Caulking comes in many varieties, colors, and prices. Ask your hardware dealer for the right kind for the job you are doing. Fill wide or deep cracks with fiberglass insulation, a tarred rope called *oakum*, or expandable foam insulation.

If you are using a caulking cartridge, cut the tip at a 45-degree angle and hold the gun at the same angle. Experts disagree over whether you should "push" or "pull" a bead of caulking as you work. Either way, move slowly so that the caulking fills the opening completely and overlaps both surfaces. Wipe away excess caulk with a damp rag or wet finger.

Use the same technique to prevent water leaks around sinks and tubs. For those areas, sealant is available in smaller dispensers.

Painting Walls and Ceilings

A fresh coat of paint will brighten any room. Most of the work is in adequate preparation. Paint the ceiling first, then the walls, floorboards, doors, and window trim.

Note: For more in-depth information on painting walls and ceilings, see the *Painting* merit badge pamphlet.

The Right Paint for the Project

There are lots of different kinds of primers and paints. Check with someone at a paint store to make sure you are getting the right paint for the project. Also, always read the product label and closely follow the manufacturer's safety guidelines. If possible, obtain the MSDS (material safety data sheet) for the product. Contact the manufacturer (check the product label) or search online (with your parent's permission).

- **Latex paints** are water-thinned and can be cleaned with soap and water. They are good for walls and ceilings.
- **Alkyd paints** are oil-based and have to be thinned and cleaned with a solvent such as turpentine. They are particularly useful in baths and kitchens.
- **Enamels**, available in both latex and alkyd bases, have a harder surface than most interior paints.

Safety First

- When painting, make sure your work area is well-ventilated.
- Lead-based paint is a major source of lead poisoning for children and can also affect adults. If you are removing existing paint that you think may contain lead, get it checked by an expert. Avoid activities that will disturb or damage any lead-based paint and create dust. State and local health departments and housing authorities may have lead poisoning prevention programs and information about testing labs and contractors who can safely remove lead-based paint.
- Basements, garages, and storage areas can contain many tripping hazards and sharp or pointed tools that can make a fall even more hazardous. Have light switches at each entrance to a dark area. Keep an operating flashlight handy in case of a power loss.

Proper Use of Hand Tools

Common hand tools include rags, sandpaper, abrasive pads, scrapers, broad knives and putty knives, wire brushes, and chipping hammers. Before using a scraper, brush, knife, or hammer, wash away oil and debris with detergents or solvents. Brush away or vacuum particles afterward.

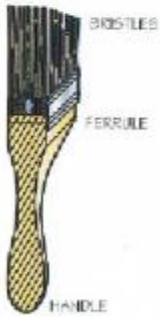
Remember to follow these safety guidelines:

- Always wear goggles and gloves.
- Keep tools in good condition.
- Do not leave unused tools lying around.
- Never throw tools; use tools only for the purpose they were intended.
- Avoid using tools that make sparks near combustible liquids or vapors.
- Properly dispose of used rags frequently, and always at the end of each day.

Common Hand Tools

- **Scrapers** remove paint from any type of surface.
- Use **broad knives** and **putty knives** to apply patching material and to scrape loose paint.
- **Wire brushes** clean debris from all types of surfaces.
- **Chipping hammers** chip away layers of loose surface material.

Application Equipment Selection and Usage



BRUSHES

Use brushes for cutting in and painting areas that the roller can't reach. Try to use only quality brushes. Some brushes may be more expensive, but they may be worth it in the end because they will last longer and using them will give a better overall performance as you apply paint.

A paintbrush consists of four parts: the handle, the bristles, the epoxy setting that binds the bristles together, and the *ferrule*, which attaches the bristles to the handle.

Select a brush that is appropriate for the job and coating type. Use a synthetic brush when painting with latex paints. Make sure the brush holds the bristles tightly. Use natural bristles when using oil-based paints and varnish.

Choose brushes suitable in width for the specific project. For large areas, use a wall brush. Select a narrow sash brush for smaller, hard-to-get-to areas. For varnishing, use a thinner brush.

ROLLERS

Using rollers gets a paint job done quickly. There are two types of rollers: the more common dip roller, which is dipped into the paint for application; and the fountain or pressure roller, which has a hollow core where the paint is stored and pressure-fed through small pores to the outer fabric.

The fibers on the roller covers are known as the *nap*, usually described by the fiber length, which ranges from ¼" to 1¼". Generally, the rougher the surface you are painting, the longer the nap you should use. The longer nap makes it possible to work paint into irregular surfaces such as concrete block and highly textured walls like stucco.

Other equipment used with rollers includes extension poles, which can make it easier to reach higher places; trays; mesh grids, which are immersed in 5-gallon paint buckets to serve the same purpose as the rough edges in a roller tray; and special tools for cleaning roller covers.

The smoother the surface you are painting—and the smoother the finish you want—the shorter the nap you should use.

Is Your House Lead Free?

Lead-based paint can cause serious health problems. Removing it is such a high-risk job that it is best left to a professional. Structures built prior to 1978 are likely to have been painted with lead-based paint. Ask your parents when your house was built. If it was before 1978, or if they are not certain when it was built, do not attempt to use your house as a project. Find something else.

Never attempt to remove lead-based paint yourself.

Contact the Environmental Protection Agency for more information (see the resources section in this pamphlet).

PADS

Paint pads are rectangular foam pads covered with fabric and set in a plastic holder. These pads, with their straight sides, are useful for painting areas like the space between the ceiling and doorframe as well as exterior siding.

Preparation

Preparing for painting is as important as the painting itself. If you don't prepare correctly, the paint may not bond well to the surface.

Fill any minor cracks or holes with *surfacing compound* and allow it to dry thoroughly. Use sandpaper to level and smooth the patches. Because surfacing compound shrinks as it dries, you may need a second application. You may also need to texturize the second application to match the wall or ceiling texture. Again, allow your work to dry thoroughly before painting.

Make sure that all surfaces are clean, dry, and free of dust. This is particularly important—even fingerprints can prevent paint from adhering well! Use a heavy-duty household detergent to wash all areas to be painted.

Cover light fixtures and doorknobs with plastic bags, and protect floors and furniture with drop cloths. Use masking tape around the edges of woodwork. Remove switch plates and tape heavy paper over jacks, plugs, and switches, or disconnect the power to the room.

Here is how to determine the amount of paint needed for a rectangular or square wall. Multiply the height and the width.

Example: 8' height × 20' width = 160 square feet

To determine the area of a room, multiply the height and the width for each wall, then add the total for each wall.

