SURVIVAL

ILLUSTRATED

Jessica W.

Introduction

This guide wants to do one thing: help people.

If you're trying to make it through a drought or a heatwave, this book will help you. If you're preparing for shortages or emergencies, this book will help you. If you're trying to figure out how to grow food or forage for it, this book will help you.

You're reading the beta version of an illustrated survival guide, designed to give you thorough but simple information about how to make it through short-term and long-term disasters, including shortages and supply shocks caused by global instability. Expanded versions will come out over the next few years, but many people want a hard copy of this guide in its current form as a hedge against the future. It makes sense.

Grid failures can affect everything from the internet to power and even indoor plumbing. Ultimately, a hard copy means you can access the information in here regardless of where you are, and regardless of grid status.

Many of us already have a few survival guides. We subscribe to newsletters and YouTube channels. We watch guides explain some or most of what we need to know in order to start projects, but even the best guides still leave us confused or wandering around online looking for the bits and pieces of information that we didn't get. This guide also strives to solve that problem, with clear and often detailed illustrations with instructions that fill those gaps and don't assume anything about knowledge you're bringing to the table.

We're also trying to be realistic here. If you can do it yourself, then this guide explains it. But if you're better off hiring a professional, this guide just comes out and says it rather than hiding those concessions halfway through.

The beta version is just that. It's functional. It's accurate. It's a work in progress. That's what prepping and survival is, an evolving project.

Printing costs are getting expensive. So I'm authorizing anyone with a copy of this guide to print it, modify it, or adapt it however they see fit. As such, this book falls under CC BY-4. It's a creative commons project. Just attribute me.

Stay safe. Stay sane. Stay kind.

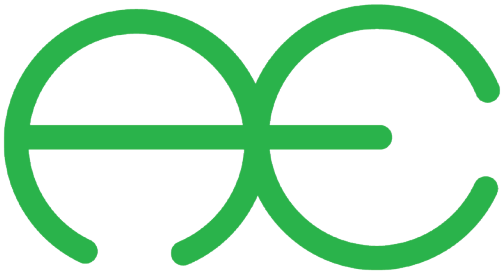
- Jessica Wildfire

Acknowledgments

The project benefits from support and feedback offered by thousands of readers who subscribe to my two newsletters. Names are added here by request.

Kimothy Ammons
Richard Crim

Funds from the Alfred Kobacker & Elizabeth Trimbach Fund make this guide possible.



The
Alfred Kobacker &
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Fund

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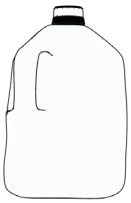
How to Store Food

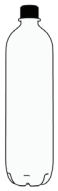
This chapter explains the basics of food storage. You'll learn how to calculate your food needs, create storage space, basic food preservation, and what foods store best. Later chapters will cover advance food preservation like canning. For now, you're just focused on the essentials.

A Conversion Cheat Sheet

1 lb = 16 oz, 0.45 kg, 0.47 liters



1 gallon = 4 qts, 128 oz, 3.9 kg, 3.8 liters



1 qt = 4 cups, 32 oz, 0.9 kg, 0.94 liters

1 pt = 2 cups, 16 oz, 0.45 kg, 0.47 liters

1 cup = 8 oz, 0.24 liters

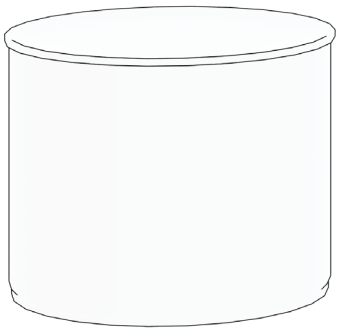
1 tbsp = 3 tsp, 15 ml

1 tsp = 5 ml, 3-5 g

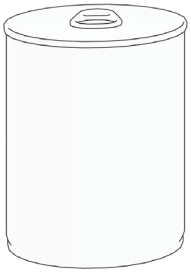
Abbreviations

Pound (lbs), gallon (gal), quart (qt), pint (pt), ounce (oz), table spoon (tbsp), tsp (teaspoon),

A Few More Conversions



1 #10 can = 104 oz, 13 cups, 3 liters



1 #401 can = 28 oz, 3.5 cups, 0.83 liters

1 mason jar = 4 cups, 32 oz, 0.7 liters

1 #2 can = 20 oz, 2.5 cups, 0.59 liters

1 #303 can = 17 oz, 2 cups, 0.5 liters

1 #300 can = 15 oz, 1.9 cups, 0.44 liters

#300 and #301 cans are commonly used for vegetables. Mason jars come in many sizes, with the 32 oz size one of the most common. They're technically listed as 32 ounces, but that's assuming you fill them all the way to the top. For storing dry goods, you might want to fill them to the 24 oz mark or a little over.

