

The thirteen most common repairs

YES Electric • a plain-language course for new plumbing apprentices

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Most of a service plumber's week is the same handful of jobs over and over. A leak on the supply side. A stoppage on the drain side. A toilet that runs. A water heater that quit. Learn these thirteen jobs and you can handle most of what comes through the office in a normal week.

The two-roads idea from the first module still applies. Supply-side repairs are almost always leaks, and the fix is shut it off, cut out the bad part, put in a new one. Drain-side repairs are almost always stoppages, and the fix is find the access point and run a cable. Toilets and water heaters have their own small set of wear parts. The jobs below are listed in rough order of how often they come up.

Before every repair

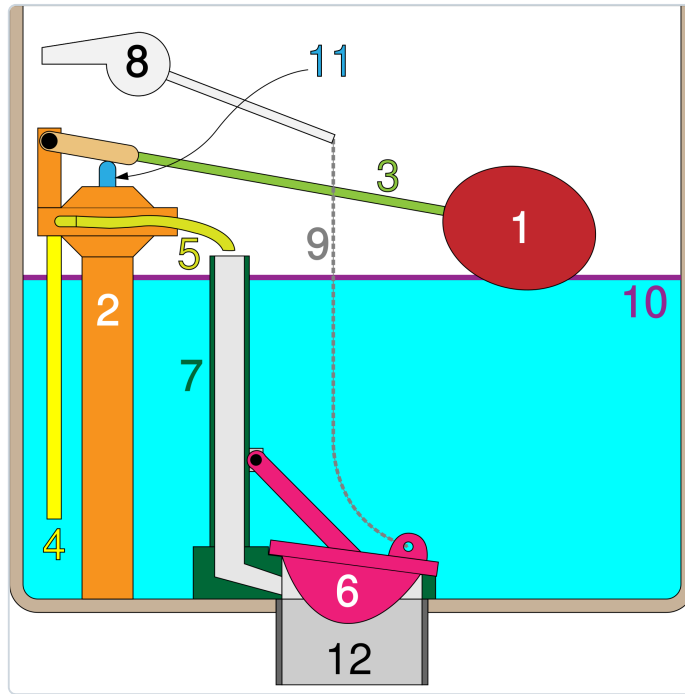
Three habits apply to every job on this list.

1. **Find the shutoff before you start.** Know where the main is and where the fixture stop is. If a fitting lets go while you are working, you want to already know which valve to grab.
2. **Put down a towel and a bucket.** Every cut pipe has water in it. Every trap has water in it. Catch it instead of mopping it.
3. **Take a picture before you take it apart.** The photo tells you how it goes back together and shows the office what you found.

1. Running toilet

What is wrong. Water keeps trickling into the bowl, or the tank refills by itself every few minutes. Either the flapper is worn and leaking past the flush valve seat, or the fill valve is not shutting off and water runs down the overflow tube.

How it is fixed. Shut the stop valve and flush to empty the tank. If the water level is above the overflow tube, replace or adjust the fill valve. The Fluidmaster 400 is the universal one and fits almost any tank. If the level is right but it still runs, replace the flapper. A few drops of food coloring in the tank tells you which it is: if color shows up in the bowl without flushing, the flapper is leaking. If a new flapper does not seal, the flush valve seat is pitted and the whole flush valve gets replaced, which means pulling the tank off the bowl.



Inside a toilet tank: 1 float, 2 fill valve, 3 lift arm, 4 tank fill tube, 5 bowl refill tube, 6 flush valve flapper, 7 overflow tube, 8 flush handle, 9 chain, 10 water line, 11 fill valve shaft, 12 flush tube to the bowl. Pushing the handle lifts the flapper by the chain; the falling water level drops the float and opens the fill valve.

Photo: File:Gravity toilet valves at rest.svg by Klork, CC BY-SA 3.0.



A worn toilet flapper. The rubber has deteriorated and partly fallen off the plastic frame, so it no longer seals the flush valve seat and the tank slowly leaks into the bowl.

Photo: File:Toilet plastic flapper leaked missing rubber - 20260808.jpg by Ranch9613, CC0.



