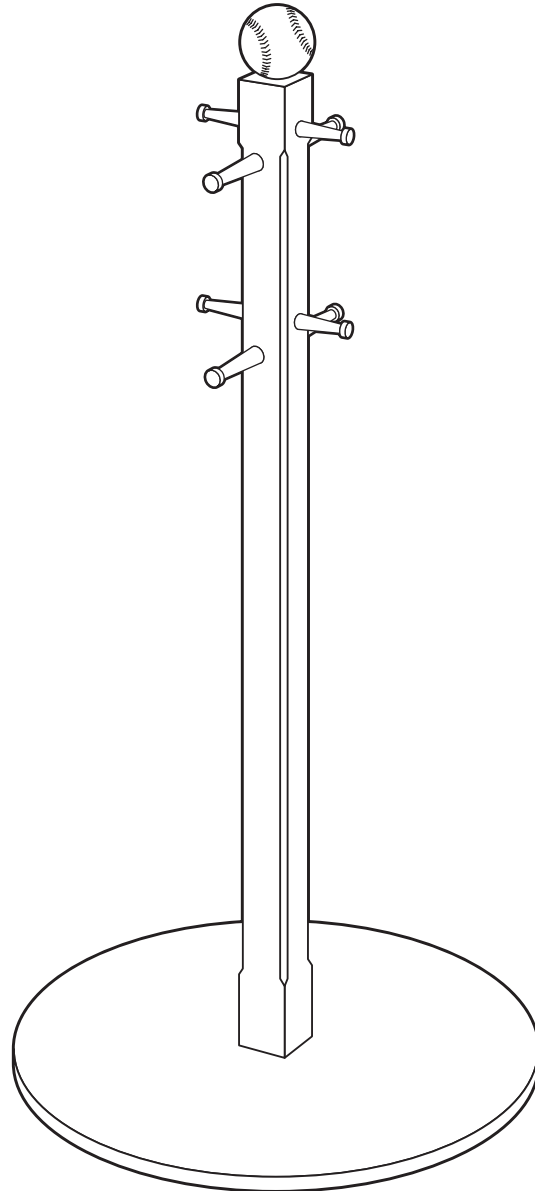




**WOODWORKS: BEGINNER PROJECT 2008-2009**  
**BASEBALL CAP RACK**



For rookie woodworkers with a fondness for baseball, this stylized cap rack is sure to hit a home run. It's the sort of project that makes learning woodworking techniques fun, and it's the perfect addition to any fan's bedroom, or a great gift. Standing 54" tall, it can accommodate as many as eight caps, so along with displaying your favorite baseball team, there's room for caps from your other favorite sports and hobbies. Making this rack will give beginning woodworkers the opportunity to learn and practice a few important, fundamental techniques, such as measuring and marking, making straight and curved cuts, doing precision wood boring, and shaping edges with a router. And when it's all assembled, you'll learn more about applying and using stains and finishes to protect the wood and keep it looking beautiful.

**TOOLS REQUIRED****Hand Tools**

Combination or try square  
 Assorted files  
 1" paddle bit  
 1/2" drill bit  
 Phillips-head screwdriver  
 Handsaws  
 Hammer and nail set  
 Block plane  
 Hand screw clamp  
 Bar clamps  
 Mallet

**Power Tools**

Drill press and portable drill  
 Table saw with dado cutter set  
 Band saw  
 Jointer  
 Stationary and portable belt sanders  
 Random-orbit sander

**Miscellaneous**

- Pencil
- Tape measure
- Safety glasses
- Carpenter's glue
- 120-, 150- and 220-grit sandpaper
- Clean, lint-free cloths
- Respirator
- Gloves for finishing
- Mineral spirits (for oil-based stains and finishes)
- Water-filled metal container with tight-fitting lid (for oil-based stains and finishes)
- Minwax® Wood Finish™ Stain Brush or other good quality, natural-bristle brush (for oil-based stains and finishes)
- Minwax® Polycrylic® Brush or other good quality, synthetic-bristle brush (for water-based stains and finishes)

**SHOPPING LIST**

**Wood Recommendation:** Pine or maple

Item	Description	Size & Quantity
A	Post	1x4, 4 pcs. at 5'
B	Base	3/4" x 36" x 36" pine or maple veneer plywood, 1 pc.
C	Tenon	1-1/2" dia. x 6" dowel, 1 pc.
D	Baseball dowel	1/2" dia. x 2" dowel, 1 pc.

