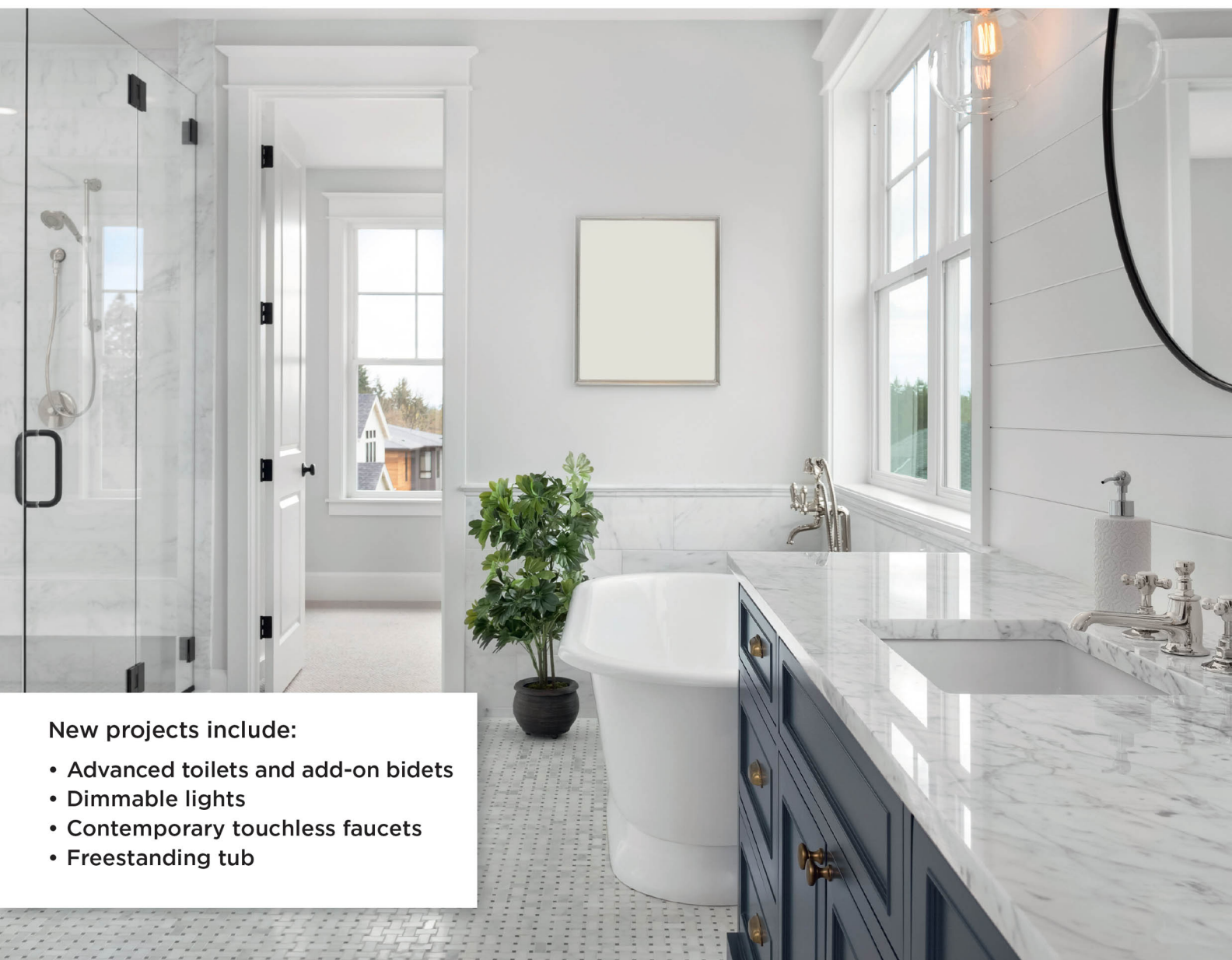


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The techniques shown in this book are general techniques for various applications. In some instances, additional techniques not shown in this book may be required. Always follow manufacturers' instructions included with products, since deviating from the directions may void warranties. The projects in this book vary widely as to skill levels required: some may not be appropriate for all do-it-yourselfers, and some may require professional help.

Consult your local building department for information on building permits, codes, and other laws as they apply to your project.

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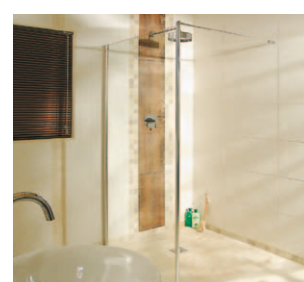
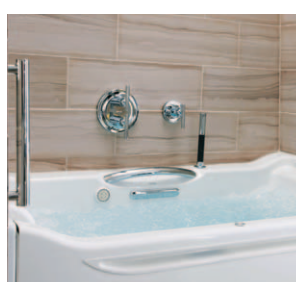
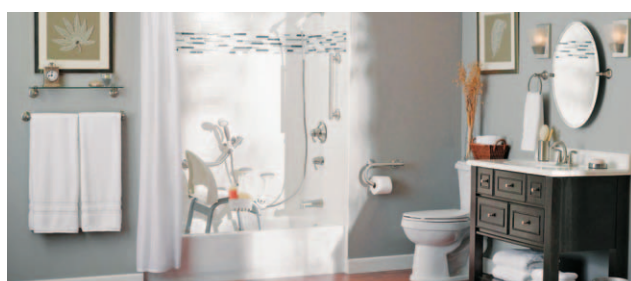
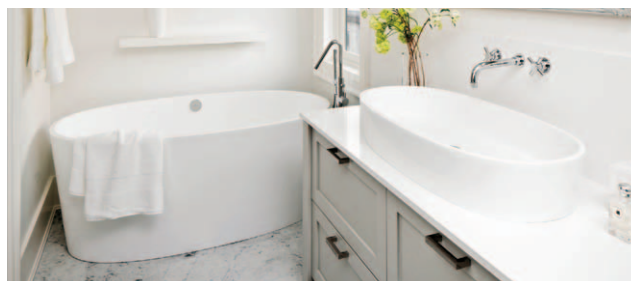
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Introduction

At their best, bathrooms are places of refuge. A well-designed bathroom is the perfect intersection of privacy, comfort, and essential function. That's a lot to ask for from one small room in a house. Fortunately, there are a wealth of fixtures, furnishings, and surface treatments from which to choose. Those enable you to create your own personal spa-like sanctuary.

Increasingly, that's what homeowners want from the bathroom—a luxurious space that they not only use every day, but *enjoy* using every day. Understandably, new bathroom design is being led by the different ways homeowners want to use their bathrooms. Where once the good old American toilet was unchanging and simple, now homeowners want a bidet-toilet (or at least a bidet seat) for the hygiene and comfort of a separate European fixture, with the convenience and economy of a single throne for the room.

Faucets have not only grown more stylish, but they are also increasingly “smart,” with touchless and touch-activated models available everywhere faucets are sold. This new technology makes something as basic as washing your hands easier and more hygienic. Again, luxury and comfort coming together in new and interesting ways.

The luxury is key. Even homeowners with only a modest bathroom space to transform, expect a certain level of luxury. And they don't have to look further than their local home center to find it. Multiple showerheads—once exclusive to high-end hotels and million-dollar homes—are now within easy reach (literally and figuratively) of just about every homeowner. The jetted tubs that once required excessive floor space can now be found in modest alcove models that will bring an opulent, rejuvenating experience to even the most cramped bathroom.

Trends come and go. Plants and black fixtures? Appealing, but perhaps not here for the long haul. Glass tiles, curbless showers, and sleek tankless toilet designs? They will likely endure.

In any case, start with your comfort and the special features that mean the most to you, whether that's a his-and-her double-bowl vanity or a slide bar, dual-head shower fixture. Then choose the finish, color, or style that complements the overall look you're after. Given the vast wealth of choices, there's just no reason not to have the bathroom of your dreams.





Gallery of Bathrooms

For what are usually fairly small spaces in a home, bathrooms are their own style islands. They don't necessarily have to follow the design philosophy used throughout the rest of the house, because they serve as remote, separate spaces. However, given the amount of time you'll spend in your bathroom, it only makes sense to create a visual style that is every bit as pleasing as the room is comfortable to use.

The options shown in these pages represent the astounding range of style elements that can affect the feel and flair of this high-traffic space. These are all meant as improvements in a room where the money you invest often comes back to you in a measurably higher home value (bathrooms and kitchens remain the two remodeling areas with the biggest return on investment, real estate-wise).

The inspirational examples shown here also reflect the practical considerations that temper any decision you might make. Tile floors? Consider whether traction is more important than looks. Vessel sink? Will small children be able to reach over the lip to use the fixture? Always keep in mind that bathrooms are where the beautiful meets the practical. Fortunately, as the photos in this section amply illustrate, you never have to do without one to have the other.



Clean and simple can be calming. A small space is often well-served by a more subtle look. Muted colors, bright reflective surfaces, and abundant lighting lend a sparkling feel to this guest bathroom, while ensuring that it is easy to keep clean. It was also inexpensive to create and serves the needs well.



Be bold in a half bath. Because powder rooms are used only briefly, and the space you need to cover is modest, you can let your creativity loose in the space. Here, the homeowner has contrasted stunning patterned wallpaper with an accent wall of sophisticated glass tile. The busy surfaces are moderated by solid color floor and ceiling and simple, modern, linear tray sink. The space is modest, but the look is anything but.



Use light to enlarge a small room. Space may be at a premium in this bathroom, but it doesn't look that way. Diagonal glass tiles run vertically make the ceiling seem higher, and the light, bright color and glass surface amplifies available light, making the space appear more open and airy. The wall-mounted toilet also conserves space, as does the handy shelf-and-towel rack unit.

Match curves to curves. A tray vessel sink (below) is not unusual in today's contemporary bathroom, but an oval version is. The shape of this lovely sink mirrors the shape of the bathtub, creating a repetition that helps guide the eye through the room's design.



Swap the tub for luxury. Many bathroom alcove tubs are small and cramped. Replacing a tiny tub with a curbless shower creates a showcase bathroom and an exceptional morning shower experience.



Play it safe with matching fixtures. You can please the eye and streamline your fixture shopping by buying a suite of fixtures from the same family, such as the showerhead, controls, and faucets in this bathroom. The brushed-nickel finish is easier to keep clean than chrome, and it adds a sophisticated aspect to the look of the room.



Accessorize with small bathroom fixtures. Faucets are the jewelry of the bathroom, and it doesn't take a huge investment to opt for bling. This waterfall faucet adds a literal splash of style to the room without breaking the bank.



Save space with a console sink. Most console sinks are modest in size, usually featuring only the sink and supporting structure. This one features the added bonus of a shelf between the legs, offering a place for towels or other small-item storage.



Colorize vanity fronts for a showstopping effect. The small surface area of vanity drawer and cabinet door fronts provides the ideal canvas for a shock of bold color in an otherwise white room. This is a great way to revive older, beat-up vanities, without the expense of replacing them.



Walk into luxury. Today's walk-in tubs are more than just pragmatic accessibility features for bathers with mobility issues. Manufacturers now outfit walk-in tubs with luxury features, such as the jets and chrome fixtures shown here.



Optimize vanity cabinets. There's no excuse to leave your undersink area bare, with a clutter of odd-sized bottles, jars, and other bathroom necessities. You can organize the space and make the most of its storage potential with a few aftermarket installations, such as the corner shelf and screw-on door-back racks shown here.



Style and accessibility can go hand in hand, as this stunning shower illustrates. A chic trench drain ensures no water from this curbless shower makes it onto the floor outside, and a seat and handheld shower wand on a sliding bar make showering as easy for people with mobility issues as it is for anyone else in the house.



Warm with wood. The bright white, hard, reflective surfaces and stark white light that shouts cleanliness in a bathroom, can also be cold and unwelcoming. Warm and soften the style of a pure white bathroom with wood accents like the side panel and toilet backdrop wall surface in this modest powder room.



Light for drama. Hidden lighting can be as much a stylistic decision as a functional feature. Here, lights behind sink mirrors provide soft illumination that is flattering to the skin and the image in the mirror, while adding a warmth and sophistication to the room.



Mix and match for the best bathroom lighting. Most bathrooms—especially those that see a lot of use—will benefit from multiple fixtures and types of light. This well-appointed shared bathroom features a skylight that supplies abundant natural light during the day and different types of fixtures, controlled by different switches, for area lighting at other times.



Transform with tile. A tiny, undistinguished bathroom becomes a stylish showcase with a wall of artsy black-and-white tile. Mixing and matching tile like this can create a dynamic effect without ruining your budget. Simple, effective, and memorable.





Bathroom Elements

This is the golden age of bathroom design. There are so many options for each and every component that goes into a bathroom, that the biggest challenge you'll face is simply whittling down your choices to a manageable short list.

Aside from empowering you to create a signature look in your bathroom, all those options also mean that there are stunning choices for affordable prices. Whether you're looking for one-of-a-kind tile, or want a vanity that makes a bold design statement, you'll probably find just what you're looking for with an attractive price tag on it.

Let's not forget, though, that bathrooms are about comfort as much (or more) than looks. From your choice of showerhead, to the toilet you pick, right down to the surface materials, all play a part in how pleasant the space will be. That's why you should keep the needs of all the users of the room in mind when choosing bathroom elements.

In any case, remember that accurate measurements are your best friend whether you're replacing an old faucet or adding tub-shower doors. Accuracy matters and simply making exacting measurements and checking them twice will head off a lot of frustration in installing new bathroom elements.

In this chapter:

- Traditional + Jetted Bathtubs
- Showers
- Sinks
- Toilets + Bidets
- Cabinets + Vanities
- Lighting
- Heating + Ventilation
- Walls + Ceilings
- Flooring

Traditional + Jetted Bathtubs

Although you can find bathtubs in a wide variety of sizes and shapes, your existing bathroom floorplan usually dictates exactly what size you should buy. But if you don't mind moving some plumbing, or you are building an all-new bathroom, your options expand dramatically.

Tubs are categorized first by the method used to install them. The three basic installation styles are alcove, deck-mounted, and freestanding.

Alcove tubs are the most common. They are often enclosed on three sides, which is why they are also called "recessed tubs." One-piece tub-and-shower combination fixtures are also available to fit standard-size alcoves. Custom sizes can be made for odd-size alcoves.

Deck-mounted tubs, also called drop-in tubs, generally rest directly on the subfloor or in a thinset mortar base. They are surrounded by custom-built decks or platforms. Typically, these tubs have a larger capacity than attached-apron tubs. The cost of making the deck can cause these tubs to be more expensive than other types, but the design possibilities are nearly limitless.

Freestanding tubs are available in an amazing range of styles and materials. The two basic

types of freestanding tub are *footed* and *pedestal*, but within those two groups are a large number of interpretations that range from the classic clawfoot tub to ultramodern units that are almost works of art. In any case, these are most often fabricated from enameled iron, polymer, or, on the high side, marble or other stone surfaces. They are meant to hold up to abuse because they lack the protective structure of an apron or deck. The plumbing is most often exposed, and the hardware presents even more design possibilities.

Corner tubs are becoming increasingly popular, not only because they allow homeowners to make use of what is often dead space in the bathroom, but because they are now often designed to include a surprising amount of room for bathers.

Semiattached tubs are butted to a wall, essentially giving the appearance of a freestanding tub while conveniently exploiting a plumbed wall in the same way as an alcove tub. Semiattached tubs are an interesting variation that allows the homeowner to add a design element with the choice of the three-sided apron (for which manufacturers often offer interchangeable options).

A deck-mounted tub can be customized to fit your space and your bathroom's design. This deck was built to blend, and it complements the vanity, walls, and floor. The side-mounted faucet and controls allow bathers to recline completely in either direction without bumping up against the hardware. The jets inside the tub ensure a spa-like bathing experience that turns an everyday ritual into something special.





A clawfoot tub is an iconic bathroom fixture. The original models made of cast iron with an enameled porcelain finish can be found through architectural-salvage companies, although the supply is dwindling and the prices are climbing. Reproductions of this style are made with lighter-weight composites and polymers.



Traditional one-piece alcove tubs remain one of the most popular choices among homeowners. The tub lends itself to accents such as high-end surround tile and distinctive fixtures and hardware.



Match your tub to the sink and toilet by purchasing all at once as part of a suite. The freestanding tub in this room is a spectacular addition only made better with the inclusion of a sleek toilet and matching vanity-top sink. It's a stunning look that makes the room stand out.

Tub Materials

Tubs are manufactured from many different materials, each with its own pros and cons.

Fiberglass is an inexpensive, lightweight material that can be finished in a variety of colors. It is easily molded, so fiberglass tubs can have seats, grab bars, soap dishes, and shampoo shelves molded into the sides. Though fiberglass has many benefits, its surface can scratch easily, and its color will fade.

Acrylic, like fiberglass, can be molded into just about any size and shape. Unlike fiberglass, however, the color runs through the entire substance, making it less likely to show scratches or to fade.

Enameled steel tubs are pressed from sheets of steel and coated with a baked-on enamel similar to that of cast-iron tubs, but the enamel layer is thin and susceptible to chipping. It doesn't retain heat well and tends to be noisy.

Cast iron is the most durable material available for tubs. Iron is cast into a tub shape, then coated with a baked-on enamel that is relatively thick ($\frac{1}{16}$ inch),

resulting in a richly colored finish. The enamel is strong, durable, and resistant to chips, scratches, and stains.

Cast iron is just about indestructible, but it's also extremely heavy. In some cases, the floor framing must be reinforced to support the additional weight. Cast iron is used most commonly for clawfoot and other stand-alone bathtubs.

Polymer can be cast into just about any tub shape and is a solid color throughout, making it impervious to scratches. The finish can be made to mimic quality surfaces such as marble or granite. Polymer also retains heat well, although the gel coat used on polymer breaks down over time.

Solid-surface tubs are gaining popularity. As with solid-surface countertops, the tubs can be made in one piece of resin or quartz and formed into many different shapes—including some with built-in features such as soap dishes. The materials retain heat well, come in many surface looks, and are durable.

Specialty Tubs

Soaking tubs are deeper and have higher sides than other styles. Traditional Japanese versions feature sides as high as 4 feet, but contemporary American soaking tubs usually have walls from 20 to 36 inches high. Traditional soaking tubs are tall enough that

bathers may sit, rather than recline, although the shallowest modern models are soaking tubs only to the extent that they will allow an adult to be covered completely with water when reclined. The experience is luxurious and meditative.

Large deck-mounted tubs offer options when it comes to locating the spout and valve handles. In many cases this means you can position the spout near the tub center so you can lean back against either end of the tub without hitting any hardware.



Jetted tubs come equipped with either water or air jets. Water jets recirculate tub water, heating it and then blowing it out under variable force that the bather can adjust. Air jets blow air into the bath water from different angles to provide different effects—from a relaxing bath to a fairly invigorating massage.

Water jets are more traditional and the more popular option. However, water-jet models are also more expensive, more difficult to install, and appreciably harder to keep clean because contaminants from soap to bath salts make their way into the jet lines, fouling them.

Either type of jetted tub is available in all formats, including stand-alone, alcove, and drop-in. Jetted tubs are almost universally made of acrylic and, because of the plumbing and mechanicals, are more expensive than any other type of tub. Most run thousands of dollars, and the price rises with both the size of the tub and the options, which can include mood lighting, headrests, timers, and touch-pad or remote controls.

Before investing in a jetted tub, carefully measure the space, and draw up plans for how and where the plumbing will run (most models are built with all the plumbing and mechanicals attached the body of the tub). Be aware of the maintenance any tub you're considering will require. Balance that against how much you will use the tub.

Because so much of the apparatus is integral to the tub, installing a jetted tub is a reasonable do-it-yourself project. It requires knowledge of basic plumbing, electrical, and carpentry principles, and will usually take the better part of a weekend for the average homeowner to install.



Most jetted tubs sold are drop-in styles. Constructing a deck is a way to customize the installation while hiding the integral plumbing lines and mechanicals. You'll likely need to install a 220-volt GFCI outlet, or hardwire the tub into the bathroom's circuit.



Install a curved-front alcove tub to enjoy maximum bathing space in a limited footprint. A model with the faucet and controls offset increases the usable interior space even more.

Showers

Tub-and-shower combos remain the most common bathing setup, largely because the combination crams the most function into the least amount of space. They also allow users to bathe either way, making them ideal in a bathroom used by more than one person. However, most combination units are not luxurious baths or showers.

For luxury, you'll want a dedicated bathing structure. And, in fact, more and more homeowners are abandoning tubs for full-featured walk-in shower enclosures. Within the modest footprint taken up by an alcove bathtub, it's quite possible, and within most homeowners' budgets, to install an upscale shower with frameless glass panels, custom tile work, a sleek curbless shower pan, and multiple showerheads.

If budget is a concern, you can find all-in-one shower-enclosure kits that include a base, three-wall surrounds, and the hardware and fixtures you'll need. Increasingly, these prefab products can be fairly upscale as well, featuring inset tile columns, multiple



The most common shower in homes across America is the one that fits inside an existing alcove tub. It's a simple setup, especially when paired with a shower curtain rather than a sliding glass door.



One-piece alcove shower enclosures can be simple and modest or incredibly upscale and detailed, such as the oversized unit shown here.

showerheads, stylish grab bars, and molded-in shelves and recesses for body-care products.

One-piece enclosures are widely available for the DIYer. Seamless stalls are molded from fiberglass or acrylic, making this option easy to clean and maintain. A wide range of sizes and styles are available. Some include seats, linear drains, steam units, and other chic features.

Neo-angle showers are designed to fit into corners. Made of acrylic or fiberglass, they are completely self-contained with integrated shower bases, walls, and doors.

Shower-surround panels are used to construct simple, inexpensive shower enclosures. They are built above a preformed shower pan. Three individual panels are bonded to the walls of the framed alcove, and the seams are sealed.

Freestanding showers are complete units unattached to walls. These are the least common option and range from sheetmetal or fiberglass units to elaborate glass-block enclosures.

Custom shower stalls can be designed to fit into odd or unusually shaped spaces. The walls can be finished with the surface material of your choosing, such as ceramic or stone tile, glass block, or even solid-surface material to do away with grout lines. Specialized options, such as benches, steam-bath fixtures, shelves, and soap dishes, can be incorporated into the design.

Curbless showers are designed for physically challenged users. The shower entrance has no curb at all, providing easy access to the shower. One-piece molded units are available, or barrier-free showers can be custom-built. Most have built-in shower seats and grab bars.

Shower doors and curtains are usually purchased separately from the shower itself. Options range from simple plastic curtains costing a few dollars to custom-made tempered-glass doors.

Multiple showerheads, shower towers, and steam showers can create a more luxurious shower. Steam showers require extra plumbing, wiring, and a shower stall with doors that seal tightly.



SHOWER LIGHTS

An overhead light ensures safety in the shower. Make sure that any light installed in a shower area is moisture resistant. Some shower lights include a heating element.



Prefab shower trays come in a variety of styles, including sleek features like the concealed trench drain in this unit.



A simple shower enclosure using off-the-shelf pan, hardware, fixtures, and frameless glass panels can create a jaw-dropping centerpiece to an already stunning bathroom.



Custom shower enclosures are limited only by imagination and can include, as this one does, a wood-slat floor over a curbless drain pan, marble walls, and multiple showerheads for a sumptuous experience.

Sinks

The variety of sinks available today practically guarantees that you can find a lavatory sink to match your space, budget, and taste. The most significant difference between the major sink types is the manner in which they are installed: wall mounted, pedestal or console, and countertop.

Wall-mounted sinks hang directly from the wall, taking up little space and offering easy access to plumbing hookups. Basic wall-mounted sinks are good options for utility bathrooms or half baths, where exposed plumbing and lack of storage space are not serious drawbacks. Designer wall-mounted styles feature attached aprons that hide plumbing. These are also accessibility features, allowing people in wheelchairs to roll under the sink for easy use.

Pedestal sinks and **console sinks** are wall-mounted styles that rest on a pedestal or legs that may or may not provide actual support to the sink bowl. A decorative pedestal may conceal plumbing and can be a smart choice for a small guest bathroom or powder room where floorspace is particularly

scarce. Console sinks have legs supporting the front two corners and often feature an apron to mask plumbing connections. The advantage of a console sink over a pedestal model is that small baskets or a modest, simple shelving unit can be placed underneath for additional storage.

Self-rimming sinks drop into a cutout in the countertop, with the rim overlapping the cutout's edges.

Integral sinks, usually made of solid-surface material or cultured marble, are molded into countertops and are easy to install and maintain.

Undermounted sinks are attached with clips beneath a cutout in a solid-surface, stone, or concrete countertop.

Vessel sinks sit on top of a countertop, with only a small cutout for the drain.

Sinks can be made of a number of materials. **Cultured marble** is an inexpensive material often used to create integral sink-and-countertop combinations to fit standard vanity sizes.



A pedestal sink has visual appeal and an efficient footprint but lacks any storage.



A solid-surface sink and countertop are the perfect match for a modern single-handle faucet and chic wall-mounted vanity.

Porcelain (vitreous china) may be used for self-rimming sinks. It has a durable glossy surface that is nonporous and easy to clean. Porcelain sinks are readily available in white and almond, and you can special order other colors. For a truly unique addition to your bathroom décor, consider a hand-painted porcelain sink in a floral or other one-of-a-kind design.

Solid-surface material is long lasting and easy to clean; scratches can be buffed or sanded out. It is one of the more expensive choices for bathroom sinks, but its durability and ease of care help justify the price. Solid-surface sinks are available in self-rimming, undermounted, and integral models, with a variety of colors and patterns to choose from.

Stainless steel brings a high-tech look and durability to bathroom sinks. It is available in either a satin or mirror finish. Price varies according to thickness, or gauge—the lower the gauge number, the thicker the steel. Look for 18-gauge material with a noise-reducing undercoating. Because they are lightweight, stainless-steel sinks are often used for undermounting.

Composite and acrylic sinks are less common because they aren't ideal in high-traffic areas. However, where the sinks won't see a lot of use, these can be low-cost, attractive alternatives to more durable materials.

Tempered glass is used to create stylish vessel sinks for bathrooms. Undermounted styles can be lit from underneath to create a mood-setting glow. Art-glass sinks continue to grow in popularity, and, if crafted properly, a cast or fused-glass sink can be every bit as durable and safe as tempered glass—with a nearly infinite number of possible designs and colors.

Other materials, such as concrete, copper, carved stone, and wood, can be used to create more stylized bathrooms. Enameled cast iron is extremely durable but available in limited shapes and colors, which is why it is used less often than other options. Volcanic rock is a relatively new material, but one that comes in a range of bold and subtle colors and appearances and is amazingly durable. Before you select a sink made of an unusual material, consider the shipping time, installation procedures, maintenance, and cost.



Self-rimming sinks (also called drop-ins) fit into a cutout in a countertop and usually are secured with mounting clips from below.



Undermount sinks have a very contemporary appearance and offer some clean-up advantages, but they can only be installed in countertops that have a contiguous waterproof composition (such as solid surface or poured concrete).



These artistic sinks are crafted from volcanic rock, as is the counter they rest on. The material offers a unique and incredibly durable surface.

Toilets + Bidets

The toilet is the essential centerpiece fixture in a bathroom—the room is not really a bathroom without one. Although the bidet as a personal hygiene fixture and bathroom standard has not become commonplace in America, toilets with integral bidet functions are gaining popularity.

The biggest advances have occurred in toilet design. Not only are there more designs than ever before, but there is also a lot of variation in actual types of new toilets—not to mention that there are even new cleaning technologies that can change your life for the better. Chief among these is the self-cleaning toilet, a unit that keeps the bowl clean with the help of a special cartridge full of cleaning fluid. Periodically change the cartridge, and you may never have to scrub a toilet bowl again.

Beyond the technology, you'll need to decide on a form for any new toilet you buy. That can be a complicated decision. The standard two-piece tank

toilet now shares the market with unibody models and streamlined, tankless, wall-mounted versions. All are high-efficiency fixtures, as mandated by law, so the choice is usually just a preference of design style and weighing the pros and cons of each type. A wall-mounted model saves floor space and gives you the option of seating heights, but it requires more fabrication work than replacing a standard toilet with another standard model. Other toilet variations may completely conceal plumbing pipes for a more elegant appearance.

Of course, the real choice for most homeowners is in the look of the toilet or bidet. Thankfully, you won't hurt for options, and all are fairly easy to install. To make things even easier, you can select a toilet as part of a bathroom suite, comprising a matching bathtub, toilet, and sink.

Today's toilets are wonderful style statements all on their own but ultimately should complement the tub if there is one and the sink if possible. Integrating the toilet in this way makes for a unified design; the comfort is already built right into modern toilets.



Toilet Types



Two-piece toilets have a separate tank and bowl, and they account for the vast majority of toilets in homes today. Their main advantage is low cost.



Wall-mounted toilets are space-saving options that are easy to clean around, but require an in-wall tank.



Flushing mechanisms are changing rapidly to keep pace with the demand for greater water economy. One common technology is the dual-flush design, which has a light flush option for liquid waste only that can save 20% on water usage over standard 1.6-gallon models.



The most recent technological development in toilets, the bidet toilet includes a hygienic bidet function incorporated into the seat. With an integral water heater, this combines both convenience and comfort.

Cabinets + Vanities

Storage will always be at a premium in most bathrooms. A major reason for remodeling bathrooms is to add storage that better serves the people who use the room. Storage options can be broken down into two basic categories: cabinets and shelves. However, within these categories, you'll find a head-spinning number of variations and options. For instance, both cabinets and shelves are offered as freestanding units, attached and affixed models, and custom storage units that you build into the bathroom remodel.

Wall cabinets are often shallow, but they are incredibly useful concealed storage in the bathroom because they can be put just about anywhere in the

room—including over the door. Cabinets come in many different configurations designed specifically for the confines of the bathroom, from shallow, tall, and thin wall-mounted units to deeper freestanding cabinets meant to accent vanity storage.

Vanity cabinets are incredibly adaptable. You can use the traditional enclosed vanity for a maximum of interior storage space or pick up a legged variety with a lower shelf that supplements the hidden cabinet storage. Vanity cabinets range from the miniscule to the mammoth, and they come in every design style you can imagine for your bathroom.



This stylish wall-mount vanity is an excellent choice for the space, offering a top surface that can accommodate his-and-her sinks, not to mention abundant storage. It also leaves space underneath that makes keeping the floor clean easier.

Medicine chests are classic cabinets used in all manner of bathrooms. Although usually shallow, the storage is quick access and provides a place to keep certain items, such as medicines, out of the reach of children. Where medicine chests were once outfitted just with glass or plastic shelves, today you can buy a model that includes a power strip for charging battery-operated personal care devices and specialized storage for grooming equipment. In any case, the chests can be surface mounted or recessed into the wall for a sleeker look. Many upscale versions also include integral lighting.

Stand-alone cabinets, often called “linen cabinets,” are usually tall and narrow. The shape takes advantage of the available vertical space in most bathrooms. These are handy not only for towel storage but also for supplies such as toilet-paper rolls, extra boxes of tissue, and more.

Tall, thin cabinets are often excellent choices for additional storage in a bathroom. The shape takes up a modest amount of space and provides abundant storage. Combining open shelving with enclosed cabinetry in a unit such as this ensures that just about anything you might need to store in the room has a proper place to go.

Vanities with legs lend an open and airy feeling to the bathroom and provide an option for useful shelving underneath. The hardware on this vanity was selected to match the brushed finish of the chic faucet and shower fixtures, creating a unified look.



Cabinets come in many shapes and sizes, but the basic choice you'll have to make at the beginning of your search for the perfect bathroom cabinets is whether to buy what's available at retail or build (or have built) custom cabinets that fit the space and your needs like a glove.

Stock cabinets are mass-produced in convenient, standardized sizes. Most of these are created from medium-density fiberboard (MDF) carcasses with veneer or laminate surfaces, although several manufacturers do produce wood cabinets. Prices vary widely depending on craftsmanship and detailing, but stock cabinets are inevitably less expensive than full custom units.

Custom cabinets are built to suit the size and shape of the area you have available, in the material

of your choosing. You can have custom cabinets built by a craftsman, but some manufacturers offer custom cabinetry services—you simply provide measurements and select from a menu of materials and details, and they produce and deliver the cabinets to be installed by a local installer (or you). In either case, the lead time is usually much greater for custom cabinets than it is for stock units.

Shelves can be a useful and flexible addition to any bathroom, and they are wonderful complements to cabinetry. The selection of shelves available for bathrooms is astounding, and, as with cabinets, you can custom-build shelves to suit your precise needs. Keep in mind that any shelves you install are decorative elements as well as useful storage.

Medicine-chest designs have evolved right along with the look and function of most other bathroom features. This sleek unit represents a significant departure from the traditional swing-out-door medicine chest. The mirror slides up to allow access to the shelving inside, eliminating the door-swing arc that can be an awkward nuisance in the ever-space-challenged bathroom. Notice that in keeping with the sophisticated technology, the mirror is frameless, offering an appealingly streamlined and modern look. It also has internal outlets so that electronics can be plugged in while stored in the cabinet. Some sleek cabinets even have LED lights fabricated into the mirror.





A linen cabinet is a freestanding furnishing, but it can take on a built-in appearance if you integrate it with other cabinets and wall trim. Linen cabinets and linen closets can be made more efficient by customizing with features such as door-back shelves and pull-out laundry bins.



Slide-out storage racks are especially useful in base cabinets. Functioning basically as drawers, slide-out racks can be included at the time of purchase or added later.



Drawers are on the rise. Even in small to medium vanity cabinets, where cabinet drawers traditionally expose only sink traps, supply tubes, and dark, unfriendly space, cabinetmakers are finding ways to design a small drawer or two to provide discreet, clean storage. The combination of a cabinet door to access plumbing and two small drawers breaks the symmetry of a traditional vanity cabinet as well, providing a small design surprise.

Lighting

Lighting can set the mood of any room. Dim lights and lit candles are perfect for a leisurely soak in the tub. When it comes to shaving or applying makeup, though, bright lights are best.

As with the rest of the house, the bathroom is best served by a combination of general, task, and accent lighting to ensure personal safety, provide ambience, and permit various uses of the space.

General lighting usually involves an overhead fixture or fixtures that illuminate the whole room. Natural lighting is considered part of your general lighting.

Task lighting provides directed light for specific activities, such as applying makeup or shaving.

Accent lighting can be used to highlight decorative points of interest, such as architectural details or artwork.



Most people focus on the major lighting elements of the bathroom, but don't forget the important accent and task lighting that are so much a part of a thoughtful "layered" lighting approach. These undercabinet puck lights provide moody task lighting that makes personal-care chores easier. The modest light is amplified by the accent wall of tan glass mosaic tiles—both a design and a functional feature.



Behind-the-mirror lighting has grown popular for its flattering effect and mood-setting glow. Used behind a round mirror, the effect is the same as a ring light on a web cam—it shows your face in sharp and realistic detail. This can be a huge help in applying makeup how and where you want it or shaving precisely around facial hair.

Surface-mounted fixtures are easy to install and available in a variety of styles. Just be sure that all fixtures you choose are moisture-proof and meant for use in a bathroom environment.

Recessed ceiling fixtures are set into canisters and have trim kits that are mounted flush with the surface of the ceiling, and some include adjustable heads that allow you to direct the light one way or another. This improves headroom in a small bath.

Wall-mount fixtures are common in bathrooms and provide ideal lighting for personal grooming, especially when placed on both sides of a mirror, as well as above.

Ceiling-mount fixtures are excellent overall light sources in the small spaces of most bathrooms.

Heating + Ventilation

Consider room size, the number of windows, and the type of heat in the rest of the house when making decisions about your bathroom heating system. Consult a professional before making final decisions. If your primary heat system is inadequate, you have three basic choices for auxiliary heat in bathrooms.

Electric heaters are mounted either by themselves or as part of light, vent, or heating units.

Heat lamps use infrared light bulbs to provide radiant heat.

Radiant floor-heating systems are installed beneath the flooring and circulate either hot water or electricity.



DIY radiant-heat floor systems are electric mats installed beneath floor coverings to warm your feet and heat your room.



A bathroom vent fan equipped with enough CFM power can quickly, quietly, and easily clear the room of steam or stale air. That ensures the space is mold and mildew-free, and a pleasure to use.

Good ventilation protects surfaces from moisture damage, deters mold and mildew, and keeps air fresh. Vents with electric fans (pages 196 to 199) are required by code in any bathroom without windows. The vent must exhaust moist air directly outdoors, not into attics or wall cavities.

Purchase a vent fan that's rated at least 5 cubic feet per minute higher than the square footage of your bathroom. Local building codes may have specific requirements, so check with your building inspector or HVAC contractor before selecting a ventilation unit.

Walls + Ceilings

If you add, move, replace, or resurface walls in your bathroom, use the best materials for the job. Options include the following.

Drywall is adequate for most bathrooms, except for the area around tubs and showers.

Greenboard is a drywall with waterproof facing. It has fallen out of use in recent years and may not be allowed by your local code.

Cement board is used primarily as an underlayment for ceramic tile although more and more codes are calling for its use in high-moisture areas, such as in a shower or tub surround.

Glass block is a decorative building block that has great visual appeal but can't bear loads.

You'll want the wall and ceiling finishes to be easy to maintain. Wall finishes for tub and shower surrounds and behind sinks and toilets should be waterproof.



A **marble-tiled wall** is a classic upscale look, and a matching marble counter and vessel sink on top of a wall-hung vanity are a space-saving update to that look.



Solid-surface panels, such as this black quartz accent surface that matches the tub deck, can make ideal waterproof bathroom wall surfaces.

Paint finishes range from flat to glossy (enamel). Glossy finishes are best for areas that will be cleaned often. Latex (water-based) paints are more environmentally friendly than oil-based paints.

Wallpaper should be treated to withstand moisture. Choose smooth-textured, solid vinyl or vinyl-coated wallpaper in a bathroom.

Wall tiles are durable, easy to clean, and available in hundreds of styles, colors, and materials, including stone, ceramic, glass, and—if you want a really unusual look—metals.

Solid-surface material is often used to fashion walls in tub and shower surrounds.

Bathroom ceilings need moisture-resistant finishes. Avoid textured ceilings, which peel in humid conditions and are difficult to clean, repair, or paint.

Flooring

Bathroom floors should stand up to daily use, frequent cleaning, and moisture.

Resilient sheet flooring is inexpensive but is seldom the first choice of professional designers. It is simple to install, easy to clean, seamless, and available in a vast number of colors, patterns, and styles. Resilient sheet products include linoleum, which is incredibly eco-friendly, and vinyl, which is far less so.

Resilient tile and planks made of vinyl are easy to install. The latest versions are made to stand up to even the most demanding bathroom conditions. These products are easier to install than ever and include marmoleum, a green option.

Ceramic tile is available in three main types: glazed ceramic tile, quarry tile, and water-resistant porcelain tile. Although cleaning issues are created by the grout lines, mosaic sheets of ceramic tile are highly popular.

Natural stone tile is a premium flooring material. Granite, marble, and slate are the most common stone products for bathroom floors.



Larger ceramic tiles are ideal for more modest bathrooms. Choose a subtle color to complement other surfaces, like the sharp and refined quartz countertops and bathtub half wall here.



A faux-wood laminate floor provides an ideal, durable stage. The star on that stage is a dramatic and luxurious jetted tub tucked into an alcove with a view.



A dramatic black marble tile floor helps a simple, elegant, deep freestanding tub pop in this chic bathroom.

Hardwood floors are difficult to totally waterproof, so they should be limited to half baths, where moisture will not be a big problem.

Laminates offer an easy-to-install flooring option that is water resistant, durable, and available in an amazing selection of surface appearances, from stone tiles to wide wood planks.

The condition of your floor structure may affect the cost of installing new flooring. If the subfloor must be replaced or repaired, more time and money will be required. Consult a professional to assess the state of your subfloor.





Getting Started

The roadmap to a great bathroom that you'll love using starts at function and heads through form, before arriving at comfort. That trip takes a good deal of planning and step-by-step execution. Don't worry, though. Putting together the ideal bathroom—whether it's a shared space for young kids, a powder room used only sparingly, or your own private spa retreat in a master bedroom suite—is easier than you might think.

Use this section as a guide to getting the basics right. They serve as a foundation on which you can add details and accent your bathroom to meet your style preferences. There is also information in this chapter that you need to know to avoid making a mistake or violating code. You'll find insight on how to make sure your bathroom meets modern accessibility standards so that it's useful for everyone who might need to use it, now and in the future.

Take your time, follow codes, and make sure plans are in place before you ever start swinging a sledge hammer or getting rid of old fixtures. That way, you'll ultimately achieve a safe, useful, and attractive bathroom ... along with the DIY pride of a job well done!

In this chapter:

- Determining Needs
- Designing for Accessibility
- Design Standards
- Drawing Plans
- Codes
- Removal + Demolition: Toilets
- Removal + Demolition: Sinks + Cabinets
- Removal + Demolition: Showers + Tubs
- Building a Wet Wall

Determining Your Needs

A typical bathroom is divided into three activity areas: the toilet, the sink, and the shower or tub. To create a successful bath design, you need to consider the relationship of these areas, allowing for accessibility and safety. This relationship varies depending on the type of bathroom being renovated: half bath, family bath, or master bath.

Half baths, also called powder rooms, are small rooms near common areas of the home. They are designed largely for visitors to use. They can be as small as 20 square feet and are often located near entrances or entertainment areas of a home. It's best to have their doors open into hallways.

Half baths typically feature a toilet and a vanity or pedestal sink finished with smaller fixtures and finer materials. When designed as a guest bath that includes a shower, these rooms require more space and are called “three-quarter baths.”

The family bath is usually located near the sleeping areas in a home. It is used by more than one family member, and it should provide storage for toiletries, towels, laundry, and cleaning supplies. It features at least one sink, one toilet, and a shower and tub or tub-shower combination.

A larger bathroom allows space for extra features, such as double sinks or separate shower and tub areas. A small family bath may conserve space by combining the tub and shower, incorporating recessed shelving, and featuring space-efficient fixtures and storage cabinets. Finishes and fixtures should be low maintenance and highly durable, such as ceramic tile and enameled fixtures.

Bathrooms for children must be safe for them to use unsupervised and should be easy to adapt as the children grow. Features that make daily hygiene easier and safer for children include single-handle faucets with antiscald guards, adjustable showerheads, safety plugs in receptacles, grab bars, smaller toilets, lowered sinks, and vanities with built-in step stools.

The master bath is usually connected to the master bedroom and is a sanctuary for the owners of the house. It is typically quite large and may have separate activity centers containing features such as a jetted tub, shower, toilet partition, and multiple sinks and vanities. It may even feature a sauna or steam room. The fixtures and finishing materials generally feature ceramic, stone, or marble tiles; custom cabinets; and upscale accessories.



A half bath need not lack drama. This small space includes the basics, using a compact wall-mounted vanity to save space. But the inclusion of sumptuous wall materials, high-end flooring, and near-theatrical lighting around a stunning mirror make it a showpiece space in the home.



There's no rule that says a modest family bath needs to be less than opulent. You can fit a lot into a small space, like this skylight-lit, simple, elegant, and deep drop-in tub.



A master bath can be a decadent temple to luxurious comfort. This homeowner has focused the design firepower on a large walk-in shower with marble tile surround and multiple showerheads. A room like this is not inexpensive, but it provides a daily experience that makes life more enjoyable.

Designing for Accessibility

Accessibility has become a key issue not only in the codes that regulate residential bathroom construction but with almost every feature designed for bathrooms. From toilets to faucets to lighting and beyond, manufacturers are responding to an aging population and the need to accommodate all potential users of a home's bathroom.

Designing bathrooms to accommodate the needs of any individual—including those with mobility limitations and even the severely disabled—is at the heart of what is known as universal design. The term was coined by disabled architect Ronald Mace. The goal? In Mace's words, "the design of products and environments to be usable by all people to the greatest extent possible, without the need for adaptation or specialized design." In practice, that translates to turnkey fixtures that work

for able-bodied individuals and those who use a wheelchair or walker alike.

More recently, a focus has been placed on accommodating the 78 million baby boomers who are rapidly aging into an incredibly large elderly population. Studies show that these people want to stay in their homes and remain independent as long as possible. The aging-in-place movement has sprung up to facilitate that and to set guidelines for bathroom design specifically to suit elderly users. But in reality, aging in place is a subset of universal design, and it is a difference largely without a distinction. If you take the steps outlined here and select fixtures and features designed for maximum accessibility, your bathroom will be welcoming and user friendly now and as you age, and for anyone who might need to use it.



Aging-in-place bathroom design often deals with remodeling existing spaces to better suit users with age-related mobility issues. Those who can't stand for the span of a shower can take one while sitting in this specially adapted stool. They can use the ergonomic handheld showerhead with a handle that clips onto a nearby grab bar. Even the toilet-paper holder has been replaced with one that has a grab bar built in.

Universal Design Standards

Bathroom elements that meet the mandates of universal design are continually being refined by manufacturers as they respond to legislation such as the Americans with Disabilities Act (ADA) and the needs of an aging population. Design style is inevitably a part of the process. Utilitarian features such as grab bars are increasingly crafted with stunning looks and finishes that make them easy to integrate into even the most sophisticated bathroom style.

Grab bars. The new rule for grab bars is “dual purpose.” Towel racks, toilet-paper holders, and bathroom shelving are all being crafted with integrated grab bars. Not only does this mean buying and installing one fixture in place of two, it means the grab bars are a blended part of the overall look of the bathroom. Even grab bars for showers are seeing style upgrades, with molded finger grips and the same selection of surface finishes found in other fixtures, such as showerheads and faucets.

Toilets. The key to making this essential fixture comfortable for every potential user lies in seat height. Manufacturers have come up with a multitude of solutions, including power-lift toilet seats, height adapters, higher-than-normal traditional toilets and those that can be adjusted, and wall-mounted toilets that can be installed at any height. Grab bars are essential to assist movement on and off any toilet, so it's fortunate that you can find attractive toilet paper holder-grab bar combinations.

Faucets. The first step in making faucets accessible was the use of paddle handles and single-handle faucets that could easily be manipulated by those lacking dexterity or motor skills. Nowadays, technology is aiding people with coordination and hand-strength difficulties in the form of motion-activated and touch-activated faucets. These make using the faucet as easy as moving a hand. They are also a breeze to install (see page 166).

Bathtubs. The standard bathtub-shower combination can be retrofitted to accommodate limited-mobility users with the addition of special stools and handheld showerheads with ergonomic grips. Better yet, consider replacing an existing tub with a walk-in model equipped with a door. These tubs typically have seats at chair height to make the transition into the tub easier. Many also feature jets and heaters to create a luxurious experience. When shopping for a walk-in tub, pay close attention to the contours of the seat and back support. These will be key to how comfortable and supportive the tub is over the course of a nice long soak. Choose a door style that best accommodates the user's preference; available styles open in or out, up or down. The lower the threshold, the better, and the door handle should be easy for the intended user to operate.

Other types of tubs can be made easier to use by locating the controls on the outside edge of the tub or tub deck. This allows the user to fill the tub without leaning over and possibly losing balance.



UNDERSTANDING AGING IN PLACE

The aging-in-place movement shares much with the general universal design trend, the key difference being the focus on the needs of the elderly. As we age, we lose strength in our hands, arms, and legs and often have to deal with nagging chronic injuries associated with aging—arthritis and limited flexibility and mobility chief among those complaints. Many aging-in-place changes are focused on accommodating those conditions and preventing any injury that could short-circuit independence.

Lighting. Older people often deal with diminished vision, so effective lighting is key to making aging-in-place bathrooms safer and more user friendly. This entails a combination of undercabinet and undercounter lighting, baseboard or cove lighting, special shower lights, and more powerful ambient lights on the wall and ceiling to dispel any visually confusing shadows.

Nonslip surfaces. Falls are the number-one cause of elderly immobilization and can have serious health ramifications. It's essential that tubs, floors, and shower stalls have truly nonslip surfaces that maintain traction even when wet. This means a slip-resistant glaze or texture on any bathroom flooring, and decals or slip-preventing strips in bathtub-shower combinations.

Showers. The two areas of continuing development in terms of universal-design showers are the shower pan and the fixtures. Low-threshold, walk-in showers were the ideal a few years ago (often equipped with ramps for wheelchairs), allowing anyone with strength and balance issues to easily step into a shower stall. That idea has evolved into true curbless showers that are on the same level as the surrounding floor. Although installing a curbless shower was once a major custom construction project, you can now buy a kit with a relatively streamlined and simple installation process (see page 94). Grab bars remain an essential addition to any shower enclosure, and the increasing variety of designs and finishes virtually guarantees you can match grab-bar finish to that of the shower controls and showerhead.

Showerheads themselves have been made more accessible by mounting handheld styles on slide bars so that the height can be adjusted to suit any user, and the showerhead itself can be removed as needed. Nonslip ergonomic grips are making handheld

showerheads even easier to use for people with motor-skill and grip limitations.

Most modern shower enclosures—whether one-piece prefab units or those built from the shower pan up—include some sort of seat. Fold-down seats are easy to retrofit into an existing shower, but many showers now include built-in or molded shower seats. Either way, the seat should be 18 inches high and at least 15 inches deep. Shower antiscald devices are also a wise addition to any shower to protect all users from burns.

Sinks and vanities. More and more wall-mounted sinks and vanities are being offered at retail. These ensure that bathroom users with wheelchairs can roll under the sink to wash their hands or brush their teeth. Many wall-mounted sinks come with attractive aprons to conceal plumbing. Roll-out vanity cabinets can be used as storage accents, replacing the undersink space in traditional vanities.

Doors and doorways. Bathroom doorways should be 32 to 36 inches wide to allow passage of a wheelchair. Shower doors should open out, or both ways, to ensure user safety.



Power lifts make toilet use easier for people with limited leg or joint strength.



A side-mounted faucet is easier to reach on this wheelchair-accessible, roll-under, wall-mounted sink.



A motion-sensing faucet is not only easier for the elderly and children to use but helps stop the spread of disease.



This bathroom sacrifices nothing to style but is completely accessible, with a roll-in curbless shower, roll-under sink with handy side ledges, and sturdy grab bars everywhere they might be needed.



A simple soap dish becomes a useful tub side grab bar featuring an elegant circular shape.



This innovative grab bar uses suction to hold to just about any bathroom surface, and it can be released and repositioned as needed with a click of the gray release tabs on either end.



This alcove tub features a chair-height seat and a slide-down front wall. To take a bath, the user simply sits on the seat, swings their legs over, and pulls the wall up. The tub offers many amenities, including simple-to-use controls, a heater, and jets.

Design Standards

Once you've drawn up your plan and created a materials list, you'll need to have them reviewed by your local building department. Getting approval early in the process can save you time and expense later. To help ensure success, here are some design standards for you to follow.

The National Kitchen and Bath Association (NKBA) publishes a list of bathroom design standards

to help people plan rooms that are safe and accessible to all users (see Resources, page 252).

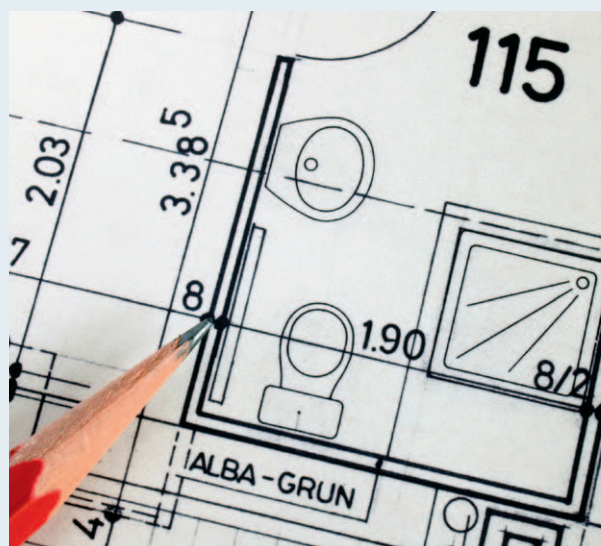
Your bathroom probably won't conform to all of the recommended standards, but they can help guide your overall plan. What your plan must include is everything prescribed by the local building codes, including plumbing and wiring codes.



BATHROOM DESIGN STANDARDS

Codes and permits are necessary to ensure safety in any remodel. They're not the most fun to focus on—not like choosing just the right floor covering or deciding between granite and marble countertops—but they are important.

- Plan doorways with a clear floor space equal to the door's width on the push side and greater than the door's width on the pull side.
- Design toilet enclosures with at least 36" × 66" of space; include a pocket door or a door that swings out toward the rest of the bathroom.
- Install toilet-paper holders approximately 26" above the floor, toward the front of the toilet bowl if possible.
- Place fixtures so faucets are accessible from outside the tub or shower. Add antiscald devices to tub and sink faucets (they are required for shower faucets).
- Avoid steps around showers and tubs, if possible.
- Fit showers and tubs with safety rails and grab bars.
- Install shower doors so they swing open into the bathroom, not the shower.
- Use tempered glass or another type of safety glass for all glass doors and partitions.
- Include storage for soap, towels, and other items near the shower, located 15" to 48" above the floor. These should be accessible to a person in the shower or tub.
- Provide natural-light openings equal to at least 10% of the floor area in the room.
- Illuminate all activity centers in the bathroom with task and ambient lighting.



- Provide a minimum clearance of 15" from the centerline of sinks to any sidewalls. Double-bowl sinks should have 30" clearance between bowls from centerline to centerline.
- Provide access panels for all electrical, plumbing, and HVAC systems connections.
- Include a ventilation fan that exchanges air at a rate of at least 8 air changes per hour.
- Choose countertops and other surfaces with edges that are smoothed, clipped, or radiused.

NOTE: Clear floor spaces within the bathroom can overlap.



Diagram illustrating the standard dimensions for a toilet:

- The distance from the wall to the center of the toilet is 18".
- The seat height is 17"-18".

Diagram illustrating the dimensions of the vanity unit:

- Height: 40" max.
- Width: 32" min.
- Depth: 30"-32"

Diagram illustrating the dimensions for a shower stall:

- Seat:** A horizontal seat is shown with a width of 15".
- Handheld showerhead:** The showerhead is mounted on a wall. The distance from the top of the seat to the center of the showerhead handle is 48" max.
- Handle:** The distance from the top of the seat to the center of the showerhead handle is 38"-48".
- Seat Height:** The height of the seat from the floor is 18".

The diagram illustrates a bathroom floor plan with the following components and dimensions:

- Sink:** Located in the top left corner. The distance from the left wall to the center of the sink is 21" max.
- Door:** Located at the top center. The door width is 36" (32" min.).
- Tub:** Located in the top right corner. The distance from the right wall to the center of the tub is 30" min. The distance from the bottom of the tub to the center of the circular area is 60" min.
- Shower:** Located in the bottom right corner. The distance from the bottom of the tub to the top of the shower is 18"-wide surface. The distance from the bottom of the shower to the center of the circular area is 48" min.
- 30" radius circular area:** A large circle with a 30" radius, centered in the room. The distance from the center of the circle to the left wall is 18" min. The distance from the center of the circle to the bottom wall is 48" min.
- 36" min. dimension:** The distance from the center of the circular area to the right wall is 36" min.

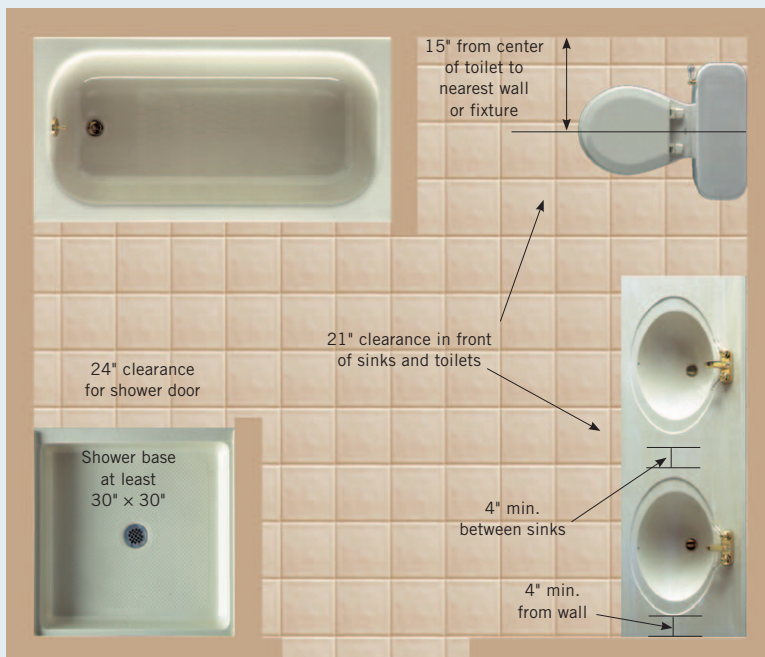
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BUILDING CODES FOR BATHROOMS

The following are some of the most common building codes for bathrooms. Contact your local building department for a list of all codes enforced in your area. Local codes may differ.

- The minimum ceiling height in bathrooms is 7'. (Minimum floor area is determined by clearances around fixtures.)
 - Sinks must be at least 4" from side walls and have 21" of clearance in front. Sinks must be spaced 4" away from neighboring sinks and toilets and 4" away from bathtubs. Center of sink drain rough-in should be 18" from the floor, and stub outs should be 24" from the floor.
 - Toilets must be centered 15" from side walls and tubs, with 21" clearance in front. New and replacement toilets must be low-flow models (no more than 1.6 gal. per flush). Toilet water supply stub out should be 6" above floor; center of toilet flange should be 12" from wall.
 - Shower stalls must be at least 30" x 30", with 24" of clearance in front of shower openings. (An ideal minimum is 34" x 36".)
 - Faucets for showers and combination tub-showers must be equipped with antiscald devices.
 - Minimum supply-line diameter for bathroom sink or most toilets is $\frac{3}{8}$ ", although standard practice and many local codes call for minimum $\frac{1}{2}$ " supply pipes.
 - A $\frac{3}{4}$ "-diameter supply-line must be used to supply two or more fixtures.
 - Waste and drain lines must slope downward $\frac{1}{4}$ " per foot toward the main DWV stack to aid flow and prevent blockage.
 - Each bathroom must be wired with at least one 20-amp circuit for GFCI-protected receptacles and one 15-amp (minimum) circuit for light fixtures and vent fans without heating elements.
 - All receptacles must be GFCI protected.
 - There must be at least one permanent light fixture controlled by a wall switch.
 - Wall switches must be at least 60" away from bathtubs and showers.
 - Toilet, shower, vanity, and other bathroom compartments must have adequate lighting.
 - Light fixtures over bathtubs and showers must be vaporproof, with a UL rating for wet areas.
 - Vanity light fixtures with built-in electrical receptacles are prohibited. Most local codes do allow medicine chests with integral outlets, although they must be GFCI. Always check local codes before installing one.
 - Jetted tub motors must be powered by dedicated GFCI-protected circuits. Switches for jetted tubs must be located out of reach of the tub.
 - Bathroom vent ducts must terminate no less than 10' horizontally or 3' vertically above skylights.
- *NOTE:** Codes for accessible bathrooms may differ.



Follow minimum clearance and size guidelines when planning locations of bathroom fixtures. Easy access to fixtures is fundamental to creating a bathroom that is comfortable, safe, and easy to use.

Drawing Plans

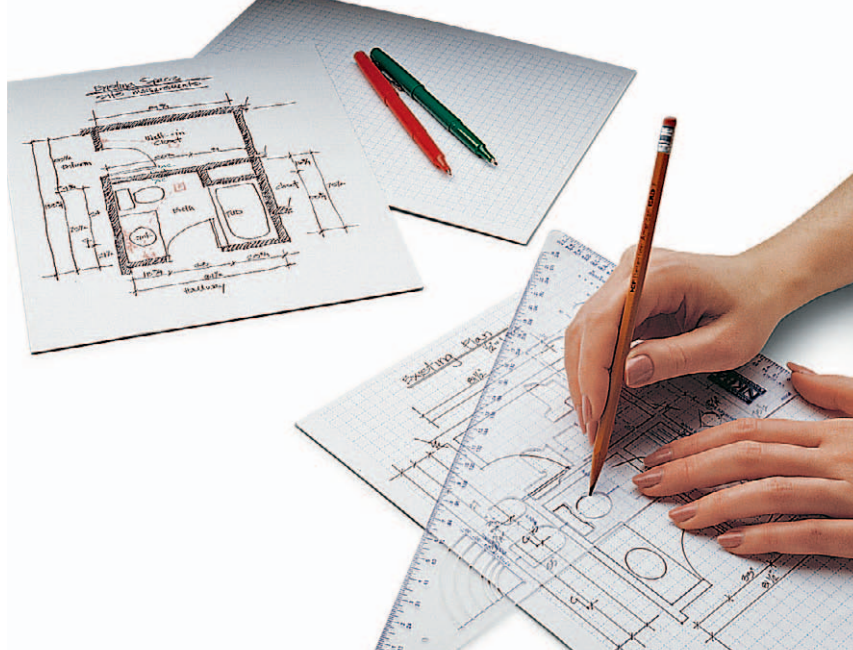
If your new bathroom involves a layout change or expansion, you'll find it helpful—and possibly required by the local building department—to create floor plans and elevation drawings. A floor plan illustrates an overhead view, while an elevation drawing illustrates a face-on view. Your drawings will be the basis for obtaining permits, negotiating contracts with tradespeople, and ordering products.

To begin, make a rough sketch of the existing floor plan. Measure and record the size and location of all existing fixtures and mechanicals from a fixed point. Sketch an elevation of each wall.

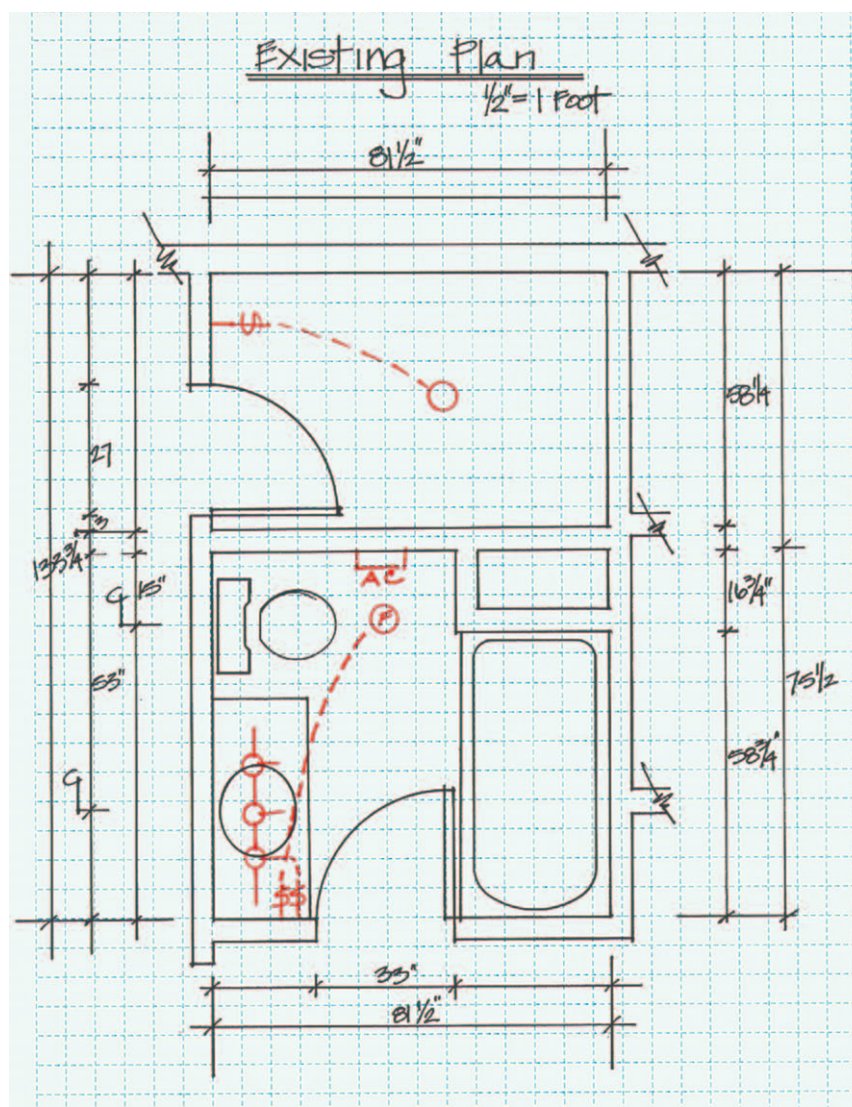
Use these rough sketches to draft a precise scale drawing of your existing floor plan. You can now sketch variations of your new bathroom using the scale drawing of the floor plan as a guide.

Use the overall dimensions of your new floor plan to sketch elevation options. In the end, the elevations and floor plans must agree. As an alternative, you can use your preliminary measurements to create floor plans digitally, using one of the plan-design software packages available.

The existing floor-plan draft should contain dimension lines noting the accurate measurements of the space, including the location of all existing fixtures. This draft also shows the location of electrical circuits. It is the starting point for your remodeled bathroom plan.