Example:
8' height × 20' width = 160 square feet for wall 1
8' height × 20' width = 160 square feet for wall 2
8' height × 15' width = 120 square feet for wall 3
8' height × 15' width = 120 square feet for wall 4
160 + 160 + 120 + 120 = 560 square feet total

You will need enough paint to cover 560 square feet. You probably will need a little less than 2 gallons for the room.

Painting Basics

- Read the label on the paint can before purchasing. Calculate the area you want to paint and compare that with the label to know how much paint to buy.
- Stir paint thoroughly. Strain any impurities through cheesecloth or old nylon hosiery.
- "Cut in" edges with a brush—that is, paint a strip about 2 inches wide in corners and along edges where the same color of paint will meet.

- Use a sturdy ladder to reach high areas.
- Use a roller for walls and ceilings, with an extension rod for high areas. Pour the paint into a roller pan, about half an inch deep. Distribute the paint evenly around the roller.
- Work across the narrowest part of ceilings. Spread paint on the walls from the top down.
- With a full roller, spread paint in a large W or M pattern on one section of a wall or ceiling. Go over the area in several directions and smooth all edge marks from the roller. Use up all the paint on the roller before reloading (resoaking) it.

Cleanup

- Keep a damp rag and a dry rag handy while you're painting. Wipe away drips and splatters as they occur.
- Clean latex paint out of a metal roller pan with soapy water. Disposable plastic liners are available for metal pans. If the pan is plastic, let the paint dry and peel it away later.
- Clean paintbrushes thoroughly after each use.

Waterproofing a Basement

These instructions are for unpainted, untreated basement walls. If your basement is painted, you must strip off the paint before you begin waterproofing.

Step 1—Prepare the walls as for painting, that is, cover all electrical sockets, etc.

Step 2—Using a broom or stiff scrub brush, clean any mildew from walls with a mixture of 3 quarts hot water, ½ cup trisodium phosphate (TSP, available at hardware stores), and 1 quart chlorine bleach. Wear gloves as you work with this mixture.

Step 3—After the wall is clean and dry, use a paintbrush to apply a premixed, concrete-based latex waterproofing compound. Make sure you fill in all the tiny cracks and pores.

Step 4—Allow the wall to dry, and apply a second coat.

Environmental Responsibility

Using chemicals comes with a risk for polluting the environment. Take care in all steps of painting and handling materials. Always dispose of any chemical material according to the manufacturer's instructions and local laws.

Air and Water Pollution. Local, state, and federal regulations apply to hazardous material disposal, so ask your merit badge counselor about regulations that may affect your project. The local Environmental Protection Agency office (look in the blue pages of the phone book) can tell you more about environmental regulations in your area.

Never remove old paint that may contain lead. Doing so may harm the environment and put yourself and others at risk. Particles can disperse into the air or settle on the ground, threatening the health of anyone nearby. Lead-contaminated earth can be lethal. Contact a qualified professional painting contractor for projects where lead-based paint may be present.

Proper Disposal Procedures. Sweep or vacuum any particles of old paint you remove, and properly dispose of this waste. To dispose of leftover paint, remove the lid and allow the paint to completely harden. Replace the lid and throw the can away. This way, the paint will not escape the can and contaminate the environment.

Weather Stripping

Doors and windows that are tightly fitted and properly weather-stripped help prevent costly heat loss from a home. Weather stripping comes in a variety of materials, including metal, vinyl, and foam. For heavily used doors and windows, nail-on weather stripping holds up better than self-adhesive types, saving time and money in the long run.

For added protection, apply a thin ribbon of caulk to nail-on weather stripping before fitting and nailing in place.

Replacing Weather Stripping on a Door

Jamb weather stripping seals the space along the sides and top of the door. *Sill weather stripping* keeps drafts or water from entering underneath the door.

JAMB WEATHER STRIPPING

Step 1—Always start with a clean, smooth, and dry surface. Remove old weather stripping if necessary. Clean the door jamb with soap and water (especially if you are using self-adhesive stripping). Allow the jamb to dry completely.

Step 2—Cut the top piece of weather stripping first, fitting it to the corners of the doorstops. Then cut the side pieces to ensure a snug fit at top and bottom. Allow for a gap at the strike plate by the door knob.

Step 3—Start with the top piece. If you are using the nail-on type stripping, nail the trim to the jamb using 4d nails. If you are using self-adhesive stripping, position the weather stripping before peeling off the paper backing. Check to be sure that the weather stripping compresses slightly against the closed door. If it compresses too little or too much, it does no good.

SILL WEATHER STRIPPING

After the jamb weather stripping is installed, seal the bottom of the door with a door sweep. High carpeting or an uneven floor may block a standard door sweep. In these cases, consider installing a hinged sweep instead.

Step 1—Cut the sweep to length. When working on the side of the door with the stops, cut the material ⅛ inch short so that it clears the stops.

Step 2—Adjust and position the sweep to seal firmly but not too tightly against the threshold.

Step 3—Tack both ends of the sweep to the door. Use screws or nails to secure the sweep in place.

Replacing Weather Stripping on a Window

When weather-stripping windows, gasket-type materials are easy to install but may wear out quickly. It should be used only along the sash where friction will not occur. Always start with a clean, dry surface.

Pressure sensitive weather stripping, such as the self-adhesive type, should be used only on the areas where friction does not occur. On windows, this means it can be used on the upper sash and lower sash, but not on the sides. If you were to apply pressure-sensitive weather stripping to the sides, opening and closing the window would be difficult and cause the weather stripping to pull loose.

GASKET-TYPE WEATHER STRIPPING

Rolled vinyl and felt are the most common choices for gasket-type weather stripping. Felt weather stripping must be installed on the inside of windows. Other types can be installed on the exterior, where they are less obvious and provide a better seal.

Step 1—Cut the weather stripping to the length of the sash.

Step 2—Attach the weather stripping so that it compresses slightly when the window is latched.

For double-hung windows:

Step 1—Attach the strips to the outside face of the sashes.

Step 2—Seal between the sashes by attaching a strip to the bottom of the upper sash.

Step 3—Seal the top and bottom sashes by attaching a strip to the outside of the upper sash's top rail and of the lower sash's bottom rail.

For casement windows, attach weather stripping to the sash or the casing, whichever makes a tighter seal.

In windows, the *sash* refers to the framework that holds a pane of glass. So, a double-hung window has two sashes, or parts.

Spring Metal Weather Stripping

Some older homes use spring metal weather stripping, which is designed to fit inside window channels or frames. Gasket-type weather stripping can be used in its place. Just follow the instructions in this chapter for installing gasket-type weather stripping.

Flooring Fix-Ups

Keeping up what's underfoot helps the overall appearance of a home and the lasting durability of your flooring.