**Miscellaneous**

- One regulation-size baseball
- Four 1-5/8" drywall screws
- Four 1-1/4" drywall screws
- Eight Shaker-style pegs, about 3-1/2" long

**CUTTING LIST**

Item	Description	Size & Quantity
A	Post	3" x 3" x 54", 1 pc.
B	Base	3/4" x 30" dia., 1 pc.
C	Tenon	1-1/2" dia. x 2-1/4", 1 pc.
D	Baseball dowel	1/2" dia. x 2", 1 pc.

**WOOD FINISHING PRODUCTS****Recommended Finish**

Prep: Minwax® Water-Based Pre-Stain Wood Conditioner  
 Stain: Minwax® Water-Based Wood Stain—Your Favorite Team's Colors  
 For example:  
 Mandarin Orange and Deep Ocean (New York Mets)  
 White Oak and Accents™ Midnight Blue (New York Yankees)  
 Finish: Minwax® Polycrylic® Protective Finish semi-gloss

**Alternate Finish**

Prep: Minwax® Pre-Stain Wood Conditioner  
 Stain: Minwax® Gel Stain Honey Maple  
 Finish: Minwax® Fast-Drying Polyurethane semi-gloss

## 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.

## CUTTING AND ASSEMBLY PROCEDURE

1. Glue and clamp together four lengths of 1x4 (A) stock to make a 3-1/2" x 3-1/2" piece that can then be ripped to 3" x 3" and cut to the 54" length. All mating faces should be covered with a thin layer of glue. Use three or four short bar clamps to hold them together. If the clamp jaws aren't padded, insert scrap wood between them and the work piece to prevent it from being marred. Wipe away excess glue before it dries.

**Builder's Tip:** When clamping the 1x4s together, keep all the edges flush with each other. They will have a tendency to slip due to the presence of the glue.

2. When the glue is dry, remove the clamps. Use a table saw to rip the post close to the finished size. Use a jointer to plane the sides smooth and to the exact dimension – 3" x 3".

3. Use a table saw or miter saw to cut the post to the exact length – 54".

4. Install a chamfering bit into the router. Mark the points where the chamfers stop, 4" from both ends of the post. Then position the router at the start point of one corner and trace the arc of the router base where it sits on the post. Do the same for all corners at both ends of the post. Now plug in the router and do the cuts, stopping each when the router meets the trace lines. To stabilize the base, use a piece of scrap that's the same thickness as the post (see Fig. 2). Chamfers can also be made with a block plane, files and sandpaper.

5. To drill into the middle of the baseball, set up the drill press with a 1" paddle bit. Clamp a scrap board to the drill-press table, and drill a hole 1/2" deep into the scrap. Remove the paddle bit. Do not disturb the position of the scrap piece (see Fig. 3). Install a 1/2" drill bit in the drill press. Set the ball in the hole bored in the previous step. Set the drill press for the hole depth (1") and drill the ball.

6. Locate the center of the top of the post by drawing diagonal lines between the corners. Bore a 1/2"-dia. x 1"-deep hole into the center.

7. Lay out peg locations shown in Fig. 5 on the post and bore holes for them, about 3/4" deep. Don't install the pegs at this time.

**Builder's Tip:** The stubs or tenons of most Shaker pegs taper from about 9/16" at the shoulder to about 1/2" at the tip. Assure that the holes you bore will accept the pegs without excessive

forcing, which could crack the pole around the hole. Before boring into the pole, test the fit in a piece of scrap. If the peg is too loose, use a slightly smaller bit.

8. To make the base, locate the center of the 3/4" plywood by drawing diagonal lines between the opposite corners (Fig. 4). From the center point, measure out 15" along one of the diagonals. Drive a small nail into the center point so that it's securely embedded. Tie one end of a string to the nail and the other end to a pencil, adjusting the length of the string so that when it's fairly taut, the pencil comes down on the 15" mark. Hold the pencil steady and draw a 30"-dia. circle.

9. Bore a hole just outside the circle that's big enough for a saber saw blade, and use the saber saw to cut out the circle. Sand the edges smooth.

10. Use a 1-1/2"-dia. spade bit to bore the through-hole into the base's center where the post will be secured by the tenon (C).

11. Clamp the post in a bench vise, bottom up, and locate the center by drawing diagonal lines between opposite corners. Make an indent with a center punch or nailset and bore a 1-1/2"-dia. hole about 1-1/2" deep. Reclamp the post with the top up and once again find the center. Drill a 1-1/2"-dia. hole about 1-1/2" deep.

12. Cut the tenon dowel (C) 2-1/4" long, apply a thin layer of glue to it and insert it into the post with a slight twisting action to seat it and spread the glue inside the hole. There should be about 3/4" of dowel protruding from the post. Glue the 1/2"-dia. dowel into the top of the post.

