

## **Life Skills**

### Search and rescue

**5-** Working with your counselor, become familiar with the Incident Command System. You may use any combination of resource materials, such as printed or online. With your counselor, discuss the features of the ICS and how they compare with Scouting's patrol method.

**6a-** Interview a member of one of the teams you have identified above, and learn how this team contributes to a search and rescue operation. Discuss what you learned with your counselor

### First aid

**1-** Demonstrate to your counselor that you have current knowledge of all first-aid requirements for Tenderfoot, Second Class, and First Class ranks.

**5a-** Prepare a first-aid kit for your home. Display and discuss its contents with your counselor

**5b-** With an adult leader, inspect your troop's first-aid kit. Evaluate it for completeness. Report your findings to your counselor and Scout leader

### Fire safety

**11-** Visit a fire station. Identify the types of fire trucks. Find out about the fire prevention activities in your community

### E-prep

**1-** Earn the First Aid merit badge

**2c-** 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

**8b-** Prepare a personal emergency service pack for a mobilization call. Prepare a family emergency 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

## **Shooting Sports:**

### Rifle

**1d-** Give the main points of the laws for owning and using guns in your community and state

**1f-** Successfully complete a state hunter education course or obtain a copy of the hunting laws for your state, then do the following:

(1) Explain the main points of hunting laws in your state and give any special laws on the use of guns and ammunition.

(2) List the kinds of wildlife that can be legally hunted in your state.

### Shotgun

**1d-** Give the main points of the laws for owning and using guns in your community and state

**1f-** Successfully complete a state hunter education course or obtain a copy of the hunting laws for your state, then do the following:

(1) Explain the main points of hunting laws in your state and give any special laws on the use of guns and ammunition.

(2) List the kinds of wildlife that can be legally hunted in your state.

\*As far as requirements that have potential to cause issues with "younger aged" scouts Shotgun 2A g and k which are "Demonstrate the knowledge, skills, and attitude necessary to

safely shoot moving targets, using the fundamentals of shotgun shooting" and "Shooting score required. - Hit at least 12 (48 percent) out of 25 targets in two 25 target groups" Could be a cause for concern due to the size and power of the 20 gauge shotguns used at camp. A younger scout may not be able to handle the shotguns safely and be unable to complete the merit badge.

## **Handicraft:**

Photography

**1a-** Show your counselor your current Cyber Chip

Woodcarving

**2a-** Earn the Totin' Chip recognition

## **Sci-Tech**

Archeology

**7-** Do ONE of the following and discuss your findings with your counselor:

(a) Visit a museum to observe how artifacts aid in conveying history.

(b) Present to your counselor a significant family artifact/heirloom and discuss its history.

(c) Make a list of the trash your family throws out during one week. Discuss with your counselor what archaeologists might learn about you and your family if they found your trash a thousand years from now.

Electricity

**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

**8-** Make a floor plan wiring diagram of the lights, switches, and outlets for a room in your home. Show which fuse or circuit breaker protects each one.

**9a-** Read an electric meter and, using your family's electric bill, determine the energy cost from the meter readings.

Energy

**1-** Do the following:

(a) With your parent's permission, use the internet to find a blog, podcast, website, or an article on the use or conservation of energy. Discuss with your counselor what details in the article were interesting to you, the questions it raises, and what ideas it addresses that you do not understand.

(b) After you have completed requirements 2 through 8, revisit your source for requirement 1a. Explain to your counselor what you have learned in completing the requirements that helps you better understand the article.

**4-** Conduct an energy audit of your home. Keep a 14-day log that records what you and your family did to reduce energy use. Include the following in your report and, after the 14-day period, discuss what you have learned with your counselor.

(a) List the types of energy used in your home such as electricity, wood, oil, liquid petroleum, and natural gas, and tell how each is delivered and measured, and the current cost; OR record the transportation fuel used, miles driven, miles per gallon, and trips using your family car or another vehicle.

(b) Describe ways you and your family can use energy resources more wisely. In preparing your discussion, consider the energy required for the

things you do and use on a daily basis (cooking, showering, using lights, driving, watching TV, using the computer). Explain what is meant by sustainable energy sources. Explain how you can change your energy use through reuse and recycling.

#### Engineering

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.

The above requirement will be done at camp, but the scout must bring the item to camp with them!

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.

If a-d is done then the scout can do part e at camp

#### Nuclear Science

4- Do TWO of the following; then discuss with your counselor the different kinds of radiation and how they can be used:

- (a) Build an electroscope. Show how it works. Place a radiation source inside and explain the effect it causes.
- (b) Make a cloud chamber. Show how it can be used to see the tracks caused by radiation. Explain what is happening.
- (c) 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.

