the following:
  - a) Prepare a written plan for mobilizing your troop when needed to do emergency service. If there is already a plan, explain it. Tell your part in making it work.
  - b) Take part in at least one troop mobilization. Before the exercise, describe your part to your counselor. Afterward, conduct an "after-action" lesson, discussing what you learned during the exercise that required changes or adjustments to the plan.
  - c) Prepare a personal emergency service pack for a mobilization call. Prepare a family kit (suitcase or waterproof box) for use by your family in case an emergency evacuation is needed. Explain the needs and uses of the contents.
- 9) Do ONE of the following:
  - a) Using a safety checklist approved by your counselor, inspect your home for potential hazards. Explain the hazards you find and how they can be corrected.
  - b) Review or develop a plan of escape for your family in case of fire in your home.
  - c) Develop an accident prevention program for five family activities outside the home (such as taking a picnic or seeing a movie) that includes an analysis of possible hazards, a proposed plan to correct those hazards, and the reasons for the corrections you propose.

## Engineering

Requirements were REVISED effective January 1, 2009.

- 1) Select a manufactured item in your home (such as a toy or an appliance), and under adult supervision and with the approval of your counselor, investigate how and why it works as it does. Find out what sort of engineering activities were needed to create it. Discuss with your counselor what you learned and how you got the information.
- 2) Select an engineering achievement that has had a major impact on society. Using resources such as the Internet (with your parent's permission), books, and magazines, find out about the engineers who made this engineering feat possible, the special obstacles they had to overcome, and how this achievement has influenced the world today. Tell your counselor what you learned.
- 3) Explain the work of six types of engineers. Pick two of the six and explain how their work is related.
- 4) Visit with an engineer (who may be your counselor or parent) and do the following:
  - a) Discuss the work this engineer does and the tools the engineer uses.
  - b) Discuss with the engineer a current project and the engineer's particular role in it.
  - c) Find out how the engineer's work is done and how results are achieved.
  - d) Ask to see the reports that the engineer writes concerning the project.
  - e) Discuss with your counselor what you learned about engineering from this visit.
- 5) Do ONE of the following:
  - a) Use the systems engineering approach to make step-by-step plans for your next campout. List alternative ideas for such items as program schedule, campsites, transportation, and costs. Tell why you made the choices you did and what improvements were made.
  - b) Make an original design for a piece of patrol equipment. Use the systems engineering approach to help you decide how it should work and look. Draw plans for it. Show the plans to your counselor, explain why you designed it the way you did, and explain how you would make it.
- 6) Do TWO of the following:
  - a) *Transforming motion.* Using common materials or a construction set, make a simple model that will demonstrate motion. Explain how the model uses basic mechanical concepts like levers and inclined planes to demonstrate motion. Describe an example where this mechanism is used in a real product.
  - b) *Using electricity.* Make a list of 10 electrical appliances in your home. Find out approximately how much electricity each uses in one month. Learn how to find out the amount and cost of electricity used in your home during periods of light and heavy use. List five ways to conserve electricity.
  - c) *Understanding electronics.* Using an electronic device such as a mobile telephone or portable digital media player, find out how sound travels from one location to another. Explain how the device was designed for ease of use, function, and durability.
  - d) *Using materials.* Do experiments to show the differences in strength and heat conductivity in wood, metal, and plastic. Discuss with your counselor what you have learned.
  - e) *Converting energy.* Do an experiment to show how mechanical, heat, chemical, solar, and/or electrical energy may be converted from one or more types of energy to another. Explain your results. Describe to your counselor what energy is and how energy is converted and used in your surroundings.
  - f) *Moving people.* Find out the different ways people in your community get to work. Make a study of traffic flow (number of vehicles and relative speed) in both heavy and light traffic periods. Discuss with your counselor what might be improved to make it easier for people in your community to get where they need to go.
  - g) *Building an engineering project.* Enter a project in a science or engineering fair or similar competition. (This requirement may be met by participation on an engineering competition project team.) Discuss with your counselor what your project demonstrates, the kinds of questions visitors to the fair asked you about it, and how well were you able to answer their questions.
- 7) Explain what it means to be a registered Professional Engineer (PE). Name the types of engineering work for which registration is most important?
- 8) Study the **Engineer's Code of Ethics**. Explain how it is like the Scout Oath and Scout Law.
- 9) Find out about three career opportunities in engineering. Pick one and research the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.

## Farm Mechanics

Requirements were REVISED effective January 1, 2009.

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- 1) Do the following:
  - a) Discuss with your counselor the safety equipment, tools, and clothing used while checking or repairing farm equipment. Use this equipment, tools, and/or clothing (when needed or called for) in meeting the requirements for this merit badge.
  - b) Draw a plan showing a well-equipped farm shop. Point out the shop's mandatory safety devices and features.
  - c) Find all the universal warning and safety symbols on a piece of equipment and explain what they mean.
  - d) Describe what a material safety data sheet (MSDS) is and tell why it is used. Obtain the MSDS for any engine coolant, oil, grease, fuel, hydraulic or transmission fluid, or other flammable or hazardous materials you use in meeting the requirements for this merit badge.
- 2) Explain how power is produced or transferred in a:
  - a) Diesel engine
  - b) Hydraulic system
  - c) Transmission or any other power system.
- 3) Do TWO of the following:
  - a) Replace the handle on any tool found on the farm.
  - b) Organize a tool rack or a storage system for nails, bolts, nuts, and washers.
  - c) Using a hand file, properly dress the mushroom head of a chisel or punch.
  - d) Using a hand file, properly dress a screwdriver tip.
- 4) Do ONE of the following:
  - a) On an engine-powered machine: Grease all fittings, change the oil and oil filter, clean the air filter, clean the radiator fins, and replace the fuel filters.
  - b) For any engine-powered machine, create a preoperational checklist; include checking the engine coolant, engine oil, hydraulic and/or transmission fluid, and battery voltage (using a voltmeter). Using your checklist, conduct a preoperational check of that machinery or equipment.
  - c) Prepare any farm machine for winter storage.
- 5) Visit an implement dealer. Interview the dealer, technician, or service manager for hints on good preventive maintenance. Ask why it is important, the costs, and what causes wear or damage? Report what you learn.
- 6) Explain each step in ONE of the following maintenance procedures:
  - a) Tightening hydraulic fittings
  - b) Checking the air filter
  - c) Cleaning a work piece with a wire-brush wheel.
- 7) Find out about three career opportunities in farm mechanics. Pick one and find out about the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.

# Fingerprinting

Requirements were REVISED effective January 1, 2004.

