

Engineering

Merit Badge Workbook

Merit badges are earned by doing: reading the pamphlet, practicing the skills, and showing your counselor what you have learned.
This workbook gives you a place to organize your notes and track your progress along the way.
Merit badge counselors may not require the use of this or any similar workbook.
You still must satisfy your counselor that you can demonstrate each skill and have learned the information.
Use the space under each requirement to note what you have done and what you want to talk about, not to write out full answers.
When a requirement says discuss, show, tell, explain, or demonstrate, that is what you must do.
No one may add to or subtract from the official requirements found on scouting.org (Guide to Advancement 7.0.4.8).
Scouting America last updated this badge's requirements page on January 7, 2026.
Requirements change from time to time. Double-check scouting.org before you start.

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ScoutSmarts

Scout's name: _____ Unit: _____ Date started: _____

Counselor's name: _____ Phone no.: _____ Email: _____

Links marked "Scouting America resources" are the ones Scouting America shares on its official badge page.
This workbook is unofficial and not endorsed by Scouting America.

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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.

Scouting America resources: How to Fix Small Appliances (video)

Item I picked _____ Supervising adult _____

How and why it works

Engineering activities needed to create it

How I got the information

Requirement 1 completed on _____ counselor initials _____

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.

Scouting America resources: Engineering the Brooklyn Bridge in 1883 (video) · Engineering America (website)

Engineering achievement I picked

The engineers who made it possible

Special obstacles they had to overcome

How it has influenced the world today

My sources

Requirement 2 completed on counselor initials

3. Explain the work of six types of engineers. Pick two of the six types and explain how their work is related to engineering.

Scouting America resources: Solve Problems: Be an Engineer (video) · What is Engineering? (video)

Six types of engineers

Type of engineer	The work they do

The two I picked

Type of engineer	How their work is related to engineering

Requirement 3 completed on counselor initials

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4. Visit with an engineer (who may be your counselor, parent or guardian) and do the following:

Engineer I visited | Type of engineering | Date

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

The work this engineer does, and the tools they use

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

Current project

The engineer's role in it

(c) Find out how the engineer's work is done and how results are achieved.

How the work is done and how results are achieved

(d) Ask to see the reports that the engineer writes concerning the project.

Reports I saw, and what they cover

(e) Discuss with your counselor what you learned about engineering from this visit.

What I learned about engineering from this visit

Requirement 4 completed on | counselor initials

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5. Use the systems engineering approach to design an original piece of patrol equipment, a toy, or a useful device for the home, office, or garage.

Scouting America resources: The Engineering Process (video)

What I designed _____ Patrol equipment, toy, or device _____

My systems engineering steps

Step	What I did

Sketch of my design (draw here or attach)

Requirement 5 completed on _____ counselor initials _____

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 elements like levers and inclined planes to demonstrate motion. Describe an example where this mechanism is used in a real product.

Scouting America resources: Transforming Motion - Rube Goldberg Machines (video)

Model I made _____ Date _____

How it uses levers, inclined planes, or other mechanical elements to show motion

A real product that uses this mechanism

☐ **(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.

Scouting America resources: AMAZING Ways to Save Electricity at Home (video) · Understanding Home Energy Electric Use (video)

Ten electrical appliances in my home

Appliance	About how much electricity it uses in a month	Appliance	About how much electricity it uses in a month

How to find the amount and cost of electricity we use in light and heavy periods

Five ways to conserve electricity

Way to conserve electricity

☐ **(c)** Understanding Electronics. Using an electronic device such as a smartphone or tablet computer, find out how sound, video, text or images travel from one location to another. Explain how the device was designed for ease of use, function, and durability.

Scouting America resources: How Does Your Mobile Phone Work? (video)

Device I used

How sound, video, text, or images travel from one location to another

How the device was designed

Design goal	What I found
Ease of use	
Function	
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.

Scouting America resources: Engineering Material Properties (video)

Date _____ Where _____

My experiments

Material	Strength: what I did and saw	Heat conductivity: what I did and saw
Wood		
Metal		
Plastic		

What I 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.

Scouting America resources: STEM Experiment: Energy Conversion (video) · 1st Place Mousetrap Car Ideas (video) Chemical Powered Cars (video) · 2018 Official Chem-E-Car Competition® (video)

Date _____ Energy converted (from and to) _____

My experiment and results

What energy is, and how it is converted and used in my 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.

Scouting America resources: Moving People Can Be Complicated (video) · Engineering Traffic (video)

Ways people in my community get to work

My traffic flow study

Date and time	Location	Heavy or light	Number of vehicles	Relative speed

What might be improved to help people 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, and how well you were able to answer their questions.

Fair or competition _____ My project _____ Date _____

What my project demonstrates

Questions visitors asked, and how well I answered them

Requirement 6 completed on _____ counselor initials _____

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.

Scouting America resources: How To Become an Engineer & Types of Engineering Careers (video)

What it means to be a registered Professional Engineer (P.E.)

Types of engineering work where registration is most important

Requirement 7 completed on _____ counselor initials _____

8. Study the Engineer's Code of Ethics. Explain how it is like the Scout Oath and Law.

Scouting America resources: Ethics and Conduct for Professional Engineers (video) · Engineering Code of Ethics (website) Engineering Ethics (video)

The Engineer's Code of Ethics: main ideas I found

How it is like the Scout Oath and Law

Part of the Code of Ethics	Part of the Scout Oath or Law it is like

Requirement 8 completed on _____ counselor initials _____

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.

Scouting America resources: How To Become an Engineer (video)

Career I researched _____ How I researched it _____

What I found out

Topic	What I found
Training and education needed	
Costs	
Job prospects	
Salary	
Job duties	
Career advancement	

What might make this an interesting career

Requirement 9 completed on _____ counselor initials _____

Counselor sign-off

Your counselor signs your blue card or approves the badge in Scoutbook, and your unit records it. This line is for your own records.

Counselor's signature _____ Date completed _____

Official Scouting America resources

Scouting America resources: Engineering merit badge page (requirements and resources) · Engineering merit badge pamphlet (free PDF) All merit badges

Made by Cole at ScoutSmarts.com, an Eagle Scout who loves helping Scouts.
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