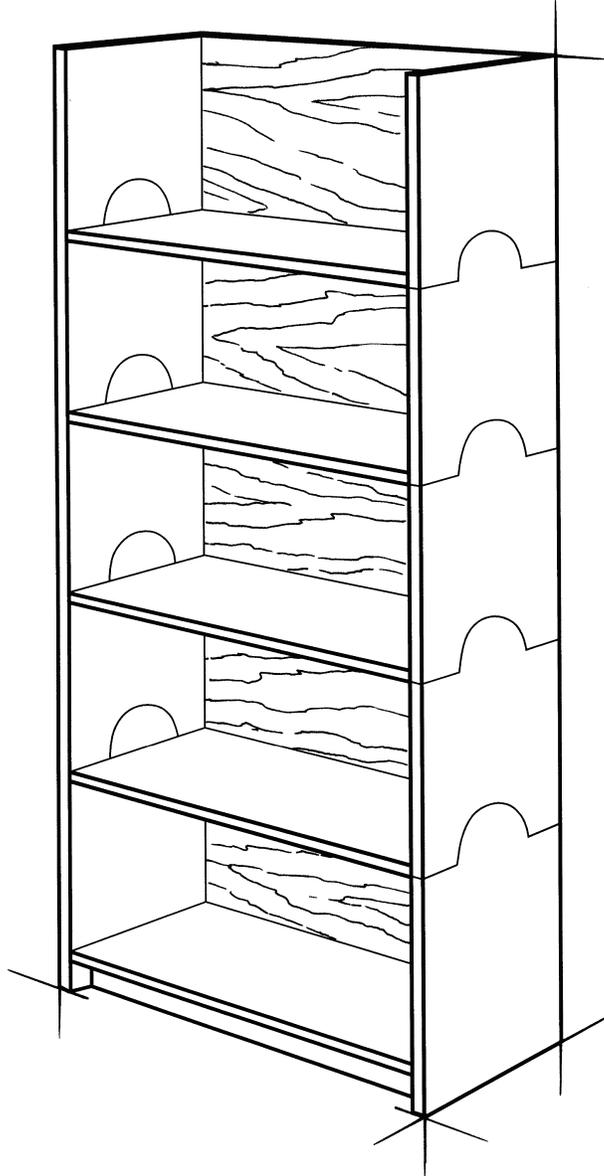




## WOODWORKS: BEGINNER PROJECT STACKABLE SHELVES



This set of storage modules can sit close to the floor or rise all the way to the ceiling. Build as many as you like!

- These adaptable stacking shelves were built with 3/4" oak plywood, but you can choose any type of veneer plywood you like.
- Since these units were intended to be given a natural finish, dowels were used to attach the sides so that nail heads or screw heads wouldn't show. However, you can simplify the construction by gluing and nailing the joints, then setting the nail heads and filling the holes with Minwax® Stainable Wood Filler, or by screwing together the joints and filling the counterbored screw-head holes with wood plugs.

This project gives beginning woodworking students the opportunity to learn a number of important, basic skills, including layout, measuring, cutting, marking, drilling, gluing, clamping and dowel joinery. And after you make the shelves, you'll learn how to apply stains and finishes to protect the wood and keep it looking beautiful.

## TOOLS REQUIRED:

### Hand Tools

- Try or combination square
- Screwdriver
- Bar clamps
- Hammer
- Tape measure or folding ruler
- Doweling jig
- Dowel centers
- Compass

### Power Tools

- Jigsaw
- Table saw
- Electric drill and/or horizontal boring machine

### Miscellaneous

- Pencil
- Safety glasses
- Sandpaper
- Clean, lint-free cloths
- Respirator
- Gloves for finishing
- Mineral spirits
- Water-filled metal container with tight-fitting lid
- Minwax® Wood Finish™ Stain Brush
- Minwax® Polyurethane Brush
- Minwax® Stainable Wood Filler

## SHOPPING LIST

Item	Quantity
3/4" red or white oak	1-1/2 sheets
veneer plywood 4' x 8' sheets	
3/4" x 6" x 36" long red or white oak	1
1/4" dia. x 1 1/4" wood dowels	86
6d finish nails	25
Wood glue	1

## CUTTING LIST

Key	Pcs.	Size & Description
A	8	12" x 18 1/8" sides
B	2	12" x 20 3/8" base sides
C	5	11 1/4" x 29 1/4" shelves
D	5	15" x 29 1/4" backs
E	1	2 1/4" x 29 1/4" base stretcher
F	15	1/4" x 3/4" edging, various lengths

