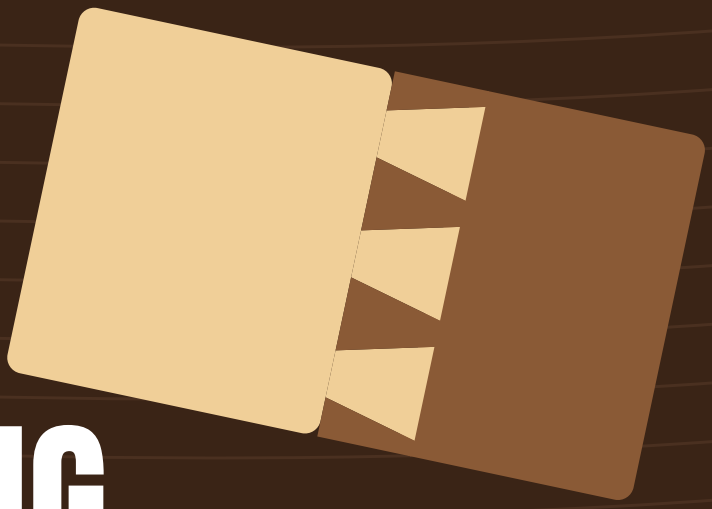
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14 CHARTS WOODWORKING CHEAT SHEETS

The numbers you look up every week, on one guide you can pin above the bench.

- Real lumber sizes and board feet
- 12 joints: strength, tools, best use
- Screws, pilot holes, glue and grits
- Finish dry times and recoat
- 15 common mistakes and the fix

HOW TO USE THIS GUIDE

Print it, pin the pages you use most, and check the chart before you cut, drill, glue or finish.

1 BEFORE YOU BUY

Lumber is sold by nominal size. Check the real size and the board feet before you go to the store.

2 BEFORE YOU CUT

Pick the joint by strength and the tools you own. Do a test cut on scrap first.

3 BEFORE YOU DRILL

Match the pilot hole to the screw size and the wood. It stops splits and stripped screws.

4 BEFORE YOU GLUE

Check open time and clamp time. Dry fit everything and have clamps ready.

5 BEFORE YOU FINISH

Sand in order, then follow the recoat time. Always test the finish on scrap.

6 WHEN IT GOES WRONG

Page 11 lists 15 common problems, the usual cause and how to fix them.

WHAT'S INSIDE

3 Lumber and plywood: real sizes

4 Board feet, hardwood and shelf spans

5 Joints 1 to 6

6 Joints 7 to 12

7 Screws, pilot holes and nails

8 Glue times and sandpaper grits

9 Finishes: coats, recoat, cure

10 Furniture sizes and fractions to mm

11 15 mistakes and the fix

12 Printable project and cut list sheet

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REAL SIZES
inch and mm

14 CHARTS
in one guide

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Free educational guide. Values are typical ranges at about 70 F; check the label of your glue and finish and test on scrap. Work safely with guards and eye protection.

LUMBER: NOMINAL VS. REAL SIZE

A 2x4 is not 2 by 4 inches. Dry, planed lumber is smaller than its name. Plan your cuts with the real size.

NOMINAL	REAL SIZE (INCH)	REAL SIZE (MM)
1x2	3/4" x 1-1/2"	19 mm x 38 mm
1x3	3/4" x 2-1/2"	19 mm x 64 mm
1x4	3/4" x 3-1/2"	19 mm x 89 mm
1x6	3/4" x 5-1/2"	19 mm x 140 mm
1x8	3/4" x 7-1/4"	19 mm x 184 mm
1x10	3/4" x 9-1/4"	19 mm x 235 mm
1x12	3/4" x 11-1/4"	19 mm x 286 mm
2x2	1-1/2" x 1-1/2"	38 mm x 38 mm
2x4	1-1/2" x 3-1/2"	38 mm x 89 mm
2x6	1-1/2" x 5-1/2"	38 mm x 140 mm
2x8	1-1/2" x 7-1/4"	38 mm x 184 mm
2x10	1-1/2" x 9-1/4"	38 mm x 235 mm
2x12	1-1/2" x 11-1/4"	38 mm x 286 mm
4x4	3-1/2" x 3-1/2"	89 mm x 89 mm
6x6	5-1/2" x 5-1/2"	140 mm x 140 mm

PLYWOOD: NOMINAL VS. REAL THICKNESS

SOLD AS	REAL THICKNESS	COMMON USE
1/4"	7/32" (about 5.5 mm)	Drawer bottoms, cabinet backs
1/2"	15/32" (about 12 mm)	Drawer sides, light boxes, jigs
3/4"	23/32" (about 18 mm)	Cabinets, shelves, bookcases, workbench tops
Baltic birch	Metric: 6, 12, 18 mm	Jigs, drawers; sold in 5 x 5 ft sheets

A 4 x 8 ft sheet = 32 sq ft. Plywood is often thinner than its name: cut dados and rabbets to the real sheet, not to 3/4".