A replacement toilet fill valve (float valve). The brass threaded shank goes through the tank wall, the float cup rides up and down on the plastic tower, and the valve shuts off the water when the float reaches the set height.

Photo: File:Fuellventil schwimmerventil toilettenspuelung.JPG by Cschirp, CC BY-SA 3.0.

2. Clogged sink or tub drain

What is wrong. Hair, soap, and grease build up in the P-trap or trap arm. Kitchen clogs are grease and food. Bathroom clogs are hair.

How it is fixed. Pull the P-trap apart under the sink and clean it. If it is past the trap, run a hand snake or small drum machine through the trap arm toward the wall. Tub drains get snaked through the overflow plate, not the drain hole, because the drain has a crossbar in the way. Reassemble with new slip-joint washers and run hot water to test. Chemical drain cleaner is not used. It damages pipe and burns whoever opens the trap next.



A drum machine (sectional drain cleaner). The technician feeds the steel cable from the rotating drum into a cleanout opening on a PVC stack; the drum spins the cable while he guides it with gloved hands.

Photo: File:Roto main5.jpg by Guynamedpaul, CC BY-SA 3.0.

3. Clogged toilet

What is wrong. Too much paper, a toy, a wipe, or a feminine product stuck in the trapway inside the bowl.

How it is fixed. Flange plunger first. If that fails, a closet auger, which is a short snake with a rubber-sleeved elbow so it does not scratch the porcelain. If the auger will not clear it, pull the toilet, flip it over, and push the object out from the bottom. If a toilet clogs over and over, the problem is usually downstream in the main line, not the toilet.



A drain snake cable fed down into the trap of a toilet bowl to clear a clog. A closet auger does the same job with a rigid elbow tube and a rubber boot so the cable cannot scratch the porcelain.

Photo: File:Čištění ucpaného záchodu.jpg by Juandev, CC BY-SA 3.0.

4. Main sewer line stoppage

What is wrong. Every drain in the house is slow, or the lowest fixture backs up when another one is used. The cause is roots, a belly in the pipe, grease, or a broken clay pipe.

How it is fixed. Find the cleanout outside or at the base of the stack and run a sewer machine with a 1/2 or 5/8 inch cable and a cutting head, 75 to 100 feet. Camera the line afterward to find what caused it. Roots get cut and the line gets a repeat visit in a year or two. A broken pipe gets spot-repaired by digging it up, or the whole run gets replaced or lined.



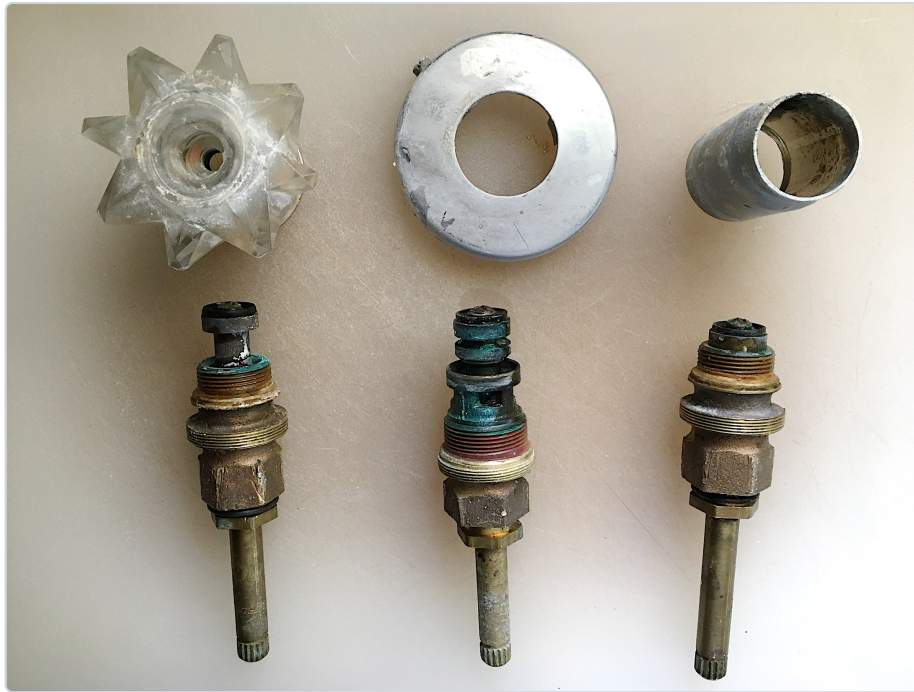
A motorized sewer machine clearing a residential side sewer. The cable runs from the drum into a cast iron cleanout wye at right; spare cutter heads and tools are in the orange bucket.

