

Pre Requisites

Astronomy

5

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

Resources: [Visible Planets Tonite \(website\)](#)

[Skywatching \(website\)](#)

6

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

Resources: [The Phases of the Moon Explained \(video\)](#)

[Moon Phase Animation \(video\)](#)

[Why Does the Moon Have Phases, but Planets Like Venus Also Show Phases? \(video\)](#)

Nature

4

- (a) **Birds.** Do ALL of the following:
- (1) In the field, identify eight species of birds.

Resources: [How to Identify Birds \[TOP 10 BACKYARD BIRDS\] \(video\)](#)

[Merlin Bird ID \(app\)](#)

- (2) Make and set out a birdhouse OR a feeding station OR a birdbath. List what birds used it during a period of one month.

Resources: [DIY Birdhouse \(video\)](#)

[How to Pick \(or Build\) the Right Bird Bath for Your Garden \(video\)](#)

[Build a Bird House for Under \\$5 in Under 5 Minutes \(video\)](#)

Reptile and Amphibian Study

8. Do ONE of the following:

- (a) Take custody of one or more reptiles or amphibians in a manner approved by your counselor. Maintain one or more reptiles or amphibians for at least a month. Record food accepted, eating methods, changes in coloration, shedding of skins, and general habits; or keep the eggs of a reptile from the time of laying until hatching; or keep the eggs of an amphibian from the time of laying until their transformation into tadpoles (frogs) or larvae (salamanders). Whichever you choose, keep records of and report to your counselor how you cared for your animal, eggs, or larvae, including lighting, habitat, temperature and humidity maintenance, and any veterinary care requirements. Unless you are the long-term owner, at the conclusion of this study, turn the animal(s) over to another responsible party approved by your counselor.

Resource: [Pet Journaling: Track Your Pet's Needs and Your Time Efficiently \(website\)](#)

- (b) Choose a reptile or amphibian that you can observe or foster at a local zoo, aquarium, nature center, local rescue, 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.

Soil and Water Conservation

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
Resource: [Alabama's "Old Rotation" Experiment \(website\)](#)
- (2) A managed forest or woodlot, range, or pasture
Resource: [Visit to Managed International Paper Forest \(video\)](#)
- (3) A wildlife refuge or a fish or game management area
Resource: [Visit to Tennessee National Wildlife Refuge \(video\)](#)
- (4) A conservation-managed farm or ranch
- (5) A managed watershed
Resource: [Watershed Forestry \(Massachusetts\) \(video\)](#)
- (6) A waste-treatment plant
Resource: [How Chicago Cleans 1.4 Billion Gallons Of Wastewater Every Day \(video\)](#)
- (7) A public drinking water treatment plant
- (8) An industry water use installation
Resources: [Water Use in the Paper Industry \(video\)](#)
[How Data Centers Optimize Energy and Water for Cooling Solutions \(video\)](#)
- (9) A desalinization plant
Resource: [Carlsbad Desalinization Plant Tour \(video\)](#)
- (b) Plant 100 trees, bushes, and/or vines for a good purpose.
- (c) Seed an area of at least one-fifth acre for some worthwhile conservation purposes, using suitable grasses or legumes alone or in a mixture.
- (d) Study a soil survey report. Describe the things in it. Using tracing paper and a pen, trace over any of the soil maps, and outline an area with three or more different kinds of soil. List each kind of soil by full name and map symbol.
Resource: [Web Soil Survey Tutorial \(video\)](#)
- (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 counselor.

Sustainability

1. Describe the meaning of sustainability in your own words. Explain the importance of sustainability to society and how you can contribute to fulfilling the needs of current generations without compromising the needs of future generations.

Resources:[What is Sustainability \(video\)](#)

[Introduction to Sustainability \(video\)](#)

6. Stuff. Do ONE of the following and discuss with your counselor:

Resources:[Decluttering \(video\)](#)

[Why Do We Have So Much Stuff? \(video\)](#)

- (a) Create a list of 15 items of your personal "stuff." Classify each item as an essential need (such as soap) or a desirable want (such as a video game). Identify any excess "stuff" you no longer need, working with your family, if possible. Donate, repurpose, or recycle those items you can.

8. Do the following:

- (a) On a campout or other outdoor Scouting activity that you attend, make notes on the sustainability practices you and your fellow Scouts practice. Observe transportation, forestry, soil conservation, water resources, habitat, buildings, campsites, and sanitation. Share what you observed and learned with your counselor.

Resources:[Sustainable Camping Tips \(Packing & Hiking\) \(video\)](#)

[What Does LNT Means to Scouts \(video\)](#)

- (c) Identify 5 behavioral changes that you and your family can make to improve the sustainability of your household. Share and discuss each with your counselor.

Resources:[Sustainability in Your Life \(video\)](#)

[10 Ways to Take Care of the Environment \(video\)](#)

Robotics

2. Robotics Industry. Discuss the following with your counselor:

- (a) The kinds of things robots can do and how robots are best used today.
Resource: [TYPES OF ROBOTS | Robots Classification \(video\)](#)
- (b) The similarities and differences between remote-control vehicles, telerobots, and autonomous robots.

Resources: [What's The Difference Between Autonomous Robots and Controlled](#)

[Robots? \(video\)](#)

[What Is the Difference Between Autonomous and Teleoperated Robots? \(video\)](#)

- (c) Three different methods robots can use to move themselves other than wheels or tracks. Describe when it would be appropriate to use each method.

Resource: [The No Wheel, Circular Gear, or Sprocket Robot Race \(video\)](#)

NOTE: The official merit badge pamphlets are now free and downloadable [HERE](#) or can be purchased at the [Scout Shop](#).