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BOARD FEET, HARDWOOD AND SHELF SPANS

Hardwood is priced by the board foot. One board foot = 12" x 12" x 1" of rough lumber.

Board feet = thickness (in) x width (in) x length (ft) / 12

BOARD	MATH	BOARD FEET
1" x 6" x 8 ft	1 x 6 x 8 / 12	4
2" x 8" x 10 ft	2 x 8 x 10 / 12	13.33
1" x 10" x 6 ft	1 x 10 x 6 / 12	5
2" x 4" x 8 ft	2 x 4 x 8 / 12	5.33

HARDWOOD THICKNESS (QUARTERS)

SOLD AS	ROUGH	SURFACED (S2S)
4/4	1"	13/16"
5/4	1-1/4"	1-1/16"
6/4	1-1/2"	1-5/16"
8/4	2"	1-3/4"

SHELF SPAN BEFORE IT SAGS

SHELF MATERIAL	MAX SPAN (BOOKS)
3/4" MDF	about 24"
3/4" particleboard	about 24"
3/4" pine (1x)	about 30"
3/4" plywood	about 32"
3/4" oak or maple	about 36"
Any of these + 1x2 front edge	add about 6 - 8"

Rule of thumb for a full load of books. Lighter loads can span more; a front edge or a center support adds stiffness.

BUYING TIP: ADD 15 - 20% FOR WASTE

Knots, checks, snipe and offcuts eat lumber. Add 15 - 20% to your board feet total, and up to 30% for figured wood or many short parts.

12 JOINTS: STRENGTH, TOOLS, BEST USE (1 - 6)

1 BUTT JOINT

STRENGTH ●○○○○ SKILL Easy

TOOLS
Saw, drill, screws or nails

BEST FOR
Quick boxes, shop furniture, hidden frames

TIP
Glue alone is weak on end grain. Add screws, pocket screws, dowels or a glue block.

2 POCKET HOLE

STRENGTH ●●●○○ SKILL Easy

TOOLS
Pocket-hole jig, drill, pocket screws

BEST FOR
Face frames, cabinet boxes, tabletops, benches

TIP
Coarse thread screws in softwood and plywood, fine thread in hardwood. Clamp before driving.

3 DOWEL

STRENGTH ●●●○○ SKILL Medium

TOOLS
Doweling jig, drill, fluted dowels

BEST FOR
Panels, chairs, frames, edge joints

TIP
Dowel up to half the board thickness: 3/8" in 3/4" stock. Glue the holes too.

4 BISCUIT

STRENGTH ●●○○○ SKILL Easy

TOOLS
Biscuit joiner (plate joiner)

BEST FOR
Aligning tabletop boards, miters, carcass panels

TIP
Mostly for alignment. #20 biscuits for 3/4" stock; mark from the same face.

5 DADO

STRENGTH ●●●●○ SKILL Medium

TOOLS
Table saw with dado stack, or router

BEST FOR
Shelves into bookcase sides, cabinet bottoms

TIP
Depth about 1/3 of the side's thickness. Cut a test piece: plywood is under 3/4".

6 RABBET

STRENGTH ●●●○○ SKILL Easy

TOOLS
Router with rabbet bit, or table saw

BEST FOR
Cabinet backs, drawer corners, box lids

TIP
Rabbet the back edges so a 1/4" back sits flush. Glue plus brads holds it.

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12 JOINTS: STRENGTH, TOOLS, BEST USE (7 - 12)

7 HALF-LAP

STRENGTH ●●●●○ SKILL Medium

TOOLS
Table saw, router or hand saw and chisel

BEST FOR
Frames, trestles, crossed stretchers

TIP
Each piece loses half its thickness. Sneak up on the depth with test cuts.

8 MORTISE AND TENON

STRENGTH ●●●●● SKILL Advanced

TOOLS
Chisels or mortiser, router, table saw

BEST FOR
Table legs and aprons, chairs, doors

TIP
Tenon about 1/3 the stock thickness. Snug by hand, never hammered in.