## WOOD FINISHING PRODUCTS:

### Recommended Finish

**Prep:** Minwax® Pre-Stain Wood Conditioner

**Stain:** Minwax® Gel Stain Honey Maple  
(or any color you prefer)

**Finish:** Minwax® Wipe-On Poly Satin

### Alternate Finish 1

**Prep:** Minwax® Pre-Stain Wood Conditioner

**Stain:** Minwax® Wood Finish™ Golden Pecan  
(or any color you prefer)

**Finish:** Minwax® Fast-Drying Polyurethane Semi-Gloss  
(or any sheen you prefer)

### Alternate Finish 2

**Prep:** Minwax® Pre-Stain Wood Conditioner

#### One-step stain & finish:

Minwax® PolyShades® Honey Pine  
(or any color you prefer)

## BEFORE YOU BEGIN

Good craftsmanship begins and ends with good work habits, so make the following steps part of your routine workshop practice. If you have any doubts or questions about how to proceed with a project, always discuss them with your shop instructor.

- Carefully and fully review plans and instructions before putting a tool to the project lumber.
- Work sensibly and safely. Wear safety goggles when doing work that creates flying chips and sawdust; wear the appropriate respirator whenever making sawdust or working with thinners or other solvents.
- At the end of every work session, clean up your shop area and put away all portable tools.

## PROCEDURE

Refer to the project illustration (Fig. A) shown on page 6.

1. Plan and lay out all the plywood cuts (A, B, C, D) on one-and-a-half sheets of oak plywood. From the full 4' x 8' sheet, you can cut seven sides (A), the two base sides (B), four shelves (C) and two backs (D). From the 4' x 4' sheet, you can cut one side (A), one shelf (C) and three backs (D).
2. Cut all the plywood pieces.
3. Use a compass to lay out the semicircular cutouts for the interlocking sides. Use a jigsaw to make the cutouts.
4. On the table saw, rip the solid oak to make the stretcher (E) and the 1/4" edging (F).
5. Begin assembling the shelf modules by gluing and nailing the backs (D) to the shelves (C), as shown in figure B on page 7. You must also attach the solid oak stretcher (E) to the underside of the base module shelf, as shown in Figure A on page 6. To attach the stretcher invisibly, use the concealed-dowel method suggested for joining the sides to the shelf/back assemblies, as described in steps 7 and 8. Drill for four dowels along the top edge of the stretcher and one dowel at each end.
6. Lay out locations for the dowel holes in the ends of all the shelves. There will be four dowels on the end of each shelf and back. See Figure C on page 7.
7. Using a doweling jig or a horizontal boring machine, drill 1/4"-dia. x 1"-deep holes into the ends of the shelves.
8. Using dowel centers, transfer the locations of the dowel holes on the shelves to the inside faces of the sides. At this point, you should group the pieces into module sets (two sides, one back, one shelf) and number them so they'll stay together through the assembly.
9. Drill 1/4"-dia. x 1/2"-deep holes into the locations marked by the dowel centers.
10. Cut to length and then glue and clamp the edging to front edges of the shelves and sides. If any glue squeezes out, wipe it away immediately with a damp cloth. Allow the glue to dry before proceeding to the next step.
11. Sand the edging until it is smooth and even with the plywood.
12. Assemble each module, carefully applying glue and using bar clamps to draw the pieces tightly together. Check for any glue that might have squeezed out of a seam and wipe it away with a damp cloth. Allow the glue to dry before proceeding to the staining and finishing.

## STAINING AND FINISHING

**Woodworker's Tip:** *Though you may be tempted to cut short your sanding, preparation and application time, don't do it. These tasks are very important steps in obtaining a high-quality finish. Remember, it is the finish, just as much as the fit and smoothness of the parts that will have great bearing on how people judge your craftsmanship. To ensure an excellent result, follow the steps listed in this section and also the instructions the finish manufacturer puts on its products.*

### Finishing Tips

- Test the stains and finishes you are planning to use on scraps of wood. On the back of the scrap, mark the stain/finish combination and the type of wood. Allow all samples to dry thoroughly before making your final finish selection. Save your samples for quick reference on future projects.
- All stains and finishes must be allowed to dry thoroughly between coats. Remember that drying times can vary due to humidity and other climatic conditions.
- If you have some leftover stain or finish, wipe the can rim so that stain or finish in the rim won't dry out and prevent the lid from forming a tight seal.
- Brushes used for oil-based finishes must be cleaned with mineral spirits.

