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Need more garage storage? Build this double-sided rolling tool cart. Photographed by Tom Fenenga

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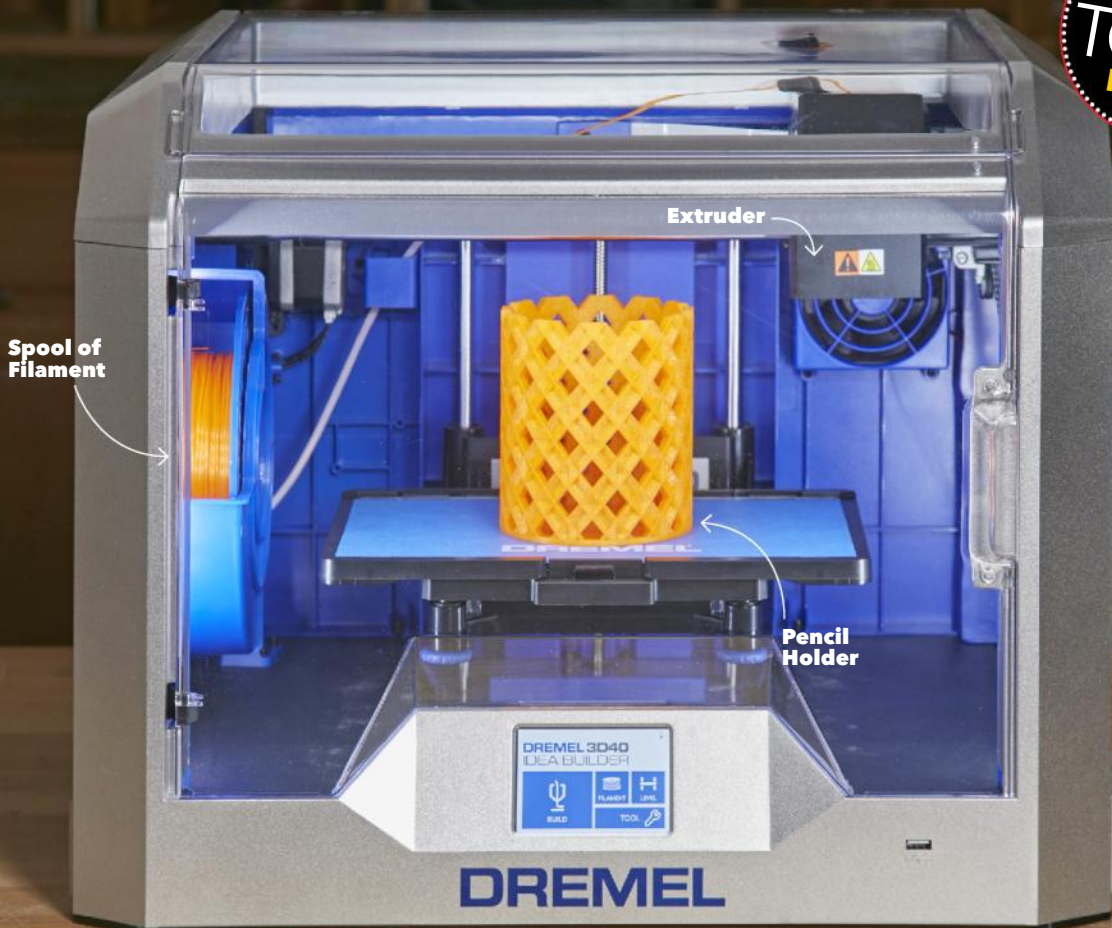
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Stuff We Love

Our favorite DIY tools, materials + gear. By Mark Petersen

OUR
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I had a blast playing with this Dremel Idea Builder 3D printer. The learning curve was relatively low—you need to be computer literate but you don't need to be a software engineer. Here's how it works: The raw material is a filament pulled off a spool and fed into a hot extruder. The extruder moves around laying down layer upon layer of tiny plastic thread.

You can either create your own 3D image to build (plenty of free software for that), or go online and download one of the gazillion shapes other people have created and shared. The image then needs to be reformatted in the free Dremel software and saved on a memory stick or an SD card. All that's left is to plug the memory stick into the printer, follow the directions on the touch screen, and watch this modern marvel go to work.

The printer can be plugged into a computer or operated over Wi-Fi as well.

Everyone asks, "What practical objects can be created with a 3D printer?" But I think 3D printing is as much about learning, creating and having fun as it is about practicality. My first attempts were a monogrammed Christmas ornament for my granddaughter, a big fat letter "M" for my son (his university emblem) and this cool pencil holder for me. The spools come in many different colors and cost about \$30 apiece. One spool would create about five or six of these pencil holders. A shape this size takes about 13 hours to print. This 3D40 model is available for \$1,299 at online retailers or by calling Dremel at (844) 800-3736.

MARK PETERSEN, ASSOCIATE EDITOR

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WORTH THE SPLURGE

A woodworking luxury

I use a router for most of my woodworking projects. I leave my monster 3-hp router in the router table for the big stuff and prefer to grab a compact trim router for freehand routing. I recently bought a Ridgid 18-volt Brushless Compact Router to “possibly” replace my corded model. I knew I would love not having to worry about shredding a cord or having it get hung up on a corner. But I was a little concerned that a cordless router would be top-heavy or lacking in power—I saved my receipt just in case.

It turns out my worries were unfounded: The router felt balanced and comfortable in my hand, and I noticed no measurable difference in power. Setting the bit height and dialing in the depth were easy and intuitive. The on-off switch took a little getting used to, but that wasn’t a deal breaker. And never having had a router with an LED light before, I found it a bonus to be able to see what I was cutting. It even has variable speed! The Ridgid 18-volt Brushless Compact Router costs \$120 without the battery (the 5.0 Ah battery works best) at The Home Depot.

ANDREW ZOELLNER,
DIGITAL CONTENT EDITOR



GREAT IDEA

NO-MESS PAINT LID

Painting is not my favorite chore. I’m a fan of any product that can make the job cleaner, faster and less frustrating. That’s why I love this paint can lid from Shur-line. It has a spout, so there’s no spilling or splashing when you pour paint into a roller pan, and the paint doesn’t ooze out all over the front of the can. And never again will I have to clean out the rim before replacing the lid—hallelujah!

The spout folds down, so I can still stack my cans, and the nonstick surface means latex paint drips or runs just peel right off. Reuse one for each paint job or buy enough of them to permanently replace all your steel lids. If you go that route, be sure to transfer the paint color information from the lid to the can itself. The Shur-line paint can lid costs about \$3 at home centers.

TRAVIS LARSON, SENIOR EDITOR

PROBLEM SOLVER

Remove stripped nuts and bolts

I discovered a new way to remove nuts and bolts that I’ve rounded over beyond all recognition. I reach for a Kobalt Steel Grip socket. Steel Grip sockets have little fingers, or cams, inside that will grab onto the most mangled surface. And the harder you turn the socket, the tighter they lock into place.

The fingers also grab onto a nut or bolt like a magnet, which is perfect for getting bolts started in hard-to-reach nooks and crannies. When I change the oil on my truck, I use one to prevent my oil drain plug from dropping down into a slimy pool of dirty oil. These sockets don’t like impact drivers (I wrecked one that way), so they won’t replace your standard set of sockets, but \$15 for an eight-piece set is a small price to pay if it gets you out of even one jam. The Kobalt Steel Grip sockets are available at Lowe’s.

JOSH RISBERG, LEAD CARPENTER



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STUFF WE LOVE



Two Horses Strapped Together

PROFESSIONAL GRADE

A NEW SAWHORSE, FAT ON FEATURES

When I was a siding installer, my crew used to pull out and pack up at least six sawhorses every day. The metal folding sawhorses we used worked OK, but they were finger pinchers, the feet were weak and tended to fold over under heavy loads, and the legs flopped out when you hauled the sawhorses around. This new pony from DeWalt doesn't have any of those problems. The feet are tough and have slip-resistant pads. The legs fold out easily and lock into place. And unlike other folding sawhorses, the DeWalt features a top with a V-groove for cutting pipes. The pad at the end prevents boards from slipping while you cut them to length, and the top metal bar works great for clamping. But what I like best is that you can strap two together and carry them as one. Each DWST1115 sawhorse is rated at 1,000 lbs. and costs about \$40 at some home centers and hardware stores.

MARK PETERSEN, ASSOCIATE EDITOR



Driver in Center

GREAT GADGET

An innovative multi-tool

This new Gerber Center-Drive multi-tool has a straight knife, a serrated knife and a bunch of other cool gadgets. But there are two features that make this multi-tool stand out: the pliers is spring loaded... nice! And the driver folds and locks into place at the center axis of the tool instead of being offset like it is with most multi-tool drivers. That makes turning a bolt or screw a lot less awkward. There

are Phillips and flathead bits onboard (one of each), and 12 other handy bits that stow away in the sheath. You can buy a Gerber Center-Drive multi-tool online or at sporting goods shops for \$100.

Additional Bits



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The Rockler Silicone Project Mat is the perfect surface for gluing small projects. Excess glue drains into the little grooves instead of pooling and getting smeared all over. When you're done, the dried glue just peels right off. The silicone also holds your board or project in place while you sand or rout it. And it's super soft, so it won't scuff finished parts. You can buy a mat at a Rockler store or at rockler.com for about \$30.

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A BETTER WAY TO REPLANT

When I bring home new flowers or shrubs for my garden, I avoid yanking them out of their plastic pots by the stems because it can hurt the plants. Instead, I use a sharp knife to cut down two or more sides of each pot to free the plant, being careful not to tear the roots when separating the soil from the container. – **LESLIE POEHLER**



CAULK CADDY

Finding a place to hang a caulk gun on some ladders can be tough. And if you move the ladder a teeny bit, the caulk gun starts to swing and falls to the floor. I had a C-clamp handy, so I attached it to my ladder—now I have the perfect spot for my caulk gun.

– **DOUG WHITING**



WIRE IN THE HOLE!

If you've ever used masonry screws to attach something to a block wall, you know you have to predrill holes for the screws. But concrete block is hollow and crumbly, and sometimes a screw won't tighten; it just spins inside the hole. To fix the problem, I back out the screw and put a piece of insulated wire inside the hole and drive the screw alongside it. Then I snip off the excess wire. Makes a nice, tight connection!

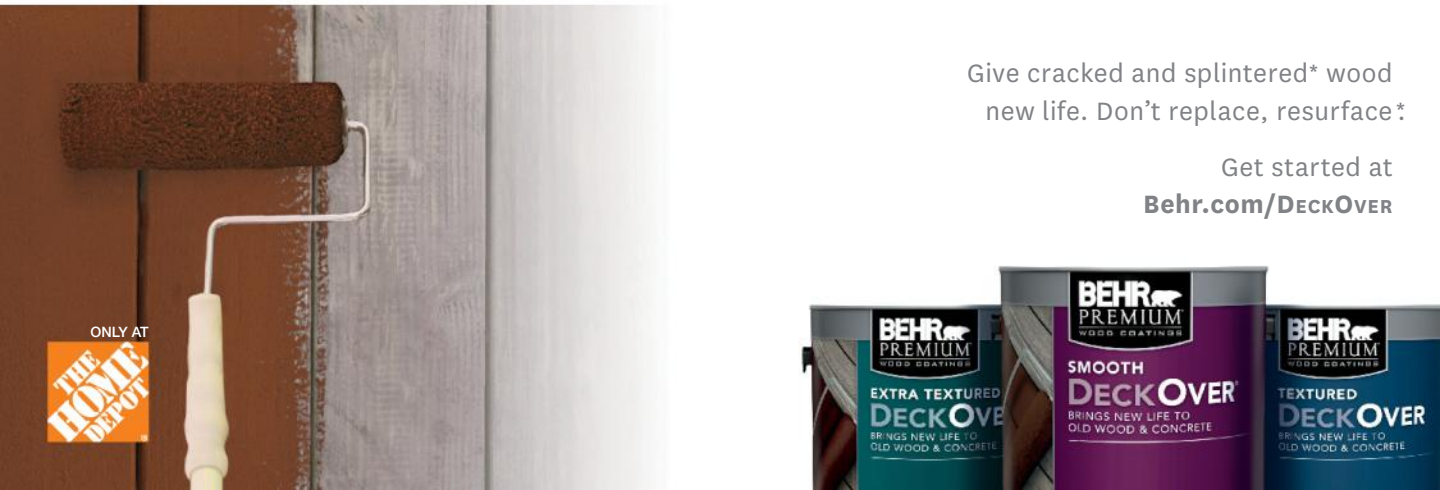
– **JOSIAH GRUNWALD**

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WINE RACK TOWEL HOLDER

I have very little space to store fresh towels in my bathroom, so I used a wine rack. The wall over my toilet was pretty much wasted space, and the wine rack fits there perfectly. Plus, it looks really cool!

– **CHRISTY BELING**



HANDS-FREE DOOR TRICK

Need to go in and out the same door a bunch of times while carrying stuff? To keep the door from latching shut, I loop a rubber band around one doorknob or handle, then twist it once and loop it around the other knob. The rubber band holds the latch in. Now if the door closes, I can push it back open with my body whenever my hands are full.

– **NICK PAONE**

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EASIER VEGETABLE PLANTING

We have a really big vegetable garden and I'm getting older, so the less time I have to spend hunched over on my hands and knees, the better. When I'm ready to plant new vegetables, I set aside my trowel and grab my posthole digger. Just one or two plunges into the soil for each plant and I've got perfectly sized holes for all my crops!

– **BARBARA MCGREW**



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DIY Essentials

Our best tips for getting your project done right. By Jeff Gorton

OUR
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ISSUE!

Foolproof Dadoes & Rabbets

Dadoes, grooves and rabbets are the workhorses of cabinet and bookcase construction. They're used in woodworking projects to make stronger joints.

Dadoes and **grooves** are flat-bottomed recesses that strengthen supporting shelves and connecting panels. A dado runs perpendicular to the grain of the wood while a groove runs parallel to the grain. A **rabbet** is like a dado that's missing a side. It's essentially a notch cut into the edge of a board or piece of plywood.

You can cut dadoes, grooves and rabbets in many different ways. In this article, however, we're going to show you a simple, foolproof cutting method that requires only a router, a pattern bit and two straight guides.



Rabbet

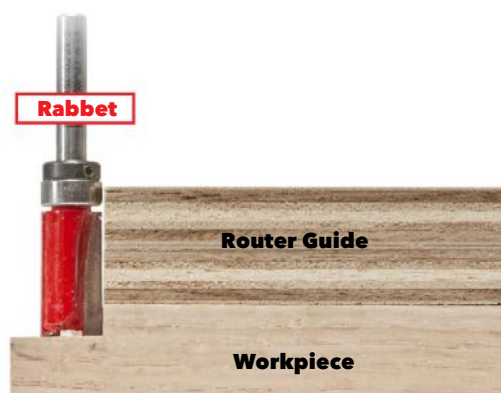
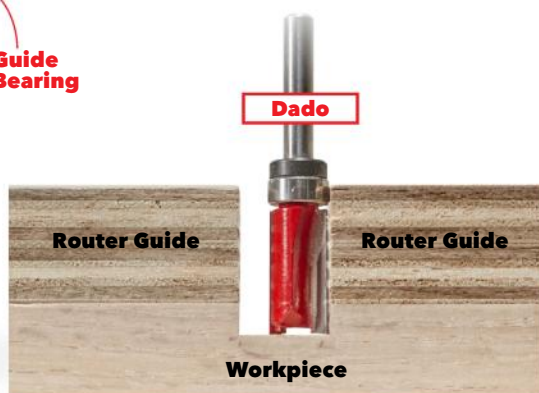
Dado



HOW A PATTERN BIT WORKS

The bit we're using is called a top-bearing pattern bit or top-bearing flush-trim bit. The bearing follows along the straight router guide as the cutters carve out the recess. Since the bearing and the cutters have the same diameter, you just line up the edge of the guide or pattern with the marks for the dado, groove or rabbet and run the router bit along the guide. Using two guides as we show here allows you to cut an exact size dado for any wood thickness that's greater than the bit diameter. The router bit can't go off track either, since it's trapped between the guides.

Most home centers and hardware stores don't stock top-bearing pattern bits, but they're readily available online and at woodworking stores. The bits come in different diameters and lengths. Make sure to buy a bit that's narrower than the thickness of the spacers (**Photo 4**). We're using a 1/2-in.-diameter bit with 1-in.-long cutters (Freud No. 50-102; \$23).



HOW TO CUT PERFECT DADOES

1. MAKE TWO STRAIGHTEDGE GUIDES

The dado cutting method we show here requires two perfectly straight guides. You can make your guides any length you want, and whatever thickness is required for your router bit. Since the bit we're using has relatively long cutters, we needed a 1-in.-thick guide to give the bearing something to ride against and the clearance necessary for the bit to reach the bottom of the dados.

To make guides like those shown here, cut four 6-in.-wide by 4-ft.-long strips of 1/2-in.-thick plywood. Glue pairs together to make two 1-in.-thick strips. When the glue is dry, use a table saw or circular saw and straight-edge to trim the guides and create one perfectly straight edge. Draw an arrow toward the straight edge of each strip to remind you which edge you should use for the guide (**Photo 3**).

When you're done trimming the edges, check the straightness of the guides by placing them next to each other on your workbench, with the arrows facing, and press them together. The guides should fit tight with no gaps. If there is a gap, recut one or both pieces until they fit tightly together.





