Learning Objectives:

- The different types of pipe and fittings.
- How to answer your customers' product-related questions.
- How to help your customer choose the right products.
- How to increase transaction sizes by learning more about add-on sales.

Chapter 1: Pipe and Fittings

Module 1: Types of Pipes

Product Knowledge:

Copper Pipe

- Use for carrying water.
- Use compression or sweat connections to join this type of pipe.
- Common sizes of pipe diameter are 3/8", 1/2" and 3/4".
- Larger sizes may be used for DWV (drain-waste-vent) applications.
- Some copper pipe can be used as refrigeration tubing. In this case, moisture is removed and ends sealed for better performance of refrigerants.
- Rigid copper pipe is good for new installation. Soft or flexible copper pipe is good for repair work since it can bend around obstacles without multiple cuts and joints.
- Type K is heaviest, used in municipal, commercial, residential and underground installation; Type L is medium weight and is the most commonly used in residential water lines; Type M is hard and thin.

PVC Pipe

- PVC (polyvinyl chloride) is used for carrying cold water, irrigation, use as conduit and for DWV (drain-waste-vent) projects.
- Use compression or solvent weld connections to join this type of pipe.
- Available in diameter sizes ranging from 1/2" to 2".
- Rated by thickness and strength. Schedule 40 is the most common and suited for uses such as carrying water and for irrigation.
- Schedule 40 with a foam core is suitable for drain and waste applications.

CPVC Pipe

- CPVC (chlorinated polyvinyl chloride), is used for both hot and cold water supply or chemical distribution systems.
- Use compression or solvent weld connections to join this type of pipe.
- Requires special solvent cement that is different from cement used for other types of plastic pipes. Most solvents will indicate this on the can.

Galvanized Pipe

- Used primarily for carrying water or waste. Do not use for gas or steam applications.
- Use threaded connections to join this type of pipe.
- Use only with similar galvanized pipe fittings, not with black pipe fittings.
- Measured using the I.D. (inside diameter).
- Common water sizes are 3/8", 1/2", 3/4" and 1". Common waste sizes are 1-1/2", 2" and 3".
- Has zinc coating that will prevent rust if it's not scratched.
- Often sold in pre-threaded standard lengths, or can be custom threaded.

Black Iron Pipe

- Used for carrying steam or gas.
- Used only with black iron pipe fittings, not galvanized fittings.
- Not treated for rust resistance.
- Use threaded connections for joining this pipe.
- Measured using the I.D. (inside diameter).

PEX Pipe

- PEX, which stands for crosslinked polyethylene, is used for carrying hot and cold water.
- Do not weld with solvents. Join with heat fusion, flare, crimp ring or compression fittings.
- Chief advantage is its flexibility and strength. It can make turns around corners without couplings.
- Excellent chemical resistance to acids and alkalis, but do not use for fuel oil, gasoline or kerosene systems.
- In a PEX plumbing system, a separate line is run from the main water supply to each fixture in a setup much like a circuit breaker box.

ABS/DWV Pipe

- Commonly used for DWV (drain-waste-vent) applications or for underground electrical conduits.
- Use compression or solvent weld connections to join this type of pipe.
- Made from a thermoplastic resin. Lightweight and easier to use than metal pipe.
- Available as either solid wall or cellular core construction.
- ABS stands for Acrylonitrile Butadiene Styrene.

Black Poly Pipe

- Used for carrying low-pressure cold water. Common applications include golf course sprinklers, underground conduits or to carry corrosive liquids and gases.
- Good chemical and crush resistance.
- Lightweight enough to cut with an ordinary knife or a fine-toothed hacksaw blade.

Vinyl Tubing

- Economical and used in a variety of applications.
- Usually joined with pressure fittings and clamps.

Taking it to the Floor:

Frequently Asked Questions

Q: Is 2" CPVC and 2" PVC the same size?
A: No. CPVC is measured by O.D., which makes its sizing similar to hard copper. PVC is measured by I.D., which makes its sizing similar to iron pipe. Remember that some pipes are measured based on their outside diameter, or O.D. Others are measured by their inside or interior diameter, or I.D.

Q: Do I use the same type of glue for both PVC and CPVC?
A: No, CPVC requires special solvent cement that is different from cement used for other types of plastic pipe. After you have glued fittings and pipe together, they are permanently joined and cannot be taken apart.

Q: There is dripping along some of my pipes. Does this indicate a leak?
A: Not necessarily. Warm, moist air condenses when it strikes cold pipes. To prevent this condensation, wrap the pipes in insulation.

Q: I have a problem with the plumbing in my house making groaning noises.
A: It could be that you have lost your "air cushion." To get it back, turn the water supply off at the main valve. Turn on all the faucets around your home. Then turn on the main valve again and shut off each faucet. This should take care of the problem.

Q: What does the toilet vent pipe do?
A: It is a pipe that runs from the toilet drain to the outside, usually to the roof. This prevents air lock in the drain line.

Add-on Items

- Suggest a **pipe cutter** or **hacksaw** for cutting the pipe.
- **Pipe hangers** or **pipe strap** will be useful for supporting long runs of pipe. Suggest nails for attaching pipe strap.
- Make sure the customer has all of the **fittings** for the project.
- If the customer is buying copper pipe, ask if he or she has all of the items needed to make the fittings, such as **solder** and **flux**, a **torch**, or extra **gas** for the torch. A customer preparing to solder may also need **emery cloth** for smoothing the edges of cut pipe, or a copper fitting cleaning **brush**.
- If the customer is buying PVC or CPVC pipe, suggest **thread seal tape** or cement solvent and primer.
- If the customer is buying PEX pipe suggest a **crimp tool** for making the connections to fittings. This is also something the customer may want to rent from your rental department, as it's an expensive item.
- Also suggest a **PVC cutter**, which will cut a variety of plastic pipe.

Product Knowledge:

Module 2: Types of Connections

Soldered Fitting

- Used to join copper pipe.
- Unthreaded. Joined by soldering (also called sweating) using flux, solder and a torch.

Threaded Fitting

- Most commonly used in steel fittings, but some plastic and copper fittings are threaded.
- Uses pipe dope or thread seal tape on the threads when joining to prevent leaks and corrosion.
- Female fittings have threads on the interior. Male fittings have threads on the exterior.
- IPS means Iron Pipe Size, and also refers to threaded pipe.
- MIP means Male Iron Pipe size. It refers to a male threading that will fit an IPS pipe.
- FIP means Female Iron Pipe size. It refers to a female threading that will fit an IPS pipe.

Solvent Weld Fitting

- Used for unthreaded plastic pipe.
- Bonded with cement that is compatible to the type of plastic being connected.

Push Fittings

- Used to connect a copper, CPVC and PEX pipe in any combination.
- Connect without soldering, clamps or solvent; simply push the pipe onto the fitting. Fittings can also be removed from the pipe using a special tool.
- Available in a variety of shapes, including valves.

Insert Fitting

- Used with flexible plastic pipe, rubber hose or rubber tubing.
- Inserted onto the pipe and compressed and sealed with an adjustable clamp.
- Sometimes called a hose barb.
- Usually made of either brass or plastic.

Compression Fitting

- Can also be used to connect two different types of pipe, such as plastic and copper.
- Achieves a watertight seal by tightening a nut, which compresses a ring onto the pipe.
- Avoids threading, gluing or soldering a pipe connection.
- Used with water supply tubes or other unthreaded ends of pipe.
- Can be removed and reinstalled or retightened.

Flared Fitting

- Operates like a compression fitting, but one end of the pipe is flared.
- Typically used in refrigeration, small appliances and oil heating.
- A connector is slipped over the end of a copper tube, which is then flared out using a special tool. The fitting can then be screwed into another fitting.

Adapter Fitting

- Any kind of fitting that helps connect two different types of tubing, such as copper and galvanized steel, or threaded and solvent weld, or two different sizes that are usually incompatible.
- Two main types, reducers and bushings, are used to convert from one size to another.

Flexible Fitting

- Short lengths of flexible and soft plastic.
- Fits over an existing pipe and tightens with a clamp.
- Generally used for drain fittings in non-pressurized repair applications or to tie into existing drainage systems.

Taking it to the Floor:

Frequently Asked Questions

Q: What is the proper way to join galvanized pipe to copper pipe?
A: You should use a dielectric union. This will prevent electrolysis from occurring, which deteriorates the copper tubing.

Q: How do I join PVC fittings to PVC pipe?
A: Use a solvent welding glue, which softens the pipe and fittings so they can melt together. After these fittings are joined, they cannot be taken apart.

Q: Can I attach metal fittings and plastic fittings?
A: Yes, there are transition fittings that make this possible.

Q: What type of fitting will I need to install a new water heater to my plumbing?
A: You need a union that is a compression fitting that can be tightened or disconnected later.

Q: How do I transition from 3/4" copper pipe to 1/2" copper pipe?
A: You need a reducer coupling or elbow (if there is a change in direction) to join the two pieces together.

Add-on Items

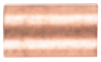
- For customers making a pipe repair, suggest they try a **push-on fitting**. While these fittings are more expensive, they are easy to use. Unlike other types of fittings, the push-on type do not require waiting for the glue to dry on a solvent welded joint, or the extra equipment needed to sweat a joint.
- Someone who crawls around underneath a house to install or repair plumbing will want a good **flashlight**. A hands-free flashlight that straps onto the head, or a miniature halogen worklight with a heavy-duty clip and a swivel that turns in any direction, will appeal to the pro. These make a good add-on sale. You can also merchandise a few in the plumbing section.
- Organization of various fittings is essential to professional customers. Be sure to stock **toolboxes** or tool chests with compartments that hold various types of fittings to help your plumbing contractors stay organized.
- Most fittings are inexpensive. For customers who are making several connections, suggest a **contractor pack**. When it comes to plumbing, it's cheaper to have a few extra pieces and save a trip back to the hardware store.

Module 3: Shapes of Fittings

Product Knowledge:

Caps & Plugs

- A **cap** is closed on one end with female threads or no threads for a solvent weld connection.
- A **plug** is closed on one end with male threads or no threads for a solvent weld connection.
- Both are used to seal a run of pipe.
- A **cleanout plug** can be added to a tee at the base of a vertical drain pipe. The plug is threaded for easy access to the drain. The threaded fitting for the plug can be added on, or some tee fittings have the threaded connection built-in.



