

Metalwork

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 September 19, 2025.
Requirements change from time to time. Double-check scouting.org before you start.

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. Read the safety rules for metalwork. Discuss how to be safe while working with metal. Discuss with your counselor the additional safety rules that apply to the metalwork option you choose for requirement 5.

Scouting America resources: Metalwork Tools Workshop Safety Training (video)

How to be safe while working with metal

Extra safety rules for the option I chose in requirement 5

Requirement 1 completed on _____ counselor initials _____

2. Explain the following terms: native metal, malleable, metallurgy, alloy, nonferrous, and ferrous. Then do the following:

Scouting America resources: Metallurgy: From Rocks to Alloys (video)

Metalwork terms

Term	What it means
native metal	
malleable	
metallurgy	
alloy	
nonferrous	
ferrous	

(a) Name two nonferrous alloys used by pre-Iron Age metalworkers. Name the metals that are combined to form these alloys.

Scouting America resources: How Alloys Made the Bronze Age Possible. Forging a New Era (video)
From Gold and Silver to Electrum: The Truth About This Rare Alloy (video)

Two nonferrous alloys used by pre-Iron Age metalworkers

Alloy	Metals combined to form it

(b) Name three ferrous alloys used by modern metalworkers.

Scouting America resources: What Are the Different Types of Steel? (video)

Three ferrous alloys used by modern metalworkers

	Ferrous alloy
1	
2	
3	

(c) Describe how to work-harden a metal.

Scouting America resources: Work Hardening and Annealing (video) · Self Organising Steel Balls Explain Metal Heat Treatment (video)

How to work-harden a metal

(d) Describe how to anneal a nonferrous and a ferrous metal.

Scouting America resources: Annealing Stainless Steel Spoons (video) · Introduction to Annealing (video)
How to Anneal Silver, Copper and Other Nonferrous Metals (video)

How to anneal

Metal	How to anneal it
A nonferrous metal	
A ferrous metal	

Requirement 2 completed on _____ counselor initials _____

3. Do the following:

(a) Work-harden a piece of 26- or 28-gauge sheet brass or sheet copper. Put a 45-degree bend in the metal, then heavily peen the area along the bend line to work-harden it. Note the amount of effort that is required to overcome the yield point in this unworked piece of metal.

Scouting America resources: Work Hardening of Copper (video)

Metal and gauge I used _____ Date _____

The effort it took to overcome the yield point

(b) Soften the work-hardened piece from requirement 3(a) by annealing it, and then try to remove the 45-degree bend. Note the amount of effort that is required to overcome the yield point.

Date

The effort it took to overcome the yield point after annealing

(c) Make a temper color index from a flat piece of steel. Using hand tools, make and temper a center punch of medium-carbon or high-carbon steel.

Scouting America resources: How to Forge a Center Punch (video)

- ☐ Temper color index made
- ☐ Center punch made
- ☐ Center punch tempered

Steel I used Date

Requirement 3 completed on counselor initials

4. Do ONE of the following:

☐ **(a)** Identify three career opportunities that would use skills and knowledge in metalworking. 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.

Scouting America resources: Sheet Metal Workers Careers (video) · What Kinds of Careers Are in Metalcasting? (video) Blacksmithing 101: What is Blacksmithing? (video) · Career Advice on Becoming a Silversmith (video)

Three career opportunities in metalworking

	Career opportunity
1	
2	
3	

The career I researched

What I found

Topic	My notes
Training	
Education	
Certification requirements	
Experience	
Expenses	
Prospects for employment	
Starting salary	

What I found (continued)

Topic	My notes
Advancement opportunities	
Career goals	

Whether I might be interested in this career

☐ **(b)** Identify how you might use the skills and knowledge in metalworking 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.

Scouting America resources: Why Blacksmithing? (video) · The Lost Art of Tinsmithing (video) Working with Silver is Awesome (video)

My metalworking hobby

What I found

Topic	My notes
Additional training required	
Expenses	
Affiliation with organizations	

My goals for this hobby

	My goals
Short-term goals	
Long-term goals	

Requirement 4 completed on counselor initials

5. After completing the first four requirements, complete ONE of the following options:

☐ **Option A—Sheet Metal Mechanic/Tinsmith. Do ALL of the following:**

(1) Name and describe the use of the basic sheet metalworking tools.

Scouting America resources: Essential Metal Fabrication Tools for Beginners: Tips and How I Use Them! (video)

Basic sheet metalworking tools

Tool	How it is used

Basic sheet metalworking tools (continued)

Tool	How it is used

(2) Create a sketch of two objects to make from sheet metal. Include each component's dimensions on your sketch, which need not be to scale.

My sketch of two objects, with each component's dimensions (draw here or attach a page)

(3) Make two objects out of 24- or 26-gauge sheet metal. Use patterns either provided by your counselor or made by you and approved by your counselor. Construct these objects using a metal that is appropriate to the object's ultimate purpose, and using cutting, bending, edging, and either soldering or brazing.