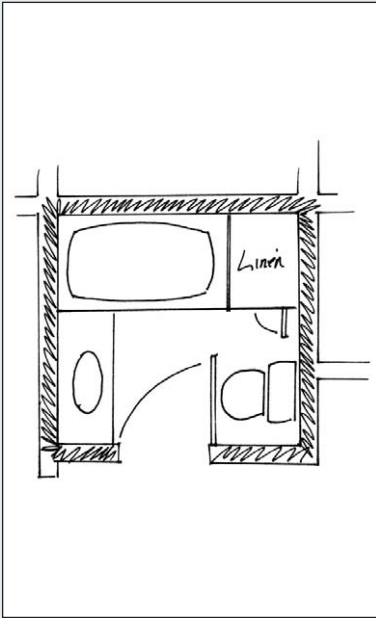


A scale drawing shows everything in accurate proportion. After measuring the dimensions of your existing bathroom, draft a floor plan, including any adjoining space that could be used for expansion of the layout (such as the storage closet shown on next page). The normal scale for bathroom plans is $\frac{1}{2}" = 1'$.

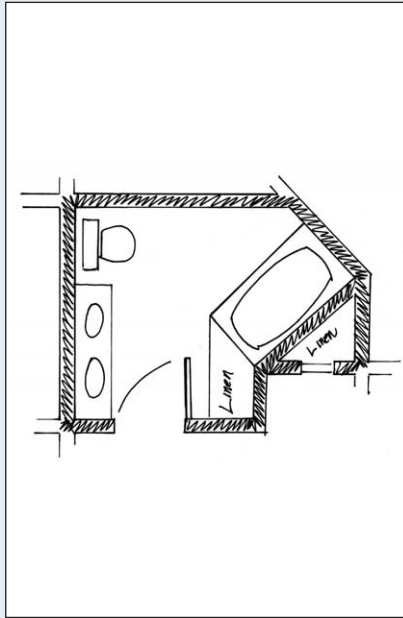




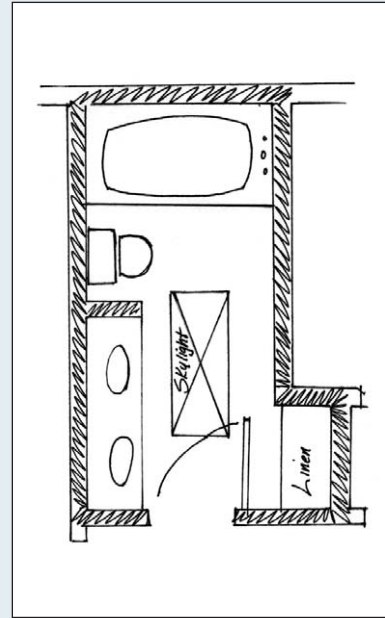
NEW BATHROOM FLOOR-PLAN SAMPLES



Option A: This floor-plan option of the draft on the opposite page shows a layout change within the existing space. The sink and vanity stay in the same place, but the tub and toilet have been switched. There is room to add a linen cabinet, but the space is still very cramped.



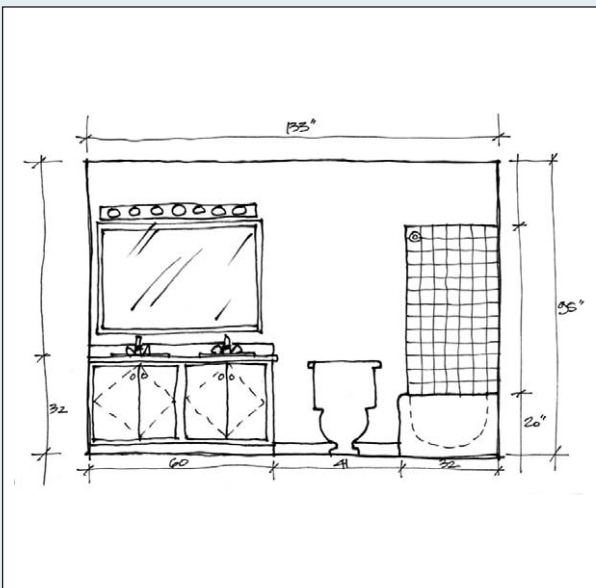
Option B: This option explores expanding the room and experimenting with some interesting angles. There is now plenty of floor space for two people, plus room for a double vanity and a large linen cabinet for increased storage.



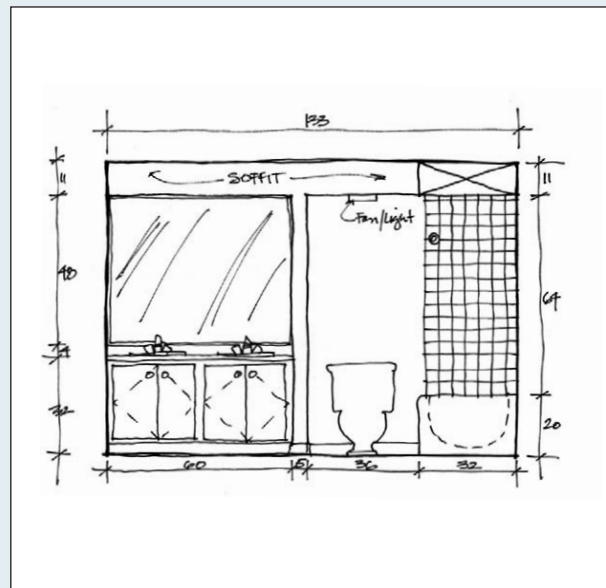
Option C: The existing room is expanded by annexing the adjacent closet. There's plenty of floor space, a double vanity, and a built-in linen cabinet. This plan has the practical benefits of Option B but is less expensive to build.



BATHROOM ELEVATION OPTIONS



Option A: This elevation shows a simple arrangement with a standard mirror and light fixture. It also shows ceramic tile in the shower area, ending just above the shower curtain.

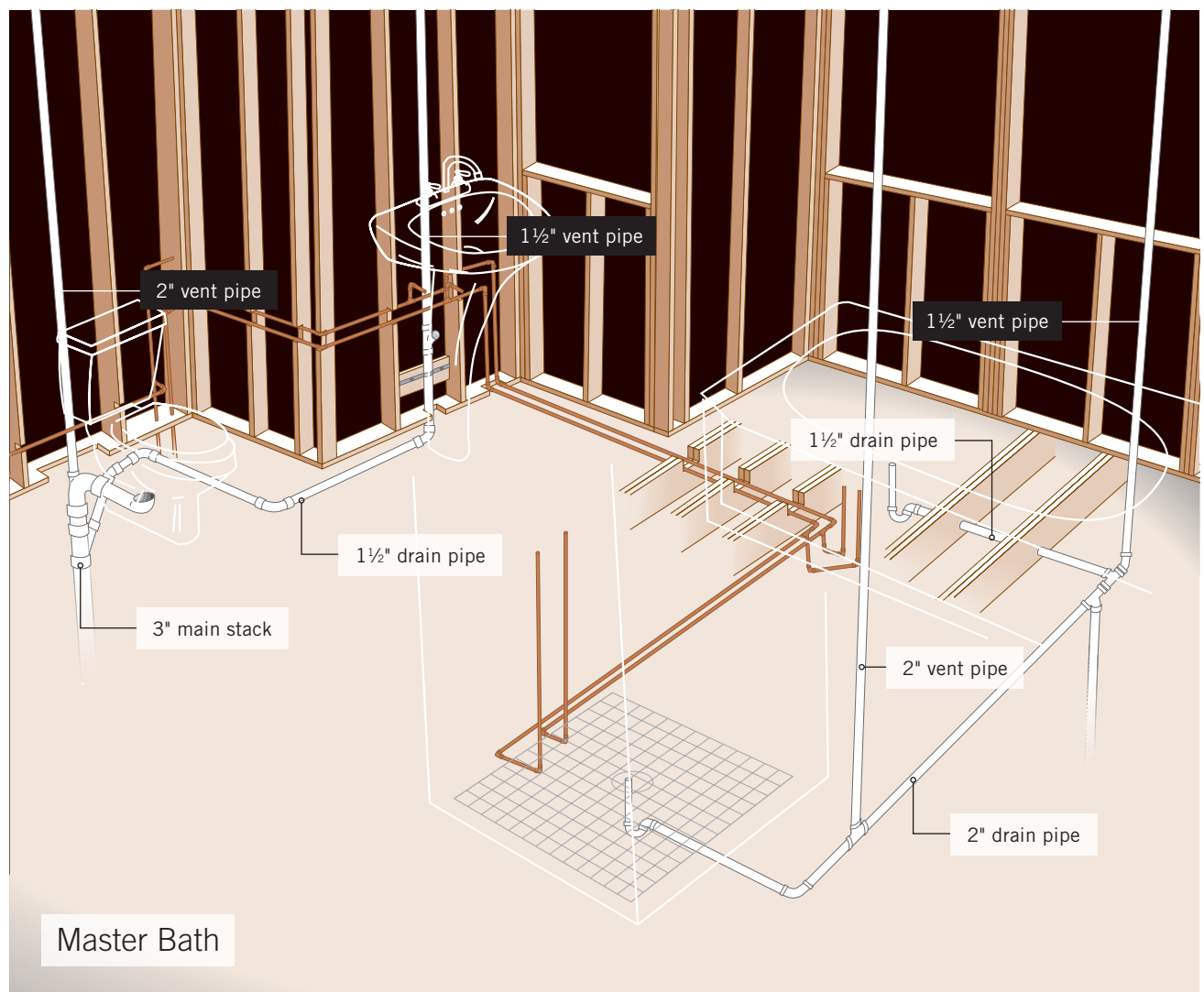


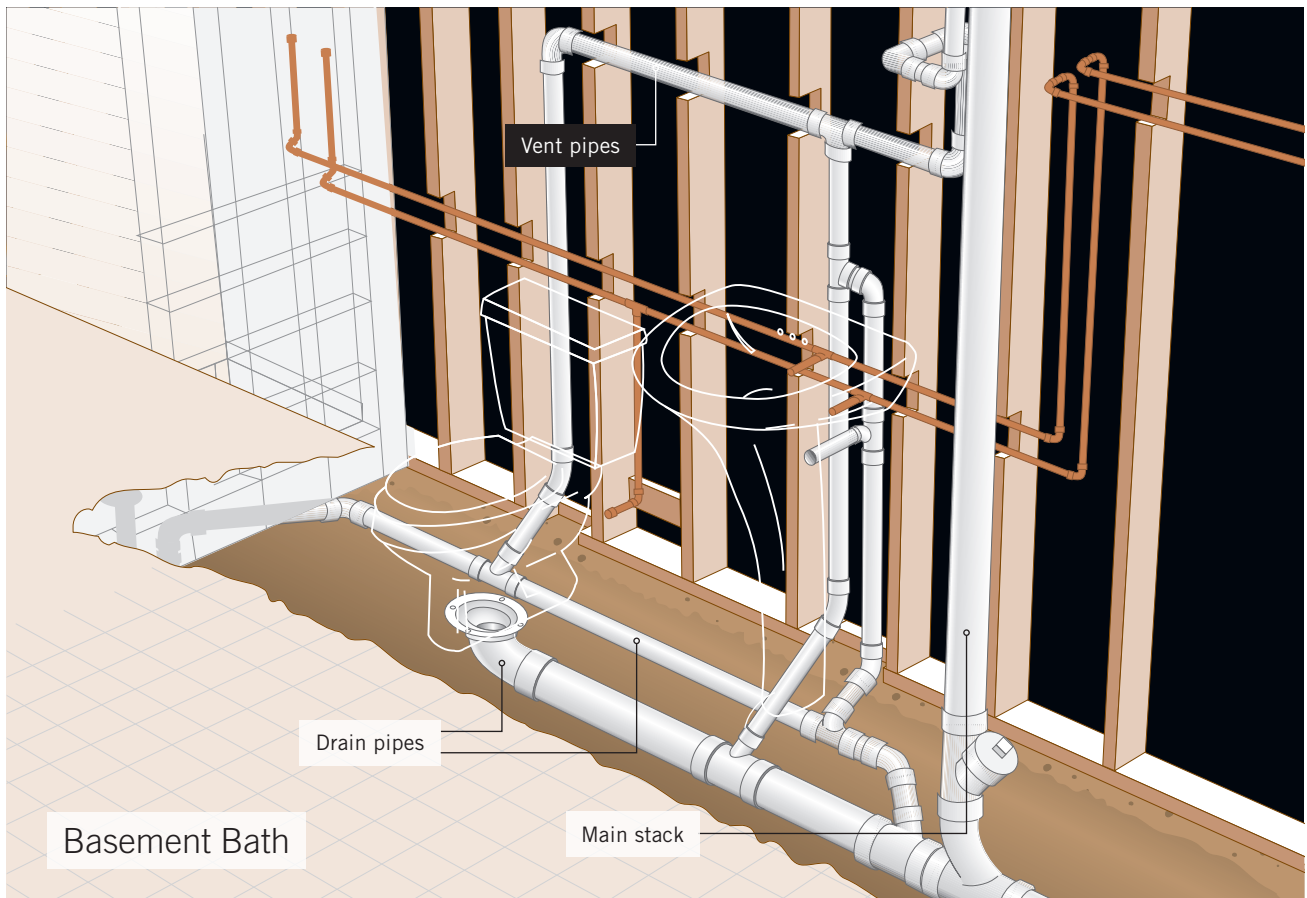
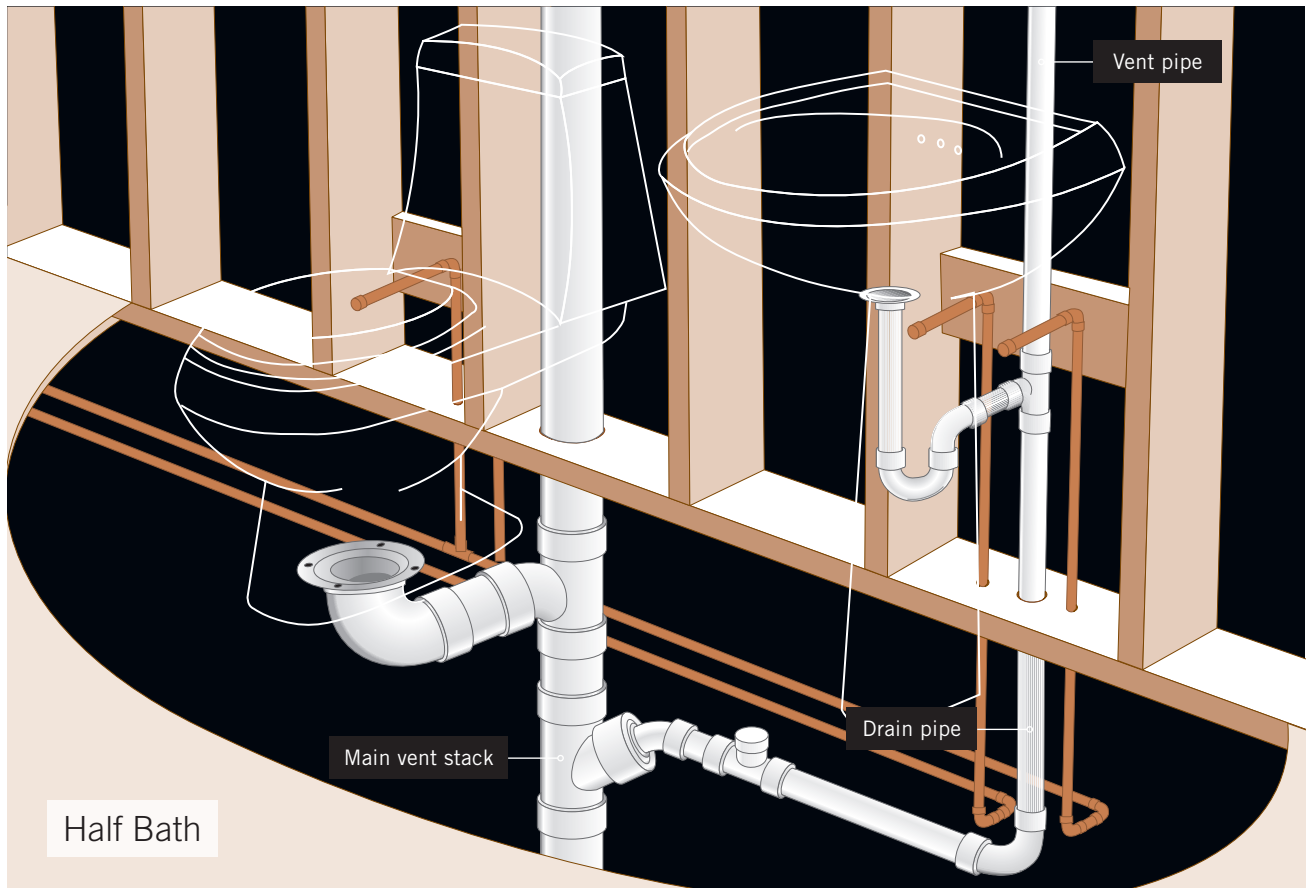
Option B: This variation shows a custom mirror framed in by a partition wall and a soffit that runs above the vanity, toilet, and tub. Lights are recessed in the soffit.

Sample Plumbing Layouts

These three-dimensional illustrations show how various fixtures, and different bathroom arrangements, are plumbed. This is for perspective; you can find more information on precise measurements and code requirements on page 49. However, 3D renderings such as these allow the homeowner to see how the space works, and how all the elements in the room relate to the space and to one another. These types of illustrations are a good way to detect any trouble spots in a new bathroom or remodeling project.

You need to be only modestly comfortable with computer technology to take advantage of one of the many 3D home-design software packages available. Any of them will allow you to produce these types of renderings of your own space. However, investing in design software makes the most sense if you plan on tackling other projects throughout the home in the future. Some of these products include the ability to render outdoor structures as well, which can be a big help if you think you'll ever want to modify or add a deck, patio, or other outdoor structure.





Removal + Demolition: Toilets

The toilet is the first fixture to be removed in most remodeling projects. Loosening corroded or rusted nuts and bolts is the most difficult part of the process.

Old toilets that will not be reinstalled may be broken up into small, easily managed pieces using a sledgehammer. Disconnect the toilet and cover it with a heavy blanket before breaking it. Wear eye protection, long sleeves, and heavy gloves during the demolition.



TOOLS + MATERIALS

Adjustable wrench	Sponge
Ratchet wrench and sockets	Rag
Screwdriver	Drop cloth
Putty knife	Eye and ear protection
Basin wrench	Work gloves



Most toilets are fragile and should be removed during full remodeling projects, even if you do not plan to replace them. Always use care when handling any fixture made of china or porcelain.



TIPS FOR REMOVING TOILETS

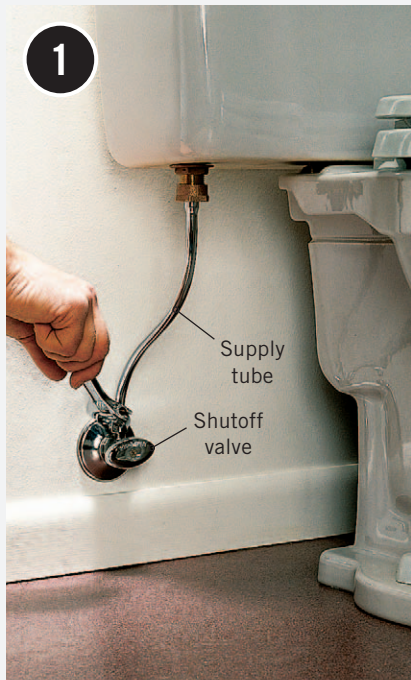


Protect your floor with a drop cloth when removing the toilet if you plan to keep the original floor covering. Residue from the wax ring seal between the bottom of the toilet and the toilet flange is very difficult to remove from floor coverings.



Disconnect any pipes between a wall-mounted toilet tank and the bowl after turning off the water supply and emptying the tank. Older toilets often have a metal elbow that connects the tank to the bowl. Set 2 × 4 braces below the tank before detaching it from the wall.

How to Remove a Toilet + Wax Ring



Turn off the water, then flush the toilet to empty the tank. Use a sponge to remove the remaining water in the tank and bowl. Disconnect the supply tube with an adjustable wrench.



Remove the nuts from the tank bolts with a ratchet wrench. Carefully remove the tank and set it aside.



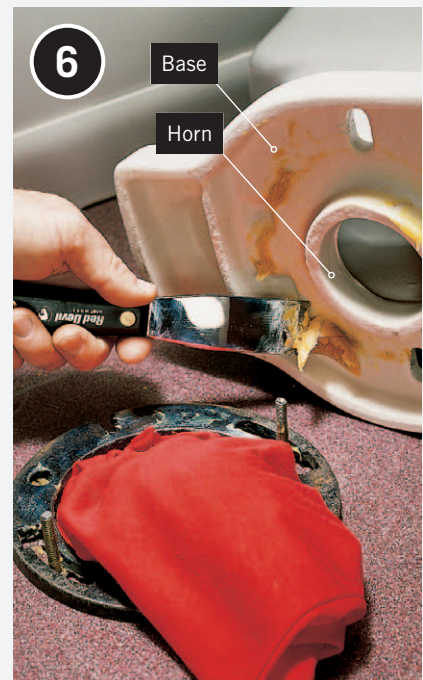
Pry off the floor-bolt trim caps at the base of the toilet, then remove the floor nuts with an adjustable wrench.



Straddle the toilet and rock the bowl from side to side until the seal breaks. Carefully lift the toilet off the floor bolts and set it on its side. A small amount of water may spill from the toilet trap.



Remove the old wax from the toilet flange in the floor. Plug the drain opening with a damp rag to prevent sewer gases from rising into the house.



If the old toilet will be reused, clean the old wax and putty from the horn and the base of the toilet.

Removal + Demolition: Sinks + Cabinets

Replacing bathroom sinks, countertops, and cabinets is a quick and relatively inexpensive way to give your bathroom a fresh, new look.

First, disconnect the plumbing, then remove the sink basin or integral sink-countertop unit. Next, take out any remaining countertops. Finally, remove the cabinets and vanities.



Cut apart cabinets and vanities to simplify their removal and disposal. A reciprocating saw or jigsaw works well for this job. Wear eye protection.



TOOLS + MATERIALS

Bucket

Screwdriver

Adjustable wrench

Reciprocating saw

Flat pry bar

Eye and

Utility knife

Basin wrench

Channel pliers

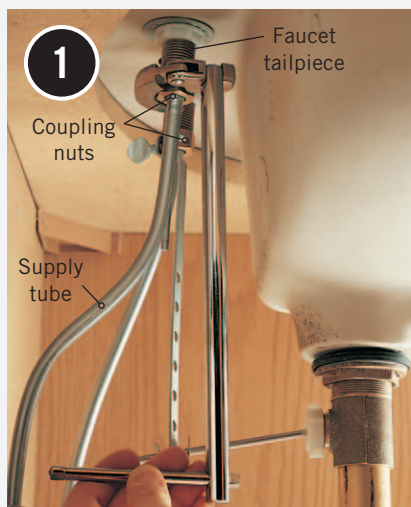
Hacksaw or pipe cutter

Work gloves

ear protection



How to Disconnect Sink Plumbing



Turn off the shutoff valves, then remove the coupling nuts that connect the supply tube to the faucet tailpieces using a basin wrench. If the supply tubes are soldered, cut them above the shutoff valves.



With a bucket beneath, remove the P-trap by loosening the slip nuts at both ends. If the nuts will not turn, cut out the drain trap with a hacksaw. When prying or cutting, take care to avoid damaging the trap arm that runs into the wall.



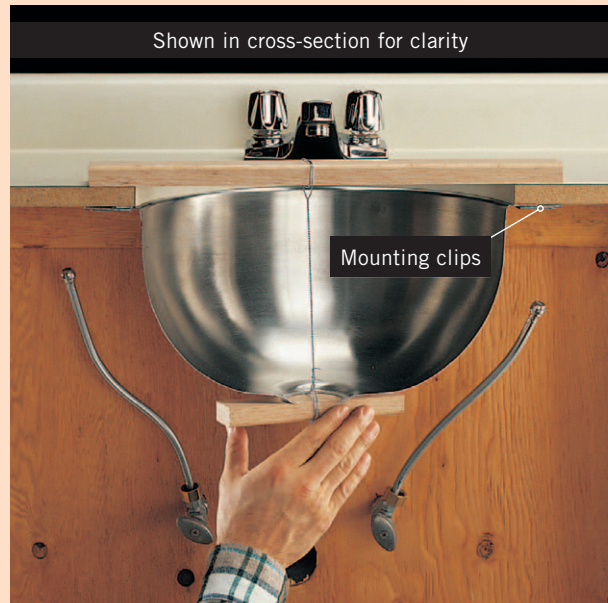
Disconnect the pop-up drain linkage from the tailpiece of the sink drain by unscrewing the retaining nut.



TIPS FOR REMOVING SINKS



Self-rimming sink: Disconnect the plumbing, then slice through any caulking or sealant between the sink rim and the countertop using a utility knife. Lift the sink off the countertop.



Undermount sink: Disconnect the plumbing, including the drain tailpiece. To support the sink, tie wire around a piece of scrap wood and set the wood across the sink opening. Thread the wire down through the drain hole and attach it to another scrap of wood. Twist the wire until taut, then detach the mounting clips. Slice through any caulking, slowly loosen the wire, then remove the sink.



Wall-mounted sink: Disconnect the plumbing, slice through any caulk or sealant, then lift the sink off the wall brackets. For models attached with lag screws, wedge 2 × 4s between the sink and floor to support it while the screws are removed.



Pedestal sink: Disconnect the plumbing. If the sink and pedestal are bolted together, disconnect them. Remove the pedestal first, supporting the sink from below with 2 × 4s. Lift the sink off the wall brackets (photo, left).



Integral sink-countertop: Disconnect the plumbing, then detach the mounting hardware underneath the countertop. Slice through any caulk or sealant between the countertop and wall and between the countertop and vanity. Lift the sink-countertop unit off the vanity.

Removal + Demolition: Showers + Tubs

Bathtubs and showers are heavy and bulky fixtures, so they pose special problems for removal. Unless the tub or shower has unique salvage value, cut or break the unit into pieces for easy removal and disposal. This technique allows one person to handle most of the disposal chores. Always wear eye protection and heavy gloves when cutting or breaking apart fixtures.

For most tubs and showers, you need to remove at least 6 inches of wall surface around the tub or shower pan to gain access to fasteners holding it to the wall studs. Maneuvering a tub out of an alcove is also easier when the wall surfaces are removed. If you are replacing the entire wall surface, do all the demolition work before removing the tub.



Disconnect the faucet through the access panel, usually located on the wall surface behind or next to the tub faucet and drain. (If the tub does not have an access panel, add one.) Turn off the shutoff valves, then cut the shower pipe above the faucet body. Disconnect or cut off the supply pipes above the shutoff valves.



TOOLS + MATERIALS

Reciprocating saw	Hacksaw	Wrecking bar	Wire cutter	2 × 4 or 1 × 4 lumber
Channel pliers	Adjustable wrench	Hammer	Eye and ear protection	Rag
Screwdriver	Flat pry bar	Masonry chisel	Utility knife	Work gloves



How to Remove Handles + Spouts



Shut off the water supply, then remove the faucet handles by prying off the covers and unscrewing the mounting screws.



Remove the tub spout by inserting a screwdriver into the spout and twisting counterclockwise until it unscrews from the stub-out that extends from the wall plumbing.



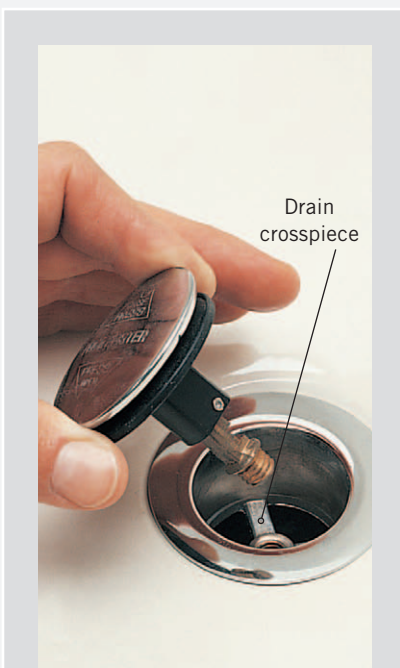
Unscrew the collar nut to remove the showerhead. Loosen the escutcheon, then twist the shower arm counterclockwise to unscrew it from the wall plumbing.



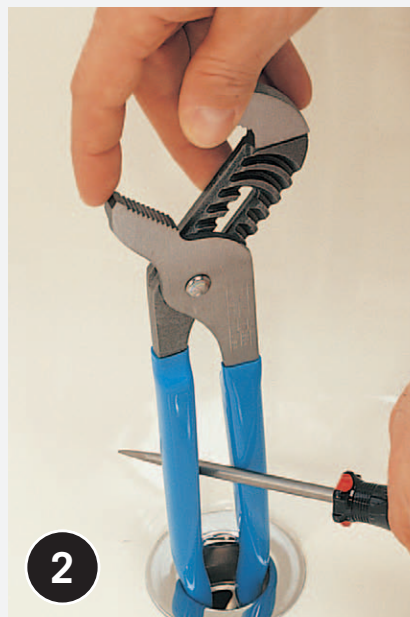
How to Disconnect Drain Plumbing



1
Remove the drain plug. Most bathtub plugs are connected to drain-plug linkage that is lifted out along with the plug.



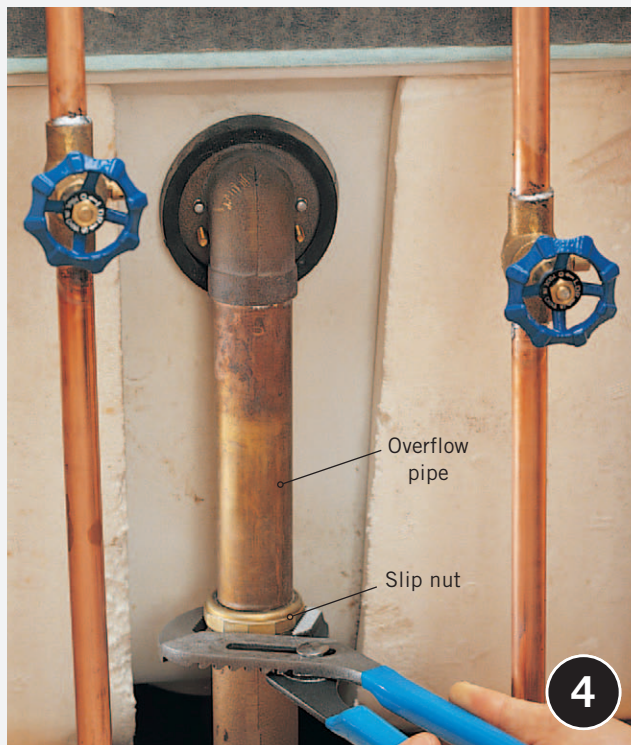
Spring-mounted drain plugs:
Remove the plug by unscrewing it from the drain crosspiece.



2
Disconnect the drain assembly from the tub by inserting a pair of pliers into the drain opening and turning the crosspiece counterclockwise. Insert a long screwdriver between the handles and use it to twist the pliers.



3
Remove the screws in the overflow coverplate (top photo). Remove the coverplate along with any attached drain plug (bottom photo).



4
Remove the overflow pipe by unscrewing the slip nut that holds it to the rest of the drain assembly, then lift out the pipe. Stuff a rag into the waste pipe after the overflow pipe is removed to keep debris from entering the trap.

How to Remove a Shower Stall



1
After disconnecting the faucet handles, spout, and showerhead, remove the shower curtain rod or shower door, molding or trim, and any other accessories.



2
Slice the caulk around each shower panel using a utility knife. Remove any screws holding the panels together.



3
Pry shower panels away from the wall using a flat pry bar. If the panels are still intact, cut them into small pieces for easier disposal using a jigsaw or a sharp utility knife.



4
Fabricated shower bases (fiberglass or plastic): Slice the caulk between the base and the floor, then unscrew any fasteners holding the base to the wall studs. Pry the base from the floor with a wrecking bar.



Ceramic-tile shower base: Remove the drain strainer, and then stuff a rag into the drain opening. Wearing protective equipment, break apart a section of tile with a hammer and masonry chisel. Cut through any steel-mesh reinforcement using a wire cutter. Continue knocking tile and mortar loose until the waterproofing layers are exposed, then scrape off the layers with a long-handled floor scraper.

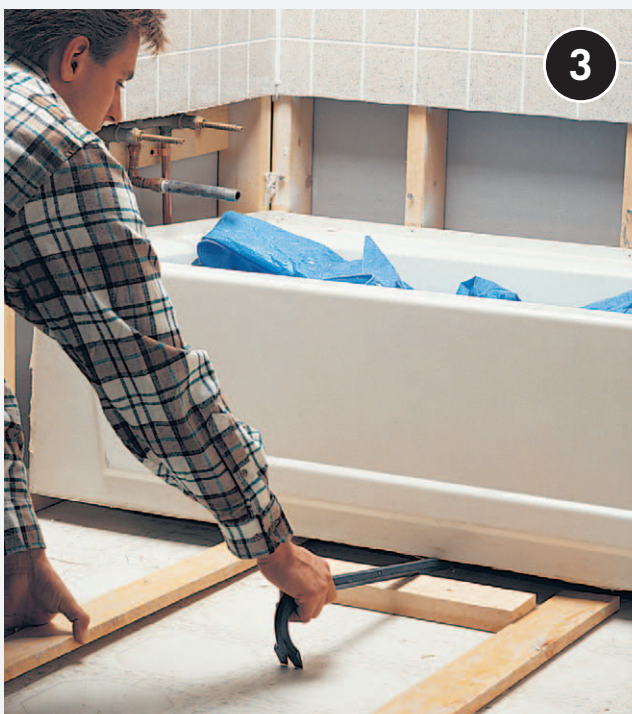
How to Remove a Bathtub



Use a reciprocating saw to cut away at least 6" of the wall surface above the tub on all sides. Before cutting into a wall, be sure faucet handles, spouts, and drains are all disconnected. Wear a mask and eye protection.



Remove the fasteners that hold the tub flanges to the wall studs, then use a wrecking bar or a piece of 2 x 4 to pry the bathtub loose.



Lift the edge of the bathtub and slip a pair of 1 x 4 runners beneath the tub apron. Pull the tub away from the wall using the runners as skids. Have helpers when removing steel and cast-iron tubs.



Cut or break the bathtub into small pieces for easy disposal. Fiberglass, reinforced polymer, and pressed-steel tubs can be cut with a reciprocating saw. Cast-iron and steel tubs should be carried out.

Building a Wet Wall

A wet wall is simply a wall that contains plumbing for water supply and drainage. To accommodate the drain and vent pipes, which range from 1½ to 3 inches in diameter for branch lines, the wall framing needs to be built with 2 × 6 or larger dimensional lumber. You can also attach furring strips (usually 2 × 2) to the edges of 2 × 4 framing to increase wall thickness. The chart on the next page describes how deeply you are allowed to notch wall-framing members under various load conditions, as well as the maximum-diameter holes you may drill for running plumbing and wiring.

Building a new wet wall or converting an existing wall to house new plumbing requires a building permit and an onsite inspection once all of the hookups are made. Do not install any wall coverings until after your plumbing and wiring have been inspected and approved.



TOOLS + MATERIALS

Circular saw	Jigsaw
Wrecking bar or pry bar	Basic plumbing tools
Drill/driver	Reciprocating saw
Caulk gun	Protective plates
Adhesive	Plumbing pipes and hangers
Hammer	Dust mask
8d finish or casing nails	Eye and ear protection
Masking tape	Work gloves
Hole saw	



WSFU FOR WATER MAIN SUPPLY SIZE

FIXTURE	WSFU	MIN. BRANCH SUPPLY LINE SIZE
Toilet	2.5	½"
Bath sink	2	½"
Shower (per head)	2	½"
Bathtub	4	½"
Dishwasher	1.5	½"
Kitchen Sink	1.5	½"
Clothes Washer	4	½"
Utility Sink	1.5	½"
Sillcock	2.5	½"

To determine the size of water supply distribution that feed branch lines, add up the Water Supply Fixture Units (WSFU) for your home and find the number on the chart above.



WATER-DISTRIBUTION PIPE SIZING

STREET SERVICE	BUILDING SUPPLY + BRANCHES	MAX. ALLOWABLE LENGTH (FEET)					
		40	60	80	100	150	200

30–45 psi

¾"	½"	6	5	4	3	2	1
¾"	¾"	16	16	14	12	9	6
¾"	1"	29	25	23	21	17	15
1"	1"	36	31	27	25	20	17
¾"	1¼"	36	33	31	28	24	23
1"	1¼"	54	47	42	38	32	28
1½"	1¼"	78	68	57	48	38	32
1"	1½"	85	84	79	65	56	48
1½"	1½"	150	124	105	91	70	57
2"	1½"	151	129	129	110	80	64

46–60 psi

¾"	½"	7	7	6	5	4	3
¾"	¾"	20	20	19	17	14	11
¾"	1"	39	39	36	33	28	23
1"	1"	39	39	39	36	30	25
¾"	1¼"	39	39	39	39	39	39
1"	1¼"	78	78	76	67	52	44
1½"	1¼"	78	78	78	78	66	52
1"	1½"	85	85	85	85	85	85
1½"	1½"	151	151	151	151	128	105
2"	1½"	151	151	151	151	150	117

Over 60 psi

¾"	½"	7	7	7	6	5	4
¾"	¾"	20	20	20	20	17	13
¾"	1"	39	39	39	39	35	30
1"	1"	39	39	39	39	38	32
¾"	1¼"	39	39	39	39	39	39
1"	1¼"	78	78	78	78	74	62
1½"	1¼"	78	78	78	78	78	74
1"	1½"	85	85	85	85	85	85
1½"	1½"	151	151	151	151	151	151
2"	1½"	151	151	151	151	151	151



REQUIREMENTS FOR HOLES AND NOTCHES

The International Building Code specifies limits on notches and holes in framing members; local codes follow that guidance. Consult local codes before altering any framing member. In any case, use nailing plates on the framing member edges for any pipes closer than 1¼" from the edge.

Notches

Notches covered by nailing plates were preferred for metal or PVC pipes, but PEX can easily be run through stud, joist, and plate holes. The code uses the term "depth" for what most homeowners think of as "width" (studs are installed edges out).

- Stud in exterior or load bearing wall: No more than 25% of the stud's depth. Examples of maximum notch size:
2 × 4: 7⁄8"
2 × 6: 1 3⁄8"
- Stud in non-load-bearing wall: No more than 40% of the stud's depth. Examples of maximum notch size:
2 × 4: 1 3⁄8"
2 × 6: 2 1⁄5"

Holes

Holes in studs shouldn't exceed 60% of stud depth, the hole must not be closer than 5⁄8" to an edge, and should not be located in a stud with a notch. A hole made in an exterior stud and exceeding 40% of stud depth requires a sister stud (doubling the stud). If two pipes are run through the same stud, the holes should be stacked, not side by side. Examples of maximum hole diameter:

2 × 4: 2" (int) / 1 3⁄8" (ext)
2 × 6: 3 1⁄8" (int) / 2 1⁄5" (ext)

Joists

Joists are a special case and have their own specific requirements.

- Notches should not be more than 1⁄6 joist depth (width).
- Holes should not be more than 1⁄3 joist depth and should not be closer than 2" from an edge or anywhere in the middle 1⁄3 of the joist's span.



PIPE SUPPORT REQUIREMENTS

MATERIAL	JOINTS	HORIZONTAL	VERTICAL
Cast Iron Hub-and-Spigot	Lead-and-oakum	5' (except 10' where 10' pipe is installed)	Base and each floor, not to exceed 15'
Cast Iron Hub-and-Spigot	Compression	Every other joint, unless more than 4', then every joint	Base and each floor, not to exceed 15'
Cast Iron Hubless	Shielded coupling	Every other joint, unless more than 4', then every joint	Base and each floor, not to exceed 15'
Copper	Soldered, threaded, mechanical	1½" or smaller: 6' 2" or larger: 10'	Each floor, not to exceed 10'
Steel (gas)	Threaded or welded	½": 6' ¾" or 1": 8' 1 ¼" up: 10'	½": 6' ¾" or 1": 8' 1 ¼" every floor level
PVC	Solvent cement	All sizes: 4' allow for expansion every 30'	Base and each story; provided mid-story guides; allow for expansion every 30'
CPVC	Solvent cement	Less than 1": 3' 1¼" or larger: 4'	Base and each story; provided mid-story guides
PEX	Mechanical	Less than 1": 32" 1¼" or larger: 4'	Base and each story; provided mid-story guides; allow for expansion every 30'

How to Build + Plumb a Wet Wall

Clear the work area. If you are remodeling an existing wall to contain plumbing for a new bathroom, you'll need to completely remove the wall coverings so you can fur out the wall studs. This project requires a building permit and at least one onsite inspection. Shut off power at the main service panel before cutting into walls.



Begin removing wall coverings on the entire wall. There are many ways to go about this. One is to set your circular saw to a cutting depth equal to the wall covering thickness and make a few starter cuts. Remove any cover plates on the wall before you start.



Next, use a wrecking bar to pry the wallcovering loose. Work in sections that are large, but manageable. Discard the material you remove immediately.



Remove old drywall screws or nails that remain in the wall-framing members.



Cut 2 × 2 furring strips to length. Start with the sole plate of the wall. Apply a bead of construction adhesive to the 2 × 2.



Attach the furring strips to the wall-framing members with 8d finish or casing nails. Drive a nail every 12 to 16".



Install the vertical furring strips next, using nails and construction adhesive. Finally, attach furring strips to the wall cap plate. Reroute wiring in the wall according to your plan. If you are keeping receptacles or switches in the same place, you'll still need to move the boxes forward in the wall cavity so the edges will be flush with the new wall surface.



If you are installing a drain for a tub or shower, mark out the location of the drain on the subfloor. Remove floor coverings first. Mark a centerpoint for the drainage pipe onto the sole plate. The pipe should align with the location for the drain trap. If your plan calls for it, drill additional holes for fixture drains, such as the wall sink stub-out being installed in this wall.



Drill holes for the drain pipes using a hole saw that's slightly larger than the outside diameter of the new pipe. In most cases, a 2"-diameter pipe is adequate for this type of branch drain, so a 2½" hole saw is a good choice.



Feed sections of drain pipe up through the holes in the sole plate and floor (if you are tying in to the plumbing on the floor below—the easiest way to tap into the existing plumbing system). Connect the drain line to a drainage stack, maintaining a slope of at least ¼" per 1'. It is always a good idea to include a cleanout on the new branch line.

(continued)



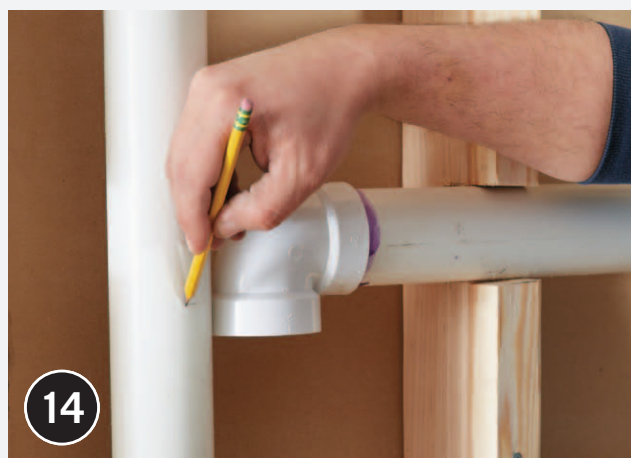
Cut notches in the wall-framing members to hold the horizontal plumbing in the drain lines. In some instances, a hole will work better than a notch. Check the chart on page 63.



Cut the horizontal lines to length and set them into the notches. You can hold them in place with tape if they don't stay put.



Attach a 90° elbow to the end of the new horizontal line so it aligns with the drain pipe coming up through the floor. The other end of horizontal pipe is fitted with a T-fitting so the vent line can be extended up through the cap plate and ceiling.



With the drain pipes seated in the fitting below the floor (but not cemented), mark the free ends of the vertical pipes for cutting at the points where they will join the fittings on the horizontal line. Dry-fit this union. Do not cement yet.



Remove the subfloor in the section you've laid out for the drain. Cut with a jigsaw, using a starter hole if you need to. If you've planned the drain location wisely it will not fall over a floor joist.



Reach into the hole in the subfloor and mark the vertical pipe for cutting to accept a T-fitting. The tee should have a slight sweep downward. Normally, the open end of the tee is sized for a 1½"-diameter drain tube to run from the vertical drain line to the drain trap.



17
Remove the drain pipes and cut them to the lengths you've marked.



18
Cement the reducing tee into the drain line for the tub, making sure to orient the sweep correctly and to align the opening with the drain-trap location.



19



20
Cement the drain lines into the drain fittings from below. Solvent-cement the branch drain line components on the floor below, tying the line into the main drain stack or another large branch drain.



21
Connect the vent pipe from the wet wall with another vent line in the attic or, if you prefer, run it out through the roof and flash and cover it according to your local plumbing codes.

Install cold and hot water-supply lines, connecting from the floor below.



22



23

Solder supply stub-outs onto the new water lines. Install protective metal plates on the wall studs to cover pipe (and electrical cable) penetrations. Have your work inspected and, when approved, you may go ahead and install wall coverings.





Showers + Bathtubs

Bathtubs and showers continue to evolve as the showpieces of a bathroom. Even smaller bathrooms can feature walk-in showers and jetted bathtubs. Luxury is available for every space and every type of bathroom, so there's no excuse to have anything less.

Nowadays, the jetted tubs that were once only for the wealthy few are available in compact sizes and every style imaginable. Stuck with an alcove space? Not to worry; there is a jetted tub or soaking style available to fit. Not sure about your floor plan? Turn to freestanding models that can reasonably be placed just about anywhere in the room that plumbing and drain lines can be run.

Showers, though, are where homeowners can really go over the top. Walk-in showers that are basically a room-within-a-room are now fairly standard. The trend is toward the seamless look and ease-of-use of curbless showers, which can include multiple showerheads, steam features, and even Bluetooth tech for those who like that shower with tunes. Of course, if you want an easier installation, you can still find upscale amenities in something like a compact neo-angle shower kit or small curb shower kit with enclosure panels.

The trick in any case is to carefully and thoroughly plan out the positioning, plumbing, and details of new or replacement bathtubs or showers. That won't be too much of a challenge with the help of the information in this chapter.

In this chapter:

- Installing Showers
- Shower Enclosure Kits
- Curbed Shower Base
- Wet Rooms + Curbless Showers
- Alcove Bathtubs
- 3-Piece Tub Surrounds
- Drop-In Bathtubs
- Freestanding Bathtubs
- Sliding Bathtub-Shower Doors
- Jetted Bathtubs
- Bathtub + Shower Fittings
- Adding a Shower to a Bathtub

Installing Showers

You can build a shower just about anywhere there's a 30-inch square spot of real estate in the bathroom. The main decision is always going to be whether you want to use a completely prefabricated enclosure or build one from the base up. In either case, making the enclosure watertight will be your prime consideration. Water-resistant cement board is the standard for prefab panels and enclosures, but manufacturers sometimes recommend specific products be used. Local building codes may also designate different techniques, such as using a waterproof membrane between the studs and the backer material.

The type of shower pan or base is an even more complicated issue. These days, many homeowners are opting for linear “trench” drains that sit level with the floor. They allow you to install a completely curbless shower floor.



Glass tile is regularly replacing ceramic tile as the surface of choice in shower and bath remodeling projects. It's not hard to see why. The tile reflects light in a room that relies on illumination, is easy to clean, and comes in a stunning variety of jaw-dropping colors, like the green that energizes this tub-shower combo. It's a blast of color in an otherwise sedate, pure white guest bath.

Antiscald Valves



Antiscald valves are safety devices that protect against sudden water temperature changes. They are required by most building codes for faucets in showers and combination tub-showers. Once installed, faucets with antiscald valves look like standard faucets.

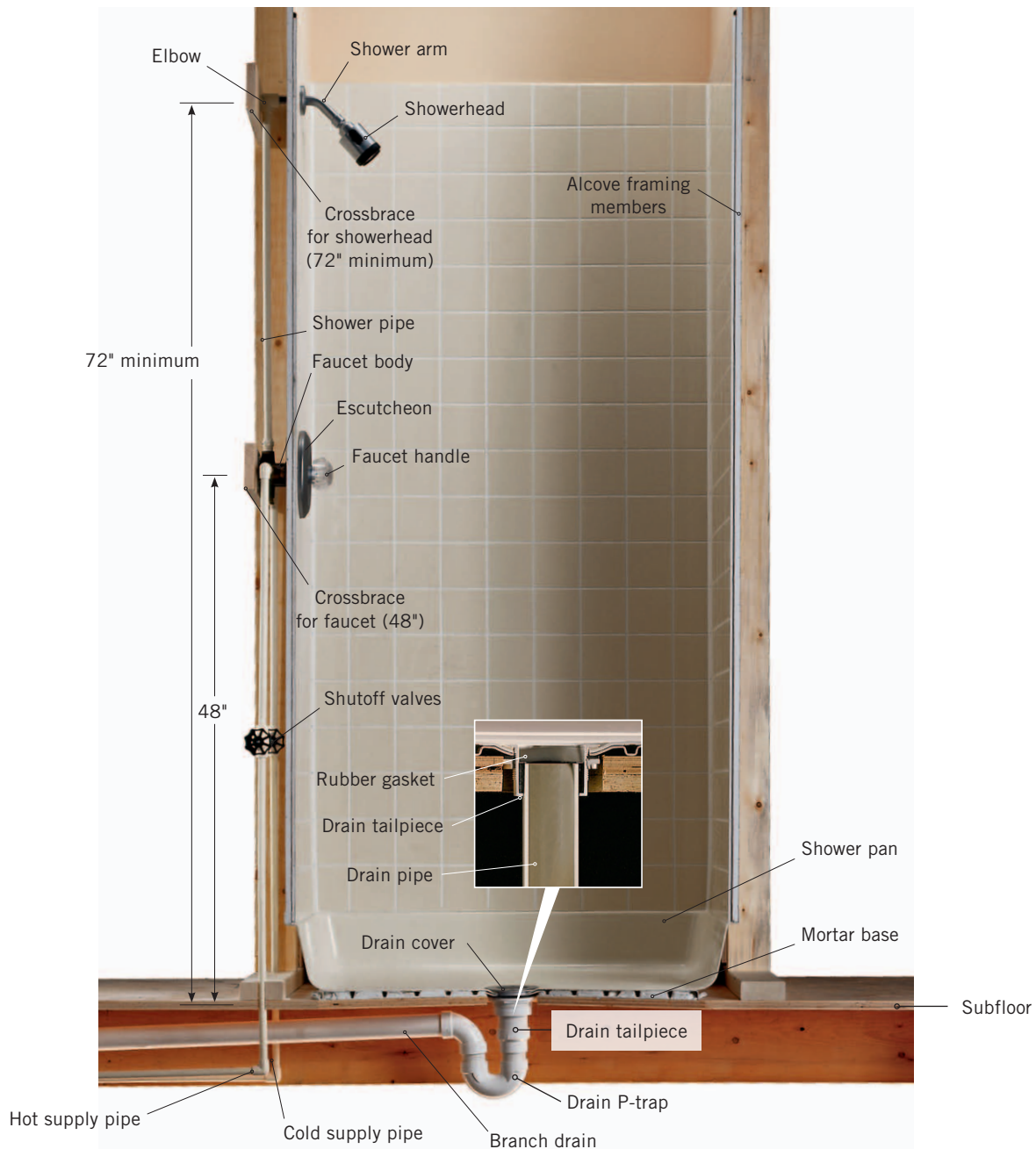
Anatomy of a Shower

Shower stalls are available in many different sizes and styles, but the basic elements are the same. Most shower stalls have a shower alcove, a supply system, and a drain system.

Shower alcove: The alcove is the frame for the stall, with 2 × 6 walls built to fit around a shower pan and blocking to secure the plumbing. The pan—in most cases—sets into a mortar bed for support, and water-resistant drywall or cement board covers the alcove walls.

The supply system: The shower arm extends from the wall, where an elbow fitting connects it to the shower pipe. The pipe runs up from the faucet, which is fed by the hot and cold water supplies.

The drain system: The drain cover attaches to the drain tailpiece. A rubber gasket on the tailpiece slips over the drain pipe, leading to the P-trap and the branch drain.



Shower stall shown cut away for clarity

Shower-Enclosure Kits

The fastest and easiest way to create a new shower in your bathroom is to frame in the stall area with lumber and cement board and then install a shower-enclosure kit. Typically consisting of three fiberglass or plastic walls, these enclosure kits snap together at the corners and nestle inside the flanges of the shower pan to create nearly foolproof mechanical seals. Often the walls are formed with shelves, soap holders, and other conveniences.

If you are on a tight budget, you can find extremely inexpensive kits to keep costs down. You can even create your own custom enclosure using waterproof beadboard panels and snap-together connectors. Or, you can invest in a higher-grade kit made from thicker material that will last much longer. Some kits are sold with the receptor (and perhaps even the door) included. The kit shown here is designed to be attached directly to wall studs, but others require a backer wall for support. The panels are attached to the backer with high-tack panel adhesive.



TOOLS + MATERIALS

Tape measure	Hacksaw
Pencil	Masking tape
Hammer	Silicone caulk
Carpenter's square	Caulk gun
Screwdrivers	Panel adhesive
Deck screws	Silicone sealant
Pipe wrench	Thinset mortar
Level	Trowel
Strap wrench	Lumber
Adjustable wrench	Shower enclosure kit
Pliers	Shower door
Drill/driver	Showerhead
Center punch	Faucet
File	Plumbing supplies
Utility knife	Eye protection
Jigsaw or hole saw	Work gloves

Paneled shower surrounds are inexpensive and easy to install. Designed for alcove installations, they often are sold with matching shower pans (called receptors). Some include molded-in accessories, such as shelves or soap dishes. High-end versions include tiled sections, faux tile, and faux stone panels, and some even include matching fixtures, controls, and built-in grab bars.





How to Install a Shower Enclosure



Mark out the location of the shower, including any new walls, on the floor and walls. Most kits can be installed over wallboard, but you can usually achieve a more professional-looking wall finish if you remove the wall covering and floor covering in the installation area. Dispose of the materials immediately and thoroughly clean the area.



If you are adding a wall to create the alcove, lay out the locations for the studs and plumbing on the new wood sill plate. Also lay out the stud locations on the cap plate that will be attached to the ceiling. Refer to the kit instructions for exact locations and dimensions of studs. Attach the sill plate to the floor with deck screws and panel adhesive, making sure it is square to the back wall and the correct distance from the side wall.



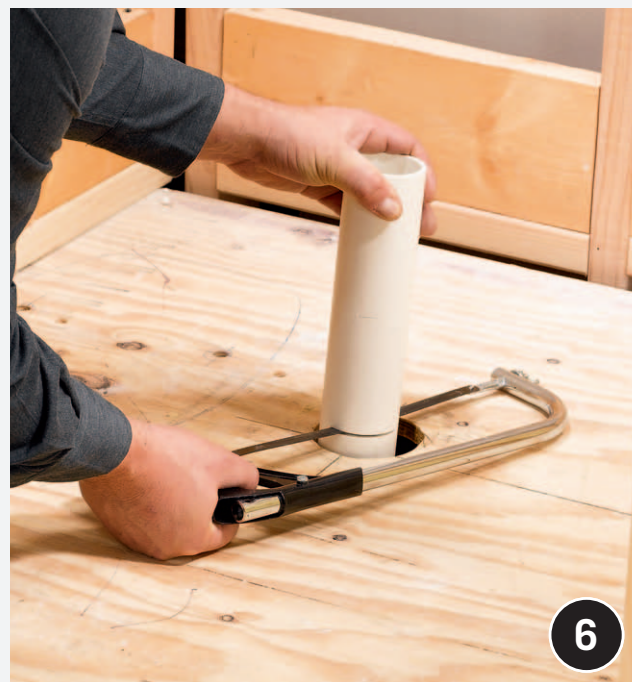
Align a straight 2 x 4 right next to the sill plate and make a mark on the ceiling. Use a level to extend that line directly above the sill plate. Attach the cap plate at that point.



Install the 2 x 4 studs at the outlined locations. Check with a level to make sure each stud is plumb and then attach them by driving deck screws toenail style into the sill plate and cap plate.
(continued)



Cut an access hole in the floor for the drain, according to the installation-manual instructions. Drill openings in the sill plate of the wet wall (the new wall in this project) for the supply pipes, also according to the instructions.



Install a drain pipe and branch line and then trim the drain pipe flush with the floor. If you are not experienced with plumbing, hire a plumber to install the new drain line.



Install new supply risers as directed in the instruction manual (again, have a plumber do this if necessary). Also install crossbraces between the studs in the wet wall for mounting the faucet body and shower arm.

NOTE: Some local codes require that you use gate valve shutoffs, not ball valves.



If the supply plumbing is located in a wall (old or new) that is accessible from the non-shower side, install framing for a removable access panel.



9

Attach the drain tailpiece that came with your shower pan to the underside of the unit, following the manufacturer's instructions precisely. Here, an adjustable spud wrench is being used to tighten the tailpiece.



OPTION: If the floor is uneven, use liquid floor leveler. Allow it to cure and then use thinset mortar to set the receptor (pan) for the enclosure kit.



10

Set the pan in place, check to make sure it is level, and shim it if necessary. Secure the pan with large-head roofing nails driven into the wall stud so the heads pin the flange against the stud. Do not overdrive the nails.



11

Lay out the locations for the valve hole or holes in the end wall panel that will be installed on the wet wall. Check your installation instructions. Some kits come with a template marked on the packaging carton. Cut the access hole with a hole saw and drill or with a jigsaw and fine-tooth blade. If using a jigsaw, orient the panel so the good surface is facing down.

(continued)



Position the back wall so there is a slight gap (about $\frac{1}{32}$ ") between the bottom of the panel and the rim of the pan—set a few small spacers on the rim if need be. Tack a pair of roofing nails above the top of the back panel to hold it in place (or use duct tape). Position both end walls and test the fits. Make clip connections between panels (inset) if your kit uses them.



Remove the end walls so you can prepare the installation area for them. If your kit recommends panel adhesive, apply it to the wall or studs. In the kit shown here, only a small bead of silicone sealant on the pan flange is required.



Reinstall the end panels, permanently clipping them to the back panel according to the kit manufacturer's instructions. Make sure the front edges of the end panels are flush with the front of the pan.



Once the panels are positioned correctly and snapped together, fasten them to the wall studs. If the panels have predrilled nail holes, drive roofing nails through them at each stud at the panel tops and every 4 to 6" along vertical surfaces.



16

Install wall-covering material above the enclosure panels and anywhere else it is needed. Use cement board, and maintain a gap of $\frac{1}{4}$ " between the shoulders of the top panel flanges and the wall covering.



17

Finish the walls and then caulk between the enclosure panels and the wall coverings with silicone caulk.



18

Install the faucet handles and escutcheon and caulk around the escutcheon plate. Install the shower-arm escutcheon and showerhead. Add a shower door.



19

Make an access panel and attach it at the framed opening created in step 8. A piece of $\frac{1}{4}$ " plywood framed with mitered case molding and painted to match the wall is one idea for access-panel covers.

Neo-Angle Showers

Whether you're making a half-bath more useful, or simply want to add a step-in shower in place of an undersized tub in a small bathroom, the solution is the same—a neo-angle shower. Using a minimum of floor space by fitting into a corner, this type of shower fits a lot of style and usefulness in a tiny footprint. Neo-angle showers are offered in looks from conventional to ultramodern, as basic one-head showers, or more upscale versions with multiple heads and other luxury options. No matter what, you'll find one that suits both your budget and your bathroom style.

In any case, most neo-angle showers are sold as all-in-one packages. The kit here includes the shower pan, three wall pieces (two flat panels and a corner shelf-connector unit), and the glass panels and frames for the sliding door. Some kits include more panels, but the basic construction is the same. All connectors and hardware are included. Some budget kits, however, don't include everything you'll need for installation. Read the instructions closely, unbox and check the parts that are included and that everything that was supposed to be supplied is there, and then shop for any additional pieces you'll need before you begin the project.

The key to smooth neo-angle shower installation is making sure the wall panels, frames, and shower pan fit squarely in the corners and against existing walls. Walls that are out of square or not perfectly flat can complicate this job, so time spent correcting faulty wall surfaces, will be time well spent.

This project requires diligent and careful sealing of the joints using silicone caulk and silicone sealant. Don't rush this step; it's crucial to achieving a workable, leak-free shower.



TOOLS + MATERIALS

Neo-angle shower kit
with shower pan

Tape measure

Pencil or marker

4' level

Drill with bits and hole saw

Straightedge

Utility knife

Silicone sealant

Wall (panel) adhesive

Siliconized latex caulk

Caulk gun

Carpenter's square

Hammer

Center punch

Phillips screwdriver

Masking tape

Mineral spirits

Clean cloths

Plastic wall anchors

Eye protection

Work gloves

How to Install a Neo-Angle Shower



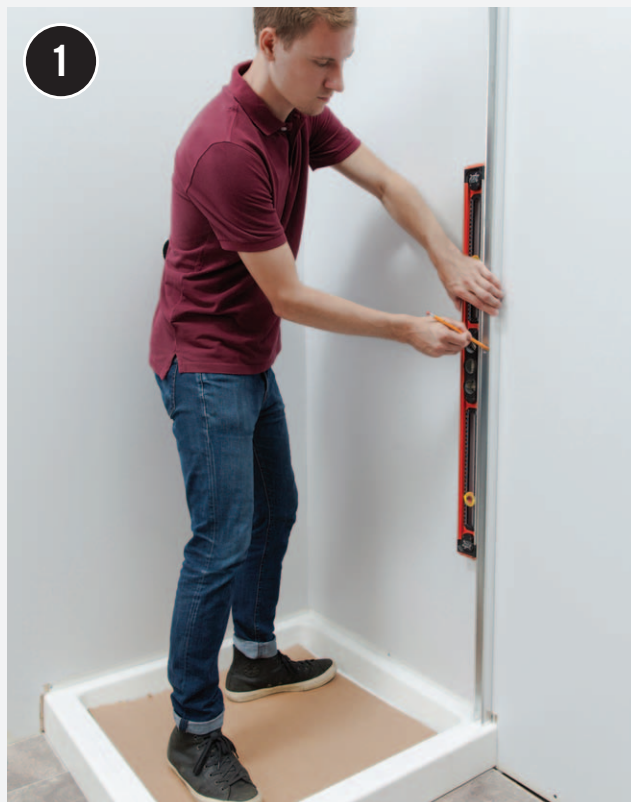
Prepare the floor drain and install a prefabricated shower pan in the corner of the room, following the instructions on pages 74 and 75. Make sure the outside diameter of the drain pipe matches the requirements of the shower pan. The shower pan must sit perfectly level on the floor and tight against the wall studs on the two adjoining walls for the installation to proceed smoothly.



Drill holes and drive plastic wall anchors for the metal shower channels. The plastic wall anchors are included in most shower kits.



Position the wall channels in place and secure them to the wall with mounting screws driven through the mounting holes and into the wall anchors.



Draw centerlines along the top of the outer thresholds of the shower pan. Position one of the metal wall channels vertically against the wall, so the bottom edge is centered on the centerline. Use a level to adjust the wall channel for plumb, then mark the mounting-hole locations on the wall through the holes in the wall channel.



Fill the gaps between the shower base and the wall with siliconized caulk. Install the other wall channel in the same way, and seal the remaining gap between the shower pan and the wall. Lightly sand the top face of the shower pan curbs with the sandpaper included in the kit. This will create a better bonding surface when you seal the pan at the end of the project. *(continued)*



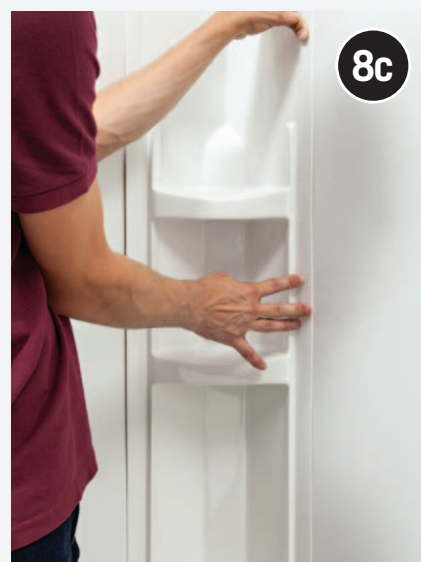
Prepare the walls in the manner recommended by the manufacturer. Test-fit the side panels and the corner panel by taping them in place with painter's tape, with the shiny side of the panels facing out. The wall panels should butt against the wall channels and rest flat against the shower-pan curbs. If the wall panels don't line up correctly, the wall channels are out of plumb or the shower pan is not level. The corner panel should slightly overlap the side wall panels, by about $\frac{1}{2}$ ". Trim if the overlap is greater.



To prepare the side wall that will contain the plumbing fixtures, cut a cardboard template to the same size as the wall panel and place the template against the wall. Mark the location of the shower and faucet on the template. Make an X on the cardboard for reference. Remove the cardboard template, then use a utility knife to cut away openings for the plumbing stub-outs on the template. Test-fit the cardboard template against the wall, making sure the plumbing pipes fit correctly.