## ***The New Trail/Trail to Eagle***

#### Citizenship in the Nation

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

#### Personal Fitness

**1b-** Have a dental examination. Get a statement saying that your teeth have been checked and cared for. Tell how to care for your teeth.

**8-** Complete the physical fitness program you outlined in requirement 7. Keep a log of your fitness program activity (how long you exercised; how far you ran, swam, or biked; how many exercise repetitions you completed; your exercise heart rate; etc.). Keep a log of your weekly healthy eating goals. Repeat the aerobic fitness, muscular strength, and flexibility tests every four weeks and record your results. After the 12th week, repeat all of the required activities in each of the three test categories, record your results, and show improvement in each one. Discuss how well you met your healthy eating goals over these 12 weeks. Discuss the meaning and benefit of your experience, and describe your long-term plans regarding your personal fitness.

#### Communications

**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. Prepare an objective report that includes all points of view that were expressed, and share this with your counselor.

**8-** Plan a troop or crew court of honor, campfire program, or interfaith worship service. Have the patrol leaders' council approve it, then write the script and prepare the program. Serve as master of ceremonies.

#### Scout

- 2a-d,6,7
- Tenderfoot
  - 1a-b,2a-b,4d,5b,6b-c,7b,9,10,11
- Second Class
  - 1a-c,2e,3b,5b-d,7a-c,8a,8c-e,10,11,12
- First Class
  - 1a-b,2a-e,3d,4a-b,6a,6c-e,7d-f,8a-b,9a-d,10,11,12,13

## **Scout Skills**

#### Wilderness Survival

**5-** Put together a personal survival kit and be able to explain how each item in it could be useful

#### Orienteering

**9-** Act as an official during an orienteering event. This may be during the running of the course you set up for requirement 8.

#### Cooking

**4c-** Using at least five of the 10 cooking methods from requirement 3, prepare and serve yourself and at least one adult (parent, family member, guardian, or other responsible adult) one breakfast, one lunch, one dinner, and one dessert from the meals you planned.\*

- \*The meals for requirement 4 may be prepared on different days, and they need not be prepared consecutively. The requirement calls for Scouts to plan, prepare, and serve one breakfast, one lunch, and one dinner to at least one adult; those served need not be the same for all meals.

**4d-** Time your cooking to have each meal ready to serve at the proper time. Have an adult verify the preparation of the meal to your counselor.

**4e-** After each meal, ask a person you served to evaluate the meal on presentation and taste, then evaluate your own meal. Discuss what you learned with your counselor, including any adjustments that could have improved or enhanced your meals. Tell how better planning and preparation help ensure a successful meal.

**6d-** While on a trail hike or backpacking trip, prepare and serve two meals and a snack from the menu planned for this requirement. At least one of those meals must be cooked over a fire, or an approved trail stove (with proper supervision).

**6e-** After each meal, have those you served evaluate the meal on presentation and taste, then evaluate your own meal. Discuss what you learned with your counselor, including any adjustments that could have improved or enhanced your meals. Tell how planning and preparation help ensure successful trail hiking or backpacking meals.

## Camping

**4b-** Help a Scout patrol or a Webelos Scout unit in your area prepare for an actual campout, including creating the duty roster, menu planning, equipment needs, general planning, and setting up camp

**5e-** Present yourself to your Scoutmaster with your pack for inspection. Be correctly clothed and equipped for an overnight campout

**7b-** Pack your own gear and your share of the patrol equipment and food for proper carrying. Show that your pack is right for quickly getting what is needed first, and that it has been assembled properly for comfort, weight, balance, size, and neatness.

**8d-** While camping in the outdoors, cook at least one breakfast, one lunch, and one dinner for your patrol from the meals you have planned for requirement 8c. At least one of those meals must be a trail meal requiring the use of a lightweight stove.

**9a-** Camp a total of at least 20 nights at designated Scouting activities or events. One long-term camping experience of up to six consecutive nights may be applied toward this requirement. Sleep each night under the sky or in a tent you have pitched. If the camp provides a tent that has already been pitched, you need not pitch your own tent

**9b-** (Rainey Mountain Hike can cover this requirement)

- On any of these camping experiences, you must do TWO of the following, only with proper preparation and under qualified supervision.
  1. Hike up a mountain, gaining at least 1,000 vertical feet.
  2. Backpack, snowshoe, or cross-country ski for at least 4 miles
  3. Take a bike trip of at least 15 miles or at least four hours.
  4. Take a nonmotorized trip on the water of at least four hours or 5 miles.
  5. Plan and carry out an overnight snow camping experience.
  6. Rappel down a rappel route of 30 feet or more.