13. Sand the shelf modules with 120-grit paper, then move up to 220-grit to complete the pre-finish smoothing. Use a pad sander and with-the-grain sanding strokes to remove any marks or scratches that may have occurred during assembly. Dust off the piece and wipe it carefully with a clean, lint-free cloth lightly dampened with mineral spirits.

14. If you choose a stain and topcoat finish, do the staining in two steps, starting on the interior surfaces and then moving to the exterior surfaces.

**NOTE:** If you choose a softwood such as pine, you'll need to prepare it for staining with a coat of Minwax® Pre-Stain Wood Conditioner. Applying this will help to ensure even absorption of stain and prevent blotchiness that can occur with some softwoods. Simply brush the conditioner over all the wood and allow it to penetrate for 5 to 15 minutes. Then remove excess conditioner with a clean dry cloth.

### Recommended Finish:

15. Apply the Minwax® Gel Stain you've chosen to the interior surfaces using a clean, lint-free cloth or natural bristle brush. Allow the Gel Stain to set for about 5 to 10 minutes, then wipe off any excess. Repeat for the exterior surfaces. Allow the stain to dry for 24 hours before applying the finish.

**Woodworker's Tip:** When wiping off stain, make certain that your last wipe with the cloth goes with the grain of the wood. This way, any stain you might miss during wipe-off will be visually minimized by the wood grain.

**16.** Apply Minwax® Wipe-On Poly following the directions on the can. Use a clean, soft, lint-free cotton cloth. Allow the first coat to dry overnight.

**17.** The next day, sand all surfaces lightly with 220-grit paper using with-the-grain strokes. Dust off and wipe all surfaces with a cloth lightly dampened with mineral spirits. Apply a second coat of Wipe-On Poly and set the pieces aside to cure overnight.

**18.** The next day, sand all surfaces lightly with 220-grit paper. Dust off and wipe the piece with a cloth lightly dampened with mineral spirits and apply the third and final coat of Wipe-On Poly. Allow the shelves to cure for several days before stacking and using them.

### Alternate Finish 1:

**19.** Prepare the wood as you did in the recommended finish.

**NOTE:** If you choose a softwood such as pine, you'll need to prepare it for staining with a coat of Minwax® Pre-Stain Wood Conditioner. Applying this will help to ensure even absorption of stain and prevent blotchiness that can occur with some softwoods. Simply brush the conditioner over all the wood and allow it to penetrate for 5 to 15 minutes. Then remove excess conditioner with a clean dry cloth.

**20.** Apply the Minwax® Wood Finish™ you've chosen to the interior surfaces using a clean, lint-free cloth. Allow the Wood Finish™ to set for about 5 to 15 minutes, then wipe off any excess. Repeat for the exterior surfaces. Allow the stain to dry for 24 hours before applying the clear protective finish.

**21.** Apply Minwax® Fast-Drying Polyurethane following the directions on the can. Use a good quality, natural bristle brush suitable for use with polyurethane. Allow the first coat to dry overnight.

**22.** The Following day, sand all surfaces tightly with 220-grit paper using with-the-grain strokes. Dust off and wipe all surfaces with a cloth lightly dampened with mineral spirits. Apply a second coat of Fast-Drying Polyurethane and set the pieces aside to cure overnight.

**23.** The next day, sand all surfaces lightly with 220-grit paper. Dust off and wipe the piece with a cloth lightly dampened with mineral spirits and apply the third and final coat of Fast-Drying Polyurethane. Allow the shelves to cure for several days before stacking and using them.

### Alternate Finish 2:

**24.** Prepare the wood as you did for the other finishes.

**NOTE:** If you choose a softwood such as pine, you'll need to prepare it for staining with a coat of Minwax® Pre-Stain Wood Conditioner. Applying this will help to ensure even absorption of stain and prevent blotchiness that can occur with some softwoods. Simply brush the conditioner over all the wood and allow it to penetrate for 5 to 15 minutes. Then remove excess with a clean dry cloth.

**25.** Apply Minwax® PolyShades® following the directions on the can. Use a good quality, natural bristle brush suitable for use with polyurethane. Allow the first coat to dry overnight.

**25.** Apply Minwax® PolyShades® following the directions on the can. Use a good quality, natural bristle brush suitable for use with polyurethane. Allow the first coat to dry overnight.

**26.** The next day, sand all surfaces lightly with 220-grit paper using with-the-grain strokes. Dust off and wipe all surfaces with a cloth dampened with mineral spirits. Apply a second coat of PolyShades® and set the pieces aside to cure overnight. Repeat this process if a third coat is desired, or allow the shelves to cure for several days before stacking and using them.