Use the template to mark the opening on the wall panel that will hold the shower plumbing fixtures, then use an appropriately sized hole saw to cut openings in the wall panel. Make sure to align the wall panel correctly when marking: the shiny side will face into the shower.



Beginning with the panel without plumbing cutouts, spread a continuous $\frac{1}{4}$ " bead of panel adhesive along the back, no closer than 2" to the edges. Leave gaps at the ends, so air can escape when pressing the panels against the wall. Also apply an S-shaped continuous bead to the center of the panel. Position the panel against the wall so the bottom rests firmly against the shower-pan curb and side edges are against the wall channel and the corner of the room. Press the panel against the wall firmly, and smooth it with even hand pressure until the panel is perfectly flat. Repeat with the wall that has plumbing cutouts, applying panel adhesive around the cutouts. Finally, apply panel adhesive to the back of the corner panel and press it into place. (Some shower models may have a connecting rod that joins the corner panel to the shower-pan unit.) Clean off adhesive squeeze-out with a rag moistened with mineral spirits.



Following the kit instructions, begin assembling the doorframes. With our kit, the first step is to attach the center guide to the bottom rail using the screws included with the kit.



Stand the sliding door panels upright so the hanging brackets are at the top. Install the rollers on the same side of the door panels as the door stops.



Most shower kits have both stationary glass panels and sliding panels. Begin by installing the first stationary panel by inserting it into the wall channel so the roller channel at the side of the top rail is facing inside the shower stall. Now insert the sliding door panel on this side, so that the rollers engage the roller channel inside the top rail. Repeat this step with the opposite-side stationary panel and sliding door panel. Secure the top and bottom rails of the glass panels to the side channels and to one another using the corner connectors included with the kit.

(continued)

Install the seal strips on the back of both sliding door panels, as per the kit instructions. These pliable strips will allow the door to form a watertight seal against the stationary panels.



Make small adjustments to the entire assembly to center it on the top face of the shower pan curbs. Once positioned correctly, so that the entire unit is plumb and the bottoms of the stationary panels are flat and level on the shower pan, drill holes in the frame through the adjustment holes in the glass frames, and secure the unit to the wall channels with the provided screws. Test the doors and, if necessary, make small adjustments by loosening and then reattaching the roller screws at the top of the doors. Allow the shower unit to sit in place for 12 hours before beginning the waterproofing step.





14

Waterproofing the shower will require the use of two different but similar-sounding products: siliconized latex caulk and silicone sealant. First, apply caulk to the seams between the wall panels and corner panel, between the wall panels and the metal wall channels, the seam where the wall panels and corner panel meet the shower pan, and along the tops of the wall panels. Apply silicone sealant to the heads of all screws in the upright panel frames. From inside of the shower, apply silicone sealant along the seams where the bottom rails lay on the shower pan curb and along the bottoms of the wall channels and glass panel upright frames. Also apply silicone sealant around the center guide. Apply silicone sealant around the joint where the bottom rails butt up against the bottom connector. Finally, apply sealant to the heads of any exposed screws.



15

Let the caulked and sealed seams dry completely. To complete your shower, make the plumbing hookups of the shower faucet spray head and the shower valve. Test the shower to check for leaks.

Curbed Shower Base

Building a custom-tiled shower base lets you choose the shape and size of your shower rather than having its dimensions dictated by available products. Building the base is quite simple, though it does require knowledge of basic masonry techniques because the base is formed primarily using mortar.

Before designing a shower base, contact your local building department regarding code restrictions and to secure the necessary permits. Most codes require water controls to be accessible from outside the shower and describe acceptable door positions and

operation. Requirements such as these influence the size and position of the base.

Choosing the tile before finalizing the design lets you size the base to require mostly full tile. Consider using small tile and gradating the color from top to bottom or in a sweep across the walls. Or, use trim tile and listellos on the walls to create an interesting focal point.

Whatever tile you choose, remember to seal the grout in your new shower and to maintain it carefully over the years. Water-resistant grout protects the structure of the shower and prolongs its useful life.

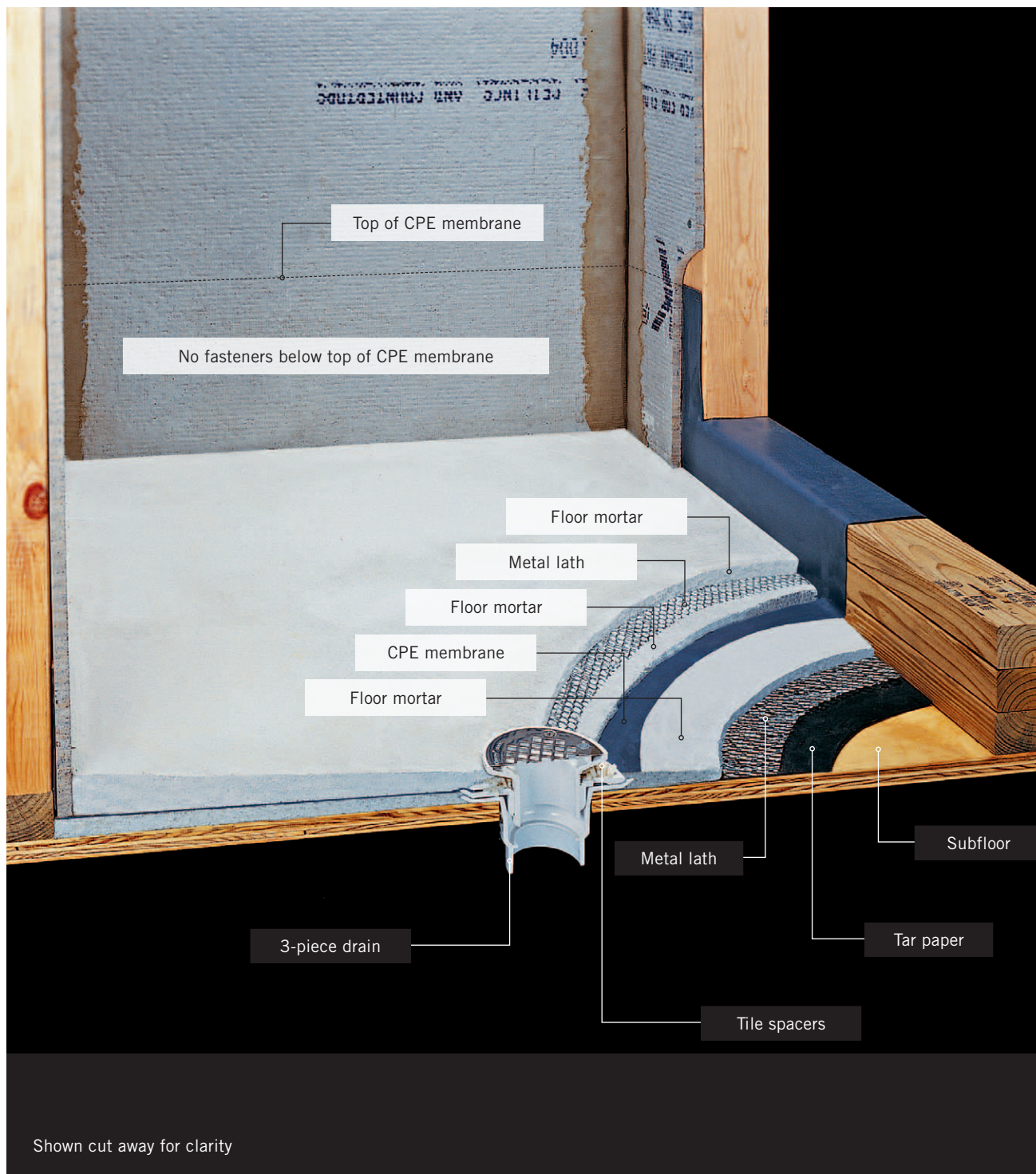


TOOLS + MATERIALS

Tape measure	Thick-bed floor mortar (“deck mud”)
Circular saw	Latex mortar additive
Hammer	Thinset mortar
Utility knife	CPE waterproof membrane and preformed dam corners
Stapler	CPE membrane solvent glue
2' level	CPE membrane sealant
Mortar mixing box	Builder’s sand
Trowel	Portland cement
Wood float	Masonry hoe
Grout tile	Work gloves
Felt-tip marker	Dust mask or respirator
Ratchet wrench	¼" wood shims
Tin snips	Tile spacers
Torpedo level	Balloon tester
Framing lumber (1×, 2×4, 2×10)	Silicone caulk
16d galvanized common nails	Caulk gun
15# building paper	Eye protection
Staples	Cement board
3-piece shower drain	
PVC primer and cement	
Galvanized-metal lath	



The easiest place to install a curbed shower base is in a rectangular space like this. Measurements are simple, and installation is easier than in an angled or curved installation. Notice that the accent wall of pale blue glass tile beautifully draws attention from the white curb and walls.



TIPS FOR BUILDING A CUSTOM SHOWER BASE

A custom-tiled shower base is built in three layers to ensure proper water drainage: the prepan, the shower pan, and the shower floor. A mortar prepan is first built on top of the subfloor, establishing a slope toward the drain of $\frac{1}{4}$ " for every 12" of shower floor. Next, a waterproof chlorinated polyethylene (CPE) membrane forms the shower pan, providing a watertight seal for the shower base. Finally, a second mortar bed reinforced with wire mesh is installed for the shower floor, providing a surface for tile installation. If water penetrates the tiled shower floor, the shower pan and sloped prepan will direct it to the weep holes of the 3-piece drain. One of the most important steps in building a custom-tiled shower base is testing the shower pan after installation (step 13). This allows you to locate and fix any leaks to prevent costly damage.



MIXING DECK MUD

Mortar beds for laying tile are made from deck mud, a simple mortar consisting of a proportioned mixture of builder's sand and Portland cement with a little water added to bind the particles together. Sometimes referred to as dry-pack mortar or floor mud, it can be purchased in prepackaged blends or you can easily make it yourself. It can be set in thicker layers than ordinary thinset mortar.

Deck mud is made with a ratio of four to six parts of builder's sand to one part of Portland cement. The higher the proportion of Portland cement in the mixture, the richer it is considered to be. Leaner mortars contain a lower proportion of Portland cement. A mortar bed 1¼" thick (a common thickness for a shower receptor base) requires approximately 12 pounds of dry sand per square foot of application. Add an additional 3 pounds of sand per square foot for each additional ¼" of mortar thickness desired. The amount of Portland cement required will depend on the mixing ratio and the total volume of sand required to complete the job. A richer blend that uses a 4:1 ratio is suitable for small areas, such as shower-pan mortar beds.



The ingredients for making your own mortar-bed "mud" are minimal. You'll need sharp sand (also called builder's sand), Portland cement, and water. The proportions vary by application.



How to Mix Deck Mud



1 Add the dry ingredients (builder's sand and Portland cement) to a mortar box in the correct ratio. For general purposes, 4 parts sand to 1 part mortar mix (by volume) works. Don't mix more mud than you can use in a half hour or so.



2 Add small amounts of clean water to the dry mixture and blend to an evenly moist consistency using a masonry hoe. Be sure to wear gloves and a dust mask or respirator.



3 Check the consistency. A squeezed clump of deck mud should hold its shape without sagging or falling apart.



How to Build a Curbed Shower Base



1

Remove building materials to expose subfloor and stud walls. Cut three 2 × 4s for the curb and fasten them to the floor joists and the studs at the shower threshold with 16d galvanized common nails. Also cut 2 × 10 lumber to size and install in the stud bays around the perimeter of the shower base.



2

Staple 15# building paper to the subfloor of the shower base. Disassemble the 3-piece shower drain and glue the bottom piece to the drain pipe with PVC cement. Partially screw the drain bolts into the drain piece, and stuff a rag into the drain pipe to prevent mortar from falling into the drain.



3

Mark the height of the bottom drain piece on the wall farthest from the center of the drain. Measure from the center of the drain straight across to that wall, then raise the height mark $\frac{1}{4}$ " for every 12" of shower floor to slope the pre-pan toward the drain. Trace a reference line at the height mark around the perimeter of the entire alcove using a level.

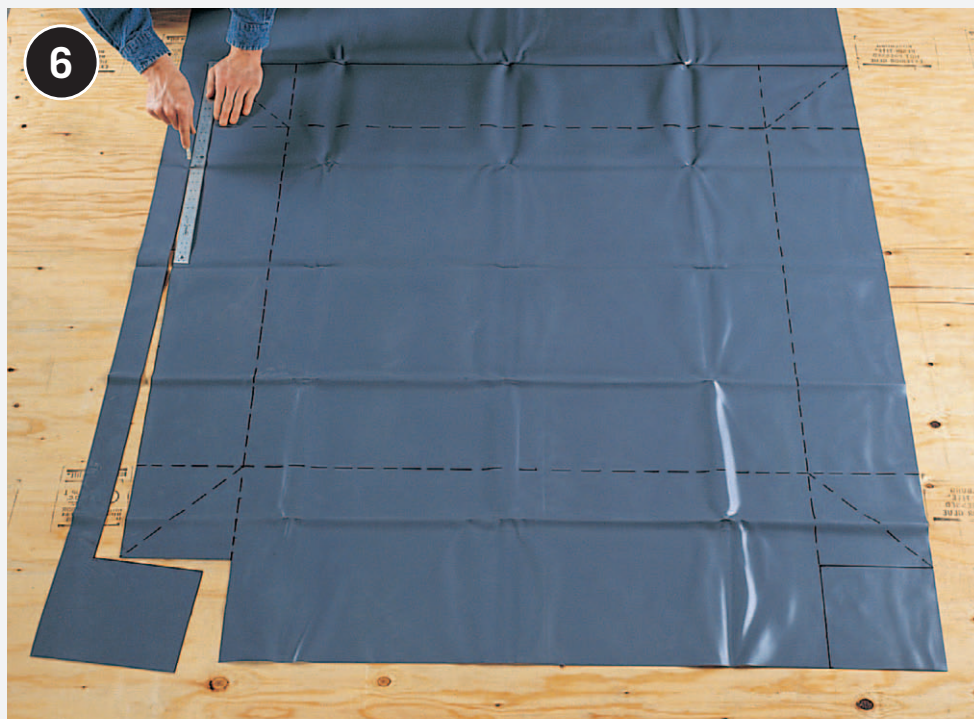


4

Staple galvanized-metal lath over the building paper; cut a hole in the lath $\frac{1}{2}$ " from the drain. Mix floor mortar to a fairly dry consistency using a latex additive for strength; mortar should hold its shape when squeezed (inset). Trowel the mortar onto the subfloor, building the prepan from the flange of the drain piece to the height line on the perimeter of the walls.

(continued)

Continue using the trowel to form the prepan, checking the slope using a level and filling any low spots with mortar. Finish the surface of the prepan with a wood float until it is even and smooth. Allow the mortar to cure overnight.



Measure the dimensions of the shower floor and mark them out on a sheet of CPE waterproof membrane using a felt-tipped marker. From the floor outline, measure out and mark an additional 8" for each wall and 16" for the curb end. Cut the membrane to size using a utility knife and straightedge. Be careful to cut on a clean, smooth surface to prevent puncturing the membrane. Lay the membrane onto the shower pan.



Measure to find the exact location of the drain and mark it on the membrane, outlining the outer diameter of the drain flange. Cut a circular piece of CPE membrane roughly 2" larger than the drain flange, then use CPE membrane solvent glue to weld it into place and reinforce the seal at the drain.



Apply CPE sealant around the drain. Fold the membrane along the floor outline. Set the membrane over the pre-pan so the reinforced drain seal is centered over the drain bolts. Working from the drain to the walls, carefully tuck the membrane tightly into each corner, folding the extra material into triangular flaps.



9

Apply CPE solvent glue to one side, press the flap flat, then staple it in place. Staple only the top edge of the membrane to the blocking; do not staple below the top of the curb or on the curb itself.



10

At the shower curb, cut the membrane along the studs so it can be folded over the curb. Solvent-glue a dam corner at each inside corner of the curb. Do not fasten the dam corners with staples.



11

At the reinforced drain seal on the membrane, locate and mark the drain bolts. Press the membrane down around the bolts, then use a utility knife to carefully cut a slit just large enough for the bolts to poke through. Push the membrane down over the bolts.



12

Use a utility knife to carefully cut away only enough of the membrane to expose the drain and allow the middle drain piece to fit in place. Remove the drain bolts, then position the middle drain piece over the bolt holes. Reinstall the bolts, tightening them evenly and firmly to create a watertight seal.

(continued)

Test the shower pan for leaks overnight. Place a balloon tester in the drain below the weep holes, and fill the pan with water to 1" below the top of the curb. Mark the water level and let the water sit overnight. If the water level remains the same, the pan holds water. If the level is lower, locate and fix leaks in the pan using patches of membrane and CPE solvent.



Install cement board on the alcove walls, using $\frac{1}{4}$ " wood shims to lift the bottom edge off the CPE membrane. To prevent puncturing the membrane, do not use fasteners in the lower 8" of the cement board. Cut a piece of metal lath to fit around the three sides of the curb. Bend the lath so it tightly conforms to the curb. Pressing the lath against the top of the curb, staple it to the outside face of the curb. Mix enough mortar for the two sides of the curb.



Overhang the front edge of the curb with a straight 1x board, so it is flush with the outer wall material. Apply mortar to the mesh with a trowel, building to the edge of the board. Clear away excess mortar, then use a torpedo level to check for plumb, making adjustments as needed. Repeat for the inside face of the curb. Allow the mortar to cure overnight.

NOTE: The top of the curb will be finished after tile is installed (step 19).



Attach the drain strainer piece to the drain, adjusting it to a minimum of $1\frac{1}{2}$ " above the shower pan. On one wall, mark $1\frac{1}{2}$ " up from the shower pan, then use a level to draw a reference line around the perimeter of the shower base. Because the prepan establishes the $\frac{1}{4}$ " per foot slope, this measurement will maintain that slope.

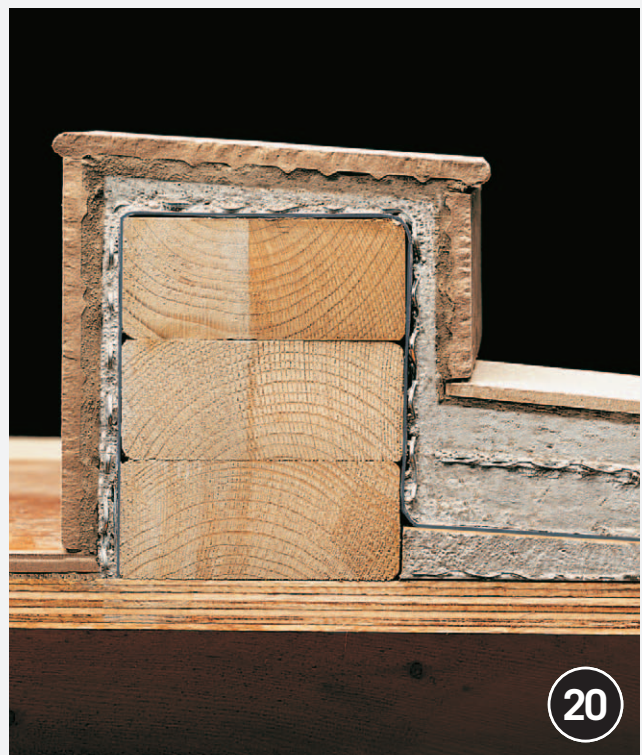
Spread tile spacers over the weep holes of the drain to prevent mortar from plugging the holes. Mix the floor mortar, then build up the shower floor to roughly half the thickness of the base. Cut metal lath to cover the mortar bed, keeping it $\frac{1}{2}$ " from the drain (see photo in step 18).



Continue to add mortar, building the floor to the reference line on the walls. Use a level to check the slope, and pack mortar into low spots with a trowel. Leave space at the drain for the thickness of the tile. Float the surface using a wood float until it is smooth and slopes evenly to the drain. When finished, allow the mortar to cure overnight before installing the tiles.



After the floor has cured, draw reference lines and establish the tile layout, then mix a batch of thinset mortar and install the floor tile. At the curb, cut the tiles for the inside to protrude $\frac{1}{2}$ " above the unfinished top of the curb and the tiles for the outside to protrude $\frac{5}{8}$ " above the top, establishing a $\frac{1}{8}$ " slope so water drains back into the shower. Use a level to check the tops of the tiles for level as you work.



Mix enough floor mortar to cover the unfinished top of the curb, then pack it in place between the tiles using a trowel. Screed off the excess mortar flush with the tops of the side tiles. Allow the mortar to cure, then install bullnose cap tile. Install the wall tile, then grout, clean, and seal all the tile. After the grout has cured fully, run a bead of silicone caulk around all inside corners to create control joints.

Wet Rooms + Curbless Showers

Wet rooms—bathrooms in which all surfaces are waterproof—have long been a popular choice for upscale remodeling projects and new construction.

The idea behind a wet room is that moisture doesn't need to be contained in any single area of the room because the whole room is as waterproof as a shower stall. This alleviates the need for divider walls and enclosures, freeing up space and giving a wet room a seamless, streamlined look. Because of the space-saving aspects, wet rooms are particularly well suited for smaller bathrooms.

Installing a wet room involves laying down layers that work together to provide an impermeable barrier to water, a process called “tanking.” That process is made easy with the use of special rubberized waterproof tape and waterproofing compound that is simply rolled onto wall and floor surfaces. Some companies even provide complete wet-room kits. The finished surface can be traditional tile, solid panels such as the quartz composite surfaces used in vanity countertops, or sheet flooring, such as vinyl or linoleum.

In practice, the preliminary work is a lot like taping and skim-coating a newly drywalled room. The more challenging aspects of wet-room installation are making sure all the openings—from drains to

water-supply inlets—are properly sealed with special membrane, and correctly sloping the floor to a central drain. Normally, a wet room floor is sloped from all four corners for this purpose, but you can opt for a sleeker look with the use of a concealed linear “trench” drain along one edge of the room. This type of drain requires that the floor be sloped in one direction only.

Regardless of the drain used, wet rooms normally include a curbless shower, because there is no need to contain runoff water. Curbless showers present a sleek and sophisticated look, which is why homeowners are choosing to include them in many different bathrooms—including those that are not true wet rooms. Properly installed within an enclosure, a curbless shower can serve a traditional bathroom every bit as well as a raised-pan shower would.

Installing a curbless shower has become a feasible project for even modestly skilled home DIYers thanks to well-thought-out kits that include all the materials you'll need. Wet rooms, on the other hand, usually require professional installation to ensure that the leaks never become a problem and all applicable building codes are met.



WET ROOMS AND UNIVERSAL DESIGN

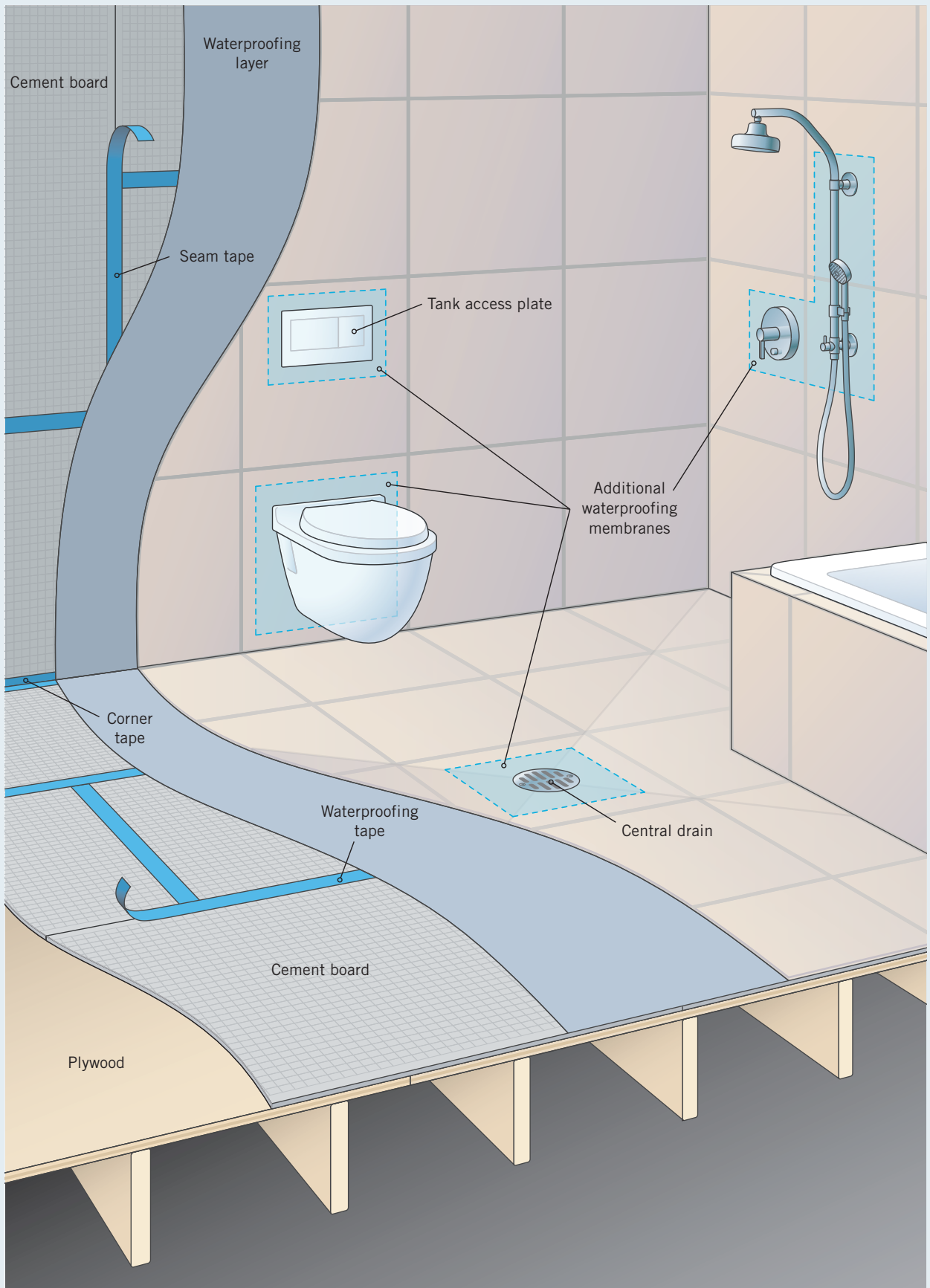
Because a wet room allows the bathroom to be designed with fewer barriers and a single-level floor surface, these rooms are natural partners to a universal design approach. If you're thinking about converting a bathroom to a wet room, it's worthwhile to consider a little extra effort to make the space as accessible as possible for the maximum number of users.

Walls. Where codes allow it, use thick plywood rather than cement board. Plywood allows for direct installation of grab bars without the need for blocking or locating studs. If you're set on using cement board, plan out locations for grab bars near toilets, behind and alongside bathtubs, and in showers. Most codes specify that grab bars must be able to support up to 200 pounds—which usually means adding blocking in the walls behind the grab bars.

Shower stall. One of the benefits to adding a curbless shower is easy wheelchair (or walker) access. For maximum accessibility, the shower area should be at least 60" wide by at least 36" deep (60" by 60" is preferable). This allows a wheelchair user to occupy the stall with a helper. And, although the idea is a wide-open shower space, it's always a good idea to add a fold-down seat. This allows for transfer from a wheelchair or a place for someone with limited leg strength and endurance to sit.



TYPICAL WET-ROOM CONSTRUCTION



Installing a Curbless Shower

A curbless shower combines easy access for those with limited mobility, convenience for other users, and a look that is trendy, sophisticated, and attractive. The trick to installing one of these water features is to ensure the moisture stays inside the shower.

Once upon a time, creating a reliably waterproof enclosure for a curbless shower was no small chore. It meant putting a lot of work into creating a custom shower pan. This kind of project was usually above the skill level or desire of the weekend DIYer, and it generally meant hiring a contractor.

Now you can buy curbless shower-pan kits that make installation a breeze. The manufacturers have thought through all the issues that can arise and have developed the kits and shower pans to be as foolproof as possible, while also meeting prevailing codes and best standards and practices. Installing a curbless shower using one of these kits is a realistic project for any home handyperson with even moderate DIY skills and a weekend to spare.

These pans come with preconfigured slopes to ensure optimal drainage away from the shower's edges. The product we used for this project, the Tuff Form

kit from Access Reliability Center (See Resources, page 252), includes an offset drain hole that offers the option of rotating the pan in the event of a joist or mechanicals that are in the way. This product is offered in nine different sizes and can be cut with a circular saw to just about any shape—including more unusual, curvy shapes for a truly custom look.

Curbless shower-pan manufacturers also sell pans with trench drains for an even sleeker look. The pan we used for this project is typical of the prefab curbless pan construction; it can support 1,100 pounds even though the pan itself weighs less than 70 pounds. It sits right on floor joists, with the addition of blocking to support the area around the drain, and to provide nailing surfaces around the edges.

Kits like these offer advantages beyond the ease of installation and a thoughtful configuration of parts. Usually, the plumbing can be completely adjusted and connected from above, so you won't need to work in the basement or a crawl space, or open up a first-floor ceiling to install a second-floor shower. The kits themselves generally include almost everything you'll need for the installation.



TOOLS + MATERIALS

Curbless shower kit	Scissors
Circular saw	Rubber gloves
Jigsaw or handsaw	Synthetic paintbrush
Caulk gun	Roller and roller handle
Torpedo level	Caulk/construction adhesive
Drill and bits	Blocking
PVC solvent and cement	Sealant
Screwdriver	Waterproofing tape
Speed square	Membrane
Putty knife	Eye protection
Palm sander and 120-grit pad	Work gloves



A curbless shower kit includes almost everything you need. All you have to supply are some basic tools, the tile, and a little elbow grease.



How to Install a Waterproof Sub-Base for a Curbless Shower



1 **Remove the existing flooring material** in the area of the shower pan (if you're remodeling an existing bathroom). Use a circular saw to cut out and remove the subfloor in the exact dimensions of the shower pan. Finish the cuts with a jigsaw or handsaw.



2 **Reinforce the floor with blocking** between joists as necessary. Toenail bridge blocking in on either side of the drain waste-pipe location, and between joists anywhere you'll need a nailing surface along the edges of the shower pan. If trusses or joists are spaced more than 16" on center, add bridge blocking to adequately support the pan.



3 **Set the pan in the opening** to make sure it fits and is level. If it is not level, screw shims to the tops of any low joists and check again; repeat if necessary until the pan is perfectly level in all directions.



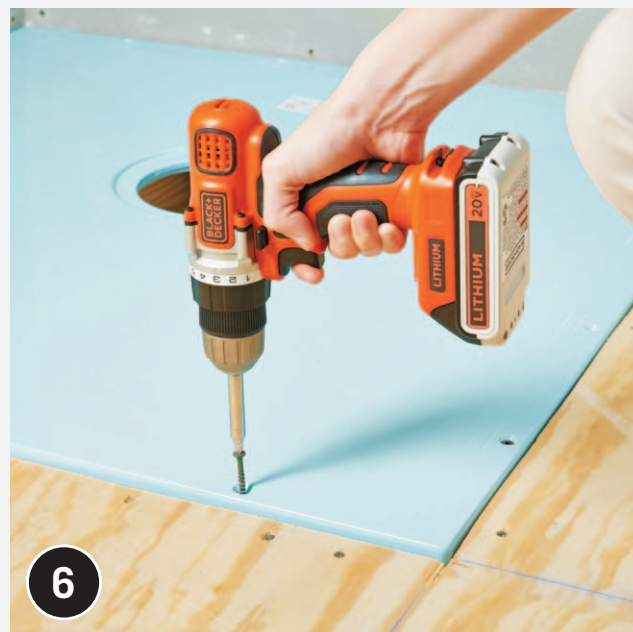
4 **Install or relocate drain pipes as needed.** Check with your local building department: if the drain and trap are not accessible from below you may need to have an onsite inspection before you cover up the plumbing.

(continued)



5

Check the height of the drain pipe. Its top should be exactly $2\frac{3}{8}$ " from the bottom of the pan—measure down from the top of the joist. If the drain pipe is too high, remove it and trim. If it is too low, replace the assembly with a new assembly that has a longer tailpiece.



6

Set the pan in place and screw it down using at least 2 screws along each side. Do not overtighten. If you've cut off the screwing flange to accommodate an unusual shape, drill $\frac{1}{8}$ " pilot holes in the cut edges and drive the screws through the holes. Lay a thick bead of construction adhesive along the contact areas on all joists, nailing surfaces, and blocking.



7

Disassemble the supplied drain assembly. Be careful not to lose any of the screws. Place the drain tailpiece on the waste pipe under where the pan's drainhole will be located and measure to check that it sits at the correct level. Solvent-glue the tailpiece to the end of the waste pipe.



8

Position the supplied gaskets on top of the tailpiece (check the manufacturer's instructions; the gaskets usually need to be layered in the correct order). Set the drain flange piece on top of the tail and into the drain hole in the pan. Drill $\frac{1}{8}$ " pilot holes through the flange and into the pan. Screw the flange to the pan. Thread the tail top piece into the tail through the drain flange. Use a speed square or other lever, such as spread channel pliers, to snugly tighten the tail top piece in place.



Install tile underlayment for the rest of the project area. If the underlayment is higher than the top of the pan once it is installed, you'll have to sand it to level, gradually tapering away from the pan.



Scrape any stickers or other blemishes off the pan with a putty knife. Lightly sand the entire surface of the pan using 120-grit sandpaper to help the sealant adhere. After you're done sanding, wipe down the sanded pan with a damp sponge. Make sure the entire area is clean.



Seal the edge seams at the wall and between the pan and subfloor with waterproof latex sealant. Caulk any pan screw holes that were not used.



Cut strips of waterproofing tape to cover all seams in the tile underlayment (both walls and floor). Also cut strips for the joints where walls and floor meet. Open the pail of liquid waterproofing membrane and mix the liquid thoroughly. Beginning at the top and working down, brush a bed of waterproofing liquid over the seams. Before it dries, set the tape firmly into the waterproofing. Press and smooth the tape. Then brush a layer of waterproofing compound over the tape.

(continued)



Trace a hole in the center of the waterproof drain gasket using the bottom of the drain clamping donut. Cut the hole out using scissors. Be careful cutting the gasket because it is a crucial part of the drain waterproofing. Check the fit with the gasket against the underside of the clamping donut top flange.



Apply a thin coat of the waterproofing compound around the drain hole and to the back of the drain gasket. Don't apply too much; if the waterproofing is too thick under the gasket, it may not dry correctly.



Put the gasket in place and brush a coat of the waterproofing over the gasket. Screw the clamping donut in place on the top of the drain and over the membrane. Hand-tighten the bolts and then cover the clamping donut with the waterproofing compound (avoid covering the slide lock for the drain grate).



Use a roller to roll waterproofing compound across the walls and over the entire pan surface. The ideal is 4 mm thick (about the thickness of a credit card). Allow this first coat to dry for 2 hours, then cover with a second coat. This should conclude the waterproofing phase of the project, and you're ready to begin laying tile once the waterproofing compound has dried thoroughly.



How to Install Tile for a Curbless Shower



TOOLS + MATERIALS

Eye protection

Latex work gloves

Tile

Spacers

Thinset tile adhesive

Trowel

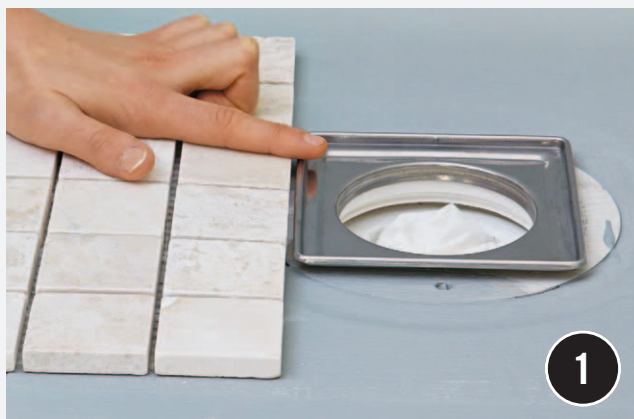
Pencil

Tile saw or nippers

Grout

Towel

Sponge



Place a sample of the floor tile directly next to the drain so you can set the drain grate height to match. The adjustable mounting plate for the grate should be flush with the tops of the tile. Lay a bed of thinset tile adhesive, using a notched trowel. The thinset container should specify the notch size ($\frac{3}{8}$ " square notch is common).



Place the corner tile and press it to set it. Don't press down too hard or you will displace too much of the material. Continue laying tile from the corner toward the drain opening. Leave space around the drain opening as it is likely you'll need to cut tiles to fit.



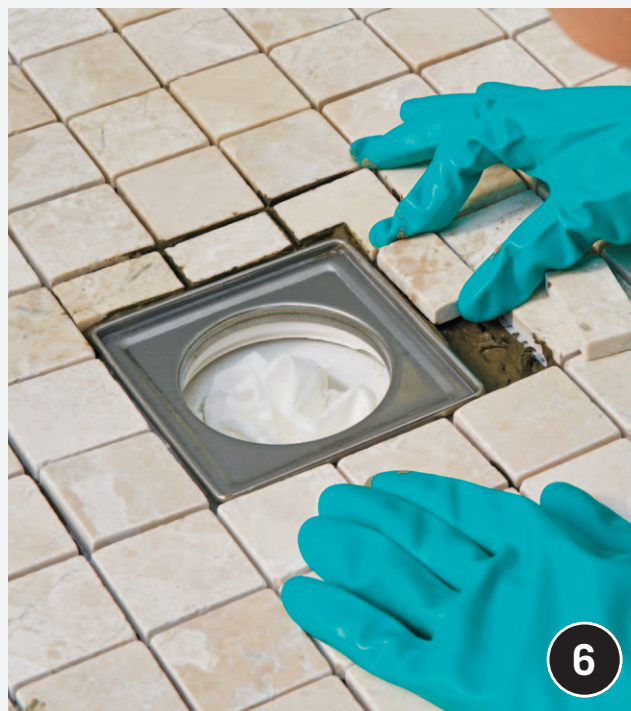
Install tile so a small square of untiled area is left around the drain opening. Mark the tiles that surround the drain opening for cutting. Leave a small gap between the tiles next to the drain-grate mounting plate.



Cut the tiles along the trim lines using a tile saw. If you are not comfortable using a tile saw, score the tiles and cut them with tile nippers.



Apply thinset onto the shower pan, taking care not to get any on the drain-grate mounting plate. You may need to use a small trowel or a putty knife to get into small gaps.



Set the cut tiles around the drain opening, doing your best to maintain even gaps that match the gaps in the rest of the floor. Once you've finished tiling around the drain, finish setting floor tile in the rest of the project area.



Let the floor tile set overnight and then apply grout. Using a grout sponge, wipe the grout over the gaps so all gaps are filled evenly. After the grout dries, buff the floor with a towel to wipe up excess residue. Snap the grate cover into the cover mounting plate (remove any rag or blockage first). The grate cover seen here locks in with a small key that should be saved.



Begin setting the wall tile. Generally, it's easiest if you start at the bottom and work upward. Instead of thinset adhesive, an adhesive mat is being used here. This product is designed for walls and is rated for waterproof applications. It is a good idea to use a spacer ($\frac{1}{4}$ " thick or so) to get an even border at the bottoms of the first tiles.



In the design used here, a border of the same mosaic tile used in the floor is installed all around the shower area to make the first course. Dark-brown accent tiles are installed in a single vertical column running upward, centered on the line formed by the shower faucet and showerhead. This vertical column is installed after the bottom border.



Next, another vertical column of accent tiles is installed on each side of the large, dark tiles. These columns are also laid using the floor tile, which connects the walls and floor visually in an effective way.



Finally, larger field tiles that match the floor tile used outside the shower area are installed up to the corner and outward from the shower area. Starting at the bottom, set a thin spacer on top of the border tiles to ensure even gaps.



Grout the gaps in the wall tiles. Protect any fittings, such as the shower faucet handle escutcheon, with painter's tape prior to grouting. If you wish, a clear surround may be installed to visually define the shower area, as in the inset, but because the shower pan is pitched toward the drain it really is not necessary.

Alcove Bathtubs

Most homes are equipped with an alcove tub that includes a tub surround and shower. By combining the tub and the shower in one fixture, you conserve precious bathroom floor space and simplify the initial installation. Plus, you only have one bathing fixture that needs cleaning.

But because tub-showers are so efficient, they do get a lot of use and tend to have fairly limited lifespans. The fact that the most inexpensive tubs on the market are designed for alcove use also reduces the average lifespan. Pressed-steel tubs have enamel finishes that crack and craze; plastic and fiberglass tubs get grimy and stained; and even acrylic and composite tubs show wear eventually (and as with other fixtures, styles and colors change too).

Plumbing an alcove tub is a relatively difficult job because getting access to the drain lines attached to the tub and into the floor is often very awkward. Although an access panel is required by most codes, the truth is that many tubs were installed without them or with panels that are too small or hard to reach to be of much use. If you are contemplating replacing your tub, the first step in the decision



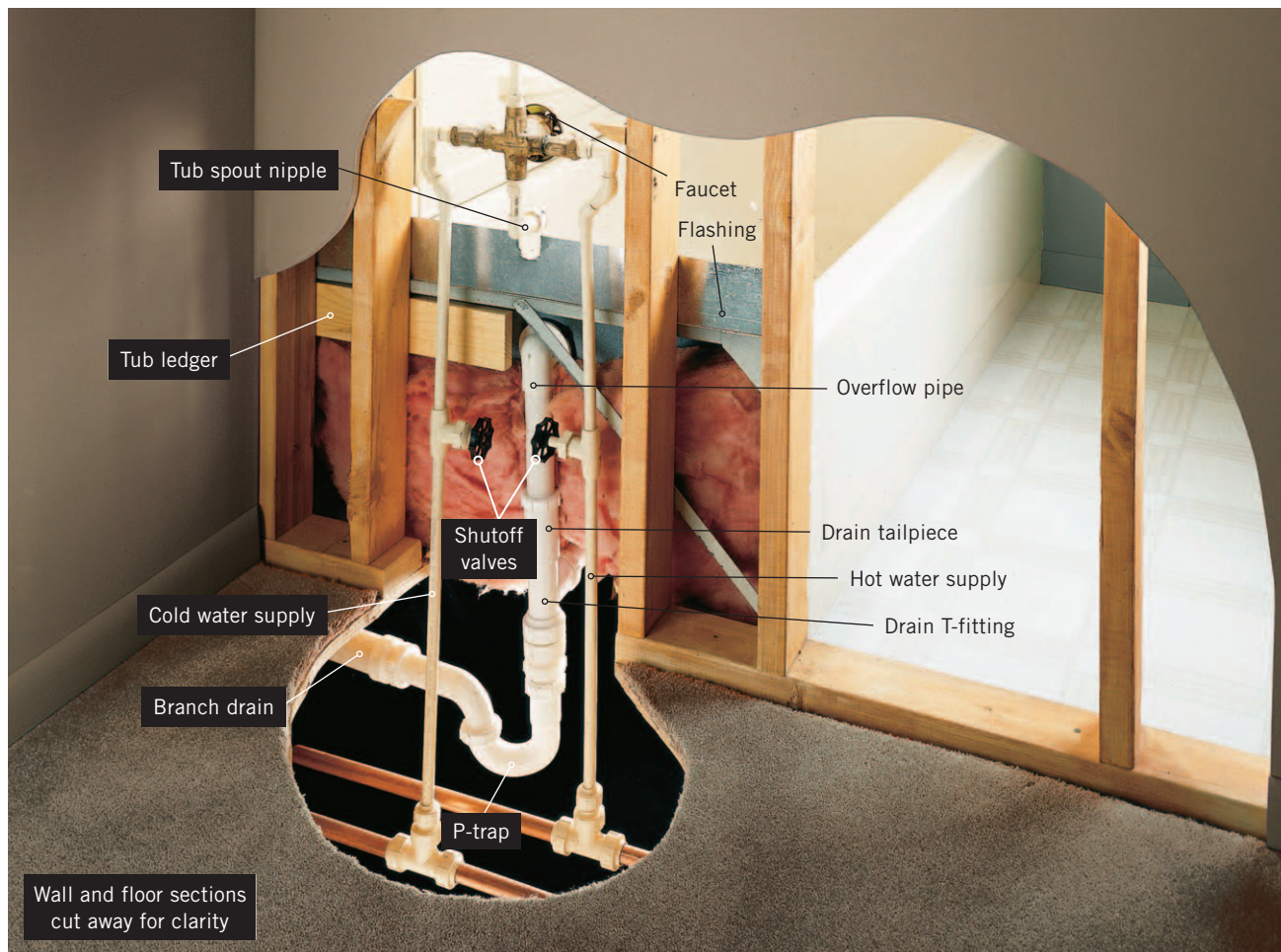
TOOLS + MATERIALS

Channel pliers	Galvanized deck screws
Hacksaw	Drain-waste-overflow kit
Carpenter's level	1 × 3, 1 × 4, and 2 × 4 lumber
Pencil	Galvanized roofing nails
Tape measure	Galvanized roof flashing
Saw	Thinset mortar
Screwdriver	Tub and tile caulk
Drill	Propane torch
Adjustable wrench	Eye protection
Trowel	Work gloves
Shims	

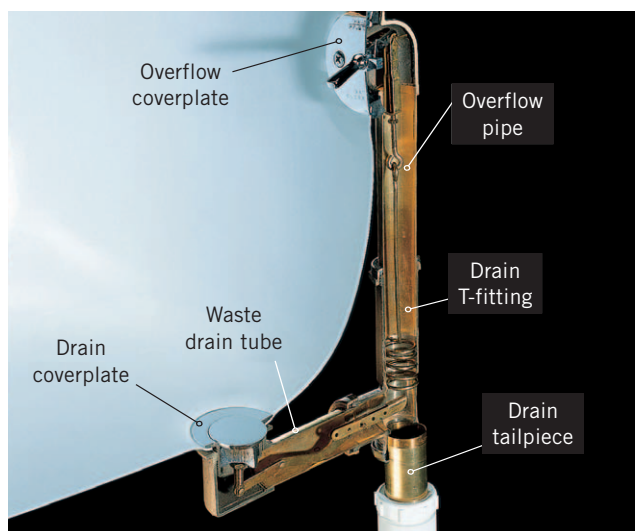
process should be to find the access panel and determine if it is sufficient. If it is not (or there is no panel at all), consider how you might enlarge it. Often, this means cutting a hole in the wall in the adjoining room or in the ceiling below. This creates more work, of course, but compared to the damage caused by a leaky drain from a subpar installation, making an access opening is little inconvenience.

A tub alcove is sized to accept a standard bathtub, usually 5' long in most of North America. A tub with an apron is typical, but you can build out the front instead if you choose.





The plumbing for a bathtub includes hot and cold supply pipes, shutoff valves, a faucet, and a spout. Supply connections can be made before or after the tub is installed. The drain-waste-overflow system for a bathtub includes the overflow pipe, drain T-fitting, P-trap, and branch drain. The overflow pipe assembly is attached to the tub before installation.



A drain-waste-overflow kit with a stopper mechanism must be attached to the tub before it is installed. Available in both brass and plastic, most kits include an overflow coverplate, a height-adjustable overflow pipe, a drain T-fitting and tailpiece, a waste drain tube, and a drain coverplate that screws into the drain tube.



Add fiberglass insulation around the body of a steel bathtub to reduce noise and conserve heat. Before setting the tub in position, wrap unfaced batting around the tub and secure it with string or twine. For showers, and deck-mounted jetted tubs, insulate between the framing members.

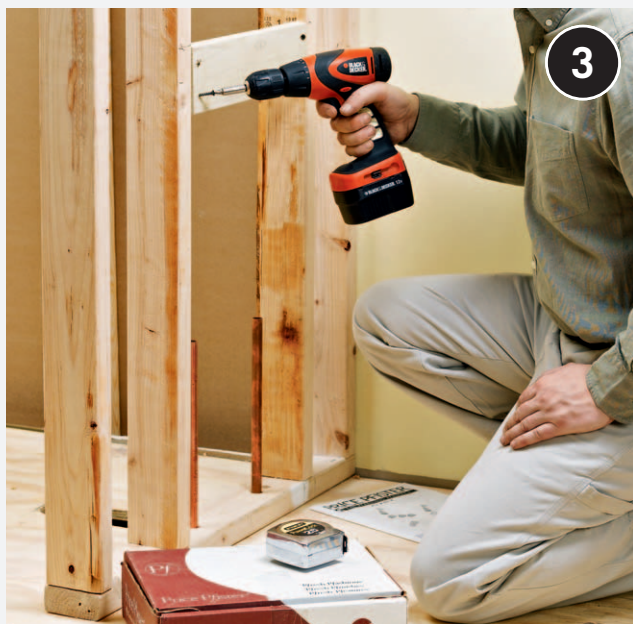
How to Install a New Alcove Tub



Prepare for the new tub. Inspect and remove old or deteriorated wall surfaces or framing members in the tub area. With today's mold-resistant wallboard products, it makes sense to strip off the old alcove wall coverings and ceiling down to the studs so you can replace them. This also allows you to inspect for hidden damage in the wall and ceiling cavities.



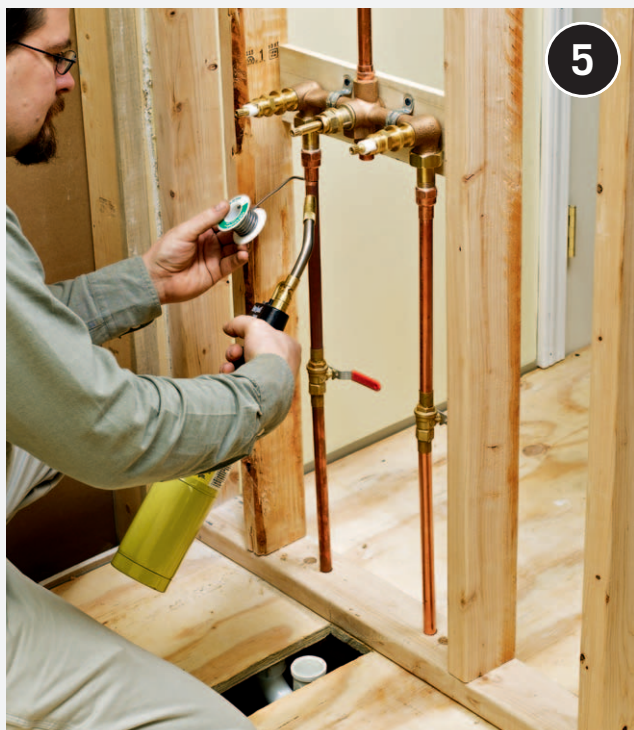
Check the subfloor for level—if it is not level, use pour-on floor leveler compound to correct it (ask at your local home center). Make sure the supply and drain pipes and the shutoff valves are in good repair and correct any problems you encounter. If you have no bath fan in the alcove, now is the perfect time to add one.



Check the height of the crossbraces for the faucet body and the showerhead. If you had to stoop to use the old shower, consider raising the brace for the showerhead. Read the instructions for your new faucet/diverter and check that the brace for the faucet body conforms to the requirements (this includes distance from the surround wall as well as height). Adjust as needed.



Begin by installing the new water-supply plumbing. Measure to determine the required height of your shower-riser tube and cut it to length. Attach the bottom of the riser to the faucet body and the top to the shower elbow.



Attach the faucet body to the crossbrace with pipe-hanger straps. Then, attach supply tubing from the stop valves to the faucet body, making sure to attach the hot water to the left port and cold to the right. Also secure the shower elbow to its crossbrace with a pipe strap. Do not attach the shower arm yet.



Slide the bathtub into the alcove. Make sure the tub is flat on the floor and pressed flush against the back wall. If your tub did not come with a tub protector, cut a piece of cardboard to line the tub bottom, and tape pieces of cardboard around the rim to protect the finish from damage.



Mark locations for ledger boards. To do this, trace the height of the top of the tub's nailing flange onto the wall studs in the alcove. Then remove the tub and measure the height of the nailing flange. Measure down this same amount from your flange lines and mark new ledger-board locations.



Install 1 x 4 ledger boards. Drive two or three 3" galvanized deck screws through the ledger board at each stud. All three walls should receive a ledger. Leave an open space in the wet wall to allow clearance for the drain-waste-overflow (DWO) kit. *(continued)*



Install the drain-waste-overflow (DWO) pipes before you install the tub. Make sure to get a good seal on the slip nuts at the pipe joints. Follow the manufacturer's instructions to make sure the pop-up drain linkage is connected properly. Make sure rubber gaskets are positioned correctly at the openings on the outside of the tub.



Thread the male-threaded drain strainer into the female-threaded drain-waste elbow. Wrap a coil of plumber's putty around the drain outlet underneath the plug rim first. Hand-tighten only.



Attach the overflow coverplate, making sure the pop-up drain controls are in the correct position. Tighten the mounting screws that connect to the mounting plate to sandwich the rubber gasket snugly between the overflow pipe flange and the tub wall. Then, finish tightening the drain strainer against the waste elbow by inserting the handle of a pair of pliers into the strainer body and turning.



Place the tub back into the alcove, taking care not to bump the DWO assembly and disturb the connections. Use a helper for this job. If the drain outlet of the DWO assembly is not directly over the drain pipe when the tub is in position, remove it and adjust the drain line location.



Attach the drain outlet from the DWO assembly to the drain P-trap. Test the drain and overflow to make sure they don't leak. Also test the water-supply plumbing, temporarily attaching the handles, spout, and shower arm so you can operate the faucet and the diverter.



Drive a 1½" galvanized roofing nail at each stud location, just over the top of the tub's nailing flange (inset). The nail head should pin the flange to the stud. For extra protection against moisture penetration, nail strips of metal flashing to the studs so they cover the tub flange.



Install the wall coverings and tub surround (see pages 108 to 111 for a 3-piece surround installation). You can also make a custom surround from tileboard or cement board and tile.



Install fittings. First, thread the shower arm into the shower elbow and attach the spout nipple to the valve assembly. Also attach the showerhead and escutcheon, the faucet handle/diverter with escutcheon, and the tub spout. Use thread lubricant on all parts.

Three-Piece Tub Surrounds

No one wants bathroom fixtures that are aging or yellowed from years of use. A shiny new tub surround can add sparkle and freshness to your dream bath.

Tub surrounds come in many different styles, materials, and price ranges. Choose the features you want and measure your existing bathtub surround for sizing. Surrounds typically come in three or five pieces. A three-panel surround is being installed here, but the process is similar for five-panel systems.

Surface preparation is important for good glue adhesion. Plastic tiles and wallpaper must be removed and textured plaster must be sanded smooth. Surrounds can be installed over ceramic tile that is well attached and in good condition, but it must be sanded and primed. All surfaces must be primed with a water-based primer.



TOOLS + MATERIALS

- Jigsaw
- Hole saw
- Drill
- Tape measure
- Level
- Caulk gun
- Tub and tile caulk
- Construction adhesive
- Screwdriver
- Adjustable wrench
- Pry bar
- Hammer
- 3-piece tub surround
- Paint roller and sleeve (optional)
- Primer (optional)
- Eye protection
- Work gloves

Three-piece tub surrounds are inexpensive and come in many colors and styles. The typical unit has two end panels and a back panel that overlap in the corners to form a watertight seal. They are formed from fiberglass, PVC, acrylic, or proprietary resin-based polymers. Five-piece versions are also available and typically have more features, such as integral soap shelves.

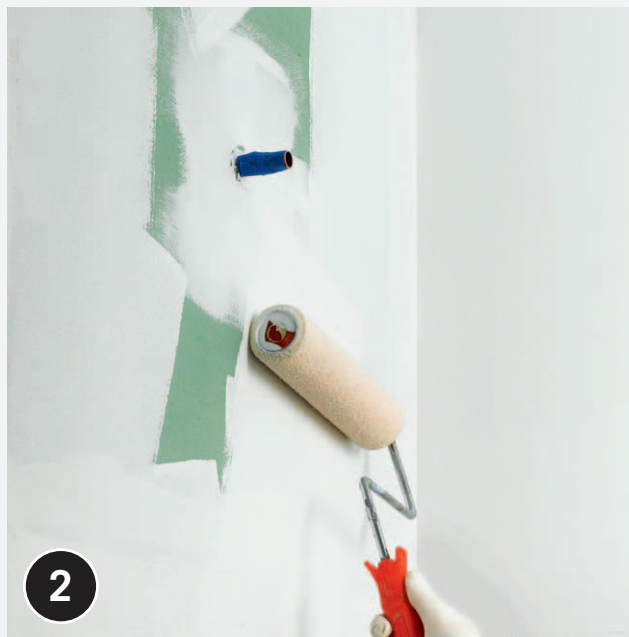




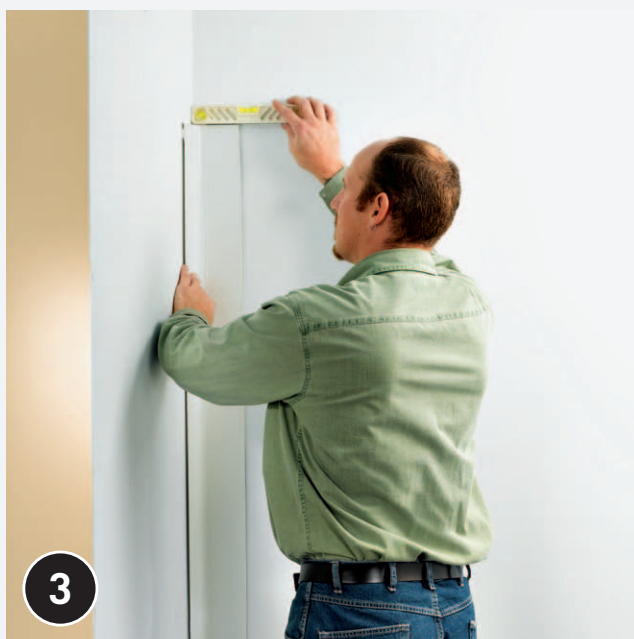
How to Install a Three-Piece Tub Surround



Remove the old plumbing fixtures and wall coverings in the tub area. In some cases you can attach surround panels to old tileboard or even tile, but it is generally best to remove the wall coverings down to the studs if you can, so you may inspect for leaks or damage.



Replace the wall coverings with appropriate materials, such as cement board. Make sure the new wall surfaces are smooth and flat. Some surround-kit manufacturers recommend that you apply a coat of primer to create a better bonding surface for the panel adhesive.



Test-fit the panels before you start; the tub may have settled unevenly or the walls may be out of plumb. Check the manufacturer's directions for distinguishing right and left panels. Place a panel in position on the tub ledge. Use a level across the top to determine if it is level. Create a vertical reference line to mark the edge of the panel on the plumbing end.



TEST-FITTING

Ensure a perfect fit by taping the surround panels to the walls in the tub area. Make sure the tops are level when the overlap seams are aligned and that you have a consistent gap between the panel bottoms and the tub flange. Mark the panels for cutting if necessary and, once the panels have been removed, make any adjustments to the walls that are needed.



(continued)



After testing the fit, check the instructions to see if you need to trim pieces. Follow the instructions for cutting. Here, we had to cut the corner panels because the instructions advise not to overlap panels by more than 3". Cut panels using a jigsaw and a fine-tooth blade that is appropriate for cutting fiberglass or acrylic tileboard.



Lay out the locations of the faucets, spout, and shower arm. Measure in from the vertical reference line and up from the top of the tub ledge. Place the panel face-up on a sheet of plywood. Mark the location of the holes. Cut the holes $\frac{1}{2}$ " larger than the pipe diameter. If your faucet has a recessed trim plate, cut the hole to fit the recess.



Apply the panel adhesive to the back of an end plumbing panel. Circle the plumbing outlet holes 1" from the edge. Follow the manufacturer's application pattern. Do not apply adhesive closer than 1" to the double-sided tape or the bottom edge of the panel.



Remove the protective backing from the tape. Carefully lift the panel by the edges and place against the corner and top of the tub ledge. Press firmly from top to bottom in the corner, then throughout the panel.



Test-fit the opposite end panel and make any necessary adjustments. Apply the adhesive, remove the protective backing from the tape, and put in place. Apply pressure to the corner first from top to bottom, and then apply pressure throughout.



Apply adhesive to the back panel following the instructions. Maintain a 1" space between adhesive tape and the bottom of the panel. Remove protective backing from the tape. Lift the panel by the edges and carefully center between the two end panels. When positioned, firmly press in place from top to bottom.



Apply caulk to the bottom and top edges of the panels and at panel joints. Dip your fingertip in water and use it to smooth the caulk to a uniform bead.



Apply caulk to escutcheons or trim plates and reinstall them. Allow a minimum of 24 hours for caulk and adhesive to cure thoroughly before using the shower or tub.

Drop-In Tubs

Drop-in tubs are some of the most adaptable and interesting fixtures you can add to a bathroom. Not only does the interior size lend itself to a luxurious soaking experience, but many drop-in tubs are jetted because the supporting structure can easily make room for a pump, heater, water-supply lines, and electrical connections. Even a plain drop-in tub can serve the same role as a traditional Japanese soaking tub, helping melt your stresses and tensions away.

These tubs are manufactured with a lip, which is often embellished to become a decorative feature in and of itself. However, the supporting structure is the greater opportunity to make a big design statement.



Drop-in tubs are usually deep but not necessarily wide. That makes them ideal for the long, narrow spaces that are so common in home bathrooms. They are especially effective when placed under windows, as this one has been. This tub has been set into a modest platform, but the tub itself adds big luxury in what amounts to a small footprint.



TOOLS + MATERIALS

Plumbing tools and supplies	Torpedo level
Tape measure	Thinset mortar
Drill	Silicone caulk
Hammer	Deck-mount faucet set
4' level	Drop-in tub
Utility knife	Tile mortar
2 × 4 lumber	Tile grout
2" screws	Grout float
1¼" cement board screws	Ceramic tile (field and bullnose)
Notched trowel	Plumb bob
Grout sponge	Framing square
CDX plywood	Drywall
Cement board	Rag
Hacksaw	Eye protection
Circular saw	Work gloves

Depending on the floor space you have available, you can isolate a drop-in tub platform in the middle of the room, like an island, or position it in the more common location, along a wall. In any case, the tops and sides are canvases for your creativity.

The supporting structure also serves a pragmatic purpose. The top surface is a place to store bathing products, a candle, drinks, or anything else you might need.

The platform built for this project is 22 inches high with a 14-inch-wide ledge, which comfortably accommodates someone sitting around the tub. The tub itself is 24 inches high, with a 2-inch-high lip. If your tub features an undistinguished lip, you can always build your platform so that the lip sits flush with the top surface of the platform, but keep in mind that a pronounced lip keeps towels and other items from sliding into the water.



ACCESS PANELS

Making the supply and drain hookups on a bathtub usually requires access from below or behind the installation area. When installing a drop-in tub in a framed deck platform, you can gain access through the platform apron area, too. If you are hooking up the drain with a slip connection, the Universal Plumbing Code requires that you install a permanent access panel in the wall behind the tub or in the floor and ceiling below. In the tub installation seen here, a removable access panel on the opposite side of the wet wall provides access to both the drain and supply hookups. This allows the platform deck and apron to be tiled in a contiguous manner. Because the faucet plumbing is readily accessible, each supply tube is connected to a shutoff valve next to the fixture and supply risers are used to bring water to the faucet valve.



How to Install a Drop-In Tub with Platform



Place the tub in position. It tub should be $14\frac{1}{2}$ " from the two corner walls, measured from the underside of the tub lip—where the inside edge of the platform deck will run—to the wall studs. This allows for a $\frac{1}{2}$ "-thick wall surface. Shim as necessary to level the tub both ways, or adjust self-leveling feet if any. Hang a plumb bob from the underside of the lip at each corner and mark the subfloor. Check that marks on adjacent corners are the same distance from the wall.



Measure from under the lip edge to the subfloor. This will be the height of the platform wall framing, minus the CDX plywood decking, $\frac{1}{2}$ " cement board, and tile.



Remove the tub and drive a nail at each corner. Snap chalk lines to represent the inside lines of the inner platform wall. Measure, cut, and align the 2×4 sole plates with the chalk lines. Screw all four sole plates for the inside platform wall into position. Check diagonal measurements or use a framing square to ensure the sole plates are square.



Measure and mark $13\frac{1}{2}$ " from the inside edge of the open side sole plates at several points along the plates. These marks will serve as guide points for placing the sole plates of the outside platform walls. Line up the outside edge of the two outer-wall sole plates and screw them in place to the subfloor. Measure again to ensure the sole plates are positioned correctly.



Measure and cut studs to create the proper platform height. Build inside and outside platform walls, spacing studs every 16" on center. Use L configurations at corners so that the top plates intersect opposite the sole plates. Cut crossbraces and screw them in place, staggering with the stud placement.



Route supply lines from the wet wall to the location of the deck-mount faucet. The connections will depend on what type of faucet you've chosen. Follow the manufacturer's instructions for securing the hot and cold connections. If you're unsure of how to plumb the faucet, hire a plumber.



Measure and cut CDX plywood for the platform deck (the deck for the two open sides should overhang the outside wall edge by $\frac{1}{2}$ " to cover the cement board that will be used on the walls). Screw the decking into position. If you will be mounting the faucet on the deck, cut holes for the valve handles and spout before screwing down that portion of the deck.



