

Blacksmithing Basics — Workbook

This workbook accompanies each of the four course modules with hands-on exercises, planning worksheets, and checklists that turn theory into shop practice. Work through each section before or after the corresponding module. Every template is designed to be printed or filled digitally before you light the forge.

The Forge — Fire, Fuel, and Shop Safety

Plan your forge setup, evaluate fuel options, and build a shop-safety checklist before your first heat.

Exercise: Forge Selection Decision Exercise

Answer each question honestly based on your actual situation, then use your answers to justify a coal or propane recommendation for your specific shop.

- Describe your available shop space (sq ft, ceiling height, ventilation openings) and explain which forge type it best supports.

- What is your nearest coal source (name, distance, price per 50 lb bag) versus your nearest propane supplier? Calculate approximate fuel cost per 4-hour session for each.

- List three project types you plan to make in your first year. Which fuel type better suits the stock sizes and temperatures those projects require?

- Identify the single biggest constraint in your setup (space, cost, fuel availability, noise, smoke). Which forge type eliminates or reduces that constraint?

Worksheet: Shop Layout Planning Worksheet

Fill in each field to document your planned or existing shop layout before building or rearranging. Use a tape measure — do not estimate.

Shop floor area (m x m):

Forge location (distance from nearest wall):

Anvil location (distance from forge, steps to walk):

Quench bucket location (distance from anvil):

Fire extinguisher location and type:

Ventilation openings (size and location of each):

Carbon monoxide detector location and last test date:

Nearest power outlet (for grinder, drill):

Emergency exit path (clear yes/no, width):

First-aid kit location:

Checklist: Pre-Session Safety Checklist

- Carbon monoxide detector tested and showing 0 ppm
- Fire extinguisher within arm's reach of forge, pin in place
- Quench bucket full and within 2 steps of anvil
- All combustible materials (wood, rags, cardboard) removed from 1.2 m radius of forge
- Leather boots with steel toes on
- Natural-fibre clothing (no polyester)
- Shade-3 or shade-5 safety glasses on
- Hearing protection at the anvil station
- Leather glove on tong hand
- Forge door or opening direction confirmed safe (not pointing toward foot traffic or combustibles)
- Propane hose inspected for cracks or abrasion (flex along full length)
- Anvil stable on stand — no rocking or movement

Reading Steel — Heat, Colour, and Metal Behaviour

Build your colour-temperature vocabulary, identify steel grades in your stock, and practice diagnosing heat defects before they ruin a project.

Exercise: Colour Identification Practice Log

For each of your first five forge sessions, observe and record the steel colour at three points: when you pull it from the forge, at the midpoint of the heat, and when you return it for a reheat. Do this for the first three heats of each session. After five sessions compare your logs.

- Describe the colour of the steel as you pulled it from the forge on your first heat today. What temperature range does that correspond to, and was it in the correct working range for your operation?
- At what point did you notice the colour drop to cherry red during hammering? How many blows did you land before the heat went cold, and did you reheat at the right moment?
- After five sessions, identify which heat colour you most frequently misjudge. What environmental factor (outdoor light, dim shop, forge glow) contributes to the error?

Worksheet: Steel Stock Inventory Worksheet

Record every piece of steel you own or purchase. This prevents using unknown stock for projects that require specific carbon content.

Stock ID (e.g. S001):

Date acquired:

Source (supplier name):

Specified grade (e.g. A36, 1084, 5160, unknown):

Spark test result (mild/medium/high carbon):

Dimensions (mm: length x width x thickness or diameter):

Weight (kg):

Intended project(s):

Notes (surface condition, any cutting done):

Checklist: Heat Defect Prevention Checklist

- Steel is above cherry red before every hammer blow
- Wire-brushed between heats to remove loose scale
- 1084 and higher-carbon steel kept below yellow-orange (never approach white)
- Forge flame observed for neutral/slightly reducing character before forging session
- Normalising cycle (3 air-cool heats) planned for any stock that will be heat-treated
- Any section showing sparks inside the forge removed immediately and end cut off
- Working heats kept short (stock in and out in under 3 minutes) to prevent decarburisation
- Unknown stock spark-tested before use in a critical project

Hammer and Anvil — The Four Core Operations

Evaluate your hammer technique, track drawing-out and upsetting progress, and confirm you have all the tools needed before attempting each operation.

Exercise: Drawing-Out Benchmark Exercise

Forge the following test piece and record your results to evaluate your drawing-out technique against standard benchmarks.

- Start with a 200 mm x 12 mm round mild steel bar. Draw out the last 80 mm to a clean point taper. Record: how many heats did it take, and what was the final length of the tapered section?
- Examine your finished taper. Is it symmetric when viewed end-on? Are there hammer marks or ridges visible? Identify the most common mark pattern and describe what hammer placement caused it.
- Benchmark comparison: a competent beginner achieves this taper in 3–4 heats with no visible edge marks. If you took more heats or have visible defects, identify one specific change to your technique (hammer angle, heat colour, blow placement) to test next session.