Photo: File:Plumbers snake 24689.jpg by Walter Siegmund, CC BY 2.5.

5. Dripping faucet

What is wrong. The seal inside the faucet is worn. Which seal depends on the faucet type.

How it is fixed. Shut the stops and take the handle off. Compression faucets, the kind with two handles that turn several times, get new rubber seats and washers, and sometimes the seats are reground. Cartridge faucets, the one-handle kind from Moen, Delta, or Kohler, get a new cartridge matched to the brand. Ball faucets get a rebuild kit with new springs and seats. If the faucet is old, cheap, or the finish is shot, replacing the whole faucet is often faster than hunting the right cartridge.



Three compression-type faucet stems pulled from an old three-handle tub valve, with the acrylic handle, escutcheon and sleeve above them. Each stem has a rubber washer on its end that presses against a seat to stop the water; corrosion and worn washers cause the drip.

Photo: File:Three Cartridges (28352215663).jpg by Alan Levine from Strawberry, United States, CC BY 2.0.

Faucet type	How to recognize it	What wears out
Compression	Two handles, several turns to shut off	Rubber washer and seat
Cartridge	One or two handles, quarter turn or lever	The cartridge
Ball	One handle on a rounded cap, Delta style	Springs, seats, and the ball
Ceramic disc	One handle, very smooth, newer	Disc cartridge, rarely

6. Leaking stop valve or supply tube

What is wrong. The little valve under the sink or behind the toilet weeps at the stem or will not shut off. Old multi-turn stops with rubber packing are the usual culprit. Plastic supply tubes crack with age.

How it is fixed. Shut the house main. Cut or unscrew the old stop. On copper, a new quarter-turn compression stop slides over the pipe with a new ferrule. On PEX, a crimp or push-fit stop. On CPVC or galvanized, a glued or threaded one. Replace the supply tube with a braided stainless one at the same time.



An angle stop valve coming out of the wall at a toilet, with a chrome escutcheon behind it and a braided stainless supply tube running up to the tank. The same valve is used under sinks for the faucet supplies. Turn the oval handle clockwise to shut the water off to the one fixture.

Photo: File:Toilet water shutoff valve.JPG by BrokenSphere, CC BY-SA 3.0.

7. Leaking water heater

What is wrong. Three different things show up as a puddle under the heater. The T&P valve is dripping, the drain valve weeps, or the tank itself has rusted through.

How it is fixed. A dripping T&P usually means too much pressure, so check house pressure with a gauge on a hose bib. Over 80 psi means a bad or missing PRV. If pressure is fine, the expansion tank has lost its air charge and needs replacing, or the T&P itself is bad and gets swapped. A weeping drain valve gets replaced with a brass ball valve. A leaking tank cannot be fixed. The heater gets replaced, which means draining it, disconnecting water, gas or electric, and the flue, setting the new unit, and running new flex connectors, a new T&P discharge line, and a drip pan if it is in a finished area.

8. No hot water or not enough

What is wrong. On an electric heater, one or both heating elements or thermostats have failed. On gas, the pilot is out, the thermocouple or igniter is bad, or the gas valve has failed. Sediment in the bottom of the tank also steals capacity.

How it is fixed. Electric: kill the breaker, pull the access panels, and test the elements with a meter for continuity and the thermostats for power. Replace what tests bad. Elements screw out with a 1 1/2 inch element wrench after draining the tank below the element. Gas: relight the

pilot. If it will not stay lit, replace the thermocouple. If the pilot lights but the burner will not, the gas valve is replaced. A tank that rumbles or runs short gets flushed through the drain valve.