Measure and cut the deck cement board to cover the plywood. Cut to the same overhang as the plywood and drill holes for the faucet if it will be deck mounted (the one seen here is mounted to the tub deck). Screw the cement board to the deck. Also attach cement board to the platform aprons.



Hang drywall or cement board in the installation area. Here, wall tile will be installed above the tub deck. A strip of cement board the same width as the total tile height is attached to the wall as a backer for the tile. Then, water-resistant drywall is installed to span from the cement board.



Lay tile over the deck surface and the platform aprons using bullnose tile around the two outside edges. Tile on the inside edge of the platform does not need to be finished—it will be covered by the tub lip. Also install wall tiles.



Grout the platform. Buff off excess with a coarse rag. Apply grout sealer product after the grout has cured completely (this may be done after the tub is installed if you do not want to wait). Attach the drain-waste-overflow connection. Trowel a $\frac{1}{2}$ " bed of mortar on the subfloor where the tub bottom will sit (unless the directions state otherwise). Set the tub in place in the platform opening, press down into the mortar, and check for level.



There should be a very slight gap between the tub lip's bottom edge and the top of the tile. Let the mortar bed dry and, working through the open walls and under the platform deck, connect the drain tailpiece to the trap. Apply a bead of tub-and-tile caulk in the seam between the tub lip and the tiled deck surface.

Freestanding Bathtubs

A large bathroom offers all kinds of design possibilities. Many homeowners enlarge a shower or add storage. But one of the best uses for ample floor space is a freestanding tub. Although more expensive than many other types of bathtubs, freestanding units offer flexibility in placement. They are also usually deeper and more spacious than alcove or even drop-in tubs. Many are technically “soaking tubs” that can offer a transformative bathing experience. Freestanding bathtubs come in impressive selection of styles, from updated classic clawfoot versions, to body-cradling egg shapes and more. There are even jetted freestanding models.

These tubs are usually no more difficult to install (and often simpler) than other types, although you must make sure there is adequate support for the tub full of water (if the location supported another type of tub, it will support a freestanding version). A freestanding bathtub should not, however, be positioned where there is no joist under the floor. That said, if you’ve gone to the expense of a buying a stunning freestanding tub, position it to highlight the unique design.

Once you’ve determined the location, installation may require running a drain line to where the tub drain will be placed, but that is fairly fundamental plumbing requiring only the basic skills you’d need for any project in this book. You’ll also need to plumb in a faucet, so we’ve included instructions that will work for most freestanding faucets, including those with both a fixed and a handheld head.



TOOLS + MATERIALS

Freestanding bathtub with hardware	4' level
Drain tub or tray	Silicone adhesive
Caulk gun	Towel or blanket
Silicone caulk	Drill + bits
Carpenter's pencil	Phillips screwdriver
Tape measure	Adjustable wrench
	Torpedo level

The contemporary “eggshell” style of the tub shown here is a look common to many contemporary freestanding tubs. As appealing and timeless as it is, it is far from your only choice. You’ll find many freestanding models with more dramatic designs, or period styles such as Victorian clawfoot tubs. Connecting them to drain and water supplies involves a similar process, regardless of style or shape.





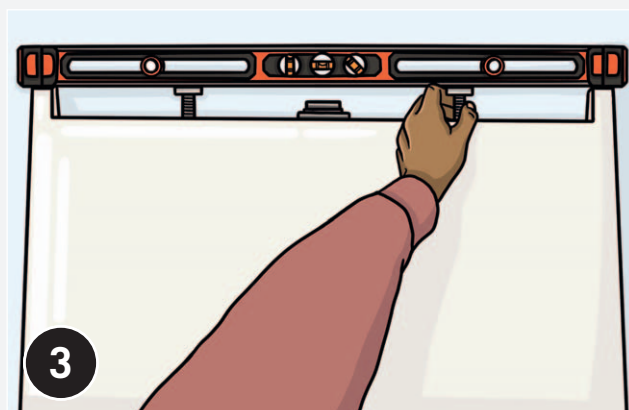
How to Install a Freestanding Bathtub



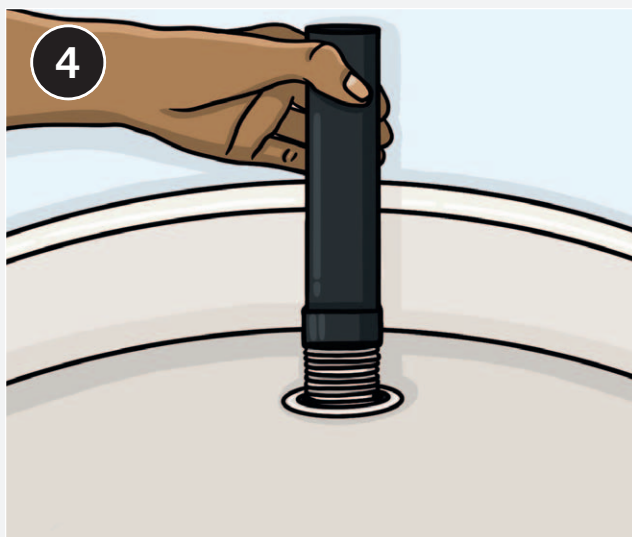
Use a helper to remove the tub from its box and inspect for damage. Check that all necessary hardware has been supplied. Set the tub on two 2 × 4 bolsters. Slide a large, deep roasting pan or tray beneath the tub, under the drain. Check that the pop-up drain and overflow are properly sealed. Close the drain and fill the tub with water to above the overflow. Check the drain and overflow for leaks. Empty the tub. Remove and reassemble drain and overflow as necessary, waterproofing the connections with silicone caulk.



Clean and level the floor as necessary. Mark the center of the existing drain, or where you will plumb the floor drain. Set the tub in place with the drain centered over the floor drain. Adjust the tub position until you're happy with it. Trace around the base of the tub with a carpenter's pencil. Mark the drain hole location.

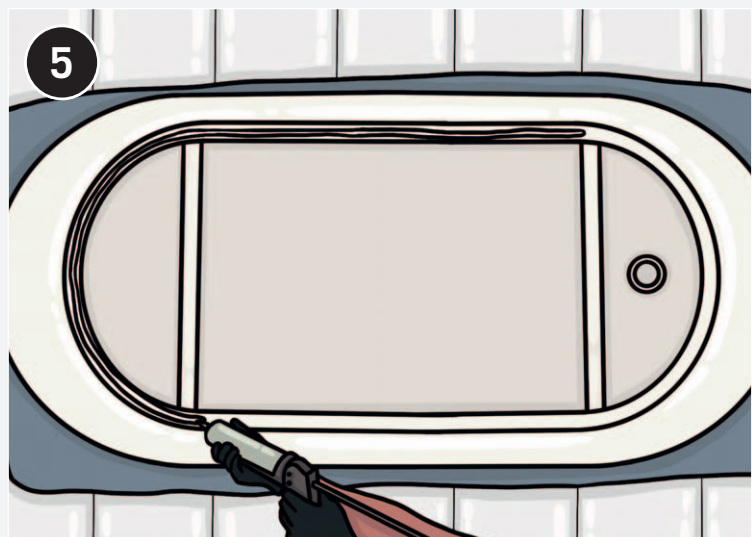


Move the tub out of the way, placing it upside down on a soft blanket or beach towel. Rest a level across the tub walls and leveling feet. Raise the feet until they touch the level, and then $\frac{1}{8}$ " more, so that the tub full of water will not rest on the walls.

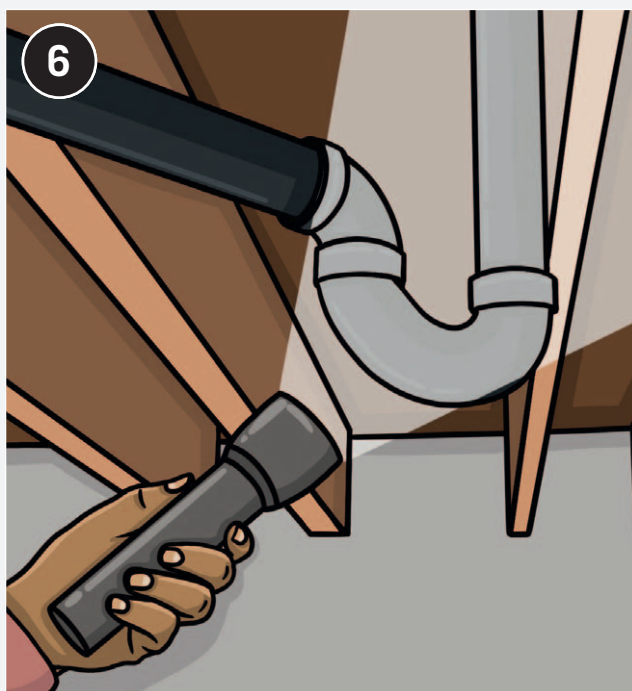


If not already installed, install a 1½" underfloor P trap and drain pipe to floor level. Slide a flanged washer onto the tub's drain body and fasten a 1½" tailpiece to the drain body (some manufacturers supply this, while others require the homeowner to supply it—check before installation).

Note: This tub is meant to be installed directly over the drain; many use an integral P trap and flexible hose that allows for some flexibility in tub placement. Use the system intended by the manufacturer.



Slip the drain trap adapter into the floor drain. Lay a bead of silicone adhesive along the bottom edge of the tub.



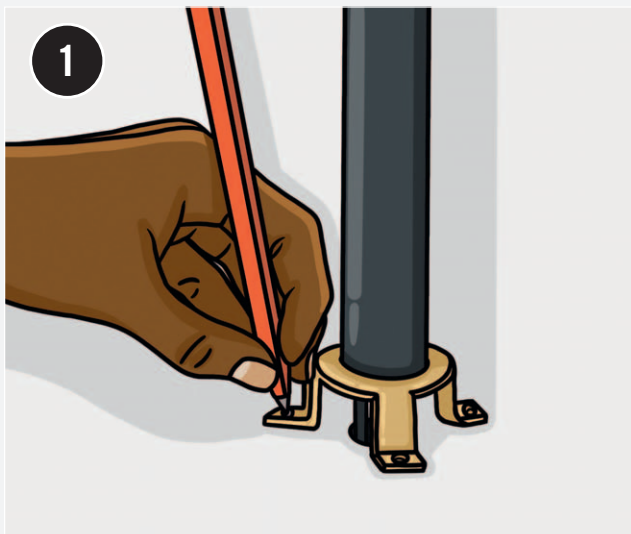
Use a helper to gently flip the tub over and carefully place it into position, sliding the drain tailpiece in the floor drain, and aligning the tub with the marked outline. Fill the tub to overflow and check for leaks.



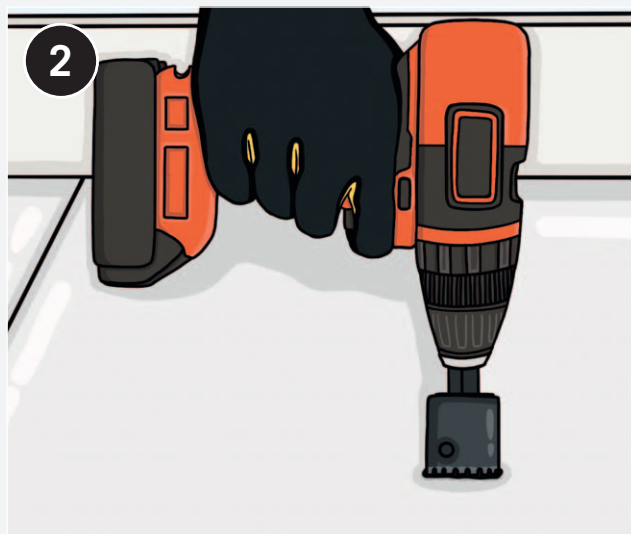
Drain the tub. If recommended by the manufacturer, lay a bead of tub-and-tile caulk along the bottom seam of the tub, between the tub edge and bathroom floor.



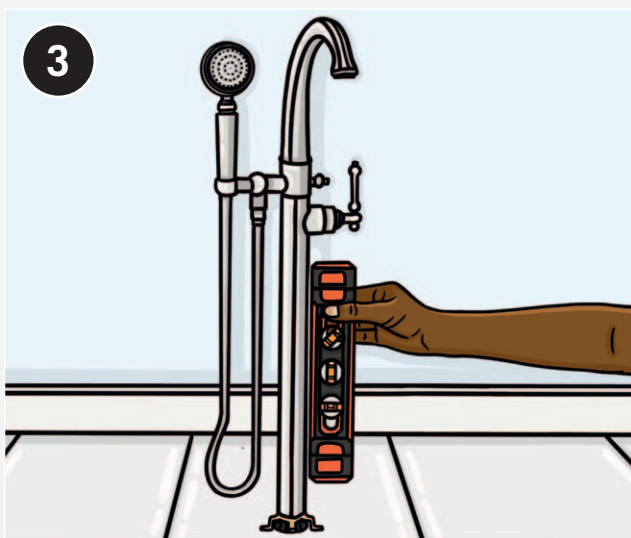
How to Install a Freestanding Tub Faucet



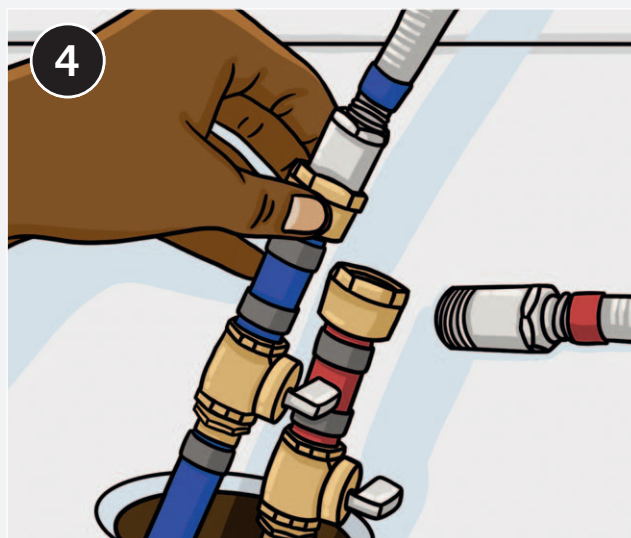
Turn off the water supply. Remove and stage all the faucet pieces on a clean towel or blanket. Check that all the pieces you will need have been supplied (you may need to purchase additional hardware for supply connections). Assemble and position the faucet body without the mounting escutcheon. Place it in position so that the faucet correctly extends over the lip the tub. Mark the mounting flange holes and access hole.



Drill the access hole for the supply lines and the mount screw holes. Install the required mating connectors onto the end of the hot and cold water supplies under the floor.



Disassemble the faucet and connect the supplied water hoses up through the body to the faucet head. Reassemble the faucet body, sliding the escutcheon onto the post. Set the faucet in place, guiding the hoses down through the access hole. Screw the base to the floor and check the body for plumb with a torpedo level (adjust as necessary by adding washers under one or more of the base screws).



Connect the faucet hoses to the water supply lines. *Note: Make sure the hot water supply is on the left as someone faces the faucet from the tub.* Turn on the water, open the faucet, and check the connections and faucet for leaks.

Sliding Tub Doors

Curtains on your bathtub shower are a hassle. If you forget to tuck them inside the tub, water flows freely onto your bathroom floor. If you forget to slide them closed, mildew sets up shop in the folds. And every time you brush against them they stick to your skin. Shower curtains certainly don't add much elegance or charm to a dream bath. Neither does a deteriorated door. Clean up the look of your bathroom, and even give it an extra touch of elegance with a new sliding tub door.

When shopping for a sliding tub door, you have a choice of framed or frameless. A framed door is edged in metal. The metal framing is typically aluminum but is available in many finishes, including those that resemble gold, brass, or chrome. Glass options are also plentiful. You can choose between frosted or pebbled, clear, mirrored, tinted, or patterned glass. Doors can be installed on ceramic-tile walls or through a fiberglass tub surround.



TOOLS + MATERIALS

- Tape measure
- Pencil + marker
- Hacksaw
- Miter box
- Level
- Drill
- Center punch
- Masonry bit for tile wall
- Phillips screwdriver
- Caulk gun
- Masking tape
- Silicone sealant
- Tub-door kit
- Eye protection
- Work gloves

A sliding tub door in a metal frame gives the room a sleek, clean look and is just one of the available options.



How to Install Sliding Tub Doors



Remove the existing door and inspect the walls. Use a razor blade to cut sealant from tile and metal surfaces. (Do not use a razor blade on fiberglass surfaces.) Remove remaining sealant by scraping or pulling. Use a silicone sealant remover to remove all residue. Remove any shower-curtain rods. Check the walls and tub ledge for plumb and level.



Measure the distance between the finished walls along the top of the tub ledge. Refer to the manufacturer's instructions for figuring the track dimensions. For the product seen here, $\frac{3}{16}$ " is subtracted from the measurement to calculate the track dimensions.



Using a hacksaw and a miter box, carefully cut the track to the proper dimension. Center the track on the bathtub ledge with the taller side out and so the gaps are even at each end. Tape into position with masking tape.



Place a wall channel against the wall with the longer side out and slide into place over the track so they overlap. Use a level to check the channel for plumb, and then mark the locations of the mounting holes on the wall with a marker. Repeat for the other wall channel. Remove the track. *(continued)*



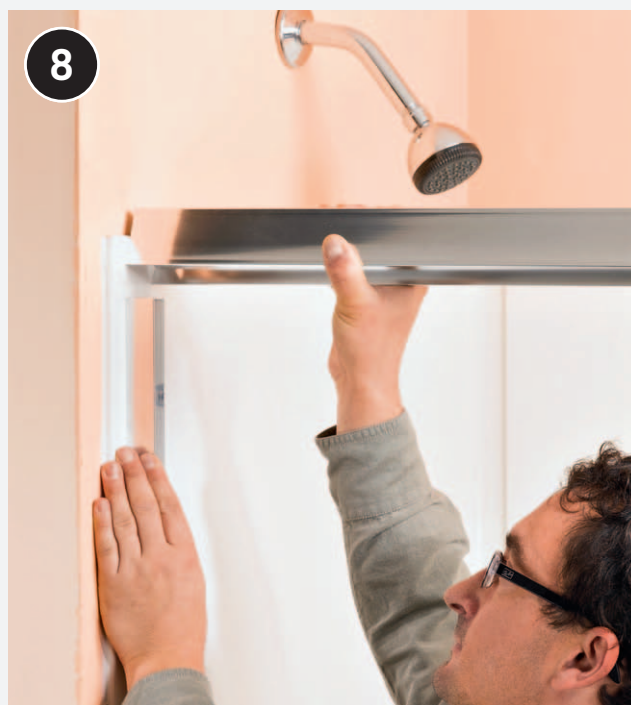
Drill mounting holes for the wall channel at the marked locations. In ceramic tile, nick the surface of the tile with a center punch, use a $\frac{1}{4}$ " masonry bit to drill the hole, and then insert the included wall anchors. For fiberglass surrounds, use a $\frac{1}{8}$ " drill bit; wall anchors are not necessary.



Apply a bead of silicone sealant along the joint between the tub and the wall at the ends of the track. Apply a minimum $\frac{1}{4}$ " bead of sealant along the outside leg of the track underside.



Position the track on the tub ledge and against the wall. Attach the wall channels using the provided screws. Do not use caulk on the wall channels at this time.



At a location above the tops of the wall channels, measure the distance between the walls. Refer to the manufacturer's instructions for calculating the header dimensions. For the doors seen here, the header dimension is the distance between the walls minus $\frac{1}{16}$ ". Measure the header and carefully cut it to length using a hacksaw and a miter box. Slide the header down on top of the wall channels until seated.



Mount the rollers in the roller-mounting holes. To begin, use the roller-mounting holes second from the top. Follow the manufacturer's instructions for spacer or washer placement and direction.



Carefully lift the inner panel by the sides and place the rollers on the inner roller track. Roll the door toward the shower end of the tub. The edge of the panel should touch both rubber bumpers. If it doesn't, remove the door and move the rollers to different holes. Drive the screws by hand to prevent overtightening.



Lift the outer panel by the sides with the towel bar facing out from the tub. Place the outer rollers over the outer roller track. Slide the door to the end opposite the shower end of the tub. If the door does not contact both bumpers, remove the door and move the rollers to different mounting holes.



Apply a bead of silicone sealant to the inside seam of the wall and wall channel at both ends and to the U-shaped joint of the track and wall channels. Smooth the sealant with a fingertip dipped in water.

Hinged Tub-Shower Door

Want a distinctive look for your alcove bathtub shower? Look no further. A hinged tub-shower door combines practicality and style in one easy-to-install package. If you have a minimum of DIY skills and a few hours of free time, you can create a brand-new waterproof barrier for your bathtub shower. Toss the moldy shower curtain in the garbage—it's time to give your bathtub a facelift.

Hinged doors can be easier to use than sliding tub doors, especially for people with limited mobility. It's also a much sleeker look. The vast majority of hinged tub doors are frameless, creating an elegant visual that can be made even more special with your choice of hardware finishes and door shape. Of course, you can also choose a framed version, if that is more to your taste.

Hinged door prices vary widely. That's mostly a matter of the look you're after, and the actual size of the doors. Most doors are curved, but a squared-off door panel will block more shower spray. The more

complex the construction, the higher the price. But given how much use the doors will see, and how powerfully they can transform a bathroom, most homeowners find these additions well worth the cost.



TOOLS + MATERIALS

- Hinged door kit + hardware
- Carpenter's pencil or marker
- Drill + bits
- Screw anchors (if not supplied)
- Mallet or hammer
- Phillips screwdriver
- Caulk gun
- Silicone tub-and-tile caulk



CHOOSING A HINGED TUB DOOR

Manufacturers have gone out of their way to make picking out a new hinged door for your bathtub as easy as possible. Just the same, here are some guidelines to finding just the right door for your tub, bathroom, and personal sense of style.

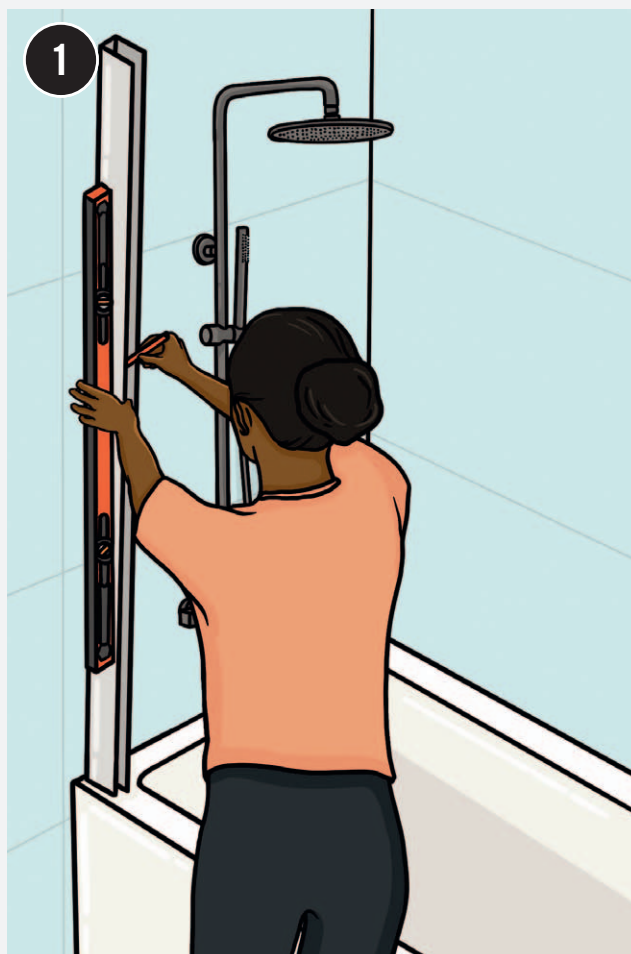
- **Measure accurately.** Most alcove tubs are a standard 5' long. However, yours may be smaller. Measuring the tub is a good time to also check whether the walls are plumb. Some doors have mountings that can accommodate variations in plumb, others do not.
- **Check for overspray.** Turn on the shower and note where the spray reaches. The one downside to a hinged door is that it doesn't block as much as a sliding door does.
- **Know "handedness."** Most—but not all—hinged doors are reversible. In other words, they can be anchored on a left or right side. However, some are not. If you're considering one of those models, you'll need to know which "hand" the door has to be—based on which side the shower is on as you face the tub.
- **Understand surface features.** Most hinged doors will not work with a curved front apron, and many will be difficult to mount on a highly textured tile surface. If you have irregular surfaces in bathtub area, check with the salesperson when shopping for the door. In any case, it's wise to look for doors that have adjustable mounting hardware in case you have to deal with a surface irregularity.
- **Hardware.** Hinged-door hardware comes in the same range of finishes as showerheads and bath spouts. Those include plain chrome finishes, brass, and even black. Although you can choose a door with distinctive hardware that will stand out, the safer bet is to match the hardware to your existing bath fixtures.
- **Choose the extras.** Look at the warranty for the functional parts of the assembly; one year is common. Some doors include proprietary surface treatments intended to reduce soap, scum, dirt, and water-spot buildup. That's a useful extra in bathrooms that see heavy traffic.



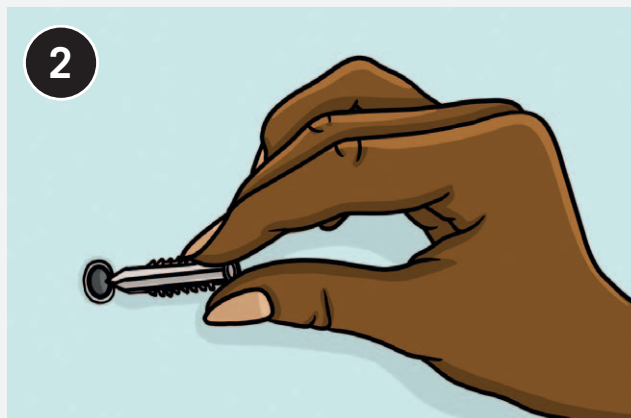
How to Install Hinged Tub-Shower Doors



A **hinged tub-shower door** is a sophisticated look that is usually easier to keep clean, and easier to use, than sliding doors are. There are many styles, including framed and frameless (like the doors shown here). Choose based on your budget and preference.



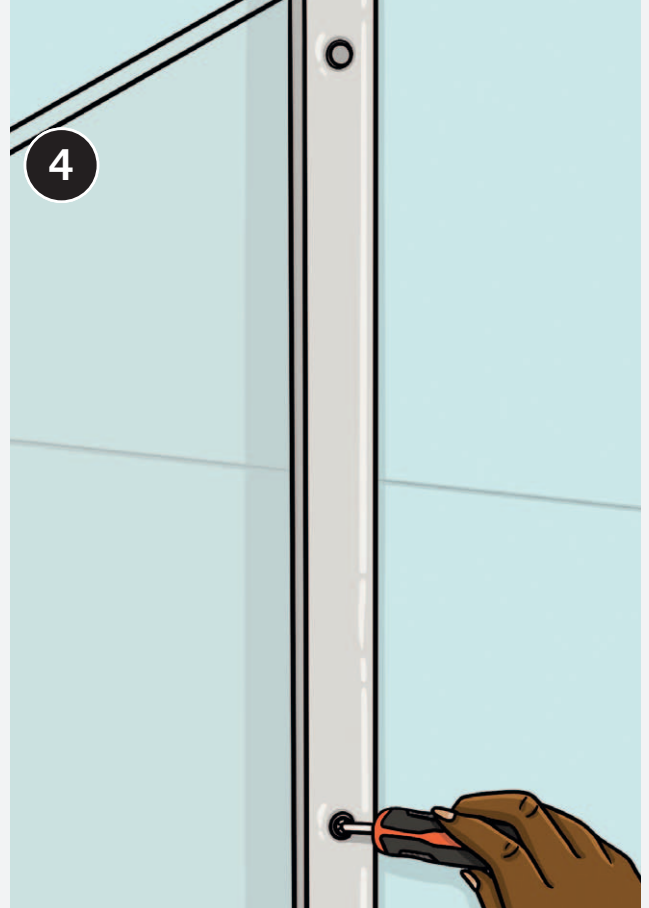
Center the wall track on the tub lip, against the wall from which you want to hang the door. Use a level to check for plumb, and mark the screw locations through the holes in the track.



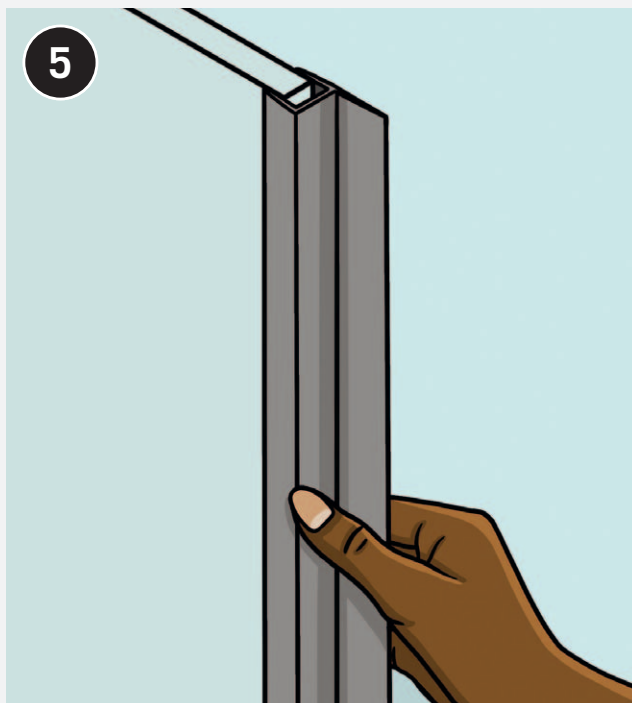
Remove the track and drill holes for the screw anchors at the marked locations. Tap the anchors into place, replace the track, and screw it to the wall.



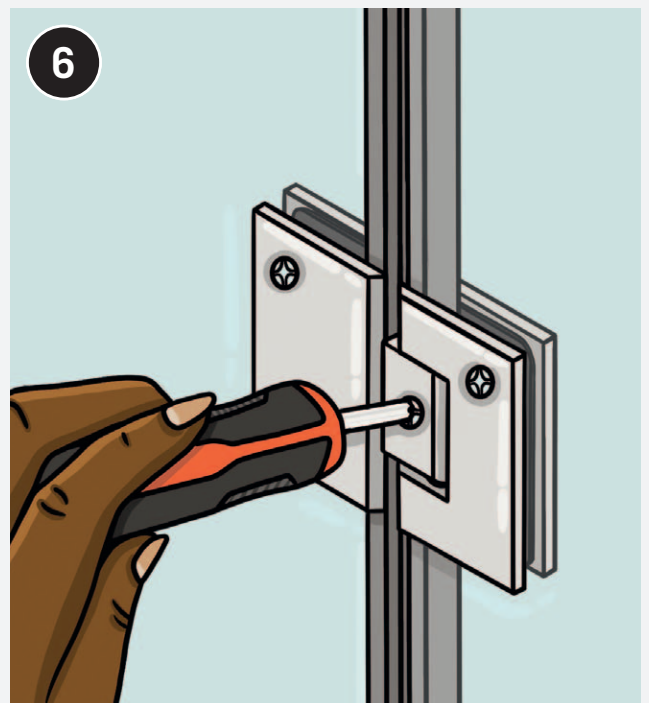
Slide the guide clip onto the lower corner of the fixed glass panel (opposite the trim edge). Slide the trim edge into the wall track as far as it will go. Make sure the trim edge is completely pushed into the track and flush top to bottom.



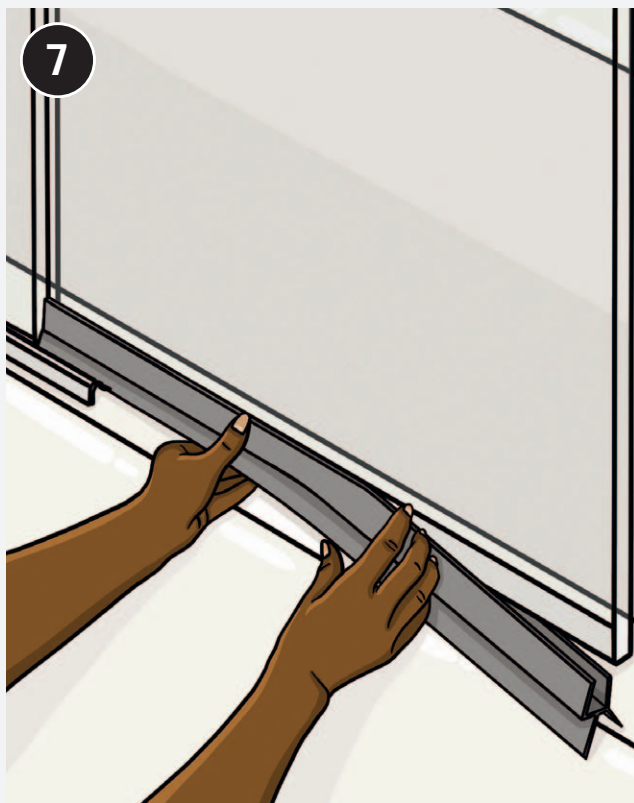
Measure and mark three holes equidistant down the length of the track and centered on its width (the top and bottom marks should be 2" from the top and bottom). Drill holes at the marks and install the supplied screws and retainers in each hole. Cover the screws with the supplied caps.



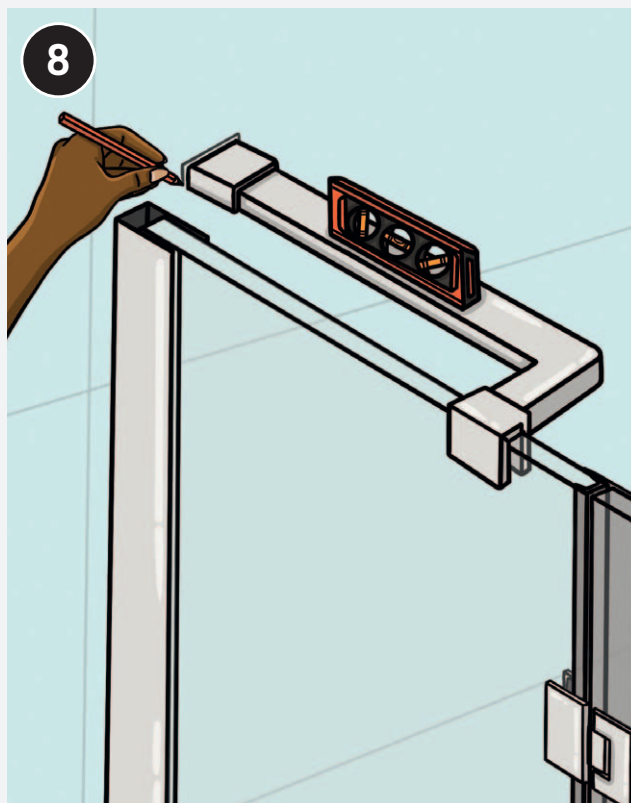
Press the vertical rubber strip onto the fixed panel's edge opposite the wall. The strip's channel should be wrapped around the edge of the glass, with the flap on the tub side.



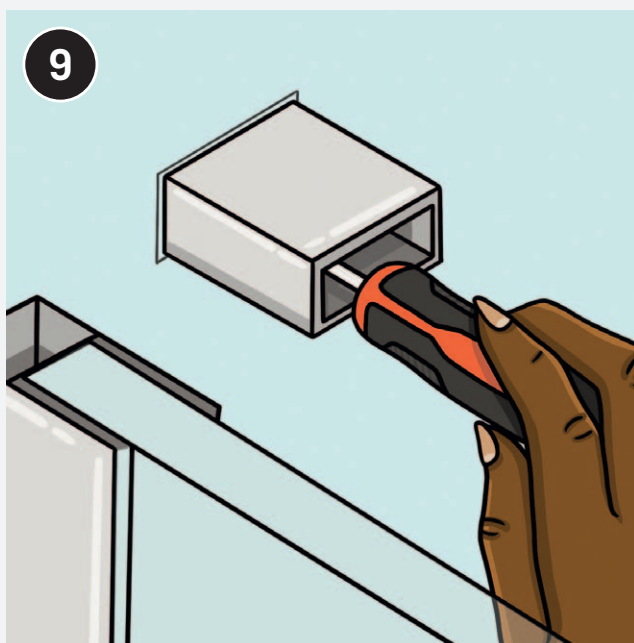
Screw the hinges to the fixed panel, through the predrilled holes in the panel. Hold the door in place with the hinge holes lined up (it may be easier to use a helper for this step), and screw the hinges to the door.



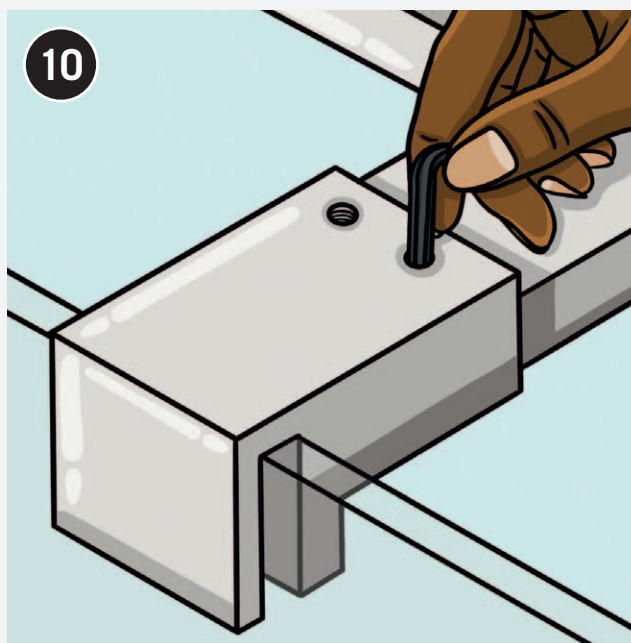
Position the tub lip clip according to instructions, and slide the metal track into the clip. Measure and cut as necessary the rubber sweep for the door bottom. Press the sweep onto the door, channel side toward the glass. Place the end clip on the metal track.



Screw the handle to the door. Cap the wall track with the supplied plastic cap. Dry fit the wall support bracket and connections, and put the bracket in place. Check level and make a key mark around the wall mount.



Remove the bracket and disassemble it. Hold the wall support in place and mark for the screw holes. Remove it and drill for anchors if there is no stud at the location (if there is a stud, drive the mounting screws directly into it). Screw the support to the wall.



Slide the wall end of the bracket into the wall support, and the opposite end into the panel-edge support. Tighten the wall support set screws to hold the bracket end in place. Do the same with the panel-edge support. Lay a bead of silicone tub-and-tile caulk along the seam between the fixed-panel wall track and the wall. Allow it to cure before using the shower.

Jetted Tubs

Historically called “whirlpool” tubs—or lumped under the brand name Jacuzzi—jetted tubs are not a single type of bathroom fixture. Technologies vary and jetted tubs come in diverse sizes and shapes to suit bathrooms from modest to grand. In fact, the only thing they all share is that any jetted tub adds undeniable luxury and comfort to the bathing experience.

The key difference lies in the jets. Those are either air or water jets. Air jets blow heated air, while water jets heat and recirculate tub water under pressure. Both create a hydromassage that can ease joint and muscle aches and pains, relieve stress, and create a wonderful experience. (Water jets are far more forceful and invigorating.)

Both types usually include a heater, pump, and integral plumbing, all of which are installed on the tub when it’s manufactured. Most require a 220-volt GFCI outlet or a direct connection to a 220-volt circuit. A few rare models—and a larger number of older units—do not include a heater (which means they can be plugged into an ordinary 110-volt GFCI outlet). Older unheated tubs can be upgraded, although it is usually worth the additional expense to just buy a new unit.

The tub in this project is a compact air-jet model perfect for a smaller or medium-sized bathroom. Air-jet bathtubs provided a less vigorous massage, but they also require less cleaning and maintenance; bath salts, oils, soaps, and other contaminants aren’t

This air-jet tub is a smaller model suited for a guest bath. Don’t be fooled, though; the air jets still provide a luxurious bubbling experience. As a bonus, no water enters the pipes, so there is no chance of bacteria build-up, and far less maintenance than with a water-jet tub.



TOOLS + MATERIALS

Plumbing tools + supplies	Shims
Utility knife	1 × 4 lumber
4' level	Deck screws
Square-edge trowel	Roofing nails
Drill or power driver	Plumber’s putty
Channel pliers	Dry-set mortar
Hacksaw	Trowel
Pencil	Silicone caulk
Level	Jetted tub
Circular saw	Faucet set
Screwdriver	Eye protection
Adjustable wrench	Work gloves
Drain-waste-overflow assembly	

recirculated through the tub’s plumbing as they would be in a water-jet model. That means there are less clogs or problems with the jets themselves, and the lines don’t need to be regularly cleaned as they do on a water-jet bathtub.

Given that jetted tubs are manufactured in the same range of styles, sizes, and types that standard bathtubs are, you should be able to find a model that works for your particular bathroom and sensibilities. Here, we installed a drop-in tub that required a new stub wall—which allowed for an access panel that makes the tub’s mechanical components easy to reach.

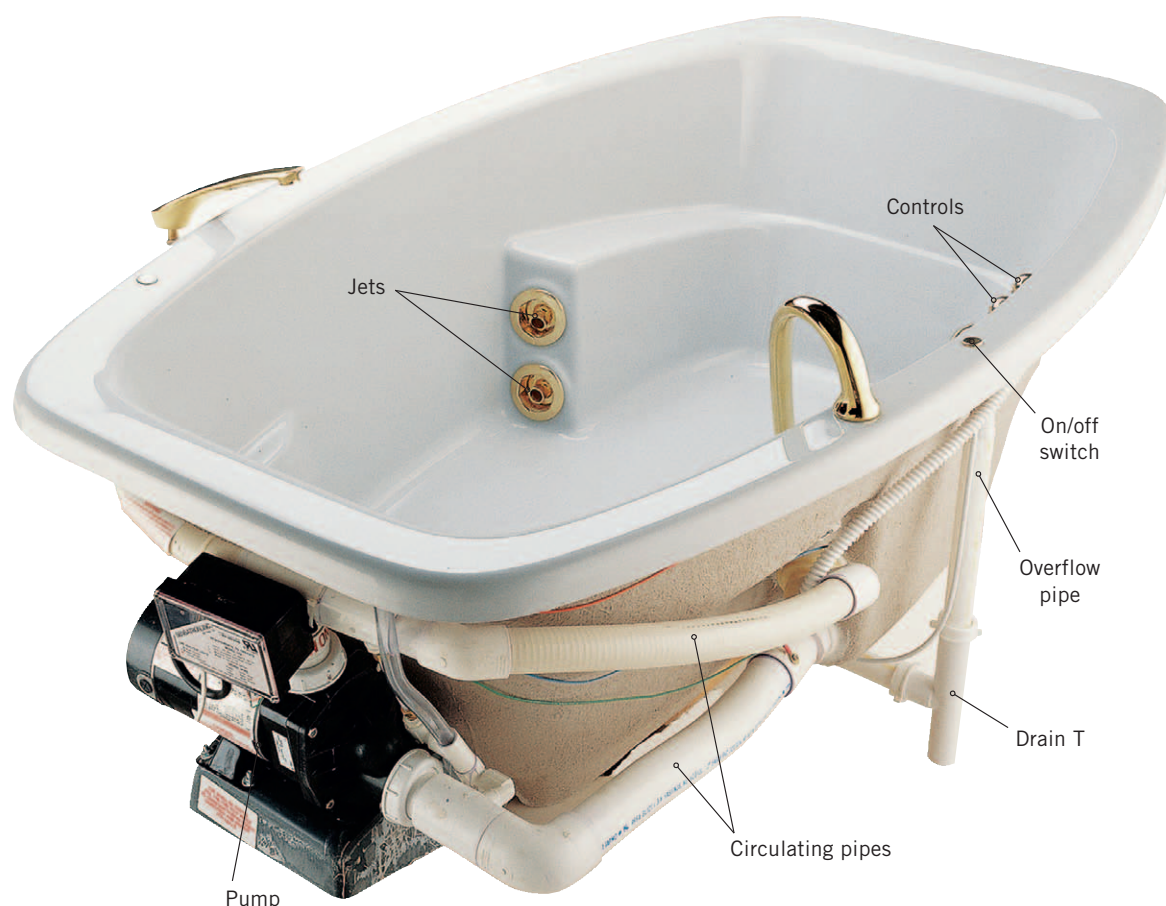




JETTED TUB DESIGN

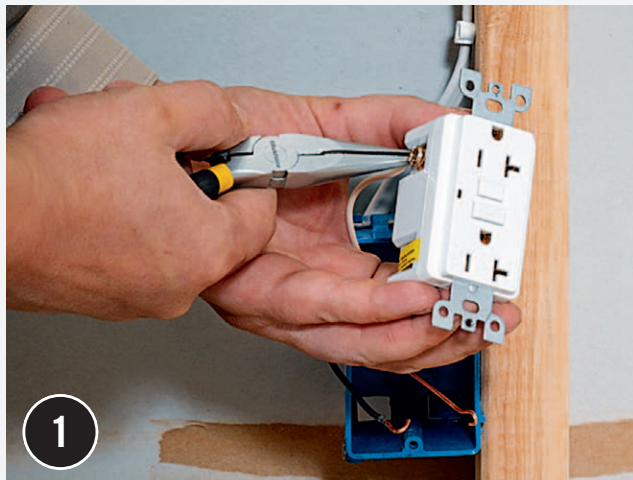
Installing a jetted tub is similar to installing any other bathtub, once the rough-in is complete. Finishing a rough-in requires that you install a separate GFCI-protected electrical circuit for the pump motor. Some building codes specify that a licensed electrician must do the wiring for a this type of tub, so check with your local building inspector.

Select your tub before you do the rough-in work, because exact measurements will differ from model to model. Select your faucet to match the trim kit that comes with the tub (although some tubs include faucet and controls). When choosing a faucet, make sure the spout is large enough to reach over the tub rim. Most jetted tubs use widespread faucets, because the handles and spout are separate and can be positioned however you like—even on opposite sides of the tub, if you want. Most building centers carry flex tubes in a variety of lengths for connecting the faucet handles and spout.



A jetted tub circulates aerated water or just air through jets mounted in the body of the tub. The pumps can move as much as 50 gallons of water per minute to create a relaxing hydromassage effect. The pump, pipes, jets, and most of the controls are installed at the factory, making the actual hookup in your home quite simple.

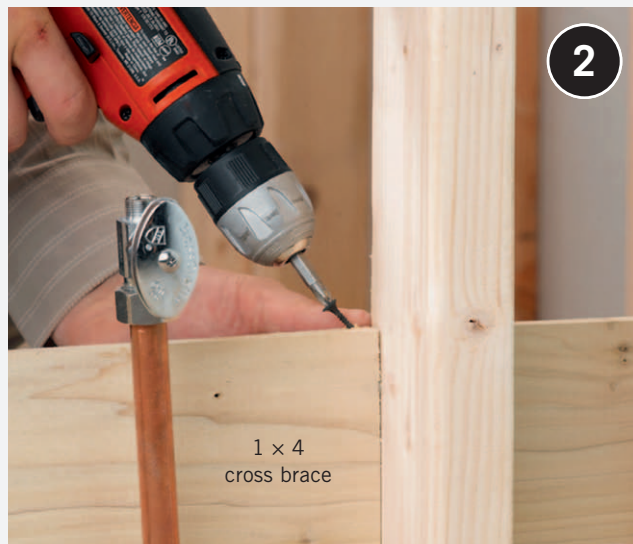
How to Install a Jetted Tub



1 **Remove wall coverings** in the installation area to expose bare studs. Provide a dedicated electrical circuit to the tub area according to the installation instructions (hire an electrician if you are not comfortable with wiring). This model plugs into a GFCI-protected receptacle on a dedicated 120-volt, 20-amp circuit.

Note: Most jetted tubs require a 240-volt circuit.

Make framing improvements such as adding 1 × 4 bracing at supply risers and faucet-body locations. For drop-in tubs that do not have nailing flanges, you may need to add short stub walls to provide a stable resting point. Here, a short stub wall was installed at one end to serve as the tub wet wall.

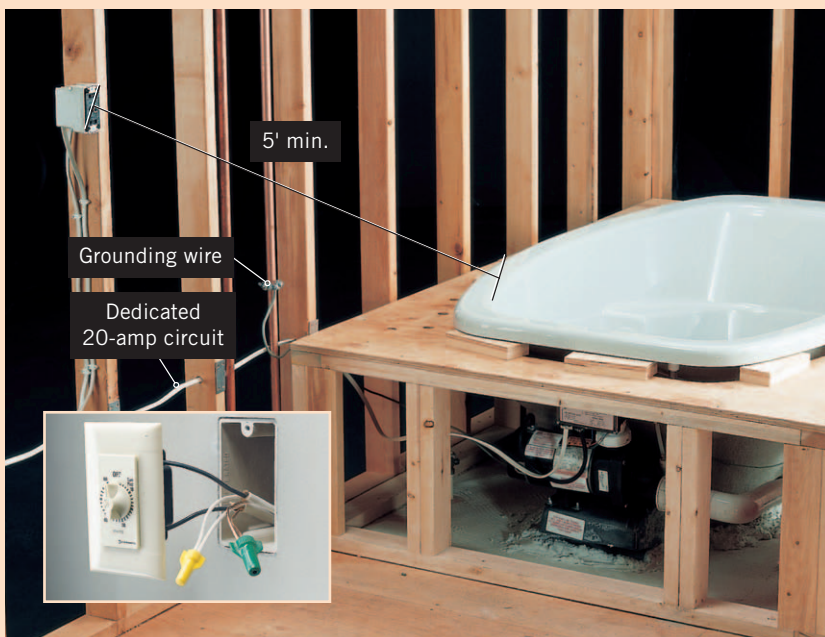


2

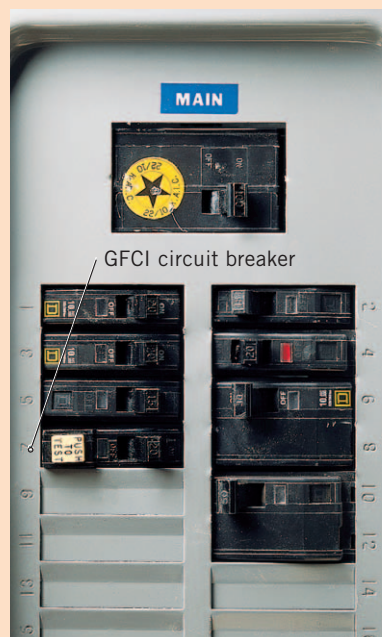
1 × 4
cross brace



REQUIREMENTS FOR MAKING ELECTRICAL HOOKUPS



The electrical service for a jetted tub should be a dedicated 120- or 240-volt circuit. The pump motor should be grounded separately, normally to a metal cold-water supply pipe. Most tub motors are wired with 12/2 NM cable, but some local codes require the use of conduit. Remote timer switches (inset), located at least 5' from the tub, are required by some codes, even for a tub with a built-in timer.



A GFCI circuit breaker at the main service panel is required with jetted-tub installations. Hire an electrician to connect new circuits at your service panel if you are uncomfortable installing circuit cables on your own.



3

Cut the drain tailpiece to length depending on the distance you'll need to span to the trap. Use a hacksaw or tubing cutter to make the cut.



4

Prepare the floor or subfloor. Check with a level and fill any dips with floor leveling compound or mortar. If there is a joint in the subfloor, make sure the sides are level. (The floor has to be level to support the weight of the tub, the water, and bather.) Also make sure there is no defect in the structural elements.



5

Test the tub fit. First, cut a piece of the shipping carton to fit inside the tub and protect its surface. Have someone help you slide the tub into the installation area, flush against the wall studs, so you can check the fit.

TIP: Lay a pair of 1 × 4s perpendicular to the tub opening and use them as skids to make it easier to slide the tub in. Remove the skids and lower the tub on the floor.



6

Set a 4' level across the rim of the tub and check it for level. If it is not level, place shims under the tub until it is.

(continued)



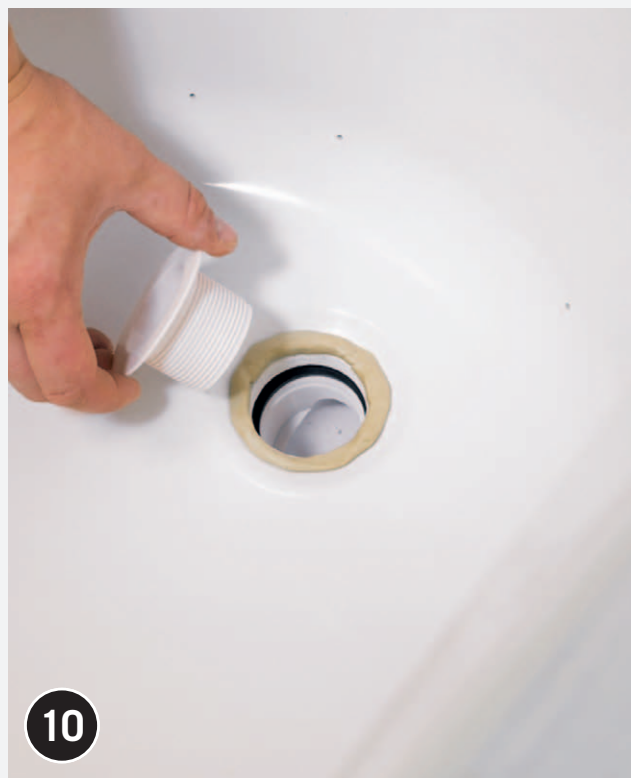
Mark the top of the tub's rim or nailing flange at each stud as a reference for installing additional supports or ledgers. Remove the tub from the alcove.



Add support frames or ledgers as directed by the manufacturer and secure them in the installation area so the top of the tub or nailing flange will be at the height you scribed in step 7.



Assemble the drain-waste-overflow kit to fit the drain and overflow openings, following the manufacturer's directions. Install the DWO kit (it is virtually impossible to attach it once the tub is in place).



Fasten the threaded parts of the drain assembly. A ring of plumber's putty between the drain coverplate and the tub will help create a good seal. If you will be installing a pop-up drain, install it now as well.



11

Attach the overflow coverplate so it conceals the overflow opening. Adjust the pop-up drain-plug linkage as directed by the manufacturer.



12

Begin the actual installation. For some tubs, it is recommended that you trowel a layer of thinset mortar in the installation area. But read your instructions carefully. Many tubs feature integral feet that are meant to rest directly on the floor.



13

Slide the tub back into the opening. Remove the skids, if you are using them. Press down evenly on the tub rim until they make solid contact with the ledgers or frames.

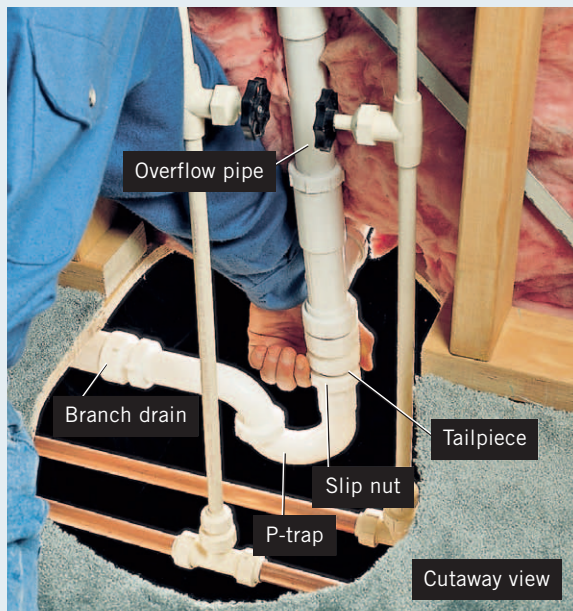


14

Provide support for the tub on the open side if it does not have a structural skirt. Here, a 2 x 4 stub wall is built to the exact height of the underside of the rim and then attached in place. Screw it to both end walls and to the floor. *(continued)*



DRAIN HOOKUPS



Make the plumbing drain connections before you proceed further. To connect the drain tailpiece to the trap, you will need access either from below or from an access panel. The photo above shows a typical tub drain configuration seen cutaway through the floor.



Cover the gaps in the wall coverings around the tub. Here, cement board is installed in preparation for a tile backsplash. If your tub has nailing flanges, attach strips of metal flashing to the wall so they extend down to within about $\frac{1}{4}$ " of the tub rim. If your tub has a removable apron, install it.



Make wiring connections according to the manufacturer's instructions. The requirements vary among jetted tubs. Some municipalities may require that a licensed professional do this work. Here, the airflow regulator is being wired. Note that most codes have a safety requirement that the on/off switch must be located so it cannot be reached from the tub.



Test the operation of the tub before you finish the walls or deck in case there is a hidden problem. Fill it with a hose if you have not installed the faucet (the faucet normally is installed after the wall surfaces, unless you are deck-mounting the faucet on the tub rim). Run the tub. If it works, drain the water.



18

Finish the wall surfaces. Here, a tile surround and backsplash are being installed over the cement board backer. The wall covering at the front of the wet wall is installed so it is easy to remove for plumbing access.

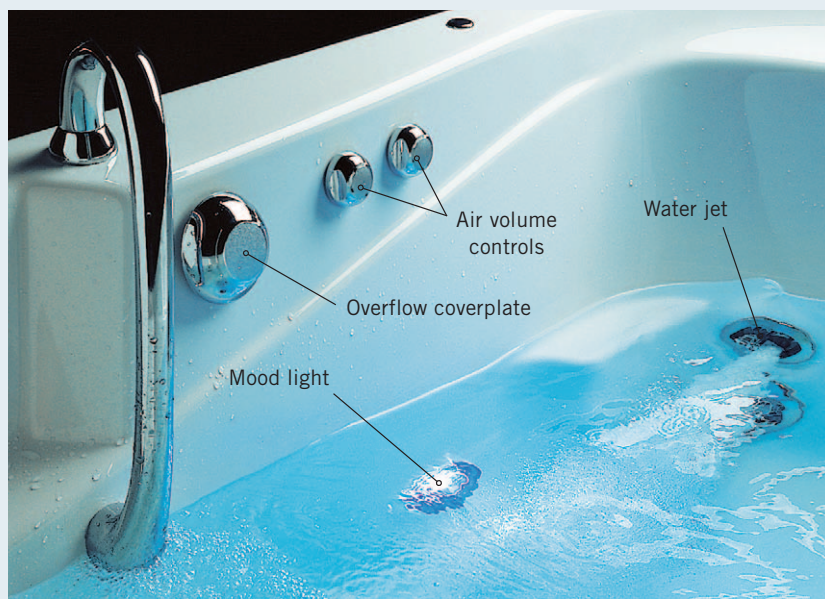


19

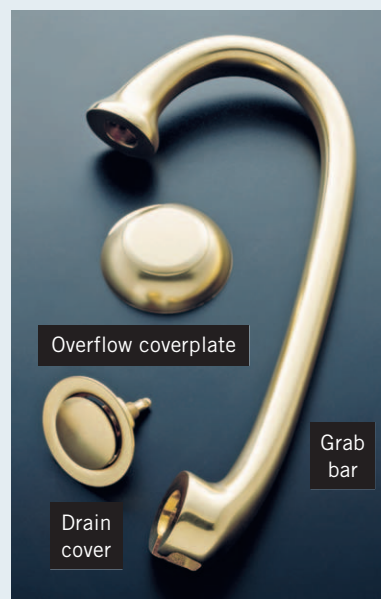
Hook up the faucet to the water supply plumbing according to the manufacturer's directions (or have your plumber do the job). Remove the aerator from the tip of the spout and run water through it to clear out any debris. Attach the aerator, fill the tub, and have yourself a nice, relaxing soak.



OPTIONAL ACCESSORIES



Mood lights are sold as factory-installed accessories by many manufacturers. Most are available with several filters to let you adjust the color to suit your mood. Mood lights are low-voltage fixtures wired through 12-volt transformers. Do not wire mood lights or other accessories into the electrical circuit that supplies the pump motor.



Trim kits for jetted tubs are ordered at the time of purchase. Available in a variety of finishes, all of the trim pieces except the grab bar and overflow coverplate are normally installed at the factory.

Bathtub + Shower Fittings

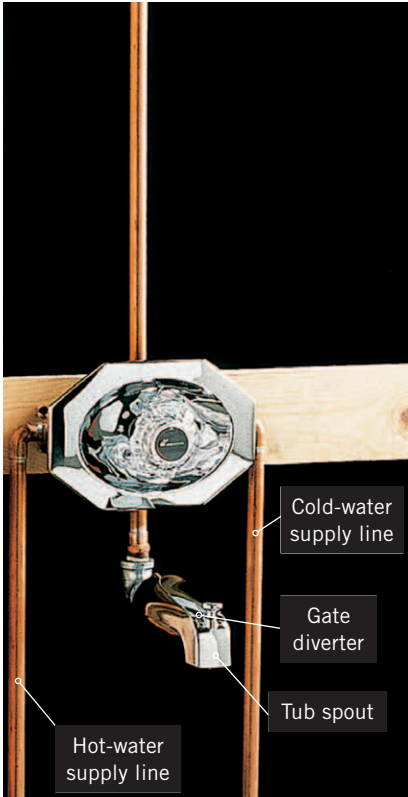
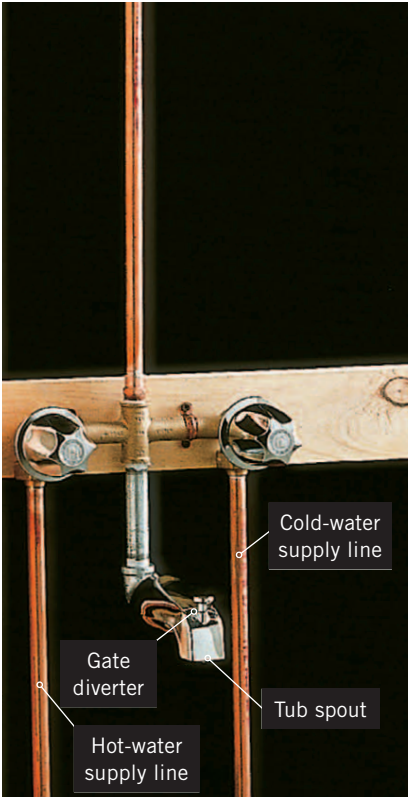
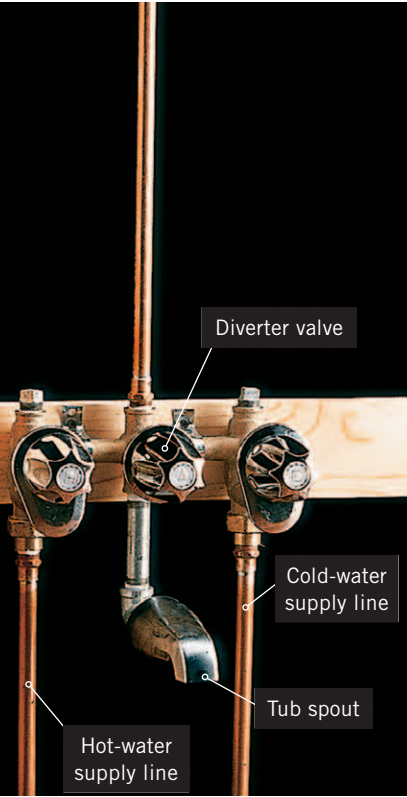
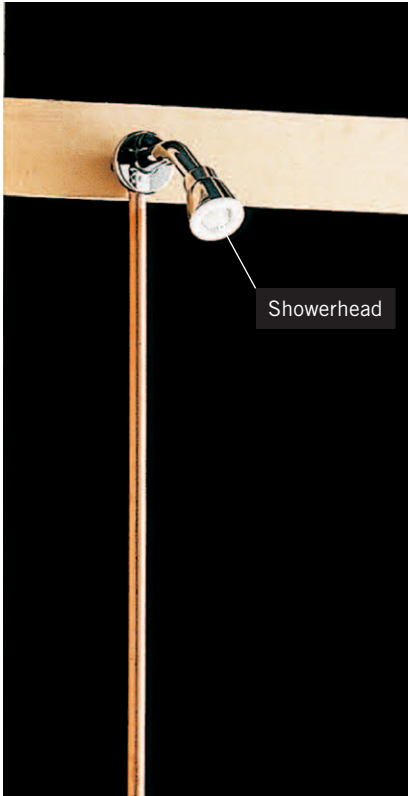
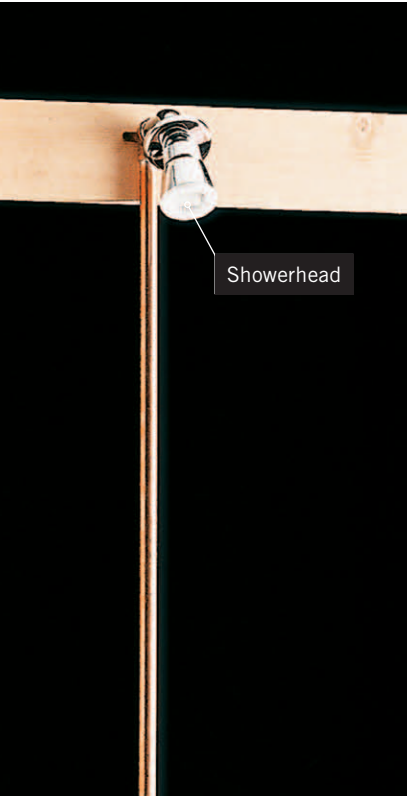
In many situations, replacing a bathtub spout can be almost as easy as hooking up a garden hose to an outdoor spigot. There are some situations where it is a bit more difficult, but still pretty simple. The only time it's a real problem is when the spout is attached to a plain copper supply nipple, rather than a threaded nipple. You'll know this is the case if the spout has a setscrew on the underside where it meets the wall. Many bathtub spouts are sold in kits with a matching showerhead and handle or handles. But for a simple one-for-one replacement, spouts are sold separately. You just need to make sure the new spout is compatible with the existing nipple.