Coupling

- Connects two lengths of pipe.
- Has female thread on both ends (for galvanized pipe) or no threads (for copper, PVC and other solvent-welded pipe).
- A **reducer coupling** joins two different sizes of pipe.
- An **adapter coupling** joins two different types of connection types, such as threaded and solvent weld.
- A **repair coupling**, or mender coupling, has no center stop so two lengths of pipe can be fastened together. Use on unthreaded lengths of pipe.

Elbow

- Changes the direction of the pipe, usually at a 45°, 90° or 22-1/2° angle.
- Most common are elbows with female threads or solvent welds on both ends.
- A **street elbow** has a female end on one end and a male end on the other. Also available for solvent welded products.
- A **sweep** is a type of elbow that has a longer curve for a more gradual bend. Available in long or short versions.
- **Reducing elbows** change the size of the pipe.

Tee

- Three female openings in a T shape. A **straight tee** has the same size openings.
- A **reducing tee** has two openings of the same size and one of a different size.
- A **sanitary tee** is used in waste lines. They have a curved branch designed for a cleanout plug and are designed to prevent obstruction of waste.
- A **cross** has four female openings of equal size.
- A **cleanout tee** has a threaded opening to be used in conjunction with a threaded plug for a cleanout opening on a drain pipe.
- A **wye bend** has three female openings. Two are straight in a line; the third is at a 45° angle.

Nipple

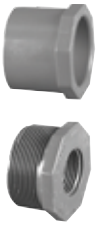
- Any length of pipe that is less than 12" and used to extend a run of pipe.
- Usually available in increments of 1", from "close" (the shortest length, where threads almost touch) to 12".
- Longer lengths of pipe are considered "cut lengths" and are available in 24" increments.

Floor Flange

- Connects a pipe to a wall, floor or any flat surface.
- Flanges are threaded onto pipe and tightened. Four screw holes allow the flange rim to attach to a flat surface.
- A **closet flange** is made to connect toilets to drain and vent systems. The adjustable ring on some closet flanges allows for easier toilet alignment.
- Another type is the **offset closet flange** that is used when the drain pipe has been incorrectly positioned.

Drop Ear Elbow

- Also known as a wing elbow.
- Drop ear elbow provides a rigid installation for mounting an elbow to a wall. Usually used for installing a shower arm or washer hose valve.
- Some variations of the drop ear elbow include fittings that can transition from plastic to brass or copper.



Bushing

- Inserted inside a coupling to reduce the size of the pipe.
- Any number of reductions can be made to reduce and couple to another size of pipe.
- Male threaded on one end with a smaller diameter female thread on the other.

Union

- A three-part fitting that connects any standard size pipe where it may be necessary to disconnect later, such as on a water heater.
- Connects to male threaded ends.
- Also known as a ground joint union.
- A **transition union** joins different types of tubing, such as CPVC to brass.

Saddle Tee

- Joins a smaller drainpipe to a larger one, such as a 1-1/2" pipe to a 3" pipe.
- Used when installing a drain on existing plumbing. Saves the labor of cutting and rejoining the main pipe.
- Some types are made for joining a PVC pipe to a cast iron drain.

Taking it to the Floor:

Frequently Asked Questions

Q: How do I make the transition from the trap under a sink to the drain in the floor?
A: Use a fitting trap adapter. This adapts PVC to tubular traps used for sinks. One end is threaded with a compression-type fitting for the drain pipe from the sink. Use PVC cement to glue the other end to the drain coming out of the floor.

Q: What is the proper way to join galvanized pipe to copper pipe?
A: You should use a dielectric union. This will prevent electrolysis from occurring, which deteriorates the copper tubing.

Q: Why do I hear a banging sound from the pipes when I turn off the water?
A: This could be caused from high water pressure. This can be harmful to your plumbing system because it puts extra pressure on pipes and joints. To correct it, try a water hammer arrestor. It's like a shock absorber for your pipes. This device uses a pressurized cushion of air to stop banging or sudden movement in water pipes due to trapped air. It reduces strain on the plumbing system and is available for standard pipe types, including copper, CPVC and galvanized.

Chapter 2: Rough Plumbing

Module 1: Supply Lines and Connectors

Product Knowledge:

Water Supply Tube

- Used to connect a water supply line to a faucet fixture, toilet or appliance.
- The most common size is 3/8", with lengths ranging from 6" to 72".
- Several types are available:
  - Plastic type is flexible and inexpensive but not designed for exposed connections.
  - Chrome-plated copper or brass tubes are more rigid than other types and are good for exposed applications.
- In areas prone to earthquakes, do not use the rigid water supply tubes. Rigid water lines cannot move, and if they do, they can become disconnected and cause serious water damage.
- Braided, flexible type features pre-attached connector nuts at both ends and flexes to fit.
- Lines made of braided stainless steel are of better quality, as they are more resistant to bursting, which can cause costly property damage.
- Some water supply lines have a built-in safety feature that shuts off the flow of water when it senses a leak in the supply line. This feature can save the home from costly water damage.

Supply Tube Connector

- Connects supply tube to water pipe coming from the floor.
- One end typically has a threaded, compression or sweat connection.
- The other end has a compression fitting for connecting to the supply tube, typically those that are straight plastic, copper or brass.

Washing Machine Supply Line

- Connects the washing machine to the water supply.
- Has two 3/4" female fittings.
- Typically made of rubber reinforced with steel braid to resist pressure and high temperature.
- Often color coded for hot and cold water.

Gas Supply Line

- Used to connect dryers, water heaters, gas ranges and fireplaces to the gas supply lines of the home. Connects the shut-off valve at the end of the run of pipe to the appliance.
- Usually flexible, made of copper or braided stainless steel and covered with a plastic coating.
- Connections are flared or pipe-threaded.
- Typically packaged and labeled according to its suggested application, such as water heater or stove.
- Typically packaged with connectors and adapters.

Gas Flow Valve

- For use with a gas supply line.
- Typically sized by its Outside Diameter (OD). May have pipe-thread fittings or flare fittings.
- An important feature in some valve types is a safety valve that can detect when the gas flow has been ruptured or disconnected at the appliance. When the valve detects a problem, it restricts the flow of gas, thus preventing an unsafe build-up of gas in the home. It automatically resets once the appliance has been repaired.

Taking it to the Floor:

Frequently Asked Questions

Q: You stock two sizes of supply lines. Which one will I need for my toilet?
A: The toilet supply line head is the larger of the two. The smaller ones are sink supply lines.

Q: What are the advantages of plastic supply lines?
A: They are less expensive, do not corrode, will not kink, are more flexible and are non-toxic.

Q: What type of supply lines do you recommend I use for a pedestal sink?
A: Since the supply lines will be exposed, use a stainless steel, brass or chrome supply line. These will look better than the standard plastic tube or the flexible connector.

Module 2: Tubular Drain Products

Product Knowledge:

Trap

- Installed under sinks and tubs to route wastewater to the drain.
- Bridges the gap between the sink tailpiece and the drain line.
- The bend in the trap uses gravity to hold water and prevent sewer gas from seeping into the house.
- Attach using slip nuts.
- Configurations include: P trap and S trap.
- Most common sizes are 1-1/4" and 1-1/2".
- Available in plastic and chrome-plated brass.

Tub Drain

- Uses an overflow opening to control draining in a tub.
- The **spring type** consists of an assembly controlled by a lever that moves a pop-up plug up and down. It is easiest to install, especially in retrofits.
- The **weight type** consists of an assembly that controls a weight that lifts up or down out of the drain hole. It is also controlled by a lever.

Pop-Up Drain

- Also known as a P.O. drain.
- Controls the opening in a lavatory sink with a plug that can open or close the drain.

Sink Tailpiece

- Used to connect the sink strainer assembly to the trap assembly.
- Available in plastic and chrome-plated brass.
- Also available is a tailpiece with a flexible tube that helps in connecting misalignments of the tailpiece and the drain line.
- The **branch tailpiece type** has an outlet for connecting to a dishwasher drain.

Waste Outlet

- Used to route wastewater to the drain, but does not usually include a trap.
- The **center outlet type** connects the tailpieces of two sinks together and feeds a drain between the two sinks.
- The **end outlet type** connects the two sinks with the drain at one side.
- Available in plastic and chrome-plated brass.

Washing Machine Drain

- One end clamps onto the washing machine drain, the other end has a solid J-bend for inserting into the drain coming from the main drain system of the house.
- PVC hose.

Taking it to the Floor:

Frequently Asked Questions

Q: What diameter trap do I need for my kitchen sink?
A: These are almost always 1-1/2". The 1-1/4" traps are for bathroom lavatories.

Q: Is a trap necessary under the sink?
A: Yes, you need a trap to shut off odor (sewer gas) from coming into the kitchen and bath area.

Q: Can I use plastic drain parts on metal drain parts under the sink?
A: Yes, they are the same size and will easily match up.

Q: Can I get a drain that looks better than a plain plastic pipe for my pedestal sink?
A: Yes, use a chrome-plated brass trap.

Add-on Items

- For customers removing an old drain trap, recommend **tongue-and-groove pliers** for loosening the joints on the old fixture.
- Anyone installing a pop-up drain might need some **plumber's putty**.
- Also recommend a **pop-up plug wrench** for anyone installing a pop-up drain.

Module 3: Valves

Product Knowledge:

Gate Valve

- Used to completely shut off or open a waterway. Does not control the volume of flow.
- Uses a sliding wedge to move across the waterway, in either a rising or non-rising action.
- In some models, either opening of a gate valve may face the pressure side of the line, while in others, an arrow indicates the direction of water flow.
- Because they allow the complete passage of water, use on supply lines that are in constant use.

Ball Valve

- Used to completely shut off or open flow, or to regulate flow.
- Uses a large lever to turn a ball that closes or opens valve with one quick quarter turn.
- Are the standard for natural and LP gas, replacing the older plug valves that were traditionally used as gas valves.
- Available in either metal or plastic, threaded or non-threaded types.
- Ball valves with double-stem seals provide greater durability.

Globe Valve

- Used to control volume of flow.
- Has a hand wheel that turns a disc that opens or closes the valve.
- Used when a valve must be opened and closed frequently under high water pressure.
- Should not be used for occasional shut-off purposes in water supply lines.
- Easy to repair.
- One type is an angle valve, which has ports at right angles. It allows for greater water passage than a globe valve.

Pressure Relief Valve

- Used to protect water heaters or hot water storage tanks.
- When the water pressure reaches a dangerous level, the valve opens and discharges water. Cold water then flows into the tank and stabilizes the water pressure.

