



# Merit Badge College 2022

## Engineering



You need to print this form and bring it with you to Merit Badge College.

**Highlighted areas are to be completed outside of class.**

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. Look for something with moving parts, gears or powered by electricity. Think about how it works. Make a list of questions if you don't understand.

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 have learned.

We recommend a historic space travel event, impressive building, bridge, dam invention of mode of transportation, new technology or material.

Engineers:

Obstacles:

Influence:

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:

Name of Engineer:

a. Discuss the work this engineer does and the tools the engineer uses.

Work:

Tools:

b. Discuss with the engineer a current project and the engineer's particular role in it.

Project:

Engineer's role:

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.

If you have a relative or friend who is an engineer arrange an interview to complete requirement

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.

Schedule:

Campsites:

Transportation:

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.  
Project 1:  
Project 2:

7. Explain what it means to be a registered Professional Engineer (P.E.). 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.

- 1.
- 2.
- 3.
- Pick one and research the education, training, and experience required for this profession.  
Career:  
Education:  
Training:  
Experience:
- Discuss this with your counselor, and explain why this profession might interest you.

\_\_\_\_\_  
Scout Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Troop Number

\_\_\_\_\_  
Counselor Signature

\_\_\_\_\_  
Unit Leader Signature

\_\_\_\_\_  
Date Completed

**Counselor:** Initial next to the box located to the left of the requirement completed in class. Sign the space that states Counselor Signature.

**Scout:** Complete the spaces above for Scout Name, Address and Troop Number. Complete all highlighted areas outside of class.

**This form replaces the traditional "Blue Card".**