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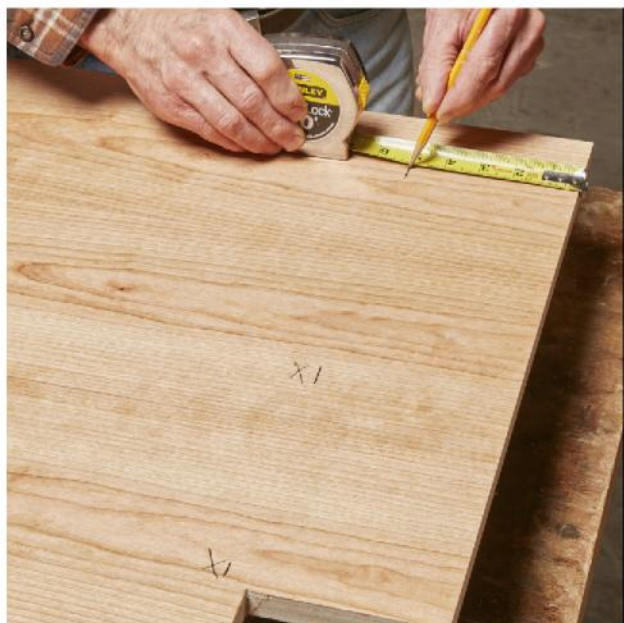
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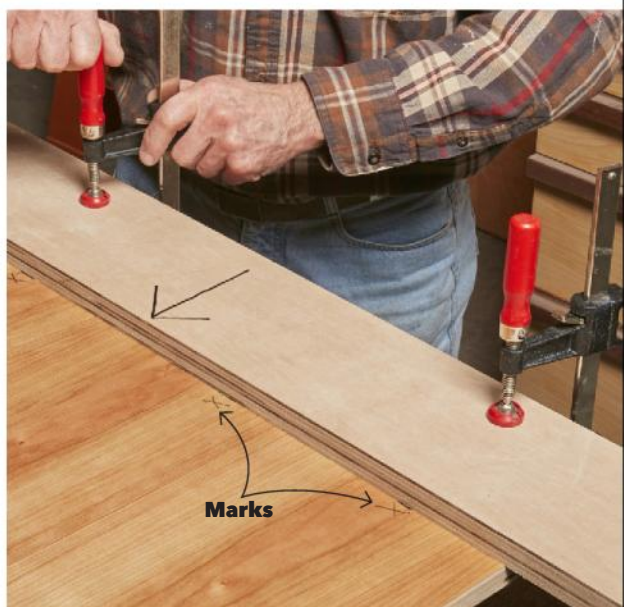
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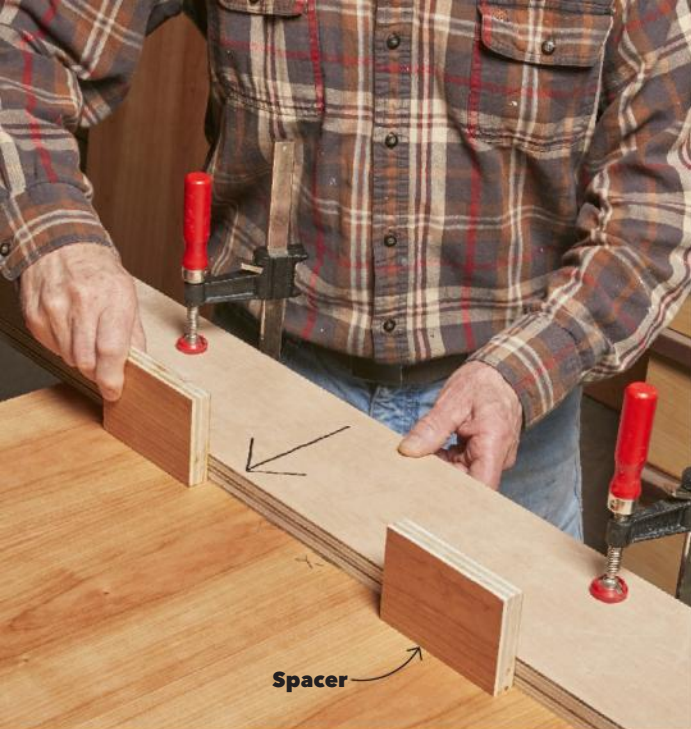
2. MARK THE LOCATION OF THE DADO

You only need to mark one edge of the dado. Then draw an "X" to indicate which side of the mark the dado goes on. A good tip is to make three, not just two, marks across the workpiece. Then when you line up your straightedge with the marks, if one of the marks doesn't line up, you'll know you've made a layout mistake.



3. CLAMP THE FIRST GUIDE

The method we're using requires two guides, one for each side of the dado. This allows you to cut a perfect-width dado regardless of the thickness of the material. Line up the guide with the marks and clamp it securely. Be careful to position the clamps where they won't interfere with the router base as you're cutting the dado.



4. ADD SPACERS

When you're cutting out the parts for your cabinet or bookcase, save a few scraps of the material. Then use those scraps as spacers. This ensures that the thickness of the material you're using will match the dado widths perfectly.



5. CLAMP THE SECOND GUIDE

Press the second guide against the spacer blocks and clamp it. Again, make sure the clamps won't interfere with the router base. Remove the spacers and you're ready to cut the dado.

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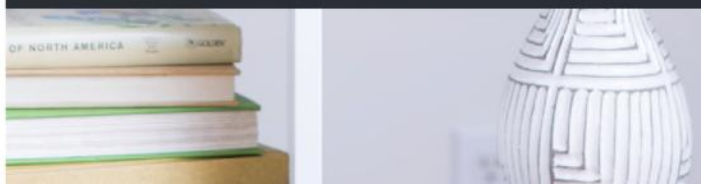
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6. ROUT THE FIRST SIDE OF THE DADO

Since the dado we're cutting is a little less than 3/4 in. wide, and we're using a 1/2-in. bit, it will take two passes, one along each router guide, to complete the dado. First adjust the router depth. This will be the thickness of the guides plus the desired depth of your dado. We set the router to cut a 1/4-in.-deep dado. If you're positioned as shown in this photo, start at the left side and move the router left to right, keeping the guide bearing pressed against the guide farthest from you. The rule of thumb is to rout inside cuts like this in a clockwise direction.



7. FINISH UP WITH A SECOND PASS

Complete the dado by moving the router right to left, keeping the guide bearing in contact with the guide closest to you. Before you remove the clamps and guides, inspect the dado to make sure both edges are straight and smooth. If you find any imperfections, run the router over that area again. That's all it takes to cut a perfect dado.

HOW TO CUT PERFECT RABBETS



1. POSITION THE GUIDE

There's more than one way to cut a rabbet, including buying a special rabbeting bit. But since you already have the guide and a pattern bit, why not use them to cut rabbets, too? Here we're cutting a 1/4-in. x 1/4-in. rabbet in the back of a cabinet side to accept the 1/4-in. plywood back. Use a scrap of the same plywood to set the position of the guide, then clamp the guide into place.



2. ROUT THE RABBET

Starting at the left end, run the router left to right along the guide to cut the rabbet. You can use this same technique to cut wider rabbets like the one along the top edge of the cabinet (see photo on p. 21), but you'll have to make one pass along the guide, and then clean up the remaining wood using the router freehand. That just means holding the bearing a tad away from the straightedge to remove the rest of the wood. Be sure to keep the router base tight to the guide at all times.

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Best Pro Tips

Expert advice from the job site. By Mark Petersen

Trend-spotting at the Builders' Show

Every year the editors here at *The Family Handyman* visit the International Builders' Show, which recently teamed up with The Kitchen & Bath Industry Show. We always find cool new products, modern building trends and a few fashionable new styles. The only downside was coming home to our own houses, which seem kinda dull by comparison. Here's some of what we saw this year:



Talk to Your Oven

If it makes your house "smarter," it's popular. GE has a line of appliances that work in conjunction with Amazon's voice-controlled Echo device. Now you can go anywhere in your house with an Echo nearby and ask Alexa (Echo's persona) to preheat the oven. You can command your dryer to keep tumbling until you're ready to pull the load, and instruct your washer to keep track of detergent and order more when you get low.



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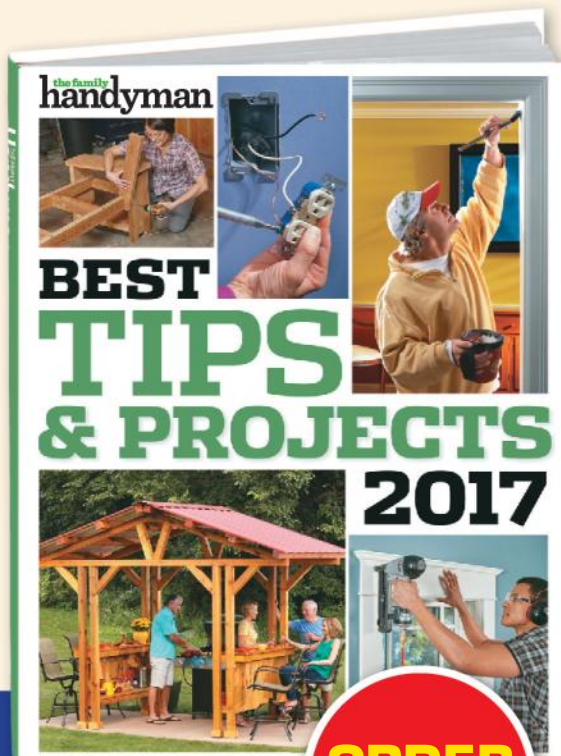
Plumbing



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BEST PRO TIPS

A Collage of Colors and Materials

More new kitchens are combining base and upper cabinets that are different colors and sometimes even different styles. Combining counter-top materials like solid surface, stainless, stone and wood is also popular.

The Builders' Show always features innovative new cabinet door and drawer hardware, and these co-plane cabinet doors from Wellborn Cabinet were a highlight this year. The doors slide sideways instead of swinging out, perfect for small or busy kitchens. Visit wellborn.com to find a dealer near you.



Liquid Flashing

Modern building products like liquid flashing can help builders achieve an exceptionally weather-tight home. Applying a liquid flashing is one of the best ways to seal rough door and window openings against the elements. The liquid flashing shown, MaxFlash, by BASF, is applied to the opening before a window or door is installed.

MaxFlash goes on the wall with a large sausage caulk gun and is then spread out with a tapping knife. Once dry, it provides an impenetrable barrier. It can be used with liquid weather-resistant barriers or traditional house wrap, and can be applied over masonry and gypsum products as well as wood. For more info, call BASF at 1-800-221-9255.



Complete Door Kits

You just can't keep barn doors down on the farm—first they were sought after as a specialty item, and now they've gone mainstream. That's because they make a lot of sense, especially in smaller homes. Doors that swing hog a lot of floor space, and pocket doors aren't an option if ducts, pipes and wires are in the way. Barn doors are a remodeler's dream because they can usually be retrofitted without too much hassle. They're perfect for closets and passageways but not the best for bedrooms because they don't block sound as well as a traditional door. A Masonite door like this (hardware included) costs about \$450 at homedepot.com.

It's a great day to stain the deck.



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BEST PRO TIPS



Sci-Fi Stoves

Magnetic field-powered induction cooktops have been around for decades, but only recently has there been a real rise in demand. The slow acceptance is surprising because there are advantages to inductive cooktops, two of the biggest being better temperature control and speed. Some inductive stovetops can boil a pot of water in 90 seconds! The surface of the cooktop stays relatively cool, which has obvious safety benefits, and spills won't cement themselves to the surface. One of the biggest hurdles to switching to induction is that not all pans will work. Prices range from about \$1,000 up to \$3,000. The one shown here is a GE Monogram.



Tile That Looks Like Wood

If you love wood but aren't crazy about the upkeep, check out these porcelain tiles from Daltile. They look like wood but hold up better in wet areas like bathrooms and entryways. And large dogs won't scratch them to ribbons.

Tiles that look just like marble, brick and fabric are also available. The folks at the Daltile booth were also excited about the growing popularity of their large-tile collection, which features tiles as big as 2 x 4 ft.! The Yorkwood Manor tiles shown here cost about \$5 per sq. ft. Go to daltile.com to find a dealer near you.



... and See-Through Refrigerator Doors

Matte black stainless steel is definitely the appliance finish *du jour*. People love it because it's better at hiding smudges and fingerprints, and it just looks cool.

Many manufacturers are also offering refrigerators with see-through doors. The idea is that you'll waste less electricity because you don't have to open the door in order to stare slack-jawed into the fridge for minutes at a time. And because all your food is on display for the world to see, you'll be motivated to keep the contents neat and organized...right? Prices for an InstaView model like this one from LG start at about \$3,700.

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BEST PRO TIPS

Double-Duty Sheathing

Plywood and OSB (oriented strand board) are being melded with all sorts of materials. Roof sheathing is available with a thin aluminum coating to keep attics cooler (Georgia Pacific Thermostat). Fire-resistant coatings are available, and there's even a sheathing designed for sheds that is primed on the outside and has a prefinished surface on the inside (LP SmartFinish).

This R-Sheathing from Huber Engineered Woods is laminated with 1 in. to 2-1/2 in. of foam, which prevents heat from being conducted through solid building components like drywall, studs and siding. Installing R-Sheathing is easy because the foam (up to R-9) is attached to the sheathing, making it a one-step process. And



R-Sheathing is part of Huber's ZIP System, which means the exterior side has a weather-resistant barrier, which takes the place of house

wrap. After it's on the wall, only the seams need to be sealed. R-Sheathing is available at lumberyards nationwide.



Contemporary Exteriors

James Hardie, maker of fiber cement products, was showcasing its Reveal Panel System for the residential market. In the past, panels like these were usually reserved for commercial buildings. If panels were installed on homes, the boards and battens would typically hide all the seams. But the seams on these panels were not only exposed but also emphasized with trim frames.

And just like interiors, the exteriors on contemporary homes are including a mix of materials like brick, lap siding, panels, shakes, and board and battens. These James Hardie Reveal panels come in a wood profile, smooth and stucco. Reveal costs about \$10 to \$15 per sq. ft. installed. For more info, go to jameshardiecommercial.com.

MORE PRO TIPS

Get it done faster, cheaper and better! You'll find tons of tricks at buildconstructpros.com





TREND:
INDUSTRIAL
STYLE



Heavy Hardware the Easy Way

Simpson Strong-Tie was showing off a cool new accessory to complement its lineup of construction screws. Outdoor Accents hex-head washers work in conjunction with construction screws to secure large decorative straps that hold together outdoor structures like pergolas and gazebos. The screw/washer combo has the benefits of a construction screw but the attractive industrial look of bolts. One 3-in. x 3-in. angle bracket costs about \$9; an eight-pack of hex-head washers, \$12; and a 12-pack of 3-1/2-in. structural screws, \$12. All are available at The Home Depot or homedepot.com.



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How To: Fix Your Fatigue and Get More Energy

PALM SPRINGS, CA -- According to patients at the Center for Restorative Medicine, a new discovery has completely transformed their lives.

Founder and Director **Dr. Steven Gundry** is a world-renowned heart surgeon, a best-selling author, and the personal physician to many celebrities. But his latest medical breakthrough could be the most important accomplishment of his career.

In a dramatic press conference, Dr. Gundry unveiled a simple — yet highly effective — solution to symptoms that plague millions of Americans over 40: low energy, low metabolism and constant fatigue.

He went on to say that persistent fatigue can be a warning sign for much more serious health problems...including diabetes, obesity, hypertension and heart disease.

“When you’re feeling low energy, that’s your body screaming **HELP!**” He told the crowd of reporters and medical professionals. Dr. Gundry’s radical solution was inspired by a breakthrough with a “hopeless” patient who had been massively overweight, chronically fatigued and suffering from severely clogged arteries.

The secret to his breakthrough? **“There are key ‘micronutrients’ missing from your diet,”** Dr. Gundry told the room. “If you can replenish them in very high dosages, the health results are astonishing.”

This unorthodox philosophy is what led Dr. Gundry to create the world’s first at-home treatment for fatigue — which has since become remarkably successful with his patients.

“They’re reporting natural, long-lasting energy without a ‘crash’ and they’re feeling slim, fit



and active,” he revealed yesterday.

The science behind his formula is brand new, and was met with both fascination and enthusiasm by those in attendance. Immediately following the announcement, Dr. Gundry’s team released a **comprehensive video presentation**, so that the public can be educated as to exactly how it works.

Watch the presentation here at **www.GetEnergy28.com**

Within just a few hours, this video had gotten thousands of hits, and is now considered to have gone viral. One viewer commented: “If this works, it’s exactly what I’ve been praying for my whole life. I’ve never seen anything like this solution before...the truth about my diet was shocking and eye-opening.”

Of course, Dr. Gundry’s announcement was met with some hesitation. We spoke to some who attended the press conference, who advised that people keep their expectations realistic.

It makes a lot of sense, and it sounds great in theory, but we’ll have to wait and see what the results are. Knowing Dr. Gundry, however, there is a great deal of potential.

See his presentation here at **www.GetEnergy28.com**

SUPER-CAPACITY

TOOL CART

Roll it to your work zone for instant access; park it in a corner for space-saving storage.

By Jeff Gorton

This cart would make a great addition to any workspace, but it's especially perfect for a garage workshop. It brings your whole tool arsenal within easy reach during a project but takes up minimal floor space, leaving plenty of room for your car when the job is done. It's also adaptable—easy to build as shown and easy to alter. You can add or subtract drawers and shelves to meet your needs.



WHAT IT TAKES

TIME	COST	SKILL LEVEL
2 days	\$350-\$450	Intermediate

TOOLS Table saw, drill, drill bits, router, 1/4-in. straight-cutting router bit, basic hand tools

Custom Spaces for All Kinds of Tools

The cart is open on both the front and the back—a design that combines easy access with maximum capacity.



It's a great weekend project

You could cut all the plywood parts with a circular saw, but we recommend using a table saw for greater accuracy and to speed things up. If you want to include the slots—grooved shelves with plywood dividers—you'll need a router and a 1/4-in. straight bit to make the dadoes. And a brad nailer is handy for tacking the parts before adding the screws.

We used birch plywood for this project, but you could choose MDF (medium-density fiberboard) or less expensive plywood to save money. We shopped around at local home centers and found nice-looking birch plywood with B-grade face veneer for about \$40 per sheet. The entire project requires four sheets of 3/4-in. plywood and one sheet of 1/4-in. plywood.

