

Woodworking Fundamentals — Workbook

This workbook accompanies the Woodworking Fundamentals course and gives you a structured place to record decisions, practice layout calculations, and track your skill development across each module. Complete the exercises before building to catch design errors on paper rather than in wood, and return to the checklists each time you start a new project.

Tools, Safety, and the Prepared Workshop

Assess your current tool inventory, plan your PPE kit, and design a safe, functional layout for your shop space.

Exercise: Tool Inventory Audit

List every hand tool and power tool you currently own. For each tool, rate its condition (sharp/serviceable/needs repair/missing) and identify the next action required before it is shop-ready.

- Which of the six essential hand tools (No. 4 bench plane, bench chisels, crosscut saw, marking gauge, combination square, marking knife) do you already own, and what condition are they in?
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- After reviewing the sharpening progression (220 !' 1000 !' 8000 grit), which tools in your collection need to go through the full sequence before your first project session?
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- List the power tools you own and identify any missing safety features (blade guard, riving knife, push stick) that must be sourced before use.

Worksheet: PPE and Safety Equipment Checklist

For each task category in the course, record what PPE you currently own, what you need to purchase, and the approximate cost.

Task category (e.g., hand planing, table saw, sanding, finishing)

Required PPE per spec

Currently owned (yes/no)

Items to purchase

Estimated cost (CAD)

Checklist: Shop Setup Pre-Build Checklist

- Measure available floor space and sketch a zone layout (machine zone vs hand-tool zone) to scale on graph paper
- Verify electrical circuits: identify which breakers serve the shop and confirm amperage for any planned machinery
- Test dust collection: run collector and confirm suction at each machine connection point

- [] Check all blades and bits for sharpness before the first session; sharpen or replace any that fail the thumbnail test
- [] Mount fire extinguisher within 3 m of the finishing area and confirm it is fully charged
- [] Source a metal self-closing oily-rag waste container before applying any oil-based finish
- [] Set up lighting to 50+ footcandles at bench height (test with a light-meter app on your phone)

Wood Science: Species, Grain, and Movement

Practice reading end grain, build your first cut list, and calculate seasonal movement for the wood species you plan to use in your first project.

Exercise: End Grain Reading Practice

Visit a lumber yard or use boards you own. For at least three boards, sketch the end grain pattern, identify the cut (plain-sawn, rift-sawn, or quartersawn), draw the crown arrow, and predict which face will cup if the board dries further.

- Sketch the end grain of each board and label it plain-sawn, rift-sawn, or quartersawn based on ring angle to the face.
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- For each plain-sawn board, draw the crown arrow and write which face you would orient up in a tabletop panel, and why.
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- Compare movement potential between a quartersawn and a plain-sawn board of the same species and width using the formula: $\text{Movement} = \text{Width} \times \text{Coefficient} \times \text{Change in MC}$.

Worksheet: Wood Movement Calculation Sheet

For your planned first project, fill in the species, cut, panel width, and local seasonal MC change to calculate how much movement to allow in your joint and fastener design.

Part name (e.g., tabletop, shelf panel, drawer side)

Wood species

Cut type (plain-sawn or quartersawn)

Finished width (mm)

Tangential shrinkage coefficient (from course table)

Seasonal MC range (min % to max %)

MC change (delta)

Calculated seasonal movement (mm)

Fastener/joint design accommodation (e.g., figure-8, floating pocket, gap allowance)

Checklist: Lumber Yard Visit Checklist

- Bring your cut list with rough dimensions and board-foot totals already calculated
- Bring a moisture meter (or ask the yard to check) — target 6–8% for interior furniture
- Sight down each board for cup, bow, and twist before accepting it
- Check end grain orientation for each board and confirm cut type matches project requirements
- Inspect for checks, knots, and reaction wood (wavy grain near the pith) that would cause problems in joinery
- Calculate cost per board-foot for at least two species options and note it for future reference

Joinery: Mortise-and-Tenon, Dovetail, and Pocket Screws

Plan and log the joinery decisions for your project, practice fit assessment, and document each joint trial to build a personal improvement log.

Exercise: Joinery Selection Matrix

For each joint in your planned project, decide which joinery method is structurally and visually appropriate using the criteria from the module. Record your reasoning so you can revisit it after the build.

- List every joint in your project (e.g., rail-to-leg, drawer box corner, face-frame stile-to-rail). For each, identify whether the primary stress is racking, shear, or tension.