How Much Do You Need?

You can find plenty of food calculators online. They give similar answers. Below, you'll see how much food one adult needs for one month. It's about the same for children over seven.

One Adult/One Month

Grains (33 lbs/15kg)

Wheat
Flour
Corn meal
Rice
Oats
Pasta

Meats (2 lbs/.9kg)

Jerky
Canned tuna/salmon

Legumes (6 lbs/2.72 kg)

Dry Beans
Split Peas
Lentils
Lima Beans
Soy Beans
Dry Soup

Milk (8 lbs/3.6kg)

Condensed Milk
Evaporated Milk

Fruits & Veggies (26 lbs/11.8 kg)

Dry Bananas
Dry Blueberries
Raisins
Dry Broccoli
Spinach/Kale Flakes
Dry Carrots
Dry Strawberries
Dry Corn

Fats & Oils

Peanut Butter (1lb/.45 kg)
Salad Dressing (1 qt/.94 liters)
Vegetable Oil (1 gallon/3.8 liters)
Shortening (1 qt/.94 liters)
Mayonaise (1 qt/.94 liters)
Olive Oil (1 qt/.94 liters)

Cooking Essentials

Baking Powder (1 lb/.45 kg)
Salt (1 lb/.45 kg)
Vinegar (1 gallon/3.8 liters)
Yeast (1 lb/.45 kg)

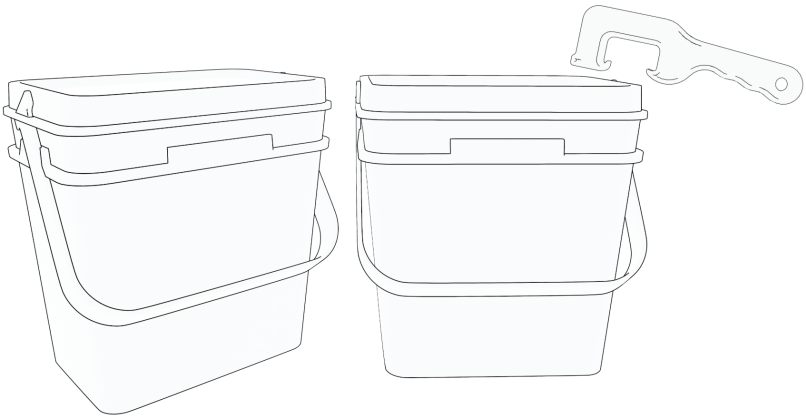
Sugars (5 lbs/2.27 kg)

White Sugar
Honey
Syrup
Brown Sugar
Jelly/Jam

These numbers offer general guidelines. Size them to your own needs.

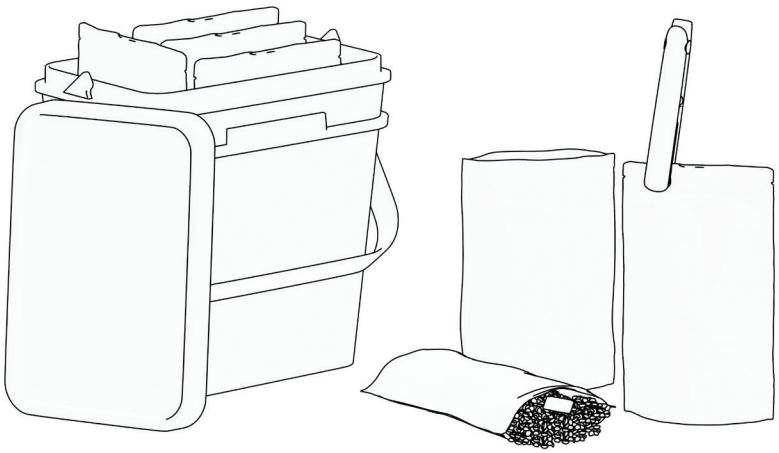
How Do You Store It?

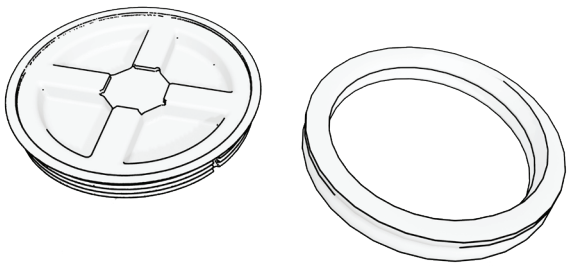
You can store dry foods like wheat berries, oats, rice, beans, lentils, and pasta for 10+ years in mylar bags. Keep a bucket opener near them. (They can be hard to open.)