Build the cabinet box

Start by cutting out the parts, using **Figure C** on p. 47 and the Cutting List on p. 39 as a guide. You'll notice that some of the dimensions in the Cutting List have an asterisk indicating that you may have to adjust the size.

That's because plywood varies slightly in thickness. We used a table saw for ripping and a crosscut sled on the table saw to crosscut narrow parts. This allowed us to cut the parts accurately for tight-fitting joints.

Photos 1 - 3 show how to get started building the basic box. Drill pilot holes for the screws to avoid splitting the plywood. Use the shelves (**Photo 2**) or temporary spacers (**Photo 3**) to hold the interior dividers in place while you secure them with screws. There are a few spots where dividers are aligned with each other, making it impossible to drive screws straight in. In these situations, start the screws alongside the part that's in the way and drive the screws at a slight angle, being careful to keep the screw tips from going through the opposite side of the plywood.

When you're done with the box, attach the casters.

**Table
Saw
Sled**

For step-by-step instructions on how to build a table saw sled, go to tftmag.com/tableawsled.

Figure A Tool Cart

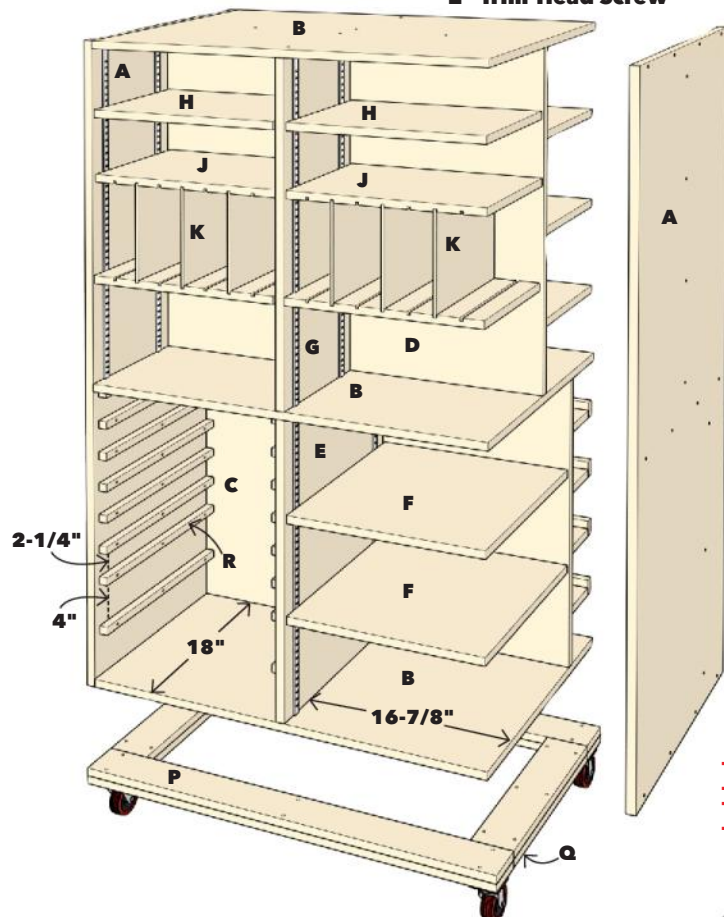
OVERALL DIMENSIONS:

36" wide x 23-7/8" deep x 68" tall

(Small drawer part letters are in parentheses)

[FRONT]

2" Trim-Head Screw



[BACK]

2" Trim-Head Screw

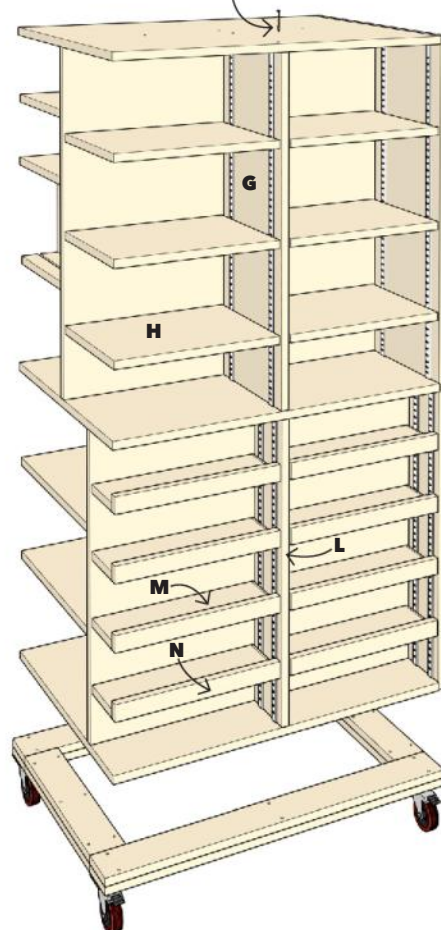
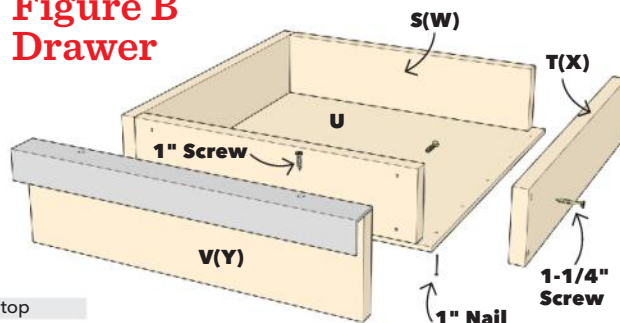


Figure B Drawer



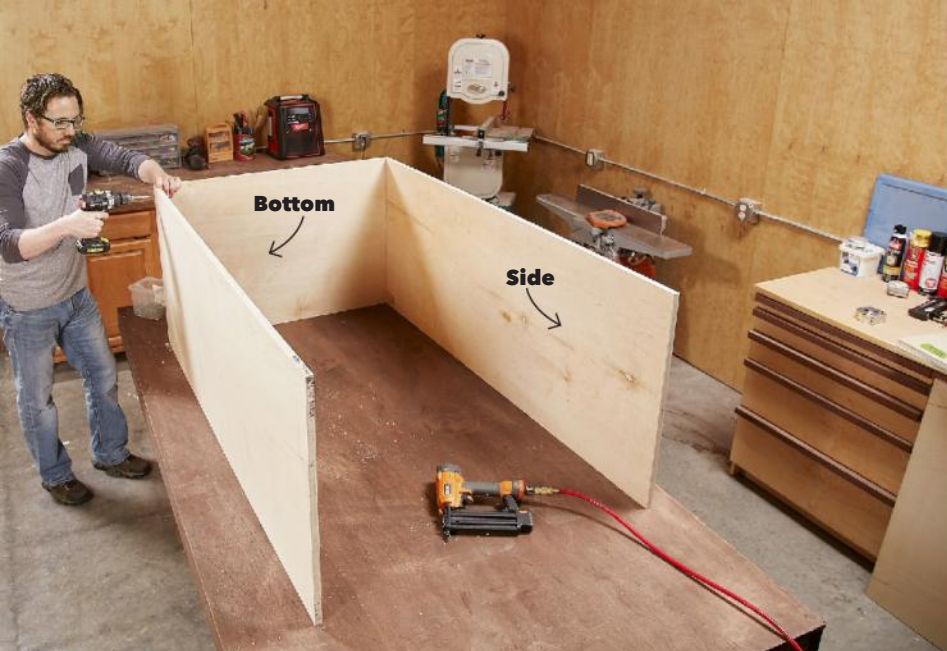
CUTTING LIST

KEY	QTY.	SIZE	PART
A	2	3/4" x 23-7/8" x 61-3/8"	Sides
B	3	3/4" x 23-7/8" x 34-1/2"	Bottom, middle and top
C	1	3/4" x 34-1/2" x 27-1/2"	Lower back
D	1	3/4" x 34-1/2" x 31-5/8" *	Upper back
E	1	3/4" x 18" x 27-1/2"	Lower front divider
F	2	3/4" x 18" x 16-1/2"	Lower front shelves
G	2	3/4" x 11-9/16" x 31-5/8" *	Upper front and back dividers
H	8	3/4" x 11-9/16" x 16-1/2"	Upper shelves
J	4	3/4" x 11-9/16" x 16-1/2"	Upper shelves with grooves
K	6	1/4" x 11-9/16" x 10"	Shelf dividers (adjust height to your tools)
L	1	3/4" x 5-1/8" x 27-1/2"	Lower back divider
M	8	3/4" x 4-3/8" x 16-1/2"	Lower back shelves
N	8	3/4" x 1-1/4" x 16-1/2"	Shelf nosing
P	4	3/4" x 3-1/2" x 36"	Caster supports
Q	4	3/4" x 3-1/2" x 16-7/8"	Caster support side fillers
R	16	3/4" x 3/4" x 17-1/4"	Drawer runners
S	4	3/4" x 3-5/8" x 15-1/4"	Large drawer back and front
T	4	3/4" x 3-5/8" x 17"	Large drawer sides
U	8	1/4" x 16-3/4" x 17"	Drawer bottoms
V	2	3/4" x 16-3/4" x 4-1/2"	Large drawer fronts
W	12	3/4" x 1-7/8" x 15-1/4"	Small drawer back and front
X	12	3/4" x 1-7/8" x 17"	Small drawer sides
Y	6	3/4" x 16-3/4" x 2-3/4"	Small drawer fronts

* Measure and cut to fit.

MATERIALS LIST

ITEM	QTY.
4' x 8' x 3/4" plywood	4
4' x 8' x 1/4" plywood	1
2" trim-head screws	100
1-1/4" screws	80
1-1/2" x 5/16" lag screws	16
No. 4 x 1" flat-head screws	16
1-1/2" finish nails	
1" finish nails	
3" casters	4
36" shelf standards	28
Shelf clips	88
Wood glue	
96" x 1-1/2" x 1-1/2" x 1/8" aluminum angle	1
24" x 1-1/2" x 1-1/2" x 1/8" aluminum angle	1

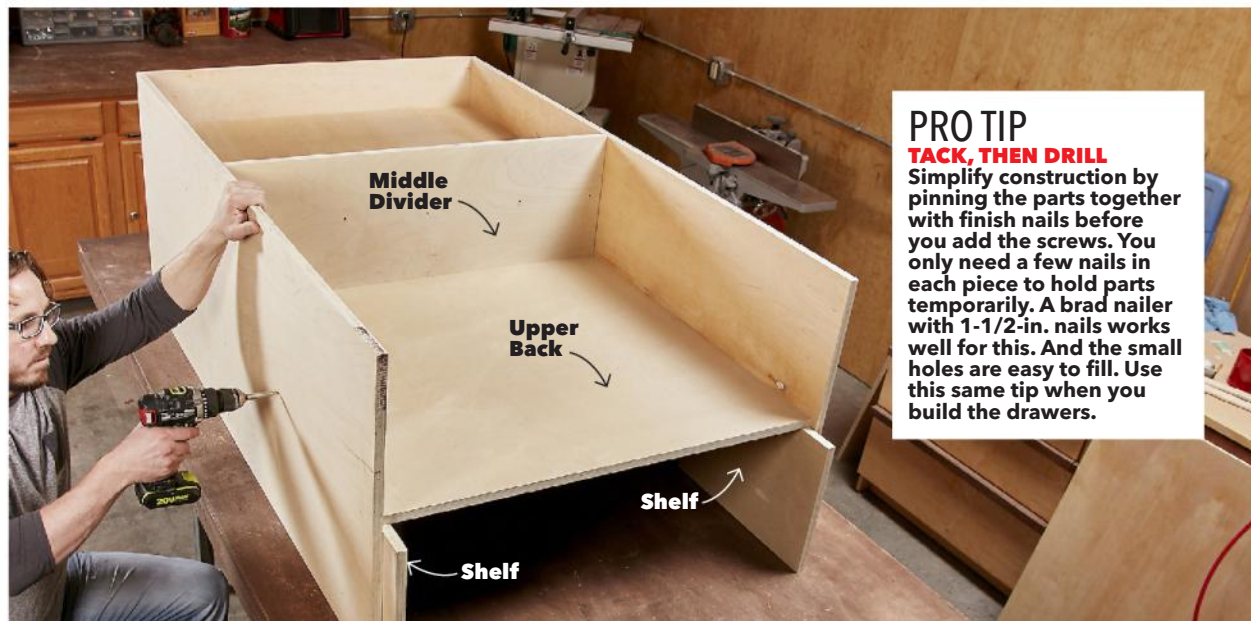


THREE OPTIONS: CHOOSE YOUR FASTENING METHOD

We assembled the parts with trim-head screws and covered them with wood filler, but there are other options. You could use screws and finish washers for a more industrial look (**above left**) or assemble the entire storage unit with pocket screws (**above right**). Pocket screw assembly would leave a lot of exposed pockets on the inside, but most would be covered once the cabinet was filled with tools, or you could buy wood plugs to fill the pockets.

1. Start with a three-sided box

Nail or clamp the two sides (A) to the bottom (B) and drill pilot holes for the screws. Place two screws about 1-1/2 in. from the edges, and add three more evenly spaced between them.



PRO TIP

TACK, THEN DRILL

Simplify construction by pinning the parts together with finish nails before you add the screws. You only need a few nails in each piece to hold parts temporarily. A brad nailer with 1-1/2-in. nails works well for this. And the small holes are easy to fill. Use this same tip when you build the drawers.

2. Build from the bottom up

Screw in the lower back (C), using the divider (E) and a shelf (F) to support it. Then add the horizontal middle divider (B). Set the upper back (D) and the top (B) in place and check the fit. You may have to trim a little from the top of D for a good fit. Use shelves (H) to support part D as you attach it with screws.

Start by building up the base with two strips of plywood so you can use 1-1/2-in. lag screws to attach the casters (**Photo 4**). We found good-quality 4-in. casters with locking ball-bearing wheels for about \$10 each at a home center. Buy good-quality casters because this cabinet could weigh hundreds of pounds fully loaded.

Build the drawers

The drawers are simple boxes that slide on 3/4-in. square runners. The drawers are sized to allow about 1/16-in. clearance on the sides and 1/8 in. on top for easy movement. **Photos 5 and 6** show how to build the

drawers. Cut the 1/4-in. plywood bottoms accurately and make sure they're square so you can use them to square the drawer frame. Finish the drawers by attaching the fronts with screws (**Photo 6**).

Mark the location of the drawer runners on the sides of the cabinet (**Photo 7**). Then attach the runners with glue and 1-1/4-in. screws (**Photo 8**). We fabricated drawer pulls from 1/8-in.-thick aluminum angle (**Photos 9 and 10**). Attach the aluminum angles to the drawers with two screws through the top. If you've laid out your drawer runners correctly, there should be about 1/8 in. of space between all the drawers.

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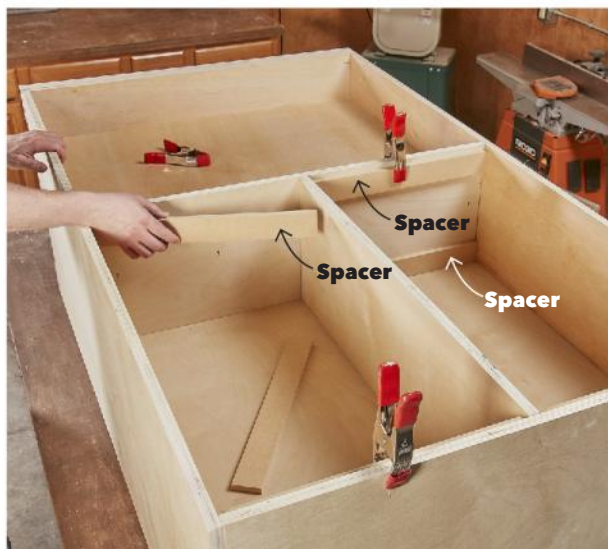
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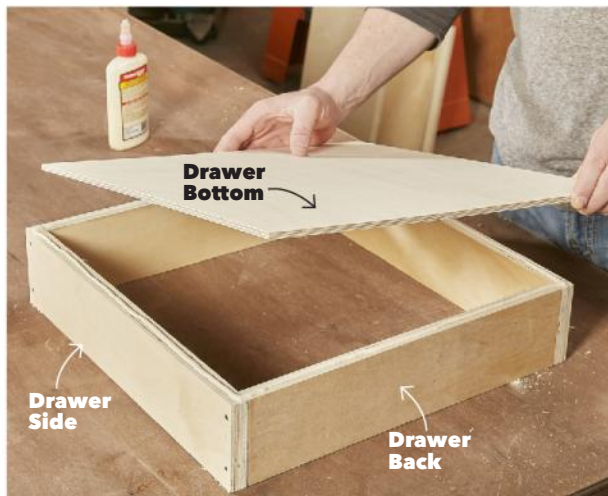
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3. Complete the cabinet assembly Add the four vertical dividers, Parts E, G and L. Use temporary spacers to hold the panels in the center as you attach them. You'll need eight spacers, 16-7/8 in. long.



5. Assemble the drawer box Glue and tack the drawer sides to the front and back. Then add screws for more strength. Apply a bead of glue to the drawer and place the drawer bottom on the drawer box. Line up one edge of the drawer bottom with the drawer and nail it. Then square the drawer by lining up the remaining edges with the edges of the drawer bottom and nail the other three sides.

Add shelves

The plywood shelves rest on shelf clips attached to metal shelf standards (**Photo 12**). This allows you to customize the shelf heights to accommodate your tools. Some of the shelves have dadoes cut into them to accept plywood dividers. **Photo 11** shows how to cut the dadoes with a router and router guide.

Build the guide by gluing a perfectly straight strip of 3/4-in. plywood (fence) to a strip of 1/4-in. plywood. Then mount a 1/4-in. straight bit in the router and run the router along the fence to cut off the excess 1/4-in. plywood. Now you can mark the dado locations on your shelves, line up the edge of the router guide to the marks



4. Add the casters First glue and screw four strips of plywood (P) to the front and back edges of the box. Then mark the caster screw holes and drill 3/16-in. pilot holes for the 5/16-in. x 1-1/2-in. lag screws. Attach all four casters with the lag screws.