**9c-** Perform a conservation project approved by the landowner or land managing agency. This can be done alone or with others.

Signs, Signals, and Codes

**7-** On a Scout outing, lay out a trail for your patrol or troop to follow. Cover at least one mile in distance and use at least six different trail signs and markers. After the Scouts have completed the trail, follow no-trace principles by replacing or returning trail markers to their original locations.

Geocaching

**9-** Plan a geohunt for a youth group such as your troop or a neighboring pack, at school, or your place of worship. Choose a theme, set up a course with at least four waypoints, teach the players how to use a GPS unit, and play the game. Tell your counselor about your experience, and share the materials you used and developed for this event.

Entrepreneurship

**3-** Identify and interview an individual who has started a business. Learn about this person's educational background, early work experiences, where the idea for the business came from, and what was involved in starting the business. Find out how the entrepreneur raised the capital (money) to start the business, examples of successes and challenges faced, and how the business is currently doing (if applicable). Discuss with your counselor what you have learned.

## ***Nature Lodge***

Astronomy

**5b-** Using the internet (with your parent's permission) and other resources, find out when each of the five most visible planets that you identified in requirement 5a will be observable in the evening sky during the next 12 months, then compile this information in the form of a chart or table.

**5d-** Observe a planet and describe what you saw

**6b-** Sketch the phase and position of the Moon, at the same hour and place, for four nights within a one-week period. Include landmarks on the horizon such as hills, trees, and buildings. Explain the changes you observe.

**8\*** (if not able to be done at camp - Weather Permitting)-

With your counselor's approval and guidance, do ONE of the following:

- (a) Visit a planetarium or astronomical observatory. Submit a written report, a scrapbook, or a video presentation afterward to your

counselor that includes the following information: (1) Activities occurring there (2) Exhibits and displays you saw (3) Telescopes and other instruments being used (4) Celestial objects you observed

(b) Plan and participate in a three-hour observation session that includes using binoculars or a telescope. List the celestial objects you want to observe, and find each on a star chart or in a guidebook. Prepare a log or notebook. Discuss with your counselor what you hope to observe prior to your observation session. Review your log or notebook with your counselor afterward.\*

(c) Plan and host a star party for your Scout troop or other group such as your class at school. Use binoculars or a telescope to show and explain celestial objects to the group.

### Bird Study

**5-** Observe and be able to identify at least 20 species of wild birds. Prepare a field notebook, making a separate entry for each species, and record the following information from your field observations and other references.

(a) Note the date and time.

(b) Note the location and habitat.

(c) Describe the bird's main feeding habitat and list two types of food that the bird is likely to eat.

(d) Note whether the bird is a migrant or a summer, winter, or year-round resident of your area.

**8-** (a) Go on a field trip with a local club or with others who are knowledgeable about birds in your area.

(1) Keep a list or fill out a checklist of all the birds your group observed during the field trip.

(2) Tell your counselor which birds your group saw and why some species were common and some were present in small numbers.

(3) Tell your counselor what makes the area you visited good for finding birds.

(b) By using a public library, the internet, or contacting the National Audubon Society, find the name and location of the Christmas Bird Count nearest your home and obtain the results of a recent count.

(1) Explain what kinds of information are collected during the annual event.

(2) Tell your counselor which species are most common, and explain why these birds are abundant.

(3) Tell your counselor which species are uncommon, and explain why these were present in small numbers. If the number of birds of these species is decreasing, explain why, and what, if anything, could be done to reverse their decline.

### Reptile and Amphibian Study

**8-** Choose a reptile or amphibian that you can observe at a local zoo, aquarium, nature center, or other such exhibit (such as your classroom or school). Study the specimen weekly for a period of three months. At each visit, sketch the specimen in its captive habitat and note any changes in its coloration, shedding

of skins, and general habits and behavior. Discuss with your counselor how the animal you observed was cared for to include its housing and habitat, how the lighting, temperature, and humidity were maintained, and any veterinary care requirements.

Find out, either from information you locate on your own or by talking to the caretaker, what this species eats and what are its native habitat and home range, preferred climate, average life expectancy, and natural predators. Also identify any human-caused threats to its population and any laws that protect the species and its habitat. After the observation period, share what you have learned with your counselor.

**9\*** (if not able to be done at camp) - Do TWO of the following:

(a) Identify at night three kinds of toads or frogs by their voices. Imitate the song of each for your counselor. Stalk each with a flashlight and discover how each sings and from where.

(b) Identify by sight eight species of reptiles or amphibians.