Large containers made with foodgrade steel (304 or 306) work well for rotating bulk foods. They have silicone seals and latches to keep out air. Keep scoops inside and transfer food to smaller containers as needed. When you open up a food bucket, pour it into one of these if you don't want to keep re-sealing the containers over and over.

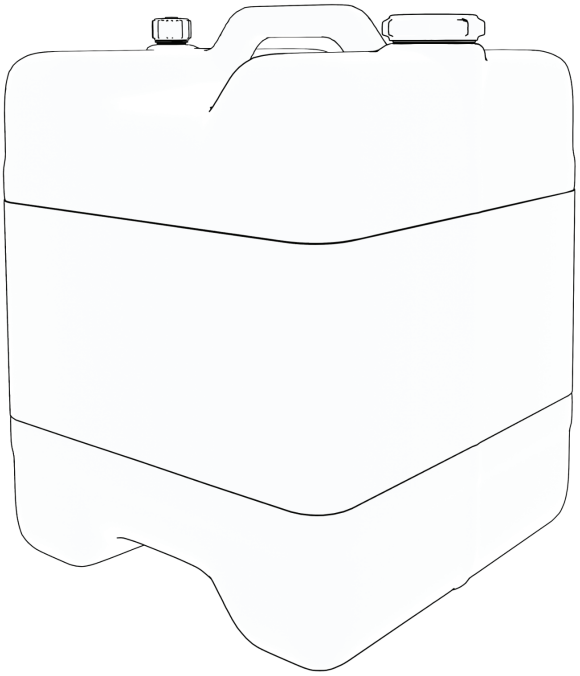
Add an oxygen absorber and seal them with a flat iron. Put the bags in foodgrade 4-gallon buckets. Use 500 cc size absorbers for gallon bags and 2 1000cc size absorbers for five-gallon bags.



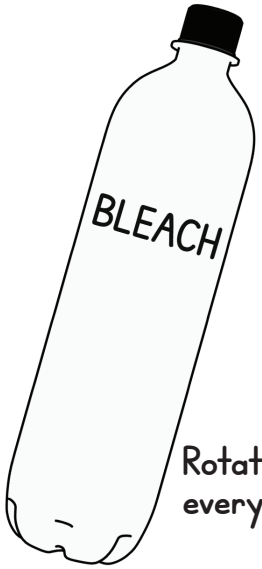


Gamma seal lids provide an airtight seal on round food buckets, and they're much easier to use. If you prefer the square ones, then it's a limitation.

How Do You Store Water?



One person needs at least 30 gallons of water for a month of hydration and basic sanitation. Aquatainers are great, foodsafe containers for storing water. A standard Aquatainer holds 7 gallons. Some models are stackable, but they hold slightly less. Wash them out first. When you're washing, use the same formula as you do when storing water. Just a little bleach in water will sanitize the container if you shake and roll it.



You can maximize your water's life by adding 1/2 tsp of regular, unscented household bleach (8.25%) to 8 gallons and mixing thoroughly. For an Aquatainer, use just shy of 1/2 tsp. For 6% bleach, use 2/3 tsp.

Rotate through your stored water every 6-12 months.

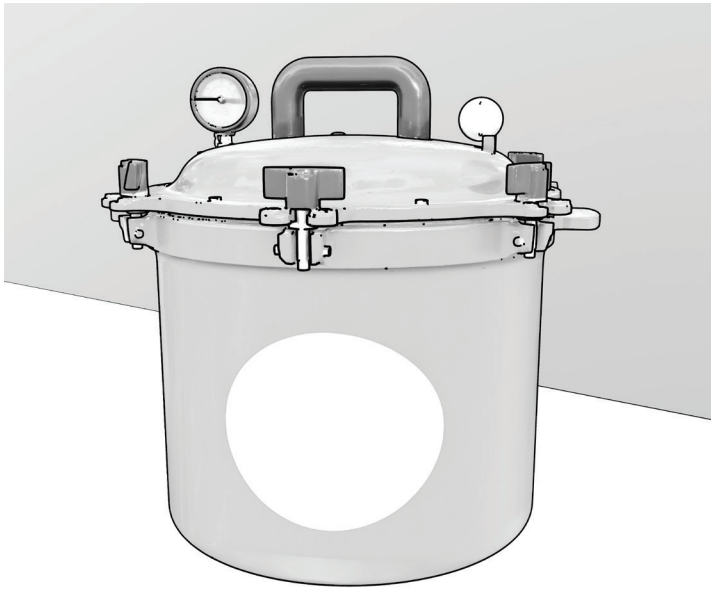
How Do You Can Food?