6. Add the drawer fronts The drawer fronts are the same width as the drawers, but a little taller. Line up the sides and bottom and attach the fronts with 1-1/4-in. screws.

and clamp it, and rout the dadoes (**Photo 11**). It's easier to cut dadoes across a 16-1/2-in.-wide by 4-ft.-long piece of plywood first, and then cut the shelves to 11-9/16 in. deep after all the dadoes are cut (**Photo 11**).

To prevent stuff from falling off the narrow shelves, nail 3/4 x 1-1/4-in. plywood strips to the face of the shelves (**Figure A**).

We finished our rolling tool cabinet with two coats of satin polyurethane. If you plan to paint or finish your tool cabinet, you'll save time and get a better job by mounting the shelf standards and drawer pulls after you apply the finish.

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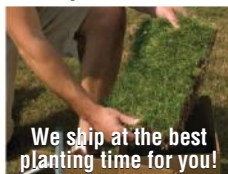
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7. Mark for the drawer runners Make a marking stick using the measurements in Figure A. Then use the stick to mark the positions of the drawer runners. Make marks at the front and back.



9. Cut aluminum with a miter saw Make drawer pulls by cutting aluminum angle to length. Many carbide blades are designed to cut nonferrous metals as well as wood—check the fine print on the blade or packaging to make sure.

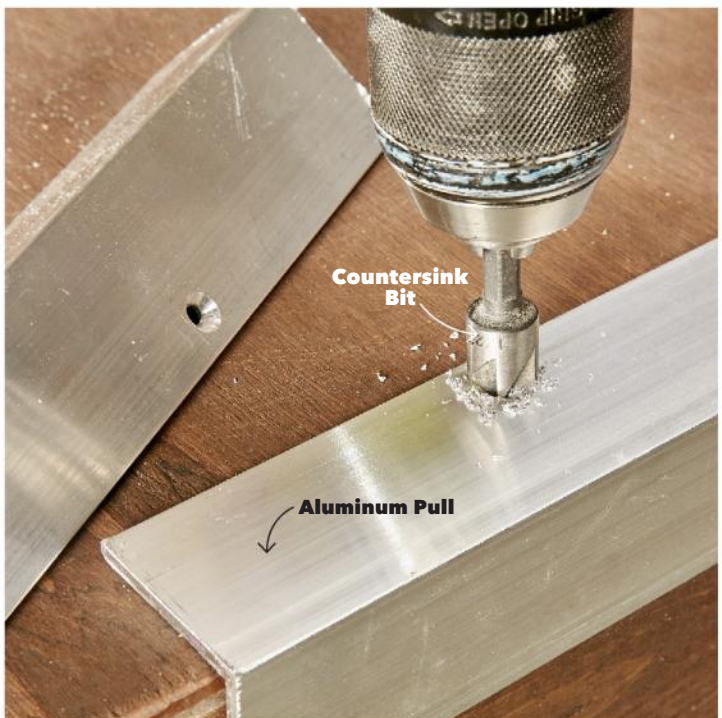


8. Install the runners Drill pilot holes and attach the runners with glue and 1-1/4-in. screws. Use spacers to hold the runners. If necessary, make slight adjustments to keep the runners aligned with the marks.

SLICK TIP

SMOOTHER DRAWER RUNNERS

You can make your drawers slide easier by applying melamine tape to the tops of the drawer runners. You'll find rolls of melamine tape at home centers, woodworking stores or online. FastEdge, a self-adhesive version, is available at fastcap.com. If you buy iron-on tape, apply it before you mount the runners in the cabinet.



10. Drill and countersink the pulls Drill two holes in each aluminum pull. Place the holes 3 in. from the ends and 3/8 in. from the edge. Use a countersink in your drill to create a recess for the screws. Line up the edges of the aluminum angles with the back edge of the drawer fronts and attach them with small screws.

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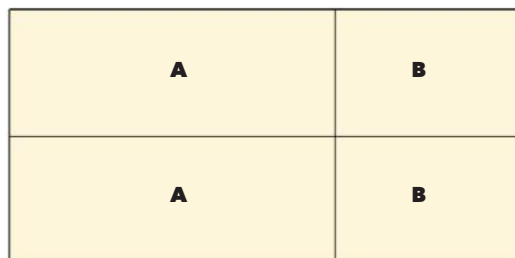
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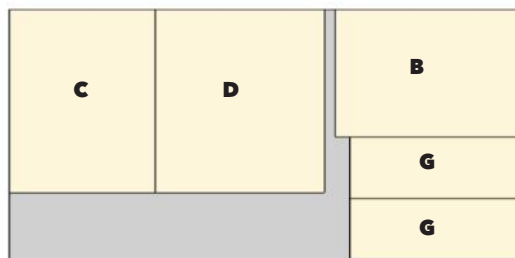


Figure C Cutting Diagrams

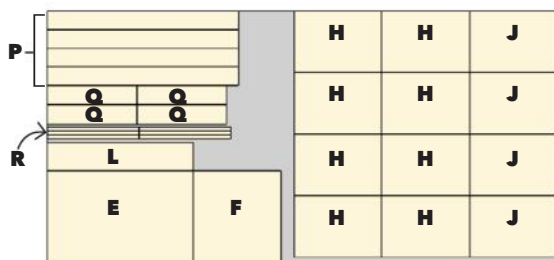
3/4" PLYWOOD



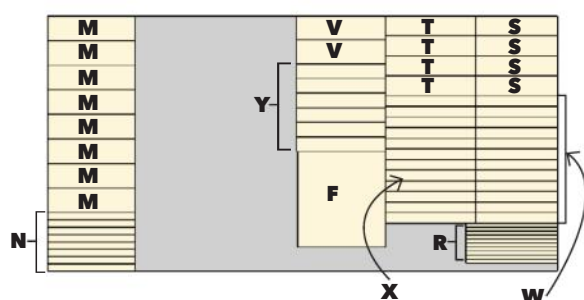
3/4" PLYWOOD



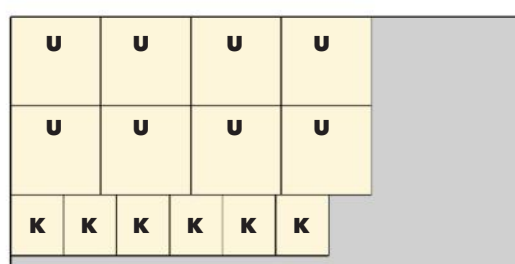
3/4" PLYWOOD



3/4" PLYWOOD



1/4" PLYWOOD



11. Cut slots for plywood dividers Four shelves require slots for plywood dividers. To save time, cut the dados across all four shelves before ripping them to the correct width. Make a straightedge jig as shown and clamp it at the marks indicating your slot location. Then use a router with a 1/4-in. straight bit to cut the slot.



12. Mount the shelf standards Cut the metal shelf standards to fit with a hacksaw. Make sure to cut off the same end of every standard so the holes will line up correctly. Position the standards 1 in. from the front and back of every shelf side and attach them with small screws.



NO-SLIP TIP

ANCHOR THE SHELVES

Drive short pan-head screws into the bottom of the shelf, directly behind the shelf clips. This will prevent the shelf from slipping forward and falling off the supports. You only need two per shelf.

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8 CLEVER TOOL HACKS

Save your back, time and money with these ingenious tool tips. By Mark Petersen

Here's a great collection of tool hacks for every level of DIYer, from beginner to advanced. These simple tips and techniques will help you get the most out of your tools. You'll learn creative ways to use everyday tools and even how to modify them to do jobs "outside the box." Got a tip of your own to share? Send it to submissions@familyhandyman.com.



4' LEVEL

FLAT PRY BAR

DRILL BIT

JIGSAW BLADES

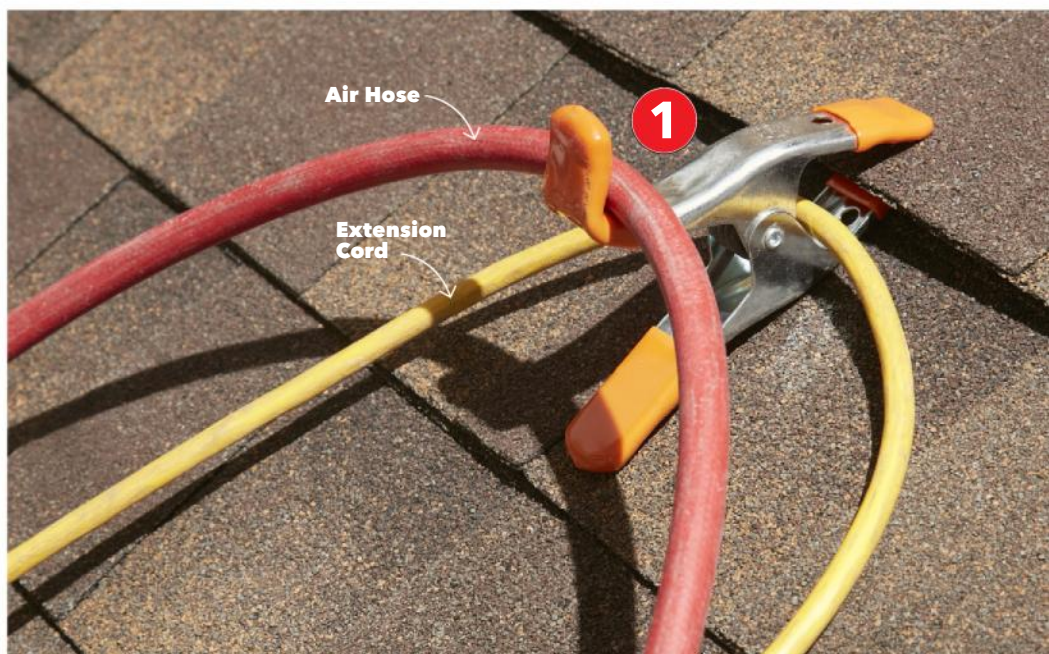
SPRING CLAMP

3" ROLLER FRAME

GARDEN RAKE

1. HANG YOUR ROOFING TOOLS

Use spring clamps to keep your hoses, extension cords, and other tools and materials from sliding off the roof. Don't try this on brittle or scorching hot shingles or you may damage them. You can create a handier hook by sticking the clamp in a vise and bending up one of the handles.



2. CLAMP WITH A TIE-DOWN STRAP

If you need to clamp boxes together, a ratchet tie-down strap can often do the job just as well as band clamps. Just make sure to protect the wood under the ratchet and hooks with cardboard.

3. MIX CONCRETE WITH A RAKE

Try a garden rake instead of a hoe the next time you have to mix concrete. The rake won't splash as much water over the edge, and the tines do a good job of combining the water with the powder. With a hoe, you waste a lot of time just pushing powder around the tub. A medium mixing tub like the one shown costs \$7 at home centers.





4. MAKE MINI ROLLER COVERS

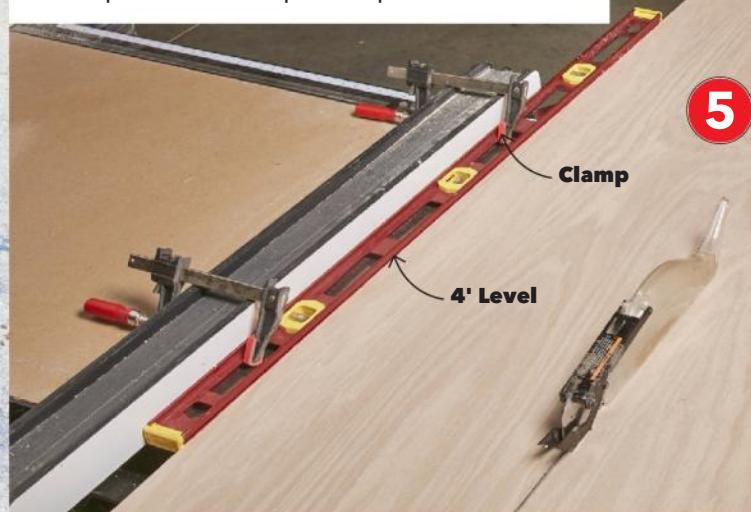
Next time you're in the paint department, pick up a 3-in. roller frame, the type that takes the same diameter cover as a standard 9-in. roller. You can then cut any 9-in. roller cover into three 3-in. covers to fit it. A 3-in. roller is perfect for painting trim or small stuff like a mailbox, but not every store carries 3-in. covers. This little trick will also cut the cost of the 3-in. roller covers in half.

Mark the 9-in. roller covers 3 in. in from each end. Cut into equal pieces with a hacksaw, holding the cover steady with a bar clamp. Trim the rough edges of the nap with scissors.



5. USE A LEVEL TO EXTEND YOUR TABLE SAW FENCE

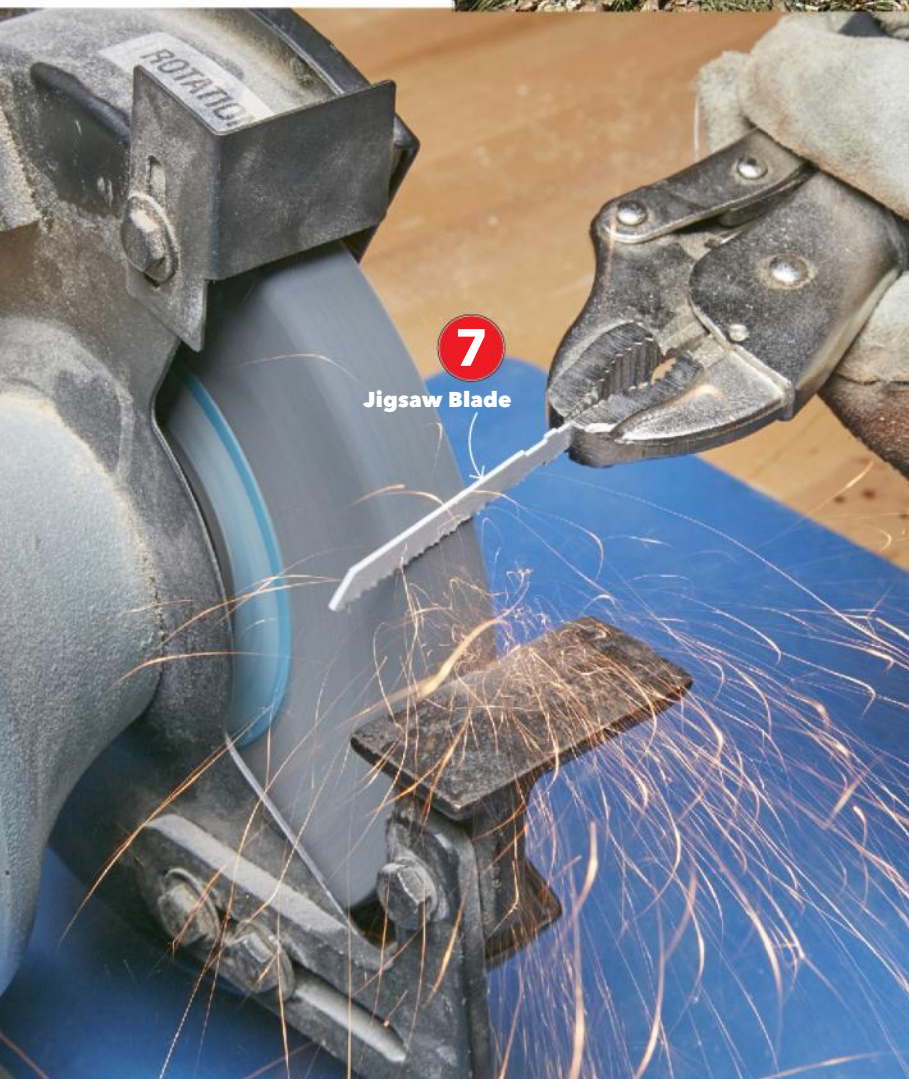
The only way to achieve a perfectly straight cut is to keep your material tight up against the table saw fence. But that's hard to do when you're cutting a large sheet of plywood on your own. Extending the fence with a 4-ft. level will make it easier to keep the plywood on a straight and narrow path as it approaches and passes through the blade. Hold the level in place with a couple clamps.



Masonry Bit

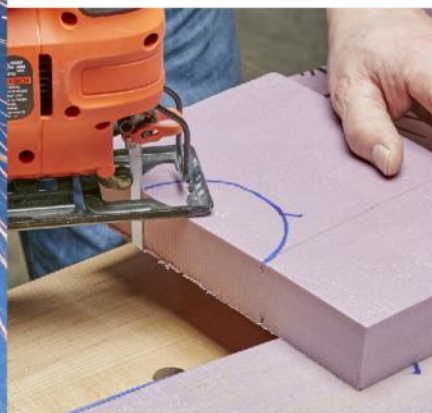
6. NEED A HOLE IN HARD SOIL? USE A DRILL!

Have you ever waited too long to install your reflective driveway markers and discovered the ground was frozen? Or tried to install a yard sale sign in dry soil that's as hard as concrete? Well, why not treat it as if it really were concrete and drill holes into it with a masonry bit? This 3/8-in. x 12-in. bit costs less than \$15 at home centers.



7. MAKE A BLADE FOR CUTTING FOAM

A jigsaw will cut through rigid foam like butter—except butter doesn't crumble into thousands of bits that mess up your shop, basement or garage. If you remove the teeth from a jigsaw blade, it will cut the foam just as well but without the mess. Remove the teeth with a grinder, and be sure to wear eye protection. Hold on to the blade with locking pliers, not your fingers!



8. LIFT HEAVY STUFF WITH A FLAT PRY BAR

If you've ever had to remove a solid-core door, you know how heavy they can be. Lifting them up to reinstall hinge pins can be a challenge if you're working alone, but a flat pry bar (aka "flat bar") can give you just the leverage you need.