An electric water heater element and its magnesium anode rod pulled from the tank. The element loops are crusted with scale and the anode rod has been eaten away, which is what hard water does inside a tank over the years.

Photo: File:Grzałka z anodą magnezową.jpg by Zbigniew.czerwik, CC BY 3.0.



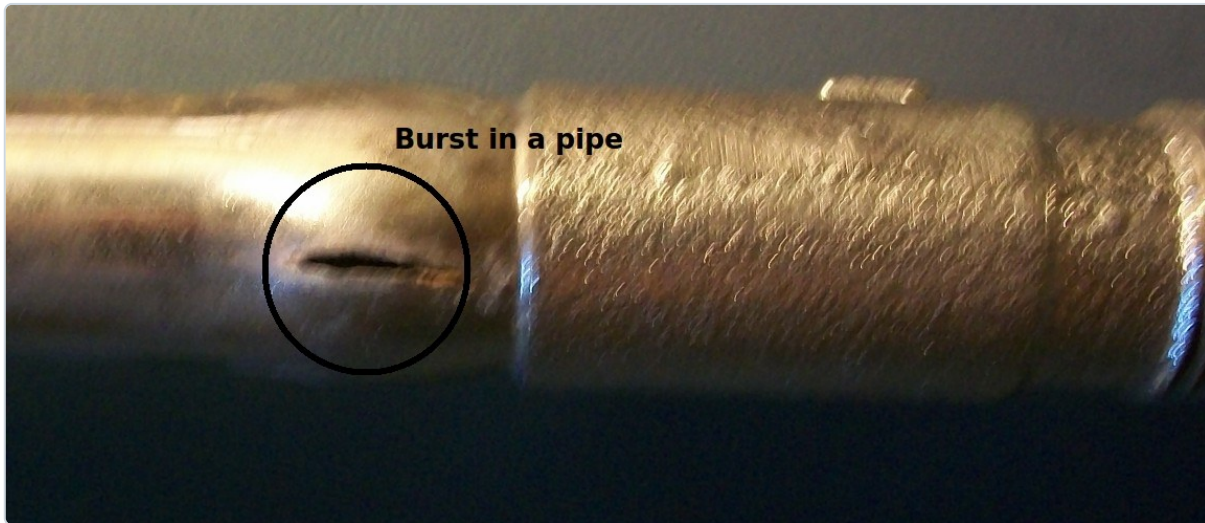
Lime scale flushed out of the inside of a water heater, collected in a bucket. This chalky sediment settles on the tank bottom and insulates the burner or element until the heater is flushed.

Photo: File:Kesselstein in Kübel.jpg by Harald Kloth, CC BY-SA 4.0.

9. Burst or pinhole pipe leak

What is wrong. A pipe froze and split, a copper pipe got a pinhole from corrosion, a nail went through it during a remodel, or a PEX fitting was never crimped right.

How it is fixed. Shut the main and open a low faucet to drain. Cut out the bad section with a tubing cutter. Copper gets a new piece soldered or pressed in, or a push-fit coupling if the pipe is wet and will not take solder. PEX gets cut back and a new coupling crimped on. A frozen pipe that split in several places gets the whole exposed run replaced and then insulated or rerouted. Drywall opening and patching is part of the job on inside walls.



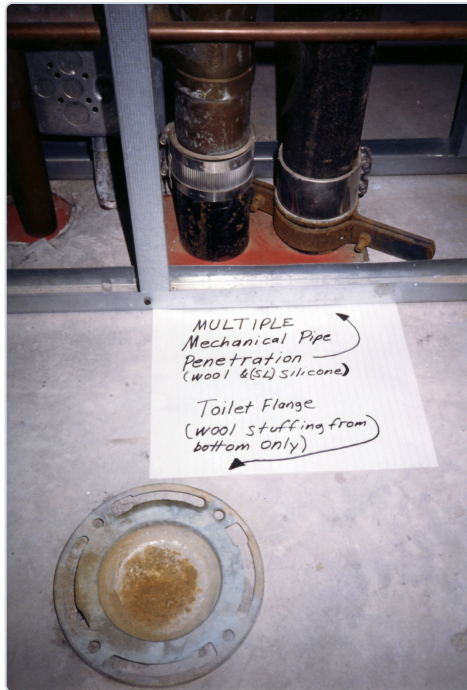
A frost split in a metal supply pipe. Water froze inside, expanded, and cracked the wall of the pipe along its length; the crack is circled.