Canning can dramatically increase you food diversity. Once you learn the basics, it doesn't feel so overwhelming. You'll know how to do it properly, and you'll know when a seal breaks or doesn't form properly. Especially if you're starting out, use Ball Mason Jars and their recipes. You can also use recipes from Ball, Kerr, USDA, and the NCHFP (National Center for Home Food Preservation).

Four Methods for Canning

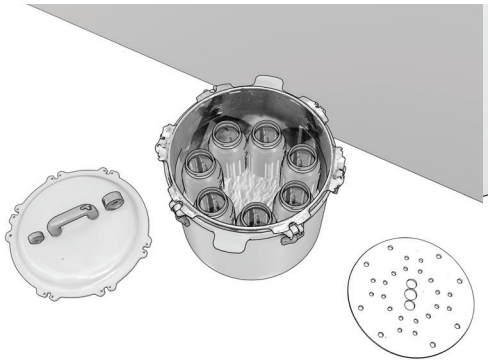
There are four main types of canning:

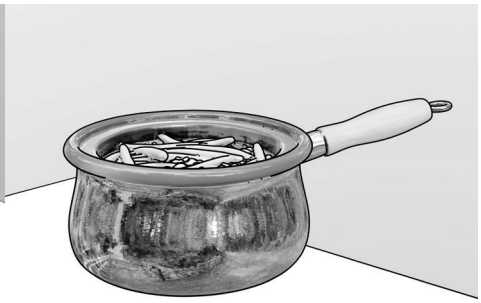
* Water Bath Canning: You submerge your jars in boiling water for a specific length of time. It doesn't require close attention to pressure, only temperature. Water bath canning only works well on foods with high acidity.
* Pressure Canning: You fill a pressure canner with roughly 2 inches of water, then seal the lid and follow a more specific series of instructions. It works best with foods that have low acidity.
* Hot Packing: You boil or blanch the food you're going to can first. You pack your food, and then you pour in boiling water to the headspace level. You can use this method with water bath or pressure canning.
* Raw Packing: You don't boil or cook the food before canning. You can add boiling water to the jar, but it's not required. You can use raw pack canning with water bath or pressure canning.



You don't have to have a garden to can. You can can bulk items from the store, to make them more manageable. Canning supplies vary a lot in cost. You can start water bath canning without spending much money. If you're serious about it, then you can invest several hundred dollars in a pressure canner and supplies that will last you for the rest of your life.

Canning, The Basic Steps

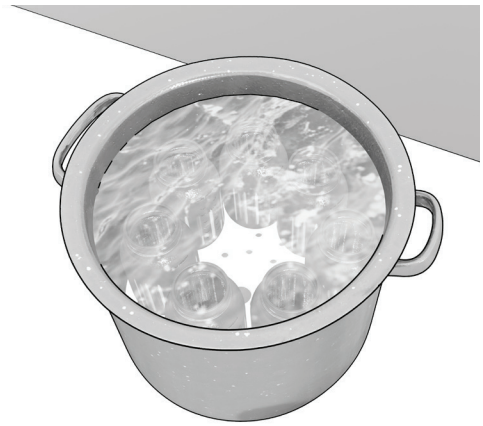




Hot packing then pressure canning involves the most steps, so we'll start there. The steps vary a little by food and recipe, but they follow a general method and principle.

1. Start by adding 2-3 inches of water to your pressure canner. Heat the water to 180F degrees.
2. Keep the jars hot while you prepare the food. This keeps the jars from cracking once you start adding the contents.
3. Next, start preparing your food. Some foods, you'll boil. Others, you'll blanch or roast. If you're blanching, you bring the water to a full boil before adding your food. You boil for 30 seconds to a few minutes, then you take it out and move it to a cold bath, then dry it.
4. Transfer the food to your jars. Use a funnel. Leave about 1 inch of headspace.
5. Use a thin spatula, a chopstick, or a debubbling tool to remove bubbles.
6. Wipe the mouths of the jars with vinegar to remove any food particles that will interrupt your seal.
7. Place the lid on with the ring/band, and "finger tighten" it. Don't use a full grip.
8. Move your jars to your canner, with gloves or jar lifter tongs.
9. Lock the lid, but leave the pressure vent open. Heat the canner up and let it steam out/vent for 10 full minutes.
10. Close the vent. Use your pressure gauge and regulator to cook the contents at 10-15 lbs of pressure, depending on the recipe, for the specified time.
11. Turn off the heat. Let the canner depressurize on its own (0 PSI).
12. Wait 10 more minutes for everything to cool down, then open and remove the jars with your jar lifter tongs.
13. Let the jars sit overnight, 12-24 hours. Remove the rings and inspect the seals by pulling gently with your fingers only. If the lid stays on, you have a good seal.