If your flat bar won't raise the door high enough, install a small block of wood at the fulcrum point of the pry bar to increase the lifting distance. Hold the block in place with a small screw and washer. Make sure the screw doesn't poke through. If it does, grind off the end so it won't damage the floor. This same setup can be used to raise bottom drywall sheets off the floor for fastening.



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CUSTOM PICTURE LEDGES

Make them any length, any color, for any wall. by Travis Larson

ANYONE CAN BUILD!

Picture ledges are the perfect marriage of beauty and function. They elegantly display your picture collections, large or small, and they're ultra easy to use.

You don't have to mess with positioning hooks. Your photos and art work will never go crooked, and best of all, you can "redecorate" instantly just by swapping things around. There's no need to patch holes every time you move a picture.

These shelves are super-simple to build too. It's mostly a matter of gluing and nailing together two boards and a length of molding—no fancy cuts, tools or skills required. This is a great woodworking project for beginners.

Planning your shelves

Even though you'll likely be swapping out and rearranging pictures down the road, it's a good idea to lay out the initial arrangement of pictures on the floor. That way, you can sketch a plan for the length of your ledges and the spacing between them. The other advantage is that you'll be able to assemble a materials list to take to the home center.

You can build your ledges any length you wish. It takes two 1x3s for every ledge, one for the apron (back) and one for the shelf (**Photo 1**). A 1-1/4 x 1/4-in. molding nailed to the front (**Photo 2**) acts as a lip to hold picture frames in place.

We made our ledges from clear pine because we planned to paint

Just three parts, so they're fast and easy to build

- Even a beginner can build these picture ledges—no experience needed.
- You can do it with basic tools. If you don't have a brad nailer or miter saw, you can assemble the ledges using a hammer and nails, then cut them with a handsaw.
- Each ledge is made from just three parts. All you have to do is glue and tack them together.





WHAT IT TAKES

TIME 1 day | **COST** \$130 | **SKILL LEVEL** Intermediate

TOOLS Hammer, saw and drill. (But if you have a miter saw and an 18-gauge nail gun, great!)



1. Glue and nail the parts
Glue and nail the 1x3 apron onto the 1x3 shelf with 2-in. brads.



2. Add the lip
Use the benchtop to make the shelf and molding flush while you glue and nail them together with 1-in. brads.



3. Trim the ends
Cut to final length after the ledge has been assembled. Sand the freshly cut ends before painting.

them. If you prefer a natural wood look, oak is available at the home center along with the 1/4-in. matching molding. You can choose any wood you want if you're capable of making your own molding.

Remember to get wood glue along with the nails. Finish washers are a simple, elegant way to dress up screw heads. They'll largely be

hidden behind the pictures, but you can paint them to help them blend in better if you wish. You'll need 2-1/2-in. screws, about one for every 8 in. of shelf plus a package of screw-in. anchors that accept conventional threaded wood screws. (E-Z Ancor is one brand.) You can use other drywall anchors if you wish.

Assembly takes minutes

You'll glue the pieces together and then nail them with an 18-gauge brad nailer (**Photo 1**). Fasten the apron to the shelf with 2-in. brads, and secure the 1/4-in. molding to the front with 1-in. brads. If you don't have an air nailer, you can certainly do it the old-fashioned way with finish nails and a hammer.



- 4. Draw a guideline** Scribe a line on the back of the apron 3/4 in. down from the top.



- 5. Drill pilot holes** Mark for screw holes 2 to 3 in. from both ends. Then space holes evenly every 8 to 12 in. between them. Drill 1/8-in. holes.



- 6. Sand and paint** Fill the brad holes with filler, sand them flush, and prime and paint the ledges. (Or use a combination primer/paint product.)

7. Mark ledge locations on masking tape

Stick a vertical strip of masking tape to the wall to position one end of the ledges. Mark the top of each ledge on the tape, and use those marks to draw level lines on the wall for each ledge.



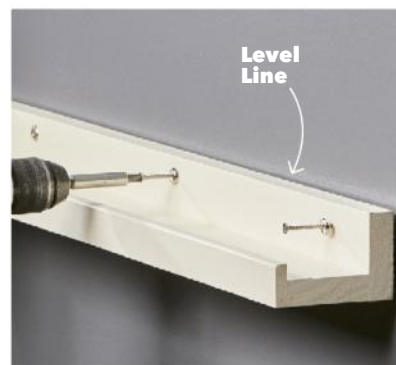
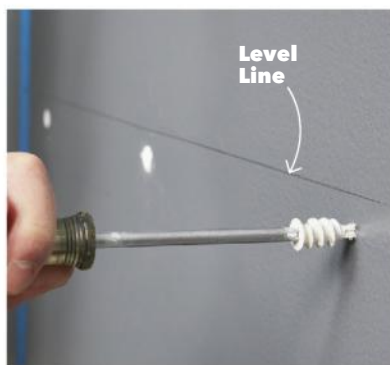
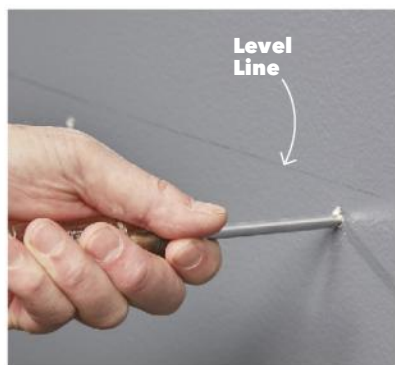
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8. *Mark the anchor holes*

Start screws so the tips project through the back of the apron about 1/4 in. Hold the top of the apron even with the level line and push the screw tips into the drywall to mark the wall for anchors. (Have a buddy help with longer ledges.)



9. *Drill anchor holes*

Twist and drive a Phillips screwdriver through the marks. Draw a circle around any holes that have studs behind them.

10. *Sink the drywall anchors*

Screw a drywall anchor into each hole except the ones over studs.



11. *Screw the ledges to the wall*

Screw each shelf to the anchors or into the studs.

2-1/2" Screw

Finish Washer

It's smart to assemble all three parts first and then cut the ends so they're perfectly flush. If you don't have a miter saw, make the cuts with a handsaw.

Finish after assembly

Whether you paint or stain and varnish for a natural wood finish, do it after the shelves are built but before they get mounted on the

wall. If you choose to paint, start with a coat of primer. The best top-coat to use is acrylic latex enamel. It's easy to apply and is much tougher than ordinary latex paint, so it resists scratches and wear—and it's easier to dust.

Hang the ledges

Use screws with finish washers along with drywall anchors to hang

the ledges—no glue. That way if you want to remove them later for repainting, you won't have to patch the walls. The screws will be mostly hidden by pictures, but if you want, you can paint them after installation. Some screws will fall over studs. You'll find them when you drill pilot holes with a Phillips screwdriver. You can skip the anchors and drive those screws directly into the wood.

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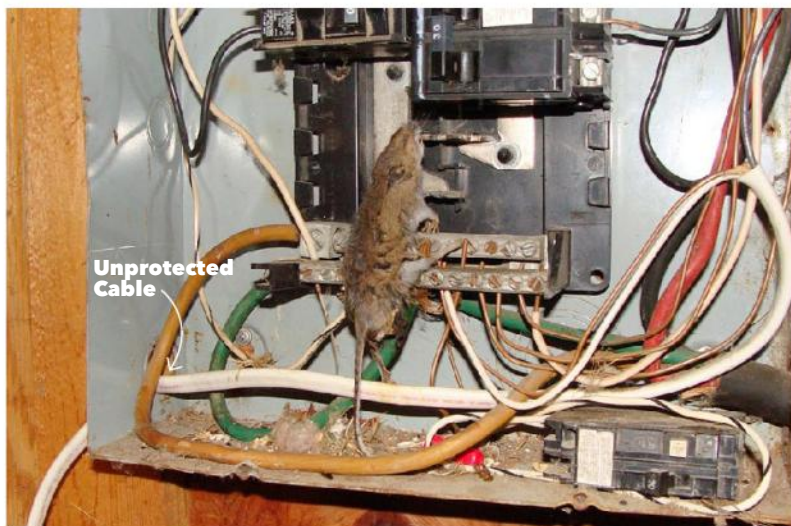
HORROR STORIES



As you might imagine, home inspectors encounter all kinds of improvised, dangerous and bizarre fixes. And lucky for us, they often photograph the odder “repairs” they come across. Here are some photos from a home inspection company, along with some advice on the proper fix.

MEET THE EXPERT

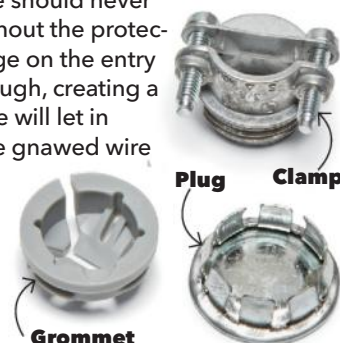
Reuben Saltzman (top right) is the president and co-owner of Structure Tech Home Inspections, a Minnesota home inspection company. He grew up remodeling homes and learning about carpentry, so he knows his stuff. Check out the company’s website, structuretech1.com.



OLD SPARKY

There are at least two things wrong with this picture (three if you count the dead mouse). Nonmetallic (NM) cable should never enter a metal electrical box or service panel without the protection of a proper clamp. Eventually the sharp edge on the entry hole will cause the cable sheathing to wear through, creating a short and a fire hazard. In addition, an open hole will let in moisture, bugs and critters and wreak havoc like gnawed wire insulation, nests and electrocuted mice.

THE RIGHT WAY: Use cable clamps or snap-in grommets to protect the cable and hold it in place as it enters any type of electrical box. Unused holes should be plugged with box plugs.

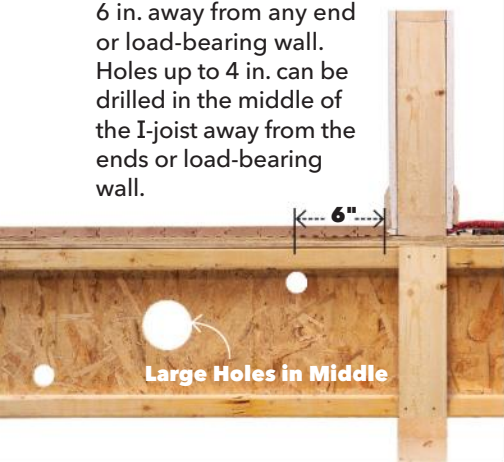




DON'T SIT ON THIS TOILET!

This is all too common. The carpenters carelessly placed a floor joist directly under a toilet that's clearly marked on the house plans. And then a plumber goes nuts with a reciprocating saw. If you have manufactured I-joists, never, ever cut the top or bottom flanges!

THE RIGHT WAY: You can drill holes up to 1-1/2 in. almost anywhere in the web area (the area between the flanges). Just stay 6 in. away from any end or load-bearing wall. Holes up to 4 in. can be drilled in the middle of the I-joist away from the ends or load-bearing wall.



DR. SEUSS WATER HEATER VENTING

Wow! This looks silly, but it's also downright dangerous. Flexible aluminum dryer duct isn't designed for venting exhaust gases, and this duct doesn't have a continuous upward slope. With this setup, carbon monoxide is likely entering the house.

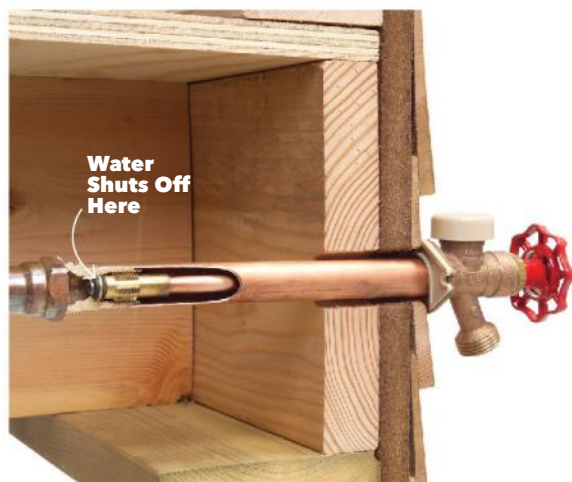
THE RIGHT WAY: Water heaters must be vented with the solid single-wall or double-wall pipe available in the HVAC aisle at home centers. The vents must always slope upward at least 1/4 in. per linear foot, and include a draft hood to allow room air to help draw out the exhaust gases.



NOW THAT'S FREEZE PROTECTION!

What you see is a freeze-proof sillcock mounted on the outside of the house. Not a good idea.

THE RIGHT WAY: In the photo at right, you'll see that the water valve is supposed to extend inside the house where it's warm. The 12-in.-long pipe "after" the valve should be slightly sloped toward the outside so residual water will drain after the valve is closed. Obviously, this amateur plumber didn't quite grasp the concept.





DRYER VENT AS CONDUIT—BRILLIANT!

The first mistake was running cable through the dryer vent, but wait, there are more. At least the installer used underground feeder (UF) cable.

THE RIGHT WAY: The cable should run through a dedicated hole in the wall and be protected inside PVC or metal conduit to at least 12 in. deep into the ground for direct burial. Also, the circuit needs GFCI (ground-fault circuit interrupter) protection.



WELL, THAT'S ONE SOLUTION

Before you go to the home center to choose a new toilet, know that toilet tanks and bowls vary in height, depth and distance to the wall. Take some careful measurements of the existing toilet while it's still in place. Check the clearance in front of the bowl and clearances from each side of the tank.



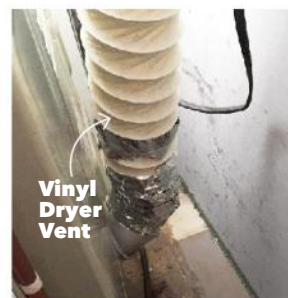
THE RIGHT WAY: Check the distance from the wall to the toilet flange bolts. That's almost always 12 in., but in rare cases you'll find that it's 10 or 14 in. When people run into trouble, it's usually from replacing a standard toilet bowl with an elongated one. They're 2 in. longer than a round bowl and might stop a door or drawer from opening. (See "Toilet Shopping Tips" on p. 72.)

WHAT'S THE WORST THING THAT COULD HAPPEN?

Vinyl dryer vent line is a fire hazard, and this house will be at risk until this line is replaced with metal. Fires caused by dryers occur about 7,000 times in the United States every year, killing 10 people on average.

Once a dryer fire starts, the lint inside the duct can ignite, and the flammable, flimsy vinyl will burn right through and ignite nearby materials. But replacing vinyl vent lines with rigid metal ducts isn't enough. You should clean the lint from ducts, the exhaust hood and the underside of the dryer cabinet at least once a year.

THE RIGHT WAY: It's best to use rigid metal vent line because it's less likely than corrugated metal to accumulate lint. Use foil tape rather than screws to join sections because the exposed screw shanks will also gather lint.



HomeCare+Repair

Fix it, maintain it, improve it. By Jason White



WORTH THE EFFORT

Protect Your Floor During Remodeling

Whenver you're remodeling, it's important to protect any uncarpeted floors from demolition debris and dropped tools. When canvas drop cloths aren't enough, I use 4 x 8-ft. sheets of 1/8-in. tempered hardboard, commonly called Masonite.

Start by thoroughly vacuuming the floors so grit doesn't scratch the flooring under the hardboard. Then cut

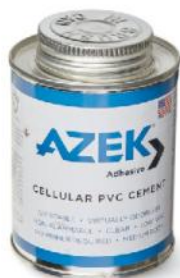
and lay down the hardboard and duct-tape the pieces together at the seams.

If you'll be running the HVAC system during the remodel, be sure you don't cover grilles or registers. Finally, seal around the perimeter with masking tape so grit can't get underneath the hardboard at the edges. A sheet of 1/8-in. hardboard costs about \$5 at home centers.

— GARY WENTZ, EDITOR-IN-CHIEF

More smart remodeling tips:

For more on removing walls and windows, as well as other demolition tips, go to tfhmag.com/demotips



[PROBLEM SOLVER]

PVC pipe cement for PVC trim?

A reader asked whether you can use PVC plumbing cement to glue PVC trim boards together.

You certainly can, but for some situations, there's a better option. The cement used for plastic plumbing pipes sets up in seconds, while PVC cement made specifically for trim takes several minutes to fuse—a major plus if you have a complicated glue-up and need more “open time” to get all your parts aligned and assembled. You probably won't find PVC trim cement at a local home center, but AZEK and Kleer are among the brands available at professional lumberyards and online.



[QUICK FIX]

Fix a broken phone charger

Charger cables for cell phones usually last only a few years before the insulation starts fraying on the ends. Replacement cables cost \$8 to \$30, but there's a cheaper solution. If the insulation is cracked but the copper wire inside is still intact, try covering the crack with a couple of layers of liquid electrical tape (\$5 to \$10 per bottle). Performix and Gardner Bender are two brands that get lots of positive reviews online. Just be sure not to let the cable touch anything until the liquid tape dries completely.

[EXPERT ADVICE]

All-in-one paint and primer

Ever wonder if it's OK to skip the primer and use a “paint and primer in one”? The answer is yes for about 90 percent of DIY painting projects, according to John Gilbert at Behr. All-in-one products are not simply primer and paint mixed in a can. Special polymers were developed to make them sticky enough to use without a separate primer.

Traditional primer is still best for metal, plastics and substrates like drywall and plaster with water stains or smoke damage. It's also recommended for woods like redwood or oak that contain tannins that might bleed through, says Gilbert.



MEET THE EXPERT

John Gilbert is the chief research and design officer at Behr Process Corp.



HOME CARE & REPAIR

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[SIMPLE SOLUTION]

Misfiring gas nailer

If you own a cordless gas nailer, you know how convenient it is. But that convenience quickly gives way to aggravation when it starts acting up. If you can hear the fan running on your nailer, but it only fires intermittently when you pull the trigger, don't take it to the repair shop—new gas may be all you need! Fuel cells have a “best used before” date printed right on the can. Old fuel cells lose internal pressure over time, so manufacturers recommend buying only as much fuel as you need to finish the job. You can buy new ones for about \$12 to \$15 at home centers.