Stop & Waste Valve

- Helps prevent freezing of water lines in winter.
- Has a small opening on the non-pressure side to allow drainage when it is in cut-off position.
- Also known as a bleeder valve or drainable valve.
- Comes in threaded, sweat, flare and slip joint ends.
- Flat head or socket head are common residential types, which have a socket head that takes a 3/8" key rod.

Check Valve

- Operates automatically, permitting flow in one direction only.
- Used to prevent water pumped to an overhead tank from flowing back when the pump stops.
- Sometimes combined with a throttling or shut-off valve. Some communities require a check valve in cold water lines between the water heater and meter.
- Some check valves are designed for use with vertical pipes only. Therefore, it will not work if installed upside down. The closing device, a disk, ball or clapper, falls shut by gravity when installed vertically.

- Another variety is the **swing-type check valve**, which is a small, smooth swing-type gate located in the center of the valve. As water is pumped through the flow side of the valve, a gate swings open to allow water to pass. If water attempts to back up through the valve, the gate is forced shut against the pressure side of the valve.

Taking it to the Floor:

Frequently Asked Questions

Q: Can you repair a leaky valve?
A: Gate valves can sometimes be repaired by tightening the outside hex nut or by removing the hex nut and adding stem packing.

Q: What is a gasket?
A: It is made of rubber, plastic or paper and is the component that seals the joints in fittings and valves. It is sometimes available in liquid form.

Q: What type of valve would you recommend to prevent hard water from corroding that valve?
A: Use an ACETAL valve. They resist mineral build-up.

Q: Can I connect a valve to tubing of a different material?
A: Use a transitional connector to prevent leaks caused by the differing contraction/expansion characteristics of the two materials.

Upselling Skills

- A ball valve may be more expensive than a gate valve, but it is superior in quality to a gate valve. It is easier to operate, it immediately shows whether the valve is on or off and it is more durable.
- Newer CPVC valves make a mechanical connection to plastic or metal material easier which will save your customers time. They are easily installed and result in a leak-free connection. There is no solvent welding, sweat soldering or pipe threading; the mechanical coupling on the CPVC valve is loosened, pushed on and hand tightened.

Add-on Items

- Customers installing a PVC valve may need **pipe cement** solvent and primer.
- For installations on copper pipe, suggest **solder** and **flux**, and a **propane torch**. If the customer already has a torch, suggest a refill **tank**. Remind the customer to use **safety glasses** when using a torch for soldering pipe.
- If the customer will be working with a threaded connection on the pipe, suggest a **pipe wrench** to fasten the new valve and **pipe dope** or **thread seal tape** for the connection.

Module 4: Shut-off Valves and Rough Faucets

Product Knowledge:

Shutoff Valve

- Used to shut on or off the water to a water supply tube.
- Generally used underneath sinks and toilets.
- Also known as a speedy, angle stop, water supply valve, cutoff valve, lavatory straight valve or stop.
- Made of metal or plastic in either a straight or 90° configuration.

Boiler Drain Valve

- Used to remove wastewater and empty to a drain.
- Also used for laundry machine hookups.
- A horizontal faucet with male hose threads on the outlet side and either male or female IPS threads on the inlet side.
- Originally designed to drain water from a boiler.

Saddle Valve

- Use for supplying water to appliances requiring water low pressure, such as an icemaker or a dehumidifier.
- Self tapping, meaning it will make its own hole in the water line where you connect it. It is also easy to install.

Sillcock

- Is a faucet located on the outside wall of the house that easily hooks to garden hoses.
- Sillcocks include a flange for attaching the valve to the exterior wall. They are available with quarter-turn and multi-turn on and off handles.
- The best type is a frost-proof sillcock, made of heavy red brass or chrome plated brass. These function like an ordinary faucet. While in on/off handle is located on the exterior wall, the open/close mechanism is positioned at the base of the barrel where the valve is connected to the water supply inside the building, protected from cold weather. Most frost-proof sillcocks are self-draining. However, it is advisable to detach the garden hose during winter months.
- The anti-siphon frost-proof sillcock includes integral back-siphon and back-flow devices. These prevent potential back-siphonage, which, if unchecked, could compromise the safe potable water supply to the home. Hose-attached garden sprays and other pressurized canisters can potentially link a cross-connection if a pressure charge occurs when the frost-proof is in the open position.
- Some have an integrated vacuum breaker to prevent excess noise during operation.

Hose Bibb

- Often used for laundry machine hookups.
- Has male hose threads on the outlet side and either male or female IPS threads on the inlet side.
- Available in a variety of sizes and configurations. Newer models of laundry valves have a single lever that controls the hot and cold water supply.

Yard Hydrant

- Used to connect to a water line that is below ground level, usually at 1-foot or deeper.
- Used in large yards, fire protection and agricultural applications.
- Hydrant allows for the user to have water anywhere there is an underground water line.
- Has a shut-off valve below the frost line, so user can access water in sub-freezing temperatures.
- Sized according to Bury Depth, or how deep the hydrant must be buried in order to reach the water line.

Taking it to the Floor:

Frequently Asked Questions

Q: What type of valve do I need to install an icemaker water line?
A: Use a saddle valve. This type of valve is easy to install and requires no special tools. You simply tighten the valve onto the water pipe, connect the icemaker supply tube to the outlet end of the vale, then begin turning the knob on the valve. The valve will puncture the pipe and allow water to flow through the pipe.

Q: Is there anything I can do to keep the faucet on the outside of my house from freezing?
A: First install a frost-free sillcock. This has a shutoff inside of the home so water isn't sitting in the faucet when it is shut off, which prevents it from freezing. Also, use an outdoor faucet cover that fits over the faucet. This will provide additional protection during freezing temperatures.

Q: What type of valve do I need to hook up a washing machine?
A: You can use a boiler drain valve. I would suggest using a box specially made for hooking up a washing machine. It has two valves, one for the hot and cold water and a hole for connecting the drain all housed in a plastic box that is easy to install in a wall cavity.

Add-on Items

- If a customer is installing a shut off valve for a sink or toilet, ask if he or she has the correct **water supply line**.
- A customer buying a sillcock may be replacing an existing one. Suggest **tube cutters** for cutting the faucet loose from the existing plumbing.
- If the sillcock is threaded, suggest **thread seal tape** for making the final connection.
- Also, a **push-on fitting** can make it easy to hook up to the existing plumbing, without any gluing or soldering.
- A customer installing a saddle valve will need a **screwdriver** and an **adjustable wrench**.

Module 5: Clamps, Straps and Hangers

Product Knowledge:

Pipe Strap

- Used to secure pipes.
- Attach to the framing material in the house.
- Usually made of galvanized steel or plastic.

Hose Clamp

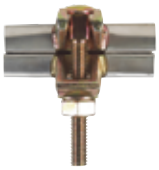
- Used to connect and seal a hose or vent duct onto a fitting, such as a nipple or barb.
- Typically made of stainless steel.

Pipe Hanger

- For hanging pipes from wood rafters.
- A Wire Hanger type has nail ends for nailing directly into the wood and holds the pipe on two sides.
- A Tubing Nailer type has a barbed nail end and holds the pipe on one side.

Tube Clamp

- Supports pipes.
- Allows for pipe expansion and helps reduce water noise.
- Sized according to the pipe it will support.
- Available in half clamp and full clamp configurations.



Pipe Clamp

- Used to repair small holes in pipes.
- Also known as a repair plate.
- Sized according to the pipe it will repair.
- Consists of two concave pieces of metal and a rubber gasket. The clamp is tightened over the pipe with the gasket over the leak.

Taking it to the Floor:

Add-on Items

- **Hammer** for nailing pipe hangers.
- **Screwdriver** for tightening pipe clamps and hose clamps.
- **Nails** or **screws** for fastening pipe clamps.
- **Adjustable wrench** for tightening pipe clamps.

Chapter 3: Fashion Plumbing

Module 1: Faucets and Repair Parts

Product Knowledge:

Tub & Shower Faucet

- Usually combination style, where hot and cold mix in a single arm.
- Available in different patterns, they can be built into the wall or flush mounted on the wall above the bathtub.
- In three-valve bath and shower faucets, two valves control water and a third diverts water either through the spout or to the showerhead.
- Two-valve tub and shower faucets have a device on the spout that, when activated, diverts water to the showerhead.
- Two-valve tub fillers and shower fittings fill either the tub or control water in the shower, as do the tub and shower faucets.

Lavatory & Kitchen Faucets

- Often come in a combination style, where hot and cold mix in a single arm.
- Faucet will specify how many holes are needed for installation. It should also specify the distance between the holes.
- Standard lavatory faucets should be installed on sinks with holes drilled on 4" centers.
- Widespread faucets are made with adjustable center measurements up to 12".
- The wall-mounted unit is connected to pipes coming through the wall above the sink. It is mounted vertically.
- Motion-activated faucets have a motion sensor to turn them on and off.
- As of Jan 4, 2014, Federal law limits the amount of lead that can be contained in faucets. Most manufacturers will indicate the faucet is low-lead or lead-free compliant.

Laundry Faucet

- Mounts either on laundry tubs or on the wall above the tub. Most fiberglass tubs require a ledge faucet with 4" centers.
- Sometimes furnished with a standard 3/4" hose thread outlet on the spout. Most codes require the use of a vacuum breaker attachment if the outlet contains threads to prevent water contamination.

Cartridge-Type Faucet

- Uses a rubber diaphragm or two metal, plastic or ceramic discs with holes that align to let the water flow or close to shut off the water flow. Ceramic plates are more difficult to damage than rubber seats, but hard water can sometimes cause problems with the ceramic cartridges, such as squeaking or sticking.
- A washer less faucet.
- Reduces leakage problems that result from worn washers.
- Easy to repair because most new models have the water-control mechanism housed in a replaceable cartridge.

Ball-Type Faucet

- A single-handle uses a ball with openings in it to control hot and cold water.
- Leaks from the handle are usually caused by improper adjusting-ring tension. To stop the leak, adjust the tension.
- A washer less faucet.
- Worn cam seals can also result in leaks at the handle.
- Worn spring-loaded, soft rubber seal assemblies usually cause dripping from the spigot.

Compression Faucet

- When the spindle is turned down, the washer or disk attached to its lower end is pressed tightly against a smoothly finished ring or ground-seat that surrounds the flow opening to shut off the water flow. If the washer and seat do not make a firm contact at all points, water will leak. This usually happens when the washer becomes worn.
- Seats in faucets that are not removable may be reground with reseating tools.
- Also known as a washer-type or stem faucet.