Canning, Variations



Once you understand hot pack and pressure canning, everything else sounds simple. Water bath canning requires fewer steps, and there's only a few big differences. First, you don't have to monitor or regulate the pressure. Second, you're completely submerging the jars under water and then cooking for a specific duration.

When you raw pack, you don't have to cook the food first. You might add boiling water to fill up the rest of the jar, but it's often not required. You can technically use hot pack canning for everything, but some foods look and taste better when you cold/raw pack, as long as it's safe.

According to many homesteaders, you can reuse the rings/bands until they start to show significant rust. However, you can't reuse the lids. Canning lids contain a special compound on the underside that forms a seal only once. They also dent after the first use, just enough that they're no longer capable of forming an airtight seal. After the first use, they're no longer safe. You might be able to store short term dry goods with those lids, but that's about it.

If you're planning for a future where new lids are hard to get, stock up on them now.

Brandwise, most homesteaders only use Ball or Kerr Mason jars for safety reasons. Each company offers canning guides, and they're worth having. Instructions can vary a little depending on the food. These guides also explain how to adjust your pressure settings when you're cooking at different altitudes Mason jars come in a variety of sizes. They're suited to different kinds of food, but they're all safe to use. Almost anyone can start canning with basic supplies, and it's a good way to transfer bulk wet foods to more manageable containers, to maximize food stores and reduce waste. Below, you'll see a basic introductory list of foods that generally need pressure and/or hot packing. (It's not exhaustive.)

Require Pressure Canning:

* Meats/Seafood
* Carrots
* Potatoes
* Beets
* Beans
* Corn
* Mushrooms
* Asparagus
* Okra
* Leafy Greens

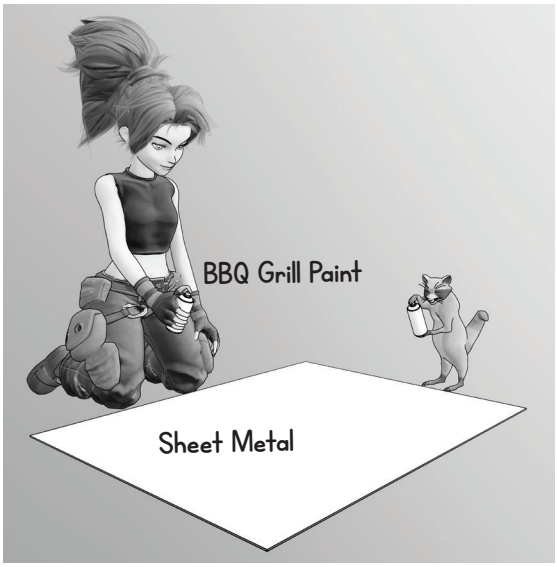
Hot Packing Strongly Recommended:

* Meats/Seafood
* Carrots
* Apples
* Apricots
* Berries
* Cherries
* Peaches
* Pears
* Beans
* Asparagus
* Okra
* Meats

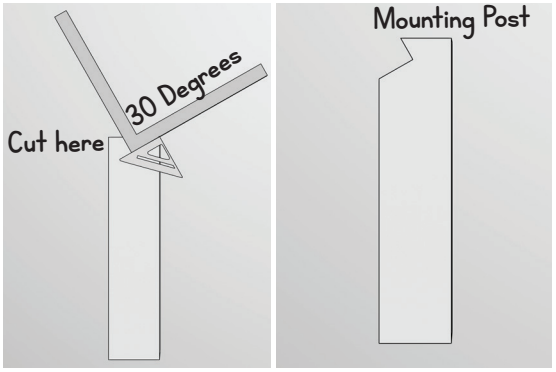
You can raw pack and then pressure can some foods, even meats, but hot packing first maximizes safety.

How Do You Dehydrate Food?

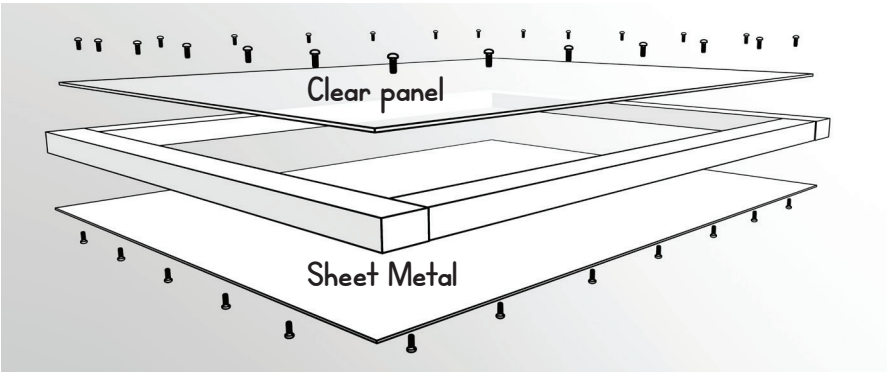
A solar dehydrator can help you preserve and store food for the long term. This design doesn't expose your food directly to the sun. It uses radiative heat to do the drying.