Safety First

- When repairing or replacing vinyl or linoleum flooring, have an expert check the existing materials to make sure that they don't contain asbestos.
- Keep your working area well-ventilated; adhesives, sealers, and adhesive solvents may contain harmful fumes.

Repairing Vinyl Flooring

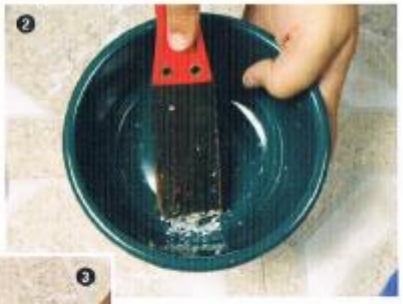
Vinyl flooring is available in sheets and tiles. Chemical seam sealers are available for some flooring materials; be sure you purchase the correct kind for your flooring.

Filling Scratches and Dents

Scratches and dents in vinyl flooring can be filled using a paste made with shavings from a scrap piece or extra tile.

Step 1—Scrape the surface of the extra flooring piece with a notched blade to make a powder.

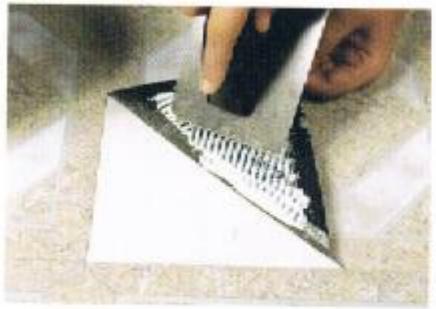
Step 2—Mix the powder with a clear, quick-drying varnish or lacquer.



Step 3—Surround the scratch or dent with masking tape to protect the undamaged floor.

Step 4—Trowel the mixture into the scratch with a putty knife so that it is level with the floor surface. Let it dry.

Step 5—Buff the surface with fine steel wool and boiled linseed oil.



Flattening Curled Tiles

Vinyl tiles sometimes curl at the edges, but you may be able to iron them flat again. First, cover the tiles with paper towels and heat using a warm—not hot—iron. Heat often reactivates the original adhesive. Once the tiles are flattened, cover the seams with foil or waxed paper, and weight down the tiles overnight.

If the tiles recurl, heat them again with a warm iron and then gently lift the curled edges and apply new adhesive. Press the tiles back into place and apply seam sealer. Cover the seams with foil or waxed paper and weight them down overnight.

Replacing Damaged Tiles

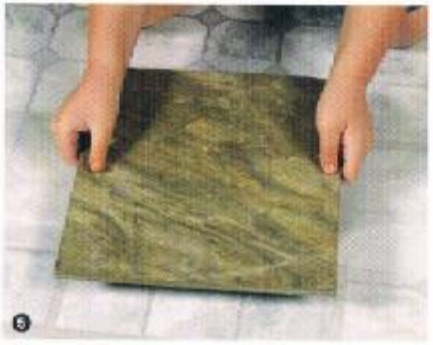
Replace damaged vinyl tiles square by square.

Step 1—Heat the damaged squares with a hair dryer to loosen the adhesive, and then lift them out with a putty knife or chisel. Be careful not to damage the edges of the adjoining tiles.

Step 2—Remove all old adhesive from the subflooring with the putty knife or chisel.

Step 3—Place the new tile in the opening, matching the pattern and trimming the new tile to fit.

Step 4—Apply the recommended adhesive to the floor. Warm the new tile with an iron or blow dryer and set it in place.



Step 5—Cover the new tile with foil or waxed paper and weight it down overnight.

Patching Sheet Flooring

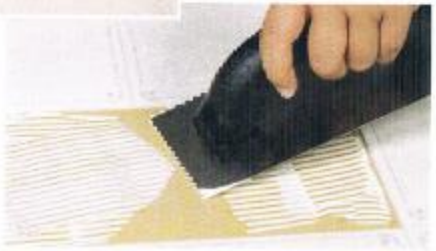
Here's how to replace a worn spot in sheet flooring:

Step 1—Cut a new piece of flooring that is larger than the damaged area. Match the pattern exactly and tape the new flooring in place.

Step 2—Use a sharp knife and carpenter's square to cut through both the patch and the old flooring. Remove the new patch and the surrounding scraps.

Step 3—Heat the old flooring with a hair dryer to loosen the adhesive. Remove the damaged area, working from the worn area to the edges. Be careful not to damage the edge of the patch area. Clean the old adhesive from the subflooring.

Step 4—Check the fit of the patch and trim it, if necessary. Apply adhesive to the subflooring and insert the patch. If seam sealer is available for that type of flooring, apply it to the edges.



Step 5—Cover the patch with foil or waxed paper and weight it down overnight.

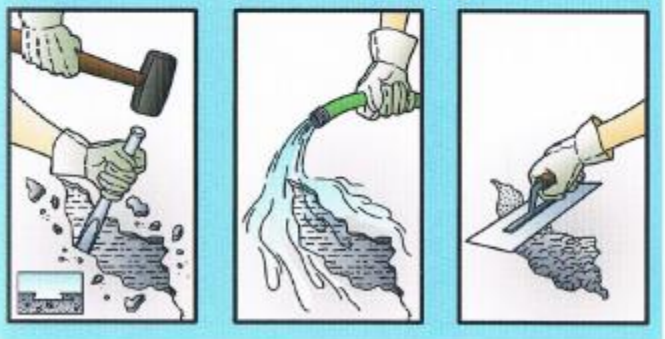
Repairing Concrete and Asphalt

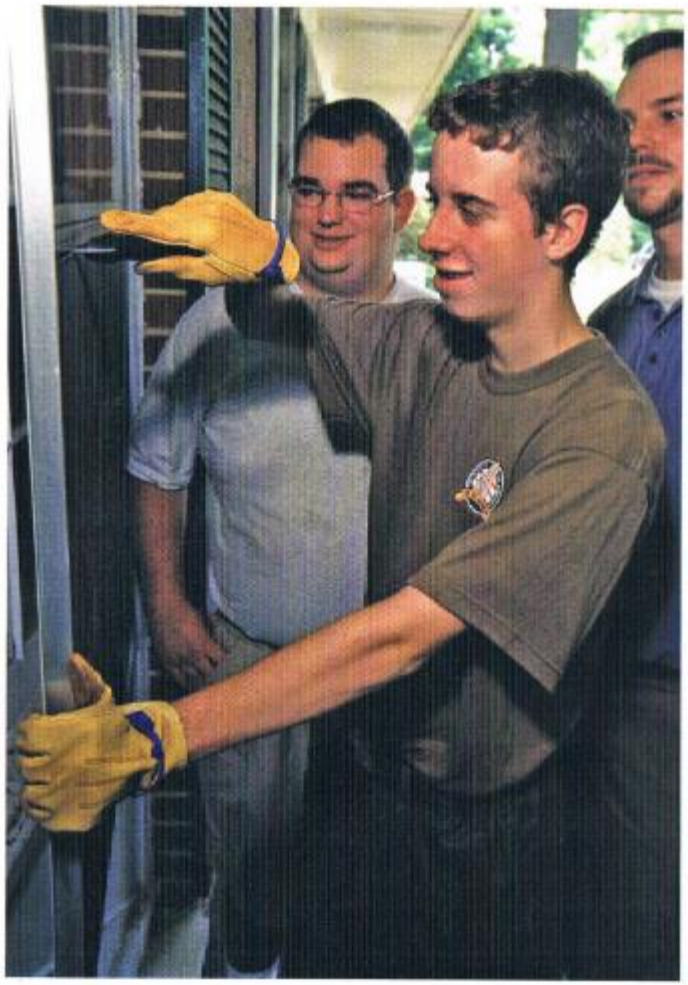
You can follow this procedure to repair cracks and small holes in concrete and asphalt.