Tub-spout assemblies can be relatively complicated, often performing three or four important functions. The spout itself is simple enough, since its only function is to deliver bathwater to the tub. But the diverter network and pop-up drain contain multiple moving parts that require precise adjustment and occasional repair or replacement (see photo, next page). The diverter is basically a stop valve that's activated by a lever or knob to block flow of water from the spout, forcing it up to a showerhead or out through a handheld showerhead, as seen here.



In many bathtub-shower plumbing systems, the spout has the important job of housing the diverter—a gate inside the spout that is operated by a lever with a knob. An open gate allows water to come out of the spout when the faucet is turned on. When the diverter is pulled shut, the water is redirected up a riser pipe and to the showerhead. Failure of the diverter is one of the most common reasons for replacing a spout.

Bathtub + Shower Combination Faucets



A 3-handle faucet has valves that are either compression or cartridge design.

A 2-handle faucet has valves that are either compression or cartridge design.

A single-handle faucet has valves that are cartridge, ball-type, or disc design.

How to Install a Slip-Fit Spout



Slip fitting: Check underneath the tub spout to look for an access slot or cutout, which indicates the spout is a slip-fit style that is held in place with a setscrew and mounted on a copper supply nipple. Loosen the screw with a hex (Allen) wrench. Pull off the spout.



Clean the copper nipple with steel wool. If you find any sharp edges where the nipple was cut, smooth them out with emery paper. Then, insert the O-ring that comes with the spout onto the nipple (see the manufacturer's instructions) and slide the spout body over the nipple in an upside-down position.



With the spout upside down for ease of access, tighten the setscrews on the clamp, working through the access slot or cutout, until you feel resistance.



Spin the spout so it's right-side up, then tighten the setscrew from below, making sure the wall end of the spout is flush against the wall. Do not overtighten the setscrew.

How to Install a Threaded Spout



If you see no setscrew or slot on the underside of the spout, it is attached to a threaded nipple. Unscrew the tub spout by inserting a heavy-duty flat screwdriver into the spout opening and spinning it counterclockwise.



OPTION: Grip the spout with a padded pipe wrench or channel pliers. Buy a compatible replacement spout at a home center or hardware store.



Wrap several courses of Teflon tape clockwise onto the pipe threads of the nipple. Using extra Teflon tape on the threads creates resistance if the spout tip points past 6 o'clock when tight.



Twist the new spout onto the nipple until it is flush against the wall and the spout is oriented properly. If the spout falls short of 6 o'clock, you may protect the finish of the spout with tape and twist it a little beyond hand tight with your channel pliers—but don't overdo it; the fitting can crack.

Adding a Bathtub Shower

Even if you're not ready to jump into a full bathroom remodel or open the wall to run new plumbing inside it, you can still have a bathtub shower. A kit like the one shown here allows you have a shower connected to a bath spout without dealing with codes, plumbers, or even much installation. The showerhead and hose connect right to a special tub spout that you install in place of your existing spout. After that, all you need is a rod and shower curtain, and you're ready to enjoy a bracing morning wake-up ritual.



The appearance of the spout gives good clues as to which kind of nipple it is connected to. A spout with no diverter (A) is probably connected to a 3"-long threaded nipple. To install a diverter spout you'll need to replace the 3" threaded nipple with a shorter threaded nipple that sticks out no more than $\frac{1}{2}''$ from the wall—not too big of a job. If the spout has a small setscrew in a slot on the underside (B), it is probably attached with a slip fitting to a $\frac{1}{2}''$ copper supply nipple. Unless you are able to solder a new transition fitting onto the old pipe after cutting it, call a plumber to install the new spout here. Spouts with outlets for shower adapters (C) require a short threaded nipple (or comparable union) that sticks out from the wall no more than $\frac{3}{4}''$.



Converting a plain bathtub into a tub-shower is a relatively easy task when you use a flexible shower adapter that fits onto a special replacement tub spout.



TOOLS + MATERIALS

- Pipe wrench
- Drill
- Glass + tile drill bit
- Tape measure
- Screwdriver
- Marker
- Teflon tape
- Brass nipple
- Spout with diverter outlet
- Hand-held mountable showerhead with flexible hose
- Mounting hardware
- Eye protection

How to Add a Bathtub Shower



1 **Make sure the old spout** is not held in place with a setscrew (see previous page) and then remove it by wrapping it with a cloth and turning the spout with channel pliers or a pipe wrench.

If you have a long iron or brass nipple like this, you need to replace it with a short one. Threaded nipples have threads at each end, so you can usually unscrew the old one. Mark the nipple at the face of the wall and write “front” on your side. Unscrew it counterclockwise with a pipe wrench. Get a threaded brass nipple of the same diameter that is about $\frac{1}{2}$ " longer than the distance from the back of your old nipple to your water supply.



2



3

Wrap 6 layers of Teflon tape clockwise on the nipple and thread into the wall. Thread the reducing bushing onto the nipple. Thread the adapter spout on. Tighten with a screwdriver or dowel to orient the spout correctly.



4

Attach a flexible shower hose to the adapter hose outlet. Tighten with an adjustable wrench.

Determine the location of the showerhead bracket. Use the hose length as a guide, and make sure the showerhead can be lifted off the bracket with ease.



5



6

Mark the hole locations. Use a glass-and-tile bit in the size recommended by the manufacturer. Wear eye protection, and drill holes in the tile at the marks. Insert anchors and tap them in place with a wooden mallet. Screw the showerhead bracket to the wall.

Slide-Bar Dual Showerheads

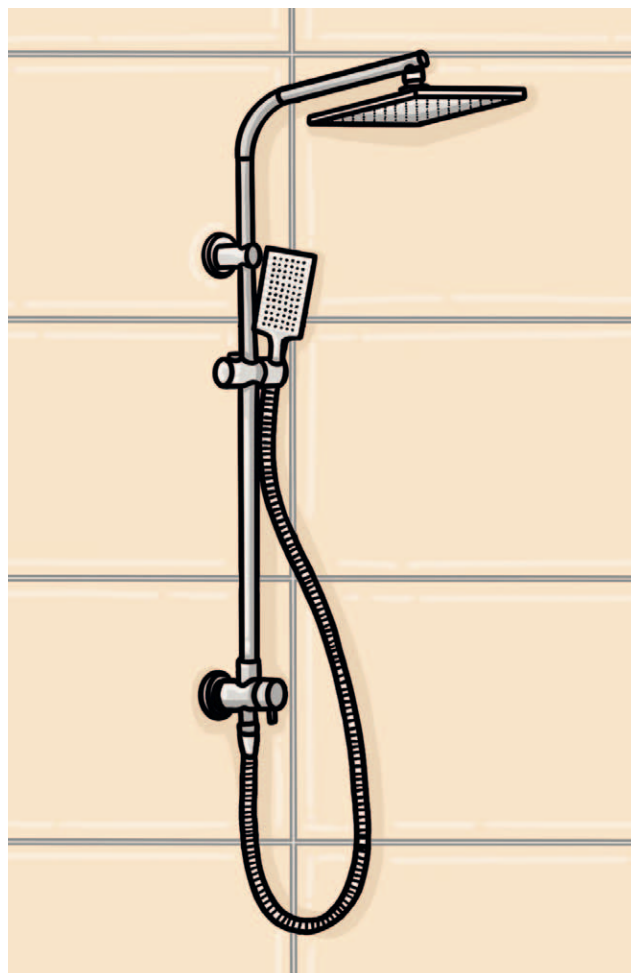
You may not have the space or inclination to install a superluxe walk-in shower with multiple heads and Bluetooth stereo, but you can have luxury in even the most basic bath-shower combo. That's the good news. The even better news? It won't break the bank and it's a simple installation that you can complete in a weekend afternoon.

The secret is a dual-head slide bar assembly. These wonderful shower conversions replace a single droopy showerhead with a new, upscale fixed head and a hand-held showerhead that can be adjusted for a custom blast even when it's not in your hand. These wonderful bathroom upgrades come in just about every style imaginable, and boost your shower experience every bit as much as it dials up your bathroom's look.



TOOLS + MATERIALS

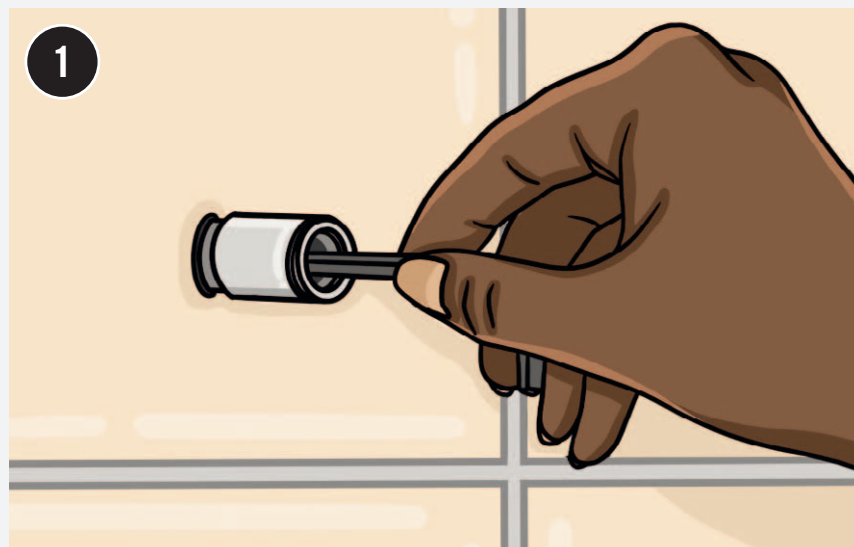
Slide-bar showerhead assembly	Grease pencil
4' level	Drill + bits
Teflon tape	Adjustable wrench
Tape measure	Gloves
	Safety glasses



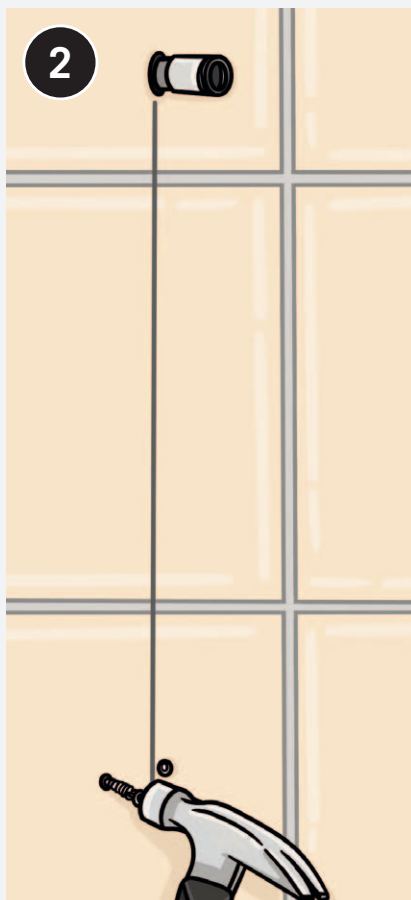
A new slide-bar, dual-head shower installation is the best type of home improvement project. It offers a style upgrade and a more enjoyable shower experience with a minimum of time, effort, or expense.



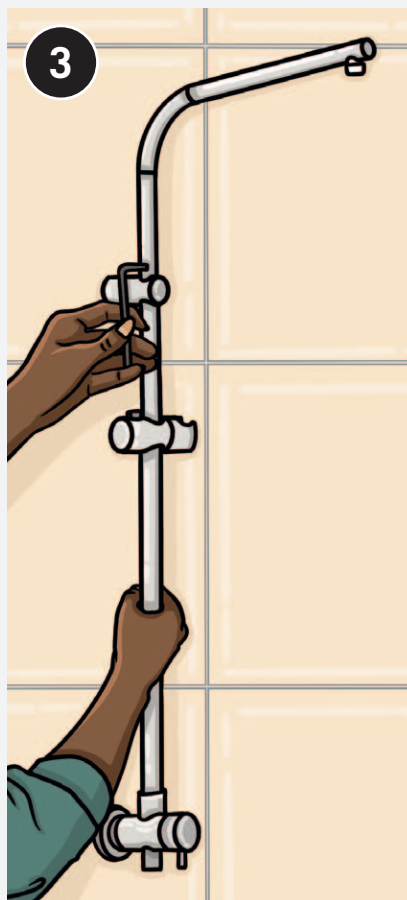
How to Install a Slide-Bar Dual Showerhead



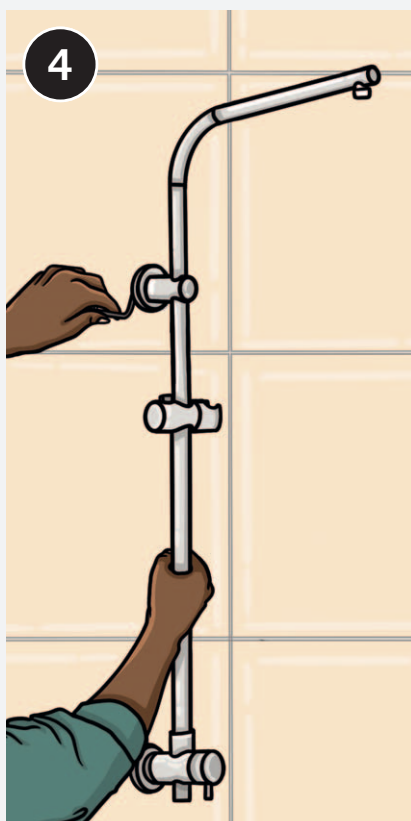
Turn off the water to the shower. Remove the existing showerhead and showerhead arm. Wrap the new nipple threads (both sides) with Teflon tape and screw into the water supply in the wall, where the showerhead arm was connected. Screw the connector to the nipple. This usually involves tightening with a hex wrench, sometimes supplied by the manufacturer.



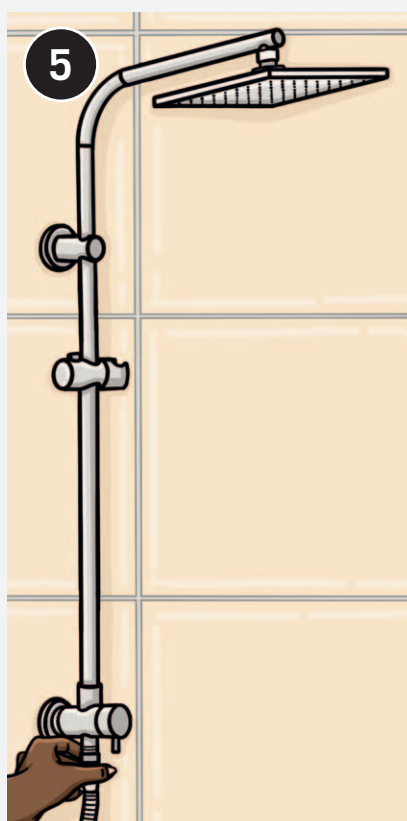
Use a level to determine a plumb line from the nipple. Mark 24½" (the distance in this case; use the measurement indicated by the manufacturer) down from the bottom of the nipple. Disassemble the bottom support. Center the support base on the plumb mark, and mark through the holes on either side for the screw anchors. Drill holes and tap in anchors for the screws.



Screw the base to the wall. Fasten the top showerhead arm onto the slide bar, using the setscrew and hex key provided (the arm should be oriented directly opposite the water supply connection). Slip the mounting flange over the slide-bar water supply.



Slide the assembly water inlet onto the coupling as you align the bottom support body with the base that you screwed to the wall. Screw the bottom support body's mounting collar to the base. Ensure that the inlet is all the way onto the water supply coupling, and tighten it in place with the setscrew on the line body.



Slide the rubber washer onto the top showerhead connector and fasten the showerhead to the connector. Be careful not to overtighten the head. Follow the same process for installing the end of the handheld showerhead hose onto the bottom of the slide bar, and the opposite end to the handheld showerhead. Turn the water on and check for leaks at any of the connections. Adjust as necessary.





Sinks + Vanities

For such a basic fixture, a sink-and-vanity combination makes or breaks the look of a bathroom. That's because this is the most frequently used area of any bathroom, and the first to show wear and tear. Fortunately, upgrading your sink or vanity (or both) is reasonably inexpensive and is certainly achievable easy home improvement project. The reward in looks and function far outstrips the effort you'll put in.

As if that weren't good news enough, you'll have a wealth of looks to choose from when shopping for a new sink or vanity. Vanities alone are hung from the wall, supported on legs, or flush with the floor. They come equipped with drawers, cabinets, slide-out bins, and more, which is why considering what storage you most need and want in your bathroom is a critical part of choosing a vanity.

The sink is by necessity married to the vanity, which is why they are so frequently sold as one unit. However, that doesn't have to be the case. For instance, there are a fantastic selection of beguiling vessel sinks from which you can choose, and most can easily be place on and plumbed through a solid-top vanity. Self-rimming sinks and even undermounts only require the right size hole be cut in the vanity's top surface—and that top surface doesn't need to be the one that came with the vanity.

It's a lot to consider and several decisions to be made. But that's the fun of renewing your bathroom's look.

In this chapter:

- Pedestal + Console Sinks
- Wall-Mounted Sinks
- Vessel Sinks
- Traditional Vanity
- Vanity Top with Integral Sink
- Plumbing a Double-Bowl Vanity
- Lavatory Faucets
- Hands-Free Bathroom Faucets
- Lavatory Drains

Pedestal + Console Sinks

Pedestal and console sinks move in and out of popularity more frequently than other types, but even during the times that they aren't particularly trendy they still find a place in many remodels because of their classic and adaptable styling. You'll find them most frequently in small half baths or powder rooms, where their modest footprints make them space-efficient options. Designers are also increasingly using these styles as his-and-her sinks for bathrooms in which the sinks are meant to visually dominate the design.

The primary drawback to pedestal sinks is that they don't offer any storage. Their chief practical benefit is that they conceal plumbing some homeowners would prefer to keep out of sight. Console sinks, with their two front legs, offer some space underneath for rolling shelf units or a towel basket.



TOOLS + MATERIALS

Pedestal sink	2 × 4 lumber
Silicone caulk	Water-resistant drywall
Stud finder	Pencil
Ratchet wrench	Drill
Basin wrench	Eye protection
Lag screws	Work gloves

Pedestal sinks are mounted in one of two ways. Most inexpensive models are hung in much the same way as wall-mounted sinks are. The pedestal is actually installed after the sink is hung, and its purpose is purely decorative. But other, higher-end pedestal sinks have structural pedestals that bear the weight of the sink. All console sinks are mounted to the wall, although the front legs offer additional support and resistance to users leaning on the front of the sink.

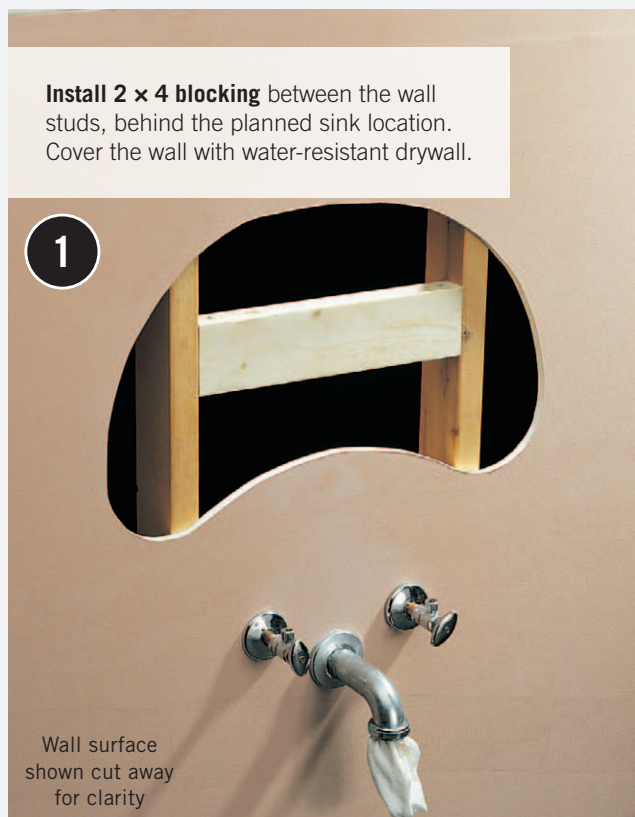


Even though they are modest in size, console sinks are a classic style that carry a lot of visual impact. This Art Deco sink fits right into a chic glam bathroom design without missing a beat.



Pedestal sinks range from elaborate to incredibly simple, like the basic, easy-on-eyes unit in this half bath. Where a small footprint is needed, a sink like this can serve the purpose, and boasts a small price and a pleasing look that won't fade as trends do.

How to Install a Pedestal Sink



Set the basin and pedestal in position and brace them with 2 × 4s. Outline the top of the basin on the wall, and mark the base of the pedestal on the floor. Mark reference points on the wall and floor through the mounting holes found on the back of the sink and the bottom of the pedestal.

Set aside the basin and pedestal. Drill pilot holes in the wall and floor at the reference points, then reposition the pedestal. Anchor the pedestal to the floor with lag screws.



Attach the faucet set to the sink, then set the sink onto the pedestal. Align the holes on the back flange of the sink with the pilot holes drilled in the wall, then drive lag screws with washers into the wall brace using a ratchet wrench. Attach the sink-stopper mechanism to the sink drain.

Hook up the drain and supply fittings.

Caulk between the back of the sink and the wall when installation is finished.



Wall-Mounted Sinks

There are many benefits to a wall-mounted sink that, depending on your situation and needs, will offset the inherent lack of storage space. In contrast to the footprint of a traditional vanity-mounted sink, wall-mounted units can save space on the sides and in front of the fixture. More importantly, they are an essential addition to a universal-design bathroom where wheelchair accessibility is a key consideration. It's why these particular fixtures are sometimes called "roll-under" sinks.

All that practicality aside, early models at the lower end of the price spectrum were somewhat unattractive because their designs simply left the drain tailpiece, trap, and supply shutoff valves in plain sight. But there's no need for you to settle for a less-than-handsome wall-mounted sink. Manufacturers have developed two solutions to the problem of exposed plumbing. Some are designed with a bowl that conceals supply-line shutoffs, replacing the trap with sleekly designed tailpieces and squared-off trap bends. The other solution, and one more widely available, is a wall-mounted pedestal that covers the plumbing. Sinks with this feature are sometimes called "semipedestal."

Although a wall-mounted sink offers many benefits—accessibility to wheelchair users among them—there's no need to sacrifice chic style for that functionality.



TOOLS + MATERIALS

Carpenter's level	Basin wrench
Adjustable wrench	Tape measure
Pipe wrench	Hacksaw
Channel pliers	2 × 8 lumber
Power drill and bits	Moisture-resistant drywall
Tubing cutting	Masking tape
Phillips screwdriver	Pencil or marker
Standard screwdriver	Eye protection
Jigsaw	Work gloves

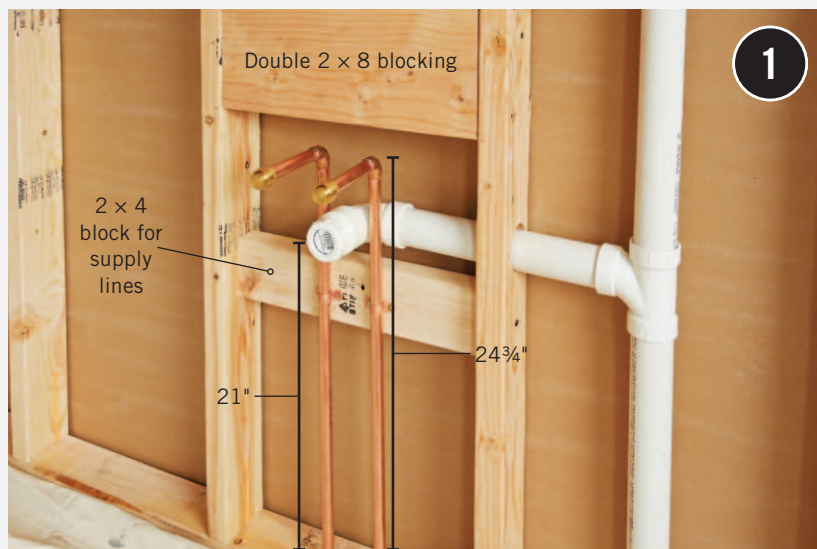
We've opted to illustrate the installation of just such a sink in the instructions that follow. Keep in mind that different manufacturers sometimes use very different mounting procedures. In any case, the idea remains the same: strongly secure the sink to studs or blocking, so that it is completely stable and will not fall.

The most involved part of the installation process is usually rerouting water-supply and drain lines as necessary. You should hire a licensed plumber for this if you're not comfortable with the work. Once the plumbing is in place, the installation is quick and easy.





How to Install a Wall-Mounted Sink



Remove the existing sink if any. Remove wall coverings as necessary to install blocking for mounting the sink. Reroute water-supply and drain lines as necessary, according to the sink manufacturer's directions. The sink in this project required the centerpoints of the waste pipe be 21" and the supply lines 24 ³/₄" up from the finished floor. If you're unsure of your plumbing skills or code requirements, hire a professional plumber. Install blocking between the studs for attaching the mounting bracket for the sink. A doubled 2 × 8 is installed here. Have your plumbing inspected, if required by your municipality, before you install the drywall and finished wall surface.

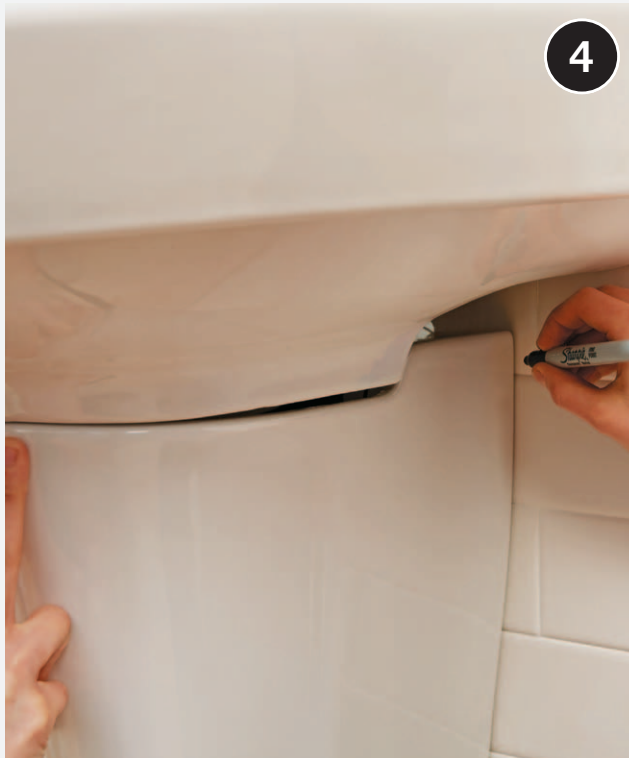


Drill guide holes for the mounting bolts if your sink is a direct-mount model, as this one is. Some wall-hung sinks are hung from a mounting bracket. The bolts used to hang this sink are threaded like lag screws on one end, with a bolt end that projects from the wall. The guide holes should be spaced exactly as the manufacturer specifies so they align with the mounting holes in the back mounting flange on the sink.

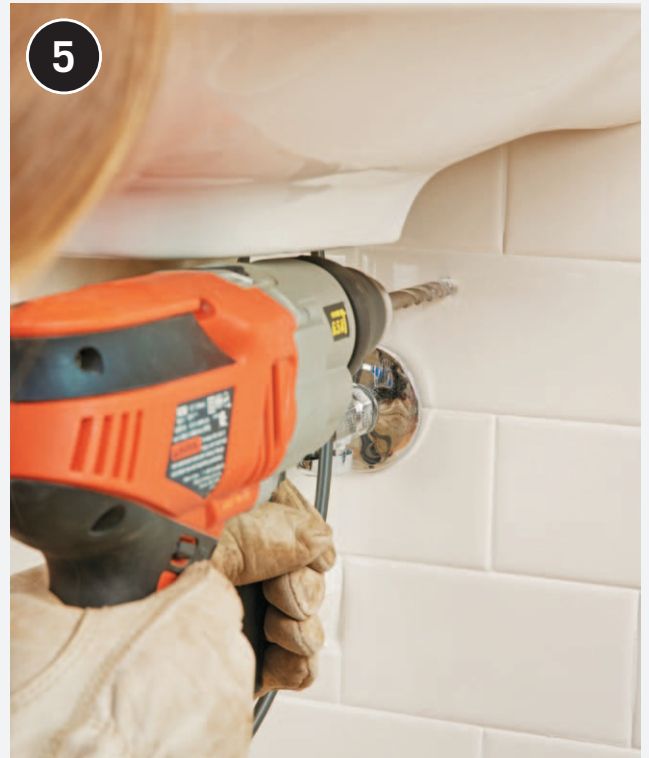
TIP: Protect tile surfaces with masking tape in the drilling areas to avoid chip-out.



Drive the threaded mounting bolts (screw end first) into the guide holes. There should be pilot holes (smaller than the guide holes) driven into the blocking. To drive this hardware, spin a pair of nuts onto the bolt end and turn the bolt closest to you with a wrench. Drive the mounting bolt until the end is projecting out from the wall by a little more than 1 ¹/₂". Remove the nuts. Install the pop-up drain in the sink and then slide the sink over the ends of the mounting bolts so the mounting flange is flush against the wall. You'll want help for this. Thread the washers and nuts onto the ends of the mounting bolts and hand-tighten. Check to make sure the sink is level and then tighten the nuts with a socket or wrench, reaching up into the void between the basin and the flange. Don't overtighten—you could crack the sink flange. *(continued)*



Have a helper hold the sink pedestal (in this model, a half pedestal) in position against the underside of the sink. Mark the edges of the pedestal on the wall covering as reference for installing the pedestal-mounting hardware.



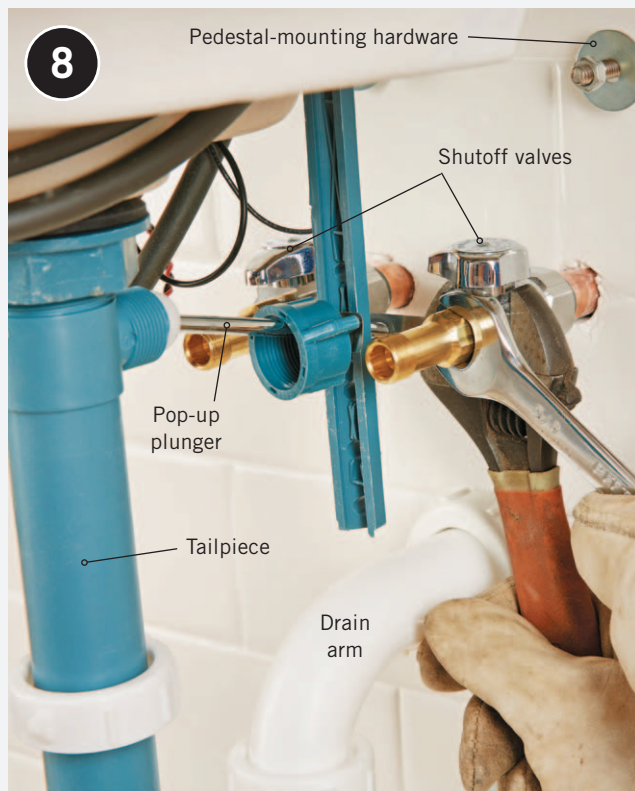
Remove the pedestal and drill the pilot holes for the pedestal-mounting bolts, which work in much the same way as the sink-mounting bolts. Drill guide and pilot holes, then drive the mounting bolts, leaving about 1¼" of the bolt end exposed.



Install the drain and drain tailpiece on the sink. Also mount the faucet body to the sink deck if you have not done so already. Also attach the drain-trap arm to the drain stub-out in the wall and attach shutoff valves to the drain-supply lines.



Complete the drain connection by installing a P-trap assembly that connects the tailpiece and the trap arm. Also connect the drain pop-up rod that projects out of the tailpiece to the pop-up plunger mechanism you've already installed.



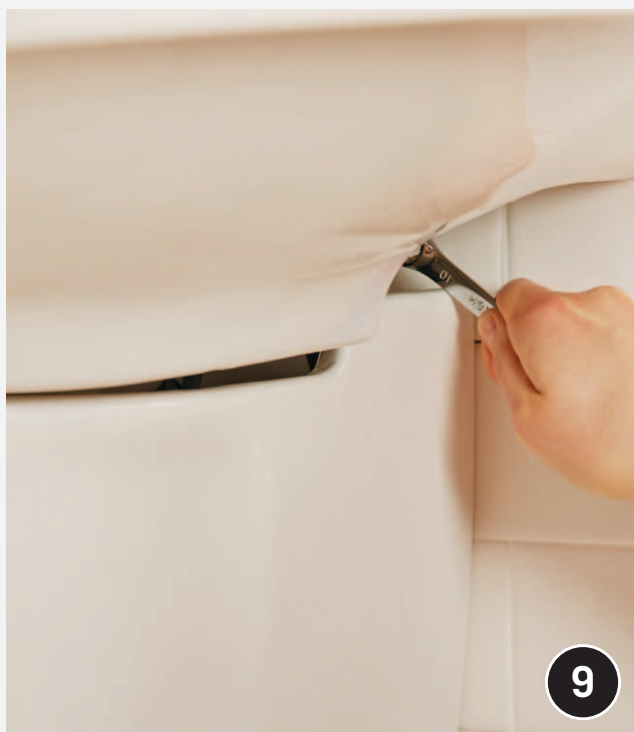
Make sure the shutoff valve fittings are tight and oriented correctly, and then hook up the faucet supply risers to the shutoff valves. Turn on the water supply and test.



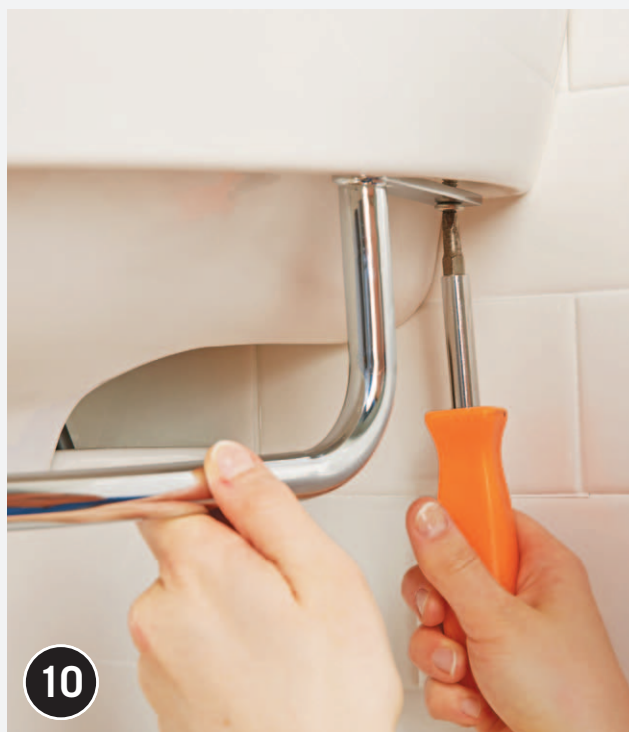
LEAK FINDER



To quickly and easily find an undersink leak, lay bright white paper or paper towels under the pipes and drain connections. Open the water supply valves and run water in the sinks. It should be clear exactly where the water dripped from by the location of the drip on the paper.



Slide the pedestal into place on the mounting studs. Working through the access space under the sink, use a wrench to tighten the mounting nut over the washer on the stud. Carefully tighten the nut until the pedestal is held securely in place. Be careful not to overtighten the nut.



Attach the towel bar to the sink by first pushing the well nuts into the holes on the underside of the sink rim. Set the bar in place, and screw in the attachment screws on both sides, just until snug.

Vessel Sinks

The vessel sink harkens back to the days of washstands and washbowls. Whether it's round, square, or oval, shallow or deep, the vessel sink offers great opportunity for creativity and proudly displays its style. Vessel sinks are a perfect choice for a powder room, where they will have high visibility.

Most vessel sinks can be installed on any flat surface—from a granite countertop to a wall-mounted vanity to an antique dresser. Some sinks are designed to contact the mounting surface only at the drain flange. Others are made to be partially embedded in the surface. Take care to follow the manufacturer's instructions for cutting holes for sinks and faucets.



TOOLS + MATERIALS

Pliers	P-trap and drain kit
Wrench	Faucet
Vanity or countertop	Eye protection
Vessel sink	Work gloves
Pop-up drain	Adjustable wrench

A beautiful vessel sink demands an equally attractive faucet. Select a tall spout mounted on the countertop or vanity top or a wall-mounted spout to accommodate the height of the vessel. To minimize splashing, spouts should direct flow to the center of the vessel, not down the side. Make sure your faucet is compatible with your vessel choice. Look for a centerset or single-handle model if you'll be custom-drilling the countertop—you only need to drill one faucet hole.



Vessel sinks are available in countless styles of materials, shapes, and sizes. Their one commonality is that they all need to be installed on a flat surface.

Vessel-Sink Options



This glass vessel sink embedded in a “floating” glass countertop is a stunning contrast to the strong and attractive wood frame anchoring it to the wall.



Vessel sinks come in many forms and colors, but a plain, curvy, bright white sink like this one is pleasing in almost any bathroom and with almost any faucet.

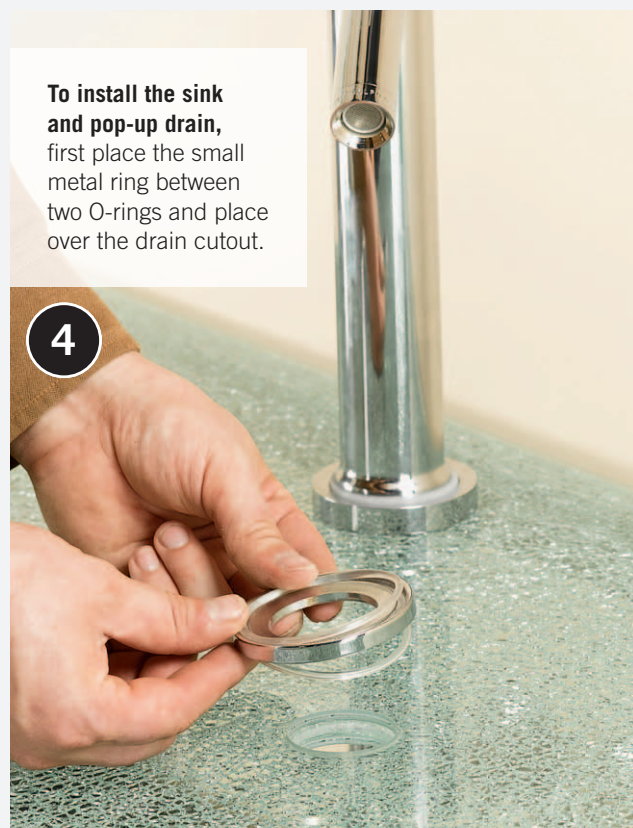


Vessel sinks don't have to be shaped like bowls. This rectangular tray sink is a cool alternative to a more common bowl shape and accents the chic, light wood vanity and cabinets in the room.



Vitreous china with a glazed enamel finish is an economical and durable choice for a vessel sink (although it is less durable than stone). Because of the flexibility of both the material and the glaze, the design options are virtually unlimited with vitreous china.

How to Install a Vessel Sink





Place the vessel bowl on top of the O-rings. In this installation, the vessel is not bonded to the countertop.



Put the small rubber gasket over the drain hole in the vessel. From the top, push the pop-up assembly through the drain hole.



From underneath, push the large rubber gasket onto the threaded portion of the pop-up assembly. Thread the nut onto the pop-up assembly and tighten. Use an adjustable wrench or basin wrench to tighten an additional half turn. Thread the tailpiece onto the pop-up assembly.



Install the drum trap. Loosen the rings on the top and outlet of the drum trap. Slide the drum-trap top hole over the tailpiece. Slide the drain arm into the side outlet with the flat side of the rubber gasket facing away from the trap. Insert the drain arm into the wall outlet. Hand-tighten the rings.

Traditional Vanities

Simple vanity bases are stages upon which much of the drama in a bathroom can play out. Because there are now so many sink and counter styles and materials, and ways of incorporating the two, a stable base that can be attractive in its own right is more important than ever.

Although vanity cabinet styles vary, the basic structure—such as incorporating a toe-kick—is common to the majority of them. The process outlined here covers the basic way that most vanities are secured in place to provide ample storage and a sturdy foundation for sinks and countertops.



A traditional vanity is a timeless look that may come equipped with its own countertop and may be sold just as “carcass.” Either way, installation is simple and this is a great way to refresh the look of a bathroom.



TOOLS + MATERIALS

Pencil	Basin wrench	Plumber's putty	Tub and tile caulk	Shims	Eye protection
Carpenter's level	Cardboard	Lag screws	4' level	3" drywall screws	Work gloves
Screwdriver	Masking tape	Stud finder		Drill	



How to Install a Vanity Cabinet

Measure and mark the top edge of the vanity cabinet on the wall, then use an electronic level/stud finder to mark the stud locations and a level line.



Slide the vanity into position so that the back rail of the cabinet can later be fastened to studs at both corners and in the center. The back of the cabinet should also be flush against the wall. (If the wall surface is uneven, position the vanity so it contacts the wall in at least one spot and the back cabinet rail is parallel with the wall.)

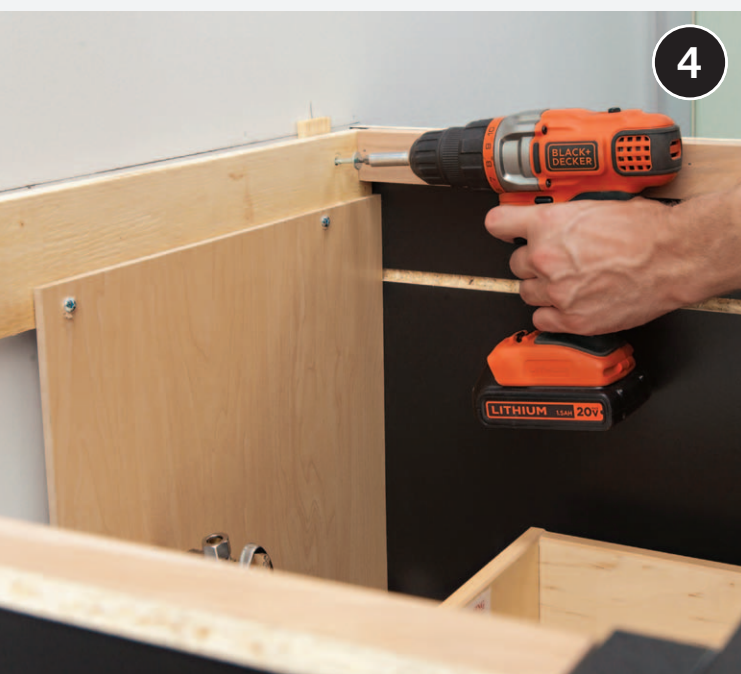


3

Using a level as a guide, shim below the vanity cabinet until the unit is level.



VARIATION: To install two or more cabinets, set the cabinets in position against the wall, and align the cabinet fronts. If one cabinet is higher than the other, shim under the lower cabinet until the two are even. Clamp the cabinet faces together, then drill countersunk pilot holes spaced 12" apart through the face frames so they go at least halfway into the face frame of the second cabinet. Drive wood screws through the pilot holes to join the cabinets together.



4

At the stud locations marked on the wall, drive 3" drywall screws through the rail on the cabinet back and into the framing members. The screws should be driven at both corners and in the center of the back rail.



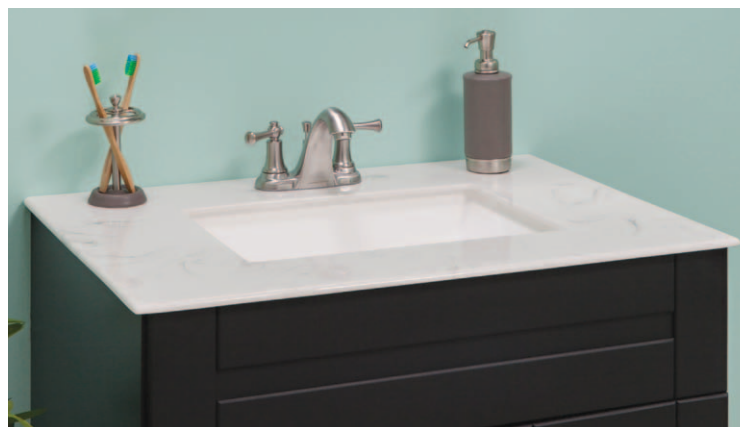
5

Run a bead of caulk along small gaps between the vanity and wall, and between the vanity and floor. For larger gaps, use ¼-round molding between the vanity and wall. Between the vanity and floor, install the same baseboard material used to cover the gap between the wall and floor.

Vanity Tops with Integral Sinks

Perhaps the easiest sink of all to install is one in which the countertop and sink are a single integrated unit that is simply attached to a standard vanity cabinet. These integrated sinks now come in many different styles and in a variety of materials, including premium solid-surface materials or synthetic stone. Gone are the days when integrated sinks were plastic faux-marble units that looked as cheap as they were. Today's integrated bathroom sinks can be quite attractive as a design statement and are available in lots of different shapes and configurations.

What hasn't changed, though, is the ease with which they can be installed—a feature that makes them very attractive to DIYers. Since integral sinks are predrilled for faucet and drain hookups, installing one is really just matter of laying the unit on the vanity cabinet, leveling and attaching it, and making the plumbing connections.



An **integral sink-countertop** is the traditional match to a stock bathroom base cabinet.



TOOLS + MATERIALS

Level	Silicone caulk
Shims	Caulk gun
Faucet and drain fittings	Eye protection
Wrenches	Work gloves
Plumber's putty	



How to Install a Vanity Top with Integral Sink



Check the vanity cabinet to make sure it is level. If not, you can place a shim under the base of the cabinet to bring it to level.



Test-fit the countertop-sink unit to make sure it fits solidly on the vanity. If it wobbles, or if the cabinet itself could not be leveled, you can level the countertop by placing shims between the bottom of the countertop and the top edge of the vanity cabinet.



Remove the sink-countertop, place it on sawhorses, and then attach the faucet unit using the predrilled cutouts in the countertop. This is an easy matter of threading the mounting nuts onto the faucet tailpieces from below, but always make sure to follow the faucet manufacturer's directions. If you wish, you can also preattach the water-supply tubes to the bottom of the faucet tailpieces.



Begin installing the drain unit, again following the instructions. Use plumber's putty or sealant between the sink surface and the bottom of the drain flange.



Finish up the drain installation by connecting the drain-stopper cable or lever to the pop-up drain fitting on the drain tailpiece.



Apply a bead of silicone caulk around the top lip of the vanity cabinet. Silicone caulk has good adhesive properties, and no other fasteners are required. Set the sink-countertop unit onto the cabinet, and press down firmly to bond it to the cabinet. Let the caulk dry completely before completing the plumbing hookups.



Complete the drain hookups by connecting the drain trap to the sink tailpiece at to the drain-arm pipe. Connect the water-supply tubes from the faucet tailpieces to the shutoff valves inside the cabinet.

Plumbing a Double-Bowl Vanity

Side-by-side sinks are a bathroom luxury, especially for busy couples (which is why they are called “his-and-her” sinks) or busy bathrooms. Although the basics of installing a vanity for a double sink are structurally the same as a single-bowl vanity, the plumbing requires modification to accommodate the extra fixture. This is a simple project that makes any bathroom much more usable and convenient.



Double-bowl vanities have drain plumbing that's very similar to double-bowl kitchen sinks. In most cases, the drain tailpieces are connected beneath one of the tailpieces at a continuous waste T. The drain line from the second bowl must slope downward toward the T. From the T, the drain should have a trap (usually a P-trap) that connects to the trap arm coming out of the wall.



TOOLS + MATERIALS

Carpenter's level	Power drill and bits	Adjustable wrench	Dual-outlet valves	P-trap	Eye protection
Screwdrivers	Basin wrench	Hacksaw	Braided-steel supply lines	PVC connections	Work gloves
Stud finder		Silicone caulk		Plumber's putty	



How to Plumb a Double Sink



Shut off the supply valves located under the sink. Disconnect and remove the supply lines connecting the faucet to the valves. Loosen the P-trap nuts at both ends and remove the P-trap.



Remove the existing countertop and vanity. Turn off the house water supply at the main shutoff valve. Drain the remaining water by opening the faucet at the lowest point in the house. Use a hacksaw to remove existing undersink shutoff valves.



Slide the new dual-outlet valve onto the hot-water supply line, pass the nut and compression washer over the pipe, and tighten with a wrench. Install the dual-outlet valve on the cold supply line in the same way.



Secure the new vanity in place by screwing it to the wall. Lay a bead of caulk along the underside and back edge of the countertop, where it will contact the vanity and wall. Set the countertop in place and check it for level. If your sinks are not integral, install them according to the type of sink you're using.



Seat the faucets for the double sinks as you would for a single sink, by applying a bead of putty on the underside of the bases (unless they are to be used with gaskets instead of putty). Secure them in place by tightening the locking nuts on the underside of the faucets.



Connect a new PVC P-trap to the undersink drain pipe, and attach a T-connector to the trap. Extend PVC connections to the drain assemblies of both sinks.



Connect the pop-up stopper linkage. Connect the cold-water supply lines to the appropriate faucet tailpieces and repeat with the hot-water supply lines. Turn on the main water supply, remove the faucet aerator, and run the water in the sinks. Check for leaks and replace the aerator.

Lavatory Faucets

Bathroom faucets (often sold as “lavatory” faucets) are manufactured with one of three mounting styles: centerset, widespread, or single hole. Centerset are the least expensive. They are constructed of a single body containing handles and spout; they require three holes in the sink or counter.

Widespread faucets also require three mounting holes, one each for the handles and spout—but they can be spaced as needed or desired. Single-hole faucets are sleeker, with a spout and handle in one thin construction, which is attached through a single hole in the vanity deck or sink. A fourth type, wall-mount, are rare because they are the hardest to plumb, repair, or replace.

All bathroom faucets come in a full range of finishes, including matte and shiny versions. They are also offered in an incredible selection of styles, from Victorian reproductions to modern works of art.

The choice of faucet may be limited if you’re replacing an existing unit and keeping your sink; you’ll



TOOLS + MATERIALS

Widespread or centerset faucet and hardware
Phillips screwdriver
Basin wrench

Adjustable wrench
Box wrench
Plumber’s putty
Teflon tape

have to choose based on the holes. However, single-hole models often come with a plate to cover any additional holes in the sink. In any case, it’s wise to measure hole spacing before shopping for a faucet. A 4-inch handle spread is the most common centerset distance, followed by an 8-inch spread. Also measure from the mounting holes to the center (deepest part) of the sink. The spout of any faucet you choose should ideally direct water down into the center of the sink, to avoid excess splashing.



Touchless faucets, like the one pictured, have become increasingly popular. Not only do they make it easier for children and anyone with mobility issues to use a bathroom sink, they are also more hygienic than other options.



LAVATORY FAUCET GUIDE

Every bathroom needs a faucet. When it comes to bathroom faucets, spending a little bit more can be the difference between a trouble-free unit that lasts a decade or more, and a problem fixture that you have to fix or replace in a year or two. Once you've chosen a mounting style from those described on the opposite page, you'll need to decide on the type of material and valve used in the faucet.

Finishes. Faucet materials include chrome, brass, bronze, copper, gold, nickel, and stainless steel. Some of those are offered in matte, brushed, or polished appearances. Shiny finishes show fingerprints and water marks more than matte surfaces will, and darker surfaces will show toothpaste, creams, or lotion spots more obviously. The most appealing look matches faucet to drain components.

Valve type. You'll choose from four basic types of faucet valves.

- 1. Compression:** The oldest, least expensive, and most prone to leaking. A valve stem raises and lowers, compressing a rubber washer. The washer eventually deteriorates and must be replaced.
- 2. Ball:** As it sounds, the valve is an actual ball in a single-handle faucet. The ball rotates in the seat to align an opening with the water inlet. This valve uses O-rings, springs, and washers, any of which can be fouled or break.
- 3. Cartridge:** Reliable, durable, and easy to replace, cartridge valves are the preferred choice for those looking to balance cost and durability.
- 4. Ceramic disc:** The most recent development and most expensive technology, this valve is two ceramic discs that are cut with channels that align when the faucet is opened. Ceramic discs are usually contained within a cartridge.

Valve construction. Brass is the most durable, followed by brass-coated, corrosion-resistant metal, and plastic.

Luxury features. Looking for a faucet upgrade? Consider LED lights in the spout or handles (which can make the faucet easier to use in the middle of the night), decorative handle insets, or a waterfall design in which the spout is actually an open channel that routes the flow of water to the sink.



Even though many use older compression valves, center-set faucets remain a popular inexpensive option, because the style fit most existing sinks, is easy to install, and comes in upscale designs like the elegant unit shown here.



Called "vessel faucets," special taller versions are used with vessel sinks, to minimize splashing and reach over the edge of higher vessel sinks.



Made explicitly for use in existing 4" centerset holes in sink and vanity decks, "miniwidespread" faucets like this one offer the same style as their larger cousins, but in a more compact package meant as a direct upgrade from a traditional centerset faucet.



How to Install a Widespread Faucet

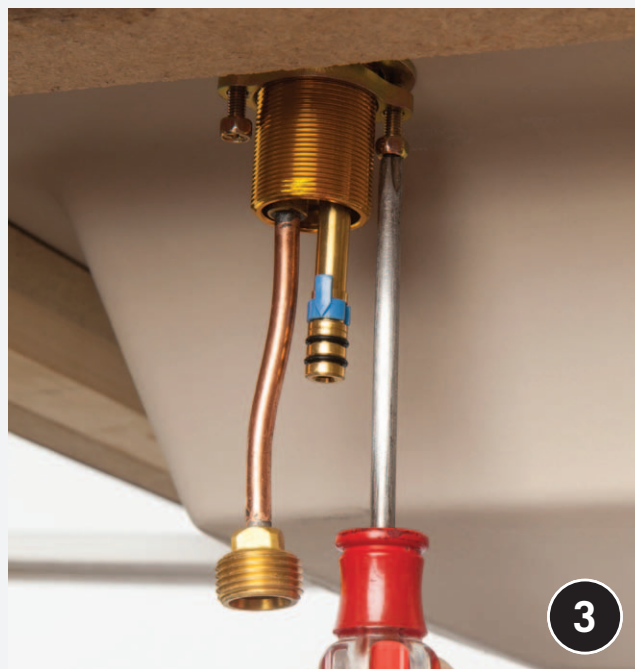


Shut off the water to the existing faucet and open the valves to drain the water. Disconnect the water-supply tubes from the faucet, and remove the old faucet by unscrewing the mounting nuts.

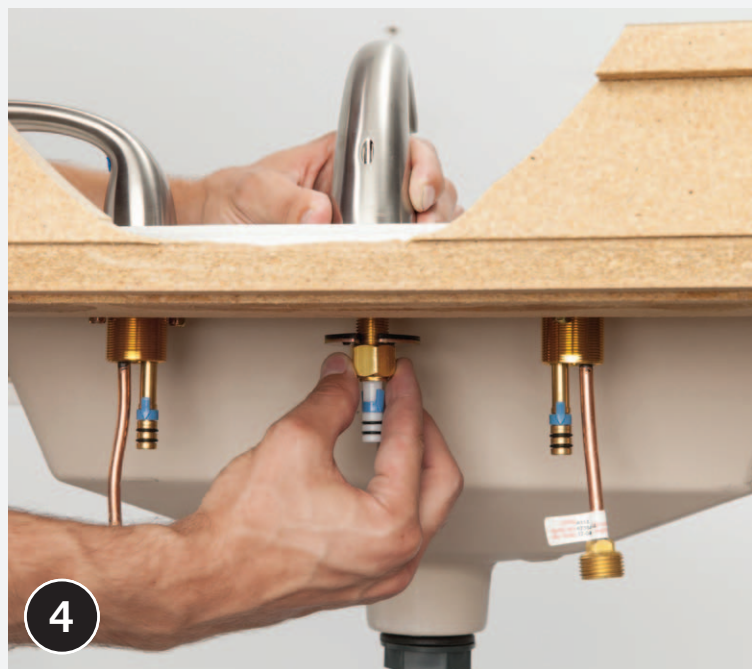
NOTE: Removing the old faucet and installing the new one may be easiest if you remove the sink from the vanity.



Clean away any existing plumber's putty or sealant from the surface of the sink, then lay a new bead of plumbers putty around each of the 3 openings. Install the 2 valves into the sink cutout openings by inserting the spout and valves and then threading the mounting screws onto the tailpieces from below the sink.



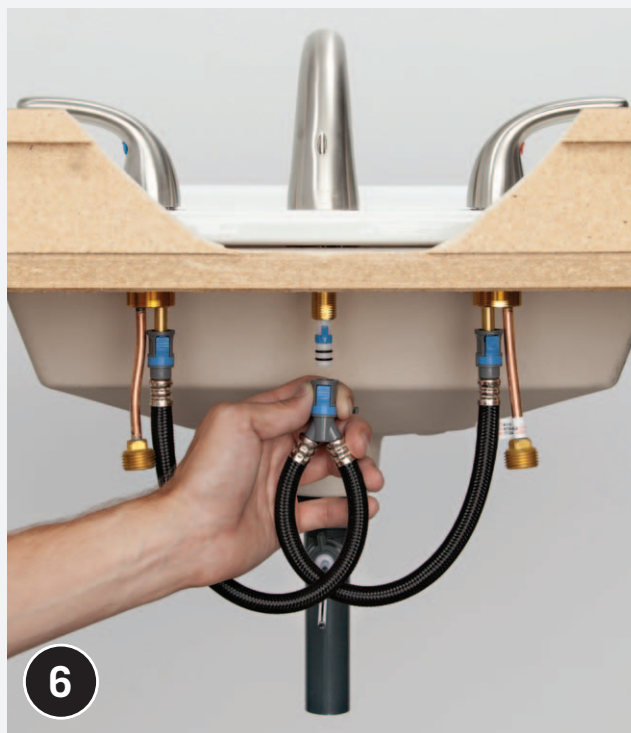
Exact mounting procedures vary; our faucet has retainer screws that are tightened after the mounting nut is threaded over the tailpieces. This secures the valves and spout tightly to the sink.



Repeat this procedure to install the center spout. Make sure the spout is aligned correctly to be perpendicular to the back of the sink.



Tighten the spout mounting nut securely. A basin wrench will make this easier, since access to the mounting nut may be difficult.



Attach the water connection tubes from the valve tailpieces to the spout tailpiece. Thread the mounting nuts by hand, then tighten slightly with channel pliers or an adjustable wrench (in tight quarters, this can also be done with a basin wrench).



Connect water-supply tubes from the water shutoff valves to the water-supply tubes on the faucet-valve tailpieces using an adjustable wrench (or basin wrench, where access is limited). In standard practice, the hot water normally connects to the left faucet valve and the cold water to the right.



Turn on the water and test the faucet. If any fittings leak, tighten them slightly until they are watertight. Attach the drain-stopper linkage to the push rod and to the stopper pivot lever.

Touch-Activated Bathroom Faucets

If you've ever washed your hands in an airport bathroom, chances are you've already come across a touchless faucet. Developed to conserve water and stop the spread of disease, these faucets have quickly become ubiquitous in commercial facilities across the country and around the world.

But now homeowners can enjoy the benefits of hands-free faucets in their own bathrooms. Widely available in home centers and hardware stores nationwide, these feature varying technologies depending on the manufacturer.

The most common type of commercial hands-free bathroom faucet relies on an infrared motion sensor, much like those in home-security systems. When something solid passes within the sensor's range, the faucet turns on for a predetermined period of time. Home units operate a little differently. They include motion-sensing and "touch-on, touch-off" units. The model we selected for this installation project uses an electrical field sensor that reacts to the stored charge in every human body, called *capacitance*. Whether motion or touch activated, these home faucets rely on an electrical field created by a solenoid connected



TOOLS + MATERIALS

Faucet and hardware	Flashlight
Adjustable wrenches	Eye protection
Channel pliers	Work gloves
Teflon tape	

to the faucet body. When a human hand disrupts the electrical field, the faucet turns on or off. Touch faucets operate the same, but the faucet body itself is the electrical field.

For most of these types of faucets, water temperature and flow rate are set manually before the faucet is "programmed." Then it's a case of tapping the faucet body or waving a hand near it to start or stop the flow.

Although these faucets are pricier than standard manual models, they represent a leap forward for people with motor-skill difficulties, or for preventing disease spread between family members using a busy bathroom in a crowded house. The good news is that they are not much more challenging to install than a standard faucet—with the exception of units that are hardwired into the home's electrical system. Hardwired units should be installed by a licensed professional.



A touch-activated faucet such as this can save water, make life easier for children and physically challenged users, and they come in a nice selection of style and finish options.



How to Install a Touch-Activated Faucet



1

Check the parts in the box against the instruction-sheet part list. Remove the center from the base gasket as necessary and thread the base's LED wire through the hole in the gasket. Seat the gasket into the groove in the insulator base and ensure that is snug and level.

NOTE: If your vanity deck has multiple holes, you'll need to use the supplied escutcheon plate. Run the LED wire through the escutcheon hole and seat the insulator base on top of the escutcheon (make sure the LED light is facing forward).



2

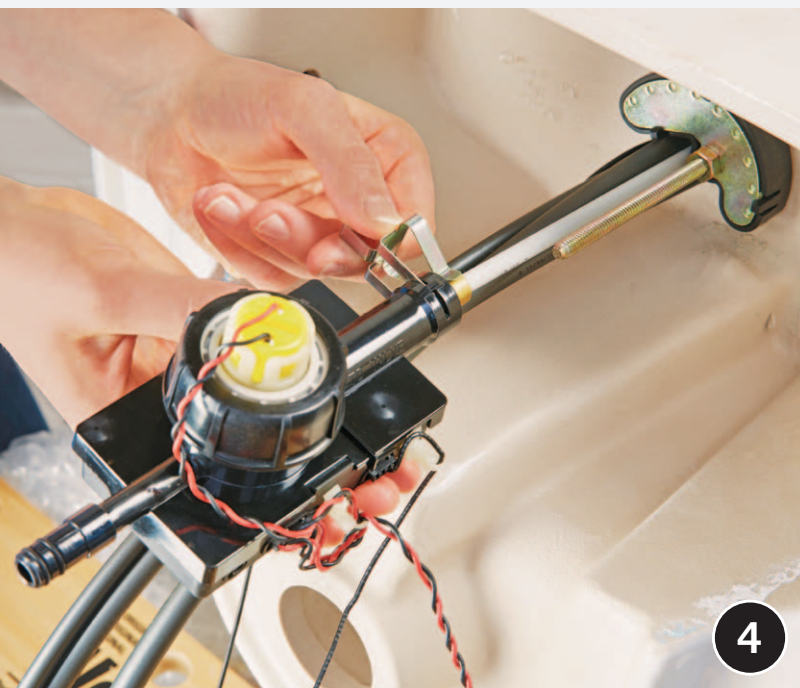
Slide the mounting bracket into place under the sink, on the mounting post. Be sure that the LED wire and supply lines are not crimped by the bracket. The mounting bracket needs to be oriented correctly; check the manufacturer's instructions to ensure it's situated in the correct direction and secured with the metal side down.



3

Ensure the LED wire is not crimped and thread the mounting-post nut on the mounting post. Hand-tighten. Check again that the faucet body is positioned correctly on the top of the sink and the LED light is facing forward. Tighten the mounting nut with a wrench, or with the tool supplied by the manufacturer, as shown here.

(continued)



Insert the outlet tube into the top of the solenoid until it is snugly attached. Secure the tube in place with the metal clip provided. These clips can often be attached more than one way, so check the instructions to make sure you've installed the clip correctly. Then lightly pull on the solenoid to ensure the tube is firmly attached and won't come free under pressure.



Slide the feeder hose into the bottom of the solenoid until it is snug. Snap the attachment clip in place to secure the hose, and again pull gently on the hose to make sure the clip is secure.



Touch the cold supply knob or another ground with your hand to dissipate any residual static charge. Remove the protective cap or endpiece from the end of the LED wire hanging from the faucet. Plug the prong of the wire into the hole in the solenoid. Make sure it is all the way in (on this model, you push until you hear a click).