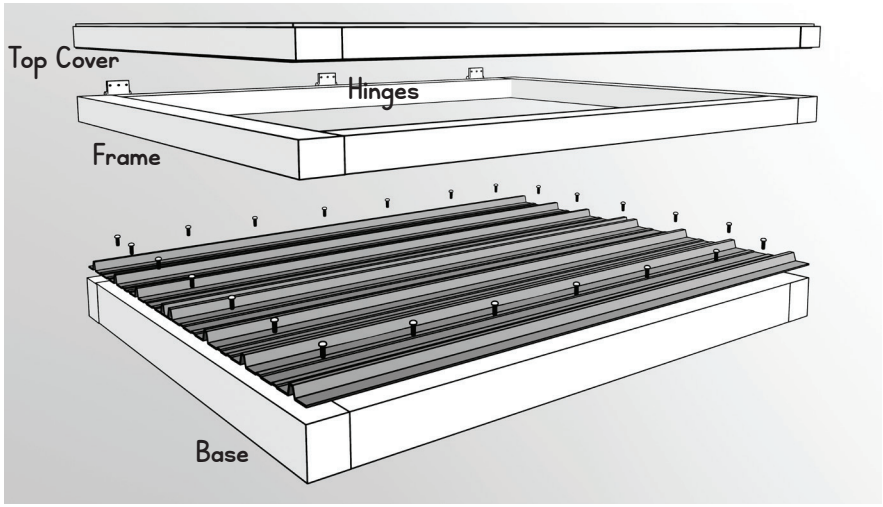
Start with a piece of 28-guage sheet metal. Give it two coats of black BBQ grill spray paint.



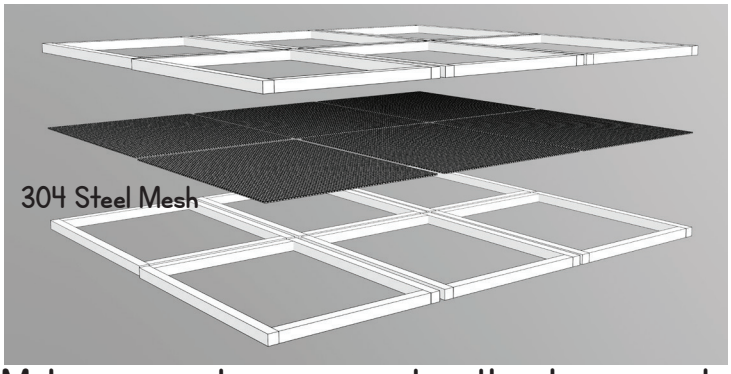
You'll want to mount your dehydrator at 30 degrees to catch sun. It also lets heat and moisture rise up through the unit. Build a mount with 2x4 lumber or something similar. Use a speed square to mark a 30 degree angle, then a framing square to mark out the rest of the nook where your dehydrator will sit. Use a saw to cut it out.



Make the top cover by screwing together lumber sized to the sheet metal. Screw the sheet metal to one side. To the other side, screw a piece of clear polycarbonate or acrylic. A piece of acrylic will produce fewer fumes during heat.

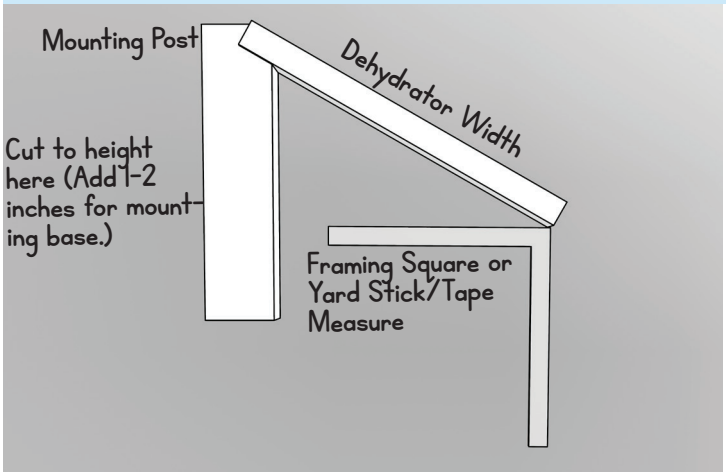


Make a main frame, and add hinges. Attach the top cover to the frame. Next, make a base with lumber, then fasten a piece galvanized metal roofing over it.