13. Apply glue to the exposed end of the dowel and attach the post to the base. Use the mallet to ensure a tight fit.

14. Working quickly, return the post-base assembly to the bench vise with the base up. Bore four countersunk holes through the base and into the post. Drive in four 1-5/8" drywall screws until the heads are slightly below the surface of the plywood.

15. Remove the assembly from the vise. At this point, decide how the piece will be stained. If the pegs will be a different color from the post and base, proceed with the prep and staining now (step 17). If one stain will be used, glue the Shaker pegs into the post, tapping them lightly with the mallet.

## 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 water-based products, such as Minwax® Water-Based Wood Stains or Minwax® Polycrylic® Protective Finish, must be cleaned with soap and water; oil-based finishes must be cleaned with mineral spirits.

16. Finish-sand the corners and any other rough spots with 220-grit sandpaper. Dust off the piece and wipe it carefully with a clean, lint-free cloth lightly dampened with water.

### Recommended Finish

17. Before applying Minwax® Water-Based Wood Stain to a hardwood or softwood, apply Minwax® Pre-Stain Water-Based Wood Conditioner following the directions on the can. Applying it will help to ensure even absorption of stain and prevent blotchiness that can occur with some woods. After 1 to 5 minutes, wipe off all excess conditioner using a clean, soft cloth. Wait 15 to 30 minutes then use 220-grit or finer sandpaper to sand off any "whiskers" raised by the conditioner. Proceed to the staining within 2 hours.

18. Do the staining in two steps, starting on the interior surfaces and then do to the exterior surfaces. Apply the Minwax® Water-Based Wood Stain you've chosen to the wood using either a nylon/polyester brush or a cloth. Allow stain to penetrate no longer than 3 minutes. While stain is still wet, wipe off all excess with a clean cloth that's been lightly dampened with stain. Allow the piece to dry for 2 hours before applying a second coat, if desired. Allow the piece to dry overnight before applying the protective clear finish. If you've used a different stain color for the pegs, now is the time to glue them into the post.

**Woodworker's Tip:** *Minwax® Water-Based Wood Stain is available in 6 wood tones, a White Wash Pickling Stain, 60 custom-mixed colors, and 8 bold Accents™ colors. This means that you are not limited to just traditional wood colors (pine, oak, walnut, etc.). Instead, you can pick and apply a color to complement the décor of the room in which the bench will be placed. For this reason, make sure you look over all of the Minwax® color charts or go to [minwax.com](http://minwax.com) before making your final selection.*

19. After allowing the piece to dry overnight, apply Minwax® Polycrylic® Protective Finish following the directions on the can. Stir the can contents thoroughly before starting and periodically repeat the stirring during your work session.

20. Working a small area at a time to maintain a wet edge, apply the first coat. Work quickly and make the final strokes in each newly finished section using with-the-grain brushstrokes.

21. Allow the finish to dry a minimum of 2 hours. Then sand lightly with 220-grit or finer sandpaper wrapped around a soft backup block.

Thoroughly dust off and wipe all surfaces with a cloth lightly dampened with water.

22. Repeat steps 19 and 20 to apply the second and final coat. When the final coat is dry, apply a small amount of glue to the baseball dowel (D) at the top of the post and set the baseball over it.

### Alternate Finish

23. Apply the Minwax® Gel Stain you've chosen using a clean, lint-free cloth or natural-bristle brush. Allow the Gel Stain to set for about 3 minutes, then wipe off any excess with a clean, lint-free cloth. To achieve a deeper color, you may apply a second coat after 8 to 10 hours, repeating the application directions for the first coat. 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.*

### Applying Minwax® Fast-Drying Polyurethane

24. Apply Minwax® Fast-Drying Polyurethane following the directions on the can. Use a good quality, natural-bristle brush. Allow the first coat to dry overnight.

25. The next day, sand all surfaces lightly with 220-grit or finer sandpaper using with-the-grain strokes. Dust off and wipe all surfaces with a cloth lightly dampened with mineral spirits. Apply a second coat of polyurethane and set the piece aside to cure overnight.

26. On the third day, sand all surfaces lightly with 220-grit sandpaper. Dust off and wipe the piece with a cloth lightly dampened with mineral spirits. Apply the third and final coat of polyurethane.

### 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:

**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.

### When using oil-based wood finishing products:

**CAUTIONS: CONTAINS ALIPHATIC HYDROCARBONS. Contents are COMBUSTIBLE.** Keep away from heat and open flame. **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, or wear respiratory protection (NIOSH approved), 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.

**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, call Poison Control Center, hospital emergency room, or physician immediately.