Slide the solenoid ground wire onto the mounting post and secure it in place with a nut. Tighten the nut with a wrench, ensuring that the wires don't twist together. Put the batteries in the battery box and then connect the wire from the solenoid to the connection on the battery box. Secure the battery box to the cabinet floor, wall, or underside of the sink according to the manufacturer's directions and the type of vanity you have.



HOOK UP AND TEST THE FAUCET

Connect the water lines for your touch-activated faucet as you would with any faucet, using the supplied ferrules and check valves in place of the existing hardware on the stops. Insert the new ferrule and screw the check valve in place, hand tight. Then tighten the nut just one turn with a wrench. Attach the cold and hot lines to the proper check valves on the cold and hot stops—they must be connected to the appropriate stop (the ends of the faucet body supply lines will usually be marked as they are in this case—with either a color or other designation to signify which stop the supply line goes to). Attach the cold supply line to the check valve first, then repeat with the hot supply line. Snug to hand tight and then use a wrench to tighten one full turn more. Loop supply lines rather than cutting them.



Turn the faucet handle to the closed position and remove the aerator (use the manufacturer's supplied tool for this). Turn on both water supplies. Turn on the water for about 1 minute. Turn off the water and reinstall the aerator. Check the solenoid, stops, and faucet for leaks.



To set and test the touch feature, turn the handle on and leave it in the position that gives you the preferred temperature and flow rate. Touch the faucet body firmly and deliberately to turn the flow off. And then try tapping to turn it on. Tap at different areas around the body to turn the faucet on and off. If you've installed a motion-sensor faucet, you should be able to perform these functions just by moving your hand close to the faucet.

Lavatory Drains

Pop-up stoppers are chrome-plated, long plugs in bathroom sinks that are opened and closed with a knob behind the spout. The stopper itself is just the visible part of a behind-the-scenes assembly that makes sure the stopper opens and closes on cue. New faucets come with their own pop-up stopper assemblies, assuming they use one, but you may also purchase one by itself. This will include everything from the stopper to the pipe that drops into the trap. Choose a pop-up stopper assembly that's heavy brass under the chrome finish. This will hold up better to time and abuse than a plastic or light-gauge metal model.



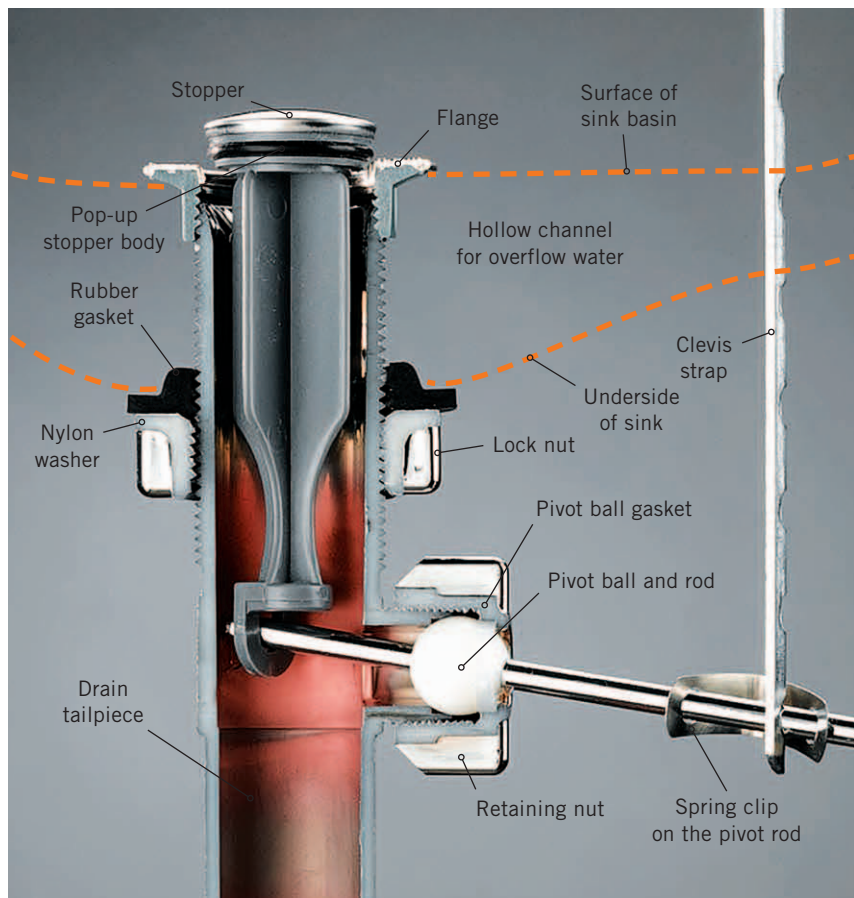
TOOLS + MATERIALS

Pop-up drain assembly
Channel pliers
Screwdriver

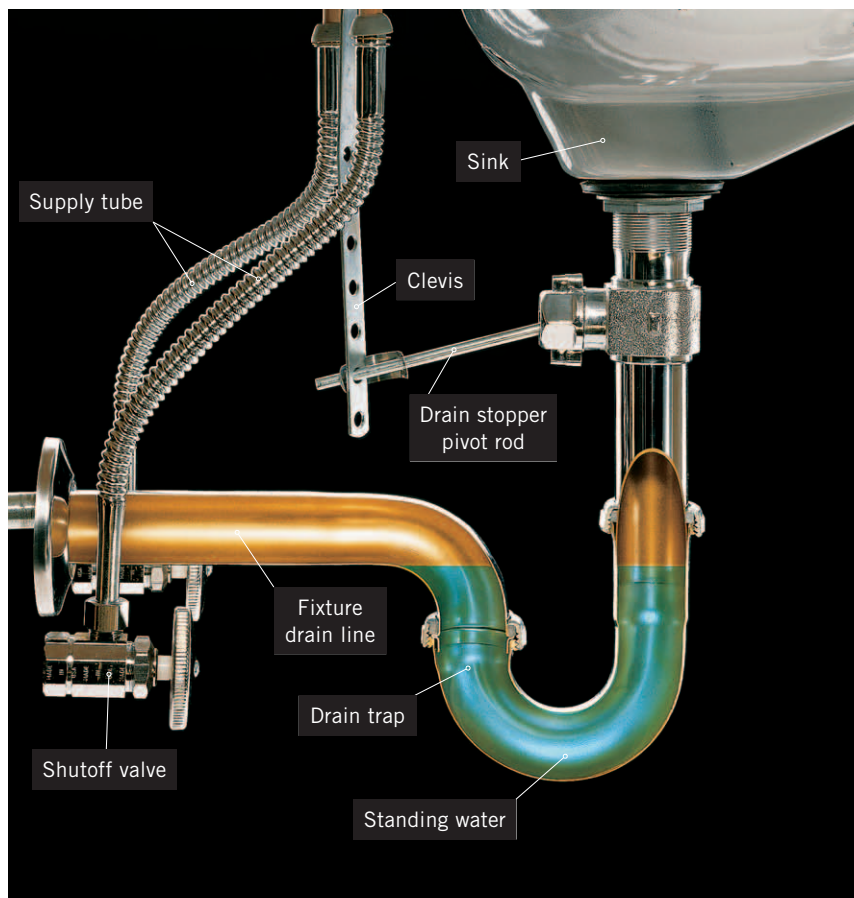
Teflon tape
Plumber's putty



Installing a lavatory drain is a bit trickier than installing a kitchen-sink drain because most have a pop-up stopper with linkage.



Pop-up stoppers keep objects from falling down the drain, and they make filling and draining the sink easy. When you pull up on the lift rod, the clevis strap is raised, raising the pivot rod, which seesaws on the pivot ball and pulls the pop-up stopper down against the flange. This blocks water through the sink drain, but water may still overflow into the overflow channel drain through overflow ports in the pop-up body. This is a handy feature if you leave the water running in a plugged basin by mistake.

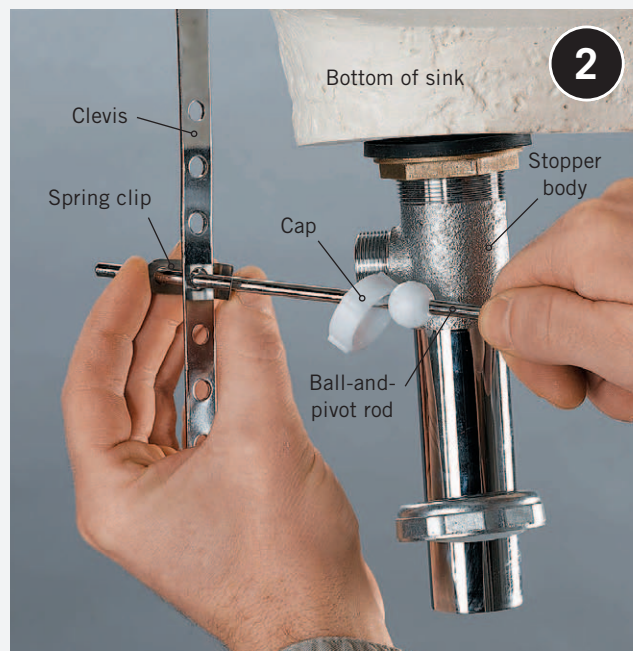


The lavatory drain trap holds water that seals the drain line and prevents sewer gases from entering the home. Each time a drain is used, the standing trap water is flushed away and replaced by new water. The shape of the trap and fixture drain line resembles the letter P, and sink traps are called P-traps.

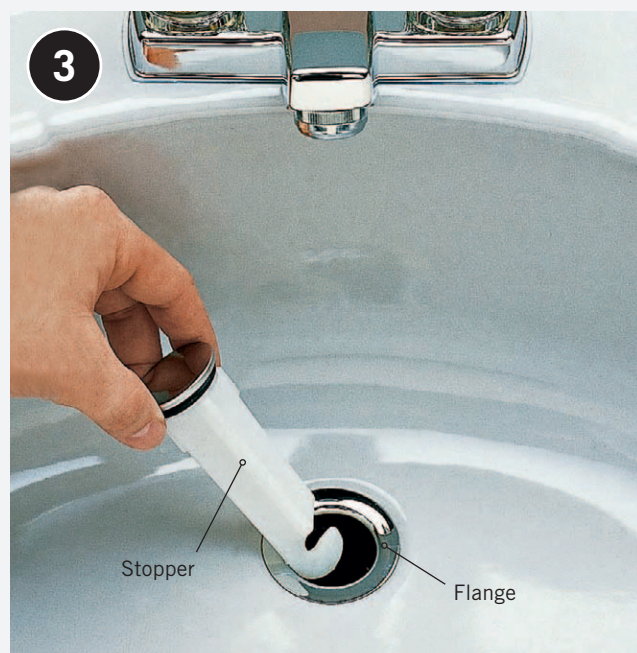
How to Replace a Pop-Up Stopper



Put a basin under the trap to catch water. Loosen the nuts at the outlet and inlet to the trap J-bend by hand or with channel pliers and remove the bend. The trap will slide off the pop-up body tailpiece when the nuts are loose. Keep track of washers and nuts and their up/down orientation by leaving them on the tubes.



Unscrew the cap holding the ball-and-pivot rod in the pop-up body and withdraw the ball. Compress the spring clip on the clevis and withdraw the pivot rod from the clevis.



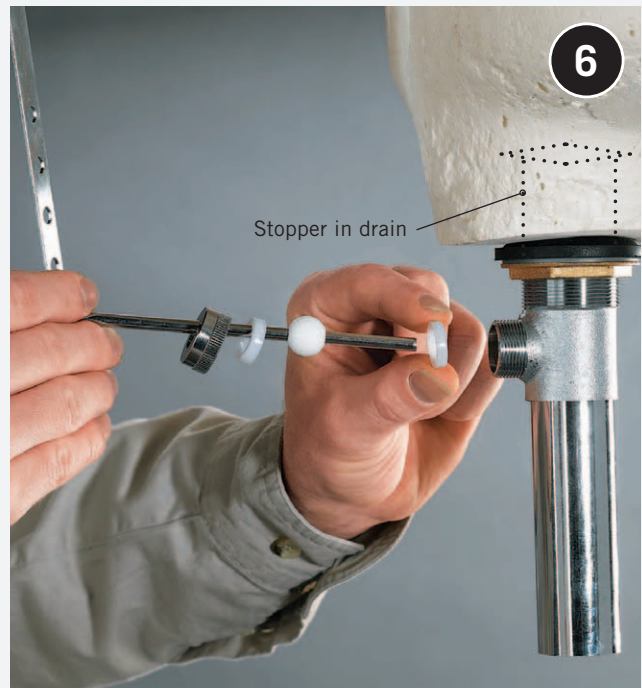
Remove the pop-up stopper. Then, from below, remove the lock nut on the stopper body. If needed, keep the flange from turning by inserting a large screwdriver in the drain from the top. Thrust the stopper body up through the hole to free the flange from the basin, and then remove the flange and the stopper body.



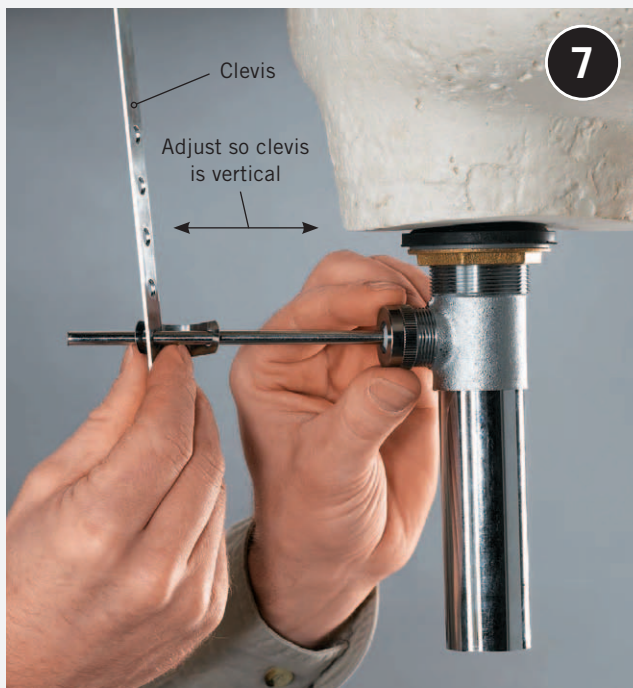
Clean the drain opening above and below, and then thread the locknut all the way down the new pop-up body followed by the flat washer and the rubber gasket (beveled side up). Wrap three layers of Teflon tape clockwise onto the top of the threaded body. Make a 1/2"-diameter snake from plumber's putty, form it into a ring, and stick the ring underneath the drain flange.



From below, face the pivot-rod opening directly back toward the middle of the faucet and pull the body straight down to seat the flange. Thread the locknut/washer assembly up under the sink, then fully tighten the locknut with channel pliers. Do not twist the flange in the process, as this can break the putty seal. Clean off the squeezeout of plumber's putty from around the flange.



Drop the pop-up stopper into the drain hole so the hole at the bottom of its post is closest to the back of the sink. Put the beveled nylon washer into the opening in the back of the pop-up body with the bevel facing back.



Put the cap behind the ball on the pivot rod as shown. Sandwich a hole in the clevis with the spring clip and thread the long end of the pivot rod through the clip and clevis. Put the ball end of the pivot rod into the pop-up body opening and into the hole in the stopper stem. Screw the cap onto the pop-up body over the ball.



Loosen the clevis screw holding the clevis strap to the lift rod. Push the pivot rod all the way down (which fully opens the pop-up stopper). With the lift rod also all the way down, tighten the clevis screw to the rod. If the clevis runs into the top of the trap, cut it short with your hacksaw or tin snips. Reassemble the J-bend trap.





Toilets

The toilet is the plumbing fixture that sees the most use. That's why toilet problems are the most common repairs that plumbers deal with, and why knowing how to tackle small malfunctions yourself can be a way to save a lot of money.

Sometimes, though, it's wise to upgrade. All toilets manufactured since 1992 have to meet the federal standard of a maximum 1.6 gallons of water per flush. Many modern models easily do better than that requirement. Water conservation has been at the forefront of toilet design evolution. But efficiency isn't the only technological advance, when it comes to this bathroom fixture.

Many toilets sold today are offered with a bidet seat built in. Bidet features—long adopted as standard in Europe—are growing in popularity across the United States. And, although separate bidets have never really caught on in America as they have in Europe, the success of aftermarket bidet seat sales has led many manufacturers to simply build the feature into their toilets. The result? Multifunctioned, supercomfortable, and extremely hygienic new toilet models.

Form always follows function in toilet design. Today's toilets come in an astounding array of styles, including one- and two-piece construction, tankless versions, wall-mounted types, and different heights to accommodate different users. If you have an older toilet in your bathroom—especially if it predates 1992—you can add a boost of comfort, convenience, and perhaps even save some money on your water bill, by upgrading to an attractive new throne.

In this chapter:

- Toilets
- Bidet Seats

Toilets

Replace an older, inefficient, leaky, beat-up toilet with a new, high-efficiency, high-quality model and you've made an investment that will save you water and frustration. Especially if your existing toilet is a pre-1992 model.

Technology has evolved so that most new toilets have wide passages behind the bowl and wide, 3-inch flush-valve openings—features that facilitate short, powerful flushes. Manufacturers also developed dual-flush technology to give the homeowner more control of the toilet; you can choose between flushing options depending on what needs to be flushed. All that technological enhancement means few second flushes and fewer clogged toilets, which were the common complaints about the first generation of 1.6-gallon low-flow toilets.

Keep in mind that amidst all this technology, the styles of modern toilets have exploded. You'll find unibody models, tankless models, wall-mounted units, and more. Even if you're shopping for a traditional look and two-piece toilet, you'll have to decide whether you want a chair height, oval or round, or a short rough-in toilet. In addition to these choices, you have to find one that fits the look of your bathroom. But with a little bit of shopping and by asking a few questions, you're sure to find a toilet that will last you the next decade or more.

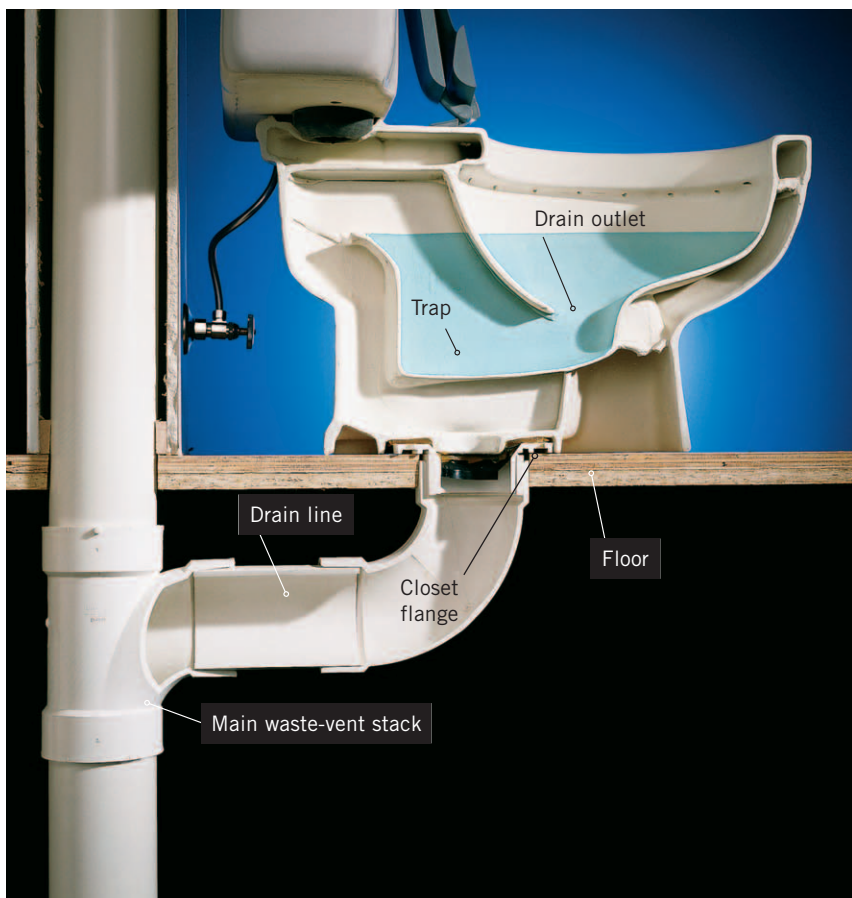


Sleek new toilet options offer attractive bathroom additions that are also more comfortable than ever before. This toilet features a compact design with a rough-in distance of 10 inches, translating to a lot of extra floor space in front of the toilet. The seat itself is positioned at chair height, making it extra comfortable for most users.



Buy a toilet that will fit the space.

Measure the distance from the floor bolts back to the wall (if your old toilet has two pairs of bolts, go by the rear pair). This is your rough-in distance and will be either 10", 12", or approximately 14". Make note of the bowl shape, round or oval (long). Oval bowls (also called elongated bowls) are a few inches longer for greater comfort, but may be too big for your space. The safest bet is to buy a replacement with the same bowl shape. You can also opt for a wall-mounted unit. Although the installation is more involved, you can save up to a foot of floor space in front of the toilet—with the added bonus of being able to mount the toilet at whatever height works best for the primary users of the room.



Knowing how a toilet works isn't

essential to successful installation, but it helps. This cutaway photo features a pre-1.6-gallon-law model, so your new toilet will have a much smaller trap. When the flush handle on the tank is depressed, the water in the tank rushes out through the hole in the underside of the bowl rim. The onrushing water forces the contents of the bowl and the trap out through the closet flange and into the drain line, while the fresh tank water refills the bowl and trap.



How to Install an Offset Toilet Flange



Most toilets sold today are 12" models, which means the distance from the wall at the tank side to the center of the drain outlet is 12". If you are replacing a toilet, the existing toilet (closet) flange might be either so close to the wall that the new model will not fit or far enough out (many older toilets are 14" fixtures) that there would be a 2" gap between the tank and wall if you installed the new model on the old flange. If your current toilet is still in place, you can determine the distance by measuring from the center of the floor bolts to the wall. Or remove the old toilet and measure from the wall to the center point of the toilet flange opening.

You can adjust the flange location by as much as 2" if you replace the old flange with an offset flange (a much easier job than moving the drain line). To remove the old flange, cut the pipe directly beneath the flange from the inside out using an internal pipe cutter chucked into your drill. Cut all the way around the pipe, and then remove the old flange.



Solvent-glue a section of new drain pipe of the correct diameter into a repair coupling, and then glue the coupling to the cut pipe in the floor repair coupling. The goal is to have fresh drain pipe of the correct height so the ring of the new flange will rest directly on the floor surface. It's not a bad idea to cut the new pipe so it is slightly overlong and then trim it to the correct height once it is installed and you can test-fit the new flange.



Position the offset flange into the drain opening and spin it until the center of the flange is in the desired position. You will most likely need to remove some flooring and subfloor to create access for the new flange. Trace around the rim of the flange.

Cut along the marked line for the new opening with a jigsaw and remove the waste. Try to avoid getting debris in the pipe opening.

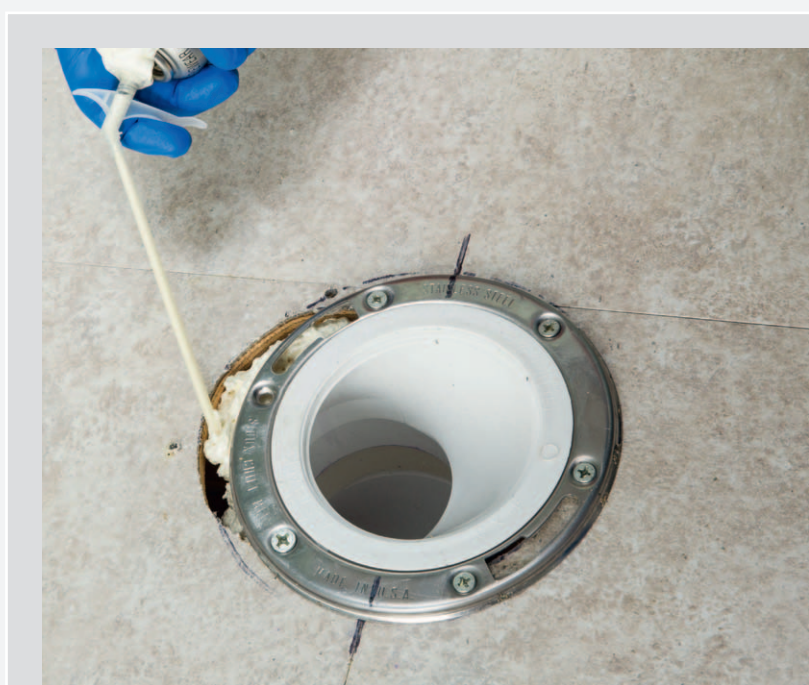


Solvent glue the new offset flange into the drain pipe, making sure it is oriented in the correct position and that the flange ring rests on the floor.

TIP: When choosing an offset flange, select a model that has a metal, not plastic, flange ring, because metal is much less likely crack or fail.



Attach the new flange to the floor by driving corrosion-resistant screws through the pre-drilled holes in the flange and into the subfloor. It is okay to skip one or two holes if there is no attaching surface below them.



OPTION: To reduce noise and air transfer, fill in the empty space around the drain pipe with minimal expanding spray foam, but if there are any more, then you should patch the subfloor beneath the flange. Install your new toilet.

How to Install a Toilet



Clean and inspect the old closet flange. Look for breaks or wear. Also inspect the flooring around the flange. If either the flange or floor is worn or damaged, repair the damage. Use a rag and mineral spirits to completely remove residue from the old wax ring.



REPLACING A FLANGE

If the old flange is solvent-welded to the closet pipe, cut the pipe flush with the floor. Dry-fit the new flange into the pipe. Turn the flange until the side cut-out screw slots are parallel to the wall. (Do not use the curved keyhole slots, as they are not as strong.) Attach the new flange with solvent glue.



Insert new closet bolts (don't reuse old ones) into the openings in the closet flange. Make sure the heads of the bolts are oriented to catch the maximum amount of flange material.



Remove the wax ring and apply it to the underside of the bowl, around the horn. Remove the protective covering. Do not touch the wax ring. It is very sticky.



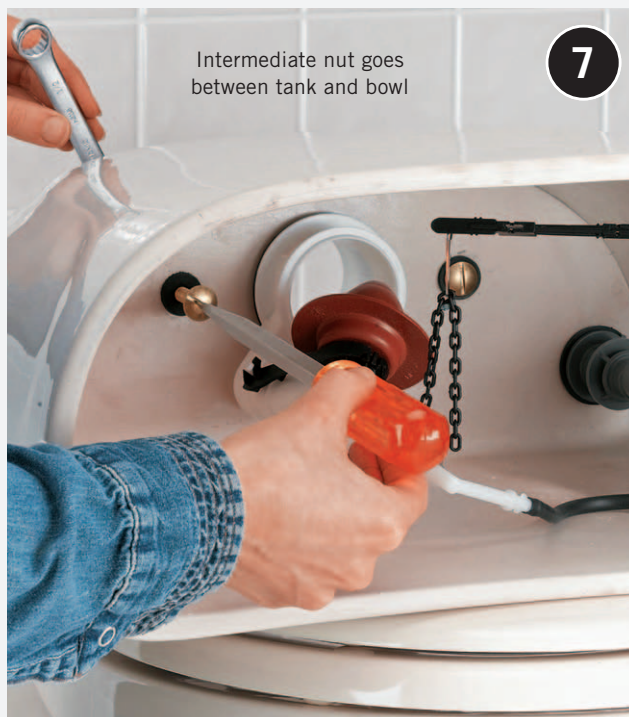
Lower the bowl onto the flange, taking care not to disturb the wax ring. The holes in the bowl base should align perfectly with the tank bolts. Add a washer and tighten a nut on each bolt. Hand-tighten each nut and then use channel pliers to further tighten the nuts. Alternate back and forth between nuts until the bowl is secure. Do not overtighten.



Attach the toilet tank. Some tanks come with a flush valve and a fill valve preinstalled, but if yours does not, insert the flush valve through the tank opening and tighten a spud nut over the threaded end of the valve. Place a foam or rubber spud washer on top of the spud nut.



Adjust the fill valve as directed by the manufacturer to set the correct tank water-level height and install the valve inside the tank. Hand-tighten the nylon lock nut that secures the valve to the tank (inset photo) and then tighten it farther with channel pliers.



With the tank lying on its back, thread a rubber washer onto each tank bolt and insert it into the bolt holes from inside the tank. Then, thread a brass washer and hex nut onto the tank bolts from below and tighten them to a ¼-turn past hand tight. Do not overtighten.

(continued)



Position the tank on the bowl, spud washer on the opening, bolts through bolt holes. Put a rubber washer followed by a brass washer and a wing nut on each bolt and tighten these up evenly.



You may stabilize the bolts with a large slotted screwdriver from inside the tank, but tighten the nuts, not the bolts. You may press down a little on a side, the front, or the rear of the tank to level it as you tighten the nuts by hand. Do not overtighten and crack the tank. The tank should be level and stable when you're done.



Hook up the water supply by connecting the supply tube to the threaded fill valve with the coupling nut provided. Turn on the water and test for leaks.



Attach the toilet seat by threading the plastic or brass bolts provided with the seat through the openings on the back of the rim and attaching nuts.



TOILET HEIGHT EXTENDERS

Although today's toilets are being made with higher seats than in the past, physically challenged and elderly people often find it difficult to use standard toilets, especially compact toilets (most of the more inexpensive toilets are compact). To address the problem of low toilet seats, you can retrofit your toilet with a seat riser or reinstall the toilet on a platform.

Hinged seat risers: By replacing your old toilet seat with a riser seat, you can raise the functional height of the toilet by 3" to 4". Look for models that are hinged or removable for easy cleaning. This is the least expensive option.

Wall-mounted toilets: If you're willing to spend significantly more, you can install a wall-mounted unit to whatever height is most comfortable for the user. These are especially effective in bathrooms used by someone who uses a wheelchair or walker.



Remove the old seat. If the nuts for the seat bolts are corroded, slip a hacksaw blade between the hinge plates and stool and cut the bolts.



Install the new height extender by bolting it to the stool through the seat-bolt holes. Attach a standard toilet seat to the extender.

Bidet Seats

The American homeowner is increasingly embracing the European bathroom convenience of a bidet. If you want to switch your conventional toilet to include a bidet function, you can either buy a whole new bidet-toilet or install a separate bidet. Either of those options is expensive, and a stand-alone bidet requires a fairly large bathroom with lots of extra floorspace. However, there is a third option: the bidet seat.

This is a retrofit feature that replaces your existing toilet seat. It is an easy and achievable home-improvement project. You won't need special plumbing skills, just a couple of hours of free time and some basic tools.

You'll probably spend more time picking out your bidet seat. There are several considerations, starting with the shape. You'll need to know whether your toilet has a round or oval bowl, to buy the correct shape of seat. You'll also have to decide on a budget. Bidet seats range from inexpensive, battery-operated units that dispense only cold water, to pricier upscale models that plug in to a power source, have a separate remote, multiple features and adjustments, and include an integral heater.

Fortunately, regardless of what seat you choose, it will be easy to install. Just be clear that for a plug-in model, you'll need a GFCI outlet close to the toilet. All the hardware needed for the installation is usually included with the seat.



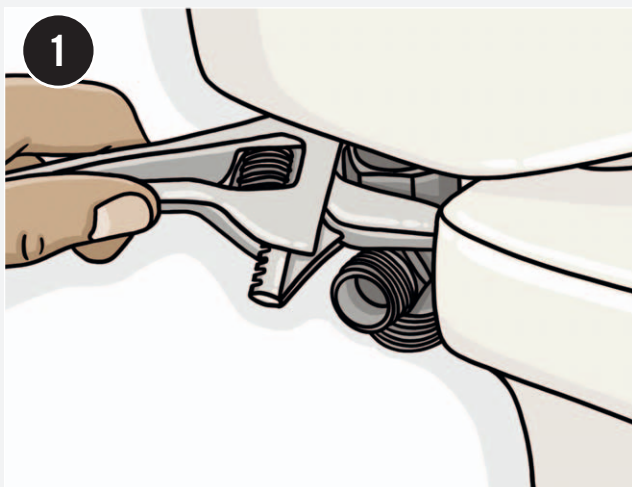
TOOLS + MATERIALS

- New bidet toilet seat
- Adjustable wrench
- Bucket
- Sponge
- Drill and bits
- Wall anchors and screws



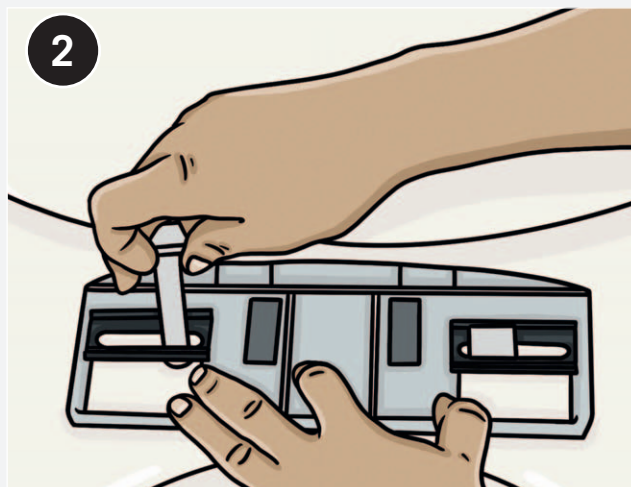
The right bidet seat looks like an original part on your existing toilet, but raises the bar in terms of comfort and hygiene.

How to Install a Bidet Toilet Seat

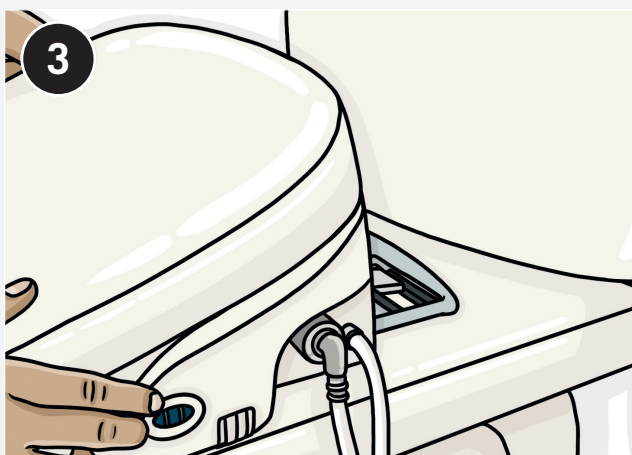


Remove the existing toilet seat. Turn off the water supply to the toilet tank. Hold the flush handle down until the tank has drained. Disconnect the supply hose at the tank fill valve, using a small bucket to catch any remaining water in the tank. Put the washer, oriented correctly, in the tank-side of the T valve. Fasten the new T valve onto the tank fill valve, snugging it hand tight, and ensuring the T inlet is pointed away from the toilet.

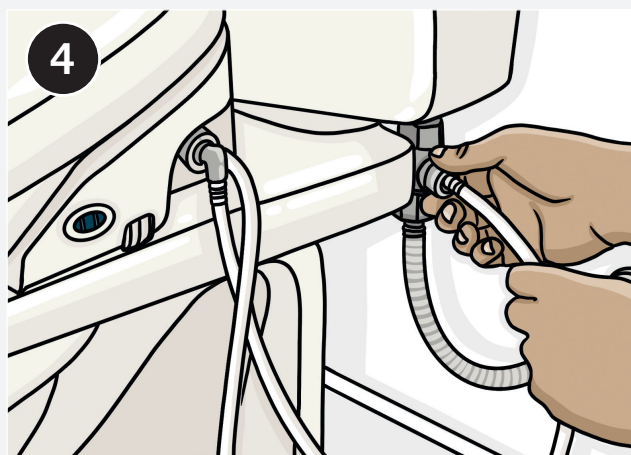
NOTE: Some models of bidet seats require the new T valve be connected to the angle stop valve. Follow the manufacturer's directions.



Clean the top of the toilet around the seat mounting holes. Put the bidet seat mounting plate in place over the holes. Click the adjustable brackets into the plate, and put each bolt through the bracket and plate, and down into the holes.



Screw the nuts to the bolts and hand-tighten, leaving them just loose enough that the seat position can be adjusted after installation. Fasten the end of the supplied water hose to the bidet seat inlet. Slide the seat into the mounting plate until you hear a click. Adjust the seat position and tighten the seat bolts down snug.



Hand-tighten the opposite end of the bidet supply hose to the open T valve outlet. Turn on the water and check for leaks. Plug in the power for the bidet seat. The power light should come on. Put the battery in the remote, and use wall anchors to fasten the remote bracket to the wall within easy reach of the toilet. Set up the remote and initiate the seat features following the manufacturer's instructions.





Lighting + Ventilation

Bathroom ventilation and lighting are essential to how pleasant and appealing the room will be. The right vent fan clears stale air, odors, and steam from the room quickly and efficiently. The perfect lighting highlights the best design details and makes the space safer, easier, and more pleasant to use.

Start with the ventilation, because vent fans and overhead lights are often combined into one fixture (which streamlines how much installation and work you or your electrician will need to do). Any bathroom ventilation has to be powerful enough—measured in cubic feet per minute (CFM)—to effectively replace the air in the room with fresh air at least 8 times an hour. CFMs are listed on vent fans, and manufacturers often include charts that match the square footage of your bathroom with the ideal CFM rating. If your current vent fan is too noisy for you, newer units include “quiet” technology that makes them almost silent. You can determine the noise the fan makes before you buy by checking the sones rating on the box (a sone is a measure of loudness).

Lighting is just as important because it is both a safety and a design element. As in other rooms in the house, the lighting in any bathroom should follow a thoughtful layered plan. General ambient light is usually supplied by an overhead fixture or fixtures. Task lighting for bath, shower, and sink areas, is crucial and often code-mandated. Accent lights can help fill in distracting and unappealing shadows.

All that considered, sink and vanity lighting is going to have the greatest impact in your day-to-day life. Where once light fixtures were normally placed above the mirror, they are now usually located alongside it (and new bathroom mirrors can include LED lighting behind the mirror). This makes the image in the mirror crisper and more accurate to what someone meeting you would see. That translates to less of a challenge in applying cosmetics, and a safer daily shave. If your budget can accommodate it, a mirror with built-in LED lighting provides even more comprehensive and effective ultimate illumination.

In this chapter:

- Vanity Lights
- LED-Backlit Mirror
- Ceiling Lights
- Vent Fans

Vanity Lights

Many bathrooms have a single fixture positioned above the vanity, but a light source in this position casts shadows on the face and makes grooming more difficult. Light fixtures on either side of the mirror is a better arrangement.

For a remodel, mark the mirror location, run cable, and position boxes before drywall installation. You can also retrofit by installing new boxes and drawing power from the existing fixture.

The light sources should be at eye level; 66 inches is typical. The size of your mirror and its location on the wall may affect how far apart you can place the sconces, but 36 to 40 inches apart is a good guideline.



TOOLS + MATERIALS

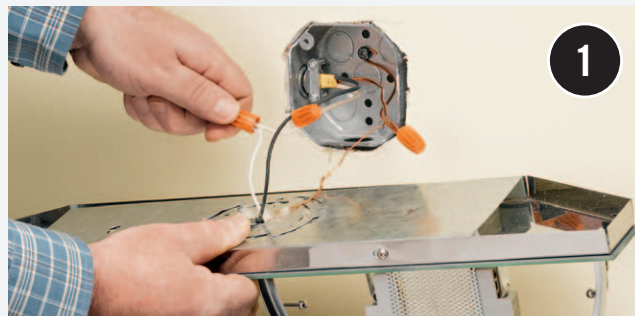
Drywall tools	Vanity light fixtures
Drill and bits	NM cable
Combination tool	Wire connectors
Circuit tester	Drywall
Screwdrivers	Eye protection
Hammer	Work gloves
Electrical boxes and braces	Wire strippers
	Wire nuts



Vanity lights on the sides of the mirror provide ideal lighting for shaving, applying makeup, and other grooming tasks.



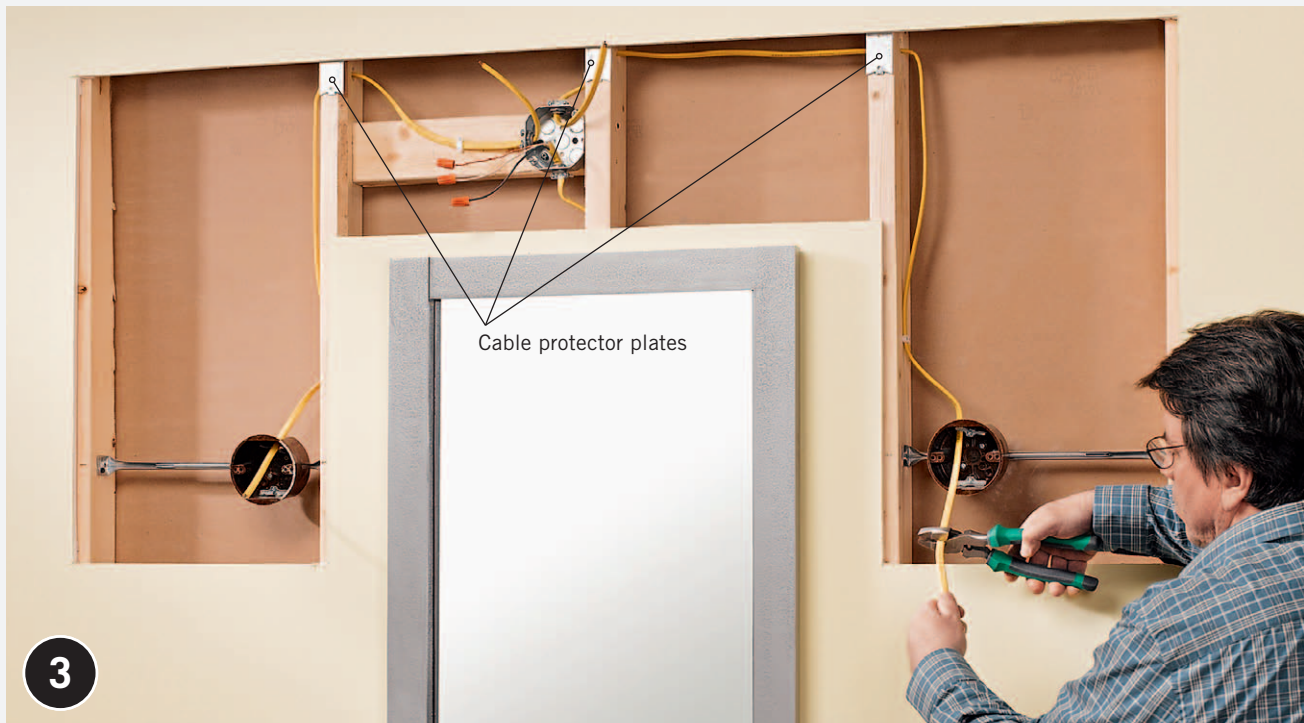
How to Replace Vanity Lights in a Finished Bathroom



Turn off the power at the service panel. Remove the old fixture from the wall and test to make sure that the power is off. Then remove a strip of drywall from around the old fixture to the first studs beyond the approximate location of the new fixtures. Make the opening large enough that you have room to route cable from the existing fixture to the boxes.



Mark the location for the fixtures and install new boxes. Install the boxes about 66" above the floor and 18 to 20" from the centerline of the mirror (the mounting base of some fixtures is above or below the bulb, so adjust the height of the bracing accordingly). If the correct location is on or next to a stud, you can attach the box directly to the stud; otherwise you'll need to install blocking or use boxes with adjustable braces (shown).



Open the side knockouts on the electrical box above the vanity. Then drill $\frac{5}{8}$ " holes in the centers of any studs between the old fixture and the new ones. Run two NM cables from the new boxes for the fixtures to the box above the vanity. Protect the cable with metal protector plates. Secure the cables with cable clamps, leaving 11" of extra cable for making the connection to the new fixtures. Remove sheathing and strip insulation from the ends of the wires.



Connect the white wires from the new cables to the white wire from the old cable, and connect the black wires from the new cables to the black wire from the old cable. Connect the ground wires. Cover all open boxes and then replace the drywall, leaving openings for the fixture and the old box. (Cover the old box with a solid junction-box cover plate.)



Install the fixture mounting braces on the boxes. Attach the fixtures by connecting the black circuit wire to the black fixture wire and connecting the white circuit wire to the white fixture wire. Connect the ground wires. Position each fixture over each box, and attach with the mounting screws. Restore power and test the circuit.

LED-Backlit Mirror

Traditionally, the standard light source for smaller bathrooms and powder rooms is a light fixture above the mirror. This was often the only solution for vanity mirror lighting where there is little or no space on the sides of the mirror. Now, however, there is an interesting option: lighting that is emitted by the mirror itself.

LED-illuminated mirrors use a base that contains LED strips that provide backlight from around the edges of the mirror or an LED frame that actually shines through the mirror when turned on. This type of mirror is not particularly expensive, is fairly easy to install, and can add brilliantly useful lighting in cramped quarters.

The wiring for our mirror features an ordinary circuit plug that fits into a standard 115- or 120-volt outlet. Installation is quite easy if you happen to have a wall outlet located on the wall directly behind where your mirror will be installed. If not, then you will need to install (or have an electrician install) a standard wall outlet behind the mirror location. Our project assumes that this wall outlet already exists or has been preinstalled. You will need competent wiring skills if you expect to do this work yourself; if you are not skilled at such work, hire an electrician to run new cable and install the wall outlet.



An LED-backlit mirror adds a special element to a small—or even a large—bathroom, but the real benefit is a true-to-life representation in the mirror so you'll see exactly what other people will see.



TOOLS + MATERIALS

Tape measure

Drill and bits

Eye protection

Carpenter's pencil

Torpedo level

Work gloves

Stud finder



How to Install an LED-Illuminated Mirror



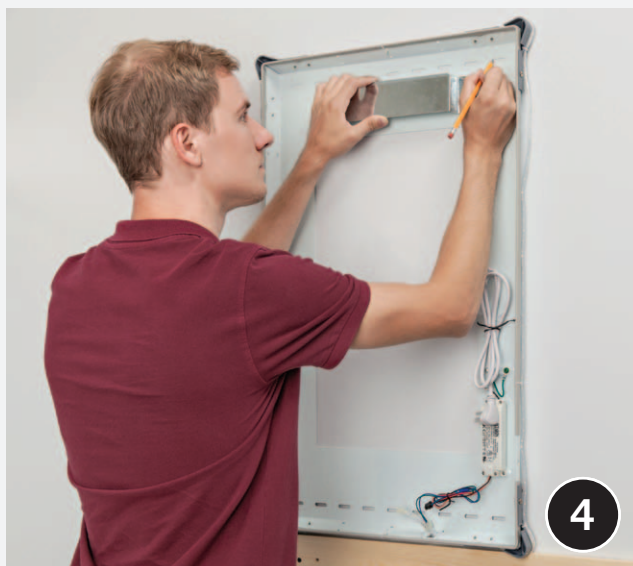
Unpack the LED mirror and place it face down on a flat surface. Examine the kit to make sure all parts are included. Make sure the necessary circuit wiring is done, based on the instructions with the LED kit. The following steps assume that the circuit wiring is complete before you continue. In our example, the assumption is that a simple circuit extension from the wall vanity light has been installed, so that the same switch that controls the wall light fixture will control the LED mirror.

Detach the mirror from the base by loosening the mounting screws. If your mirror has illuminated LED strips, there may also be wire connections running from the base to the mirror panel that need to be detached before you go any further.





Remove the mirror base from the mirror panel. Establish a level line on the wall to mark where the bottom of the mirror will go. Installing a temporary ledger board along this line can help make installation easier.



Position the mirror base against the wall, and mark the location for the mounting holes on the wall. Ideally, you should be able to find locations over studs where you can mount the mirror base securely. Should this not be possible, you will need to attach plastic wall anchors to secure the mirror base or use toggle bolts to secure the mirror to the wall.



Secure the mirror base to the wall by driving mounting screws into wall studs, both at the top and bottom of the mirror on both sides. If you have access to wall studs on both sides, four screws driven near each corner should be sufficient to mount the mirror base securely. Plug in the electrical cord on the mirror base into the wall outlet.



Holding the mirror panel in place, use the quick-fit connector to establish the electrical connection between the mirror panel and the base. This work is easiest if you have a helper hold the mirror panel as you plug in the wiring.



Carefully hang the mirror panel onto the mounting bracket on the base. Align the mirror panel so the mounting screws are properly positioned.



Secure the mirror panel to the base using the mounting screws included with the kit. Test the LED mirror to make sure it works properly.

Ceiling Lights

Bathroom ceiling fixtures usually don't have moving parts, and their wiring is simple. So, other than changing bulbs, you're likely to enjoy decades of trouble-free service from a bathroom fixture. Although that sounds like a pure benefit, it means that the fixture will work fine long after the style of the fixture has become unfashionable. Thankfully, you don't really need a malfunction to use as an excuse for updating a bathroom lighting fixture. New fixtures are relatively inexpensive and easy to install, and they can be one of the most dramatic changes you make to a bathroom. You can even change the type of fixture—such as replacing a traditional incandescent fixture with a newer, energy-conserving



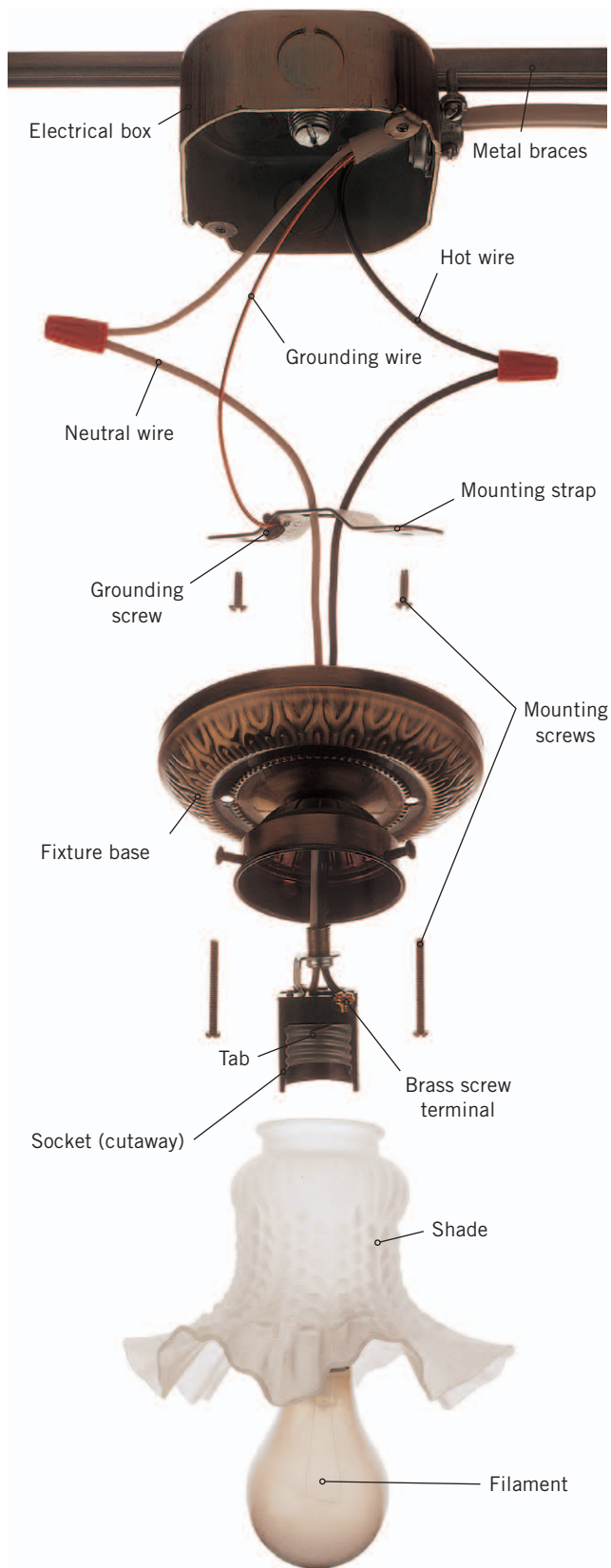
TOOLS + MATERIALS

Replacement light fixture	Wire nuts
Combination tool	Eye protection
Voltage sensor	Work gloves
Insulated screwdrivers	

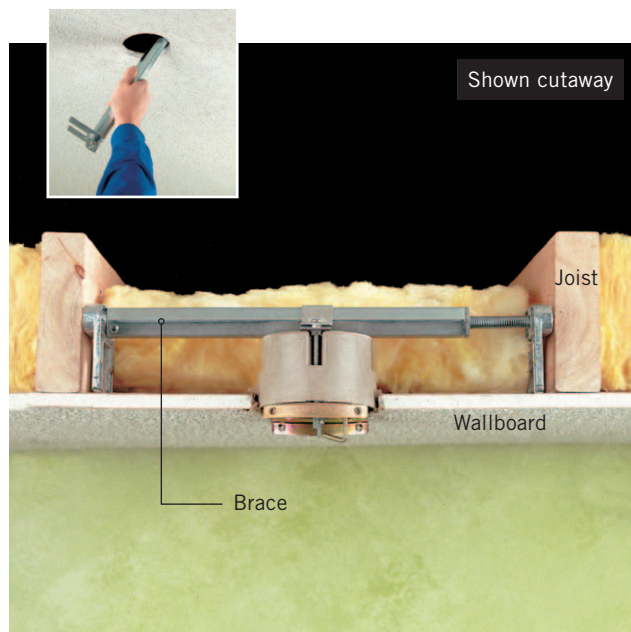
halogen fixture. Whichever you choose, make sure it suits the room's décor. It's worth considering choosing a dimmable fixture, like the one in following project, which will provide more control over the light in the room at different times.



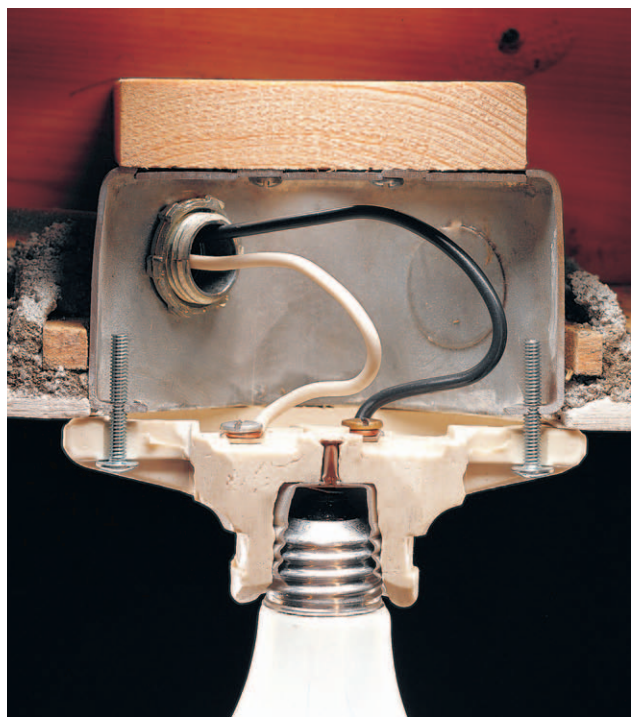
A simple overhead light like this adds useful illumination exactly where it's needed, and the basic design echoes other elements in the room. That this fixture is dimmable makes it only more adaptable and useful for the room.



No matter what a ceiling light fixture looks like on the outside, they all attach in basically the same way. An electrical box in the ceiling is fitted with a mounting strap, which holds the fixture in place. The bare wire from the ceiling typically connects to the mounting strap. The two wires coming from the fixture connect to the black and the white wires from the ceiling.



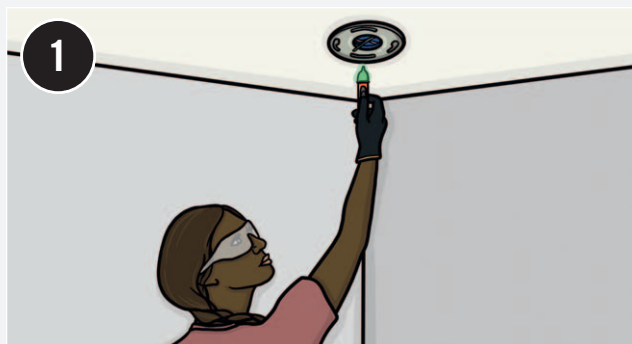
If the new fixture is much heavier than the original fixture, it will require additional bracing in the ceiling to support the electrical box and the fixture. The manufacturer's instructions should specify the size and type of box. If the ceiling is finished and there is no access from above, you can remove the old box and use an adjustable remodeling brace appropriate for your fixture (shown). The brace fits into a small hole in the ceiling (inset). Once the bracing is in place, install a new electrical box specified for the new fixture.



Inexpensive light fixtures have screw terminals mounted directly to the back side of the fixture plate. Often, as seen here, they have no grounding terminal. Some codes do not allow this type of fixture, but even if your location does approve them, it is a good idea to replace them with a better-quality, UL-approved fixture.



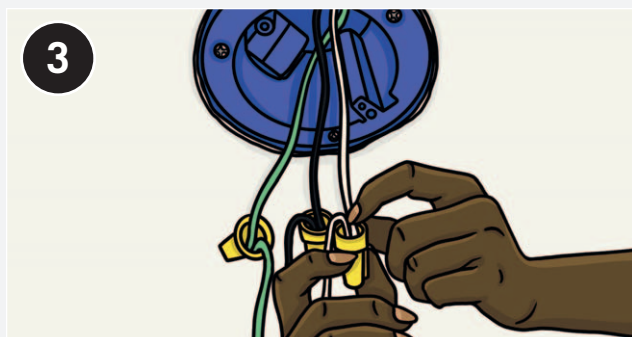
How to Install a Dimmable Bathroom Ceiling Light



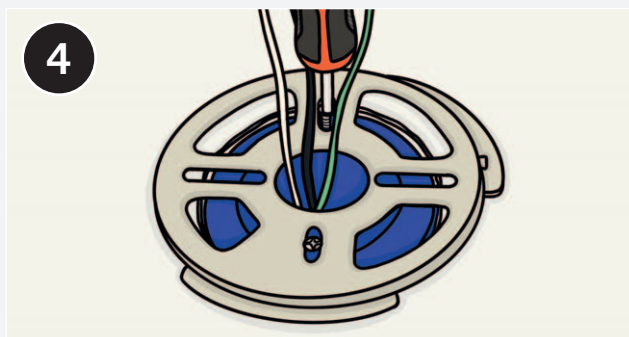
Turn the power for the bathroom off at the main breaker. Remove the shade and bulb from the existing fixture, and unscrew the base from the mounting plate or electrical box. Pull the fixture down, and test with a circuit tester that the wires carry no current. Unscrew the wire nuts. Discard the old wire nuts.



Remove all the pieces for the new fixture and lay them out on a clean towel. Make sure you have all the pieces of the assembly before you begin, as well as new wire nuts (most manufacturers supply these).

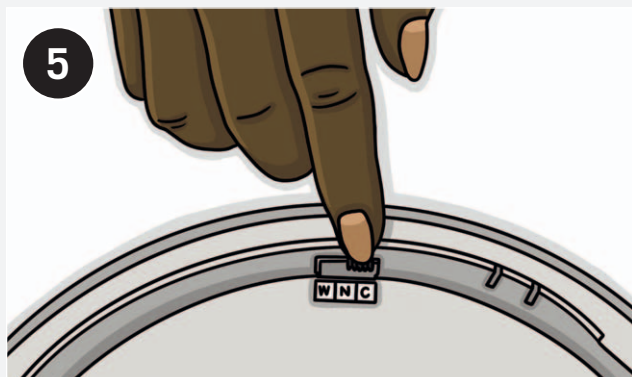


Hold up the base plate and connect the fixture wires to the box wires: green or bare to green or bare, black to black, and white to white. Secure the connections with wire nuts. Screw the supplied mounting screws into the junction box, leaving them loose.

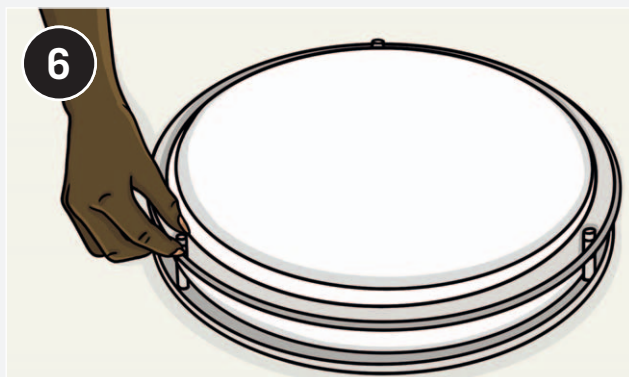


Carefully press the wires into the box. Twist the base plate onto the mounting screws, and then tighten the screws snug to the junction box. On older boxes, you may need to install a mounting strap.

NOTE: Some units use a twist-on mounting plate for the fixture base. In that case, the mounting plate is first screwed into the junction box, and then the fixture base wires are connected to the wires from the box.



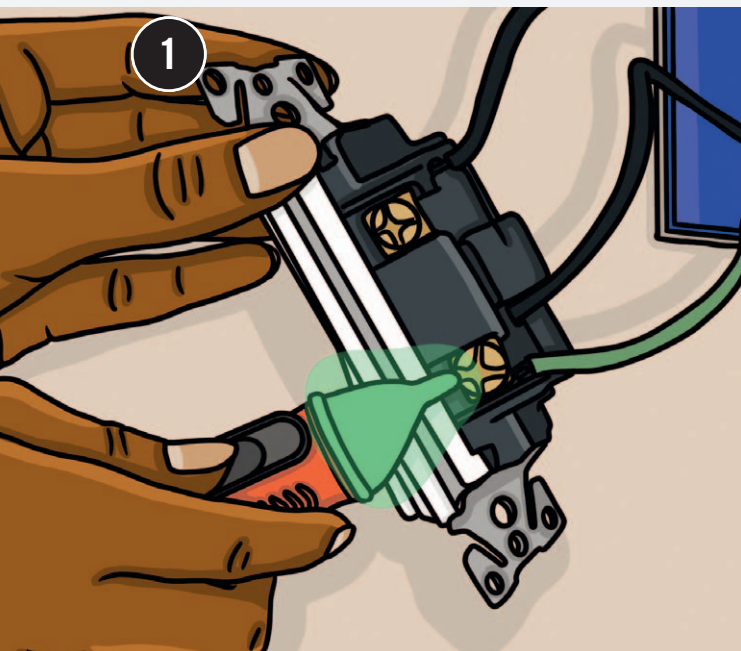
Set the warmth of the light with the fixture switch before installing the shade and any frame. This is also where you select a color, if your fixture offers different colors.



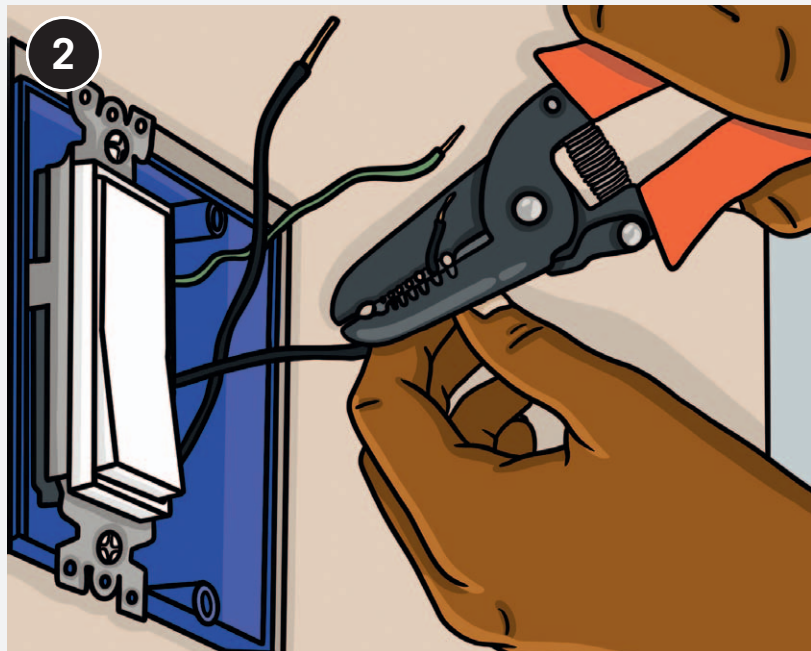
Turn on the power, and then turn on the light to check that it works. Once you're happy that all connections have been made correctly and that the light is functioning properly, attach the shade and frame (if any) to the base plate with the supplied thumb nuts.