Fuel Cell

[INSIDER ADVICE]

Are factory-reconditioned tools any good?

If you're looking to save money on power tools, consider going the “factory-reconditioned” route. Most of the time they're good-quality tools that somebody just changed their mind about after they opened the box, or they returned it because of a defect. These tools are sent back to the manufacturers, who fix whatever's wrong with them and then sell them again at a discount.

“The product is good and often comes with a warranty,” says Jason Swanson of Techtronic Industries, makers of Ryobi and Ridgid power tools. “All of our refurbished tools are inspected and rebuilt as needed by trained technicians.”

You'll find factory-reconditioned tools online at sites like cpooutlets.com, directtoolsoutlet.com and acmetools.com.



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Reconditioned Stamp

MEET THE EXPERT

Jason Swanson is vice president of communications for Techtronic Industries. He's been in the tool business for more than 20 years.



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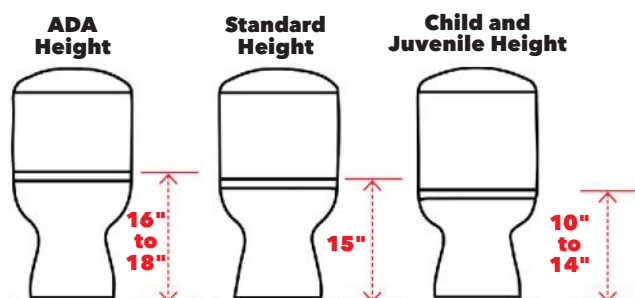
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Toilet Shopping Tips

Sick of your old, leaky, water hog of a toilet and want to buy a new one? You'll find water-efficient toilets with an array of options. Our friends at Maximum Performance (MaP) Testing make a living putting toilets through their paces and offered these tips for the next time you go toilet shopping.



Bowl height

This is the distance from the floor to the top of the toilet bowl's rim. The standard height for toilets used to be 14 to 15 in. But today, you'll find toilets that are 16 to 18 in. high. These are often called "comfort height" or "ADA height" or something similar. The additional height makes getting on and off the toilet easier and is more comfortable for lots of people, especially the elderly. Child heights of 10 to 14 in. are also available.



Insulated tank

If summers are humid where you live and you don't have air conditioning, you've probably noticed your toilet "sweating" quite a bit. Condensation forms on the outside of the toilet, which can drip down and make a mess or even rot out your floor. Some toilets are available with insulated tanks to prevent condensation problems.

One-piece vs. two-piece

A two-piece toilet—a separate tank and bowl—is the most common design found in homes. But one-piece models are available. While two-piece toilets are less expensive, one-piece toilets often have shorter tanks and are easier to clean. Some people also like one-piece toilets for their smooth, sleek appearance.



Cost

When it comes to toilets, expensive doesn't automatically mean better performance. In fact, some of the best models tested by MaP are relatively inexpensive, while costlier ones offer only marginal performance.

Color

Fashion is fickle. Stick with a white or an off-white toilet so you're not stuck with a color you'll hate a few years down the road. (Don't miss the blue one on the opposite page!)



Flush-handle location

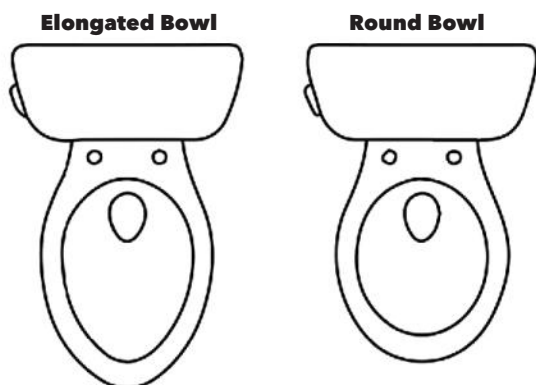
If you have lots of room above or beside your toilet, this probably isn't all that important. But if your toilet will be right up against a wall or cabinet, choose one with the handle on the opposite side or on top of the tank.



Rough-in

The distance of the flange bolts—the two bolts that anchor your toilet bowl to the floor—to the wall behind the toilet is known as the “rough-in” dimension (make sure to account for the thickness of your baseboard, paneling or tile).

Twelve-inch rough-ins are the most common, but in some older houses you may find 10-in. or 14-in. rough-ins. Be sure to measure your rough-in before you go toilet shopping so you'll know what to ask for.



Bowl shape

Most toilets sold today have either round-front bowls or elongated-front bowls. Round-front bowls are great if space is tight. Elongated bowls have a longer rim—as much as 2 in. longer—and require more space (there have been cases where doors and drawers couldn't be opened after installation). On the plus side, elongated bowls are generally more comfortable for adult use and help improve hygiene. Check manufacturer websites for dimensions of bowls and measure your space before deciding on the bowl shape.

“Wall print”

If you install a new toilet with a smaller tank, you might have to paint the part of the wall that was covered by the old toilet tank.

Footprint

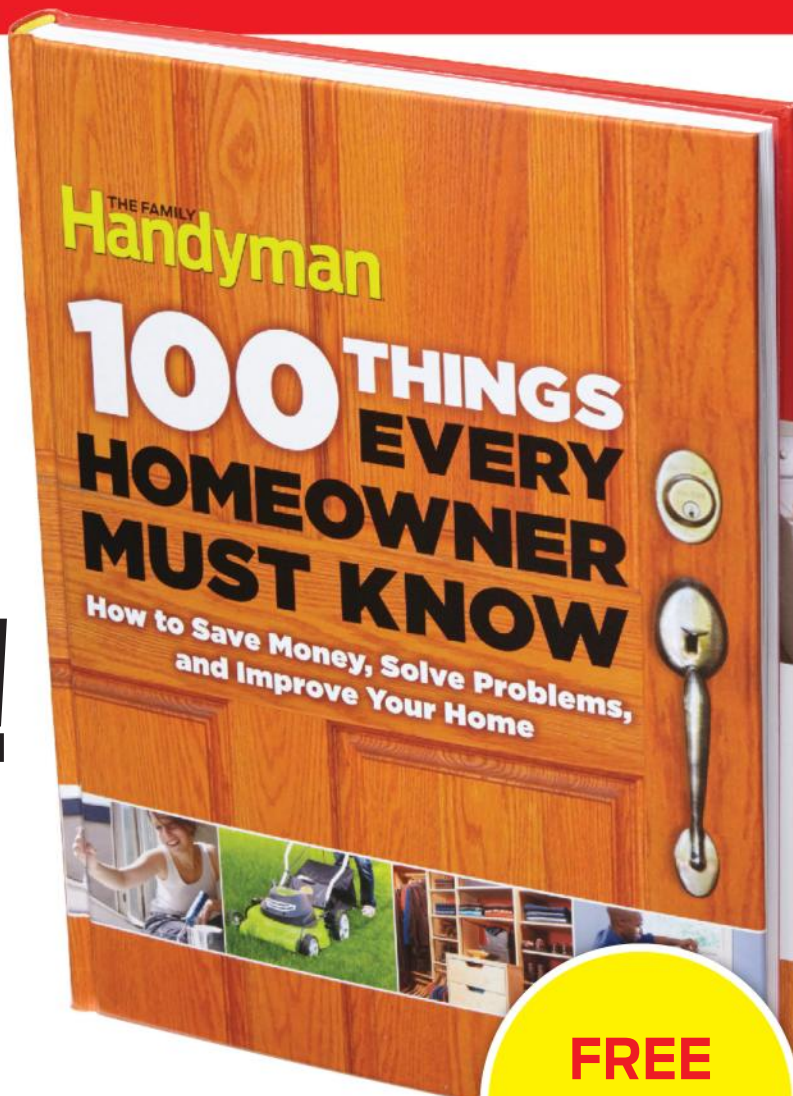
If you're replacing an old toilet that has a large footprint (the base covers a large floor area), you might have to patch and repair the part of the floor that was covered by the old toilet. You may even have to replace the entire floor before installing a new toilet with a smaller footprint.



MEET THE EXPERT

John Koeller is a principal at Maximum Performance (MaP) Testing and contributed his toilet expertise to this article. Visit map-testing.com for more toilet shopping tips, product reviews and flush ratings.

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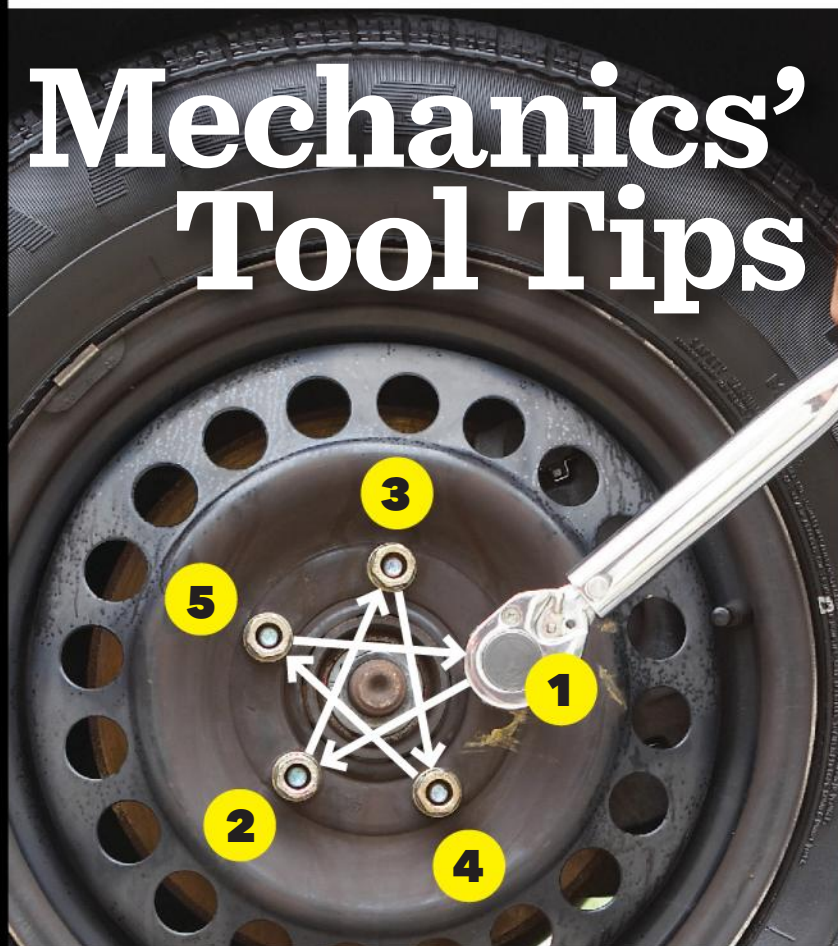
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Car + Garage

OUR
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Expert advice on repair, maintenance and gear. By Rick Muscoplat

Mechanics' Tool Tips



It's not only about having the right tools. It's about knowing when, where and how to use them. Sometimes that means using them for tasks they weren't designed for. Check out this collection of mechanics' tool tips—you're bound to find a couple to help you.

Proper way to torque lug nuts

Did you know there's a right way and a wrong way to tighten lug nuts? Most people think tighter is better. Not true. Overtightening lug nuts is the No. 1 cause of warped brake rotors (called "brake rotor lateral run-out"). Warped rotors cause pedal pulsation and can increase your stopping distance. Overtightening can also break wheel studs. The stud itself doesn't cost much (\$3), but the labor to press out the old stud and insert the new one can run \$50 to \$75.

Spin the lug nuts on by hand. Never coat the stud with grease,

oil or anti-seize. Lower the jack only enough to bring the tire into contact with the road. Tighten each nut to half the specified torque. Then lower the vehicle completely and tighten each nut to full torque.

1. Consult your owner's manual or a shop manual and set your torque wrench to one-half the recommended torque specification.

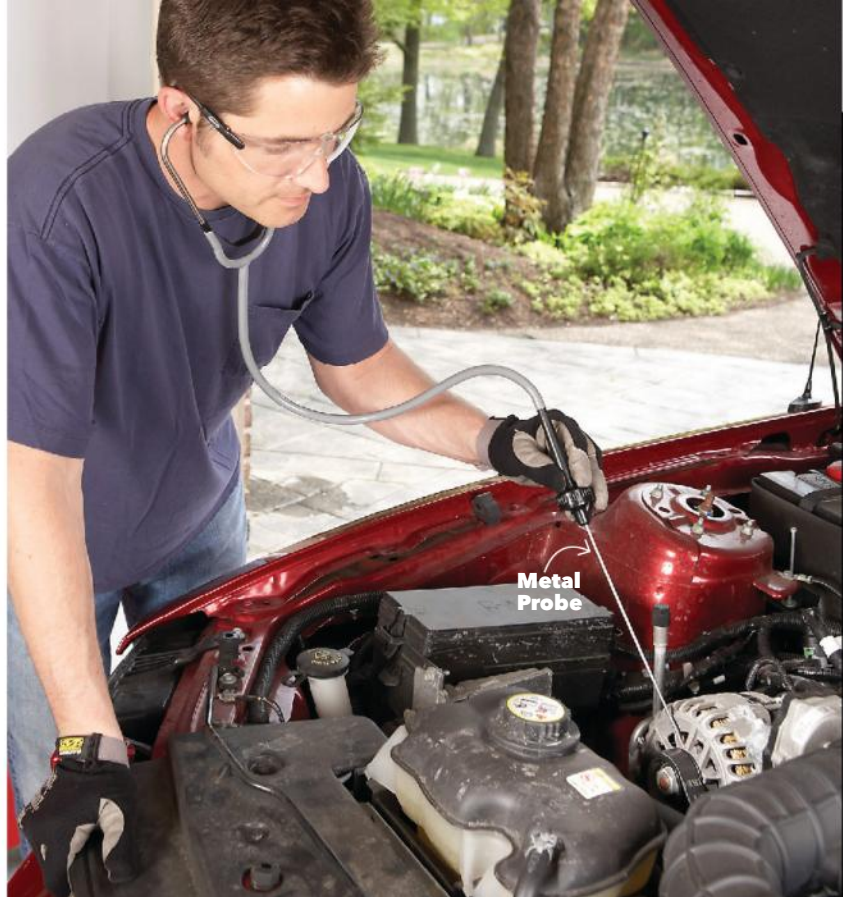
2. Reset the wrench and tighten each nut to full torque. Move the socket from one nut to the next in a star-shaped sequence.



Diagnose chirps and squeals with a stethoscope

If you want to be a real car doctor, you've got to use the right tools. An automotive stethoscope can be the most effective diagnostic tool in your toolbox. It works just like the medical version, allowing you to "hear inside" a mechanical component. The stethoscope we chose, the Lisle No. 52750, comes with two attachments—a sound amplifier and a metal probe.

You connect the amplifier to the hose and move it around the engine compartment as you listen. That will narrow your search to a smaller area. Then you switch to the metal probe to pinpoint the exact source of the problem. The Lisle No. 52750 Automotive Stethoscope is available for \$15 at tooldiscounter.com.



Touch the scope's metal probe to the nonrotating part of the suspect component. If it's worn, you'll hear an unmistakable metallic sound.



Save your back with a 20-in. extension bar

When you're leaning over the fender and elbow deep into a tune-up, the tool you want is a 20-in. extension bar. It'll save your back every time. Just snap your socket onto the end and ratchet away—while standing. The Kobalt 20-in. Extension (No. 337368) is \$14 at Lowe's.

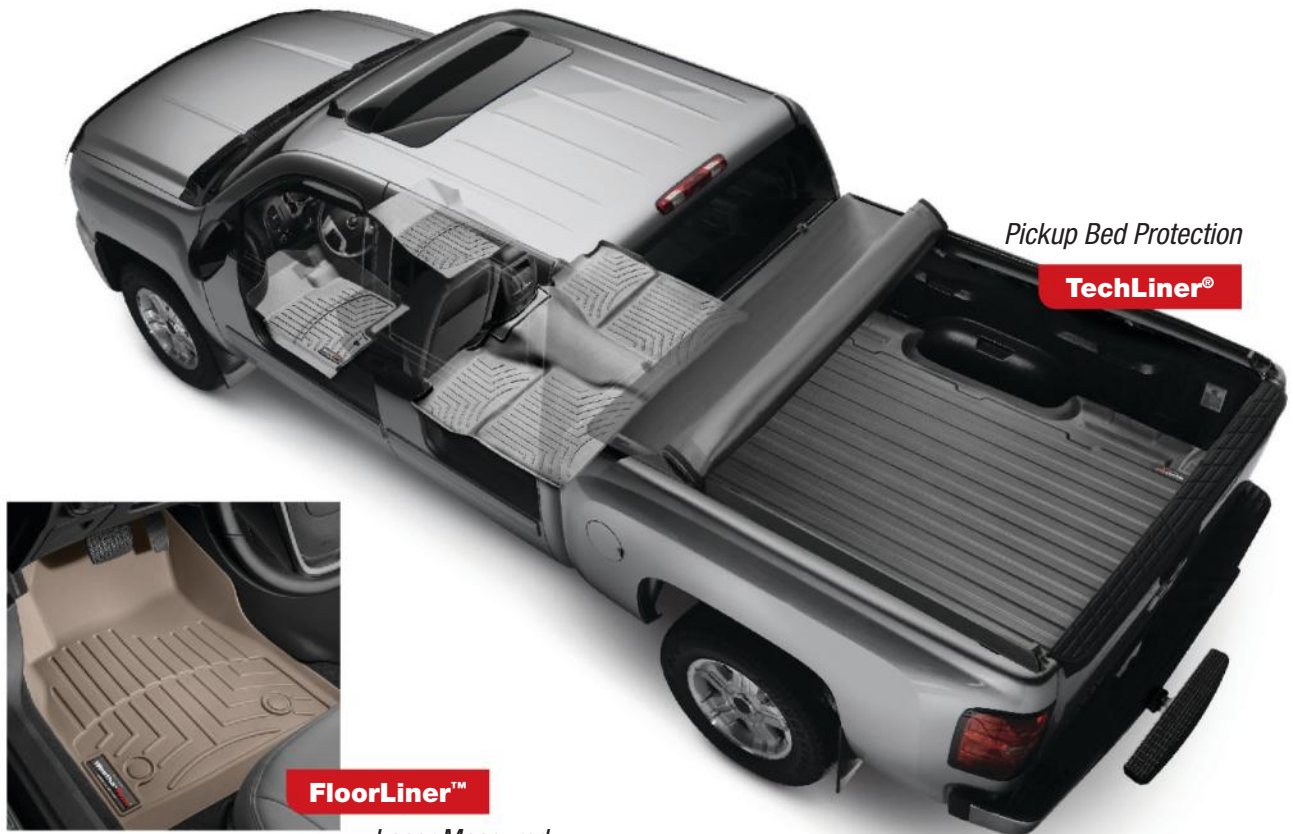
Great way to store used oil

Storing used motor oil is a hassle. Here's a tip: Restaurants order liquids such as cooking oil and soy sauce in 5-gallon jugs. Next time you're out to eat, ask if you can have a few empty jugs. Rinse them and use them to store several changes' worth of used oil between trips to the recycling center.