Step 1—Clear the crack or hole of all large debris. Undercut the edges with a chisel and heavy hammer.

Step 2—Flush out the remaining debris with water.

Step 3—Apply patching material with a trowel. If you are patching concrete, the patch area must still be wet; if asphalt, the area must be completely dry. Use the edge of the trowel to pack every crevice.





All About Windows

Routine maintenance of your windows will keep them looking good inside and out and can also contribute toward keeping them working well. Often, this can lead to increased energy efficiency in your home—always an important goal.

Safety First

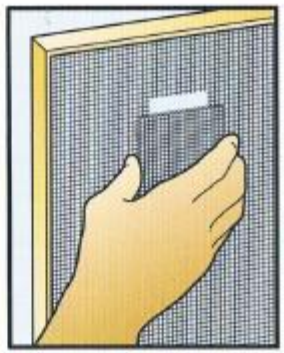
- Make sure that a raised lower window sash is secured when repairing a window.
- Always wear thick work gloves and eye protection when holding glass panes during window-repairing activities.

A window *sash* is the movable part of a window that includes the glass panes and the framework that holds those panes. A *double-hung* window has two sashes. *Casement windows* have a hinge on the side and swing like a door.

Repairing Screens

Severely torn or damaged screens should be replaced, but small holes or tears are easy to repair. Repair kits are available at hardware stores.

Cover small rips and holes in a metal screen with a patch that is 2 inches larger than the tear. First, press the damaged wires of the tear against a flat surface. Bend the wires on the edge of the patch into right angles (use a block of wood to help you make a straight, sharp bend). Center the patch over the tear and push the bent wires through the screening around the tear. Turn the screen over and bend the wires flat against the screen with a block of wood.



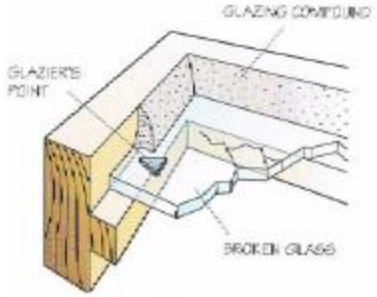
Glazing is the process or trade of fitting windows with glass. A *glazier* is the person who cuts and sets the glass.

For extra strength, work these wires into the screen again, weaving them back and forth as many times as you can. Your patch will be noticeable at first, but the new wire will weather with time.

For a fiberglass screen, cut a patch that is ½ to 1 inch larger than the tear. Using nylon thread, sew the patch onto the screening. Or you can apply a thin line of epoxy glue around the edges of the patch, smooth it, and then blot any excess before it dries.

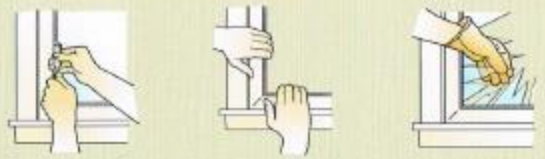
Replacing Glass Panes

Many homeowners' insurance policies include a provision that pays for a professional to replace broken windows. Before repairing a window yourself, check whether your homeowner's policy has this provision. If not, you can try replacing small panes yourself. But be careful! *Be sure to wear thick work gloves and eye protection when working with broken glass.* Also, don't break glass that is merely cracked; you might damage the frame.



Wood-Framed Windows

Step 1—Remove old glazing compound from the frame. Make this task easier by letting linseed oil soak into the compound for about 30 minutes. Then remove the *glazier's points* (small, flat, triangular metal pieces). Finally, remove the broken glass.

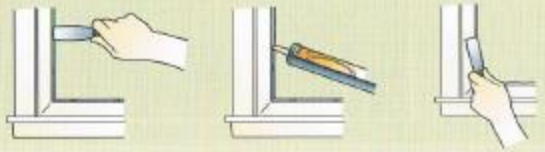


Step 2—Clean the frame, removing all paint and compound. Sand the wood, then add a light coat of linseed oil to help prevent the new compound from becoming brittle.

Step 3—Measure the frame; subtract 1/16 inch on each side to allow for wood expansion. Have the replacement glass cut to size, or carefully cut it yourself.

Step 4—Apply a thin bed of glazing compound to the frame's outside edge, then place the glass on this cushion. Install glazier's points every 4 to 5 inches.

Step 5—Lay strips of glazing compound around the frame; smooth it with a putty knife into a 45-degree bevel. Let it dry five to seven days before painting.



Making a Straight Cut on Glass

Before you try to cut a window pane, practice first on a piece of scrap glass so that you can get a feel for how much pressure you need to use to score the glass. If you hear a rasping sound as you move the glass cutter across the glass, your pressure is just right.

Step 1—Score the glass first with a glass cutter. Lay the glass on a padded surface and place a straightedge against the cut line. Run the cutter against the glass only once, pulling toward you in one smooth motion.

Step 2—Deepen the score by tapping against the underside of the score line with the ball at the end of the glass cutter.

Step 3—Place a thin dowel that is as long as the score line on the work surface, and place the score line directly over it. Press firmly on both sides of the score, and the glass should snap with a clean, straight edge.

Metal-Framed Windows

Glass can be held in metal sashes in three ways: with flexible spring clips that keep the glass in place (instead of glazier's points), with four plastic moldings that snap into channels in the frame (common with insulated glass), or with rubber gaskets. Talk with a professional or do some research about the kind of sash you have and the best way to remove and replace the glass.

Some metal windows come apart so that you can remove the gaskets and the glass. If rubber gaskets are worn and cracked, buy new ones. Also, make sure you use a glazing compound that is especially formulated for steel or aluminum window sashes.