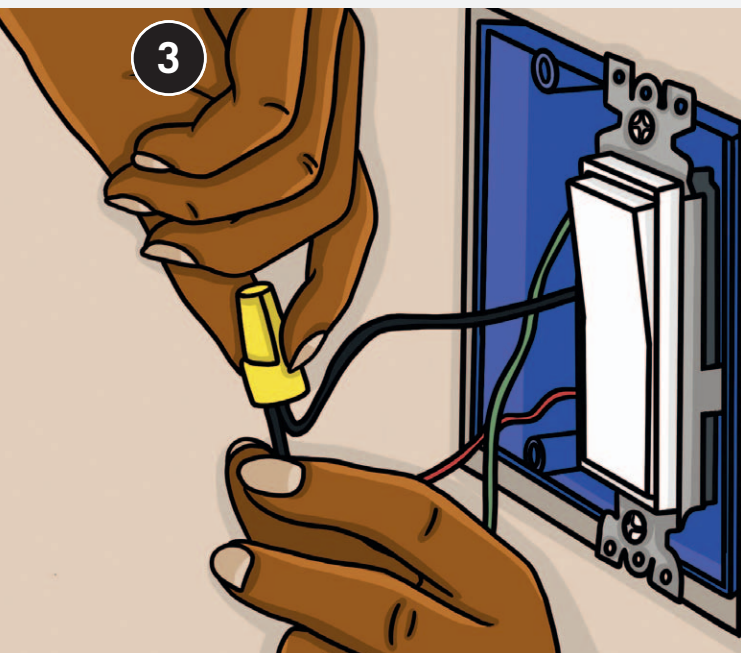
How to Install a Bathroom Dimmer Switch



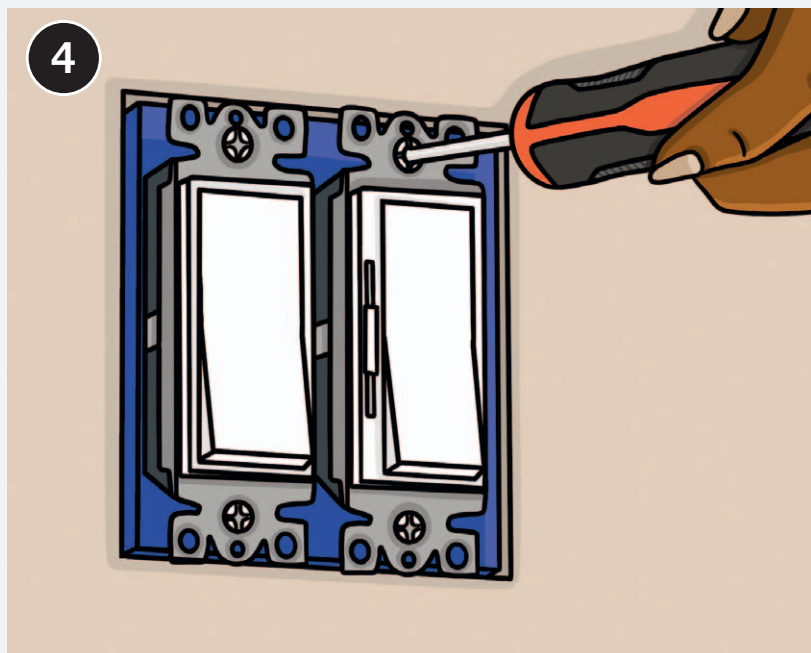
Turn off the power to the bathroom. Remove the switch faceplate and unscrew the switch from the box. Use a circuit tester to ensure the switch wires are not live.



Unscrew the wires from the switch, marking them as necessary. Cut and strip wires as needed to make clean connections.



Use new wire nuts to connect the wires from the dimmer switch to the box wires. Connect the box bare or green to the switch's green wire, and the switch's black wires to the box red and black wires (it doesn't matter which).



Wrap each nut connection in electrical tape. Stuff the wires into the box and screw the dimmer switch to the box. Replace the faceplate, or install any new faceplate the dimmer switch came with, and turn the power on. Check that the light works properly and dims as it should.

Vent Fans

For most of us, a dream bathroom does not include foggy mirrors or unpleasant odors. Opening a window, if your bathroom is equipped with one, can help, but vent fans do the best job of clearing the air.

Most vent fans are installed in the center of the bathroom ceiling or over the toilet area. A fan installed over the tub or shower area must be GFCI protected and rated for use in wet areas. You can usually wire a fan with a light fixture into a main bathroom electrical circuit, but units with built-in heat lamps or blowers require separate circuits.

If the fan you choose doesn't come with a mounting kit, purchase one separately. A mounting kit should include a vent hose (duct), a vent tailpiece, and an exterior vent cover.

Venting instructions vary among manufacturers, but the most common options are attic venting and soffit venting. Attic venting routes fan ductwork into the attic and out through the roof. Always insulate ducting in this application to keep condensation from forming and running down into the motor. Carefully install flashing around the outside vent cover to prevent roof leaks.

Soffit venting involves routing the duct to a soffit (roof overhang) instead of through the roof. Check

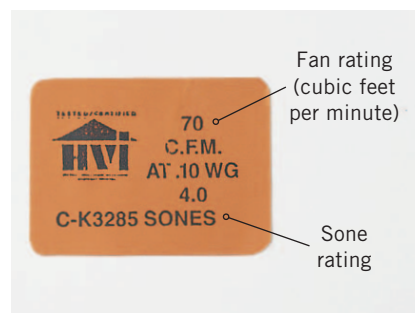


TOOLS + MATERIALS

Pencil	Vent cover
Screwdrivers	Drywall
Jigsaw or drywall saw	4" hole saw
Reciprocating saw	Wire stripper or combination tool
Drill and bits	Fish tape
Electrical tester	Drywall tape
Drywall screws	Drywall compound
Wire nuts	Eye protection
Flexible dryer vent duct	Work gloves
Dryer vent clamps	

with the vent manufacturer for instructions for soffit venting. To prevent moisture damage, always terminate the vent outside your home—never into your attic or basement. You can install a vent fan while the framing is exposed or as a retrofit, as shown in this project.

A combination light/vent fan is a great product in powder rooms and smaller baths that do not generate excessive amounts of air moisture. In larger baths with tubs and showers, install a dedicated vent fan with a CFM rating that's at least 5 CFM higher than the total square footage of the bathroom.

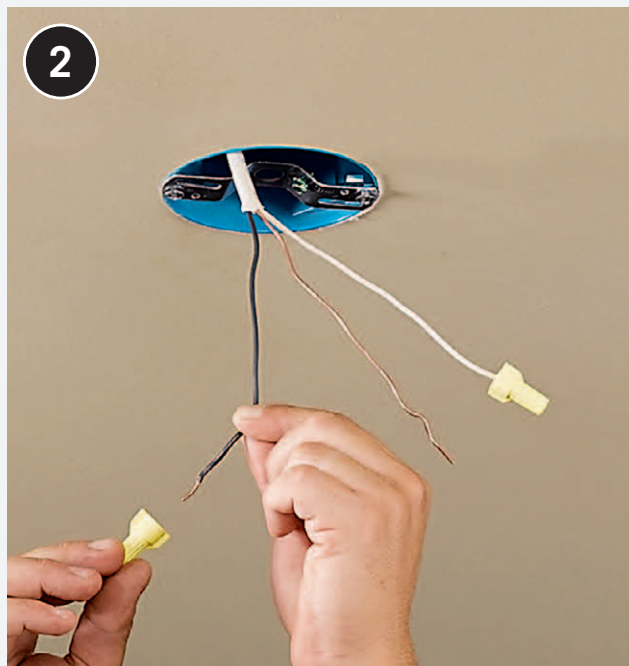




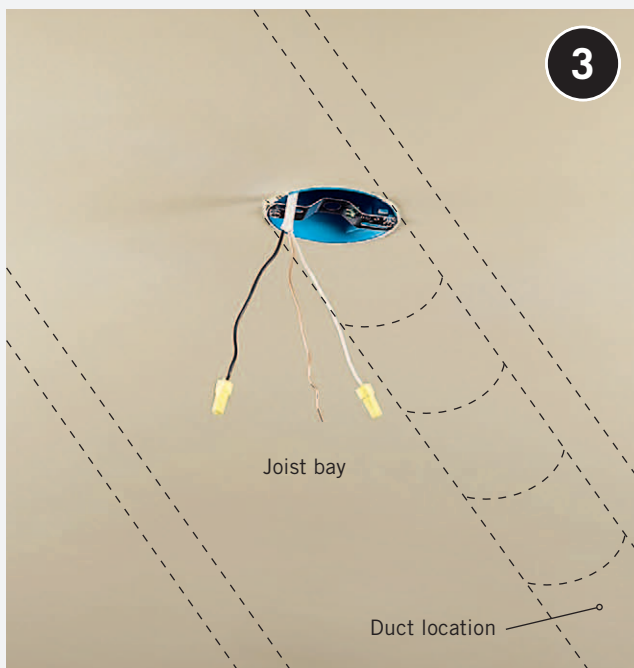
How to Replace an Overhead Light with a Light/Fan



Shut off power to the ceiling light at the electrical service panel. Remove the globe and bulb from the overhead ceiling light, and then disconnect the mounting screws that hold the light fixture to the ceiling box.



Test the wire connections with a current tester to make sure they are not live, and then disconnect the wires and remove the light fixture. Cap the wire ends.

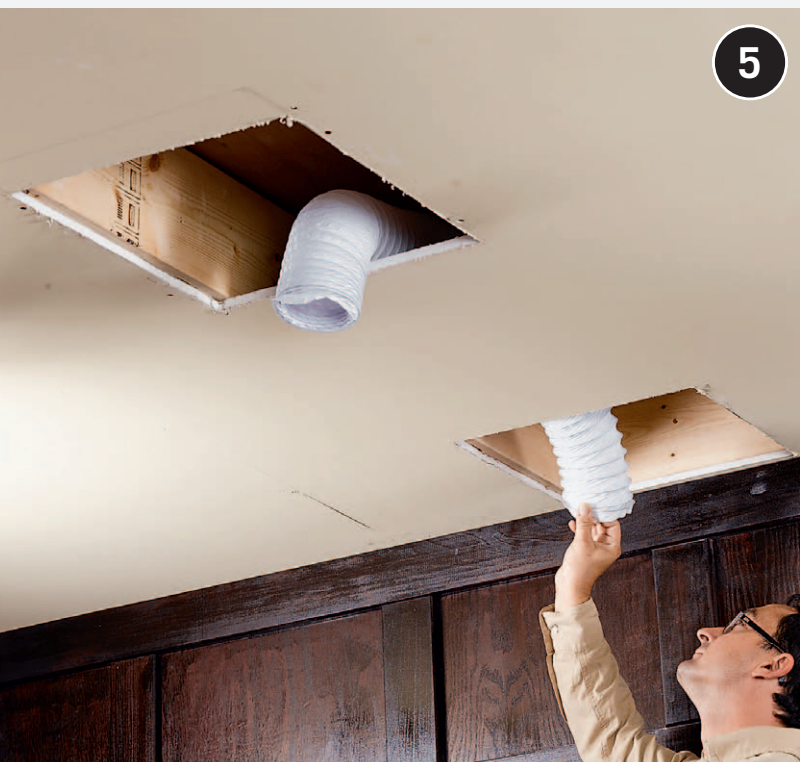


Plan your exhaust-pipe route. In most cases, this means determining the shortest distance between the fan and the outdoors. If the room is located at the top living level, venting through the roof is usually smartest. On lower levels and in basements, you'll need to go through an exterior wall. If you need to route through a wall in a room with a finished ceiling, choose a route that runs through a single ceiling joist bay.

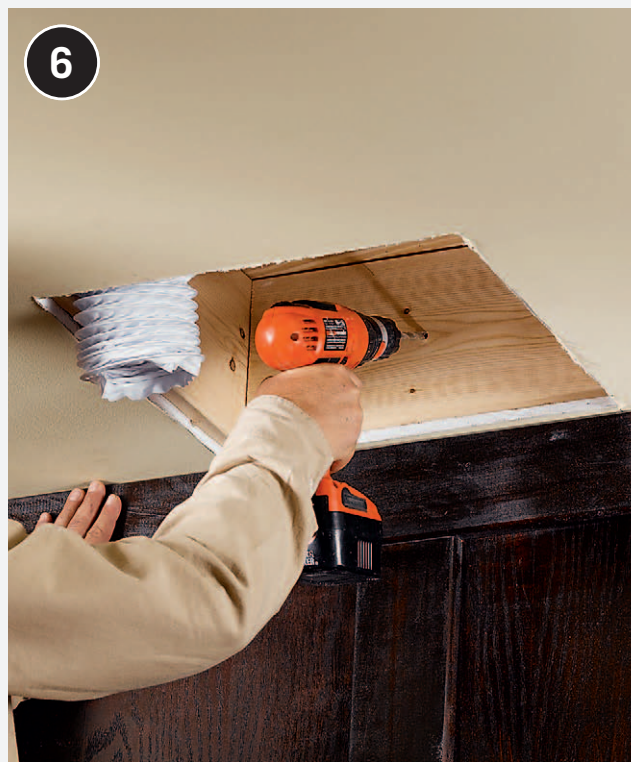


Remove ceiling covering in the fan-unit installation area and between the joists at the end of the run, next to the wall. You'll need at least 18" of access. If you are running rigid vent pipe or the joist bay is insulated, you'll need to remove ceiling material between the joists for the entire run. Make cuts on the centerlines of the joists.

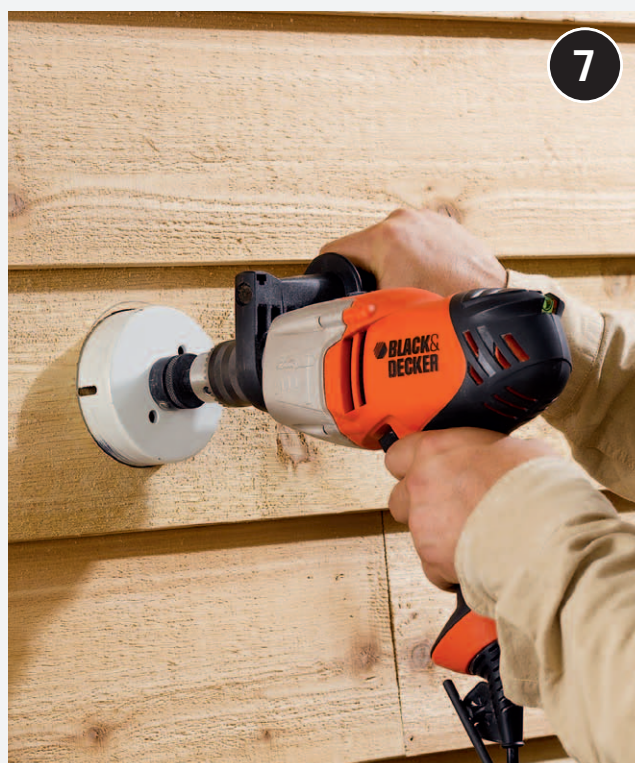
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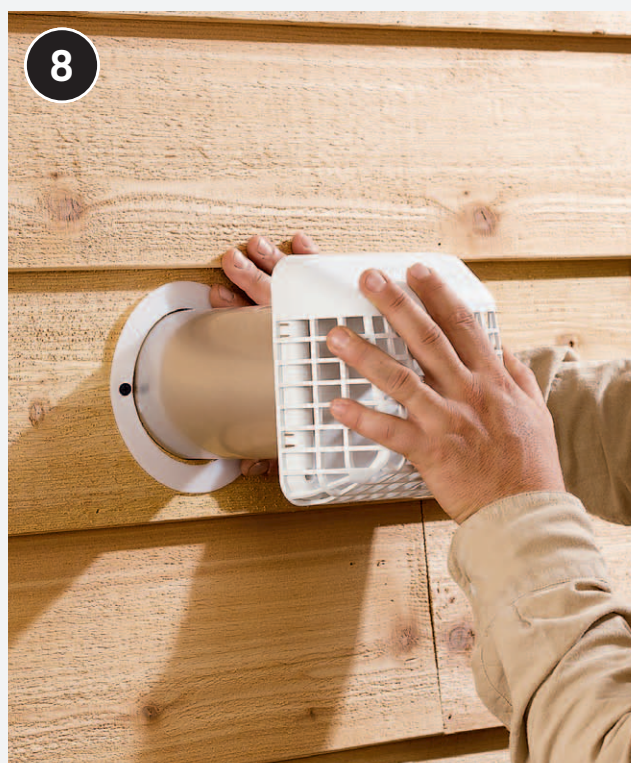
Insert flexible vent tubing into one of the ceiling openings and expand it so the free end reaches to the ceiling opening at the wall. A fish tape for running cable through walls can be a useful aid for extending the tubing.



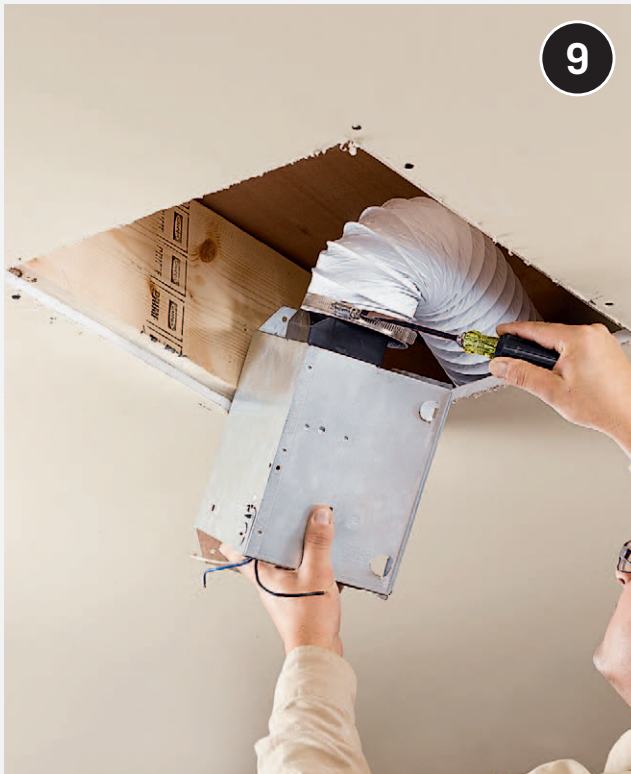
Draw a 4"-diameter circle on the wall framing at the end of the joist bay, marking the exit point for the duct. Choose a long, ¼"-diameter drill bit and drill a hole at the center of the circle. Drill all the way through the wall so the bit exits on the exterior side. This will mark your hole location outside.



On the exterior, draw a 4"-diameter circle centered on the exit point of the drill bit. Cut out the opening for the vent cover with a reciprocating saw or a 4" hole saw.



Insert the vent-cover assembly into the opening, following the manufacturer's directions for fastening and sealing it to the house.



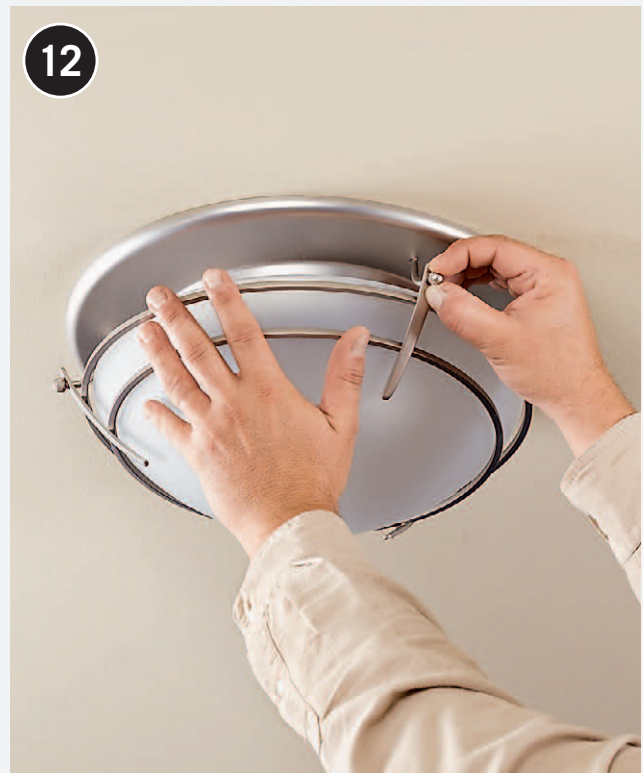
Attach the end of the vent tubing to the outlet on the vent-cover unit and secure it with a large pipe clamp.



Nail the housing for the light/fan unit to the ceiling joist so the bottom edges of the housing are flush with the ceiling surface.



Make the wiring connections in the housing box according to the manufacturer's instructions. In just about every case you should be able to use the existing wires from the original light switch. Once you have connected the wires, restore the power and test the fan.



Patch and paint the wall and ceiling in the project area. Mount the light (the model we installed plugs into a receptacle in the fan box), grille, globe, and any other fixture parts.





Wall + Floor Projects

The surfaces in your bathroom are the canvas for your design vision. They are the largest visual element in the room and can set the stage for the fixtures you've chosen. Although some flooring, such as carpeting, simply isn't appropriate for the bathroom, the range of flooring that is has expanded in recent years thanks to the advent of moisture-resistant laminate.

Flooring should take safety and looks into consideration. For anyone who might have mobility issues, a textured floor that is less likely to be slippery when wet, will be the better option than something like marble tile. In a busy bathroom used by kids in the family, you'll probably have to balance durability with appearance. Fortunately, function, sturdiness, and form go hand in hand in most modern bathroom options.

You can choose from real stone, marble, or granite tiles, or laminates and marmoleum that convincingly mimic the look of those materials. These easy-to-install options come in other appearances as well, including different species of wood flooring.

Tile remains a popular option for both floor and wall bathroom surfaces. Long lasting, light-reflecting, and offered in an amazing array of colors, sizes, and materials—including attractive glass tiles—it's hard to think of a look you can't have in tile. Tile is, however, relatively expensive and will normally involves grout lines that will need to be regularly cleaned.

Your bathroom walls offers the same gamut of design options. Painting is easy to do, rewarding, and opens up an amazing palette of colors. Paint an accent wall in a bold color, and pair it with a backsplash of luxury tile and you've used the most expensive material in the smallest space possible, while getting huge visual bang for your buck.

In this chapter:

- Installing Cement board
- Wall Tile
- Tub Tile Surround
- Toilet Enclosure
- Radiant Floor Heating
- Floor Tile

Installing Cement Board

Cement board is ideally suited for bathroom surfaces; in fact, it was developed as a moisture-resistant cladding for floors, walls, and countertops in areas regularly exposed to water. As the name implies, it is essentially layers of cement sandwiching fiberglass mesh. This creates a waterproof surface that won't swell or warp even with long-term exposure to moisture. Unlike drywall, cement board is normally sold in 3 × 5-foot sheets.

It's the base of choice for tiles. Laying tile on a subsurface of plywood is a bad idea because the wood is prone to swelling and deforming with exposure to water. However, cement board, also known as "backer board" is a great choice regardless of the surfacing you're putting on top of it.

As generally impermeable as cement board is, it's standard practice to use a vapor barrier between wall studs and board, as an added layer of protection. This is usually polyethylene sheet or 15# roofing felt. Polyethylene sheet is normally sold in 10-foot-wide and, less often, 4-foot-wide rolls. Roofing felt is sold in 3-foot-wide rolls. If you can't cover the wall with a single layer from a 10-foot-wide roll, overlap the material at least 2 inches for horizontal seams, and 6 inches for vertical seams and corners. A vapor barrier is often required by local codes. Attach it to studs with staples or roofing nails. Make sure all fasteners are flush with the surface of the studs before installing the cement board.

Before you hang anything, however, you need to carefully check the condition of the studs to which the cement board will be attached. Fix any damage or compromised studs. The same goes with a plywood subfloor. As with drywall, you should carefully plan out the placement of cement board sheets to ensure that the seams are staggered and no sheets meet in the corners (see illustrations, opposite page). When hanging cement board on a wall, sheet edges should overlap studs by exactly half the edge width.



TOOLS + MATERIALS

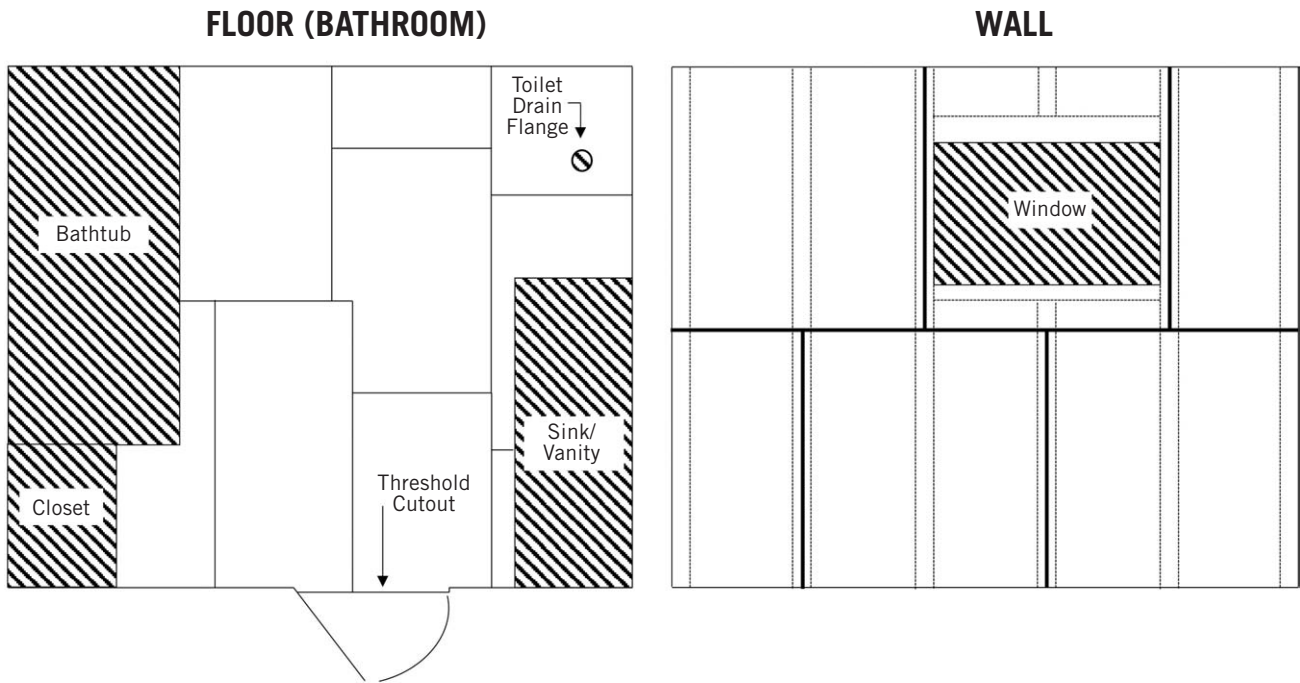
- Tape measure
- Marker
- 4' level
- Polyethylene sheet or 15# roofing felt
- Staple gun and staples
- Cement board
- Drill and bits
- Drywall screws
- Shims or spacers
- Bar clamps
- Utility knife
- Jigsaw
- Spade bit or hole saw (optional)
- Trowel
- Thin-set mortar
- Putty knife
- Fiberglass mesh tape

Attach ½"-thick cement board to the framing members horizontally with the rough side facing out.

Use 1¼" cement board screws. Fasten screws every 6" on center for ceiling applications and every 8" on center for wall applications. Keep fasteners 2" away from each corner and no less than ⅜" from the panel edges.



Sample Cement Board Layouts



Preparing the Wall



A moisture barrier consisting of 4-mil clear polyethylene sheeting can be stapled to framing members in damp areas before installing the cement board.



Asphalt roofing felt (15# building paper) can also be used as a moisture barrier behind cement board panels in damp areas.



How to Install Cement Board on a Wall



Use a level to check plumb of the studs in the room, as well as the integrity of each stud—to ensure that none are bowing or defective. Make sure there are no obstructions in the way of the cement board, and sister studs, or install blocking where necessary to provide an adequate nailing surface for any cement board cut into odd shapes to fit the space.

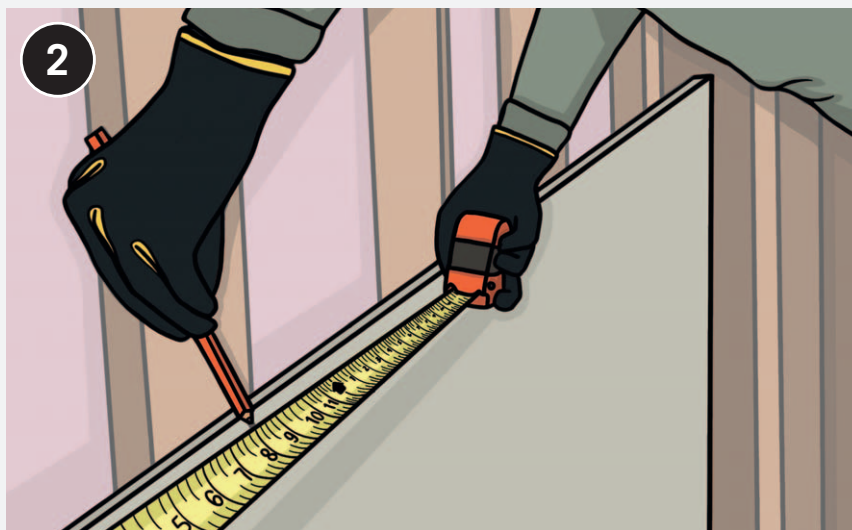


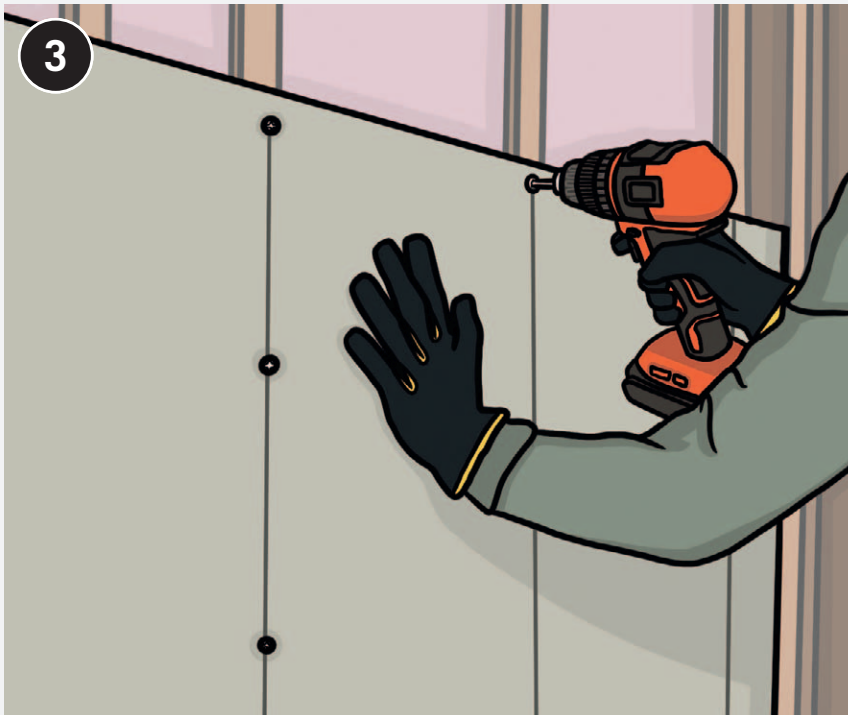
Optional: Install a vapor barrier—4- or 6-mil polyethylene sheet, stapled to the studs and overlapping by at least 6 inches.

NOTE: Many backer board manufacturers don't require a vapor barrier; you can skip this step if not required by local code and if the bathroom will not experience high levels of moisture.

Measure and mark sheets for placement.

The edge of the sheets should overlap stud faces by $\frac{3}{4}$ inch and should be laid out so that seams are staggered. Put the first sheet in position and use a level to mark the stud lines on the face of the board.





Install sheets horizontally, screwing them in place with 1¼" drywall screws or galvanized roofing screws. Screws should not be closer than ⅜" from an edge, or 2" from a corner. Use screws every 6" and set screw heads flush with the surface of the board.

NOTE: Cement board is usually installed rough side out. However, it may be installed smooth side out when you'll be using latex mastic. Check the manufacturer's recommendations.



Check measurements as you work. Maintain even ⅛" spacing between sheets, and ¼" spacing between the board and fixtures such as a tub. A shim can be used as a ¼" spacer, while a screw works well as a spacer between sheets.



To cut sheets for fitting, mark the sheet with a clear, accurate, and straight cut line. Lay it on a scrap sheet of cement board or on a wood work table. Use a straightedge and a carbide tip scoring knife (or a utility knife) and cleanly score the cut line repeatedly.

NOTE: Clamping full cement board sheets to a work table for cutting can ensure accuracy and make the process easier.



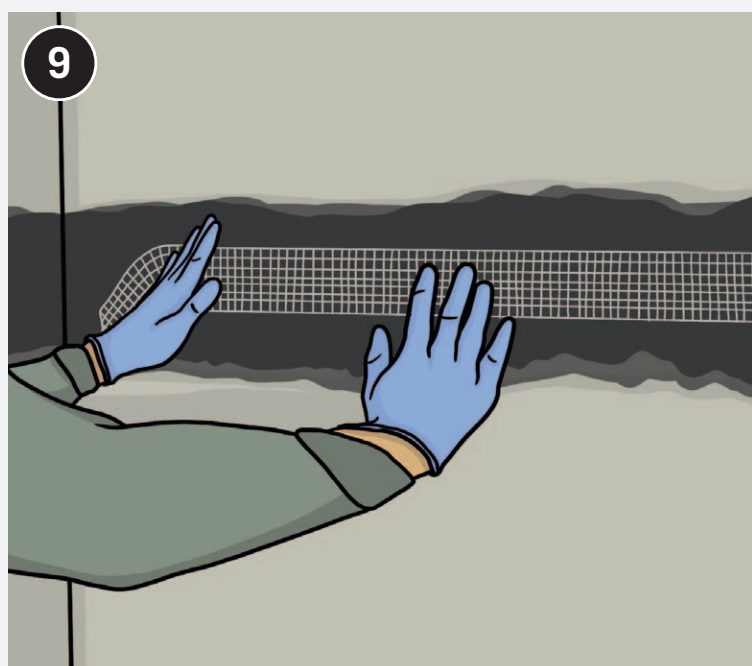
Snap along the cut line over the edge of the table (or straight up, if you're cutting on a cement floor or sacrificial board). Use the knife to sever any stubborn strands of webbing, and clean the edge up as necessary, if it's jagged.



For holes to accommodate stub outs or other protrusions, carefully measure and mark the location of the hole center. Cut small holes with a spade bit, or cut larger openings with a hole saw or jig and router.



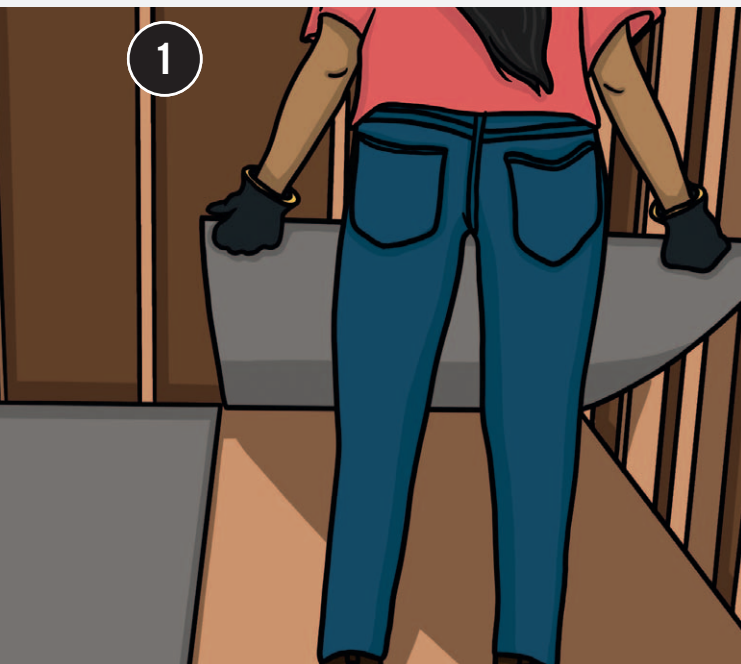
For unusual shapes or cutouts, such as for a window, drill an access hole and use a jigsaw to cut out the shape. Clean the edges up with a utility knife before installing the board.



Use a large putty knife or trowel to fill all the wall joints with thin-set mortar. Embed 2" mesh fiberglass tape into the mortar, and cover with a thin layer of mortar.



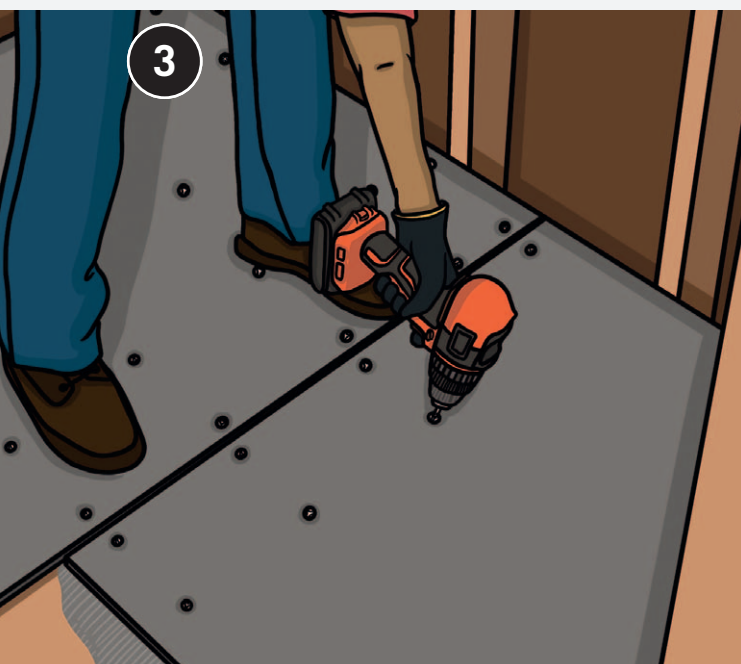
How to Install Cement Board on a Floor



Check the subfloor for integrity, and replace warped, cracked, or otherwise defective subflooring. Measure and lay out boards to fit the floor. The joints should be staggered and none should align with the subflooring joints. Leave a $\frac{1}{8}$ " gap between sheets, and at walls. Cut the boards and check the fit.

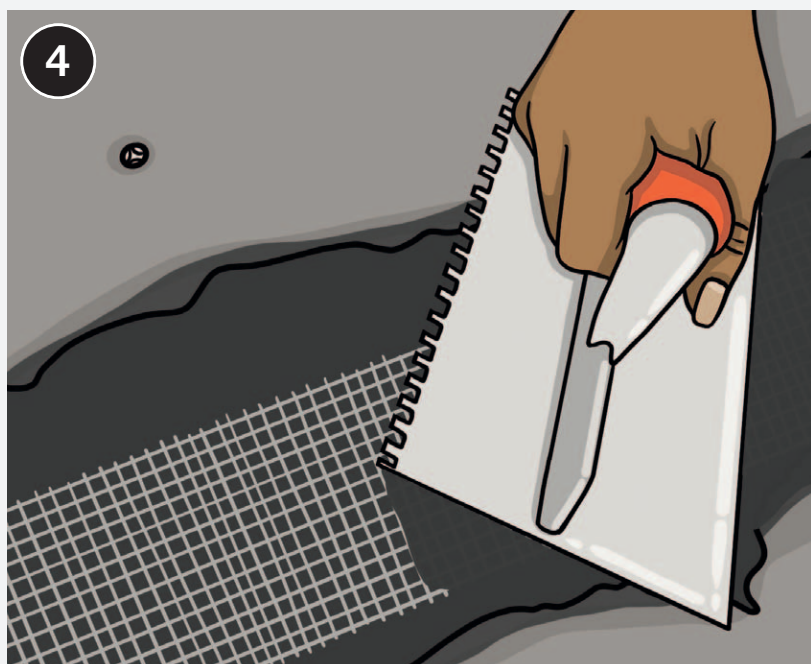


Working one sheet at a time, lay mortar for one sheet and trowel it to form the bed for the sheet. Use a slight sliding motion to embed the sheet in place.



Screw the cement board to the subfloor. Drive screws every 8" on center, $\frac{3}{8}$ " to $\frac{3}{4}$ " from edges, and 2" from any corner. Keep screw heads flush with the surface of the board.

NOTE: Many manufacturers print screw guide grids on the faces of their boards. Follow the guides for fastening the board to the floor.



Fill the joints with a generous layer of mortar. Line each joint with fiberglass mesh tape, and then level the mortar over the tape.

Wall Tile

Beautiful, practical, and easy to clean and maintain, tile walls are well suited to bathrooms. When shopping for tile, keep in mind that tiles that are at least 6 inches × 6 inches are easier to install than small tiles, because they require less cutting and cover more surface area. Larger tiles also have fewer grout lines that must be cleaned and maintained. Check out the selection of trim, specialty tiles, and accessories available to help you customize your project.

Most wall tile is designed to have narrow grout lines (less than 1/8 inch wide) filled with unsanded grout. Grout lines wider than 1/8 inch should be filled with sanded floor-tile grout. Either type will last longer if it contains, or is mixed with, a latex additive. To prevent staining, it's a good idea to seal your grout after it fully cures, then once a year thereafter.

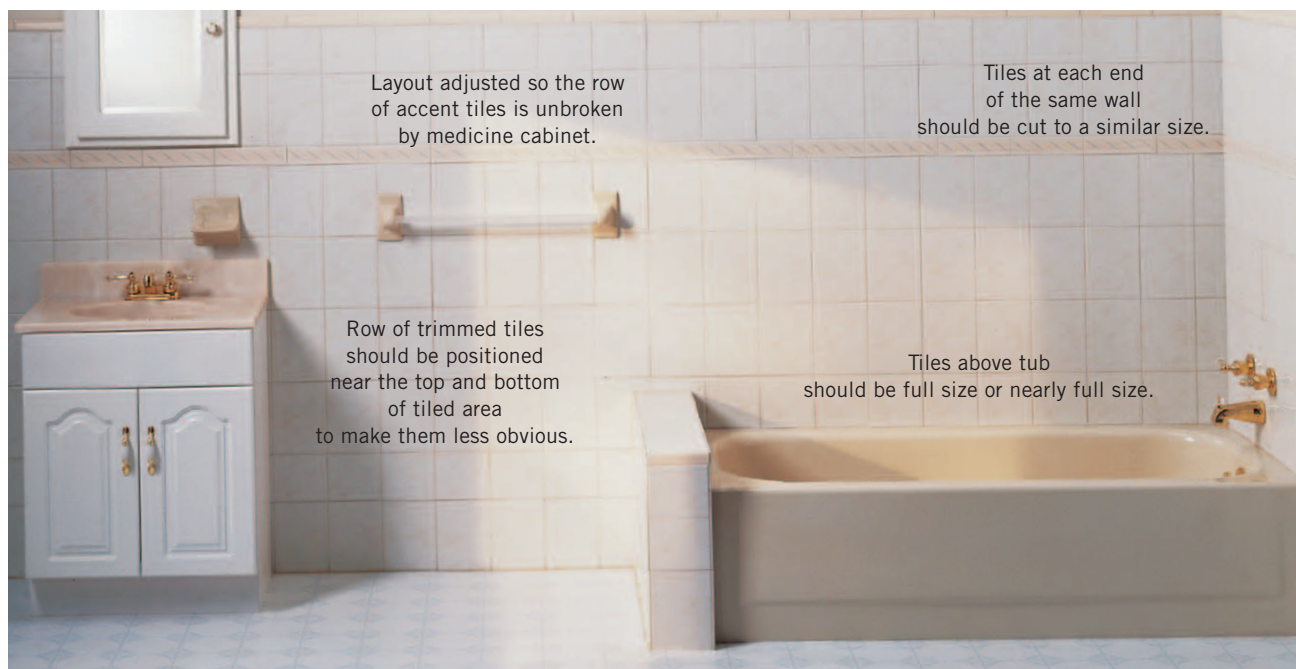


TOOLS + MATERIALS

Tile-cutting tools	Trim tile (as needed)
Marker	Straight 1 × 2
Tape measure	2 × 4
4' level	Scrap 2 × 4
Notched trowel	Carpet
Mallet	Carpet scrap
Small paintbrush or foam brush	Thinset mortar with latex additive
Grout float	Tile grout with latex additive
Grout sponge	Tub and tile caulk
Soft cloth	Grout sealer
Caulk gun	Eye protection
Story stick/pole	Work gloves
Wall tile	

Tile is a practical, easy-to-maintain choice for bathroom walls. The variety of colors, shapes, patterns, and styles is nearly endless. Ceramic tile (right) remains a low-cost, versatile, and attractive option, but glass tile (below) adds shimmer to a room. Glass tiles can also offer a stunning contemporary edge with brilliant colors and patterns unlike any other material.





Tiling an entire bathroom requires careful planning. The bathroom shown here was designed so that the tiles directly above the bathtub (the most visible surface) are nearly full height. To accomplish this, cut tiles were used in the second row up from the floor. The short second row also allows the row of accent tiles to run uninterrupted below the medicine cabinet. Cut tiles in both corners should be of similar width to maintain a symmetrical look in the room.



How to Set Wall Tile



Design the layout and mark the reference lines. Begin installation with the second row of tiles above the floor. If the layout requires cut tiles for this row, mark and cut the tiles for the entire row at one time.



Mix a small batch of thinset mortar containing a latex additive. (Some mortar has additive mixed in by the manufacturer and some must have additive mixed in separately.) Cover the back of the first tile with adhesive using a $\frac{1}{4}$ " notched trowel. *(continued)*



VARIATION: Spread adhesive on a small section of the wall, then set the tiles into the adhesive. Thinset adhesive sets fast, so work quickly if you choose this installation method.



Beginning near the center of the wall, apply the tile to the wall with a slight twisting motion, aligning it exactly with the horizontal and vertical reference lines. When placing cut tiles, position the cut edges where they will be least visible.



Continue installing tiles, working from the center to the sides in a pyramid pattern. Keep the tiles aligned with the reference lines. If the tiles are not self-spacing, use plastic spacers inserted between tiles to maintain even grout lines. The base row should be the last row of full tiles installed. Cut tile as necessary.



As small sections of tile are completed, set the tile by laying a scrap of 2 x 4 wrapped with carpet onto the tile and rapping it lightly with a mallet. This embeds the tile solidly in the adhesive and creates a flat, even surface.



To mark bottom and edge row tiles for straight cuts, begin by taping $\frac{1}{8}$ " spacers against the surfaces below and to the side of the tile. Position a tile directly over the last full tile installed, then place a third tile so the edge butts against the spacers. Trace the edge of the top tile onto the middle tile to mark it for cutting.



Install any trim tiles, such as the bullnose edge tiles shown above, at border areas. Wipe away excess mortar along the top edges of the edge tiles. Use bullnose and corner bullnose tiles (with two adjacent bullnose edges) at outside corners to cover the rough edges of the adjoining tiles.



Let mortar dry completely (12 to 24 hours), then mix a batch of grout containing latex additive. Apply the grout with a rubber grout float, using a sweeping motion to force it deep into the joints. Do not grout joints adjoining bathtubs, floors, or room corners. These will serve as expansion joints and will be caulked later.



Wipe a damp grout sponge diagonally over the tile, rinsing the sponge in cool water between wipes. Wipe each area only once; repeated wiping can pull grout from the joints. Allow the grout to dry for about 4 hours, then use a soft cloth to buff the tile surface and remove any remaining grout film.



When the grout has cured completely, use a small foam brush to apply grout sealer to the joints, following the manufacturer's directions. Avoid brushing sealer on the tile surfaces, and wipe up excess sealer immediately.



Seal expansion joints at the floor and corners with silicone caulk. After the caulk dries, buff the tile with a soft, dry cloth.

Tub Tile Surround

With a nearly limitless selection of styles, colors, and sizes of tile to choose from, a tub tile-surround replacement is an ideal home-improvement project. It can transform your bathroom into a luxurious retreat, while increasing the value of your home.

Tub tile surrounds can be broken down into three basic components. The back wall is always tiled first. The towel-bar wall contains the optional posts and rod used for hanging bath towels. Lastly, the manifold wall contains the valve stems, showerhead, and tub spout. Some tub surrounds are topped off with a low-hanging ceiling. If this is the case for your project, install the cement board on the ceiling first and tile the ceiling after the walls have been tiled. Ceiling tile is often installed on a diagonal pattern to avoid alignment issues with the wall tile joints.

With proper care and maintenance, nearly any type of wall or floor tile can be used for a surround. Tiles that are rated vitrified or impervious, however, absorb less moisture and are better suited for wet areas. Unglazed tiles such as the tile installed in this project may be used, but be sure to seal them well with at least two coats of tile sealant.

While field tile is estimated and purchased by the total number of square feet, trim tile such as bullnose or cap tile is quantified in linear feet. If the tile you select isn't available with matching trim tile, consider making your own using a wet tile saw fitted with a bevel profile wheel. Through-body porcelain tile is an excellent choice for making custom trim because the surface color is uniform throughout the body of the tile. Most tiled surrounds include bath accessories such as a soap dish and towel bar fixtures. Some tile families offer these accessories in the same patterns and colors. In other cases, you'll have to choose a similar—or perhaps contrasting—style or color. Make sure the thickness of the base for these accessories matches the tile thickness.

To introduce a splash of color to an otherwise plain tile surround, consider adding one or more bands of contrasting tile into the installation. Some tile product lines are available in a variety of solid colors, allowing the installer to incorporate colored rows of similarly sized tiles into the installation without having to make special adjustments to the layout. For added effect, you can even match the trim color to the colored bands of tile or sprinkle some decorative accent tiles throughout the tile installation.



TOOLS + MATERIALS

1 × 2 furring strips	Grout
1¼" cement board screws	Grout sponge
½" cement board	Keyhole saw
2" fiberglass mesh tape	Latex tile caulk
4' level	Tape measure
6-mil polyethylene sheeting	Tarps
6" joint knife	Tile
Caulk gun	Tile-cutting tools
Drill	Trim tile
Eye protection	Work gloves
Square notched trowel	Utility knife
Modified thinset mortar	Screwdriver
Stapler and staples	Hammer
Carbide scoring tool	Wood blocking
Carbide hole saw bit	Tile spacers
Grout-release agent	Small roller
Grout float	Pencil



A perfectly functional alcove bathtub surround can be utterly transformed with tile.

After





How to Install a Tiled Tub Surround

1



Remove the old fittings. To begin, remove the tub spout, faucet handles, and showerhead. Then, slice and remove the caulk from the corner joints. Existing ceramic fittings, such as soap dishes, should also be removed to prevent them from falling later and damaging the tub. Use a utility knife to remove old caulk, grout, and adhesive from around the lip of the tub and drape tarps over cabinets and toilets.

2



Cut out old surround panels or tiles. A keyhole or drywall saw can be used to safely cut through the drywall at the junction where it meets the surround. Use the edge of the tile or panel as a guide, taking care to feel for and avoid plumbing or other unseen obstacles hidden within the wall cavity.

3



Remove any drywall in the new tile-installation area. This will need to be replaced with cement board. Remove all nails and debris from the framing members. If necessary, install additional wood blocking to accommodate the cement board installation.

4



Install a moisture barrier. Fasten polyethylene sheeting to the studs using staples. This step may be omitted if a waterproofing membrane will be applied over the surface of the cement board later.



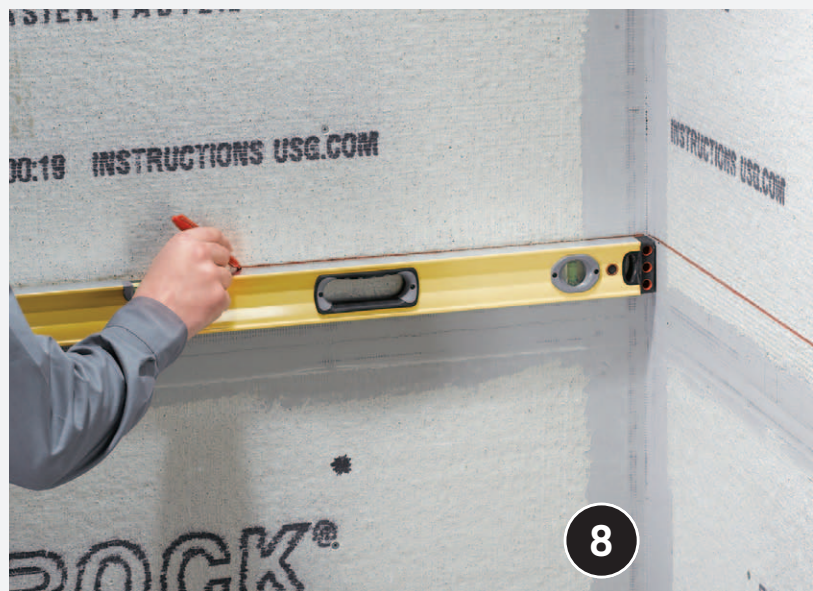
Install ½"-thick cement board horizontally on the back wall first, and then on the side walls. Fasten the panels to the studs using 1¼" cement board screws. To make straight cuts, score the panel using a carbide scoring tool, then snap the panel along the scored line. To make hole cuts for plumbing protrusions, use a drill fitted with a carbide hole-saw bit.



Fill the gaps between cement board panels with thinset mortar, overlapping at least 2 to 3" on each side of the joint. Center and embed 2"-wide alkaline-resistant fiberglass tape over the joint and lightly skim thinset over the joint. If your local codes require it, apply a roll-on waterproofing membrane to the cement board.



Dry-lay tile for your surround on a flat surface, inserting ⅛" spacers between the tiles to set the gap. Lay out enough for roughly half the surround height and then measure the length of the dry-laid row to find the actual height of the tiles on the wall.



Draw horizontal reference lines on the wall using a 4' level to make sure the lines are level. Extend these reference lines to each side wall. Measure down from the horizontal lines to the tub at several points on all walls to make sure the tub deck and the lines are parallel. If they aren't, remeasure from the point where the tub deck is highest and transfer level lines all around from that point. *(continued)*



9

Draw a vertical reference line down the center of the back wall. To temporarily support the weight of the tile that will be installed above, align and fasten 1 × 2 furring strips just below the horizontal reference lines located in the midsection of the tub surround.



10

Mix a small batch of thinset mortar. Apply the thinset using a $\frac{1}{4}$ " square-notched trowel held at a 45° angle. Align the ridges of the setting bed in a horizontal direction. Install tile on the back wall first, keeping tile aligned to the centered guide line.



11

Install two or three rows of tiles—here, a row of decorative accent tiles is installed as well.



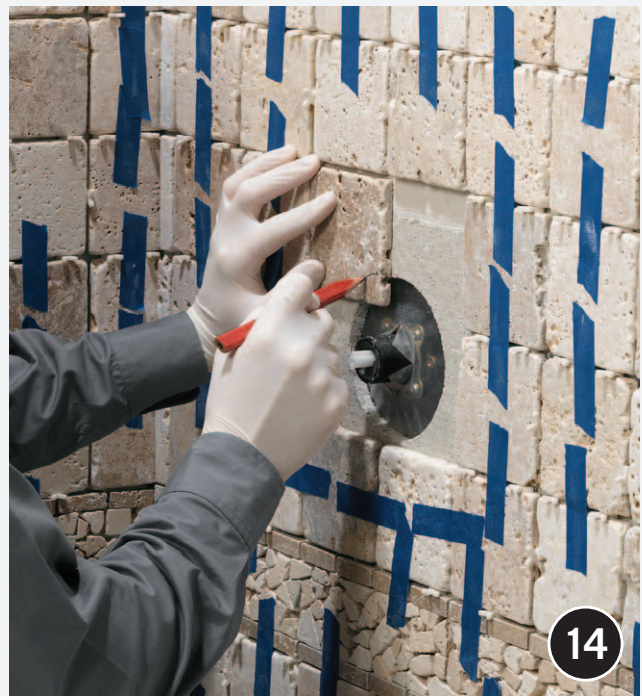
12

To mark tiles for straight cuts, place a full tile directly on top of the field tile that is installed adjacent to the void. Position another full tile over the void, abutting the overhanging edge of the tile against a $\frac{1}{8}$ " spacer. Trace the edge of this tile to mark the underlying tile for cutting.



13

Complete the upper sections. After the top portion of the back wall is tiled, fill in the upper portions of each side wall. Leave out tiles as needed to accommodate tiled-in accessories such as a soap dish or towel rod.



14

Mark and cut tiles to fit around the valve stems and water pipes as required to install your tub spout, diverter, and showerhead. Finish tiling the lower portions of the tile installation, then allow to dry for 24 hours.

TIP: Tape tiles together to prevent slippage while they dry.



15

Coat the tile surfaces with a sealer or other grout-release agent if they are not glazed by the manufacturer. This treatment will prevent grout from getting into places where it should not go.



16

Grout the tiles. To apply grout, hold the grout float at an angle and force the mortar into the joints, skimming excess grout from the tile surface with each pass. Wipe tile clean using a damp grout sponge. After grouting, buff tile surfaces with a soft cloth to remove haze. Install fittings and hardware, and caulk around the tub deck.

Toilet Enclosure

One of the best ways to make a busy family bathroom more usable is to enclose the toilet in a room of its own. Toilet enclosures—originally called “water closets” after the cistern they enclosed—make a privacy compartment within the bathroom. This allows one person to shower while the other uses the toilet. It also effectively hides the fixture that most people think is the sore thumb of the bathroom.

Although toilet enclosures are basic structures comprising framed walls and a prehung door, they must be built to maintain adequate spacing around the toilet for maximum comfort and to meet local codes. As a general rule of thumb, you want to leave at least 15 inches from the center of the toilet bowl to the wall surface on either side, and at least 21 inches from the front of the bowl to the door. You may also want to add baffles or soundproofing inside the walls, to make the space as private as possible.

The enclosure shown here includes a combination lighting/ventilation fixture. Both are absolute musts for appropriate hygiene and comfort, even if they are not mandated by local codes. (A window can serve



TOOLS + MATERIALS

Prehung door unit	Drywall
Hammer	Handsaw
16d nails	Utility knife
Screwdriver	Wall compound
2 × 4 lumber	Interior door lockset
Drywall tape	Door trim
Wood shims	Silicone caulk
¼-round molding	Fiberglass insulation
Stud finder	Pencil
Circular saw	Eye protection
Drill	Work gloves

the ventilation function, but you’ll still need to install lighting for nighttime use.)

When it comes to toilet enclosures, more room is always better. If you can dedicate extra space to the enclosure, you’ll not only make the space more comfortable, you’ll be able to add nice finishing touches such as a magazine rack or shelves for candles.

A full enclosure with a door offers the maximum in privacy, but it may be a more extreme solution than you require. A simple partition wall next to the toilet creates a sense of privacy without any claustrophobia.

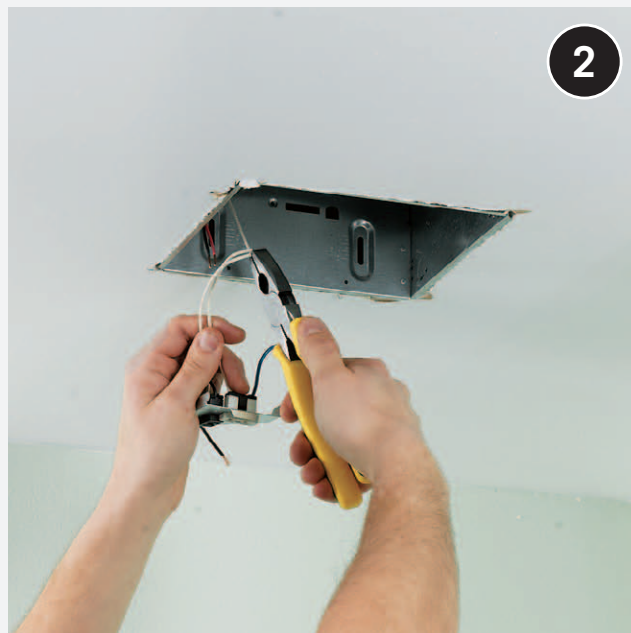




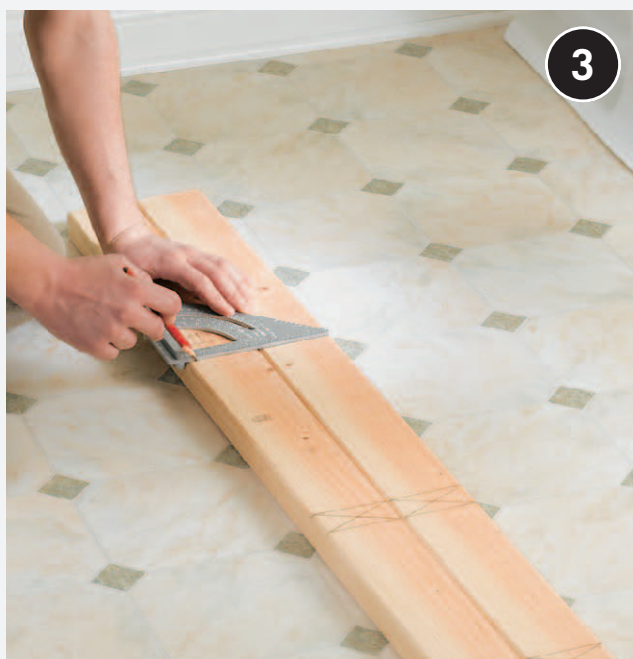
How to Build a Toilet Enclosure



Carefully plan out the enclosure. Sketch your plans with exact dimensions to ensure that you allow proper space between toilet and walls, and to ensure door swing won't impede the shower, vanity drawers, or other fixtures.



Run wiring and ducting for lighting and ventilation as necessary. Install a box for an overhead fixture and run wire for the switch. We installed a combination light/vent fan connected to an interior wall switch placed just on the latch side of the enclosure wall. The fixture can be run off the light-switch circuit for the entire bathroom if that circuit has the capacity.



Check existing connection walls for plumb and square. Cut the sole and top plates accordingly, compensating as needed for any variances. Place top and sole plates side by side and mark stud locations, 16" on center.



Secure sole plates to the floor. Plates installed over resilient flooring, as shown here, can be nailed through to the subfloor. When installing over a tile floor, use a masonry bit to drill pilot holes and then screw through to the subfloor. (Over mosaic floors, it's best to remove the tiles from under the sole plate and secure the plate directly to the subfloor.)



Use a stud finder to locate ceiling joists, then nail the top plates into place. Frame out the walls by toenailing studs between top and sole plates as marked. Frame L-corner for walls, as shown (inset).



Frame the doorway with header, cripple studs, and jack studs (you should purchase your prehung door first, so that you can double-check the opening measurements against the actual door unit).



Hang drywall on the framed walls, inside and out. The enclosure here was clad with standard drywall because the walls won't be subjected to any direct moisture contact. If the enclosure abuts a shower or bath, use cement board.

(continued)



Position the prehung door in place. Check that it is oriented correctly, to open out from the enclosure and against a wall, rather than blocking the central space or opening against the vanity.



Shim all around the jamb (specifically, behind hinges and lockset location) until the door unit is plumb and square in the opening and the door opens smoothly. Nail through the door jambs into the framing at the shim points.



Saw the shims off flush. Measure, cut, and nail the trim for the door in place. Putty and sand over the nail heads on jambs and casework.



USE THE WALL CAVITY



Because the partition wall you've built is essentially empty, it is a good candidate for installing niche fittings that are recessed into the wall. A recessed toilet tissue holder is one easy-to-install fitting. Space will be fairly tight in your enclosure, so using the wall space makes a lot of sense. A wall-niche magazine rack or niche shelving are just two additional ways you may use the wall cavity space.



11 **Finish the drywall surfaces with tape and joint compound.** Work as neatly as you can to minimize sanding. Seal the new drywall with drywall primer before you paint.



12 **Paint the enclosure walls and add any additional elements,** including paper holders, grab bars, and shelves or cabinets. The wall area behind the toilet tank is a good spot for installing shallow shelving, but keep it at least 3' above the tank lid.



13 **Attach base ¼-round molding on the bottom of the walls,** inside and out (or cove molding if you prefer). Apply a bead of silicone caulk to the bottom of the molding before nailing it in place.

Radiant Floor Heating

Radiant heating systems are generally used in warmer parts of the country or in smaller rooms, for localized heating. They are a good solution for a small bathroom remodeling project.

A typical floor-warming system consists of one or more thin mats containing electric resistance wires that heat up when energized, like an electric blanket. The mats are installed beneath the tile and are hardwired to a 120-volt GFCI circuit. A thermostat controls the temperature, and a timer turns the system off automatically.

The system shown in this project includes two plastic mesh mats, each with its own power lead that is wired directly to the thermostat. Radiant mats may be installed over a plywood subfloor, but if you plan to install floor tile you should put down a base of cement board first and then install the mats on top of the cement board.

A crucial part of installing this system is using a multimeter to perform several resistance checks to make sure the heating wires have not been damaged during shipping or installation.