9 BRIDLE JOINT

STRENGTH ●●●●○ SKILL Medium

TOOLS
Table saw with tenon jig, or band saw

BEST FOR
Frame corners, legs to top rails

TIP
Like an open mortise and tenon: easier to cut, big glue surface.

10 BOX JOINT (FINGERS)

STRENGTH ●●●●○ SKILL Medium

TOOLS
Table saw or router with a finger jig

BEST FOR
Boxes, drawers, toy chests

TIP
Lots of long grain glue area. Fingers equal to the blade or dado width.

11 DOVETAIL

STRENGTH ●●●●● SKILL Advanced

TOOLS
Dovetail saw and chisels, or router jig

BEST FOR
Drawers, chests, heirloom boxes

TIP
Locks against pulling apart. Common slope: 1:6 in softwood, 1:8 in hardwood.

12 MITER (WITH SPLINES)

STRENGTH ●●○○○ SKILL Medium

TOOLS
Miter saw or sled, spline jig

BEST FOR
Picture frames, trim, boxes with hidden end grain

TIP
Plain miters are weak. Splines or keys make them strong and decorative.

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SCREWS, PILOT HOLES AND NAILS

Drill a pilot hole for the threads and a clearance hole for the shank in the top board. Test on scrap: woods vary.

SCREW	DIAMETER	PILOT SOFTWOOD	PILOT HARDWOOD	CLEARANCE
#6	0.138"	5/64"	3/32"	9/64"
#8	0.164"	3/32"	1/8"	11/64"
#10	0.190"	7/64"	9/64"	3/16"
#12	0.216"	1/8"	5/32"	7/32"

- Countersink so the head sits flush.
- Stay about 1" from the end of a board.
- Wax or soap on the threads in hardwood.
- Screw length: at least half of it in the bottom board.

NAIL SIZES (PENNY)

SIZE	LENGTH
2d	1"
3d	1-1/4"
4d	1-1/2"
6d	2"
8d	2-1/2"

SIZE	LENGTH
10d	3"
12d	3-1/4"
16d	3-1/2"
20d	4"

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GLUE: OPEN TIME, CLAMP TIME, FULL CURE

Open time = how long you have to assemble. Clamp time = when you can take the clamps off. Do not stress the joint before full cure.

GLUE	OPEN TIME	CLAMP	FULL CURE	BEST FOR
PVA yellow glue	5 - 10 min	30 - 60 min	24 h	Indoor furniture, most joints
PVA water-resistant	5 - 10 min	30 - 60 min	24 h	Cutting boards, outdoor under cover
PVA waterproof	10 - 15 min	30 - 60 min	24 h	Outdoor furniture, more working time
Polyurethane glue	15 - 20 min	1 - 2 h	24 h	Mixed materials; foams, needs moisture
5-minute epoxy	about 5 min	about 1 h	24 h	Small repairs, filling gaps
Slow epoxy	20 - 45 min	6 - 8 h	24 - 72 h	Gap filling, loose joints, outdoor
CA (super glue)	seconds	none	8 - 24 h	Quick fixes, holding parts while glue dries

SANDPAPER GRIT ORDER

Don't skip more than one grit. Each grit only removes the scratches of the one before it.

60 - 80 > **100 - 120** > **150** > **180** > **220** > **320 - 400**

- **60 - 80**: Shaping, removing saw marks, flattening
- **100 - 120**: General smoothing after machining
- **150**: Last grit before stain on most woods
- **180**: Before clear finish on hardwoods
- **220**: Final pass for clear finish; first scuff between coats
- **320 - 400**: Between finish coats only

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FINISHES: COATS, RECOAT TIME, CURE

Typical times at about 70 F and 50% humidity. Cold or humid rooms slow everything down. Read the can and test on scrap.