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- 1) Give a short history of fingerprinting. Tell the difference between civil and criminal identification.
- 2) Explain the difference between the automated fingerprint identification systems (AFIS) now used by some law enforcement agencies and the biometric fingerprint systems used to control access to places like buildings, airports, and computer rooms.
- 3) Do the following:
  - a) Name the surfaces of the body where friction or papillary ridges are found.
  - b) Name the two basic principles supporting the science of fingerprints and give a brief explanation of each principle.
  - c) Explain what it takes to positively identify a person using fingerprints.
- 4) Take a clear set of prints using ONE of the following methods:
  - a) Make both rolled and plain impressions. Make these on an 8-by-8-inch fingerprint identification card available from your local police department or counselor.
  - b) Using clear adhesive tape, a pencil, and plain paper, record your own fingerprints or those of another person.
- 5) Show your merit badge counselor you can identify the three basic types of fingerprint patterns and their subcategories. Using your own hand, identify the types of patterns you see.

## Fire Safety

Requirements were REVISED effective January 1, 2010.

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- 1) Do the following:
  - a) Demonstrate the technique of stop, drop, roll, and cool. Explain how burn injuries can be prevented.
  - b) List the most frequent causes of burn injuries.
- 2) Explain the chemistry and physics of fire. Name the parts of the fire tetrahedron. Explain why vapors are important to the burning process. Name the products of combustion. Give an example of how fire grows and what happens.
- 3) Name the most frequent causes of fire in the home and give examples of ways they can be prevented. Include a discussion about fires caused by smoking in the home, cooking, candles, fireplaces, and electrical appliances.
- 4) Do the following:
  - a) Explain the role of human behavior in the arson problem in this country
  - b) List the actions that cause seasonal fires and explain how these fires can be prevented.
- 5) List common circumstances that cause holiday-related fires and explain how these fires can be prevented.
- 6) Conduct a home safety survey with the help of an adult. Then do the following:
  - a) Draw a home fire-escape plan, create a home fire-drill schedule, and conduct a home fire drill.
  - b) Test a smoke alarm and demonstrate regular maintenance of a smoke alarm.
  - c) Explain what to do when you smell gas and when you smell smoke.
  - d) Explain how you would report a fire alarm.
  - e) Explain what fire safety equipment can be found in public buildings.
  - f) Explain who should use fire extinguishers and when these devices can be used.
  - g) Explain how to extinguish a grease pan fire.
  - h) Explain what fire safety precautions you should take when you are in a public building.
- 7) Do the following:
  - a) Demonstrate lighting a match safely.
  - b) Demonstrate the safe way to start a charcoal fire.
  - c) Demonstrate the safe way to melt wax.
- 8) Explain the difference between combustible and noncombustible liquids and between combustible and noncombustible fabrics.
- 9) Do the following:
  - a) Demonstrate the safe way to fuel a lawnmower.
  - b) Demonstrate the safety factors, such as proper ventilation, for auxiliary heating devices and the proper way to fuel those devices.
- 10) Do the following:
  - a) Explain the cost of outdoor and wildland fires and how to prevent them.
  - b) Demonstrate setting up and putting out a cooking fire.
  - c) Demonstrate using a camp stove and lantern.
  - d) Explain how to set up a campsite safe from fire.
- 11) Visit a fire station. Identify the types of fire trucks. Find out about the fire prevention activities in your community.
- 12) Choose a fire safety-related career that interests you and describe the level of education required and responsibilities of a person in that position. Tell why this position interests you.

## First Aid

Requirements were REVISED effective January 1, 2008.

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### ***This Merit Badge is Required to earn the Eagle Scout Rank***

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- 1) Satisfy your counselor that you have current knowledge of all first aid requirements for [Tenderfoot](#), [Second Class](#), and [First Class](#) ranks.
- 2) Do the following:
  - a) Explain how you would obtain emergency medical assistance from your home, on a wilderness camping trip, and during an activity on open water.
  - b) Explain the term *triage*.
  - c) Explain the standard precautions as applied to bloodborne pathogens.
  - d) Prepare a first aid kit for your home. Display and discuss its contents with your counselor.
- 3) Do the following:
  - a) Explain what action you should take for someone who shows signals of shock, for someone who shows signals of a heart attack, and for someone who shows signals of stroke.
  - b) Identify the conditions that must exist before performing CPR on a person. Then demonstrate proper technique in performing CPR using a training device approved by your counselor.
  - c) Explain the use of an automated external defibrillator (AED).
  - d) Show the steps that need to be taken for someone suffering from a severe cut on the leg and on the wrist. Tell the dangers in the use of a tourniquet and the conditions under which its use is justified.
  - e) Explain when a bee sting could be life threatening and what action should be taken for prevention and for first aid.
  - f) Explain the symptoms of heatstroke and what action needs to be taken for first aid and for prevention.
- 4) Do the following:
  - a) Describe the signs of a broken bone. Show first aid procedures for handling fractures (broken bones), including open (compound) fractures of the forearm, wrist, upper leg, and lower leg using improvised materials.
  - b) Describe the symptoms and possible complications and demonstrate proper procedures for treating suspected injuries to the head, neck, and back. Explain what measures should be taken to reduce the possibility of further complicating these injuries.
- 5) Describe the symptoms, proper first aid procedures, and possible prevention measures for the following conditions:
  - a) Hypothermia
  - b) Convulsions / seizures
  - c) Frostbite
  - d) Dehydration
  - e) Bruises, strains, sprains
  - f) Burns
  - g) Abdominal pain
  - h) Broken, chipped, or loosened tooth
  - i) Knocked out tooth
  - j) Muscle cramps
- 6) Do TWO of the following:
  - a) If a sick or injured person must be moved, tell how you would determine the best method. Demonstrate this method.
  - b) With helpers under your supervision, improvise a stretcher and move a presumably unconscious person.
  - c) With your counselor's approval, arrange a visit with your patrol or troop to an emergency medical facility or through an American Red Cross chapter for a demonstration of how an AED is used.
- 7) Teach another Scout a first-aid skill selected by your counselor.

## Geology

Requirements were REVISED effective January 1, 2010.