Electrical service required for a floor-warming system is based on size. A smaller system may connect to an existing GFCI circuit, but a larger



TOOLS + MATERIALS

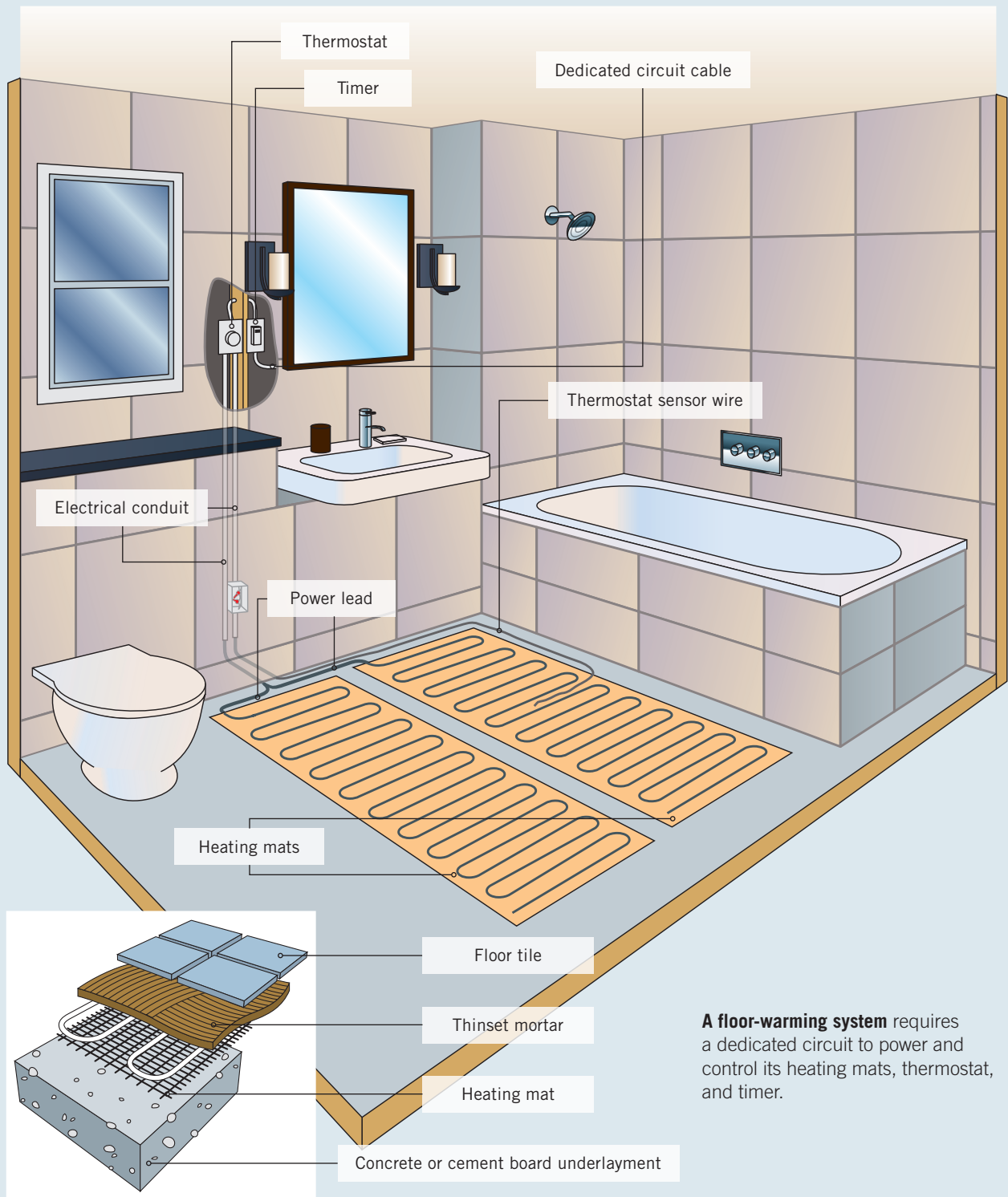
Vacuum cleaner	Trowel or rubber float
Multimeter	Conduit
Tape measure	Thinset mortar
Scissors	Thermostat with sensor
Router/rotary tool	Junction box(es)
Marker	Tile or stone floor covering
Electric wire fault indicator (optional)	Drill
Hot glue gun	Double-sided carpet tape
Radiant floor mats	Cable clamps
12/2 NM cable	Eye protection
	Work gloves

one will need a dedicated circuit; follow the manufacturer's requirements.

To order a radiant heating system, contact the manufacturer or dealer. In most cases, you can send plans to the manufacturer and they'll custom-fit a system for your project area.

A radiant heating system employs electric heating mats that are covered with floor tile to create a floor that's cozy underfoot.

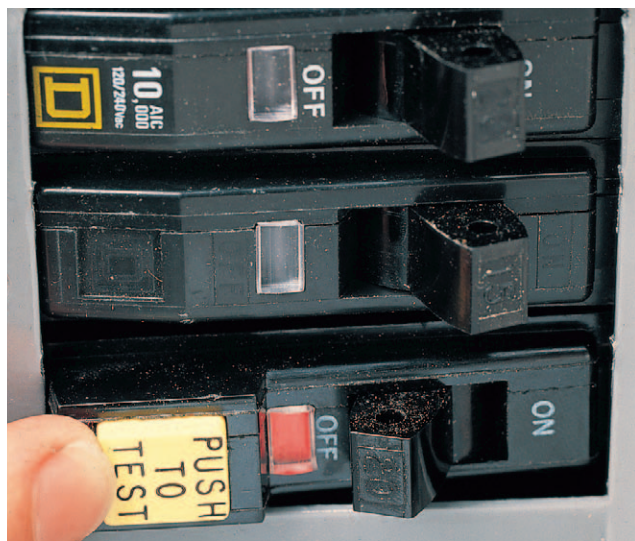




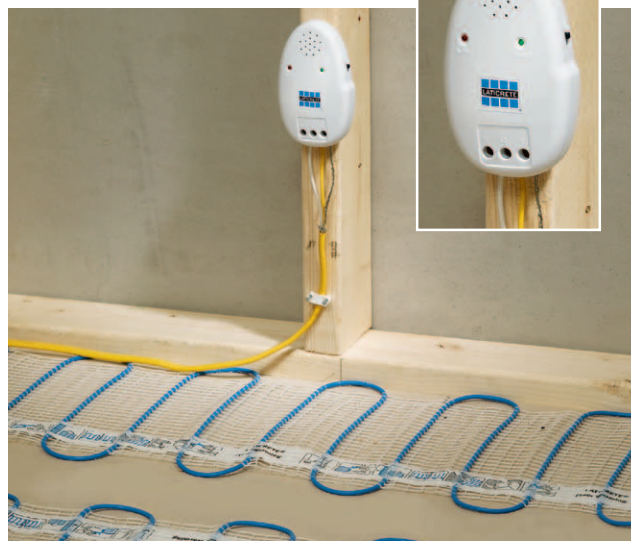
A floor-warming system requires a dedicated circuit to power and control its heating mats, thermostat, and timer.

- Each radiant mat must have a direct connection to the power lead from the thermostat, with the connection made in a junction box in the wall cavity. Do not install mats in series.
- Do not install radiant floor mats under shower areas.
- Do not overlap mats or let them touch.
- Do not cut heating wire or damage heating wire insulation.
- The distance between wires in adjoining mats should equal the distance between wire loops measured center to center.

Installing a Radiant Floor-Warming System



Floor-warming systems must be installed on a circuit with adequate amperage and a GFCI breaker. Smaller systems may tie into an existing circuit, but larger ones need a dedicated circuit. Follow local building and electrical codes that apply to your project.



An electric wire fault indicator monitors each floor mat for continuity during the installation process. If there is a break in continuity (for example, if a wire is cut), an alarm sounds. If you choose not to use an installation tool to monitor the mat, test for continuity frequently using a multimeter.



How To Install a Radiant Heating System



Install electrical boxes to house the thermostat and timer. In most cases, the box should be located 60" above floor level. Use a 4"-deep x 4"-wide double-gang box for the thermostat/timer control if your kit has an integral model. If your timer and thermostat are separate, install a separate single box for the timer.



Drill access holes in the sole plate for the power leads that are preattached to the mats (they should be over 10' long). The leads should be connected to a supply wire from the thermostat in a junction box located in a wall near the floor and below the thermostat box. The access hole for each mat should be located directly beneath the knockout for that cable in the thermostat box. Drill through the sill plate vertically and horizontally so the holes meet in an L-shape.

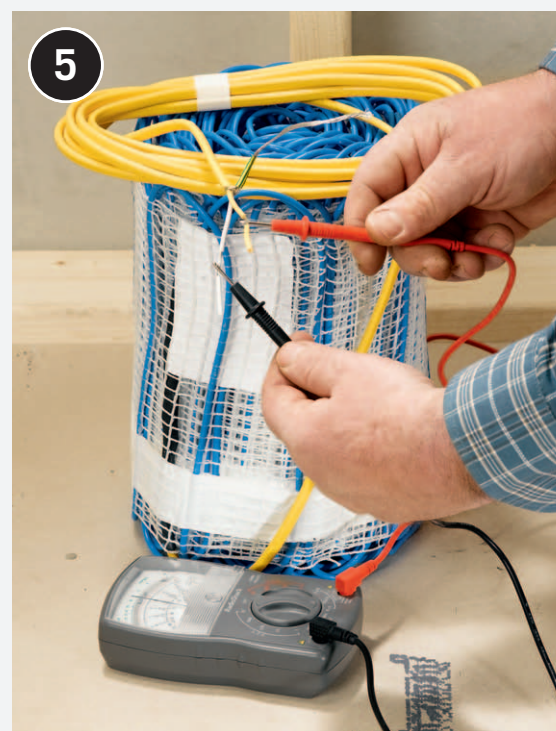


Run conduit from the electrical boxes to the sill plate. The line for the supply cable should be $\frac{3}{4}$ " conduit. If you are installing multiple mats, the supply conduit should feed into a junction box about 6" above the sill plate and then continue into the $\frac{3}{4}$ " hole you drilled for the supply leads. The sensor wire needs only $\frac{1}{2}$ " conduit that runs straight from the thermostat box via the thermostat. The mats should be powered by a dedicated 20-amp GFCI circuit of 12/2 NM cable run from your main service panel to the electrical box (this is for 120-volt mats—check your instruction manual for specific circuit recommendations).



Clean the floor surface thoroughly to get rid of any debris that could potentially damage the wire mats. A vacuum cleaner generally does a more effective job than a broom.

Test for resistance using a multimeter set to measure ohms. This is a test you should make frequently during the installation, along with checking for continuity. If the resistance is off by more than 10% from the theoretical resistance listing (see manufacturer's chart in installation instructions), contact technical support for the kit manufacturer. For example, the theoretical resistance for the 1 x 50' mat seen here is 19, so the ohms reading should be between 17 and 21.



Finalize your mat layout plan. Most radiant floor-warming mat manufacturers will provide a layout plan for you at the time of purchase, or they will give you access to an online design tool so you can come up with your own plan.

(continued)



7

Unroll the radiant mat or mats and allow them to settle. Arrange the mat or mats according to the plan you created. It's okay to cut the plastic mesh so you can make curves or switchbacks, but do not cut the heating wire under any circumstances, even to shorten it.



8

Finalize the mat layout and then test the resistance again using a multimeter. Also check for continuity in several different spots. If there is a problem with any of the mats, you should identify it and correct it before proceeding with the mortar installation.

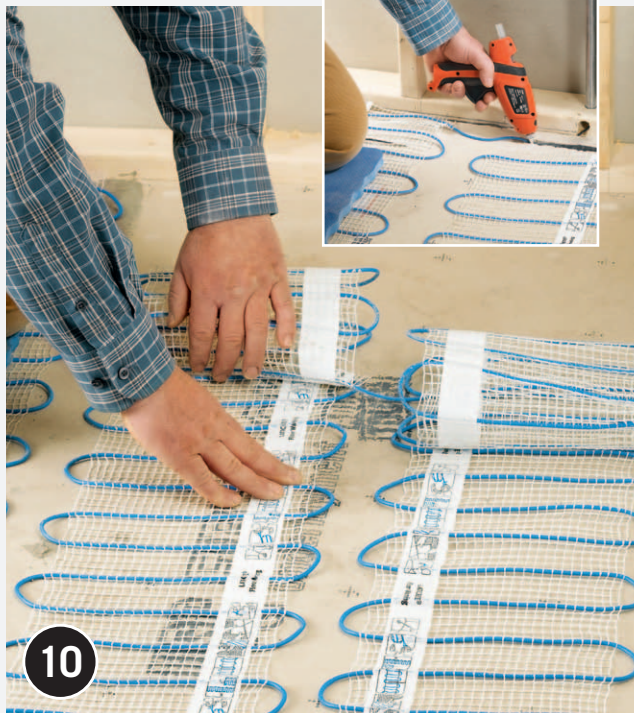


9

Run the thermostat sensor wire from the electrical box down the $\frac{1}{2}$ " conduit raceway and out the access hole in the sill plate. Select the best location for the thermostat sensor and mark the location onto the flooring. Also mark the locations of the wires that connect to and lead from the sensor.



VARIATION: If your local codes require it, roll the mats out of the way and cut a channel for the sensor and the sensor wires into the floor or floor underlayment. For most floor materials, a spiral cutting tool does a quick and neat job of this task. Remove any debris.



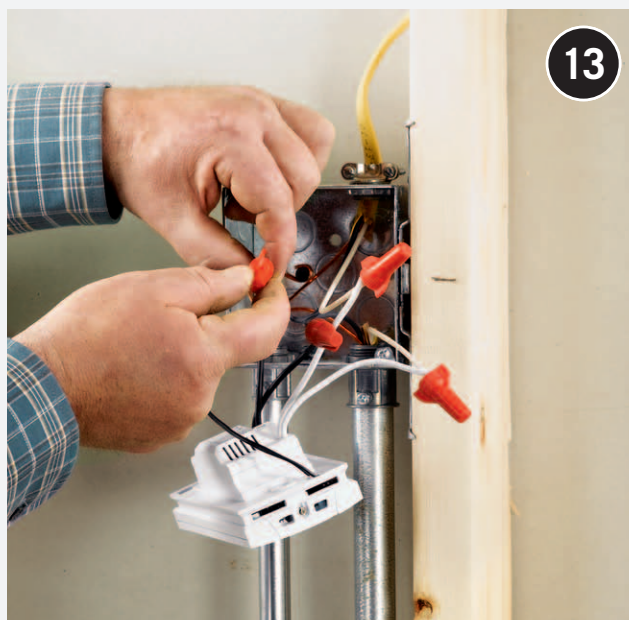
Bond the mats to the floor. If the mats in your system have adhesive strips, peel off the adhesive backing and roll out the mats in the correct position, pressing them against the floor to set the adhesive. If your mats have no adhesive, bind them with strips of double-sided carpet tape. The thermostat sensor and the power supply leads should be attached with hot glue (inset) and run up into their respective holes in the sill plate if you have not done this already. Test all mats for resistance and continuity.



Cover the floor installation areas with a layer of thinset mortar that is thick enough to fully cover all the wires and mats (usually around $\frac{1}{4}$ " in thickness). Check the wires for continuity and resistance regularly and stop working immediately if there is a drop in resistance or a failure of continuity. Allow the mortar to dry overnight.



Connect the power supply leads from the mat or mats to the NM cable coming from the thermostat inside the junction box near the sill. Power must be turned off. The power leads should be cut so about 8" of wire feeds into the box. Be sure to use wire nuts to protect the wires.



Connect the sensor wire and the power-supply lead (from the junction box) to the thermostat/timer according to the manufacturer's directions. Attach the device to the electrical box, restore power, and test the system to make sure it works. Once you are convinced that it is operating properly, install floor tiles and repair the wall surfaces.

Floor Tile

Although the floor tiles shown in the steps that follow are porcelain, this process would be the same if you were installing ceramic or stone tiles. In all cases, a successfully tiled floor relies on proper preparation. That starts with laying down a stable, secure surface for the tile. But the most important step for the look of the finished floor is snapping the chalk lines and dry-fitting to determine the most visually pleasing tile placement. Beyond that, work carefully and steadily, using spacers throughout to maintain proper spacing, and be careful never to walk on a newly tiled floor. This means planning so that you never tile yourself into a corner. Plan carefully, pay attention when laying the tiles, and work within your own abilities and capacity, and you'll wind up with a long-lasting, beautiful tile floor.



Floor tile can be laid in many different patterns, but for your first effort, it's wise to stick to a basic grid. Generally, you'll combine the floor tile with a profiled base tile or cove molding, installed after the flooring is completely dry and set.



TOOLS + MATERIALS

- ¼" square-notched trowel
- Rubber mallet
- Tile cutter
- Tile nippers
- Handheld tile cutter
- Needlenose pliers
- Grout float
- Grout sponge
- Soft cloth
- Thinset mortar
- Tile
- Tile spacers
- Grout
- Latex grout additive
- Wall adhesive
- 2 × 4 lumber
- Grout sealer
- Tile caulk
- Sponge brush
- Cement board
- Chalk line
- Tape measure
- Drill
- Paddle bit
- Caulk gun
- 1¼" cement board screws
- Fiberglass-mesh wallboard tape
- Utility knife or grout knife
- Threshold material
- Jigsaw or circular saw
 - with a tungsten-carbide blade
- Rounded bullnose tile
- Eye protection
- Work gloves



How to Install Floor Tile



Screw the cement board down to the subfloor with 1¼" self-piloting screws driven every 2" around the edge. Tape the seams with fiberglass mesh tape and finish the surface as described on page 207.

Draw reference lines and establish the tile layout. Check that the lines are square to each other using the 3-4-5 method. Dry-lay 2 half rows of tiles in place, running from the center in 2 directions out to the wall. Determine if the layout leaves less than ⅓ of a tile at either wall, and adjust your reference lines if it does.



OPTION: Build a grid system of chalk lines based on the actual dimensions of your tiles, including the grout lines. A grid system ensures that you will stay on track and it helps you divide the project into small sections so you can apply the correct amount of thinset without guessing.

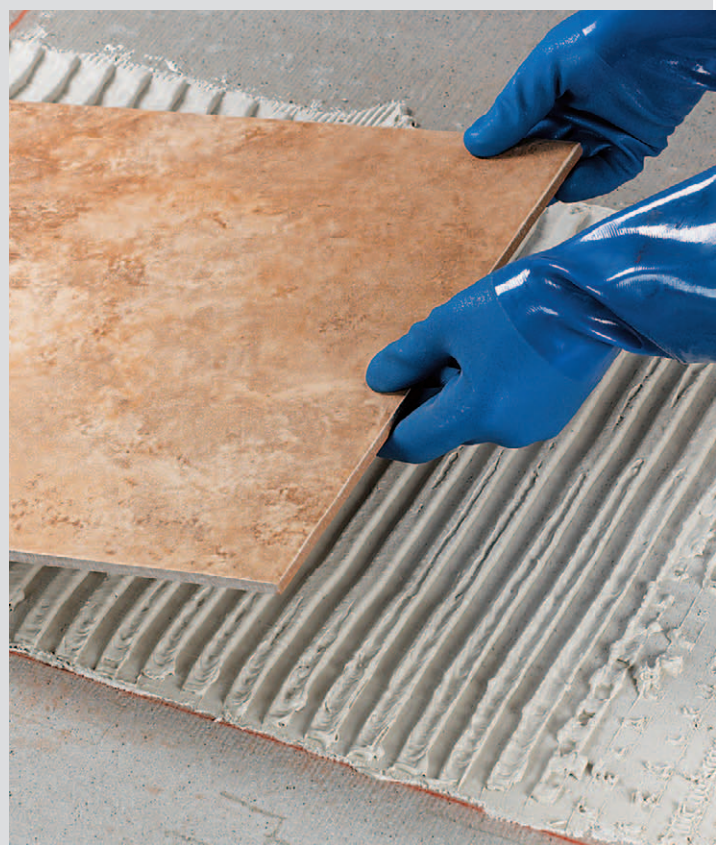


Mix a batch of thinset mortar and spread it evenly across a square along both reference lines of the quadrant. Use the notched edge to create furrows, being careful not to press down all the way to the cement board. *(continued)*



4

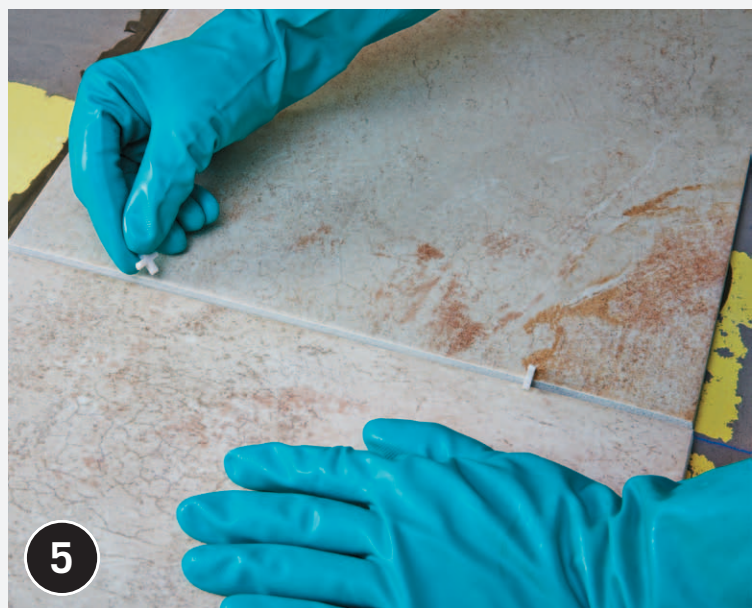
Press the first tile down into the mortar at the corner of the quadrant where the reference lines intersect. Twist it slightly and press down. Use a putty knife to pull the tile up to check that the mortar consistency is correct and coating all areas on the bottom of the tile. Press the tile back into position. Use a rubber mallet to gently tap the center area of the tile to set it properly.



VARIATION: For 16 × 16" or larger tiles or uneven stone, use a larger trowel with notches that are at least ½" deep.



VARIATION: For mosaic sheets, use a ⅜" V-notched trowel to spread the mortar and a grout float to press the sheets into the mortar. Apply pressure gently to avoid creating an uneven surface.



5

Continue laying tiles along one row, using spacers to maintain spacing between tiles. Use the appropriate spacers for the size tile you are laying, and stand them upright; do not lay spacers flat at tile intersections because they will be impossible to remove from the mortar and can compromise the integrity of the grout lines.

To make sure tiles are level with one another, place a straight 2 × 4 across several tiles in a row and tap the top of the board with a rubber mallet.

6



TIP

Use a small, flat plastering trowel to scrape up any mortar squeezeout from the surface of the backer board around a set tile, so that you don't wind up with too much under the adjacent tiles. When you're ready to take a break or the mortar is starting to harden, clean up around the margins of the last tile you've laid with the same trowel.

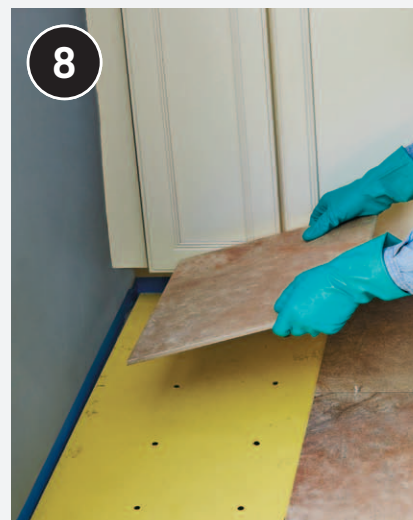


7

As you work, clean up any mortar on the top of the tiles as soon as you detect it. Use a damp sponge to wipe up the mortar completely, to ensure it doesn't dry on the surface of the tile.

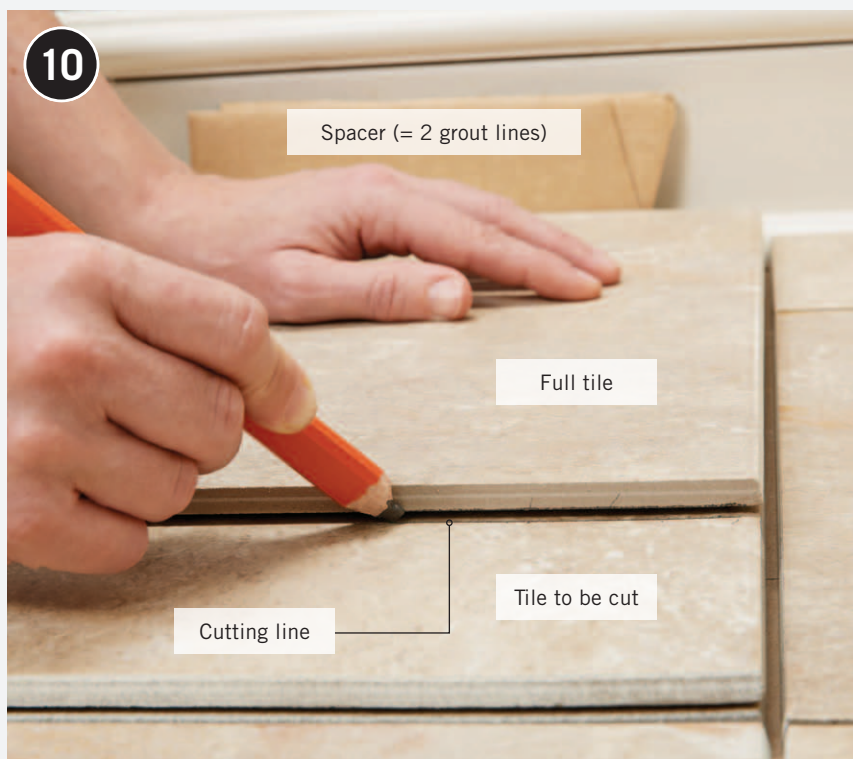
Lay the rest of the tile in the remaining area of the quadrant, repeating steps 2 through 7. Be careful to plan tile placement so that you don't tile yourself into a corner. Avoid stepping or kneeling on the laid tiles.

8

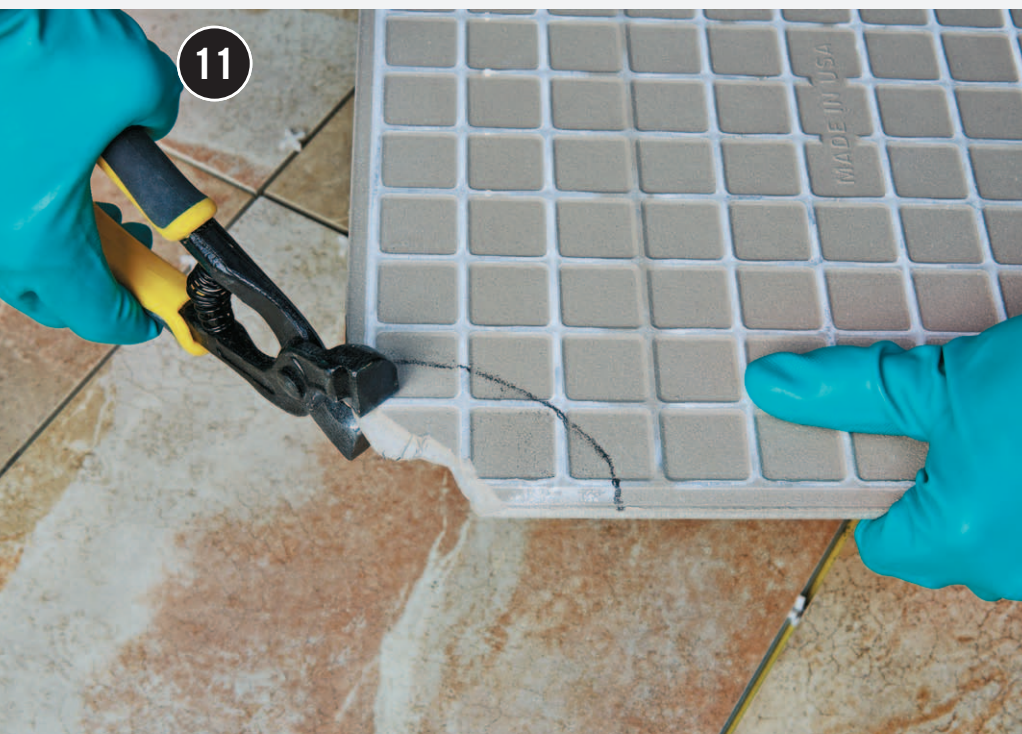


(continued)

In corners and against walls leave a gap of at least $\frac{1}{4}$ " between the tiles and the walls or cabinets. Make sure the gap is still narrow enough that your base shoe molding or trim will cover it.



To mark tile for cutting so it will fit between the end or edge of a row and the wall, lay the tile to be cut directly on top of the full tile it will sit next to. Stand one or two tiles up flat against the wall as spacers (this will account for an expansion and the grout space between tiles) and lay another tile on top of the tile to be marked, with the edge butted against the tiles on the wall. Mark the second tile for cutting. Check the dry fit and then apply mortar for two partial tiles at a time and set them in place, leaving an expansion gap between the tile edge and the wall or obstruction.



Measure, cut, and install tiles that require notches or curves to fit around obstacles, such as exposed pipes or toilet drains.



Continue laying tiles until the floor is complete. Allow 24 hours for the mortar to dry and then remove the spacers. To prepare for grouting, use painter's tape to protect any trim that abuts the tiled surface.



13

Mix the grout using the drill and paddle bit. Follow the instructions for the grout you're using.

NOTE: When mixing grout for porous tile, such as unsealed quarry or natural stone, include an additive with a release agent to prevent the grout from bonding to the tile surfaces.



14



15

As you finish one small quadrant of tile, use the float and a small trowel to clean the excess grout off the surface of the tiles. Continue applying the grout at a 45° angle to the joints until you've finished about 25 sq. ft. of the floor.



16

Wipe a damp grout sponge diagonally over about 2 sq. ft. of the floor to remove grout residue. Rinse the sponge in cool water between passes. Be careful not to press so hard you pull grout out of the joints, but use as many passes as necessary to clean the surface of the tiles. Change the rinse water frequently. *(continued)*



17

Allow the grout to dry for the recommended period (4 hours is a common drying time). Use a soft cloth such as folded cheesecloth to buff the tile surface and remove any remaining grout film. If any grout film remains, use a grout-remover solution.



18

Ensure the integrity of the grout by misting it with water two to three times per day, for the first two or three days. This will help the grout cure evenly and completely and make it less likely to crack.

Apply grout sealer to all the grout lines.

You can use an applicator bottle such as the one shown here, or you can use a formula meant to be applied with a small sponge or foam brush. Be careful to apply the sealer on the grout lines only.



19



20

Install threshold transitions in doorways and between transitions to different flooring materials. If the threshold is too long for the doorway, cut it to fit with a jigsaw or circular saw equipped with a tungsten-carbide blade (if you are using a threshold made of tile). Depending on the type of threshold strip, either screw it down or set it in a bed of thinset mortar and allow 24 hours for the mortar to dry.

How to Install Bullnose Base Trim



Dry-fit the tiles to determine the best spacing. Grout lines in base tile do not always align with grout lines in the floor tile. Use rounded bullnose tiles at outside corners, and mark tiles for cutting as needed.



Leaving a 1/8" expansion gap between tiles at corners, mark any contour cuts necessary to allow the covered edges to fit together. Use a jigsaw with a tungsten-carbide blade to make curved cuts.



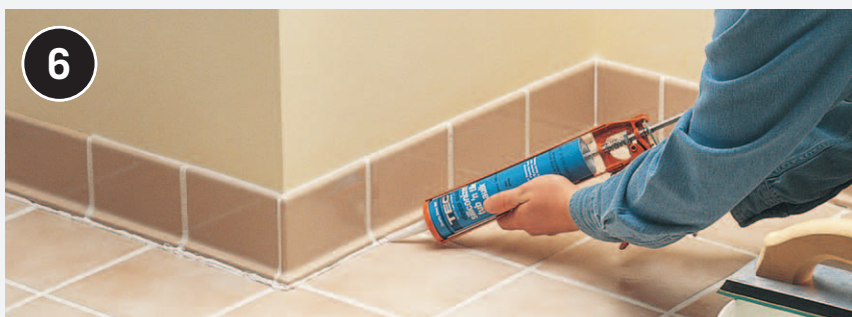
Begin installing base-trim tiles at an inside corner. Use a notched trowel to apply wall adhesive to the back of the tile. Place 1/8" spacers on the floor under each tile to create an expansion joint.



Press the tile onto the wall. Continue setting tiles, using spacers to maintain 1/8" gaps between the tiles and 1/8" expansion joints between the tiles and floor.



Use a double-bullnose tile on one side of outside corners to cover the edge of the adjoining tile.



After the adhesive dries, grout the vertical joints between tiles and apply grout along the tops of the tiles to make a continuous grout line. Once the grout hardens, fill the expansion joint between the tiles and floor with caulk.





Bathroom Accessories

Accessorizing your bathroom can be like putting the finishing touches on a painting. It's your chance to dress up the room, add small spots of sparkle, and put your own personalized mark of style on the space.

But accessories also add function to a bathroom. In fact, an addition like a new medicine chest will see daily use and you'll wonder how you ever did without it. In this age of Universal Design and Age-in-Place guidelines, bathroom accessories have taken on a whole new role: safety. A correctly positioned and supported grab bar can prevent a nasty fall that might otherwise lead to a hospital visit. Even for able-bodied users, grab bars provide an ease of use. Fortunately, grab-bar manufacturers have evolved designs from earlier clunky appearances, to produce safety features that can hold their own against any other accessory in the bathroom.

The best part of all is that most accessories are a breeze to install. That means you won't need much more than some basic tools and hardware and a couple of free hours for these projects. Dress up your bathroom with some handsome and useful additions, and the rest of the Saturday is yours to enjoy!

In this chapter:

- Medicine Cabinets
- Grab Bars
- Glass Shelving
- Towel Warmers

Medicine Cabinets

Medicine cabinets were traditionally just shallow containers for pill bottles, with a mirrored door on the front. We've come a long way since then. Today, you can buy a medicine cabinet that includes power outlets for recharging your electric toothbrush, adjustable shelves, built-in LED lighting, and more. Whether you're ready to purchase a deluxe unit or just want to replace a flat mirror with some small-item storage, you'll choose between a surface-mounted unit and the more difficult-to-install recessed cabinet. The instructions for both are outlined here.



TOOLS + MATERIALS

Electronic stud finder	Drill	Framing square	2½" wood screws
Level	Circular saw	Duplex nails	Wood shims
Pry bar	Reciprocating saw	10d common nails	Cabinet
Hammer	Pencil	Finish nails	Eye protection
Screwdriver	Bar clamp	1 × 4 lumber	Work gloves

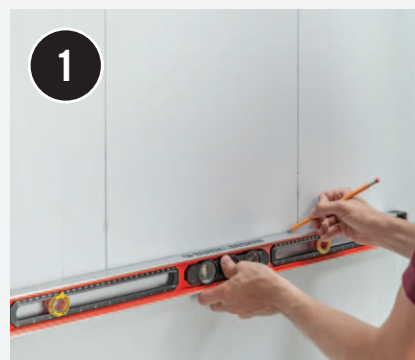


Medicine cabinets don't have to be frumpy.

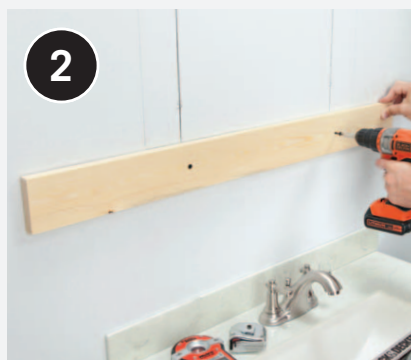
This easy-to-install version has a simple knob handle and sleek aesthetic.



How to Install a Surface-Mounted Medicine Cabinet



1 **Locate the wall studs** and mark them clearly on the wall surface. Draw a level line at the desired top height of the cabinet body, then measure and mark a second line to indicate the bottom of the cabinet.



2 **Attach a temporary ledger board** (usually 1 × 4) just below the lower level line using duplex nails. Rest the base of the cabinet on the ledger and hold it in place or brace it with 2 × 4s.



3 **Attach the cabinet to the wall** at the stud locations by drilling pilot holes and driving wood screws. Remove the ledger when finished, and patch the nail holes with drywall compound.



How to Install a Recessed Cabinet



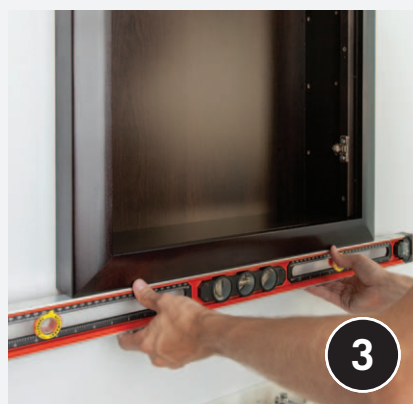
OPTION: Most recessed medicine cabinets sold today are sized in width to fit into the stud bay between standard studs that are 16" or 24" on center. If this lands the cabinet where you want it, you have a very easy job in front of you. But if you want the cabinet centered over a permanent furnishing, you may need to frame a new opening for the cabinet.



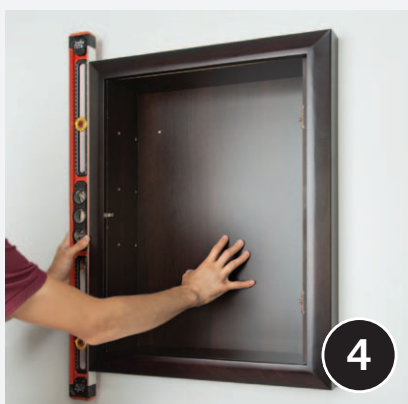
Use a stud finder to locate the wall-framing members and then draw an outline for the new cabinet, with the sides of the outline at the edges of the stud bay. (If you need to adjust the cabinet position or the cabinet you are installing is wider than the stud bay, see the option at left).



Shut off power at the main circuit panel in case there are any live wires in the stud cavity. Cut out the marked opening in the wall covering. A hand drywall saw will make neat work of this job.



Remove the door/mirror from the cabinet and position the cabinet carcass in the opening. The opening should be slightly taller and wider than the cabinet. Set the height by resting the cabinet on a level and raising or lowering it. Tack the cabinet to a wall stud on one side with a nail driven through one of the screw access holes in the cabinet side.



Move the level to the cabinet side and adjust the cabinet until it is vertical. Tack it to the wall stud on the side opposite the first nail.



Drive a 2" drywall screw through one of the screw access holes on each side of the cabinet. Do not overdrive. Double-check for level and plumb, then add additional screws on each side until the cabinet is secure. Reattach the door/mirror.

Accessorizing for Universal Design

An increasing number of bathroom accessories are designed to make the room more usable for people with mobility limitations and motor-skill impairments—an important development as more consumers choose to stay in their homes as they age. These features are offered in many styles and finishes to complement just about any bathroom style. That means that there is really no reason not to include a set of grab-bar accessories in your bathroom.

The trick is to make sure these extras are installed correctly. They should be secured to studs or blocking to reliably support minimum weight requirements. But they also need to be installed at the correct heights. The following are the Americans with Disabilities Acts (ADA) requirements for grab-bar heights. The ADA is generally used as the basis for universal design and aging-in-place principles in bathrooms.

- **Toilets:** Grab bars behind toilets (centered over the tank, or bowl if no tank is present) should be a minimum of 36 inches long, mounted between 33 and 36 inches up from the floor. Grab bars on a wall alongside the toilet should be mounted 12 inches out from the back wall, 33 to 36 inches from the floor, and should be a minimum of 45 inches long. Where there isn't a side wall, you can use a swing-up or swing-away independent grab-bar unit with a supporting post and mounted with the same measurements as a wall-mounted bar.
- **Showers:** Back-wall (main-support) grab bars should be mounted 33 inches to 36 inches up from the shower floor and can be between 38 inches and 48 inches, depending on the space available in the stall. These can be used in conjunction with a permanent or fold-down seat mounted



This handsome bathroom is an example of ultimate accessibility, with a curbless shower that allows a wheelchair- or walker-using individual to easily take a shower (fold-down seat and grab bars assure stability). A roll-under sink is great for all users, and a toilet-side fold-down grab bar makes it simple for those with limited mobility to get on and off the essential fixture.



A stylish accent ring around the faucet controls in this tub doubles as a grip bar that helps bathers safely get into and out of the tub.



Why install just a towel bar, when you can add a safety feature with a combination towel-and-grab bar accessory? This one features a handsome rubbed-bronze finish, but you'll find these in a range of surface styles.



Combine stability with convenience by adding a simple shelf holder-grab bar combo like this one. The sleek curving style of this unit is just one of many forms and finishes available in this type of accessory.



Manufacturers continue to create accessible fixtures like this showerhead that is both a fixed and handheld unit. The head is easily removed from the stem—held in place by a magnetic connection. Once removed, a valve automatically redistributes the water to the head.

18 inches up from the shower floor. Side-wall grab bars should be a length that fits on the side wall, mounted 33 to 36 inches up from the shower floor.

- **Bathtubs:** As with other locations, all grab bars in a tub area should be mounted between 33 and 36 inches up from the floor of the bathroom. A back-wall grab bar should be a minimum of 48 inches long but should leave no more than 12 inches from the end of the grab bar to the head wall of the tub and no more than 15 inches from the back end of the grab bar to the foot wall of the tub. Head-wall

grab bars should be a minimum of 24 inches long and should be mounted with the outer end flush with the outside edge of the head wall. A back-wall grab bar should be installed in the same way and should be a minimum of 12 inches long.

You can supplement these requirements with angled bars around shower stalls, offering variable heights at which the user can grab the bar. Use additional grab bars—such as those as part of a towel rack—to supplement these primary bars and make navigating the room easier.

Grab Bars

Bathrooms are beautiful with their shiny ceramic tubs, showers, and floors, but add water and moisture to the mix and you've created the perfect conditions for a fall. The good news is that many falls in the bathroom can be avoided by installing grab bars at key locations.

Grab bars help family members steady themselves on slippery shower, tub, and other floor surfaces. Plus, they provide support for people transferring from a wheelchair or walker to the shower, tub, or toilet. Grab bars come in a variety of colors, shapes, sizes, and textures. Choose a style with a 1¼- to 1½-inch diameter that fits comfortably between your thumb and fingers.

The easiest way to install grab bars is to screw them into wall studs or into blocking or backing attached to studs. Blocking is a good option if you are framing a new bathroom or have the wall surface removed during a major remodel (see Illustration A). Use 2 × 6 or 2 × 8 lumber to provide room for adjustments, and fasten the blocks to the framing with 16d nails. Note the locations of your blocking for future reference.

As an alternative, cover the entire wall with ¾-inch plywood backing secured with screws to the wall framing, so you can install grab bars virtually anywhere on the wall (see Illustration B).

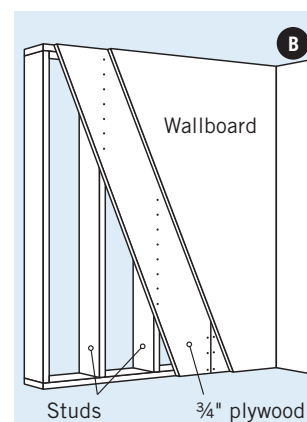
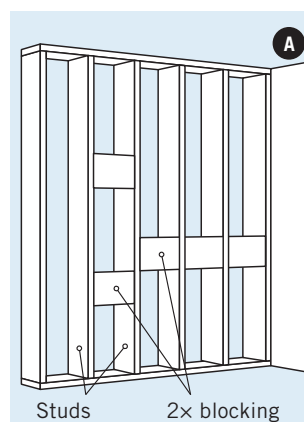
Grab bars can be installed in areas without studs. For these installations, use specialized heavy-duty hollow-wall anchors designed to support at least 250 pounds.

Grab bars of different styles and configurations meet varied needs in any bathroom, and in different areas of the bathroom.



TOOLS + MATERIALS

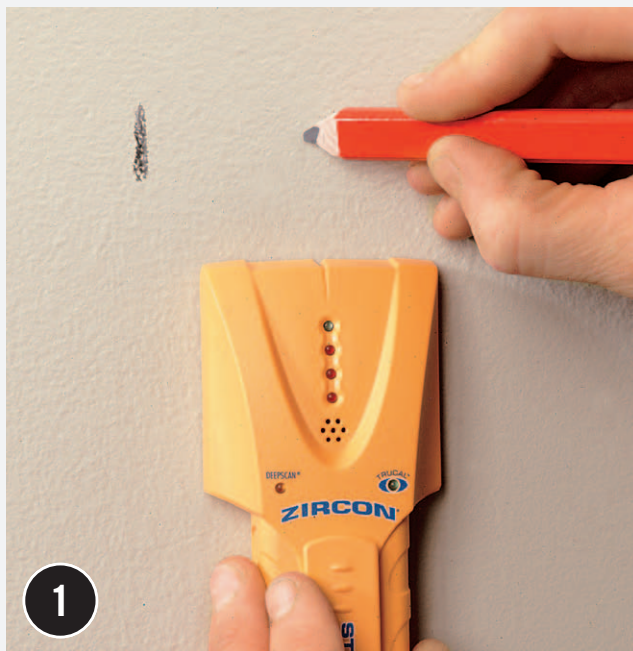
Tape measure	Grab bar
Pencil	Wall anchors
Stud finder	#12 stainless-steel screws
Level	Silicone caulk
Drill and bits	Eye protection
Masonry bit	Work gloves



Blocking or backing is required for secure grab bars. If you know where the grab bars will be located, add 2× blocking between studs (Illustration A). You also can cover the entire wall with ¾" plywood backing, which allows you to install grab bars virtually anywhere on the wall (illustration B).



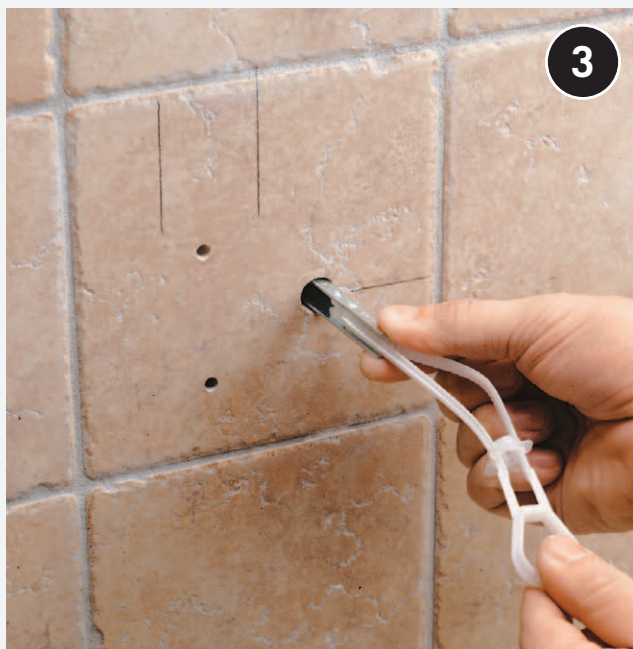
How to Install Grab Bars



1 **Locate the studs in the installation area** using a stud finder. If the area is tiled, the stud finder may not detect studs, so try to locate the studs above the tile, if possible, then use a level to transfer the marks lower on the wall. Otherwise, you can drill small, exploratory holes through grout joints in the tile, then fill the holes with silicone caulk to seal them. Be careful not to drill into pipes.



2 **Mark the grab-bar height at one stud location**, then use a level to transfer the height mark to the stud that will receive the other end of the bar. Position the grab bar on the height marks so at least 2 of the 3 mounting holes are aligned with the stud centers. Mark the mounting-hole locations onto the wall.



3 **Drill pilot holes for the mounting screws.** If you are drilling through tile, start with a small bit (about $\frac{1}{8}$ "), then redrill the hole with the larger bit. For screws that won't hit studs, drill holes for wall anchors, following the manufacturer's directions for sizing. Install anchors, if necessary.



4 **Apply a continuous bead of silicone caulk** to the back side of each bar end (inset). Secure the bar to the studs using #12 stainless-steel screws (the screws should penetrate the stud by at least 1"). Install a stainless-steel screw or bolt into the wall anchors. Test the bar to make sure it's secure.

Glass Shelving

Glass shelving is unobtrusive so it can fit many styles of bathrooms—from sleek modern to elaborate Victorian. You can find a wide variety of shelving available in home stores and online.

Most glass shelves are held in place with metal mounts. How the shelves are secured to the mounts and how the mounts are attached to the wall, differs. Most shelves have a hidden bracket that is secured to the wall. The mount then slips over the bracket and

is secured with a setscrew. The most basic models may have mounts that are screwed directly into the wall with exposed screws. The directions here are for shelving that uses hidden brackets.

If you are installing shelves on a tiled wall, mount the brackets in grout lines if at all possible to minimize the possibility of cracking the tiles. Many glass shelves have some flexibility in the distance between the mounts.



TOOLS + MATERIALS

Level

Drill and bits

Pencil

Glass shelves

Eye protection

Work gloves



Glass shelves fit any style and size of bathroom. They are held in place with metal mounts, which can be decorative and attached to the wall.

How to Install Glass Shelves



Assemble the shelf and shelf holders (not the brackets). Hold the shelf against the wall in the desired location. On the wall, mark the center point of each holder, where the setscrew is.



Remove the shelves and use the level to extend the mark into a 3" vertical line. Use the level to mark a horizontal line across the centers of these lines.



Center the middle round hole of the bracket over the intersection of the vertical and horizontal lines. Mark the center of each of the oblong holes. Put the bracket aside and drill a $\frac{1}{4}$ " hole at each mark. Insert the included wall anchors in the holes. Replace the bracket, insert the screws into the wall anchors, and drive the screws. Repeat for the second bracket.



Remove the shelf from the holders. Slide a holder over a bracket, check that the shelf mount is level, and tighten the setscrew. Repeat with the other holder. Insert the shelf and fix in place. Check the shelf for level. If it's not level, remove one holder and loosen the bracket screws. Slide the bracket up or down to make the unit level. Replace the holder and shelf.

Towel Warmers

Here's a little bit of luxury that need not be limited to high-end hotel stays. You can have toasty towels in your own bathroom with an easy-to-install towel warmer. In a relatively cold room, this can make stepping out of the shower a much more pleasant experience.

Heated towel racks are available in a wide range of styles and sizes. Freestanding floor models as well as door- and wall-mounted versions can be plugged in for use when desired. Hardwired wall-mounted versions can be switched on when you enter the bathroom so your towels are warm when you step out of the shower. Although installing them requires some electrical skills, the hardwired models do not need to be located near wall receptacles, and they do not have exposed cords or extension cords hanging on the wall. However, if you locate the warmer directly above an existing receptacle, you can save a lot of time and mess by running cable up from the receptacle to the new electrical box for the warmer.

Before installing hardwired models, check your local electrical codes for applicable regulations. If you are not experienced with home wiring, have an electrician do this job for you or opt for a plug-in model.



TOOLS + MATERIALS

- Drill and bits
- Level
- Keyhole saw
- Wiring tools
- Phillips screwdriver
- Stud finder
- Retrofit electrical outlet box
- Wire connectors
- NM cable
- Towel warmer
- Pencil
- Masking tape
- Eye protection
- Work gloves

A hard-wired towel warmer offers the luxury of heated towels without the safety concerns of a plug-in device.





How to Install a Hardwired Towel Warmer



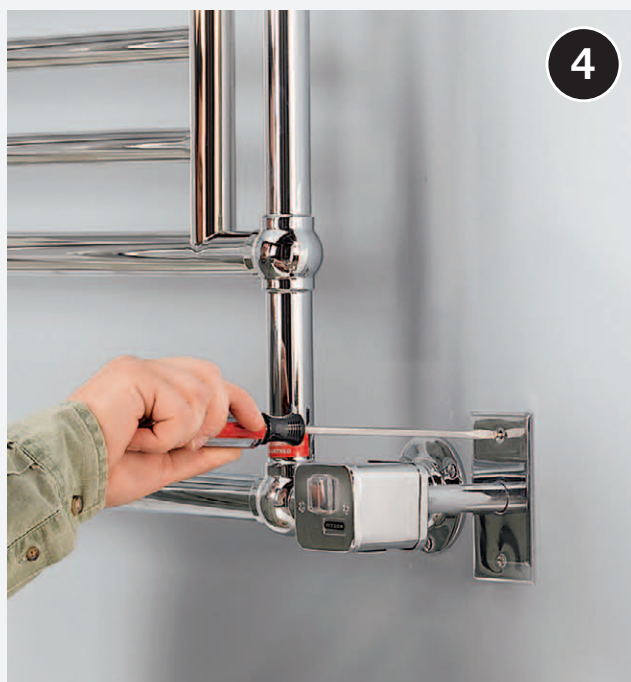
Use a stud finder to locate the studs behind where the towel warmer will be positioned. Mark stud locations. Attach the wall brackets to the towel warmer. Mark the location of the wall-bracket outlet plate (where the electrical connection will be made) and the mounting brackets.

Shut off electrical power at the main service panel. At the mark for the wall-bracket outlet, cut a hole in the wall covering for a retrofit electrical box. Run NM cable from the opening to a GFCI-protected circuit (here, we ran cable down to a receptacle directly beneath it) or install a separate GFCI-protected circuit. Pull the cable through the hole in the retrofit box, then tighten the cable clamp. Place the box in the hole flush with the wall surface and tighten the mounting screw in the rear of the box. Cut the wires so about 5" extends into the box and strip the insulation off at $\frac{3}{8}$ " from the end of each wire.



Position the towel warmer over the outlet box and mark the screw holes for the wall brackets. Make sure the warmer is level. Remove the warmer and drill $\frac{1}{4}$ " pilot holes at the marked locations. If the marks are located over studs, drill $\frac{1}{8}$ " pilot holes. If not, push wall anchors into the holes. Thread the mounting screws through the brackets. Have a helper hold the towel rack in place and use wire connectors to connect the wires, including the ground wire, according to the instructions.

After the electrical connections are made, fasten the towel rack brackets to the wall. Turn on power and test the towel warmer. Finally, attach the electrical cover plate with integral on/off switch.



Measurement Conversions

ENGLISH TO METRIC

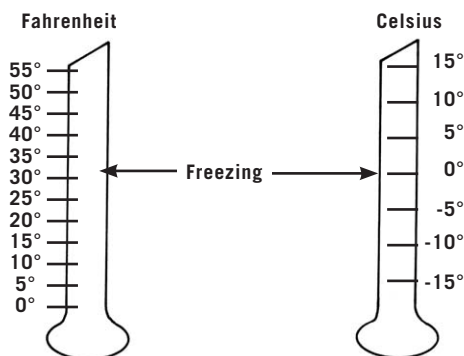
TO CONVERT:	TO:	MULTIPLY BY:
Inches	Millimeters	25.4
Inches	Centimeters	2.54
Feet	Meters	0.305
Yards	Meters	0.914
Square inches	Square centimeters	6.45
Square feet	Square meters	0.093
Square yards	Square meters	0.836
Ounces	Milliliters	30.0
Pints (US)	Liters	0.473 (Imp. 0.568)
Quarts (US)	Liters	0.946 (Imp. 1.136)
Gallons (US)	Liters	3.785 (Imp. 4.546)
Ounces	Grams	28.4
Pounds	Kilograms	0.454

TO CONVERT:	TO:	MULTIPLY BY:
Millimeters	Inches	0.039
Centimeters	Inches	0.394
Meters	Feet	3.28
Meters	Yards	1.09
Square centimeters	Square inches	0.155
Square meters	Square feet	10.8
Square meters	Square yards	1.2
Milliliters	Ounces	.033
Liters	Pints (US)	2.114 (Imp. 1.76)
Liters	Quarts (US)	1.057 (Imp. 0.88)
Liters	Gallons (US)	0.264 (Imp. 0.22)
Grams	Ounces	0.035
Kilograms	Pounds	2.2

CONVERTING TEMPERATURES

Convert degrees Fahrenheit (F) to degrees Celsius (C) by following this simple formula: Subtract 32 from the Fahrenheit temperature reading. Then multiply that number by $\frac{5}{9}$. For example, $77^{\circ}\text{F} - 32 = 45$. $45 \times \frac{5}{9} = 25^{\circ}\text{C}$.

To convert degrees Celsius to degrees Fahrenheit, multiply the Celsius temperature reading by $\frac{9}{5}$. Then, add 32. For example, $25^{\circ}\text{C} \times \frac{9}{5} = 45$. $45 + 32 = 77^{\circ}\text{F}$.



METRIC PLYWOOD PANELS

Metric plywood panels are commonly available in two sizes: 1,200 mm $\times$ 2,400 mm and 1,220 mm $\times$ 2,400 mm, which is roughly equivalent to a 4 $\times$ 8' sheet. Standard and Select sheathing panels come in standard thicknesses, while Sanded grade panels are available in special thicknesses.

STANDARD SHEATHING GRADE		SANDED GRADE	
7.5 mm	($\frac{5}{16}$ ")	6 mm	($\frac{1}{4}$ ")
9.5 mm	($\frac{3}{8}$ ")	8 mm	($\frac{5}{16}$ ")
12.5 mm	($\frac{1}{2}$ ")	11 mm	($\frac{7}{16}$ ")
15.5 mm	($\frac{5}{8}$ ")	14 mm	($\frac{9}{16}$ ")
18.5 mm	($\frac{3}{4}$ ")	17 mm	($\frac{5}{8}$ ")
20.5 mm	($\frac{13}{16}$ ")	19 mm	($\frac{3}{4}$ ")
22.5 mm	($\frac{7}{8}$ ")	21 mm	($\frac{13}{16}$ ")
25.5 mm	(1")	24 mm	($\frac{15}{16}$ ")

LUMBER DIMENSIONS

NOMINAL - U.S.	ACTUAL - U.S. (IN INCHES)	METRIC
1 $\times$ 2	$\frac{3}{4}$ $\times$ 1 $\frac{1}{2}$	19 $\times$ 38 mm
1 $\times$ 3	$\frac{3}{4}$ $\times$ 2 $\frac{1}{2}$	19 $\times$ 64 mm
1 $\times$ 4	$\frac{3}{4}$ $\times$ 3 $\frac{1}{2}$	19 $\times$ 89 mm
1 $\times$ 5	$\frac{3}{4}$ $\times$ 4 $\frac{1}{2}$	19 $\times$ 114 mm
1 $\times$ 6	$\frac{3}{4}$ $\times$ 5 $\frac{1}{2}$	19 $\times$ 140 mm
1 $\times$ 7	$\frac{3}{4}$ $\times$ 6 $\frac{1}{4}$	19 $\times$ 159 mm
1 $\times$ 8	$\frac{3}{4}$ $\times$ 7 $\frac{1}{4}$	19 $\times$ 184 mm
1 $\times$ 10	$\frac{3}{4}$ $\times$ 9 $\frac{1}{4}$	19 $\times$ 235 mm
1 $\times$ 12	$\frac{3}{4}$ $\times$ 11 $\frac{1}{4}$	19 $\times$ 286 mm
1 $\frac{1}{4}$ $\times$ 4	1 $\times$ 3 $\frac{1}{2}$	25 $\times$ 89 mm
1 $\frac{1}{4}$ $\times$ 6	1 $\times$ 5 $\frac{1}{2}$	25 $\times$ 140 mm
1 $\frac{1}{4}$ $\times$ 8	1 $\times$ 7 $\frac{1}{4}$	25 $\times$ 184 mm
1 $\frac{1}{4}$ $\times$ 10	1 $\times$ 9 $\frac{1}{4}$	25 $\times$ 235 mm
1 $\frac{1}{4}$ $\times$ 12	1 $\times$ 11 $\frac{1}{4}$	25 $\times$ 286 mm
1 $\frac{1}{2}$ $\times$ 4	1 $\frac{1}{4}$ $\times$ 3 $\frac{1}{2}$	32 $\times$ 89 mm
1 $\frac{1}{2}$ $\times$ 6	1 $\frac{1}{4}$ $\times$ 5 $\frac{1}{2}$	32 $\times$ 140 mm
1 $\frac{1}{2}$ $\times$ 8	1 $\frac{1}{4}$ $\times$ 7 $\frac{1}{4}$	32 $\times$ 184 mm
1 $\frac{1}{2}$ $\times$ 10	1 $\frac{1}{4}$ $\times$ 9 $\frac{1}{4}$	32 $\times$ 235 mm
1 $\frac{1}{2}$ $\times$ 12	1 $\frac{1}{4}$ $\times$ 11 $\frac{1}{4}$	32 $\times$ 286 mm
2 $\times$ 4	1 $\frac{1}{2}$ $\times$ 3 $\frac{1}{2}$	38 $\times$ 89 mm
2 $\times$ 6	1 $\frac{1}{2}$ $\times$ 5 $\frac{1}{2}$	38 $\times$ 140 mm
2 $\times$ 8	1 $\frac{1}{2}$ $\times$ 7 $\frac{1}{4}$	38 $\times$ 184 mm
2 $\times$ 10	1 $\frac{1}{2}$ $\times$ 9 $\frac{1}{4}$	38 $\times$ 235 mm
2 $\times$ 12	1 $\frac{1}{2}$ $\times$ 11 $\frac{1}{4}$	38 $\times$ 286 mm
3 $\times$ 6	2 $\frac{1}{2}$ $\times$ 5 $\frac{1}{2}$	64 $\times$ 140 mm
4 $\times$ 4	3 $\frac{1}{2}$ $\times$ 3 $\frac{1}{2}$	89 $\times$ 89 mm
4 $\times$ 6	3 $\frac{1}{2}$ $\times$ 5 $\frac{1}{2}$	89 $\times$ 140 mm

LIQUID MEASUREMENT EQUIVALENTS

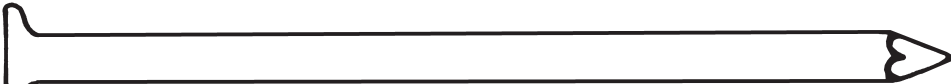
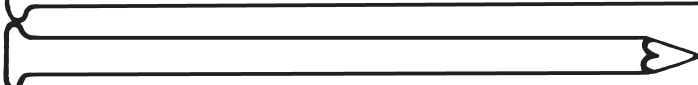
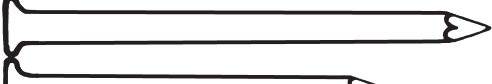
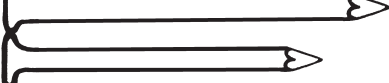
1 Pint	= 16 Fluid Ounces	= 2 Cups
1 Quart	= 32 Fluid Ounces	= 2 Pints
1 Gallon	= 128 Fluid Ounces	= 4 Quarts

COUNTERBORE, SHANK + PILOT HOLE DIAMETERS

SCREW SIZE	COUNTERBORE DIAMETER FOR SCREW HEAD (IN INCHES)	CLEARANCE HOLE FOR SCREW SHANK (IN INCHES)	PILOT HOLE DIAMETER	
			HARD WOOD (IN INCHES)	SOFT WOOD (IN INCHES)
#1	.146 ($\frac{9}{64}$)	$\frac{5}{64}$	$\frac{3}{64}$	$\frac{1}{32}$
#2	$\frac{1}{4}$	$\frac{3}{32}$	$\frac{3}{64}$	$\frac{1}{32}$
#3	$\frac{1}{4}$	$\frac{7}{64}$	$\frac{1}{16}$	$\frac{3}{64}$
#4	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{64}$
#5	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{5}{64}$	$\frac{1}{16}$
#6	$\frac{5}{16}$	$\frac{9}{64}$	$\frac{3}{32}$	$\frac{5}{64}$
#7	$\frac{5}{16}$	$\frac{5}{32}$	$\frac{3}{32}$	$\frac{5}{64}$
#8	$\frac{3}{8}$	$\frac{11}{64}$	$\frac{1}{8}$	$\frac{3}{32}$
#9	$\frac{3}{8}$	$\frac{11}{64}$	$\frac{1}{8}$	$\frac{3}{32}$
#10	$\frac{3}{8}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{7}{64}$
#11	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{5}{32}$	$\frac{9}{64}$
#12	$\frac{1}{2}$	$\frac{7}{32}$	$\frac{9}{64}$	$\frac{1}{8}$

NAILS

Nail lengths are identified by numbers from 4 to 60 followed by the letter “d,” which stands for “penny.” For general framing and repair work, use common or box nails. Common nails are best suited to framing work where strength is important. Box nails are smaller in diameter than common nails, which makes them easier to drive and less likely to split wood. Use box nails for light work and thin materials. Most common and box nails have a cement or vinyl coating that improves their holding power.

	LBS.	MM	IN.
	20d	102 mm	4"
	16d	89 mm	3½"
	10d	76 mm	3"
	8d	64 mm	2½"
	6d	51 mm	2"
	5d	44 mm	1¾"
	4d	38 mm	1½"

Resources

Accessibility Resource Center (ARC)

Shower and wet room kits, Aging in Place,
and accessibility accessories
715-743-2771
www.arcfirst.net

American Standard

Bathroom and kitchen fixtures
800-442-1902
www.americanstandard-us.com

BLACK+DECKER

Power tools and accessories
800-544-6986
www.blackanddecker.com

Duravit

Bathtubs, sinks, and bathroom furniture
www.duravit.us

Interstyle Glass and Ceramic

Ceramic glass and tiles
604-421-7229
www.interstyle.ca

Moen

Bathroom faucets, shower fixtures, safety and
accessibility accessories
800-289-6636
www.moen.com

MTI

Tubs, shower bases, and enclosures, sinks, and
accessories
800-783-8827
www.mtibaths.com

National Kitchen and Bath Association

Industry association offering advice and connection
to professionals
800-843-6522
www.nkba.org

Plumbing, Heating, Cooling Contractors Association

Producers of the National Standard Plumbing Code
800-533-7694
www.phccweb.org

Robern

Bathroom cabinets, lighting, vanities, and mirrors
800-877-2376
www.robern.com

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