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- For each joint under racking stress, explain why mortise-and-tenon or dovetail is preferred over pocket screws.

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- Sketch the proportions of your mortise-and-tenon joint (tenon thickness = 1/3 of rail thickness) and confirm the minimum mortise wall thickness is at least 8 mm.

Worksheet: Joint Practice Log

Each time you cut a practice joint, record the result and what you will change in the next attempt. This is your most valuable shop document for the first year.

Date

Joint type (mortise-and-tenon, dovetail, pocket screw)

Species and thickness (mm)

Fit result (gapless / minor gap / major gap / rework required)

Observed fault (tearout, chisel skew, out-of-square, over-cut cheek...)

Root cause identified

Correction for next attempt

Checklist: Pre-Joinery Setup Checklist

- Confirm all stock is milled flat and square to final dimensions before marking any joints
- Set marking gauge to chisel width and test the registration on scrap — no play, crisp scored line
- Sharpen bench chisels to 8000-grit polish and strop before mortise chopping
- Verify the mortise gauge is locked at the correct setting and will not shift during the layout run
- Cut one test joint in scrap of the same species and thickness before cutting project parts

[] Confirm glue, clamps, and cauls are staged and within reach before assembly — no running to the shelf with wet glue

Project Planning and Finishing

Complete a full project planning package (drawing, story stick, cut list, finish spec) and document your finishing process for repeatability.

Exercise: Story Stick Build Exercise

Using a scrap of 12 mm plywood 50 mm wide and at least as long as your longest project dimension, lay out a complete story stick for one major component (e.g., a shelf unit side panel). Bring it to the lumber yard and use it to size boards rather than measuring with a tape.

- Mark all shoulder lines, dadoes, and hardware positions on the stick at full size. What errors did you catch that were not visible in the sketch?

- Compare the story-stick dimensions to the dimensions on your original sketch. Are there any discrepancies? If so, which is correct — the stick or the sketch?

- After using the stick in the shop, note one instance where it prevented a measuring error you would have made with a tape measure.

Worksheet: Finishing Specification Sheet

Before applying any finish, complete this spec sheet for each surface in your project. Having a written record lets you reproduce the result on future projects and troubleshoot failures systematically.

Part name

Species

Final sanding grit

Grain raised and re-sanded (yes/no)

Grain filler used (product name or none)

Finish system (oil/wax, WBP, Danish oil, other)

Brand and product name

Number of coats planned

Between-coat sanding grit

Ambient temperature and humidity at time of application

Actual coats applied

Result notes (appearance, issues encountered)

Checklist: Final Project Quality Checklist

- All joints seat by hand pressure — no gaps visible at 300 mm in raking light
- All surfaces sanded to planned grit with no skipped steps; grain raised and re-sanded
- Story stick and cut list filed with project photos for future reference
- Finish coats applied per spec sheet; full cure time observed before putting piece in service
- All exposed end grain sealed with at least one extra coat of finish to prevent moisture uptake
- Hardware (hinges, handles, shelf pins) fitted with correct pilot hole size to prevent splitting
- Oily rags disposed of safely in sealed metal container or spread flat to dry outdoors

Your Action Plan

1. Complete the tool inventory audit worksheet before your first shop session and order any missing sharpening stones (220, 1000, 8000 grit) and PPE items
2. Build or purchase a water stone flattening plate (diamond plate or 120-grit wet-dry on glass) and flatten all your stones before first use
3. Visit a lumber yard with a blank cut list template; practice calculating board-feet for three different species and compare prices
4. Mill a test board through the full four-step sequence (face joint, edge joint, thickness plane, rip) and check for square on all four faces with a reliable combination square
5. Cut three mortise-and-tenon practice joints in pine before attempting them in project stock; log each attempt in the Joint Practice Log
6. Cut one set of through dovetails in 12 mm pine or poplar; focus on sawing to the line rather than gap-filling with putty
7. Sketch your first project in three views, produce a cut list with rough dimensions and board-foot totals, and calculate the material cost before purchasing
8. Make a story stick for your first project's tallest or widest component and verify it against your drawing
9. Apply one finishing system (Danish oil recommended for first projects) on a scrap panel of your project species and note grain raise, sheen level, and drying time in the Finishing Specification Sheet
10. Complete the Final Project Quality Checklist on your finished piece; photograph any defects and note the root cause for the next build