(c) Using visual aids, give a brief talk to a small group on three different reptiles and amphibians.

#### Weather

**9-** 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, NOAA Weather Radio All Hazards, 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

#### Oceanography

**7-** Do ONE of the following:

(a) Make a plankton net. Tow the net by a dock, wade with it, hold it in a current, or tow it from a rowboat.\* Do this for about 20 minutes. Save the sample. Examine it under a microscope or high-power glass. Identify the three most common types of plankton in the sample.

(b) Make a series of models (clay or plaster and wood) of a volcanic island. Show the growth of an atoll from a fringing reef through a barrier reef. Describe the Darwinian theory of coral reef formation.

(c) Measure the water temperature at the surface, midwater, and bottom of a body of water four times daily for five consecutive days.\* You may measure depth with a rock tied to a line. Make a Secchi disk to measure

turbidity (how much suspended sedimentation is in the water). Measure the air temperature. Note the cloud cover and roughness of the water. Show your findings (air and water temperature, turbidity) on a graph. Tell how the water temperature changes with air temperature.

(d) Make a model showing the inshore sediment movement by littoral currents, tidal movement, and wave action. Include such formations as high and low waterlines, low-tide terrace, berm, and coastal cliffs. Show how offshore bars are built up and torn down.

(e) Make a wave generator. Show reflection and refraction of waves. Show how groins, jetties, and breakwaters affect these patterns.

(f) Track and monitor satellite images available on the Internet for a specific location for three weeks. Describe what you have learned to your counselor

### Mining in Society

#### 5- Do ONE of the following:

(a) With your parent's approval and your counselor's assistance, use the Internet to find and take a virtual tour of two types of mines. Determine the similarities and differences between them regarding resource exploration, mine planning and permitting, types of equipment used, and the minerals produced. Discuss with your counselor what you learned from your Internet-based mine tours. mining in society 3

(b) With your parent's permission and counselor's approval, visit a mining or minerals exhibit at a museum. Find out about the history of the museum's exhibit and the type of mining it represents. Give three examples of how mineral resources have influenced history.

(c) With your parent's permission and counselor's approval, visit an active mine.\* Find out about the tasks required to explore, plan, permit, mine, and process the resource mined at that site. Take photographs if allowed, and request brochures from your visit. Share photos, brochures, and what you have learned with your counselor.

(d) With your parent's permission and counselor's approval, visit a mining equipment manufacturer or supplier.\* Discuss the types of equipment produced or supplied there, and in what part of the mining process this equipment is used. Take photographs if allowed, and request brochures from your visit. Share photos, brochures, and what you have learned with your counselor.

(e) Discuss with your counselor two methods used to reduce rock in size, one of which uses a chemical process to extract a mineral. Explain the difference between smelting and refining.

(f) Learn about the history of a local mine, including what is or was mined there, how the deposit was found, the mining techniques and processes used, and how the mined resource is or was used. Find out from a historian, community leader, or business person how mining has affected your community. Note any social, cultural, or economic consequences of mining in your area. Share what you have learned with your counselor.

#### 7- Do ONE of the following:

(a) Explore the anticipated benefits of interplanetary mining. Learn how

NASA and private investors may search for, extract, and process minerals in outer space, and the primary reasons for mining the moon, other planets, or nearEarth asteroids. Find out how exploration and mineral processing in space differ from exploration on Earth. Share what you have learned with your counselor, and discuss the difficulties encountered in exploring, collecting, and analyzing surface or near-surface samples in space.

(b) Identify three minerals found dissolved in seawater or found on the ocean floor, and list three places where the ocean is mined today. Share this information with your counselor, and discuss the chief incentives for mining the oceans for minerals, the reclamation necessary after mining is over, and any special concerns when mining minerals from the ocean. Find out what sustainability problems arise from mining the oceans. Discuss what you learn with your counselor.

(c) Learn what metals and minerals are recycled after their original use has ended. List four metals and two nonmetals, and find out how each can be recycled. Find out how recycling affects the sustainability of natural resources and how this idea is related to mining. Discuss what you learn with your counselor.

(d) With your parent's permission, use the Internet and other resources to determine the current price of gold, copper, aluminum, or other commodities like cement or coal, and find out the five-year price trend for two of these. Report your findings to your counselor.

8- Do ONE of the following:

(a) With your parent's and counselor's approval, meet with a worker in the mining industry. Discuss the work, equipment, and technology used in this individual's position, and learn about a current project. Ask to see reports, drawings, and/or maps made for the project. Find out about the educational and professional requirements for this individual's position. Ask how the individual's mining career began. Discuss with your counselor what you have learned.