Disc-Type Faucet

- Two discs, usually ceramic, control the flow of water. When the discs are rotated to align, the water flows. When the discs are misaligned, the water shuts off.
- A washer less faucet.
- May have one or two handles.
- Fix by replacing the O-rings or the whole disc.

Taking it to the Floor:

Frequently Asked Questions

Q: What does it mean when a faucet is said to have 4" centers?
A: The faucet mounts with the fixture holes set 4" apart. It is important that you buy the right size faucet to fit.

Q: What do I need to do to repair my leaking faucet?
A: Most faucets are washer-type, and if these are leaking from the spout, you will have to replace the washer. If the seat is corroded, you will have to dress it or replace it. If it is leaking from the handle, you may need to replace the O-rings, tighten the packing nut or replace the packing. If a disk faucet is leaking, you will need to replace the O-ring. If it is leaking from the spout, you will need to replace the disk assembly. For ball-type faucet leaks, you may need to replace the cam assembly, the seat assembly and the ball.

Q: Are all faucet seats the same?
A: No, you will need to bring in their old seat to match up with the new one. Each brand has its own design and thread.

Q: How do I remove the faucet seat?
A: Use a seat wrench, which has several sizes of square and hex ends.

Q: When replacing a faucet, I was told that I should put some putty underneath the faucet. Why?
A: This is a good idea to keep moisture from getting under the faucet and into the cabinet below.

Upselling Skills

- Better quality faucets will have ceramic disc cartridges or stainless-steel ball valves. Solid brass faucets will last the longest, especially if your area has hard water. Choose a finish that is durable and guaranteed by the manufacturer not to tarnish or corrode.
- Kitchen faucets can have added features, such as ergonomic designs or pullout spouts with adjustable spray control, are quite popular with homeowners because of their looks and practicality.
- High-arc faucets, also known as gooseneck faucets, extend high above the sink and make it easy to fill large pots. The arc also increases the swivel range of the faucet.
- Suggest installing an anti-scald valve to prevent sudden changes in temperature. The pressure-balanced type provides consistent water temperature despite pressure fluctuations in the supply line. Thermostatic valves respond to outlet temperature rather than inlet pressure and adjust the hot-water pressure accordingly. Faucets can also have an adjustment that allows the installer to set how high the water temperature can go.
- One type comes with factory-installed flexible supply lines and a spring-loaded toggle, with the screw head concealed by the escutcheon. This makes it easier to install, as you don't have to crawl under the basin to install.

Add-on Items

- Remind customers they'll need **plumbers putty** when installing the faucet to prevent leaks.
- An **adjustable wrench** and a **basin wrench** are two tools useful in installing a faucet.
- Recommend replacing the **water supply lines** whenever replacing a faucet.
- For any customer installing a new faucet in the bathroom, recommend he or she complete the update of the room with matching **bath accessories**.

Module 2: Toilets and Repair Parts

Product Knowledge:

Standard Toilet

- Gravity-fed toilets operate with a conventional flush, where water draining from the tank is released into the bowl and its weight and gravity pull waste down the drain.
- The rough-in is the distance from the finished wall to the center of the sewer outlet. Standard rough-ins are 10", 12" or 14".
- Made of vitreous china and finished with a high-gloss glaze.
- White and almond are most common colors.
- Federal law mandates that all new toilets use no more than 1.6 gallons per flush, compared to old models that used 3.5 gallons or more.
- Dual flushers feature a lever that uses 1.6 gallons for solid waste removal and 1.1 gallons for liquid waste.
- Pressure-assisted units use pressure built up within the water supply to increase the force of the flush. These tend to be noisier than gravity-fed models, but the bowl empties quickly (within 4 seconds). Since the trapway on pressure-assisted models has fewer bends, it is less likely to clog than a gravity-fed system.
- A third type of toilet uses a pump to assist the flushing operation with increased pressure. Some models are even designed to flush automatically when the seat lid is closed.

Flush Handle

- Activates the flush valve.
- Usually sold in combination with the trip lever.
- Attaches with a left-handed screw, which screws on in a counter-clockwise direction.

Flush Valve

- Surrounds the opening that lets water into the bowl.
- Older toilets generally use a 2" diameter flush valve, while newer toilets have a 3" diameter flush valve.
- Kept closed by a rubber flush ball or flapper.
- Located at the bottom of the tank.
- The flush valve seat is attached to the overflow tube, which drains water back into the bowl if the water level goes above it. This is a good safety precaution if the inlet valve fails.

Flapper Valve

- This device sits on the flush valve seat and attaches to the trip lever with a chain, rod or guide arm.
- When the outside handle on the toilet tank is pressed down, it raises a trip lever that pulls the flapper off its seat. Water inside the tank pours through the opening to flush the toilet bowl.
- The valve stays closed with water pressure. However, once the trip lever lifts the device, it remains off the seat by floating on top of the water until the tank is empty. As the water level drops, the flapper gradually settles back into the opening, sealing it so the tank can refill for the next flush.

Fill Valve

- Also known as a ballcock or inlet valve.
- Controls refilling the tank with water. When the water level rises, it shuts off the valve that lets water into the tank.
- When repairing them it is best to replace the entire unit instead of trying to repair its parts.
- Better models have an anti-siphon feature that keeps toilet water from backing up into the water lines.
- Older models use a float ball, made of plastic or copper.

Tank-To-Bowl Hardware

- Creates a secure connection between the tank and the bowl.
- Consists of long brass bolts with rubber washers and a large foam-rubber washer.
- There are many different styles and sizes that vary from manufacturer to manufacturer.

Bowl Gasket

- Also known as a wax ring.
- Seals the joint between the toilet bowl and the drain piping in the floor.
- Some types have a plastic ring inside to add protection.
- For a better seal, use two rings, one on top of the other.

Taking it to the Floor:

Frequently Asked Questions

Q: My toilet fills up every 10 minutes. What is the problem?
A: If the toilet flushes on its own, the flush valve is probably not seating properly and water is leaking from the tank into the bowl. This could be the result of the lift chain being tangled. If it is the valve, you can change the flapper. Scale deposits on the seat can be removed with steel wool. Make sure you clean the valve seat. If it still leaks, the seat is damaged and you will need to replace it as well.

Q: There is water seeping from around the base of my toilet. How do I fix it?
A: Your wax gasket is probably not working anymore. This is a relatively simple problem to fix. You need to remove the toilet and install a new wax ring. While you have the toilet off, you should go ahead and replace the bolts. Otherwise, it could be a crack in your toilet bowl.

Q: The toilet bowl is not filling up. What is the problem?
A: See if your toilet has an overflow pipe. If so, a rubber tube should go into it. It has a metal clip on it and sometimes it can come loose.

Q: How do I test to see if water is leaking from the tank into the bowl?
A: After flushing the toilet, let it refill. Now put a few drops of food coloring into the tank. If the color appears in the bowl after a few minutes, there is a leak.

Q: Can I test to see if the leak is coming from the refill or the flush valve?
A: Yes. Shut off the water supply to the toilet. Mark the water level on the inside of the tank with a pencil. Check the water level in 10 or 20 minutes. If the water has fallen, you know the flush valve is leaking.

Q: How high should the water level in the toilet tank be?
A: It needs to be high enough for complete flushes, but it should be below the top of the overflow pipe. The tank should have a colored or molded water level mark. The rule of thumb is to set the water level about 3/4" below the top of the overflow pipe.

Upselling Skills

- A waxless bowl gasket is now available that offers a cleaner, easier way to install a toilet. It eliminates the need for stacking multiple wax rings on new, raised flooring and seals on uneven floors or over recessed tile floors. It fits 3" and 4" drain pipes and adapts to all types of flooring and drain pipes.

- Better toilet seats have high-quality plastic or kiln-dried hardwood seats and solid brass hardware that will last longer and will not rust.

- Toilets and even toilet seats are prime candidates for special order. Many styles are available that will fit any decorating demand.

- Some models have an easy-close hinge to eliminate slamming. Also look for hinges that make it easy to take off the seat for easier cleaning. Some seats are also constructed with special chemicals to help resist growth and odor of microorganisms on the seat.

- To make cleaning the toilet easier, suggest a cleaning system that installs in the tank and adds a cleaning solution to every flush. Some systems also dispense a chemical that aids in the care of septic systems.

Add-on Items

- Makes sure the customer has a **mop**, **sponge** and **bucket** for cleaning up the water that is often involved in a toilet repair project.
- Suggest **adjustable wrench** and a **screwdriver** for removing old toilet parts.
- Also suggest **penetrating oil** for loosening rusted bolts.
- If the customer is replacing a wax ring, suggest a **putty knife** for scraping off the old ring.

Module 3: Tubs, Showers and Surrounds

Product Knowledge:

Bathtub

- The standard Drop-In tub installs within a tile or solid-surface surround within three walls of the bathroom, while the old-fashioned Clawfoot tubs are freestanding.
- Standard size for tubs is 60" wide, 30" deep and 14" high.
- Whirlpool and deep tubs are designed for soaking and relaxation. These tubs can be separate or incorporate a shower combination.
- Cast iron tubs are the most durable and do not stain or scratch easily.
- Acrylic is a better insulating material so the water takes longer to cool, and its light weight and flexibility makes it a better choice for larger tubs.
- Fiberglass tubs are easy to install, but are more apt to fade and scratch.
- Tub and shower combinations are typically made of reinforced fiberglass with a polyester finish.

Shower Stall

- Some units come in one piece, mainly for new construction or major remodels.
- Some units come in multiple pieces that snap or caulk together to be a leak free.
- Sell color-coordinated caulk with this product.

Tub Surround

- Attaches to drywall, plaster or most any solid surface.
- Comes in three or more pieces that snap or caulk together for a leak-free fit.
- May include shelves molded-in to the construction.
- Inexpensive alternative to tile and good solution for keeping bathroom walls around the shower easy to clean.
- Also available as a one-piece unit that include a tub and shower walls, typically for new construction or major remodels.

Tub/Shower Door

- An attractive alternative to shower curtains.
- Usually easy to install and require few tools.
- Door mounts on a frame that is adjustable to all standard bathtubs.
- Sell caulk with this product.

Taking it to the Floor:

Frequently Asked Questions

Q: What are some benefits of a fiberglass tub?
A: Fiberglass tubs are very economical, lightweight and easy to install. However, they don't retain heat as well as other types.