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- 1) Define geology. Discuss how geologists learn about rock formations. In geology, explain why the study of the present is important to understanding the past.
- 2) Pick three resources that can be extracted or mined from Earth for commercial use. Discuss with your counselor how each product is discovered and processed.
- 3) Review a geologic map of your area or an area selected by your counselor, and discuss the different rock types and estimated ages of rocks represented. Determine whether the rocks are horizontal, folded, or faulted, and explain how you arrived at your conclusion.
- 4) Do ONE of the following:
  - a) With your parent's and counselor's approval, visit with a geologist, land use planner, or civil engineer. Discuss this professional's work and the tools required in this line of work. Learn about a project that this person is now working on, and ask to see reports and maps created for this project. Discuss with your counselor what you have learned.
  - b) Find out about three career opportunities available in geology. Pick one and find out the education, training, and experience required for the profession. Discuss this with your counselor, and explain why this profession might interest you.
- 5) Do ONE of the following (a OR b OR c OR d):
  - a) Surface and Sedimentary Processes Option
    - 1) Conduct an experiment approved by your counselor that demonstrates how sediments settle from suspension in water. Explain to your counselor what the exercise shows and why it is important.
    - 2) Using topographical maps provided by your counselor, plot the stream gradients (different elevations divided by distance) for four different stream types (straight, meandering, dendritic, trellis). Explain which ones flow fastest and why, and which ones will carry larger grains of sediment and why.
    - 3) On a stream diagram, show areas where you will find the following features: cut bank, fill bank, point bar, medial channel bars, lake delta. Describe the relative sediment grain size found in each feature.
    - 4) Conduct an experiment approved by your counselor that shows how some sedimentary material carried by water may be too small for you to see without a magnifier.
    - 5) Visit a nearby stream. Find clues that show the direction of water flow, even if the water is missing. Record your observations in a notebook, and sketch those clues you observe. Discuss your observations with your counselor.
  - b) Energy Resources Option
    - 1) List the top five Earth resources used to generate electricity in the United States.
    - 2) Discuss source rock, trap, and reservoir rock - the three components necessary for the occurrence of oil and gas underground.
    - 3) Explain how each of the following items is used in subsurface exploration to locate oil or gas: reflection seismic, electric well logs, stratigraphic correlation, offshore platform, geologic map, subsurface structure map, subsurface isopach map, and core samples and cutting samples.
    - 4) Using at least 20 data points provided by your counselor, create a subsurface structure map and use it to explain how subsurface geology maps are used to find oil, gas, or coal resources.
    - 5) Do ONE of the following activities:
      - (1) Make a display or presentation showing how oil and gas or coal is found, extracted, and processed. You may use maps, books, articles from periodicals, and research found on the Internet (with your parent's permission). Share the display with your counselor or a small group (such as your class at school) in a five minute presentation.
      - (2) With your parent's and counselor's permission and assistance, arrange for a visit to an operating drilling rig. While there, talk with a geologist and ask to see what the geologist does onsite. Ask to see cutting samples taken at the site.

c) Mineral Resources Option

- 1) Define rock. Discuss the three classes of rocks including their origin and characteristics.
- 2) Define mineral. Discuss the origin of minerals and their chemical composition and identification properties, including hardness, specific gravity, color, streak, cleavage, luster, and crystal form.
- 3) Do ONE of the following:
  - (1) Collect 10 different rocks or minerals. Record in a notebook where you obtained (found, bought, traded) each one. Label each specimen, identify its class and origin, determine its chemical composition, and list its physical properties. Share your collection with your counselor.
  - (2) With your counselor's assistance, identify 15 different rocks and minerals. List the name of each specimen, tell whether it is a rock or mineral, and give the name of its class (if it is a rock) or list its identifying physical properties (if it is a mineral).
- 4) List three of the most common road building materials used in your area. Explain how each material is produced and how each is used in road building.
- 5) Do ONE of the following activities:
  - (1) With your parent's and counselor's approval, visit an active mining site, quarry, or sand and gravel pit. Tell your counselor what you learned about the resources extracted from this location and how these resources are used by society.
  - (2) With your counselor, choose two examples of rocks and two examples of minerals. Discuss the mining of these materials and describe how each is used by society.
  - (3) With your parent's and counselor's approval, visit the office of a civil engineer and learn how geology is used in construction. Discuss what you learned with your counselor.

d) Earth History Option

- 1) Create a chart showing suggested geological eras and periods. Determine which period the rocks in your region might have been formed.
- 2) Explain to your counselor the processes of burial and fossilization, and discuss the concept of extinction.
- 3) Explain to your counselor how fossils provide information about ancient life, environment, climate, and geography. Discuss the following terms and explain how animals from each habitat obtain food: benthonic, pelagic, littoral, lacustrine, open marine, brackish, fluvial, eolian, protected reef.
- 4) Collect 10 different fossil plants or animals OR (with your counselor's assistance) identify 15 different fossil plants or animals. Record in a notebook where you obtained (found, bought, traded) each one. Classify each specimen to the best of your ability, and explain how each one might have survived and obtained food. Tell what else you can learn from these fossils.
- 5) Do ONE of the following:
  - (1) Visit a science museum or the geology department of a local university that has fossils on display. With your parent's and counselor's approval, before you go, make an appointment with a curator or guide who can show you how the fossils are preserved and prepared for display.
  - (2) Visit a structure in your area that was built using fossiliferous rocks. Determine what kind of rock was used and tell your counselor the kinds of fossil evidence you found there.
  - (3) Visit a rock outcrop that contains fossils. Determine what kind of rock contains the fossils, and tell your counselor the kinds of fossil evidence you found at the outcrop.
  - (4) Prepare a display or presentation on your state fossil. Include an image of the fossil, the age of the fossil, and its classification. You may use maps, books, articles from periodicals, and research found on the Internet (with your parent's permission). Share the display with your counselor or a small group (such as your class at school). If your state does not have a state fossil, you may select a state fossil from a neighboring state.

## Indian Lore

Requirements were REVISED effective January 1, 2009.

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**Requirement 4e used to require "an Indian story of at least 300 words, or any number of shorter ones adding up to 300 words." We believe, but have not confirmed, that the change from 300 words to 25 words as shown below was a typographical error in the pamphlet, but until we get confirmation from BSA, we've shown the wording in the pamphlet.**

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- 1) Give the history of one American Indian tribe, group or nation that lives or has lived near you. Visit it, if possible. Tell about traditional dwellings, way of life, tribal government, religious beliefs, family and clan relationships, language, clothing styles, arts and crafts, food preparation, means of getting around, games, customs in warfare, where members of the group now live, and how they live.
- 2) Do TWO of the following. Focus on a specific group or tribe.
  - a) Make an item of clothing worn by members of the tribe.
  - b) Make and decorate three items used by the tribe, as approved by your counselor.
  - c) Make an authentic model of a dwelling used by an Indian tribe, group, or nation.
  - d) Visit a museum to see Indian artifacts. Discuss them with your counselor. Identify at least 10 artifacts by tribe or nation, their shape, size, and use.
- 3) Do ONE of the following:
  - a) Learn three games played by a group or tribe. Teach and lead one game with a Scout group.
  - b) Learn and show how a tribe traditionally cooked or prepared food. Make three food items.
  - c) Give a demonstration showing how a specific Indian group traditionally hunted, fished, or trapped.
- 4) Do ONE of the following:
  - a) Write or briefly describe how life would have been different for the European settlers if there had been no native Americans to meet them when they came to this continent.
  - b) Sing two songs in an Indian language. Explain their meanings.
  - c) Learn in an Indian language at least 25 common terms and their meaning.
  - d) Show 25 signs in Indian sign language. Include those that will help you ask for water, for food, and where the path or road leads.
  - e) Learn in English (or the language you commonly speak at home or in the troop) an Indian story of at least 25 words, or any number of shorter ones adding up to 300 words. Tell the story or stories at a Scout meeting or campfire.
  - f) Write or tell about eight things adopted by others from American Indians.
  - g) Learn 25 Indian place names. Tell their origins and meanings.
  - h) Name five well-known American Indian leaders, either from the past or people of today. Give their tribes or nations. Describe what they did or do now that makes them notable.
  - i) Learn about the Iroquois Confederacy, including how and why it was formed. Tell about its governing system. Describe some of the similarities and differences between the governments of the United States and of the Six Nations (the Haudenosaunee or Iroquois Confederacy).