(b) Find out about three career opportunities in the mining 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.

(c) With your parent's permission and counselor's approval, visit a career academy or community college to learn about educational and training requirements for a position in the mining industry that interests you. Find out why this position is critical to the mining industry, and discuss what you learned with your counselor.

## Geology

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:

(a) 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.

(b) 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:

(a) 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.

(b) 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:

(a) 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.

(b) 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.

(c) 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 the theory of plate tectonics.

(3) Explain to your counselor the processes of burial and fossilization, and discuss the concept of extinction.

(4) 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.

(5) 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.

(6) Do ONE of the following:

(a) 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.

(b) 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.

(c) 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.

(d) 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.

#### Insect Study

**5a-** Observe 20 different live species of insects in their habitat. In your observations, include at least four orders of insects.

**5b-** Make a scrapbook of the 20 insects you observe in 5a. Include photographs, sketches, illustrations, and articles. Label each insect with its common and scientific names, where possible. Share your scrapbook with your merit badge counselor.

**6a-** From your scrapbook collection, identify three species of insects helpful to humans and five species of insects harmful to humans.

**6b-** Discuss the use of integrated pest management vs. chemical methods of insect control. What are the advantages and disadvantages of each?

**9-** Raise an insect through complete metamorphosis from its larval stage to its adult stage (e.g., raise a butterfly or moth from a caterpillar).\*

**10-** Do ONE of the following:

(a) Observe an ant colony in a formicarium (ant farm). Find the queen and worker ants. Explain to your counselor the different chambers found within an ant colony.

(b) Study a hive of bees. Remove the combs and find the queen. Estimate the amount of brood and count the number of queen cells. Explain how to determine the amount of honey in the hive.

#### Nature

**4a1-** In the field, identify eight species of birds

**4d1-** Collect and identify either in the field or through photographs 10 species of

insects or spiders.\*

**4d2-** Hatch an insect from the pupa or cocoon; OR hatch adults from nymphs; OR keep larvae until they form pupae or cocoons; OR keep a colony of ants or bees through one season

**4e2-** Collect four kinds of animal food eaten by fish in the wild.

**4f2-** Collect, mount, and label six shells.

**4g2-** Collect and label the seeds of six plants OR the leaves of 12 plants.

**4h1-** Collect and identify soils found in different layers of a soil profile.

**4h2-** Collect and identify five different types of rocks from your area.

#### Fish and Wildlife Management

**7-** Do ONE of the following:

a. Determine the age of five species of fish from scale samples or identify various age classes of one species in a lake and report the results.

b. Conduct a creel census on a small lake to estimate catch per unit effort.

c. Examine the stomach contents of three fish and record the findings. It is not necessary to catch any fish for this option. You may visit a cleaning station set up for fishermen or find another, similar alternative.

d. Make a freshwater aquarium. Include at least four species of native plants and four species of animal life, such as whirligig beetles, freshwater shrimp, tadpoles, water snails, and golden shiners. After 60 days of observation, discuss with your counselor the life cycles, food chains, and management needs you have recognized. After completing requirement 7d to your counselor's satisfaction, with your counselor's assistance, check local laws to determine what you should do with the specimens you have collected.

#### Fishing

**7-** Obtain and review the regulations affecting game fishing where you live. Explain why they were adopted and what is accomplished by following them.

**9\***(if not able to be done at camp)- Catch at least one fish and identify it.

**10-** If regulations and health concerns permit, clean and cook a fish you have caught. If you are unable to catch a fish for eating, acquire a fish, clean the fish you acquired, and cook the fish you acquired. (It is not required that you eat the fish.)

#### Fly Fishing

**6-**Go to a suitable fishing location and observe what fish may be eating both above and beneath the water's surface. Explain the importance of matching the hatch.

**8-**Obtain and review a copy of the regulations affecting game fishing where you live or where you plan to fish. Explain why they were adopted and what is accomplished by following them.

**10\*** (if not able to be done at camp)- Catch at least one fish using a fly rod and a fly. Identify it and quickly release it live back into the water. Discuss this experience with your counselor

**11-** If regulations and health concerns permit, clean and cook a fish you have caught. If you are unable to catch a fish for eating, acquire a fish, clean the fish you acquired, and cook the fish you acquired. (It is not required that you eat the fish.)

### Forestry

**1-** Prepare a field notebook, make a collection, and identify 15 species of trees, wild shrubs, or vines in a local forested area. Write a description in which you identify and discuss the following:

- (a) The characteristics of leaf, twig, cone, or fruiting bodies
- (b) The habitat in which these trees, shrubs, or vines are found
- (c) The important ways each tree, shrub, or vine is used by humans or wildlife and whether the species is native or was introduced to the area. If it is not native, explain whether it is considered invasive or potentially invasive.