Photo: File:Burst pipe from freezing.jpg by Tomwsulcer, CC BY-SA 3.0.

10. Toilet leaking at the base

What is wrong. Water seeps out around the bottom when flushed. The wax ring has failed, the closet bolts are loose and the toilet rocks, or the flange is broken or set too low.

How it is fixed. Shut the stop, drain the tank and bowl, unbolt and lift the toilet. Scrape the old wax off the flange and the horn of the bowl. Inspect the flange. A cracked flange gets a repair ring screwed over it. A flange below the finished floor gets a spacer or an extra-thick wax ring. Set a new wax ring or waxless seal, drop the toilet straight down, new closet bolts, snug but not tight so the china does not crack. Caulk the base and leave the back open so a future leak shows itself.



A closet flange set in a concrete floor with the toilet removed. The toilet sits on a wax ring on this flange and is held down by closet bolts in the slots. The note is from a fire-stopping test; the drain pipe runs down through the floor below the flange.

Photo: File:Toilet flange.jpg by Achim Hering, Public domain.

11. Garbage disposal jammed or dead

What is wrong. Something hard, a bone or a spoon, stopped the plate and the motor tripped its thermal overload. Or the unit has leaked from the bottom seal and is done.

How it is fixed. Kill power. Turn the plate from underneath with the hex key that fits the bottom of the unit, or a broom handle from above. Pull out the object. Push the red reset button on the bottom. If it hums but will not turn after freeing, or leaks from the body, replace it. A new disposal mounts on the same sink flange if it is the same brand. Otherwise the flange and plumber's putty get redone.

12. Low water pressure at one fixture

What is wrong. The aerator on the faucet is plugged with grit, the showerhead is scaled up, the cartridge is clogged, or a stop valve is half shut.

How it is fixed. Unscrew the aerator and rinse it, or soak the showerhead in vinegar. Check that both stops are fully open. If still low, pull the cartridge and flush the lines by turning the stops on into a bucket, which blows debris out before the new cartridge goes in. Low pressure at every fixture is a different problem: a PRV, a clogged whole-house filter, or galvanized pipe rusting shut.



A new faucet aerator in its bag beside an old one. The old aerator screen is caked with white scale and the threads are damaged, so the flow drops and sprays sideways until it is cleaned or replaced.

Photo: File:New and old faucet aerator.JPG by MKFI, Public domain.

13. Outdoor hose bib leaking or frozen

What is wrong. The packing nut leaks when the valve is on, the washer is worn so it drips when off, or a frost-free sillcock froze with a hose left on and split the stem.

How it is fixed. Tighten the packing nut a quarter turn. If it still leaks, pull the stem and replace the washer and packing. A split frost-free gets the whole sillcock replaced from inside, cutting the pipe behind it and soldering or crimping on a new one, pitched slightly down toward the outside so it drains.

The pattern

Side of the house	What goes wrong	What the fix looks like
Supply	Leaks	Shut it off, cut out the bad part, put in a new one
Drain	Stoppages	Find the access point, run a cable, camera if it repeats
Toilet	Wear parts	Flapper, fill valve, wax ring
Water heater	Wear parts	Elements, thermostats, thermocouple, T&P, expansion tank

An apprentice who can do these thirteen jobs can handle most of a service truck's week.

Check yourself

1. What is the food coloring test, and which two parts does it tell apart?
2. Why do you snake a tub through the overflow instead of the drain hole?
3. A toilet clogs every few weeks. Where is the problem most likely to be?
4. Name the three things that can put a puddle under a water heater, and which one cannot be fixed.
5. What tool pulls a water heater element, and what has to happen to the tank first?
6. When would you use a push-fit coupling instead of soldering a copper repair?
7. Why do you leave the back of the toilet base uncaulked?
8. Low pressure at one faucet versus low pressure at every faucet point to different causes. Name one cause for each.

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