## Law

Requirements were REVISED effective January 1, 2003.

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- 1) Define "law." Tell some of its sources. Describe functions it serves.
- 2) Discuss TWO of the following:
  - a) The Justinian Code, The Code of Hammurabi, and the Magna Carta.
  - b) The development of the jury system.
  - c) Two famous trials in history.
- 3) Tell what civil law is; tell what criminal law is. Tell the main differences between them. Give examples of each.
- 4) Ask five people (not more than one from your immediate family) about the role of law enforcement officers in our society. Discuss their answers with them. Go to a law enforcement officer in your neighborhood and ask about his or her responsibilities and duties. Report your findings.
- 5) Tell about several laws that were passed to protect the consumer and the seller. Tell about several organizations that provide help to consumers and sellers.
- 6) Do ONE of the following:
  - a) Attend a session of a civil or criminal court. Write 250 words or more on what you saw.
  - b) Plan and conduct a mock trial with your troop or school class. After the trial is over, discuss it with the group.
- 7) Arrange a visit with a lawyer who works for a business, bank, title company, or government agency. Find out his or her duties and responsibilities. Report what you learned.
- 8) Explain the requirements for becoming a lawyer in your state. Describe how judges are selected in your state.
- 9) Make a list of 15 jobs which deal with some aspect of law or legal processes. Tell which you prefer. Why?
- 10) Tell where people can go to obtain the help of a lawyer if they are unable to pay for one. Tell what you can do if you can afford a lawyer but do not know of any in your area.
- 11) Discuss with your counselor the importance of TWO of the following areas of law that have recently emerged and are still developing:
  - a) Environmental law
  - b) Computers and the Internet
  - c) Copyright and the Internet
  - d) Space travel and satellites orbiting the earth

## Lifesaving

Requirements were REVISED effective January 1, 2009.

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### ***This Merit Badge (or Emergency Preparedness MB) is Required to earn the Eagle Scout Rank***

- 1) Before doing requirements 2 through 15
  - a) Complete Second Class requirements 7a through 7c and First Class requirements 9a through 9d.
    - 1) *Second Class requirements 7a through 7c*
      - (1) (7a) Tell what precautions must be taken for a safe swim.
      - (2) (7b) Demonstrate your ability to jump feetfirst into water over your head in depth, level off and swim 25 feet on the surface, stop, turn sharply, resume swimming, then return to your starting place.
      - (3) (7c) Demonstrate water rescue methods by reaching with your arm or leg, reaching with a suitable object, and by throwing lines and objects. Explain why swimming rescues should not be attempted when a reaching or throwing rescue is possible, and explain why and how a rescue swimmer should avoid contact with the victim.
    - 2) *First Class requirements 9a through 9c*
      - (1) (9a) Tell what precautions should be taken for a safe trip afloat.
      - (2) (9b) Successfully complete the BSA swimmer test.
      - (3) (9c) With a helper and a practice victim, show a line rescue both as tender and as rescuer. (The practice victim should be approximately 30 feet from shore in deep water).
  - b) Swim continuously for 400 yards using each of the following strokes in a strong manner for at least 50 continuous yards: front crawl, sidestroke, breaststroke, and elementary backstroke.
- 2) Explain the following:
  - a) Common drowning situations and how to prevent them.
  - b) How to identify persons in the water who need assistance.
  - c) The order of methods in water rescue.
  - d) How rescue techniques vary depending on the setting and the condition of the person needing assistance.
  - e) Situations for which in-water rescues should not be undertaken.
- 3) Demonstrate "reaching" rescues using various items such as arms, legs, towels, shirts, paddles, and poles.
- 4) Demonstrate "throwing" rescues using various items such as lines, ring buoys, rescue bags, and free-floating supports. Successfully place at least one such aid within reach of a practice victim 25 feet from shore.
- 5) Show or explain the use of rowboats, canoes, and other small craft in performing rescues.
- 6) List various items that can be used as rescue aids in a noncontact swimming rescue. Explain why buoyant aids are preferred.
- 7) Perform the following *equipment-based rescues for a conscious practice subject* 30 feet from shore. Use a proper entry and a strong approach stroke. Speak to the subject to determine his condition and to provide instructions and encouragement.
  - a) Present a rescue tube to the subject, release it, and escort the victim to safety.
  - b) Present a rescue tube to the subject and use it to tow the victim to safety.
  - c) Present a buoyant aid other than a rescue tube to the subject, release it, and escort the victim to safety.
  - d) Present a buoyant aid other than a rescue tube to the subject and use it to tow the victim to safety.
  - e) Remove street clothes in 20 seconds or less and use a non-buoyant aid, such as a shirt or towel, to tow the subject to safety. Explain when it is appropriate to remove heavy clothing before attempting a swimming rescue.
- 8) Explain the importance of avoiding contact with an active victim and describe lead-and-wait tactics.
- 9) Perform the following *nonequipment rescues for a conscious practice subject* 30 feet from shore. Begin in the water from a position near the subject. Speak to the subject to determine his condition and to provide instructions and encouragement.
  - a) Provide a swim-along assist for a calm, responsive, tired swimmer moving with a weak forward stroke.
  - b) Perform an armpit tow for a calm responsive, tired swimmer resting with a back float.
  - c) Perform a cross-chest carry for an exhausted, passive victim who does not respond to instructions to aid himself.