**5-** With your parent's and counselor's approval, do ONE of the following:

(a) Visit a managed public or private forest area with the manager or a forester who is familiar with it. Write a brief report describing the type of forest, the management objectives, and the forestry techniques used to achieve the objectives.

(b) With a knowledgeable individual, visit a logging operation or wood-using manufacturing plant. Write a brief report describing the following:

- (1) The species and size of trees being harvested or used and the location of the harvest area or manufacturer
- (2) The origin of the forest or stands of trees being utilized (e.g., planted or natural)
- (3) The forest's successional stage. What is its future?
- (4) Where the trees are coming from (land ownership) or where they are going (type of mill or processing plant)
- (5) The products that are made from the trees
- (6) How the products are made and used
- (7) How waste materials from the logging operation or manufacturing plant are disposed of or utilized

(c) Take part in a forest-fire prevention campaign in cooperation with your local fire warden, state wildfire agency, forester, or counselor. Write a brief report describing the campaign, how it will help prevent wildfires, and your part in it.

**8-** Visit one or more local foresters and write a brief report about the person (or persons). Or, write about a forester's occupation including the education, qualifications, career opportunities, and duties related to forestry.

### Plant Science

**5-** Tell how to propagate plants by seeds, roots, cuttings, tubers, and grafting. Grow a plant by ONE of these methods.

**6-** List by common name at least 10 native plants and 10 cultivated plants that grow near your home. List five invasive nonnative plants in your area and tell how they may be harmful. Tell how the spread of invasive plants may be avoided or controlled in ways that are not damaging to humans, wildlife, and the

environment.

8- Choose ONE of the following options and complete each requirement:

Option 1: Agronomy

A. Describe how to prepare a seedbed.

B. Make and use a seed germination tester to test 50 seeds of four of the following plants: corn, cotton, alfalfa, soybeans, clover, wheat, rice, rye, barley. Determine the percentage of live seeds.

C. Tell about one important insect pest and one important disease that damage each of the following: corn, small grains, cotton. Collect and name five weeds that compete with crops in your locality. Tell how to control these weeds without harming people, wildlife, or useful insects.

D. On a map of the United States, identify the chief regions where corn, cotton, forage crops, small grain crops, and oil crops grow. Tell how climate and location of these regions make them leaders in the production of these crops.

E. Complete ONE of the following alternatives:

(1) Corn

(a) Grow a plot of corn and have your plot inspected by your counselor. Record seed variety or experimental code number.

(b) Tell about modern methods of commercial corn farming and the contributions that corn makes to today's food and fuel supply.

(c) Tell about an insect that can damage corn, and explain how it affects corn production and how it is controlled.

(2) Cotton

(a) Grow a plot of cotton and have your plot inspected by your counselor.

(b) Tell about modern methods of commercial cotton farming, and about the uses of cotton fiber and seed and the economic value of this crop.

(c) Tell about an insect that can damage cotton, and explain how it affects cotton production and how it is controlled.

(3) Forage Crops

(a) Collect, count, and label samples of each for display: perennial grasses, annual grasses, legumes, and broadleaf weeds. Indicate how each grass and legume is used. Keep a log of the site where you found each sample and share it with your counselor.

(b) Explain how legumes can be used to enrich the soil and how they may deplete it under certain conditions. Explain how livestock may enrich or deplete the soil.

(c) Name five poisonous plants that are dangerous to livestock, and tell the different ways of using forage crops as feed for livestock.

(4) Small Grains

- (a) Give production figures for small grain crops listed in the U.S. Statistical Report or Agricultural Statistics Handbook for the latest year available.
- (b) Help in harvesting a crop of grain. Tell how to reduce harvesting losses and about modern methods of growing one small grain crop.
- (c) Visit a grain elevator, flour mill, cereal plant, feed or seed company. Talk with the operator. Take notes, and describe the processes used and tell your patrol, troop, or class about your visit.

(5) Oil Crops

- (a) Grow a plot of soybeans and have your plot inspected by your counselor.
- (b) Tell about modern methods of growing soybeans on a commercial scale, and discuss the contributions soybeans make to our food supply.
- (c) Explain why a killing frost just after emergence is critical for soybeans.