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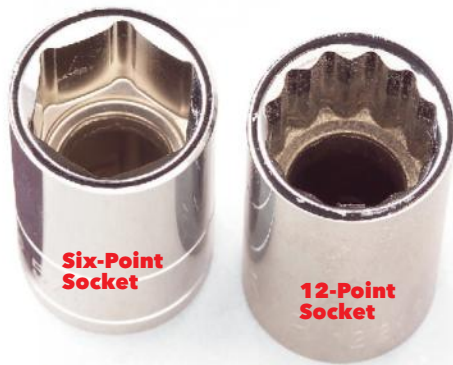
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Expert Advice

Six-point vs. 12-point sockets

Q My gearhead neighbor keeps telling me I should quit using my 12-point sockets and buy a set of six-points. Is this really necessary?

A A 12-point socket is fine for most lightweight repairs, but heavy wrenching calls for a six-point socket. A six-point socket is much less likely to slip off a stubborn fastener or round over the corners.

Here's why: (1) Six-point sockets have thicker walls, so they're less likely to flex. (2) A six-point socket is designed to contact the head of a fastener well away from the corners so contact is made on the thickest part of the socket and the flattest part of the fastener. This dramatically reduces the likelihood of slippage and rounding over the corners. And (3), the edges of a socket are angled back a few degrees to allow the socket to slide easily over a fastener. The angle on a six-point socket is less than on its 12-point counterpart, again providing more contact area inside the socket.

One last point. Most high-quality sockets are chrome plated to prevent rusting and make cleanup easy. However, after years of use, the chrome finish can flake off. Don't use a socket if the chrome is peeling. The chrome will be as sharp as a razor blade. Any reputable tool company will replace a tool that has peeling chrome.



Free up a stuck trailer hitch

When the ball mount on your trailer hitch is rusted in place, don't whack at it with a sledgehammer. Here's what to do instead. Buy a can of penetrating oil (\$6) and an air chisel fitted with a "hammer" bit. The air chisel will run about \$15 and the extra bit will be about \$8.

Spray the opening to the hitch receiver. This newest style of penetrating fluid chills the metal, causing it to contract to help break the rust seal. Then use an air chisel fitted with a hammer bit to knock everything loose. The air hammer will break up the rust, spread the penetrant and free up the ball mount. Once it's free, just tap out the rusted ball mount with a regular hammer. If you plan to reuse the rusty mount, coat it with a rust converter or waterproof marine grease.

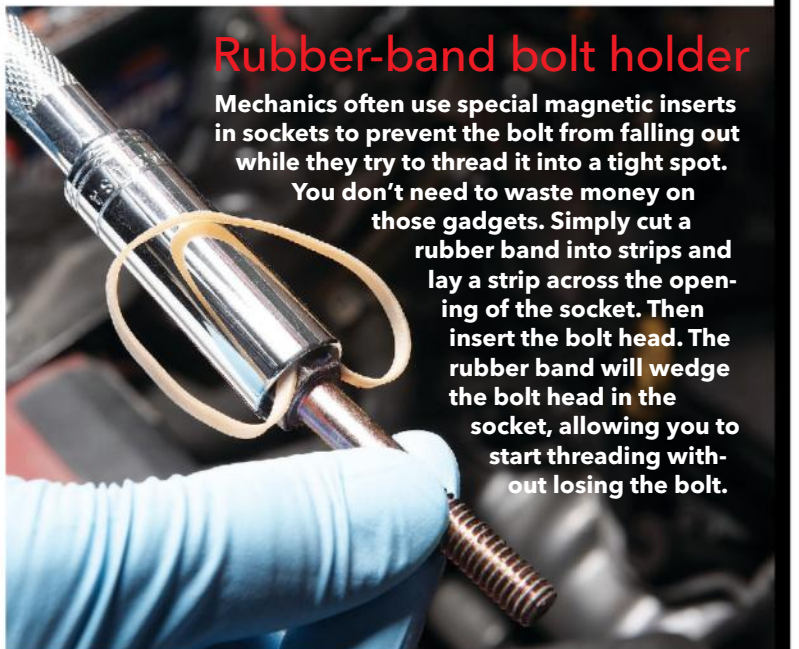
Rap the sides, top and bottom of the hitch receiver for 15 seconds with blows from the air hammer. Spray again. Repeat the rapping until the ball mount loosens.



Rubber-band bolt holder

Mechanics often use special magnetic inserts in sockets to prevent the bolt from falling out while they try to thread it into a tight spot.

You don't need to waste money on those gadgets. Simply cut a rubber band into strips and lay a strip across the opening of the socket. Then insert the bolt head. The rubber band will wedge the bolt head in the socket, allowing you to start threading without losing the bolt.



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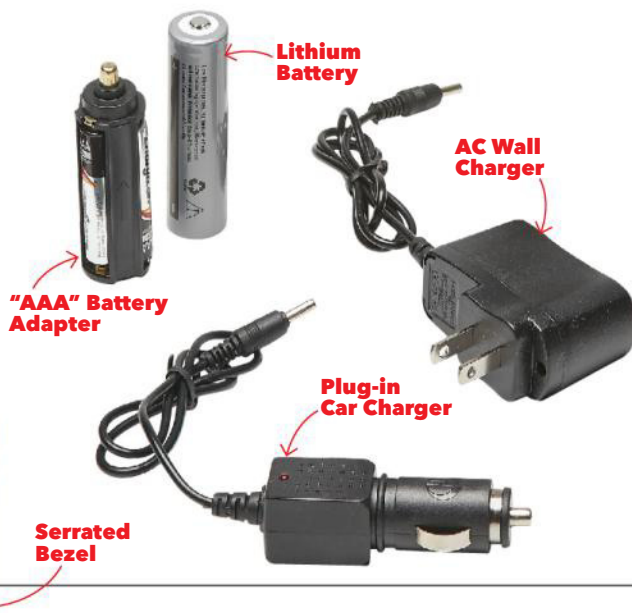
TECH TOOLS FOR DIYers AND PROS

These four innovative, affordable
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GREAT DEAL

Next-generation flashlight

LED flashlights aren't new, but this isn't an ordinary LED flashlight. The **TFCFL 1800LM XM-L T6 LED Zoomable Torch Flashlight** (\$17 online) is powered by a standard 18650 lithium rechargeable battery that provides up to five hours of continuous use. The zoom feature allows you to concentrate light to get better illumination or pull back to light up large areas. Use the serrated front bezel for self-defense or to break glass in emergency situations. The flashlight kit comes with plug-in car and AC wall chargers, lithium battery, "AAA" battery adapter, a lanyard and a plastic case.



BUILT FOR ABUSE

Smartphone with thermal imaging

The **CAT S60 Android smartphone** (\$630 at catphones.com) is far more rugged than a consumer-grade phone. It's shatterproof up to a 6-ft. drop onto concrete, dustproof, shock-proof and waterproof down to 5 meters for up to an hour.

This phone works in temps from minus 13 to 131 degrees F, and the touch screen has glove-on and wet-finger tracking ability, so it operates in any weather.

The CAT S60 has a 13-megapixel camera as well as an infrared (FLIR) camera. Use the FLIR camera throughout your house to measure surface temperatures and find air leaks and temperature differences behind walls, electrical problems and even beehives.

The S60 works with AT&T and T-Mobile and affiliated GSM networks using a nano sim card. It comes with 32GB internal memory and accepts a microSD card for extended storage up to 128GB.

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Aim the FLIR camera, center the temperature cursor over the dark blue areas and get an instant read on your biggest air leaks.

**BUILT-IN SAFETY**

Electrical tools with onboard voltage tester

Noncontact voltage testers are great for making sure the power is off before you start an electrical project. But the testers are easy to lose track of and misplace—which pocket is it in?

Tool manufacturer Gardner Bender solves the problem of lost testers by incorporating a tester right into the handles of its wire stripper and screwdriver—tools you're bound to have on hand whenever you're doing electrical work. Simply press the button and move the tool handle near the wires to test before touching. Or, slide the tester off the tool handle to use it as a free-standing unit.

Find the **GST-70M Circuit Alert Voltage sensing stripper** (about \$30) and **SDT-10 screwdriver** (about \$16) at home centers.



HOME TECH



BARGAIN TECH

Smartphone inspection camera

This **Distianert Endoscope Inspection Camera** has a 13-ft. cable that lets you snake behind walls and peek inside appliances—even grab wires or retrieve nuts and bolts from tight quarters. Just download the app and plug the 2.0-megapixel inspection camera into any on-the-go (OTG) compatible Android smartphone or tablet or into a USB port on a Mac laptop. Move the camera into position and adjust the light intensity switch to get the proper illumination. Watch your screen to get the camera into the right spot. Then snap a still shot or shoot video.

For long runs, tape the cable to a stick to feed and aim the camera head. The unit comes with a cloth storage bag and three attachments: a 90-degree mirror, a hook and a magnetic tip. The video quality is good enough to get the job done; just don't expect 1080 resolution for this price. You can find the camera for about \$23 at amazon.com.

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DESIGN ON THE WALL

Planning to remodel? You can get a preview of the remodeled space by creating a full-scale layout on walls and floors with tape, chalk and paper. This trick is especially helpful in kitchens and bathrooms.



Consider storm windows

If you want windows that look great and open smoothly, complete replacement is definitely the way to go. But if your main concern is air leakage and energy costs, consider storm windows. Quality storm windows can stop air leaks almost as well as full replacements but cost half as much—or even less. Plus, the labor savings are huge; a DIYer can install 10 storm windows in the time it takes to replace one window. You might find storm windows for less than \$50 each, but shop around. Chances are, you'll discover that spending \$75 to \$150 is smarter.

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Raise your dryer

Set your dryer on a box and save your back. This box is a simple one made from 2x8 boards and topped off with 3/4-in. plywood. It's a good project for a first-time carpenter. Before you begin, make sure your dryer's exhaust duct, power cord and gas line will accommodate the move up. If you have a rigid duct rather than a flexible one, you'll have to alter it.

Economy Cable

Braided Wire

Foil



DON'T CHOOSE CHEAP COAXIAL CABLE

Shielding is what counts when it comes to cable quality. It blocks interference and keeps the signal clean. So skip the "dual-shield" or "double-shield" cable and go for a "quad-shield" product; it has twice as much braided wire and foil shielding. After spending big bucks on a TV or computer, it doesn't make sense to skimp on cable.

Quad-Shield Cable

Braided Wire

Foil





DON'T CARRY IT—SLIDE IT

You can buy furniture slides in many shapes and sizes at home centers and online. It's also easy to make your own sliders from plastic container covers, Frisbee discs, bedspreads, moving blankets, towels and carpet remnants. Use hard plastic sliders for carpeting and soft, padded sliders for hard flooring.



Caulking concrete

The best caulks for concrete are usually labeled "urethane" or "polyurethane," and most can fill cracks 1/2 in. wide or more (check the label). For any crack wider than 1/4 in., stuff in foam backer rod first. Using backer rod saves expensive caulk and results in a stronger joint. And since it seals off the crack, it allows you to use runny "self-leveling" caulk, which provides a much neater look on flat surfaces.

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LOCK THE OVERHEAD GARAGE DOOR

When some people go on vacation, they “lock” their overhead garage door by unplugging the opener. That’s a good idea, but physically locking the door is even better. An unplugged opener won’t stop a burglar who has entered through the house from opening the garage door from the inside, backing in a van and using your garage as a loading dock. Make a burglar’s job more difficult by locking the door itself. If your door doesn’t have a lockable latch, drill a hole in the track just above one of the rollers and slip in a padlock.

Springtime safety warning

Every spring and summer, readers tell us about their window air conditioner accidents: A/C units dropped on toes, tumbling down stairways or falling out of windows. We haven’t heard about any serious injuries or deaths, but lots of close calls. In almost every case, the trouble began when someone decided to install an A/C unit solo. The lesson is this: Those things are heavy and clumsy to handle. Get help!

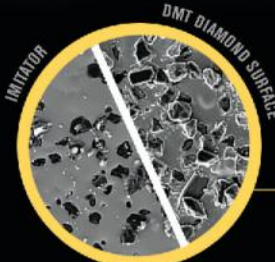


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CHECK THE OUTLET

If any electronic item suddenly won’t turn on, don’t immediately assume it’s broken. Plug in a radio or a lamp to make sure the outlet is working.



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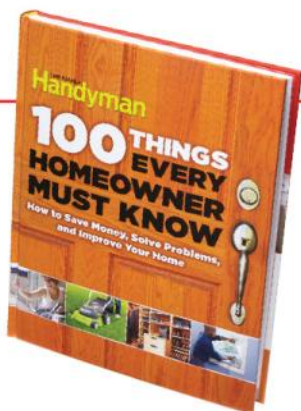
Buying light fixtures? Beware!

Every once in a while, I show up at a home to install a new fixture that the homeowner provided and run into an obstacle. It might be a hanging fixture that won't allow a door or cabinet to open or a sconce that blocks the medicine cabinet. The worst part is that I sometimes don't recognize the problem until I've installed the fixture. Ouch. So before you go shopping, measure first.



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Electrical contractor and
The Family Handyman wiring whiz



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DIY Quiz

Test what you know—learn what you don't. By Travis Larson

Put on your thinking cap and take this month's quiz to see just how smart you are when it comes to DIY. Here's how it works:

- There are easy, intermediate and really tough questions all mixed together.
- There may be more than one correct answer!
- Get the answers and your DIY rating on pp. 92-93.

1. The best time to apply crabgrass preventer is:

- A. After the second mowing in the spring.
- B. When the soil temperature ranges from 55 to 60 degrees F.
- C. As soon as the grass begins greening up.
- D. When certain flowers are blooming.

2. True or False? It's good practice to wrap plumbing threads with Teflon tape and coat the tape with pipe thread sealant.

3. Which of the following would be used to clamp PEX tubing to fittings?

- A. Cinch clamp
- B. "Pro" crimp ring
- C. Copper crimp ring
- D. All of the above



4. True or False? Water-repellent preservative (WRP) is a coating applied to wood in damp areas before you prime and paint.

5. How do you know whether a finishing product (paint, varnish, etc.) is oil- or water-based?

- A. You can tell by the smell.
- B. Read the cleanup instructions.
- C. Oil-based finishes are much thicker than water-based ones.
- D. It's stated clearly on the label.



6. True or False? The "setback" distance from the property line to a new building is defined by the part of the building that's closest to the line.

7. This style of drill bit is used for:

- A.** Universal drilling in many types of materials.
- B.** Drilling holes in ceramic tile and glass.
- C.** Boring countersink holes to recess screw heads.
- D.** Drilling holes in masonry.

WHAT'S YOUR LEVEL OF EXPERTISE?

BEGINNER
0-3 Correct

INTERMEDIATE
4-7 Correct

DIY GURU
8-10 Correct

8. True or False? You can minimize soap scum on your shower walls and doors by switching to synthetic soap.

9. True or False? Your refrigerator quit working. It's a good idea to unplug it to reboot the computer.

10. Which of these three hearing protectors is most effective?

- A.** Disposable foam earplugs
- B.** Earmuffs
- C.** Reusable plugs



Less Pees, More Zzz's...

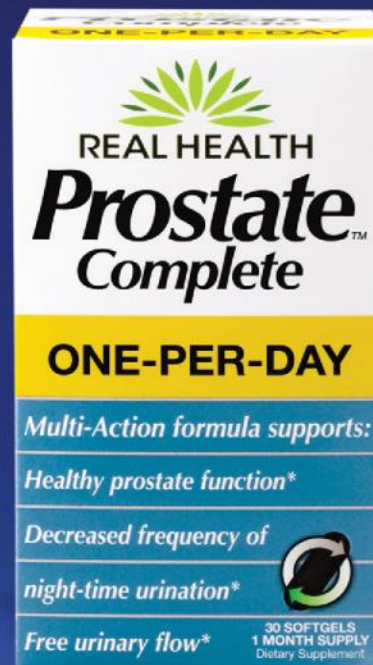
One of the signs of an aging prostate is an increased need to urinate, often in the middle of the night.

That's where Prostate Complete can help. With just one pill per day, Prostate Complete helps support:

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9" BENCHTOP BANDSAW



MADE IN AN ISO 9001 FACTORY!

G0803 \$235 **SALE \$185⁰⁰**

14" BENCHTOP DRILL PRESS 12-SPEED, HEAVY-DUTY



TOOL
of the
Month

\$89
shipping
charge

G7943 \$349⁹⁵ **SALE \$295⁰⁰**

2 HP DUST COLLECTOR WITH ALUMINUM IMPELLER



MADE IN AN ISO 9001 FACTORY!

2.5 MICRON TOP BAG



\$89
shipping
charge

G102972P \$355 **SALE \$325⁰⁰**

13" BENCHTOP PLANER WITH BUILT-IN DUST COLLECTION

New!