- 10) In deep water, show how to escape from a victim's grasp on your wrist. Repeat for front and rear holds about the head and shoulders.
- 11) Perform the following rescues for an *unconscious practice subject* at or near the surface 30 feet from shore. Use a proper entry and strong approach stroke. Speak to the subject and splash water on him to determine his condition before making contact. Remove the victim from the water, with assistance if needed, and position for CPR.
  - a) Perform an equipment assist using a buoyant aid.
  - b) Perform a front approach and wrist tow.
  - c) Perform a rear approach and armpit tow.
- 12) Describe how to respond if a victim submerges before being reached by a rescuer, and do the following:
  - a) Recover a 10-pound weight in 8 to 10 feet of water using a feetfirst surface dive.
  - b) Repeat using a headfirst surface dive.
- 13) Demonstrate knowledge of resuscitation procedures:
  - a) Describe how to recognize the need for rescue breathing and CPR.
  - b) Demonstrate proper CPR technique for at least 3 minutes using a mannequin designed to simulate ventilations and compressions.
- 14) Demonstrate management of a spinal injury:
  - a) Explain the signs and symptoms of a spinal injury
  - b) Support a face up victim in calm, shallow water.
  - c) Turn a subject from a facedown to a faceup position while maintaining support.
- 15) Show that you know first aid for other injuries or illnesses that could occur while swimming or boating, including hypothermia, heat reactions, muscle cramps, sunburn, stings, and hyperventilation.

## Nuclear Science

Requirements were REWRITTEN effective January 1, 2005

- 1) Do the following:
  - a) Describe the biological effects and hazards of radiation to humankind, the environment, and wildlife. Explain the difference between deterministic and stochastic effects. In your explanation, discuss the nature and magnitude of radiation risks to humans from nuclear power, medical radiation, and background radiation. Explain the measures required by law to minimize these risks.
  - b) Describe the radiation hazard symbol and explain where it should be used. Tell why and how people must use radiation or radioactive materials carefully.
- 2) Tell the meaning of the following: ALARA, alpha particle, atom, background radiation, beta particle, contamination, curie and becquerel, gamma ray, half-life, ionization, quark, isotope, neutron, nuclear energy, nuclear reactor, particle accelerator, rad and gray, radiation, radioactivity, radon, rem and sievert, and X-ray.
- 3) Choose five individuals important to the field of atomic energy and nuclear science and explain each person's contribution.
- 4) Choose an element from the periodic table. Construct 3-D models for the atoms of three isotopes of this element, showing neutrons, protons, and electrons. Use the three models to explain the difference between atomic number and mass number. Then do the following:
  - a) Make a drawing showing how nuclear fission happens, labeling all details. Draw another picture showing how a chain reaction could be started and how it could be stopped.
  - b) Explain what is meant by a "critical mass."
- 5) Do any THREE of the following:
  - a) Build an electroscope. Show how it works. Place a radiation source inside and explain any difference seen.
  - b) Build a model of a reactor. Show the fuel, control rods, shielding, moderator, and any cooling material. Explain how a reactor could be used to change nuclear energy into electrical energy or make things radioactive.
  - c) Using a radiation survey meter and a radioactive source, show how the measurements per minute change as the source gets closer to or farther from the radiation detector. Place three different kinds of materials between the source and the detector, then explain any differences in the measurements per minute. Explain how time, distance, and shielding can reduce the radiation dose.
  - d) Obtain a sample of irradiated and non-irradiated foods. Prepare the two foods and compare their taste and texture. Store the leftovers in separate containers and under the same conditions. For a period of 14 days, observe their rate of decomposition or spoilage, and describe the differences you see on days 5, 10, and 14.
  - e) Describe how radon is detected in homes. Discuss the steps taken for the long-term and short-term test methods, how to interpret the results, and explain when each type of test should be used. Explain the health concern related to radon gas and tell what steps can be taken to reduce radon in buildings.
  - f) Visit a place where X-ray is used. Draw a floor plan of the room in which it is used. Show where the unit, the unit operator, and the patient would be when X-ray is used. Explain the precautions taken when X-ray is used and the importance of those precautions.
  - g) Make a cloud chamber. Show how it can be used to see the tracks caused by radiation. Explain what is happening.
  - h) Visit a place where radioisotopes are being used. Using a drawing, explain how and why they are used.
  - i) Obtain samples of irradiated seeds. Plant them. Plant a group of non-irradiated seeds of the same kind. Grow both groups. List any differences you observe during a 30-day period. Discuss with your counselor what irradiation does to seeds.
  - j) Visit an accelerator (research lab) or university where people study the properties of the nucleus. After your visit, discuss what you have learned with your counselor.
- 6) Do ONE of the following:
  - a) Give an example of each of the following in relation to how energy from an atom can be used: nuclear medicine, environmental applications, industrial applications, space exploration, and radiation therapy. For each example, explain the application and its significance to nuclear science.

- b) Find out how many nuclear power plants exist in the United States. Locate the one nearest your home. Find out what percentage of electricity in the United States is generated by nuclear power plants, by coal, and by gas.
  - c) Name three particle accelerators in the United States and describe the type of experiments each accelerator is designed to perform.
- 7) Find out about three career opportunities in nuclear science that interest you. Pick one and find out the education, training, and experience required for this profession and discuss this with your counselor. Tell why this profession interests you.

## Personal Management

Requirements were REWRITTEN effective January 1, 2004.

### ***This Merit Badge is Required to earn the Eagle Scout Rank***

- 1) Do the following:
  - a) Choose an item that your family might want to purchase that is considered a major expense.
  - b) Write a plan that tells how your family would save money for the purchase identified in requirement 1a.
    - 1) Discuss the plan with your merit badge counselor
    - 2) Discuss the plan with your family
    - 3) Discuss how other family needs must be considered in this plan.
  - c) Develop a written shopping strategy for the purchase identified in requirement 1a.
    - 1) Determine the quality of the item or service (using consumer publications or rating systems).
    - 2) Comparison shop for the item. Find out where you can buy the item for the best price. (Provide prices from at least two different price sources.) Call around; study ads. Look for a sale or discount coupon. Consider alternatives. Can you buy the item used? Should you wait for a sale?
- 2) Do the following:
  - a) Prepare a budget reflecting your expected income (allowance, gifts, wages), expenses, and savings. Track your actual income, expenses, and savings for 13 consecutive weeks. (You may use the forms provided in this pamphlet, devise your own, or use a computer generated version.) When complete, present the results to your merit badge counselor.
  - b) Compare expected income with expected expenses.
    - 1) If expenses exceed income, determine steps to balance your budget.
    - 2) If income exceeds expenses, state how you would use the excess money (new goal, savings).
- 3) Discuss with your merit badge counselor FIVE of the following concepts:
  - a) The emotions you feel when you receive money.
  - b) Your understanding of how the amount of money you have with you affects your spending habits.
  - c) Your thoughts when you buy something new and your thoughts about the same item three months later. Explain the concept of buyer's remorse.
  - d) How hunger affects you when shopping for food items (snacks, groceries).
  - e) Your experience of an item you have purchased after seeing or hearing advertisements for it. Did the item work as well as advertised?
  - f) Your understanding of what happens when you put money into a savings account.
  - g) Charitable giving. Explain its purpose and your thoughts about it.
  - h) What you can do to better manage your money.
- 4) Explain the following to your merit badge counselor:
  - a) The differences between saving and investing, including reasons for using one over the other.
  - b) The concepts of return on investment and risk.
  - c) The concepts of simple interest and compound interest and how these affected the results of your investment exercise.
- 5) Select five publicly traded stocks from the business section of the newspaper. Explain to your merit badge counselor the importance of the following information for each stock:
  - a) Current price
  - b) How much the price changed from the previous day
  - c) The 52-week high and the 52-week low prices
- 6) Pretend you have \$1,000 to save, invest, and help prepare yourself for the future. Explain to your merit badge counselor the advantages or disadvantages of saving or investing in each of the following:
  - a) Common stocks
  - b) Mutual funds
  - c) Life insurance
  - d) A certificate of deposit (CD)
  - e) A savings account or U.S. savings bond