Option 2: Horticulture

- A. Visit one of the following places and tell what you learned about horticulture there: public garden, arboretum, retail nursery, wholesale nursery, production greenhouse, or conservatory greenhouse.
- B. Explain the following terms: hardiness zone, shade tolerance, pH, moisture requirement, native habitat, texture, cultivar, ultimate size, disease resistance, habit, evergreen, deciduous, annual, perennial. Find out what hardiness zone you live in and list 10 landscape plants you like that are suitable for your climate, giving the common name and scientific name for each.
- C. Do ONE of the following:
  - (1) Explain the difference between vegetative and sexual propagation methods, and tell some horticultural advantages of each. Grow a plant from a stem or root cutting or graft.
  - (2) Transplant 12 seedlings or rooted cuttings to larger containers and grow them for at least one month.
  - (3) Demonstrate good pruning techniques and tell why pruning is important.
  - (4) After obtaining permission, plant a tree or shrub properly in an appropriate site.
- D. Do EACH of the following:
  - (1) Explain the importance of good landscape design and selection of plants that are suitable for particular sites and conditions.
  - (2) Tell why it is important to know how big a plant will grow.
  - (3) Tell why slower-growing landscape plants are sometimes a better choice than faster-growing varieties.

E. Choose ONE of the following alternatives and complete EACH of the requirements:

(1) Bedding Plants

(a) Grow bedding plants appropriate for your area in pots or flats from seed or cuttings in a manufactured soil mix. Explain why you chose the mix and tell what is in it.

(b) Transplant plants to a bed in the landscape and maintain the bed until the end of the growing season. Record your activities, observations, materials used, and costs.

(c) Demonstrate mulching, fertilizing, watering, weeding, and deadheading, and tell how each practice helps your plants.

(d) Tell some differences between gardening with annuals and perennials.

(2) Fruit, Berry, and Nut Crops

(a) Plant five fruit or nut trees, grapevines, or berry plants that are suited to your area. Take full care of fruit or nut trees, grapevines, or berry plants through one season.

(b) Prune a tree, vine, or shrub properly. Explain why pruning is necessary.

(c) Demonstrate one type of graft and tell why this method is useful.

(d) Describe how one fruit, nut, or berry crop is processed for use.

(3) Woody Ornamentals

(a) Plant five or more trees or shrubs in a landscape setting. Take full care of the trees or shrubs you have planted for one growing season.

(b) Prune a tree or shrub properly. Explain why pruning is necessary.

(c) List 10 trees (in addition to those listed in general requirement 5 above) and tell your counselor how each is used in the landscape. Give the common and scientific names.

(d) Describe the size, texture, color, flowers, leaves, fruit, hardiness, cultural requirements, and any special characteristics that make each type of tree or shrub attractive or interesting.

(e) Tell five ways trees help improve the quality of our environment.

(4) Home Gardening

(a) Design and plant a garden or landscape that is at least 10 by 10 feet.

(b) Plant 10 or more different types of plants in your garden. Tell why you selected particular varieties of

vegetables and flowers. Take care of the plants in your garden for one season.

(c) Demonstrate soil preparation, staking, watering, weeding, mulching, composting, fertilizing, pest management, and pruning. Tell why each technique is used.

(d) Tell four types of things you could provide to make your home landscape or park a better place for birds and wildlife. List the common and scientific names of 10 kinds of native plants that are beneficial to birds and wildlife in your area.

### Option 3: Field Botany

A. Visit a park, forest, Scout camp, or other natural area near your home. While you are there:

(1) Determine which species of plants are the largest and which are the most abundant. Note whether they cast shade on other plants.

(2) Record environmental factors that may influence the presence of plants on your site, including latitude, climate, air and soil temperature, soil type and pH, geology, hydrology, and topography.

(3) Record any differences in the types of plants you see at the edge of a forest, near water, in burned areas, or near a road or railroad.

B. Select a study site that is at least 100 by 100 feet. Make a list of the plants in the study site by groups of plants: canopy trees, small trees, shrubs, herbaceous wildflowers and grasses, vines, ferns, mosses, algae, fungi, lichens. Find out which of these are native plants and which are exotic (or nonnative).

C. Tell how an identification key works and use a simple key to identify 10 kinds of plants (in addition to those in general requirement 5 above). Tell the difference between common and scientific names and tell why scientific names are important.

D. After gaining permission, collect, identify, press, mount, and label 10 different plants that are common in your area. Tell why voucher specimens are important for documentation of a field botanist's discoveries.

E. Obtain a list of rare plants of your state. Tell what is being done to protect rare plants and natural areas in your state. Write a paragraph about one of the rare plants in your state.

F. Choose ONE of the following alternatives and complete EACH of its requirements:

(1) Tree Inventory

(a) Identify the trees of your neighborhood, a park, a section of your town, or a Scout camp.

(b) Collect, press, and label leaves, flowers, or fruits to document your inventory.