**NOTICE:** Reports have associated repeated and prolonged occupational exposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal.

**WARNING:** This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm. **DO NOT TAKE INTERNALLY. KEEP OUT OF REACH OF CHILDREN.**

**When using water-based wood finishing products:**

**CAUTIONS:** 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, or wear respiratory protection (NIOSH approved), 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.

**FIRST AID:** In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, get medical attention immediately.

**WARNING:** Contains Alkyl propanols, ethylene glycol, n-methyl pyrrolidone. **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, or wear respiratory protection (NIOSH approved), 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.**

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

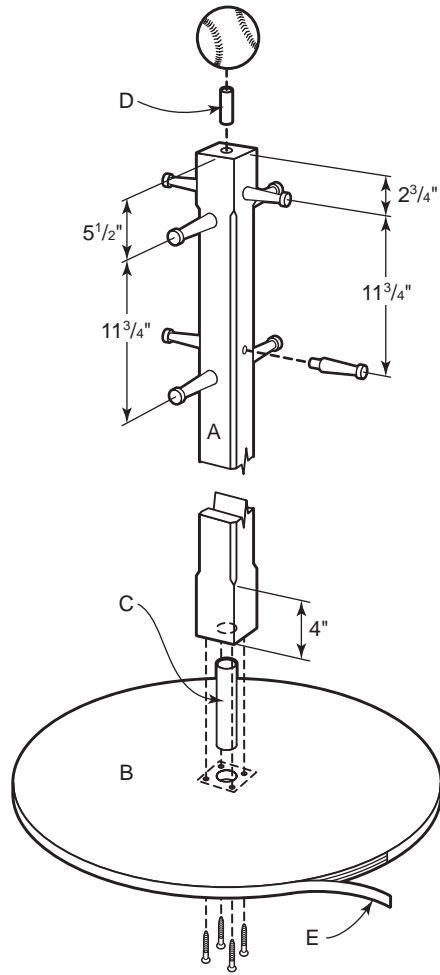
Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal.

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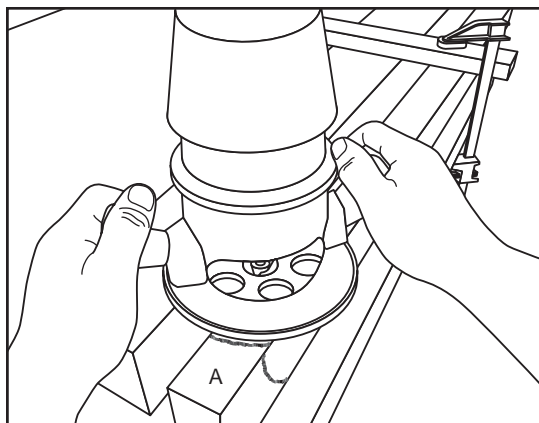
**SAFE DISPOSAL OF RAGS AND WASTE.**

**DANGER:** Rags, steel wool, other waste soaked with this product, and sanding residue may spontaneously catch fire if improperly discarded. Immediately place rags, steel wool, other waste soaked with this product, and sanding residue in a sealed, water-filled metal container. Dispose of in accordance with local fire regulations.

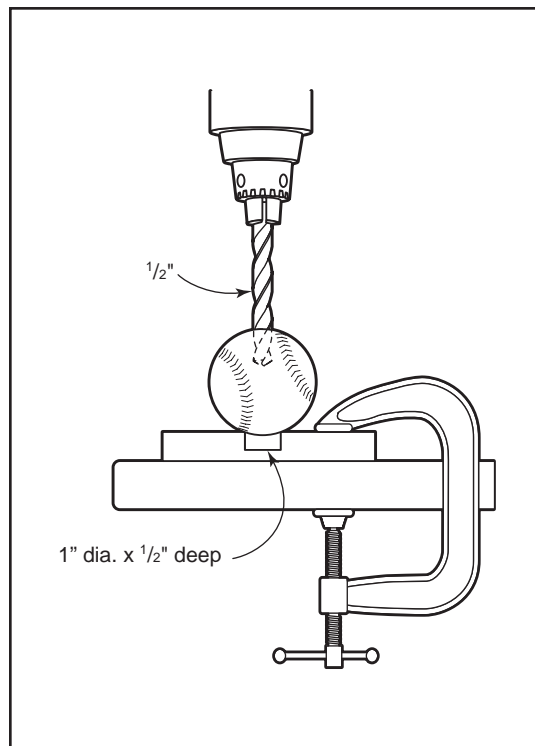
FIG 1.



**FIG 2.**



**FIG 3.**



**FIG 4.**