Q: What are the benefits of an acrylic tub?
A: Acrylic tubs are more expensive but are lightweight, resist abrasion and fading and will hold heat well if insulated properly.

Q: I'm replacing an old bathtub; how do I choose which one is best for my home?
A: If you're replacing an old bathtub without doing a major remodel, you may be limited in the new tub you'll buy. First you'll need to measure the space to make sure you have room for the new tub. If the new tub is heavier than the old tub, you'll need to make sure the floor is capable of holding the new one. Also you'll need to know if the drain and spout are on the left or right hand side of the tub.

Upselling Skills

- Remodeling the bathroom is the perfect time to upgrade to a tub with new amenities, such as built-in heaters and whirlpool jets. There are even new clawfoot tub retro model available that incorporate these features if the customer wants an old-fashioned look.
- Removing an old tub is a project that will crossover into several other categories. Anyone removing a tub may want to repair or replace the old floor, repaint the walls, tile the walls around the tub or change the fixtures on the tub.
- Suggest installing a glass shower door to replace the old shower curtain.

Add-on Items

- Anyone replacing a bathtub will likely want to replace the **bath faucet** and **showerhead**.
- Also suggest bathroom accessories, such as **robe hooks**, **towel bars** and **soap dishes**.
- Suggest **bath grab bars** for any one with seniors in the home.
- Anyone installing a tub will need **caulk**.
- If the customer is installing a tub or shower surround, don't forget to sell the surround **adhesive**.

Product Knowledge:

Kitchen Sinks

- Shapes are rectangular or square; custom sinks can be round, oval or other shapes.
- Standard size is 8" deep; low-end sinks are only 5 to 7" deep and top-quality sinks can go 10" deep.
- **Mounting Style**
  - Self-rimming sinks feature a rolled edge that mounts directly over the countertop. They are the most common and easiest to install.
  - Undermounted sinks mount below the countertop.
- **Number of Sinks**

  - Double sinks are the most common in new construction, with one bowl available for washing and one for rinsing dishes.
  - In triple sinks, the middle bowl is designed for the garbage disposal.
  - Single bowls are necessary in small kitchens with little counter space or can function as a second sink for meal preparation.
- **Construction**

  - Sinks are constructed of many different materials including enameled steel, stainless steel, cast iron, brass, stone and composites such as quartz or granite combined with resin.
  - Enameled steel has a tendency to chip and is less durable than cast iron or stainless steel.
  - Stainless steel comes in different gauges: the lower the number, the thicker the steel. Thicker steel is less noisy, and undercoating can help dampen noise. Satin finish is the easiest to clean.

Vanity Sinks

- Mounts in a countertop over a cabinet. Offers the advantage of storage space under and next to the sink.
- The mounting for vanity sinks can be self-rimming, flush-mounted or undermounted.
- In addition to cultured stone and solid surfacing, bath sinks are made of enameled steel, vitreous china, glass, cast iron and stainless steel. Vitreous china is the most common material, since it provides a high-gloss finish and is durable and sanitary.

- For bath vanities, 34"-36" is a more comfortable height for adults than the typical height of 30"-32".
- Many vanity sinks have a top where the sink is molded into the counter.
- This is also known as an integral sink where basins are typically made of solid surfacing or cultured stone. Any damage to the sink will mean replacing the entire unit.

Pedestal Lavatory

- The bowl rests on a pedestal and does not have storage space underneath.
- The most common type of pedestal is made of vitreous china, but manufacturers offer other high-end types as well.
- More difficult to install than countertop vanities.

Utility Sink

- Provides an extra deep, single or double bowl for multi-purpose use such as pre-washing laundry or washing out items like paint brushes not suitable or other more expensive sinks.
- Sturdy, durable and often made of fiberglass.
- Also called a laundry sink.

Taking it to the Floor:

Frequently Asked Questions

Q: How do I clean my stainless steel sink?
A: Use a stainless steel cleaner and a nonabrasive cloth or sponge. Do not use cleaners containing chloride or abrasive pads or steel wool. If you need to remove hard water stains, try cleaning it with a cloth dipped in rubbing alcohol.

Q: How is cultured marble different from marble?
A: Cultured marble is made up of dust from natural marble. It is mixed with a liquid polyester resin for a product that is actually easier to care for than marble.

Q: How do I clean cultured marble?
A: Do not use abrasive cleaners. Use an all-purpose disinfectant cleaner and a soft cloth. Keep the marble wet while working on it. Never use steel wool, powdered cleaners, metal scrapers or scrub pads on marble. If you want to make it look shiny again, use a polishing compound. To fill in scratches or dents, use appliance wax or car wax.

Upselling Skills

- If your customer is buying a new sink, encourage the purchase of a new faucet, particularly one that matches the style of the sink.
- If the customer is buying a kitchen sink, suggest purchasing a new garbage disposer.
- Marble and granite sinks are the most expensive, but will last the longest and require the least amount of upkeep.
- If your customer is installing a pedestal sink and the plumbing will be exposed, suggest using chrome supply tubes and drains.

Add-on Items

- If a customer is installing a sink, it's likely they are also installing a **faucet**. Be sure to sell them all of the items needed for a faucet installation. Refer back to module one in this chapter for more information.
- Also, the customer may need a **drain** for the new sink, as well as the parts and tools associated with that project. Refer to module one of the Rough Plumbing chapter for more information.

- If the customer is replacing an existing sink, suggest a **putty knife** for removing the existing caulk around the sink.
- Remind the customer to get **caulk** for sealing around the new sink.
- The customer will need a **screwdriver** for tightening the bolts that attach a self-rimming sink.

Module 5: Showerheads and Bath Accessories

Product Knowledge:

Standard Showerhead

- A wall-mount showerhead.
- Usually has full-range, adjustable sprays and features self-cleaning rims and swivel ball joints.
- Is typically made of chrome-plated brass or plastic. Plastic models are less expensive but also less durable.
- All new models must meet the federal standard flow rate of 2.5 gallons per minute, although some deliver a more satisfying shower than others.

Massaging Showerhead

- Uses water pressure forced through a diverting valve to create one or more pulsating water actions.
- In most cases, users can vary the amount of pulsing pressure or force to their liking.
- Available in hand-held or permanently mounted models. While all offer massaging action of one or more kinds, they can all be easily converted to conventional shower action.

Rainfall Showerhead

- An overhead showerhead that mounts on the ceiling, or mounts on the wall with a long arm that extends so the showerhead is pointing downwards, rather than at an angle as with a standard showerhead.
- Cascades water for a more luxurious shower and full body coverage.

Combination Shower

- A versatile wall and hand shower combined.
- It can be easily attached to existing shower arms.
- Some brands feature on-off flow control built into the handle, which is a brass push-button diverter valve that permits instant switch from showerhead to hand shower. May also feature a 6' flexible hose and hang-up bracket.

Grab Bar

- Installed for safety around tubs to help prevent falls.
- Also used as a handrail to help anyone who may have trouble sitting down or standing up.
- Never use a towel rod in place of a grab bar.
- Never install diagonally, as a person's hand might slide if footing isn't secure.
- Another type is a suction grab bar that can be moved around.

Taking it to the Floor:

Frequently Asked Questions

Q: Why is my showerhead spraying unevenly, or why is water not coming through some of the holes?
A: The shower head may need to be cleaned of hard water deposits. Take the shower head apart and clean it using an old toothbrush and a decalcifying-type cleaner.

Q: Why can't I just get a regular showerhead instead of one of those water saver types?
A: Federal law has set a standard on the flow rate of water from showerheads. However, many of the new showerheads mix air with water. The resulting shower is as satisfying as any shower, and you'll likely never know you were using a low-flow showerhead.

Q: What type of caulk should I use in my shower?
A: Silicone caulks are water resistant and provide excellent adhesion to smooth surfaces, such as metal, glass and tile. However, it does not adhere well to masonry and is paint resistant. It is also difficult to work with and smears must be cleaned up with paint thinner.

Q: Is there any way to make my shower head taller without remodeling the entire shower?
A: Try a shower extender. This will attach to the shower arm and allow you to position the showerhead higher. This allows you to better adjust the showerhead to a specific height or angle.

Upselling Skills

- Many manufacturers make bath accessories that match the finish and style of faucet and lighting fixtures. For customers updating showerheads or other plumbing fixtures in the bathroom, suggest they consider also upgrading towel bars and other accessories to match.
- Better combination showerheads have a rubber grip on the handheld portion of the shower, making it easier to grip, especially when wet.

Add-on Items

- Use **thread seal tape** to wrap around the threads of the showerhead before installing.
- **Tongue-and-groove pliers** will help tighten the new showerhead during the installation.
- If the customer is buying bath accessories, there are several items you can suggest for that project. Use a **tape measure** and **level** for marking holes for towel bars and towel rings.
- Suggest a **hollow wall anchor** for installing accessories in areas where there may not be a stud.
- Customers will also need a **drill** and **drill bits** for installing wall anchors for bath accessories.

Chapter 4: Water Conditioning Systems

Module 1: Water Heaters & Accessories

Product Knowledge:

Tank Water Heater

- Stores hot water at a preset temperature until it is ready to be used.
- Typically operates on either gas or electricity.
- Components include water hookups, a pressure relief valve (see Plumbing chapter 2, module 3 valves), a control for regulating the temperature of the unit, thermostats, a drain valve, and a gas burner (for gas models) or heating elements (for electric models).
- An automatic shutoff valve is a safety feature that shuts off the flow of gas if there is a sudden increase in the flow of gas.
- Better-grade, non-metallic gas water heaters are also popular. The tanks, although more expensive than metal models, are light, easy to install and corrosion-proof.
- The lining of the tank is one feature that can affect the performance of the water heater.
  - Unlined galvanized steel tanks perform least well, but they are the least expensive and may prove satisfactory in localities where the water supply does not have an adverse effect on equipment.
  - Copper-, stone- and glass-lined water heaters perform better than unlined aluminum or galvanized steel heaters.
  - A stainless steel alloy called HWT is designed to resist corrosion and performs similar to the lined models.
- For maintenance, advise homeowners to drain their water heaters once or twice a year to remove the accumulation of sediment, which can affect operation.
- Self-cleaning units are designed to fight sediment buildup and extend the life of the tank.
- Efficiency of the water heater is measured by its Energy Factor (EF). A higher energy factor indicates a more efficient unit.
- Recommend a water heater with a high recovery speed. This is the time it takes to heat a full tank of water.