- 7) Explain to your merit badge counselor the following:
  - a) What a loan is, what interest is, and how the annual percentage rate (APR) measures the true cost of a loan.
  - b) The different ways to borrow money.
  - c) The differences between a charge card, debit card, and credit card. What are the costs and pitfalls of using these financial tools? Explain why it is unwise to make only the minimum payment on your credit card.
  - d) Credit reports and how personal responsibility can affect your credit report.
  - e) Ways to eliminate debt.
- 8) Demonstrate to your merit badge counselor your understanding of time management by doing the following:
  - a) Write a "to do" list of tasks or activities, such as homework assignments, chores, and personal projects, that must be done in the coming week. List these in order of importance to you.
  - b) Make a seven-day calendar or schedule. Put in your set activities, such as school classes, sports practices or games, jobs or chores, and/or Scout or church or club meetings, then plan when you will do all the tasks from your "to do" list between your set activities.
  - c) Follow the one-week schedule you planned. Keep a daily diary or journal during each of the seven days of this week's activities, writing down when you completed each of the tasks on your "to do" list compared to when you scheduled them.
  - d) Review your "to do" list, one-week schedule, and diary/journal to understand when your schedule worked and when it did not work. With your merit badge counselor, discuss and understand what you learned from this requirement and what you might do differently the next time.
- 9) Prepare a written project plan demonstrating the steps below, including the desired outcome. This is a project on paper, not a real-life project. Examples could include planning a camping trip, developing a community service project or a school or religious event, or creating an annual patrol plan with additional activities not already included in the troop annual plan. Discuss your completed project plan with your merit badge counselor.
  - a) Define the project. What is your goal?
  - b) Develop a timeline for your project that shows the steps you must take from beginning to completion.
  - c) Describe your project.
  - d) Develop a list of resources. Identify how these resources will help you achieve your goal.
  - e) If necessary, develop a budget for your project.
- 10) Do the following:
  - a) Choose a career you might want to enter after high school or college graduation.
  - b) Research the limitations of your anticipated career and discuss with your merit badge counselor what you have learned about qualifications such as education, skills, and experience.

## Photography

Requirements were REWRITTEN effective January 1, 2006.

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- 1) Explain how the following elements and terms affect the quality of a picture:
  - a) Light-natural light/ambient, flash
  - b) Exposure-aperture (f-stops), shutter speed, depth of field
  - c) Composition-rule of thirds, leading lines, framing, depth
  - d) Angle of view
  - e) Stopping action
- 2) Explain the basic parts and operation of a film camera or digital camera. Explain how an exposure is made when you take a picture.
- 3) Discuss with your counselor the differences between a film camera and a digital camera. List at least five advantages and five disadvantages of using a digital camera versus using a film camera.
- 4) Do ONE of the following:
  - a) Produce a picture story using the photojournalistic technique of documenting an event. Share your plan with your counselor and get your counselor's input and approval before you proceed. Then, using either a film camera or a digital camera, produce your approved picture story. Process your images and select eight to 12 images that best tell your story. Arrange your images in order, then mount the prints on a poster board. If you are using digital images, you may create a slide show on your computer or produce printouts for your poster board. Share your picture story with your counselor.
  - b) Choose a topic that interests you to photograph for an exhibit or display. Get your counselor's approval, then photograph (digital or film) your topic. Process your images. Choose 20 of your favorite images and mount them on poster board. Share your display with your counselor. If you are using digital images, you may create a slide show on your computer or produce printouts for your poster board.
- 5) Discuss with your counselor the career opportunities in photography. Pick one that interests you and explain how to prepare for such a career. Discuss with your counselor the education and training such a career would require.

## Plumbing

Requirements were REVISED effective January 1, 2005.

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- 1) Do the following:
  - a) Describe how a properly working plumbing system protects our family's health and safety.
  - b) List five important local health regulations related to plumbing and tell how they protect health and safety.
  - c) Describe the safety precautions you must take when making home plumbing repairs.
- 2) Do the following:
  - a) Make a drawing and explain how a home hot- and cold- water supply system works. Tell how you would make it safe from freezing.
  - b) Make a drawing and explain the drainage system of the plumbing in a house. Show and explain the use of drains and vents.
- 3) Show how to use five important plumber's tools.
- 4) Identify and describe the use of each of the following: washer, retaining nut, plunger (rubber force cup), solder, flux, elbow, tee, nipple, coupling, plug, union, trap, drainpipe, and water meter.
- 5) Name the kinds of pipe that are used most often in a plumbing system. Explain why these pipes are used.
- 6) Cut, thread, and connect two pieces of steel pipe.
- 7) Under the supervision of a knowledgeable adult, solder three copper tube connections using a gas torch. Include one tee, two straight pieces, and one coupling.
- 8) Do the following:
  - a) Replace a washer in a faucet.
  - b) Clean out a sink or lavatory trap.

## **Public Speaking**

Requirements were REVISED effective January 1, 2003.

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- 1) Give a three- to five-minute introduction of yourself to an audience such as your troop, class at school, or some other group.
- 2) Prepare a three- to five-minute talk on a topic of your choice that incorporates body language and visual aids.
- 3) Give an impromptu talk of at least two minutes, either as part of a group discussion or before your counselor. Use a subject selected by your counselor that is interesting to you but that is not known to you in advance and for which you do not have time to prepare.
- 4) Select a topic of interest to your audience. Collect and organize information about this topic and prepare an outline. Write an eight- to 10-minute speech, practice it, then deliver it in the conversational way.
- 5) Show you know parliamentary procedure by leading a discussion or meeting according to accepted rules of order; or by answering questions on the rules of order.

## Railroading

Requirements were REVISED effective January 1, 2005.