(c) List the types of trees by scientific name and give common names. Note the number and size (diameter at 4 feet above ground) of trees observed and determine the largest of each species in your study area.

(d) Lead a walk to teach others about trees and their value, OR write and distribute materials that will help others learn about trees.

## (2) Transect Study

(a) Visit two sites, at least one of which is different from the one you visited for Field Botany requirement 1.

(b) Use the transect method to study the two different kinds of plant communities. The transects should be at least 500 feet long.

(c) At each site, record observations about the soil and other influencing factors AND do the following. Then make a graph or chart to show the results of your studies.

(1) Identify each tree within 10 feet of the transect line.

(2) Measure the diameter of each tree at 4 feet above the ground, and map and list each tree.

## (3) Nested Plot

(a) Visit two sites, at least one of which is different from the one you visited for Field Botany requirement 1.

(b) Mark off nested plots and inventory two different kinds of plant communities.

(c) At each site, record observations about the soil and other influencing factors AND do the following. Then make a graph or chart to show the results of your studies.

(1) Identify, measure, and map each tree in a 100-by-100-foot plot. (Measure the diameter of each tree at 4 feet above the ground.)

(2) Identify and map all trees and shrubs in a 10-by-10-foot plot within each of the larger areas. (3) Identify and map all plants (wildflowers, ferns, grasses, mosses, etc.) of a 4-by-4-foot plot within the 10-by-10-foot plot.

## (4) Herbarium Visit

(a) Write ahead and arrange to visit an herbarium at a university, park, or botanical garden; OR, visit an herbarium website (with your parent's permission).

(b) Tell how the specimens are arranged and how they are used by researchers. If possible, observe voucher specimens of a plant that is rare in your state.

(c) Tell how a voucher specimen is mounted and prepared for permanent storage. Tell how specimens should be handled so that they will not be damaged.

(d) Tell about the tools and references used by botanists in an herbarium.

(5) Plant Conservation Organization Visit

(a) Write ahead and arrange to visit a private conservation organization or government agency that is concerned with protecting rare plants and natural areas.

(b) Tell about the activities of the organization in studying and protecting rare plants and natural areas.

(c) If possible, visit a nature preserve managed by the organization. Tell about land management activities such as controlled burning, or measures to eradicate invasive (nonnative) plants or other threats to the plants that are native to the area.

#### Soil and Water Conservation

**2d**-Take pictures or draw two kinds of soil erosion.

**3c**-Take pictures or draw three kinds of erosion-control practices

**4b**-Outline the smallest watershed that you can find on a contour map

**7**- Do TWO of the following:

(a) Make a trip to TWO of the following places. Write a report of more than 500 words about the soil and water and energy conservation practices you saw.

(1) An agricultural experiment

(2) A managed forest or woodlot, range, or pasture

(3) A wildlife refuge or a fish or game management area

(4) A conservation-managed farm or ranch

(5) A managed watershed

(6) A waste-treatment plant

(7) A public drinking water treatment plant

(8) An industry water use installation

(9) A desalinization plant

(b) Plant 100 trees, bushes, and/or vines for a good purpose.

(c) Seed an area of at least 1/5 acre for some worthwhile conservation purpose, using suitable grasses or legumes alone or in a mixture.

(d) Study a soil survey report. Describe the things in it. On tracing paper over any of the soil maps, outline an area with three or more different kinds of soil. List each kind of soil by full name and map symbol.

(e) Make a list of places in your neighborhood, camps, school ground, or park that have erosion, sedimentation, or pollution problems. Describe how these could be corrected through individual or group action.

(f) Carry out any other soil and water conservation project approved by your merit badge counselor.

## **Waterfront**

Lifesaving

Safe Swim Defense must be completed first

**2a-** Must have the swimming merit badge before starting the requirements

BSA Lifeguard

**1-** Submit proof of age. You must be at least 15 years old to participate.

**2-** Submit written evidence of fitness for swimming activities (signed health history).

**3-** Swim continuously for 550 yards in good form using the front crawl or breaststroke or a combination of either, but swimming on the back or side is not allowed.

**4-** Immediately following the above swim, tread water for two minutes with the legs only and the hands under the armpits.

**5-** Starting in the water, swim 20 yards using a front crawl or breaststroke, surface dive 7 to 10 feet, retrieve a 10-pound object, surface, swim on your back with the object 20 yards back to the starting point with both hands holding the object, and exit the water, all within 1 minute, 40 seconds.

Complete Within 120 days of Instruction

CPR/AED for the Professional Rescuer

Complete 2 separate swimming activities totaling 2 hours