Tankless Water Heater

- Tankless water heaters are small heating units hooked into plumbing lines and heat water only as needed. They do not store water, but heat it as it moves through the unit. They typically operate on either gas or electricity.
- Larger tankless heaters are installed at the point where water enters the house; smaller units are installed at the point where water is used and require more than one in a house. Some operate on electricity, others on gas.
- Some of the larger units require different size plumbing lines and different size flue vents than do tank-type heaters.
- If gas-fueled, the heater must be properly vented.
- Electric units may require a 220V or 240V line. Smaller electric units operate on standard 110V lines.
- Tankless heaters are more expensive than tank-type water heaters. However, they do produce savings by lowering annual energy consumption.

Water Heater Pan

- Used to collect water from leaks or overflows caused by excess pressure in the tank.
- A hole in the side of the pan accepts fittings for a drain hose to carry water away from the pan.

Water Heater Element

- Common repair part for water heaters.
- Some types bolt on to the tank, others screw in.

Taking it to the Floor:

Frequently Asked Questions

Q: Are all electric hot water heater elements the same?
A: There are three types: screw in, bolt in and clamp in. They all have different wattage ratings and can work on either 120 or 240 voltage.

Q: There is water leaking from my water heater. What is the cause?
A: The pressure relief valve could be leaking. This is a safety device that will open in case of high pressure or temperature. Try operating the valve to see if it will stop. It also might need tightening. A gasket around the heating element may need to be replaced, or the tank could be rusted out, which requires a new hot water heater.

Q: The water from my electric hot water tank is too hot.
A: The thermostat may be set too high, or it may be faulty. It could also be a grounded heating element.

Q: I am getting no hot water from my water heater.
A: If you have a gas water heater, the pilot light might be out, or you may have a faulty thermostat. If you have an electric water heater, the temperature control may be set too low. Otherwise it is probably a faulty heating element or thermostat, which can be replaced.

Add-on Items

- Suggest a **water heater insulation blanket** for improving the energy efficiency of the water heater.
- A customer making a new gas water heater installation will need **vent pipe fittings** for venting the water heater.
- Suggest **flex water connectors** for making the hookup to the new heater easy.
- **Push fittings** will also make the water hookup easy.
- Suggest **flex gas connectors** for an easy connection to the gas line.
- Your customer will need a small **pipe wrench** for tightening the connections.
- If the water heater is electric, ask if the customer has enough of the proper gauge **cable** for hooking up the unit.
- Suggest **wire connectors** for making the final connection.
- Your customer may also need **linesmans' pliers** and a **screwdriver** to complete the electrical connections.

Module 2: Water Softeners

Product Knowledge:

Water Softener

- Helps remove minerals (magnesium, calcium, iron) that cause "hard" water.
- Modern water softeners have non-ferrous parts throughout the water flow paths and therefore will not rust. Iron or steel parts are seldom used in a quality softener because salt can cause rust.
- Water softener salt is a product customers with water softeners will need on a regular basis. The salt is a critical component to the regeneration process.
- How a water softener works
  1. When water enters the home, it is directed into the water softener. Water passes through a resin bed with resin trapping the lime and magnesium present in the water.
  2. As the resin bed nears its capacity for removing minerals, water softeners must be regenerated, or cleaned.
  3. The regeneration process is automatic and happens by reversing the flow of water through the softener tank and rinsing the resin bed with sodium chloride or potassium chloride that has been added by the customer to the salt tank of the softener.
  4. The reversed water flow quickly flushes accumulated minerals from the resin bed and the sodium chloride/potassium chloride along with the filtered minerals are washed down the drain. The regeneration process is all automatic and happens once to several times a week.

Taking it to the Floor:

Frequently Asked Questions

Q: How do I know if I have hard water in my home?
A: You can test your water to see if it's hard. But if you notice watermarks on dishes after you wash them, or if your water heater isn't lasting as long as it should, there's a good chance you have hard water.

Q: Why does soft water feel slippery?
A: Many people don't like the slippery feeling soft water leaves on their skin. Actually, while it may feel like soft water leaves soap on our skin, it's actually just the opposite. Hard water leaves soap scum on our skin and hair, resulting in a "squeaky clean" feeling. While it may feel clean, soap scum can cause dry and itchy skin and scalp. Soft water rinses all that soap away. Soft water is actually better for our skin because it doesn't leave soap behind.

Q: What's harmful about hard water?
A: Besides drying out your skin, hard water leaves behind mineral build up that can reduce the life of appliances. For example, that minerals from hard water forms a scaly buildup in the water heater tank. The thicker this scale becomes, the more energy it takes to heat the water. Hard water can also eventually cause costly repair in some appliances.

Q: What are the benefits of using a water softener?
A: You will benefit from a water softener in many ways. Glasses will not spot – shower doors will not calcify – faucets will not water spot- soap and shampoo in the shower will lather better – soap in the laundry and dishwasher will work better and they will use less of it – clothes will be brighter and wear longer – water using appliances will last longer with soft water.

Add-on Items

- **Water softener salt** is an item homeowners with a water softener will need often.

- For new installations, the type of connections and tools the customer needs will depend on the type of pipe the customer has in the home. Suggest **push-on fittings** as a quick and easy solution for connecting to water lines.
- Two other useful tools to suggest are a **hacksaw** and a pair of **tongue-and-groove pliers**.

Product Knowledge:

Water Filter

- Used to remove bacteria and/or chemicals suspended in water to improve its taste and smell. Filters either install under the sink or at the point where the water supply enters the building. Others mount on the faucet or countertop.
- Always study information about the specific filters you are selling and what types of contaminants they remove.
- Some filters feature cartridges that can be cleaned and reused several times before replacement.

- The basic types of water filtration devices are activated-carbon filters, reverse osmosis, distillation and aeration.
    - **Activated-carbon filters** are the least expensive water filtration devices. They can remove impurities and improve water taste and odor, but do not eliminate dissolved minerals or bacteria. One solution is to combine a carbon filter with a chlorination system.
    - **Reverse-osmosis systems** take out dissolved lead, mercury, cadmium and other heavy metals that are present in the water, but will not eliminate microorganisms. They are also relatively expensive.
    - **Distillation** removes most impurities in the water system. Distillers work slowly and must be cleaned regularly.
    - **Aeration** reduces, but does not necessarily eliminate, the levels of iron, chlorine and other gases in the water. It works best when combined with other treatment forms.
- Filters based on ceramic technology will remove up to 100 percent of bacteria as well as chemicals, tastes and odors. Some have proven effective in removing such contaminants as algae, chlorine and detergents found in many urban water supplies.

Pitcher Filters

- These filters are designed to be used with a pitcher. They filter water more slowly than other types.
- Some models have an LED to indicate when the filter needs changed.

Faucet-Mount Filters

- Attach directly to the faucet. They require no plumbing connections.
- This is a highly visible filter and only provides filtration at a single location.

Undersink Filters

- Install under the sink and into the plumbing line going to the faucet.
- They provide filtered water at a single location.
- They may use multiple cartridges, depending on the level of filtration desired.

Whole House Filters

- Install on the main water line entering the home and filter water for the entire home.
- Have a valve that makes it easy to change the filter without shutting off the water to the home.

Taking it to the Floor:

Frequently Asked Questions

Q: What is the "rotten egg" smell I sometimes smell in the water?
A: That is likely hydrogen sulfide, a corrosive gas. Look for a filter that removes this from the water.

Q: What is a reverse osmosis filter?
A: This tends to be one of the most effective ways to filter your water. Reverse osmosis is a process where the water molecules are forced through a semi-permeable membrane under intense pressure. Since only water molecules can pass through this membrane, contaminants are left behind.

Q: What are some of the benefits of filtered water?
A: Filtered water saves the cost of bottled water and offers clean water not just for drinking, but also for food preparation. By using less bottled water, you also save the waste of bottles that end up in landfills.

Add-on Items

- Use a **tube cutter** to make a cut in the line where the filter will be installed.
- Use an **adjustable wrench** for tightening the plumbing joints to the water filter.
- Use **thread seal tape** to seal the joints to the new filter
- **Slip-joint push fittings** make it easy to connect to copper or PVC pipes.

Chapter 5: Plumbing Tools & Misc.

Module 1: Plumbing Wrenches

Product Knowledge:

Pipe (Stillson) Wrench

- Used to grasp pipes and other curved surfaces. Solid housings and hardened steel jaws provide excellent bite and grip.
- Has two serrated jaws, one adjustable and the other fixed and slightly offset.
- The jaws will leave marks on the pipe, so it's best to avoid using them on coated pipe, such as galvanized pipe.
- Some pipe wrenches have aluminum handles for lighter weight.
- The **straight pattern** is standard, but other styles are also available.
- The **end-pattern** style has jaws slightly offset and is handy for working in restricted spaces or close to walls.
- The **offset style** has jaws at 90° to the handle and is also handy for tight spots.

Chain Pipe Wrench

- Turns pipe in either direction and can be used like a ratchet wrench. The handle can be loosened, shifted and turned again without removing the chain from around the pipe.
- Offers easy handling in close quarters on round, square or irregular shapes without crushing the object.
- Consists of a forged-steel handle attached to a length of heavy sprocket chain. The chain wraps around a length of pipe and engages the sprockets in notches on the back of the handle. Sharp teeth on the face of the handle bite into pipe while the chain holds the pipe against the teeth to prevent slipping.

Strap Wrench

- This type of pipe wrench has a strap that grips the pipe when the wrench is pulled tight.
- It is recommended for working with brass, aluminum, lead, soft metal or plastic pipe because it grips pipe without teeth and does not damage the surface.
- Consists of a fabric strap, attached to a loop ring that is fastened in the curved head of a straight forged bar or handle. It is then pulled around the pipe, back through the loop and over the head.

Basin Wrench

- This wrench is also known as a faucet wrench or a crowfoot faucet wrench. There are two main types of this wrench.
- One type has fixed jaws opening at right angles to the shaft handle. It is primarily used to remove supply nuts and hose coupling nuts on faucet spray attachments under work-tables, sinks and lavatories.
- The second type has spring tension pipe-gripping jaws that are reversible by flip-over on the end of drive shaft handle. It will grip pipe nipples, odd sized supply nuts and jam nuts in hard-to-reach spots.