### Product Safety

For your safety and the safety of those you work with, always read the safety warnings, which manufacturers print on their labels, and follow them to the letter. Typical safety advice and instructions will contain information such as the following:

**DANGER! MINERAL-BASED PRODUCTS ARE HARMFUL OR FATAL IF SWALLOWED. SKIN IRRITANT. COMBUSTIBLE. KEEP OUT OF REACH OF CHILDREN.**

**WARNING!** Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in U.S.) or contact your local health authority.

**DANGER:** Contains mineral spirits. Do not take internally. Avoid contact with skin and eyes. Wear rubber gloves and safety glasses when handling. Do not use or store near heat, sparks, flame or other source of ignition. Close container after each use. Avoid inhalation and use only with adequate ventilation. If using indoors, open all windows and doors to make sure there is fresh air movement. If you experience lightheadedness, dizziness or headaches, increase fresh air movement or leave the area. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

**FIRST AID:** If swallowed: Do not induce vomiting. Call physician immediately.

**FOR SKIN CONTACT:** Wash thoroughly with soap and water. If irritation persists, get medical attention.

**FOR EYE CONTACT:** IMMEDIATELY flush eyes thoroughly with water, then remove any contact lenses. Continue to flush eyes with water for at least 15 minutes. If irritation persists, get medical attention.

**IF AFFECTED BY INHALATION:** Immediately remove to fresh air. If symptoms persist, call physician.

**When using Minwax® Polycrylic® Protective Finish:**

**VAPOR HARMFUL.** Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches or dizziness, increase fresh air supply or wear respiratory protection (NIOSH/MSHATC23C or equivalent) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

**DO NOT TAKE INTERNALLY.**

**FIRST AID.** In case of eye contact, flush thoroughly with large amounts of water for 15 minutes and get medical attention. For skin contact, wash thoroughly with soap and water. In case of respiratory difficulty, provide fresh air and call physician. If swallowed, get medical attention immediately.

**DELAYED EFFECTS FROM LONG-TERM OCCUPATIONAL OVEREXPOSURE.**

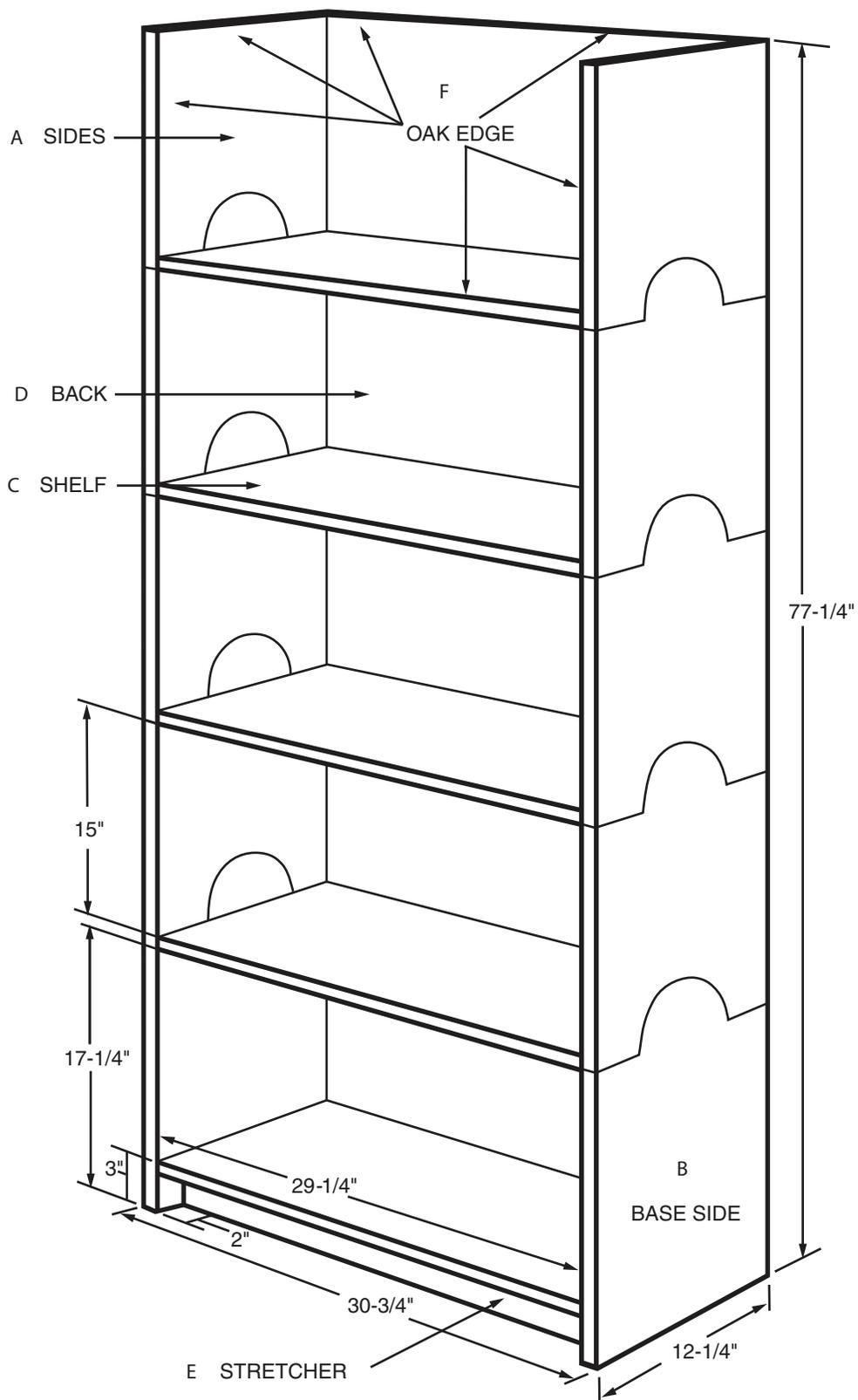
Contains solvents that can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