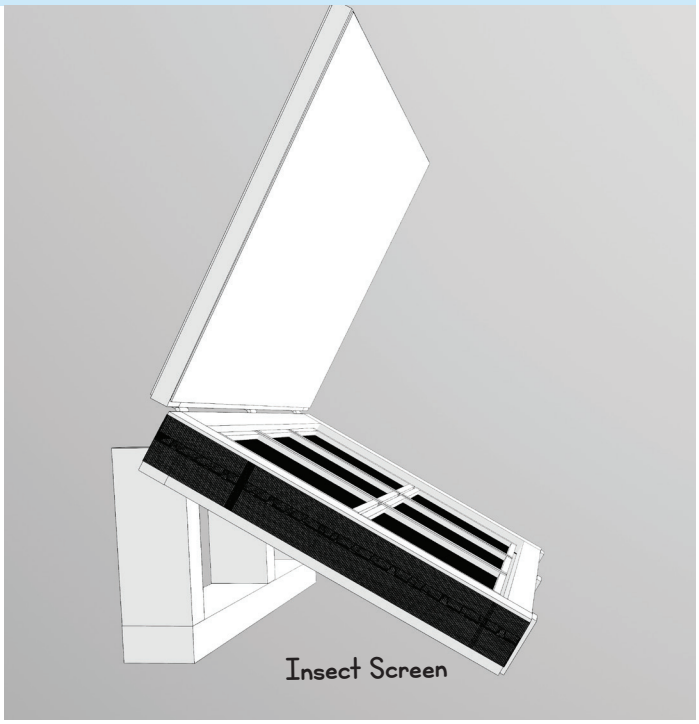


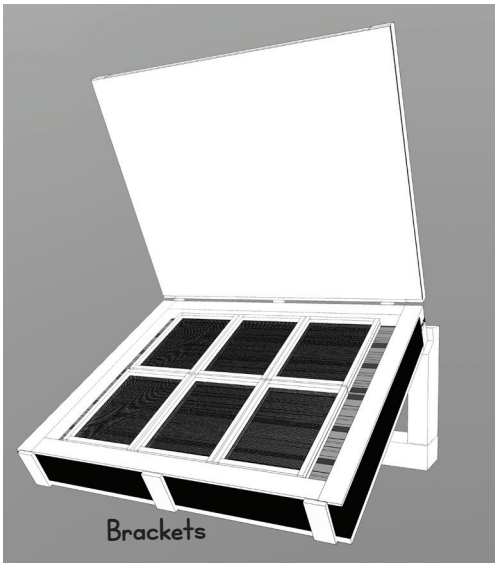
Make screens by screwing together 1" square dowels or something similar. You can make one or several, as pictured here. Sandwich pieces of 304 (food grade) stainless steel mesh. You can find it at hardware stores.

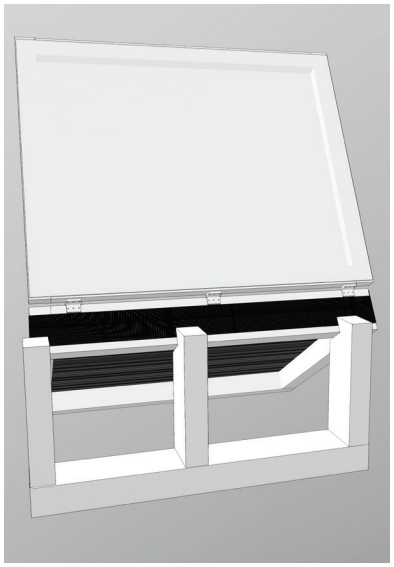
Finishing Your Dehydrator



To measure the height of the mounting stand for your dehydrator, lay one piece flat on the ground. Take a piece of lumber the same width of your dehydrator and place it in the notch. Use a framing square or a yard stick to mark the bottom. Cut there.







Mount 2-3 brackets to the base, to keep the frame secure. The frame will rest on the bed. You'll add your food to the screens, then place them on metal roofing. Your food won't touch the metal.

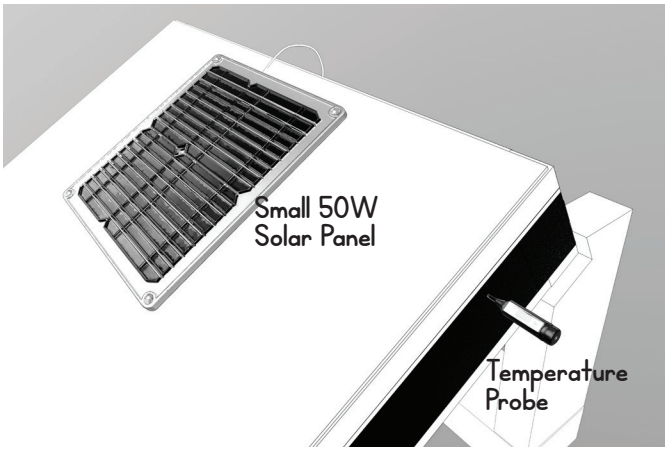
Finally, wrap some mosquito netting or window screen around the gap where the frame sits on the base. That allows airflow, but it keeps out insects. If you need more air flow, drill holes in the sides and cover with netting.