Installing Rods for Curtains or Drapes

There are lots of different kinds of window treatments—including basic curtains and drapery rods. When installing rods, keep these things in mind:

- Keep rods perfectly level, even when the window isn't.
- Usually, you shouldn't be able to see rods from the outside.
- Bracket placement affects the look of a window, making it appear taller or wider, or both. Decide whether to allow wall space or window area to accommodate the drapes when they are open.
- When determining the height of a rod for full-length drapes, notice where the hooks are placed in the drape. Allow ½ to 1 inch at the bottom so the drapes will not touch the floor or carpeting, even after hanging for a while.
- Once you find the best place for the rod, hammer a small nail lightly into the frame or wall where the top of the bracket will be. Place a yardstick, a long thick dowel, or a metal ruler across the top of the nails. Check the placement with a carpenter's level.

Replacing Blind Cords

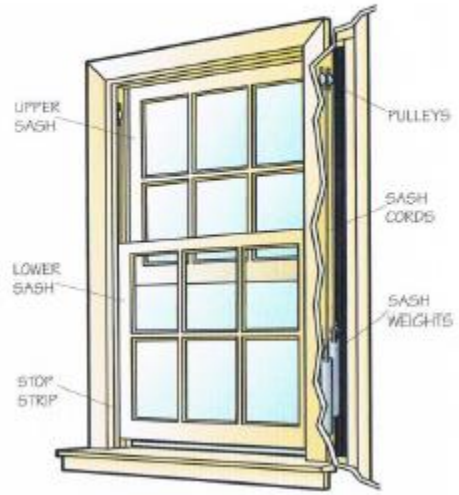
It doesn't cost much to replace broken or frayed cords in window blinds. Take the blind from the window and place it on a floor, table, or workbench. Pull tacks, clips, or staples from the top mechanism that holds the pulleys. Blinds will differ in the way they are made, so carefully sketch the cord path before removing the existing cords. When you are sure that you understand how the blind works, remove the old cords and thread the new ones through.

For easier threading, attach the new cord to one end of the existing cord with a small knot and cover it with tape. Pull the old cord until the new one is in place.

Repairing or Replacing Window Sash Cords

Many older wooden windows have a pulley system for opening and closing. Here's how to install a new cord in such windows. Note, however, that experts suggest replacing sash cords with sash chains if the window has a metal pulley with a groove large enough to accommodate the chain.

Step 1—Raise the lower sash of the window. With a wide, thick pry bar, pry out the stop strip on both sides of the window and lift the lower sash out of the window frame.



Step 2—Remove the cover to the weight pocket by unscrewing its screws. If necessary, pry off the cover with a chisel. Take the weight out of the weight pocket and remove the old cord.

Step 3—Add about a foot to the total length of the old cord and cut a new cord (or chain) to this length.

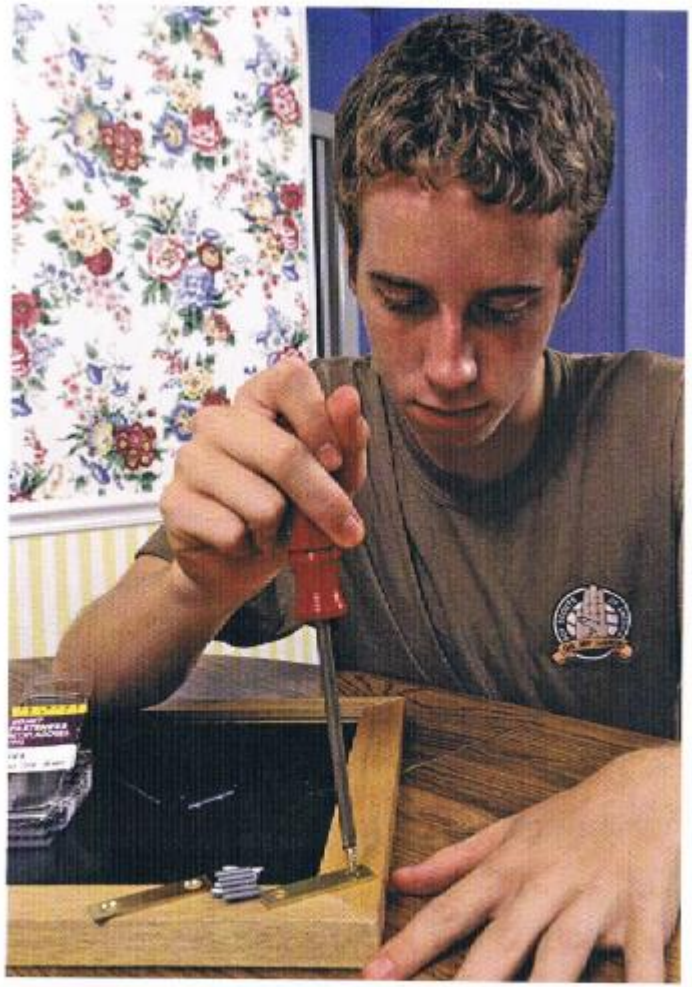
Step 4—Push the new cord over the pulley and connect it to the sash. If the cord sticks, tie a small fishing sinker to a string, attach it to the cord, and then drop the sinker over the pulley.

Step 5—Remove the sinker and attach the end of the cord to the sash weight. If you are replacing the cord with a chain, loop the chain through the hole in the weight and bind it tightly with wire. Put the weight into the weight pocket.

Step 6—Replace the pocket cover, then place the sash in the sill. Pull the weight as high as it will go. Cut the cord or chain 4 inches below the hole in the edge of the sash.

Step 7—Tie an overhand knot in the cut end of the cord, fit the knot into the hole in the edge of the sash, and release the slack. The cord will lie in the channel of the sash. If you have used a chain, secure it in the slot with two ¼-inch wood screws fastened through separate links of the chain.

Step 8—Replace the sash in the window frame and nail the stops back on.



Home Furnishings How-Tos

Furniture and decorative objects give your home its unique personality. Should one of these items break, don't trash it—repair it.

Safety First

- When spray painting, work in a well-ventilated area and wear a paper mask to avoid breathing paint fumes.
- Certain kinds of solder release fumes that can be harmful to your eyes and lungs; therefore, always work with solder in a well-ventilated area.
- Be careful not to let hot solder splash around because it will burn you almost instantly.
- Wear safety goggles when soldering.
- Before you start soldering, protect any flammable material with a fireproof shield or wet rags, and have a fire extinguisher nearby.
- If possible, use a soldering iron stand or clamps when you are soldering, leaving one hand free to hold the solder.
- Never leave a soldering iron on unattended.

Reinforcing Picture Frames

If pictures are hung improperly, particularly heavy ones, the joints of the frame may pull apart. It's a good idea to reinforce joints before hanging to prevent future problems.