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- 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 as the fixed guide path.
- 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.
- 4) Explain the purpose of Operation Lifesaver and its mission.
- 5) 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 railroad rights-of-way are important for safety.
  - 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.
- 6) Explain the appearance and meaning of the following warning signs and devices: advance warning sign, pavement markings, crossbucks, flashing red lights, crossing gates.
- 7) 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 whistle 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 trains.
- 8) Select **ONE** of the following special-interest areas and complete the requirements:
  - a) **Model Railroading**

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

    - 1) Draw a layout of your own model railroad; or one that could be built in your home. Design a point-to-point track or loop with different routings. Include one of the following: turnaround or terminal or yard or siding.
    - 2) Build one model railroad car kit or one locomotive kit.
    - 3) Name the scale of four popular model railroad gauges. Identify the scale of four model cars or locomotives.

- 4) Locate the Web site of four model railroad - related manufacturers or magazine publishers. Print information on their products and services and discuss the information with your counselor.
- 5) Build one railroad structure (from scratch or using a kit), paint and weather the structure, mount it on your layout or diorama, and make the surrounding area on a diorama scenic.
- 6) Alone or with others, build a model railroad or modular layout, including ballast and scenery. Make electrical connections and operate a train. Describe what you enjoyed most.
- 7) Participate in a switching contest on a timesaver layout and record your time.

b) **Railfanning**

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

- 1) 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.
- 2) 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.
- 3) 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.
- 4) 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.

## Salesmanship

Requirements were REWRITTEN effective January 1, 2004.

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- 1) Explain the responsibilities of a salesman, and how a salesperson serves customers and helps stimulate the economy.
- 2) Explain why it is important for a salesperson to do the following:
  - a) Research the market to be sure the product or service meets the needs of customers.
  - b) Learn all about the product or service to be sold.
  - c) If possible, visit the location where the product is built and learn how it is constructed. If a service is being sold, learn about the benefits of the service to the customer.
  - d) Follow up with customers after their purchase to confirm their satisfaction and discuss their concerns about the product or service.
- 3) Write and present a sales plan for a product or service and a sales territory assigned by your counselor.
- 4) Make a sales presentation of a product or service assigned by your counselor.
- 5) Do ONE of the following and keep a record (cost sheet). Use the sales techniques you have learned, and share your experience with your counselor.
  - a) Help your unit raise funds through sales either of merchandise or of tickets to a Scout show.
  - b) Sell your services such as lawn raking or mowing, pet watching, dog walking, snow shoveling, and car washing to your neighbors. Follow up after the service has been completed and determine the customer's satisfaction.
  - c) Earn money through retail selling.
- 6) Do ONE of the following:
  - a) Interview a person and learn the following:
    - 1) What made the person choose sales as a profession?
    - 2) What are the most important things to remember when talking to customers?
    - 3) How is the product or service sold?
    - 4) Include your own questions.
  - b) Interview a retail store owner and learn the following:
    - 1) How often is the owner approached by a sales representative?
    - 2) What good traits should a sales representative have? What habits should the sales representative avoid?
    - 3) What does the owner consider when deciding whether to establish an account with the sales representative?
    - 4) Include your own questions.
- 7) Investigate and report on career opportunities in sales, then do the following:
  - a) Prepare a written statement of your qualifications and experience. Include relevant classes you have taken in school and merit badges you have earned.
  - b) Discuss with your counselor what education, experience, or training you should obtain so you are prepared to serve in that position.

## Space Exploration

Requirements were REVISED effective January 1, 2005.

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- 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.
- 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.\* 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)  
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 an unmanned space exploration mission and an early manned mission. Tell about each mission's major discoveries, its importance, and what we 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 an unmanned mission to another planet or moon that will return samples of its surface to Earth. Name the planet or moon your spacecraft will visit. Show how your design will cope with the conditions of the planet's or moon's environment.
- 6) Describe the purpose and operation of ONE of the following:
  - a) Space shuttle
  - b) International Space Station
- 7) Design an inhabited base located on the Moon or Mars. 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.

## Swimming

Requirements were REVISED effective January 1, 2009.

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### ***Either this Merit Badge or Hiking MB or Cycling MB is Required to earn the Eagle Scout Rank***

- 1) Discuss the prevention and treatment for health concerns that could occur while swimming, including hypothermia, dehydration, sunburn, heat exhaustion, heatstroke, muscle cramps, hyperventilation, spinal injury, stings and bites, and cuts and scrapes.
- 2) Do the following:
  - a) Identify the conditions that must exist before performing CPR on a person. Explain how to recognize such conditions
  - b) Demonstrate proper technique for performing CPR using a training device approved by your counselor.
- 3) Before doing the following requirements, successfully complete Second Class rank requirements 7a-7c and First Class rank requirements 9a-9c
  - a) Second Class rank requirements:
    - 1) (7a) Tell what precautions must be taken for a safe swim.
    - 2) (7b) Demonstrate your ability to jump feetfirst into water over your head in depth, level off and swim 25 feet on the surface, stop, turn sharply, resume swimming, then return to your starting place.
    - 3) (7c) Demonstrate water rescue methods by reaching with your arm or leg, reaching with a suitable object, and by throwing lines and objects. Explain why swimming rescues should not be attempted when a reaching or throwing rescue is possible, and explain why and how a rescue swimmer should avoid contact with the victim.
  - b) First Class rank requirements:
    - 1) (9a) Tell what precautions should be taken for a safe trip afloat.
    - 2) (9b) Before doing the following requirements, successfully complete the BSA swimmer test. Jump feetfirst into water over your head in depth, swim 75 yards in a strong manner using one or more of the following strokes: sidestroke, breaststroke, trudgen, or crawl; then swim 25 yards using an easy, resting backstroke. The 100 yards must be swum continuously and include at least one sharp turn. After completing the swim, rest by floating.
    - 3) (9c) With a helper and a practice victim, show a line rescue both as tender and as rescuer. (The practice victim should be approximately 30 feet from shore in deep water).
- 2) Demonstrate survival skills by jumping feetfirst into deep water wearing clothes (shoes, socks, swim trunks, long pants, belt, and long-sleeved shirt). Remove shoes and socks, inflate the shirt, and show that you can float using the shirt for support. Remove and inflate the pants for support. Swim 50 feet using the inflated pants for support, then show how to reinflate the pants while still afloat.
- 3) Swim continuously for 150 yards using the following strokes in good form and in a strong manner: front crawl or trudgen for 25 yards, back crawl for 25 yards, sidestroke for 25 yards, breaststroke for 25 yards, and elementary backstroke for 50 yards.
- 4) Do the following:
  - a) Float faceup in a resting position for at least one minute.
  - b) Demonstrate survival floating for at least five minutes.
  - c) While wearing a properly fitted personal floatation device (PFD), demonstrate the HELP and huddle positions. Explain their purposes.
  - d) Explain why swimming or survival floating will hasten the onset of hypothermia in cold water.
- 5) In water over your head, but not to exceed 10 feet, do each of the following:
  - a) Use the feetfirst method of surface diving and bring an object up from the bottom.
  - b) Do a headfirst surface dive (pike or tuck), and bring the object up again.
  - c) Do a headfirst surface dive to a depth of at least 5 feet and swim underwater for three strokes. Come to the surface, take a breath, and repeat the sequence twice.