Spud Wrench

- Good for general-purpose plumbing use.
- "Spud" is a generic name for many types of wrenches that have large, flat-sided jaws.
- The **adjustable type** is an all-purpose model with notched jaws ideal for various sizes of nuts. It is the handiest and most common.

- The **fixed type** works with large spud nuts under kitchen sinks.
- The **4-in-1** is similar to the fixed type and is used for turning locknuts on the toilet tank, basket strainers and spuds.
- The **closet type** is designed for toilet tanks and bowls.
- The **internal type** holds the sink strainer basket in place while you tighten the locknut below. It can also remove or install closet spuds, pop-up plugs and strainers.

Seat Wrench

- Used to remove faucet seats.
- It is L shaped. One end has four flat sides, the other has five flat sides.
- It is also known as a faucet seal tool or faucet seat wrench.

Socket Wrenches

- This wrench is hex-shaped on both ends and has a hollow core to fit over faucet stem handles.
- Available in sets and fits nearly all tub and shower valves.
- Also known as a plumber's wrench or wall socket set.

Pop-Up Plug Wrench

- Used to remove pop-up or pop-out (PO) plugs from the drain opening in the basin.
- The four-way shape makes it useful for a variety of strainer types.

Internal Pipe Wrench

- Used to remove pieces of pipe that have broken off.
- Has a rigid cylinder with a moving part that fits into the inside of the pipe. Use pliers to turn it.
- Also known as a nipple extractor.

Taking it to the Floor:

Frequently Asked Questions

Q: I don't have enough room under my sink to get the faucet nut off.
A: A basin wrench is a tool specifically designed for that.

Q: Is there a wrench I can use that will not damage the brass, aluminum or other soft material?
A: Yes, a strap wrench grips the pipe without teeth. If you want to keep from damaging the coating on a galvanized pipe, wrap the pipe in duct tape first.

Q: Do I need all of those special wrenches? Can't I just use a standard wrench or a pair of adjustable pliers?
A: The plumbing fittings these wrenches are designed for are usually difficult to access and the standard wrench or pliers will not fit into those tight spaces. Using the proper tool will save frustration and ensure a proper installation.

Q: Will one pipe wrench be enough for my project?
A: It's a good idea to have two. Always use two pipe wrenches when tightening or loosening a pipe. One pipe wrench turns, while the other stabilizes the pipe that is not turning. Particularly on plumbing that is already installed, using only one wrench could cause pressure on the rest of the plumbing system, resulting in additional breaks.

Module 2: Specialty Plumbing Tools

Product Knowledge:

Handle Puller

- Used to remove corroded or frozen handles without scarring the chrome.
- Has two hook-like jaws with a center rod that turns.
- Also known as a faucet handle puller.

Vise

- Helps hold pipe while you cut or ream the pipe.
- The yoke vise holds the pipe with the inverted V-shaped yoke that unlatches on one side and tilts to accommodate the pipe.
- This vise has V-shaped jaws that grip pipe from above and below. The lower jaw is fixed, while the upper jaw is raised or lowered by a screw.
- The chain vice is smaller than the yoke vise, this vise has a fixed lower V-shaped jaw with teeth on where the pipe is laid and a bicycle-type chain fastened to one end.
- When the pipe is inserted, the chain is placed over it and locked in a slot on the opposite side.

Reamer

- Removes burrs from the inside of the pipe. Burrs are the flakes of metal or plastic on the outside and inside of the pipe after the pipe is cut.
- It is cone-shaped with ratchet handles.
- Straight-fluted reamers have straight cutting edges. They can be used by hand or in a pipe rotating on a power drive unit.
- Spiral-fluted reamers have spiral-shaped cutting edges. They cut more easily, save time and are often used by sheet metal workers to enlarge holes in sheet metal and conduit box outlets, as well as smoothing inside edges of pipe.

Tubing Cutter

- Primarily used to cut copper pipe.
- Easier to use than an ordinary hacksaw, and it makes a cleaner cut.
- Has a single cutting wheel and two rollers that make smooth right-angle cuts.
- Some have a triangular blade-type reamer that folds out of the way when not in use.
- Sized to cut material with outside diameters ranging from 1/8" through 4-1/2".

- Major points of wear are rollers, wheels and pins on which they are mounted. When cutter wheels are worn out, they should be replaced; sharpening them is not advisable.
- Separate cutting wheels for plastic pipe are also available.
- Another type is a PVC cutter with a ratcheting action for easy cutting of PVC, CPVC and PEX pipe.

Pipe Threader

- Uses a die head to create threads on unthreaded pipe ends.
- The hand tool type revolves around a stationary pipe. It is good for threading pipe on the job.
- With the powered type, the tool stays stationary while the pipe revolves into the die.
- When cutting pipe with a pipe threader, always use thread cutting oil for best results.

Seat Dresser

- Used to smooth a faucet seat. Seats may not operate properly if they collect corrosion or calcium deposits or become rough with wear.
- Inexpensive ones often have 1/2" and 5/8" cutters.
- Also known as a faucet seat reamer or valve seat-grinding tool.

Flaring Tool

- Used to flare the end of a pipe before joining it with a flared fitting.
- The two flat bars of the tool (the yoke) clamp around the pipe at the appropriate sized hole. Then the cone-shape, powered by the drive screw, forces its way into the pipe and creates a flare.

Taking it to the Floor:

Frequently Asked Questions

Q: Can I use an ordinary hacksaw to cut copper pipe?
A: Yes, but it doesn't do as good a job as a tube cutter, which makes a cleaner cut at a 90° angle. They can also be used in tight spots. Use a cutter with a built-in reamer, as that makes one less tool you have to keep track of.

Q: Can I use a copper tube cutter to cut PVC pipe?
A: While there are separate cutting wheels available for plastic pipe, such as PVC, you would probably be better off buying a PVC cutter.

Q: How do I fix a faucet that is leaking due to my hard water?
A: Instead of buying a new valve stem, try to ream the faucet seat with a seat reamer to remove any calcium deposits that may have formed from your hard water. Try a reseating tool with a tapping attachment for reseating faucets with faulty and battered seat threads.

Q: Can I sharpen the edges of this pipe reamer?
A: Cutting edges can be sharpened, but this is difficult and time-consuming and the small cost of replacing the tool cost usually makes sharpening impractical.

Add-on Items

- Suggest **thread cutting** oil for anyone using a pipe threader.
- If the customer purchased a **tubing cutter**, ask if he or she needs extra tube cutter wheels.
- Recommend using **safety glasses** when using a pipe threader.
- Ask if the customer has a good **pipe wrench** to use for making pipe connections.
- Suggest **thread seal tape** to help complete the plumbing connection after the customer has threaded pipe.
- For those using a tubing cutter, ask if they need any extra **solder**, **flux** or **fuel** for their torch.

Module 3: Pipe Joining Supplies

Product Knowledge:

Propane Torch

- Used to heat joints in copper pipe so solder can melt.
- Also used to heat corroded fittings to loosen them.
- Attaches to a cylinder containing the fuel used to light the torch.
- Propane fuel attaches to the torch.
- Propane is generally used to heat copper for flaring.
- Sometimes there is water in the line that needs to be evaporated so the pipe will heat enough to sweat a joint. Use MAPP gas for this, but use caution as too much heat can melt the pipe.
- Propane comes in bright blue tanks and MAPP welding gas comes in yellow tanks.

Solder

- Used to sweat a copper fitting, for electrical applications and anything made of metal.
- Forms a permanent bond between the fitting and pipe or metal surfaces.
- Use lead-free solder if you're working on potable water lines.
- The most common type is 95-5 tin-antimony solder. The first number is the percentage of tin in the solder. The more tin, the more workable the solder.

Flux

- Helps prevent oxidation and allows solder to flow freely. It also helps clean the pipe before soldering.
- Comes in both liquid and paste form.
- Necessary whenever sweating a joint.

Flux Brush

- Used to apply flux to a pipe.
- About 6" long.

Copper Fitting Cleaning Brush

- Used to clean copper fittings before soldering.

Emery Abrasive Cloth

- Can also be used to clean the copper pipe before sweating a joint.

Flame Shield

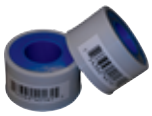
- Protects surrounding areas from the torch flame when sweating a joint.
- Most popular type attaches to the torch.

Plumber's Putty

- Setting compound used to install sinks, drain plugs and faucets.
- Ensures a good seal.
- Use a non-staining putty in granite, marble, quartz and all other porous surfaces in order to prevent discoloration around the fixture.

Pipe Joint Compound

- Also known as pipe dope.
- Use for joining threaded pipe and fittings. This is a thick oily paste brushed on pipe threads before joining.
- Prevents leaks, corrosion and makes it easier to disassemble.
- Check packaging to see what types of pipe it is suitable for. Not all compounds may be suitable for plastic pipe and gas pipe.



Thread Seal Tape

- Also known as Teflon tape. Thin tape applied to pipe threads before joining. It does the same job as pipe joint compound, but is easier to use.
- Check packaging to see what types of pipes it is suitable for. Not all tapes may be suitable for joining gas pipe.

Pipe Solvent Cement

- Solvent cement used to weld together plastic pipe and fittings.
- There are different types of solvent cement used for PVC, CPVC and ABS pipe and fittings. The type of solvent cement used will also vary based on the pipe diameter.
- One type is a one-step solvent that combines primer and solvent into one. Check local codes to determine acceptability of one-step solvent cements.

Pipe Primer

- Used in conjunction with pipe solvent cement as required by local plumbing codes.
- Prepares plastic pipe and fittings for solvent cement by softening its surface. Apply primer prior to applying solvent cement.
- Never use primer with ABS pipe and fittings.
- Some primers also contain a cleaner that helps remove surface dirt and grease from the pipe.

Pipe Cleaner

- Use in conjunction with pipe solvent cement and primer. Apply the cleaner before applying the primer.
- Removes surface dirt and grease from plastic pipe and fittings.
- Clean ABS pipe and fittings with pipe cleaner only. Remember, do not use primer on ABS fittings.

Taking it to the Floor:

Frequently Asked Questions

Q: Do I use the same type of glue for both PVC and CPVC?
A: No, CPVC requires special solvent cement that is different from cement used for other types of plastic pipe. Remember that after pipes have been glued they are permanently joined and cannot be taken apart.

Q: Why is the torch hard to light?
A: The valve may be open to far. Open the valve just slightly so the rush of gas doesn't blow out the flame. You can also try a torch with a self-igniting tip.