FINISH	COATS	RECOAT	READY	BEST FOR
Oil-based stain	1 - 2	4 - 8 h	Wait 8 h before topcoat	Color; wipe off the excess
Water-based stain	1 - 2	1 - 2 h	Wait 2 h before topcoat	Fast color; raise the grain first
Oil finish (tung or Danish blend)	2 - 3	8 - 24 h	about 3 days	Natural look, easy repair, low protection
Wipe-on poly	3 - 5	2 - 3 h	24 h light use	No brush marks, beginner friendly
Oil-based poly	2 - 3	4 - 24 h	48 h light use	Tables, floors; ambers with age
Water-based poly	3 - 4	about 2 h	24 h light use	Clear on light woods, low odor
Shellac	2 - 4	about 1 h	same day	Sealer under other finishes, quick
Spray lacquer	3 - 4	30 - 60 min	same day	Fast, smooth, cabinets
Hardwax oil	2	8 - 12 h	24 - 48 h light use	Matte, durable, easy touch-up
Paste wax	1 - 2	buff after 10 - 20 min	right away	Over other finishes, drawer runners

Rags with oil finishes can catch fire by themselves. Lay them flat to dry outside or keep them in a sealed metal can with water.

Free educational guide. Values are typical ranges at about 70 F; check the label of your glue and finish and test on scrap. Work safely with guards and eye protection.

FURNITURE SIZES AND FRACTIONS TO MM

STANDARD SIZE	COMMON RANGE
Dining table height	28 - 30"
Dining chair seat height	17 - 19"
Desk height	28 - 30"
Kitchen counter height	36"
Bar height	40 - 42"
Coffee table height	16 - 18"
Bench seat height	17 - 19"
Nightstand height	24 - 28"
Bookcase shelf depth	10 - 12"
Space per diner at a table	24" wide
Workbench height	about your wrist (34 - 38")
Drawer slide clearance	1/2" each side (most side-mount)

FRACTION	DECIMAL	MM
1/16"	0.0625	1.6
1/8"	0.125	3.2
3/16"	0.1875	4.8
1/4"	0.25	6.3
5/16"	0.3125	7.9
3/8"	0.375	9.5
7/16"	0.4375	11.1
1/2"	0.5	12.7
9/16"	0.5625	14.3
5/8"	0.625	15.9
11/16"	0.6875	17.5
3/4"	0.75	19.0
13/16"	0.8125	20.6
7/8"	0.875	22.2
15/16"	0.9375	23.8
1"	1.0	25.4

Square check: measure both diagonals. Equal diagonals = square. For big layouts, use 3-4-5: 3 ft on one side, 4 ft on the other, 5 ft across.

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15 COMMON MISTAKES AND THE FIX

PROBLEM	USUAL CAUSE	THE FIX
1. Tearout on crosscuts	Dull blade, no support under the cut	Sharp blade, zero-clearance insert, tape the line, backer board
2. Blotchy stain	Pine, maple, cherry or birch absorb unevenly	Pre-stain conditioner, gel stain, or a wash coat of shellac
3. Glue spots show under stain	Glue squeeze-out sealed the wood	Scrape when rubbery, sand it off, stain test before finishing
4. Gaps in miters	Saw not at true 45 degrees	Test cut 4 pieces, adjust the saw, then cut the real parts
5. Project not square	Uneven clamping	Measure both diagonals: equal = square; shift clamps until they match
6. Top cracks or cups	Wood movement was blocked	Fasten tops with slotted holes or clips; finish both faces
7. Screw splits the board	No pilot hole, too close to the end	Pilot hole (chart on page 7), stay 1" from the end, clamp
8. Burn marks	Slow feed, dull or dirty blade or bit	Steady feed, clean the blade, light final pass
9. Brush marks or bubbles	Coat too thick, shaken can	Stir, don't shake; thin coats; or switch to wipe-on
10. Rough feel after water-based finish	Raised grain	Wipe with a damp cloth, let dry, sand 220, then finish
11. Finish stays sticky	Too thick, cold or humid, oil not wiped	Wipe with mineral spirits, warm dry room, thinner coats
12. Parts come out the wrong size	Different tapes, thick pencil lines	One tape for the project, knife or fine line, cut on the waste side
13. Drawer sticks	Tight fit or humid season	Leave the slide clearance, wax the runners, plane a hair off
14. Glue joint fails	Starved joint or glue on end grain	Even glue film, moderate clamp pressure, add fasteners on end grain
15. Wobbly table or chair	Legs not the same length	Set on a flat surface, shim, mark and trim the long leg

PROJECT AND CUT LIST

Project: _____ Date: _____

Wood: _____ Finish: _____

Overall size (W x D x H): _____ Budget: _____

PART	QTY	T	W	L	NOTES

BOARD FEET TOTAL:

SHOPPING LIST

BUILD STEPS



MEASURE TWICE. TEST ON SCRAP. ENJOY THE BUILD.

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