G0832 **ONLY \$355⁰⁰** **\$89** shipping charge

6" JOINTER WITH KNOCK-DOWN STAND AND BUILT-IN MOBILE BASE



\$89
shipping
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14" DELUXE BANDSAW ANNIVERSARY EDITION

MADE IN AN ISO 9001 FACTORY!



\$89
shipping
charge

G0555LANV \$575 **SALE \$525⁰⁰**

12" BABY DRUM SANDER 1.5 HP SANDING MOTOR



\$89
shipping
charge

G0459 \$695 **SALE \$595⁰⁰**

10" HYBRID TABLE SAW CAST IRON TABLE AND EXTENSION WINGS

New!



\$109
shipping
charge

G0771Z \$895 **SALE \$750⁰⁰**

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DISCOVER



DIY QUIZ ANSWERS

1. (A, B & D) If you apply crabgrass preventer too early or late, it won't do any good. Timing it with the second mowing works well. Or in the North, apply preventer when lilacs or forsythia are blooming; in the South, when dogwoods are blooming. But the best way is to buy an inexpensive soil thermometer and test the soil. Apply between temperatures of 55 and 60 degrees F.



2. True. Burrs on threads inside female fittings can tear Teflon tape. Adding a bit of pipe thread sealant will fill any gaps caused by tape failures.

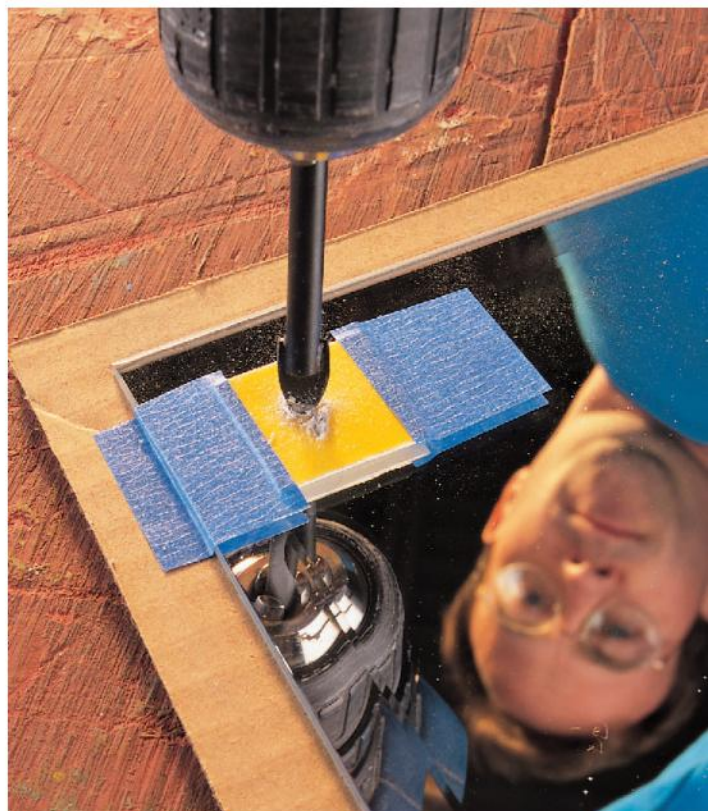
3. (D) The cinch clamp is the most DIY-friendly system. It requires a relatively inexpensive cinching tool that works on either 1/2-in. or 3/4-in. material. Crimp rings require a more expensive crimping tool (one for both 1/2-in. and 3/4-in. fittings). The red plastic you see (B) is simply a collar that holds the fitting in place before and during crimping. If these collars are available at the store, they're well worth the extra few cents.





4. True. Few know about WRP, but it's very smart to apply it to wood in moisture-prone locations like windowsills and garage door trim to keep paint from peeling. It prevents water from getting into the wood through tiny cracks in the paint. Once water gets in, the wood swells and begins creating more and bigger cracks, eventually leading to peeling paint. Nearly every paint manufacturer makes a version of WRP; just make sure you pick one that's paintable and then scrupulously follow the instructions.

6. True. You might think that the setback would always be measured to the foundation or edge of the building. But that could mean you'd end up sawing off your roof eaves to comply with a prickly building inspector or neighbor!



7. (B) Ceramic tile and glass. Some will even drill through porcelain tile.

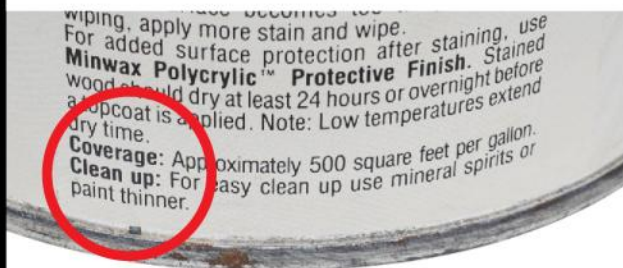
8. True. "Synthetic" soaps make cleaning your shower or bath easier because they don't contain the ingredients that create tough soap scum. Any liquid or gel soap is synthetic. Most bar soaps are standard soaps, but a few, including Zest and Ivory, are synthetic.

9. True. Most modern refrigerators have an onboard computer. Unplugging the refrigerator for a half hour or so and then plugging it back in will often get your fridge back online without an expensive service call.

10. (A) Disposable foam plugs are the best, although both earmuffs and reusable plugs offer plenty of protection for just about any loud work. According to the Occupational Health and Safety Administration (OSHA), the goal is to reduce noise levels to 85dB, the point where hearing damage begins. For super-loud noise, like a screaming chain saw, use both disposable plugs and earmuffs.



5. (B) Read the cleanup instructions. If the product cleans up with soap and water, it's water-based; if it requires mineral spirits, it's oil-based. The label doesn't always state which is which. And with all the new finish formulations, the smell isn't a reliable indicator either.



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drillmaster **SCISSOR SUPER COUPON**

SAVE 50%

4-1/2" ANGLE GRINDER
ITEM 69645
60625 shown

SUPER COUPON
\$9.99

Compare ~~\$14.99~~ **\$20.13**

Customer Rating **★★★★★**

24433425

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SCISSOR SUPER COUPON

Not for highway use.

10" PNEUMATIC TIRE
ITEM 69385/62388/62409
62698/30900 shown

SAVE 73%

Customer Rating **★★★★★**

SUPER COUPON
\$3.99

Compare ~~\$5.99~~ **\$14.99**

24375282

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CENTRAL MACHINERY **SCISSOR SUPER COUPON**

UNIVERSAL TOOL STAND
ITEM 69805

SAVE 57%

Customer Rating **★★★★★**

SUPER COUPON
\$2.99

Compare ~~\$39.99~~ **\$69.99**

24418820

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HaulMaster **SCISSOR SUPER COUPON**

17 FT. TYPE IA MULTI-TASK LADDER
ITEM 62656/62514
67646 shown

SAVE \$161

Customer Rating **★★★★★**

SUPER COUPON
\$119.99

Compare ~~\$139.99~~ **\$281.87**

24390142

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PITTSBURGH **SCISSOR SUPER COUPON**

4 PIECE WOOD CHISEL SET WITH CLEAR PVC HANDLE
ITEM 42429/69471 shown

SAVE 83%

Customer Rating **★★★★★**

SUPER COUPON
\$4.99

Compare ~~\$7.99~~ **\$29.97**

24406767

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SCISSOR SUPER COUPON

20% OFF

ANY SINGLE ITEM

Limit 1 coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Track Club membership, Extended Service Plan, gift card, open box item, 3 day Parking Lot Sale item, compressors, floor jacks, saw mills, storage cabinets, chests or carts, trailers, trenchers, welders, Admiral, Bauer, CoverPro, Daytona, Earthquake, Hercules, Jupiter, Lynox, Poulan, Predator, StormCat, Tailgator, Viking, Vulcan. Not valid on prior purchases. Non-transferable. Original coupon must be presented. Valid through 8/10/17.

24393441

PREDATOR **SCISSOR SUPER COUPON**

8750 PEAK/7000 RUNNING WATTS 13 HP (420 CC) GAS GENERATORS
ITEM 68530/69671/63086/63085 shown

Customer Rating **★★★★★**

ITEM 68525/63087/63088 CALIFORNIA ONLY
Wheel kit and battery sold separately.

BEST BUY WINNER
8-13 HRS. RUN-TIME
420 CC ENGINE
76 dB SUPER QUIET ELECTRIC START

SAVE \$469

SUPER COUPON
\$52.99

Compare ~~\$599.99~~ **\$999**

24446696

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Lifetime **SCISSOR SUPER COUPON**

ALUMINUM OXIDE SANDING SPONGES - PACK OF 10
COARSE ITEM 46751
MEDIUM ITEM 46752
FINE ITEM 46753

SAVE 16%

Customer Rating **★★★★★**

YOUR CHOICE
\$3.99

Compare ~~\$4.80~~ **\$4.80**

24429739

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CHICAGO ELECTRIC **SCISSOR SUPER COUPON**

ADJUSTABLE SHADE AUTO-DARKENING WELDING HELMET
ITEM 61611
46092 shown

Customer Rating **★★★★★**

SUPER COUPON
\$34.99

SAVE 56%

Compare ~~\$44.99~~ **\$79.99**

24415381

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CHICAGO ELECTRIC **SCISSOR SUPER COUPON**

SAVE \$94

Blade sold separately.

10" SLIDING COMPOUND MITER SAW
ITEM 61971/61972
98199 shown

Customer Rating **★★★★★**

SUPER COUPON
\$84.99

Compare ~~\$119.99~~ **\$179**

24436010

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PITTSBURGH **SCISSOR SUPER COUPON**

RAPID PUMP® 3 TON LOW PROFILE HEAVY DUTY STEEL FLOOR JACK
ITEM 61282 shown
61253/62326

Customer Rating **★★★★★**

• Weighs 73 lbs.

SAVE \$190

SUPER COUPON
\$19.99

Compare ~~\$84.99~~ **\$269.99**

24387853

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US GENERAL **SCISSOR SUPER COUPON**

26", 16 DRAWER ROLLER CABINET
ITEM 61609

SAVE \$653

• 1060 lb. capacity
• 14,600 cu. in. of storage

Customer Rating **★★★★★**

SUPER COUPON
\$299.99

Compare ~~\$349.99~~ **\$952.99**

24431222

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CENTRAL PNEUMATIC **SCISSOR SUPER COUPON**

18 GAUGE BRAD NAILER
ITEM 63157
68021 shown

Customer Rating **★★★★★**

SAVE 80%

SUPER COUPON
\$14.99

Compare ~~\$19.99~~ **\$74.99**

24397470

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US GENERAL **SCISSOR SUPER COUPON**

26", 4 DRAWER TOOL CART
ITEM 95659 shown
61634/61952

Customer Rating **★★★★★**

• 580 lb. capacity

SAVE \$269

SUPER COUPON
\$99.99

Compare ~~\$149.99~~ **\$369.32**

24451477

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SCISSOR SUPER COUPON

7 FT. 4" x 9 FT. 6" ALL PURPOSE WEATHER RESISTANT TARP
ITEM 69249/69115/69137
69129/69121/877 shown

SAVE 64%

Customer Rating **★★★★★**

SUPER COUPON
\$2.99

Compare ~~\$8.48~~ **\$4.99**

24427036

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HaulMaster **SCISSOR SUPER COUPON**

1195 LB. CAPACITY 4 FT. x 8 FT. FOLDABLE HEAVY DUTY TRAILER
ITEM 62648/62666
90154 shown

SAVE \$140

• DOT certified tires

Customer Rating **★★★★★**

SUPER COUPON
\$259.99

Compare ~~\$399.99~~ **\$299.99**

24413638

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CENTRAL PNEUMATIC

SCISSOR SUPER COUPON

YOUR CHOICE
\$39.99

3 GALLON, 100 PSI OILLESS AIR COMPRESSORS

A. HOT DOG
ITEM 69269/97080 shown

B. PANCAKE
ITEM 95275 shown
60637/61615



SAVE 59%

Customer Rating



24474542

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SUPER COUPON FREE

WITH ANY PURCHASE
3-1/2" SUPER BRIGHT NINE LED ALUMINUM FLASHLIGHT

ITEM 69052 shown
69111/63599
62522/62573



\$4.97
VALUE

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 8/10/17. Limit one FREE GIFT coupon per customer per day.



HaulMaster

SCISSOR SUPER COUPON

1000 lb. capacity

MOVER'S DOLLY

ITEM 60497/93888 shown
61899/62399/63095/63096
63096/63097



SAVE 59%

Customer Rating



Compare \$19.97

24493051

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drillmaster

SCISSOR SUPER COUPON

80 PIECE ROTARY TOOL KIT

ITEM 97626 shown
63235/68986
69451/63292



\$9.99

Customer Rating



Compare \$19.97

24493051

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CHICAGO ELECTRIC POWER TOOLS

SCISSOR SUPER COUPON

4" BISCUIT PLATE JOINER

ITEM 68987 shown



SAVE \$134

Customer Rating



Compare \$179

24464077

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CENTRAL MACHINERY

SCISSOR SUPER COUPON

14" OSCILLATING SPINDLE SANDER

ITEM 95088/62146
69257 shown



SAVE \$53

Customer Rating



Compare \$152.99

24464172

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CENTRAL MACHINERY

SCISSOR SUPER COUPON

4" x 36" BELT/6" DISC SANDER

ITEM 62502
97181 shown



SAVE \$64

Customer Rating



Compare \$124.51

24471395

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BADLAND

SCISSOR SUPER COUPON

2500 LB. ELECTRIC WINCH WITH WIRELESS REMOTE CONTROL

ITEM 61258 shown
61840/61297
68146/63476



Voted Best Winches in Quality & Price

SAVE \$70

Customer Rating



Compare \$119.99

24457700

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PITTSBURGH

SCISSOR SUPER COUPON

50" CLAMP AND CUT EDGE GUIDE

ITEM 66581



SAVE 70%

Customer Rating



Compare \$49.99

24464728

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U.S. GENERAL

SCISSOR SUPER COUPON

16" x 30" TWO SHELF STEEL SERVICE CART

ITEM 60390
5107 shown



SAVE 50%

Customer Rating



Compare \$59.98

24452610

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HaulMaster

SCISSOR SUPER COUPON

1000 LB. CAPACITY SWING-BACK TRAILER JACK

ITEM 68780/41005 shown



SAVE 54%

Customer Rating



Compare \$39.94

24457994

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CENTECH

SCISSOR SUPER COUPON

AUTOMATIC BATTERY FLOAT CHARGER

ITEM 69594/69595
42292 shown



SAVE 85%

Customer Rating



Compare \$34.99

24483017

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HaulMaster

SCISSOR SUPER COUPON

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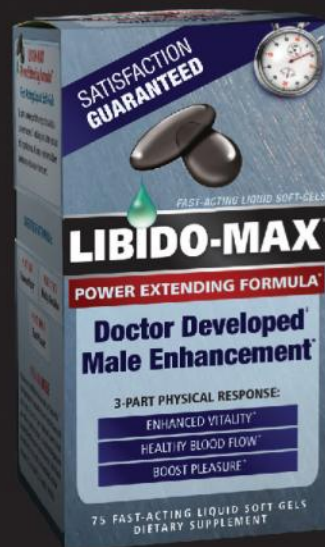
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Laughs and lessons from our readers



WATERWORKS

In an attempt to bring our lawn up to par with our neighbors', I installed an underground sprinkler system. A few months went by and the results were terrific—our lawn was green and lush.

One neighbor suggested we'd get even better results if we had our lawn professionally aerated. So of course I called up a lawn service and had it done.

The next morning, I peered out the window to see water spurting up from random spots in the lawn. Apparently I hadn't buried the tubing deep enough, and the machine that aerated the lawn punctured the lines.

Now I can impress my neighbors with my pipe-patching skills.

— RICH ANDREONI

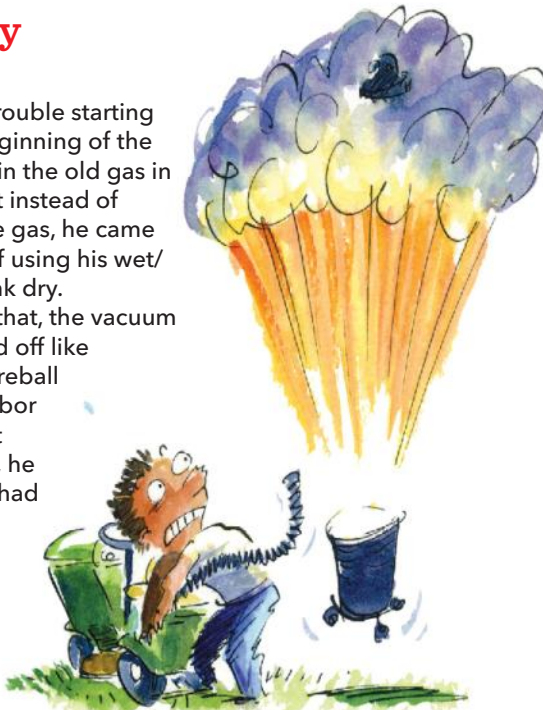
Slow and steady saves your face

My neighbor was having trouble starting his riding mower at the beginning of the season. He decided to drain the old gas in the tank and replace it. But instead of patiently siphoning out the gas, he came up with the brilliant idea of using his wet/dry vacuum to suck the tank dry.

After about a minute of that, the vacuum ignited and the top blasted off like a missile, leaving a huge fireball in its wake. I saw my neighbor later that day, and it wasn't pretty. His hair was singed, he had no eyebrows, his skin had a charcoal hue and he clearly didn't want to talk about it.

Eventually he got the mower up and running, but I'm pretty sure the shop vacuum was a goner.

— ROD WOOCK



LET THERE BE LIGHT

My sister had just finished rewiring my porch light, but when I screwed in a new bulb, nothing happened.

She rechecked the wiring, flipped the switch and—no light. Then she redid the wiring—again no light.

Finally, I unscrewed the new bulb and noticed a bar code label glued to the bottom where the connection is made. I removed it and—lo! There was light.

— WILHELMINE BENNETT

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