Worksheet: Tool Inventory and Condition Worksheet

Inspect each tool and record its condition before each project. A tool that is not listed is not available — do not improvise with wrong tools.

Tool name:

Type/size (e.g. cross-peen 1.5 kg, flat-jaw tongs 300 mm):

Handle condition (secure yes/no; cracks yes/no):

Face/jaw condition (pitting, chips, loose yes/no):

Fits hardy hole correctly (yes/no/N/A):

Last dressing date (for hammers: faces polished; for tongs: jaw fit checked):

Safe to use this session (yes/no):

Checklist: Pre-Operation Hammer Technique Checklist

- Hammer handle tight — no movement between head and handle, wedge secure
- Hammer face dressed (no sharp edges that would leave marks on the work)
- Anvil face clean and free of scale build-up before session starts
- Stance confirmed: 45 degrees to anvil, feet shoulder-width, hammer-side foot back
- Grip is near the handle end, not choked up
- First test blow on a cold piece of scrap to confirm hammer face is landing flat
- Tongs grip tested on cold stock before heating — stock cannot rotate or slip under hammer blows
- Planned operation (draw, upset, bend) decided before the heat goes in the forge

Exercise: Bending Precision Exercise

Make a 90-degree bend in a 12 mm mild steel bar using the anvil horn and verify accuracy with a square.

- Heat the bend location to orange and make your bend. Measure the actual angle with a protractor or framing square. How far from 90 degrees is your result, and which direction (over-bent or under-bent)?

- What adjustment to your technique (horn position, hammer placement, heat location) would correct the error? Apply it on the next attempt and record the result.

First Project and Heat Treatment

Plan your first project, track the forging and heat treatment process, and record results for future reference.

Worksheet: Project Planning Worksheet

Complete this worksheet before you pick up a hammer. A project begun without a plan produces a project without a useful outcome.

Project name:

Target completion date:

Steel grade and stock dimensions (length x width x thickness):

Estimated number of forging heats:

Required tools (list every tool needed):

Required operations (draw / upset / bend / punch — circle all that apply):

Heat treatment required (yes/no):

Quench medium (canola / Parks 50 / water / none):

Target hardness (HRC) or temper colour:

Finish method (as-forged / wire-wheel / belt grind / beeswax / linseed oil):

Success criteria (how will you know this project succeeded):

Exercise: Heat Treatment Observation Exercise

Document your 1084 knife blank heat treatment in real time. This log becomes your reference for every future heat treatment on this steel.

- Record the normalising cycle: for each of three normalising heats, note the colour you observed when the magnet stopped sticking, the approximate time in the forge, and whether the air-cool took place on firebrick or a different surface.
- Describe the quench: oil temperature before quench, colour and brightness of the blade at the moment of plunge, any warping observed when the blade came out, and the file test result (skated or bit).
- Describe the temper: oven temperature (verified with thermometer), duration of each cycle, surface colour observed after each cycle. Compare to the expected straw colour at 190–205 °C.

Checklist: Project Completion Quality Checklist

- All forging defects (cold shuts, scale pitting, off-centre upsets) identified and corrected or noted
- Final geometry matches the design sketch — measured, not estimated
- Normalising cycle completed (3 air-cool heats) before hardening
- Quench oil pre-warmed to 40–50 °C
- File test passed after quench (file skates, does not bite)
- Both temper cycles completed at correct temperature with full air-cool between
- Blade or workpiece loaded/tested to confirm function (hook load-tested, knife edge sharpened and tested on paper)
- Finish applied and dry before storage
- Project logged in project tracking template with date, materials, heats, and outcome
- Lessons-learned note written for the next project

Your Action Plan

1. Before your first session: complete the Shop Layout Planning Worksheet and physically verify every measurement in your actual shop space
2. Before lighting the forge: run the Pre-Session Safety Checklist in full — do not skip items because the session is short
3. Session 1: light and shut down the forge three times without forging anything — build the startup/shutdown procedure into muscle memory
4. Session 2: forge five tapered points on scrap mild steel mild rod, log your heats and colours, compare against the 3–4 heat benchmark
5. Session 3: practice upsetting — make three upset bosses on bar ends and correct any off-centre deformation in the same heat
6. Session 4: make three 90-degree bends over the horn and measure each with a square — aim for within 3 degrees by the third attempt
7. Session 5–6: forge the wall hook from start to finish using the Project Planning Worksheet; load-test the finished hook
8. Session 7–8: forge the 1084 knife blank through rough profile and normalising; complete the

Heat Treatment Observation log

9. Session 9: temper, grind, and finish the knife blank; complete the Project Completion Quality Checklist

10. After 10 sessions: review all session logs, identify your most persistent defect, and design a focused practice drill to eliminate it