- 6) Do ONE of the following:
- a) Demonstrate snorkeling and scuba diving knowledge:
    - 1) Demonstrate selection and fit of mask, snorkel, and fins; discuss safety in both pool and open-water snorkeling.
    - 2) Demonstrate proper use of mask, snorkel, and fins for underwater search and rescue.
    - 3) Describe the sport of scuba diving or snorkeling, and demonstrate your knowledge of BSA policies and procedures relating to that sport.

OR

- b) Demonstrate the following competitive swimming skills:
  - 1) Racing dive from a pool edge or dock edge (no elevated dives from racing platforms or starting blocks)
  - 2) Racing form for 25 yards on one competitive stroke (front crawl, back crawl, breaststroke, or butterfly)
  - 3) Racing turns for the stroke that you chose in 8b(2), OR, if the camp facilities cannot accommodate the racing turn, repeat 8b(2) with an additional stroke.
  - 4) Describe the sport of competitive swimming.
- 7) Following the guidelines set in the BSA Safe Swim Defense, in water at least 7 feet deep, show a standing headfirst dive from a dock or pool deck. Show a long shallow dive, also from the dock or pool deck.
- 8) Do the following:
  - a) Explain the health benefits of regular aerobic exercise, and explain why many people today do not get enough of the beneficial kinds of exercise.
  - b) Discuss why swimming is favored as both a fitness and a therapeutic exercise.
  - c) Write a plan for a swimming exercise program that will promote aerobic/vascular fitness, strength and muscle tone, body flexibility, and weight control for a person of Scout age. Identify resources and facilities available in your home community that would be needed for such a program.
  - d) Discuss with your counselor the incentives and obstacles for staying with the fitness program you created in requirement 10c. Explain the unique benefits that could be gained from this program, and discuss how personal health awareness and self discipline would relate to your own willingness and ability to pursue such a program.

## Veterinary Medicine

Requirements were REWRITTEN effective January 1, 2006

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- 1) Discuss with your counselor the roles a veterinarian plays in the following:
  - a) Companion or small animal medicine, and equine medicine
  - b) Food animal or large animal medicine
  - c) Exotic animal medicine
  - d) Marine animal medicine (mammal and fish)
  - e) Poultry medicine
  - f) Wildlife medicine and aquaculture medicine
- 2) Discuss with your counselor the roles a veterinarian plays in the following:
  - a) Public health medicine and zoonotic disease surveillance and control
  - b) The military
  - c) Food safety and inspection
  - d) Laboratory animal medicine and research
  - e) Teaching and government
- 3) Describe the training required to become a veterinarian. Where is the veterinary medical college nearest you? Describe the prerequisites for applying to veterinary school.
- 4) Tell your counselor what a registered veterinary technician (R.T.V.) or animal health technician (A.H.T.) is. Describe the training required to become an R.V.T. or A.H.T. Where is the school or facility for R.V.T. or A.H.T training nearest you? Describe the role an R.V.T. or A.H.T. would play in assisting a veterinarian working in three of the practice types listed in requirement 1.
- 5) Discuss with your merit badge counselor the role a veterinarian plays in the human-animal bond.
- 6) Do ONE of the following:
  - a) Visit a veterinary clinic, hospital, or veterinary referral teaching hospital that does work in one of the practices listed in requirement 1. Spend as much time as you can observing the veterinarians and their staff. Write a report on what you observed and learned at the facility. Share your report with your counselor.
  - b) Spend as much time as possible with a veterinarian who works in one of the fields listed in requirement 2. Learn what special training beyond veterinary medical school may have been required for that position. Learn about any special or unusual activities required of this position. Write a report on what you have learned about this field of veterinary medicine. Include in your report how this field serves the needs of the general public. Share your report with your counselor.

## Weather

Requirements were REVISED effective January 1, 2007.

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- 1) Define meteorology. Explain what weather is and what climate is. Discuss how the weather affects farmers, sailors, aviators, and the outdoor construction industry. Tell why weather forecasts are important to each of these groups.
- 2) Name five dangerous weather-related conditions. Give The safety rules for each when outdoors and explain the difference between a severe weather watch and a warning. Discuss the safety rules with your family.
- 3) Explain the difference between high and low pressure systems in the atmosphere. Tell which is related to good and to poor weather. Draw cross sections of a cold front and a warm front , showing the location and movements of the cold and warm air, the frontal slope, the location and types of clouds associated with each type of front, and the location of precipitation.
- 4) Tell what causes wind, why it rains, and how lightning and hail are formed.
- 5) Identify and describe clouds in the low, middle, and upper levels of the atmosphere. Relate these to specific types of weather.
- 6) Draw a diagram of the water cycle and label its major processes. Explain the water cycle to your counselor.
- 7) Define acid rain. Identify which human activities pollute the atmosphere and the effects such pollution can have on people.
- 8) Do ONE of the following:
  - a) Make one of the following instruments: wind vane, anemometer, rain gauge, hygrometer. Keep a daily weather log for one week using information from this instrument as well as from other sources such as local radio and television stations or NOAA Weather Radio , and Internet sources (with your parent's permission). Record the following information at the same time every day: wind direction and speed, temperature, precipitation, and types of clouds. Be sure to make a note of any morning dew or frost. In the log, also list the weather forecasts from radio or television at the same time each day and show how the weather really turned out.
  - b) Visit a National Weather Service office or talk with a local radio or television weathercaster, private meteorologist, local agricultural extension service officer, or university meteorology instructor. Find out what type of weather is most dangerous or damaging to your community. Determine how severe weather and flood warnings reach the homes in your community.
- 9) Do ONE of the following:
  - a) Give a talk of at least five minutes to a group (such as your unit or a Cub Scout pack) explaining the outdoor safety rules in the event of lightning, flash floods, and tornadoes. Before your talk, share your outline with your counselor for approval.
  - b) Read several articles about acid rain and give a prepared talk of at least five minutes about the articles to a group (such as your unit or a Cub Scout pack). Before your talk, share your outline with your counselor for approval.
- 10) Find out about a weather-related career opportunity that interests you. Discuss with and explain to your counselor what training and education are required for such a position, and the responsibilities required of such a position.