1. Safety. Do the following:

- (a) Explain to your counselor the most likely hazards you may encounter while working with robots and what you should do to anticipate, mitigate and prevent, and respond to these hazards. Describe the appropriate safety gear and clothing that should be used when working with robotics.

Resource: [Hazards and Robot Safety \(video\)](#)

- (b) Discuss first aid and prevention for the types of injuries that could occur while participating in robotics activities and competitions, including cuts, eye injuries, and burns (chemical or heat).

Resource: [How to Treat Cuts and Scrapes \(video\)](#)

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2. General Knowledge. Discuss with your counselor three of the five major fields of robotics (human-robot interface, mobility, manipulation, programming, sensors)

and their importance to robotics development. Discuss either the three fields as they relate to a single robot system OR talk about each field in general. Find pictures or at least one video to aid your discussion.

Resource: [5 Sub-Disciplines of Robotics \(video\)](#)

7. Do ONE of the following:

- (a) Identify three career opportunities that would use skills and knowledge in robotics. Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field. Research the prospects for employment, starting salary, advancement opportunities and career goals associated with this career. Discuss what you learned with your counselor and whether you might be interested in this career.

Resources: [Learn About the Careers of Robotics Technicians \(video\)](#)
[Careers in Robotics \(video\)](#)

- (b) Identify how you might use the skills and knowledge in robotics to pursue a personal hobby. Research the additional training required, expenses, and affiliation with organizations that would help you maximize the enjoyment and benefit you might gain from it. Discuss what you learned with your counselor and share what short-term and long-term goals you might have if you pursued this.

Resources: [How To Make Anything—Learn to Think Like an Engineer \(video\)](#)
[Why Try Computer Quilting? \(video\)](#)
[How I Built a Difference | My Engineering Journey \(video\)](#)
[Tertill Weeding Robot Overview \(video\)](#)

Scouting Heritage

5. Research the history of your unit, council, summer camp, or Order of the Arrow lodge. With the permission of a parent or guardian, your research methods may include an internet or library search, interviews with Scout leaders, or visits to locations where you learn about your topic. Prepare an oral or written report, a presentation, or a video of your research and review it with your counselor.

6. Make a collection of some of your personal patches and other Scouting memorabilia. With their permission, you may include items borrowed from family members or friends who have been in Scouting in the past, or you may include photographs of these items. Show this collection to your counselor, and share what you have learned about items in the collection.

Note: There is no requirement regarding how large or small this collection must be.

Resources: [Scouting Memorabilia Collection - Philmont License Plates \(video\)](#)

[Philmont Recognition Patches \(video\)](#)

8. Interview at least three people (different from those you interviewed for requirement 5) over the age of 40 who were Scouts. Find out about their Scouting experiences. Ask about the impact that Scouting has had on their lives. Share what you learned with your counselor.

Wilderness Survival

1. Hazards and First Aid

(a) Show or explain first aid for injuries or conditions that could occur in backcountry settings [1-13]

(Note: Scouts should prepare by studying the Tenderfoot and Second Class Rank Requirements for First Aid.)

(b) Explain how the Scout Basic Essentials address hazards of survival situations and are basic to a survival kit.

(Note: This information can be found in the Scout Handbook.)

4. First Aid Kits

Put together:

a personal first aid kit

a personal survival kit

Show how the items in the kits are used.

5. Shelter

(e) Improvise a natural shelter. For the purpose of this demonstration, use techniques that have little negative impact on the environment.

Spend a night in your shelter.

(Note: There will not be time to construct shelters during our merit badge time at Stempede. Scouts may complete this requirement and provide documentation showing their shelter and that they spent a night in it.)

10. Careers

Do ONE of the following:

(a) Explore careers related to this merit badge. Research one career to learn about the training and education needed, costs, job prospects, salary, job duties, and career advancement. With permission of your parent or guardian, your research methods may include an internet or library search, an interview with a professional in the field, or a visit to a location where people in this career work. Discuss with your counselor both your findings and what might make it an interesting career.

(b) Explore how you could use knowledge and skills from the Wilderness Survival merit badge to pursue a hobby or serve as a volunteer. Research any training needed, expenses, and organizations that promote or support it. Discuss with your counselor what short-term and long-term goals you might have if you pursue this.

Bird Study

2. Show that you are familiar with the terms used to describe birds by doing the following:

(a) Sketch or trace a perched bird and then label 15 different parts of the bird.

Resource: [How to Draw and Label a Bird \(video\)](#)

(b) Sketch or trace an extended wing and label six types of wing feathers.

Resources: [Bird Wing Anatomy - Underside \(video\)](#)

[Bird Wing Anatomy - 2 \(video\)](#)

5. Observe and be able to identify 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.

Resource: [How to Keep Birding Records in a Field Notebook \(video\)](#)

(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.

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.

2. Select an engineering achievement that has had a major impact on society. Using resources such as the internet (with your parent or guardian'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.

9. Explore careers related to this merit badge. Research one career to learn about the training and education needed, costs, job prospects, salary, job duties, and career advancement. Your research methods may include—with your parent or guardian's permission—an internet or library search, an interview with a professional in the field, or a visit to a location where people in this career work. Discuss with your counselor both your findings and what about this profession might make it an interesting career.

Wildland Fire Management

10. Apply Your Learning to a Real Event. Research an historic catastrophic wildland fire incident that occurred in the United States. Discuss with your counselor and/or your troop or a group approved by your counselor the conditions that led to the incident, how the incident was managed, and how the incident could have been prevented. Explain what lessons were learned and how this incident affected future fire suppression policy or suppression tactics.

Example fires to write about: Yarnell Hill, South Canyon, Peshtigo, Camp, Thirty-Mile, Dude, Mann Gulch