**SAFE DISPOSAL OF RAGS AND WASTE.**

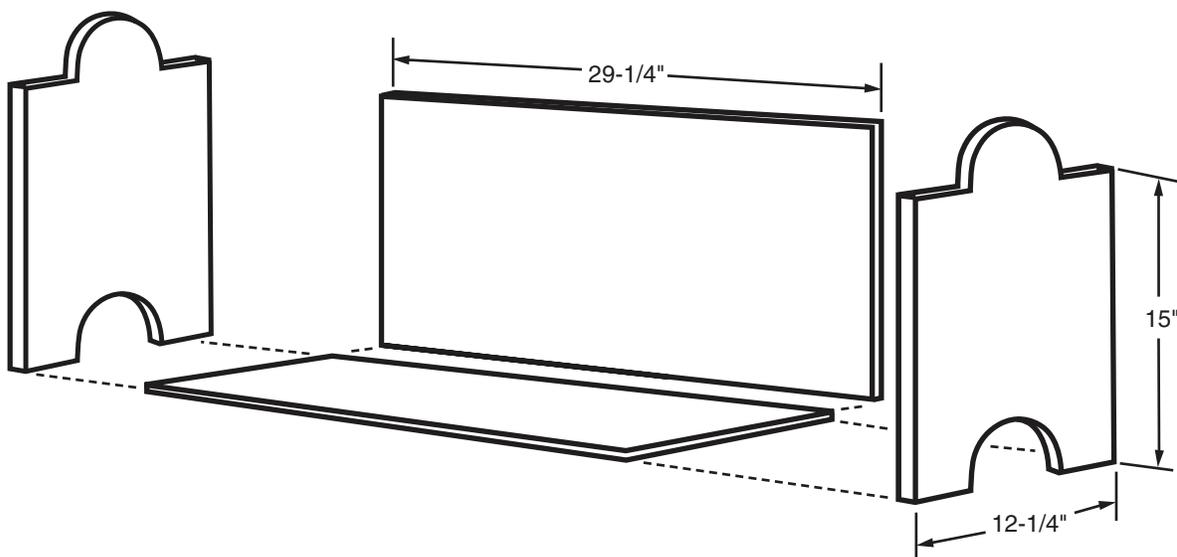
Please be mindful of the safe way to dispose of rags and other waste. Rags, steel wool and other waste products soaked with oil finishes or solvents may spontaneously catch fire if improperly discarded. Place rags, steel wool and other waste immediately after use in a waterfilled metal container. Tightly seal and dispose of the waste materials in accordance with local trash removal regulations. Be sure to keep the waste out of reach of children.

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**FIG A. STACKABLE SHELVES**



**FIG B.**



**NOTE:**  
 ENDS ARE GLUED AND DOWELED  
 WITH 1/4" x 1-1/2" DOWELS TO  
 SHELVES AND BACKS

**FIG C.**