Scouting America resources: How To Make a Sheet Metal Box (video)

My two objects

	What I made	Metal and gauge	Date finished
Object 1			
Object 2			

- ☐ Cutting
- ☐ Bending
- ☐ Edging
- ☐ Soldering or brazing

(a) One object also must include at least one riveted component.

Object with the riveted component _____ Date _____

(b) If you do not make your objects from zinc-plated sheet steel or tin-plated sheet steel, preserve your work from oxidation.

Scouting America resources: How To Prevent Rust (video)

How I preserved my work (if needed) _____

☐ **Option B—Silversmith. Do ALL of the following:**

(1) Name and describe the use of a silversmith's basic tools.

Scouting America resources: Silversmithing Tools for Beginners | All You Need to get Started Making Jewelry! (video)

A silversmith's basic tools

Tool	How it is used

(2) Create a sketch of two objects to make from sheet silver. Include each component's dimensions on your sketch, which need not be to scale.

My sketch of two objects, with each component's dimensions (draw here or attach a page)

(3) Make two objects out of 18- or 20-gauge sheet copper. Use patterns either provided by your counselor or made by you and approved by your counselor. Both objects must include a soldered joint. If you have prior silversmithing experience, you may substitute sterling silver, nickel silver, or lead-free pewter.

Scouting America resources: The Basics of Soldering | Jewelry 101 (video)

My two objects

	What I made	Metal and gauge	Date finished
Object 1			
Object 2			

(a) At least one object must include a sawed component you have made yourself.

Scouting America resources: Step-by-Step Guide to Sawing for Handmade Jewelry (video)

Object with my sawed component _____ Date _____

(b) At least one object must include a sunken part you have made yourself.

Scouting America resources: Basic Sinking & Planishing (video)

Object with my sunken part _____ Date _____

(c) Clean and polish your objects.

Scouting America resources: How I Clean & Polish Jewelry RIGHT After Casting | Step By Step (video)

Date cleaned and polished

☐ **Option C—Founder. Do ALL of the following:**

(1) Name and describe the use of the basic parts of a two-piece mold. Name at least three different types of molds.

Scouting America resources: What Are the Common Types of Metal Casting Process in Engineering and Industry (video)

Basic parts of a two-piece mold

Part	How it is used

Types of molds

	Type of mold
1	
2	
3	

(2) Create a sketch of two objects to cast in metal. Include each component's dimensions on your sketch, which need not be to scale.

My sketch of two objects, with each component's dimensions (draw here or attach a page)

(3) Make two molds, one using a pattern provided by your counselor and another one you have made yourself that has been approved by your counselor. Position the pouring gate and vents yourself. Note: Do not use copyrighted materials as patterns.

Scouting America resources: Sand Casting Lesson for Beginners - Step-by-Step (video)

My two molds

Mold	What the pattern is	Date made
From my counselor's pattern		
From my own pattern		

(a) Using lead-free pewter, make a casting using a mold provided by your counselor.

What I cast _____ Date _____

(b) Using lead-free pewter, make a casting using the mold that you have made.

What I cast _____ Date _____

☐ **Option D—Blacksmith. Do ALL of the following:**

(1) Name and describe the use of a blacksmith's basic tools.

Scouting America resources: Basic Blacksmithing Tools (video)

A blacksmith's basic tools

Tool	How it is used

(2) Make a sketch of two objects to hot-forge. Include each component's dimensions on your sketch, which need not be to scale.

My sketch of two objects to hot-forge, with each component's dimensions (draw here or attach a page)

(3) Using low-carbon steel at least 1/4 inch thick, perform the following exercises:

(a) Draw out by forging a taper.

Scouting America resources: Blacksmith Basics: How to Draw Out a Taper (video) · Tapering for Beginners (video)

Date _____ My notes _____

(b) Use the horn of the anvil by forging a U-shaped bend.

Scouting America resources: Blacksmithing For Beginners - Working On The Horn Of The Anvil (video)

Date _____ My notes _____

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(c) Form a decorative twist in a piece of square steel.

Scouting America resources: Blacksmithing for Beginners - Twisting Bar Stock (video)

Date | My notes

(d) Use the edge of the anvil to bend metal by forging an L-shaped bend.

Scouting America resources: Fundamentals of Blacksmithing - Bending (video)

Date | My notes

(4) Using low-carbon steel at least 1/4 inch thick, make the two objects you sketched that require hot-forging. Be sure you have your counselor's approval before you begin.

Date my counselor approved

My two objects

	What I made	Date finished
Object 1		
Object 2		

(a) Include a decorative twist on one object.

Scouting America resources: Blacksmithing for Beginners - Twisting Bar Stock (video)

Object with the decorative twist

(b) Include a hammer-riveted joint in one object.

Scouting America resources: Forging Red Hot Rivet on This Awesome Anvil (video)

Object with the hammer-riveted joint

(c) Preserve your work from oxidation.

Scouting America resources: Preventing Rust The Old Fashioned Way And Protecting Some Gifts (video)

How I preserved my work

Requirement 5 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: Metalwork merit badge page (requirements and resources) · Metalwork merit badge pamphlet (free PDF)
All merit badges

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