One way to reinforce frames is by using a metal frame-mending plate, which you can buy at hardware stores. Drill holes first before securing the plate with screws, making sure that the screws aren't so long that they come through to the front of the frame.

To reinforce a small frame, use a finishing nail. Drill a hole for the nail (a *pilot hole*) and then drive the nail through the joint. Countersink the nail head and fill with surfacing compound. Or, heat a crayon that is close in color to the wood and apply it over the nail head; you can scrape off the excess crayon with a fingernail.

For a very large frame, use a ¼-inch dowel rather than a finishing nail. Drill a hole that is a little bit deeper than the dowel (for the glue). Coat the dowel with glue, hammer it into the hole, and cut the end flush with the surface of the frame.

Corrugated or *chevron fasteners* are useful for strengthening miter joints in a picture frame. Seal the edges with wood glue, and then hammer the sharp end gently across the joint. A small *angle iron* may also strengthen the joint.

Mending Pottery, Glass, and China

You can mend items made of pottery, glass, or china with quick-drying cements specially made for these materials. Each piece must be clean and dry. Fit the pieces together like a puzzle *before* cementing so that you know where each belongs and in what order they should be placed together. Apply cement according to the package directions, holding pieces together with rubber bands or masking tape for the entire drying period. Or, you can easily make a *positioning box* by filling a shallow box three-quarters full with uncooked rice or beans. When you place the item in the box, it will stay upright and balanced while the glue sets.

Let the glue set for 24 hours. If the item is in several pieces, you may want to do only a portion at a time, letting each set thoroughly before continuing to glue.

Soldering

Solder is a mixture of tin and lead (usually 60 percent tin and 40 percent lead) used to join together wires or other metals such as tin, copper, brass, or iron. Soldering is used in some plumbing jobs and can be used for minor repairs of kitchen items such as reattaching a handle to a collander.

Ribbon or wire solder with a rosin core is the most common type of solder. The rosin core in the center of this solder eliminates the need for a separate application of *flux*, which is a paste that removes tarnish from metal and helps make soldered joints stronger.

A 25- to 50-watt soldering pen is a good tool for the kinds of fine wires found in small appliances; soldering guns or irons with higher wattage are useful for larger soldering projects. Using the soldering gun for repairs is easy:

Step 1—Lightly scrape wires and metals to be soldered so that they are clean.

Step 2—Paint the area to be soldered with flux. Flux varies depending on the metal to be soldered. Make sure you use the right one. Acid fluxes corrode copper wires and must be washed away after soldering.

Step 3—Heat the soldering tool and apply it to the solder point. Feed the solder to the area from the top, letting it melt down over the joint.

Keep your soldering tool *tinned*, or coated with solder, at all times, to improve heat transfer and keep the tip of the tool in good working condition.

Repairing Furniture

Wobbly legs, loose rungs, splits, or warps detract from the appearance of wood furniture—and in time can lead to its ruin. Most of the time, minor repairs can solve the problem and the piece will be as good as new.

You will find many products for filling holes in wood: wood dough, wood filler, water putty, and stick shellac, for instance. Read the label to find out which will work best for the kind of hole you are filling.

Uneven Chair Legs

Place the chair on an even surface and note the airspace under the short leg. Even out this space by attaching a small metal glider to the shorter leg, or tack a small chip of wood to it. Remove the tack and wood-glue the chip in place. Before leaving the chair to dry, place a piece of foil or waxed paper under the leg in case of excess glue.

Filling Holes in Wood

If you are using wood dough or putty to fill a cavity, apply it so that it is slightly higher than the furniture surface. Let the filler dry thoroughly. It may shrink as it dries, so you may have to add another layer. Once it is dry and hard, sand the surface smooth, and then paint or stain and varnish the patch to match the surrounding color.

Repairing a Split in Wood

Fill splits with wood glue and then clamp with a vise, strong wire, or masking tape until dry. Protect the wood surface from scratches by padding the area with cardboard.

Basics of Sanding

Always sand with the grain of the wood when you are sanding by hand. If you don't, you'll leave scratches. Sand with an even pressure. For easier sanding, make a sanding block out of a block of wood that measures 3 or 6 × 3¼ × 1 inches. Pad the top and the bottom with cork or felt to protect the work. Wrap sandpaper around the block and hold it against the sides as you work.

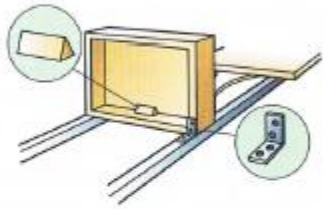
Loose Rungs

Remove the loose rung from its hole. Using sandpaper, steel wool, or a round file, clean the old glue out of the hole and from the tenon (the protruding piece of wood that fits into the hole). Coat the tenon with wood glue and wrap it with enough fine, strong thread so that it will fit tightly in the hole. Apply more glue to the thread and reinsert the rung into the hole. Clamp the joint until the glue dries.

Loose Joints

Simply tightening joint screws often solves the problem of loose joints. Sometimes, however, you may need to add filler first in order to tighten a screw sufficiently.

You also can strengthen a chair with an angle iron, or a strategically placed wood block glued and nailed to the chair back. Be sure the nail doesn't puncture the finished surface.



Water Rings and Fine Scratches

You can usually remove a water ring on wood furniture by rubbing it with toothpaste or another gentle abrasive cleaner. Buffing with very fine steel wool and furniture oil may remove surface scratches. When you are finished, clean the area thoroughly with a soft, dry cloth.

Veneer Bubbles and Dents

Veneer is a very thin layer of fine hardwood that is glued over a plywood or solid wood base. Sometimes the veneer bubbles up or dents down. A hot iron and a washcloth may be all you need to restore the surface, as you will soften the glue and then allow it to reharden. Use a dry iron and dry cloth on a bubble, and a steam iron and damp cloth on a dent. In both cases, be careful not to hold the iron down too long—just 5- or 10-second cycles, checking for scorching—so that you don't damage the finish. Cover the heated area with waxed paper and weight it down until the glue rehardens.

Don't skimp on a paintbrush. A good brush makes a world of difference when working with enamel. Be sure to choose the proper bristle for the paint you are using. Generally, alkyd- and oil-based paints require natural-bristle brushes, whereas synthetic-bristle brushes are fine for latex paint.

Painting, Staining, and Varnishing Wood

Restoring a piece of furniture to like-new condition, or repainting a major piece of house trim, such as a door, can give you a lot of satisfaction. When painting, choose enamel for woodwork because it's easier to keep clean. Enamel comes in latex or alkyd-based paint with either a high gloss or satin finish. For durability, buy the best paint you can afford.

Preparation

Painting and staining projects begin with similar preparation. Both also require careful attention to detail for the best results.