Q: Why won't the torch stay lit while upside down?
A: In some torches, the liquid propane in an upside down tank works its way through the torch and blows out the flame. To avoid this, use a pressure regulated torch.

Q: Is there a way to make a small repair in a pipe without replacing it?
A: Try an epoxy repair compound. It is a two-part material that looks like clay and hardens like steel in minutes. Just before using, break off a piece and mix together by rubbing between your fingers.

Add-on Items

- It's a good idea to have **rags** available to clean up messes when using pipe solvents.
- For customers using a propane torch, suggest a **spark lighter** for easy lighting.
- They also might want a spare **fuel tank**.
- A **flame spreader** is handy for heating a wider area.
- Always suggest **gloves** and **safety glasses** for customers working with soldering torches.
- Don't forget to ask the customer if he or she has all of the **pipe** and **fittings** needed for the project.

Module 4: Pumps and Well Supplies

Product Knowledge:

Submersible Sump Pump

- Used to discharge ground water that accumulates around a basement that is below the water line. The basement should have a drain tile around it to collect ground water and convey it to the sump in the basement.
- It is not meant to handle solids.
- Pump capacity is rated by gallons-per-hour pumped as well as "lift" pressure generated, or how high the liquid is to be pumped.
- A Submersible type pump is a motor and pump sealed in one unit that rests in the sump pit. It is a quieter pump and longer lasting than a pedestal sump pump.

Pedestal Sump Pump

- Has the same function as a submersible sump pump, but the motor is mounted on a column above the water. It is available in automatic or manual models, either gravity-fed or self-priming operation.
- These pumps typically do not last as long as submersible types, but tend to be less expensive.

Backup Sump Pump System

- This system turns on if the primary pump system stops working because of power failure or failure of the primary pump.
- Typical kit contains a battery for backup power and a backup pump.
- Typically battery powered, although some water powered pumps are available.
- Some systems have audible alarms to signal a problem.

Sump Basin

- Installed as a protective barrier around the sump pit.
- Use with a sump pit cover, which covers the basin to let in water but keep out debris, which can clog the pump.
- A sump basin is also called a sump pump liner.

Effluent Pump

- For continuous use in moving large volumes of water containing solids.
- Typically for homes without a municipal sewage collection system.
- Pump capacity is rated by gallons-per-hour pumped as well as "lift" pressure generated, or how high the liquid is to be pumped.
- Also called a sewage pump.

Utility Pumps

- Used to drain water down to surface level.
- Attaches to a standard garden hose and operates on 115V current.
- It is not for permanent installation and is portable.

Transfer Pump

- Used to pump manholes, for irrigation and lawn sprinkling, for fire protection and as an emergency water supply during power failure.
- Larger than all purpose pumps and often gasoline powered.
- Capacities range up to 85 gallons per minute. Suction lifts up to 25'.

Homewater Systems

- Used to supply water to a home from an underground source. A system consists of a pump, a pressure tank and switch.
- Pumps are shallow-well or deep-well. Shallow-well pumps are installed at well depths of 25' or less. Where deep-well pumps can be used in water depths of 300' or greater, depending on altitude.
- Horsepower rating determines pump size. Sizes of pumps used in the average home range between 1/3 and 1-hp. When helping customers choose a pump, find the required capacity by counting the number of faucets in the home (count tub faucets as two) and multiplying by 60. This is the number of gallons-per-hour the pump should supply from the well. Remind customers to allow for any appliances that use water.
- Home water-system pumps are usually centrifugal or jet types. Older homes may have a piston pump type.

Taking it to the Floor:

Frequently Asked Questions

Q: What's the most likely reason my sump pump isn't working?
A: Usually it's the switch. If the pump shifts inside the sump pit, the float switch may become stuck and not float freely on the water. Debris can also get into the sump pit and interfere with the switch action.

Q: My sump pump runs constantly. Do I need to buy a new one?
A: It could just be a bad switch that is easy to replace.

Q: I just refinished my basement and I want to ensure that it doesn't flood. Do you have any advice?
A: You can buy a sump pump that has a battery back up. There are also high-water alarms. You can also buy a better quality pump. Try a submersible sump pump as it will last longer than the pedestal type. Also consider one with a corrosion-free housing.

Q: How do I know which pump I should buy?
A: You first need to know how high you need to send the water. This is called the lift, or head pressure. Your pump needs to lift the water high enough to get it out of your basement or crawlspace.

Add-on Items

- Recommend a **check valve** for installing in the plumbing above the pump.
- Offer a **sump pump pit liner** and a sump pit cover for the hold where the sump pump will sit.
- The customer will need **PVC pipe** for the pump drain and pipe solvent cement for gluing the pipe together.
- Recommend an **adjustable wrench** for tightening the connection from the drain to the pump.
- Make sure the customer has a **hacksaw** for cutting the drain pipe to the proper size.

Module 5: Garbage Disposers

Product Knowledge:

Garbage Disposer

- Grinds food waste into small particles so they may be flushed through waste pipes into the sewer or septic system. Homeowners with septic systems need to take special care, as the disposer they select needs to be compatible with septic systems.
- Attaches to the sink with a flange and a mounting assembly that makes do-it-yourself installation easy.
- For clearing a jam, use a special disposer wrench that will turn the impeller in reverse.
- Disposers may be hard-wired into a wall switch, or plugged into an outlet controlled by a wall switch.
- On the side of the disposer, there is an outlet for connecting to the dishwasher drain.
- Available in two types. The **batch feed type** activates after a stopper is placed on the disposer opening. **Continuous feed types** are the most popular and activate by a switch.

Taking it to the Floor:

Frequently Asked Questions

Q: What is the correct size of garbage disposer that I should put under my sink?
A: If you are replacing an existing unit that has worked well for a number of years, the old size should work fine. Otherwise, 1/3 hp will handle limited use once a day. If you prepare meals frequently, however, I recommend a 3/4 or 1 hp unit. Larger units handle larger amounts of waste as well as food that is more difficult to grind, such as bones or fibrous materials.

Q: Can you have a garbage disposer if you have a septic system?
A: Yes, in fact, many manufacturers make models specifically for homes with septic systems.

Q: My garbage disposer smells bad. What can I do?
A: There are garbage disposer cleaners that will eliminate this smell, or a home remedy is to grind up citrus peels in the disposer, which will also eliminate the smell.

Q: How do I clear a jam in my garbage disposer?
A: Use a special disposer wrench that will turn the impeller in reverse.

Upselling Skills

- Better disposers have features like insulation around the unit and a sound deadening sink baffle for quieter operation.
- When selling a disposer, advise customers on the types of food items that shouldn't be flushed down a disposer to extend disposer life and prevent clogs in the drain. Those items include grease, bones, pits, seeds, eggshells, rice, pasta and fibrous foods like banana peels. Better quality disposers, however, may feature multiple grind stages for grinding food that normally shouldn't be placed through the disposer.
- Recommend getting a disposer with an anti-jamming feature. This will help reduce simple jams in the machine. The feature often includes an auto-reverse mode that help clear the jam.
- Suggest the higher powered units, 3/4 to 1 hp, as the larger units can handle larger amounts of waste. They can also handle food that is more difficult to grind, like bones.

Add-on Items

- Use **plumber's putty** for installing the disposer flange to the sink.
- The customer may also need a pair of **tongue-and-groove pliers** for making the plumbing connections to the disposer.
- For making the electrical connection, remind the customer to have **needle nose pliers**, **wire strippers**, **wire connectors** and a **screwdriver**.

Module 6: Drain Cleaners

Product Knowledge:

Plunger

- Used to clear blockages in toilets sinks and tubs.
- Also known as a force cup or a plumber's friend.
- Recommend combination plungers for clearing toilets. These plungers (usually black in color) consist of two cups, one inside the other.

Auger

- Consists of a coiled spiral cable, usually 1/4" thick and of varying lengths. It's also known as a snake.
- The most basic type has a z-shaped handle used to crank the cable as it snakes through the drain.
- Another type, the drum auger, uses a funnel-shaped container to store the cable and then to spin it as it works its way through the drain.
- Professionals use an auger attached to a drill or other device that spins the cable. Usually these versions can maneuver a much longer cable.

Closet Auger

- Also known as a toilet auger, use it to clear toilets. Better than a regular auger because it is more rigid.
- Consists of a short cable with a crank.
- The handle is covered with a rubber sleeve to protect the porcelain in a toilet bowl.

Sewer Tape

- An alternative to the auger, but not as effective in difficult blockages.
- A flat metal band with a hook on one end.

Water Powered Drain Cleaner

- Attaches to a standard garden hose.
- The rubber component of the unit expands in the drain to lock it in place, then uses water pressure to break loose the clog in the drain.

Chemicals

- Used to clear stopped-up drains by chemical action.
- Most liquid drain cleaners are heavier than water and will seek out the stoppage, even if the sink, tub or bowl is full of water.
- Cleaners are typically a combination of potassium hydroxide, which turns grease to soft soap. They also contain thioglycolic acid, that dissolves hair. Others may contain sodium hydroxide, sulfuric acid or lye.
- Toxic liquids should carry warnings and must be used with caution.
- Septic tank cleaners dissolve sludge through enzyme activators that regenerate the natural bacterial activity of decomposition for which the tanks were designed. These natural bacterial activators continue from the tank into the drain and tile field.

Taking it to the Floor:

Frequently Asked Questions

Q: What should I do to clear my clogged kitchen drains?
A: First, try using a plunger. If that doesn't clear the clog, try using a liquid drain opener, but use caution and read the directions carefully. Third, you can remove the trap. Be careful if you have used a liquid drain opener because there may be some left in the trap. If the clog is beyond the trap, there are drain augers that extend from 15' up to more than 50'.

Q: What can I put in my drain line to kill the tree roots invading the line?
A: Yes, there are root killers that contain copper sulfate that are quite effective.

Q: What type of auger should I buy?
A: I recommend buying a heavy duty and high quality auger. The cheaper ones will kink at bends in the pipe, which will make them more difficult, if not impossible, to use.

Add-on Items

- Recommend using **tongue-and-groove pliers** for taking apart drains so it's easier to use an auger.
- Suggest **work gloves** for keeping hands clean when using an auger.
- Recommend **rubber gloves** when using harsh drain cleaning chemicals.
- Offer **rags**, a **plastic pail** and a **sponge** for dealing with the mess often left after you clean the drain.
- Finally, you can suggest an **air freshener** for dealing with unpleasant odor that often results from opening a clogged drain.