Step 1—Remove any hardware and clean the surface of all dirt and grime with household cleaner.

Step 2—Strip the old finish, if necessary. Use a commercial stripper and follow the manufacturer's directions. Read the label.

Step 3—Fill cracks and make any needed repairs.

Step 4—Lightly sand the entire object. Clean it with a soft, dry cloth to remove all the dust caused by sanding.

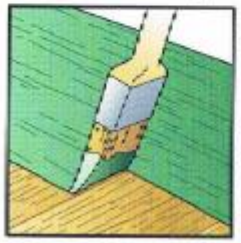
Painting and Varnishing

Step 1—Stir the paint thoroughly. If the paint has been used already, you may need to strain out any impurities with cheesecloth or an old nylon stocking.

Step 2—Lay down the first coat of enamel with long, full strokes. Smooth out runs before they set.

Step 3—When the surface is covered, go over the coat crosswise with the tip of the brush to smooth out the brush strokes.

Step 4—Allow the paint to dry thoroughly. Drying time depends on temperature and humidity.



Step 5—Resand with steel wool and wipe the piece of furniture clean. Apply a second coat in the same manner.

Spray Painting

Spray small objects in a cardboard box to contain excess spray. Spray larger objects outside or in a garage or basement. Protect floors and walls with a large spread of newspapers or drop cloths.

Make the first coat of spray paint very light and barely noticeable. The second coat can be a bit heavier. Let the paint dry thoroughly between coats.

Staining

Staining changes the color of wood and enhances the natural wood grain. There are two basic types of stains: *penetrating* and *pigmented*. Each has its advantages and disadvantages. *Gel stains* combine some of the best qualities of both stain types and are easy to apply.

Here are some hints for successful staining:

- End grains soak up stain more than the rest of the wood, so seal ends with shellac before staining. After drying, sand off any shellac that has lapped onto other areas.
- Apply stain with a chisel-end brush, foam pad, or lint-free cotton cloth (such as cheesecloth).
- Wipe off excess stain with a clean cloth.
- A second coat will darken the stain.

You can finish a stained piece with a polyurethane or varnish coating. Polyurethane is clear; varnish has some tint and may affect the stain color. Apply varnish with the wood grain. Smooth out runs before they set. Sand the piece with steel wool and wipe off the dust between coats.

Care and Storage of Equipment

Clean your brushes after each use. Cleaning takes only a few minutes and will help brushes last a long time. Allowing paint to harden in a brush makes cleaning difficult and time-consuming. If the same brush and paint have been used over several days, store the brush overnight (with most of the paint wiped off) in tightly folded aluminum foil or wet paper.

Clean brushes that have been used in oil-based paint with a solvent-based cleaner such as mineral spirits. (Follow the solvent cleaning by washing in warm sudsy water and rinsing.) With water-based paint, clean the equipment with soap and water, then rinse. Carefully smooth down the bristles and wrap the brush in its original packaging or heavy paper.

Remove roller covers from the frame. Clean them with the appropriate solvent or soap and water; rinse well. Clean up around the painted area. After the paint has dried on the drop cloth, shake off any debris, then fold or roll it up neatly. Sweep up any debris and properly dispose of it.

The most important part of taking care of any paint application tool or equipment is cleaning it immediately after painting. Failure to do so can cost you more time and more money spent on special cleaners, which in some cases may ruin the tool.

Doors and More

Making the outside of your home sound, safe, and attractive is just as important as keeping up the inside.

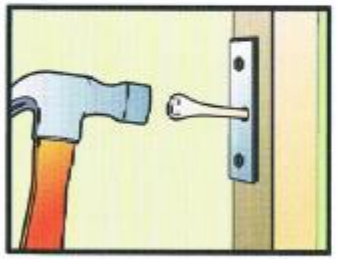
Safety First

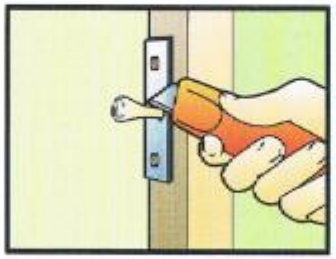
Get help from another person when lifting a heavy door or gate off its hinges during a repair job.

Repairing Sagging Doors and Gates

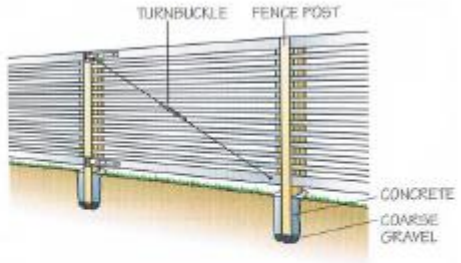
A loose hinge is often responsible for a sagging door. If that's the problem in your home, brace the door with a wedge and tighten the screws. If the holes are too large and have been stripped, fill the cavity with wood plugs—a wooden golf tee dipped in wood glue works well. Drive it into the hole with a hammer as far as it will go.

After the glue dries, cut the tee or plug off so that it is level with the surface of the hinge. Then you can reset the screw into the new material. This method works just as well with outside gates. If tightening the screws isn't sufficient, add extra nails.



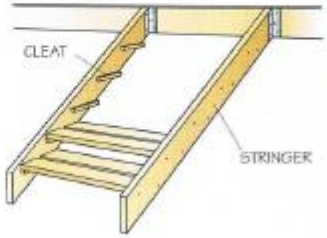


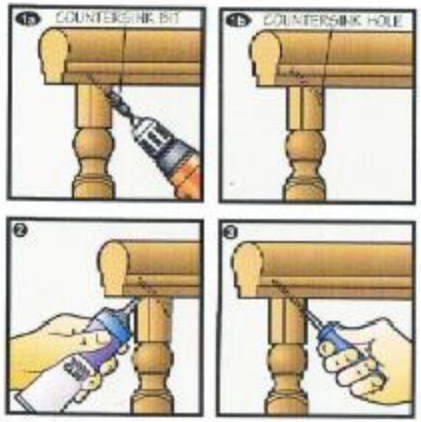
Sometimes the weight of a gate makes it sag. Installing a *sag rod* (also called a *tension support*) or *wire-and-turnbuckle* arrangement will correct this problem. Support the gate in the proper position with a piece of wood before attaching the hardware. To attach the wire, rod, or cable, use bolts or install eye hooks at the top of the hinged side and the bottom of the opposite side. Tighten the turnbuckle to adjust the tension on the cable and pull the gate into position. The sag rod needs to be installed on the hinge side of the gate. (You can also use a wire-and-turnbuckle to help with a sagging door.)



Repairing Stairs

A loose step is dangerous, and often all it takes to fix it is a well-placed nail. If the step is rotted or split, however, you must replace it. Cut a new one of the same length and nail it to the cleat. If the cleat is rotten or broken, replace it first. Bolt cleats to the side of the stair, called the *stringer*.





Repairing Railings

Loose railings are a serious hazard, but before repairs begin you must figure out the root of the wobble. If the rail is pulling away from the newel post, follow the steps below. If the newel posts are loose, it is best to consult a professional.

Step 1—Drill a pilot hole at an angle through the newel post into the loose handrail. (See views 1a and 1b.)

Step 2—Work wood glue into the joint between the post and railing.

Step 3—Countersink a wood screw into the pilot hole and tighten.

Another option is to work from the opposite direction. Drill pilot holes at an angle through the sides of the railing into the newel post, apply wood glue to the joint, then nail the railing firmly to the post. (See view 4.)

If the whole railing is loose, reinforce it by attaching blocking under the rail between each newel post. Cut the blocks to fit snugly between each pair of posts, then glue and nail them into place. (See views 5 and 6.) For a more polished look, you will want to paint the block.

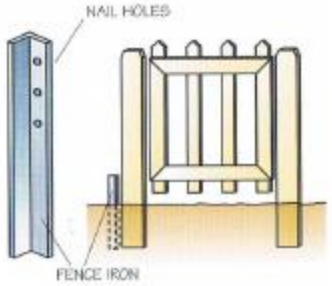
Repairing Fences

People in different parts of the country prefer different kinds of fences. Among the most common types are picket, board, rail, and chain-link fences. Each has its own advantages. Construction and repair of these fences are also unique, although there are some common procedures.

Fence posts usually are set in large holes with concrete. Several handfuls of coarse gravel at the bottom of the hole promote drainage and deter wood rot.

The *fence rails* usually are horizontal pieces of wood or metal to which the *infill* is attached. The infill can be any one of several varieties of pickets, boards, or metal fencing placed perpendicularly to the rails and/or posts.

Renailing pickets or boards is a common fence repair. Another is replacing an entire picket or board if it is damaged. If you have a loose fence post, you can bolster it with a fence iron. Butt the fence iron next to the post, placing the side of the fence iron that has nail holes against the post. Hammer the iron into the ground and then attach the iron to the post with nails.



Sag rods (also known as tension supports) are optional for the wood gates described here, but they are easy to install and add stability to the gate posts. They are rods or cables with bolts to secure them to the posts. They should be installed near the top of the gate post and run down to nearly the bottom of the closest fence post in the same section. Use the turnbuckles in the rod to adjust the rod or cable tension to keep the gate post steady. The sag rod need only be installed on the hinge side of the gate. Sag rods can be bought in most hardware stores and building supply stores.

Home Repairs Resources

Scouting Literature

Electricity, Electronics, Fire Safety, Painting, Plumbing, Welding, and *Woodwork* merit badge pamphlets

Visit the Boy Scouts of America's official retail website at http://www.scoutstuff.org for a complete listing of all merit badge pamphlets and other Scouting resources.

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Organizations and Websites

Ask the Builder
Website: http://www.askthebuilder.com

CornerHardware.com
12815 N. Cave Creek Road
Phoenix, AZ 85022
Toll-free telephone: 877-825-1497
Website: http://www.cornerhardware.com

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Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, DC 20460
Telephone: 202-272-0167
Websites: http://www.epa.gov/iedweb00/asbestos.html
http://www.epa.gov/opptintr/lead/

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471
Telephone: 617-770-3000
Website: http://www.nfpa.org

This Old House Online
1185 Avenue of the Americas, 27th floor
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Website:
http://www.thisoldhouse.com/toh/

Toiletology 101
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Merit Badge Pamphlet	Year
American Business	2002
American Cultures	2005
American Heritage	2005
American Labor	2006
Animal Science	2006
Archaeology	2006
Archery	2004
Architecture and Landscape Architecture	2010
Art	2006
Astronomy	2013
Athletics	2006
Automotive Maintenance	2012
Aviation	2006
Backpacking	2007
Basketry	2003
Bird Study	2005
Bugling (see Music)	
Camping	2005
Canoeing	2004
Chemistry	2004
Chess	2011
Cinematography	2008
Citizenship in the Community	2005
Citizenship in the Nation	2005
Citizenship in the World	2005
Climbing	2011
Coin Collecting	2008
Collections	2008
Communication	2009
Composite Materials	2006
Computers	2009
Cooking	2007
Crime Prevention	2005
Cycling	2003
Dentistry	2006
Disabilities Awareness	2005
Dog Care	2012
Drafting	2008
Electricity	2004
Electronics	2004
Emergency Preparedness	2012
Energy	2005
Engineering	2006
Entrepreneurship	2006
Environmental Science	2006
Family Life	2005
Farm Mechanics	2008
Fingerprinting	2003
Fire Safety	2004
First Aid	2007
Fish and Wildlife Management	2004
Fishing	2009
Fly-Fishing	2009
Forestry	2005
Gardening	2013
Genealogy	2005
Geocaching	2010
Geology	2005
Golf	2002
Graphic Arts	2006
Hiking	2007
Home Repairs	2009
Horsemanship	2010
Indian Lore	2008
Insect Study	2008
Inventing	2010
Journalism	2006
Kayaking	2012
Landscape Architecture (see Architecture)	
Law	2003
Leatherwork	2002
Lifesaving	2008
Mammal Study	2003
Medicine	2009
Metalwork	2007
Model Design and Building	2010
Motorboating	2008
Music and Bugling	2003
Nature	2003
Nuclear Science	2010
Oceanography	2009
Orienteering	2003
Painting	2008
Personal Fitness	2006
Personal Management	2003
Pets	2003
Photography	2013
Pioneering	2006
Plant Science	2005
Plumbing	2004
Pottery	2006
Public Health	2005
Public Speaking	2013
Pulp and Paper	2006
Radio	2008
Railroading	2003
Reading	2003
Reptile and Amphibian Study	2005
Rifle Shooting	2001
Robotics	2011
Rowing	2006
Safety	2006
Salesmanship	2003
Scholarship	2004
Scouting Heritage	2010
Scuba Diving	2009
Sculpture	2007
Search and Rescue	2012
Shotgun Shooting	2006
Skating	2005
Small-Boat Sailing	2004
Snow Sports	2007
Soil and Water Conservation	2004
Space Exploration	2004
Sports	2006
Stamp Collecting	2007
Surveying	2004
Swimming	2008
Textile	2003
Theater	2005
Traffic Safety	2006
Truck Transportation	2006
Veterinary Medicine	2006
Water Sports	2007
Weather	2006
Welding	2012
Whitewater	2005
Wilderness Survival	2007
Wood Carving	2006
Woodwork	2011