Tips for Dehydrating

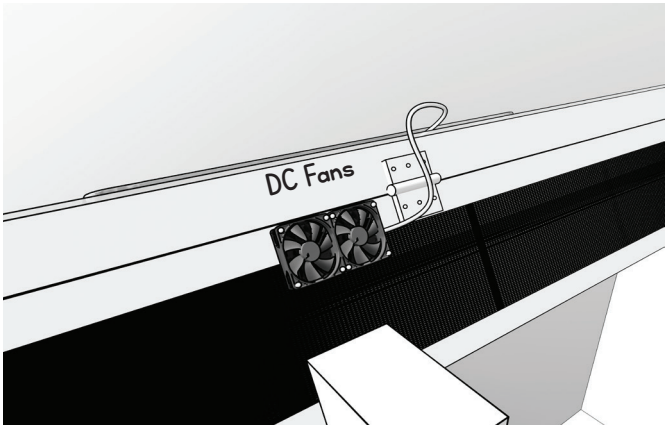
A solar dehydrator can reach 120-140F degrees, even on a cloudy day. Most fruits and vegetables will dry in about 12 hours. They should retain only 10-20 percent of their moisture. (You can test with strips.) If you want even more air flow, you can buy a DC solar fan kit at many hardware stores or online. They're easy to mount.

If you plan on dehydrating food on a regular basis, it's worth keeping a separate guide with instructions for each food you grow.

More Tips on Dehydrating Food



Most foods need to stay around 120-140F to dehydrate properly. You can add a temperature gauge to your dehydrator to ensure food safety. Drill a small hole into the side for a temperature probe. You'll want a heavy duty waterproof one with a probe that runs 5-12 inches, long enough to pass the lumber and get a good read. After you add the probe, seal the hole with silicone caulk. This way, you don't have to open the unit.



Here's what your dehydrator will look like once you've installed the extra features, like the DC solar fans and and temperature gauges.

You can find plenty of other designs online, including bigger community-sized dehydrators that use a slightly different venting and heat transfer process. But you can make this design almost any size, large or small, and it's one of the simplest and most effective ones out there.

Final Tips on Dehydrating Food

* Use stainless steel or foodsafe plastic for the nonwood components. You don't want materials that will rust or leach contaminants.
* Use glass or acrylic for the top cover. Some preppers and homesteaders say polycarbonate is safe, but it contains BPA that can leach over time due to heat.
* You can dehydrate food on almost any day when outdoor temperatures reach the mid 80s F (30s C), even if it's partially cloudy. If you're not sure, check the temperature on your dehydrator before you start.
* Make sure the outdoor humidity stays at less than 60 percent.
* Keep the area around the dehydrator clean. Maintain it well. Don't allow vegetation to grow around it. That leads to moisture buildup.
* Most foods need to dry at 120-140F degrees. Low temperatures allow bacterial growth, and higher temperatures wind up cooking the food, not drying it.
* Slice fruits and vegetables thin to accelerate the drying process. Generally, you want slices 1/4 to 1/8 of an inch. Too thick, and they won't dry.
* Properly dried fruits should have a leathery texture. Vegetables should be crisp. Keep the food in a large clear container for 4-7 days to make sure it doesn't clump or form condensation. If it doesn't, it's ready for longterm storage in jars, bags, etc.
* You can buy special "dry cards" or "humidity indicator" cards that change color to indicate moisture levels. You can reuse them up to 20 times. Unused, they last 2-3 years if they're kept sealed in a cool, dry place. Some say they last even longer, but you probably don't want to rely on ones older than 5 years exclusively.

Where Do You Put It All?

You can convert a standard closet into a food storage pantry. This closet measures 2X6 ft and 90 inches in height. (Everything is to scale.) Store heavier items like food buckets and water containers on the bottom. Make sure you screw brackets to studs to hold the weight.

30 #10 Cans
(96 oz/2.8 liters)

14 100 oz (2.95 liters)
Latch lid Jars

20 17 oz (.5 liters)
Latch lid Jars

22 32 oz (.94 liters)
Latch lid Jars

30 Mason Jars
(24-32 oz, 0.7 liters)

64 14 oz (.41 liters)
Cans

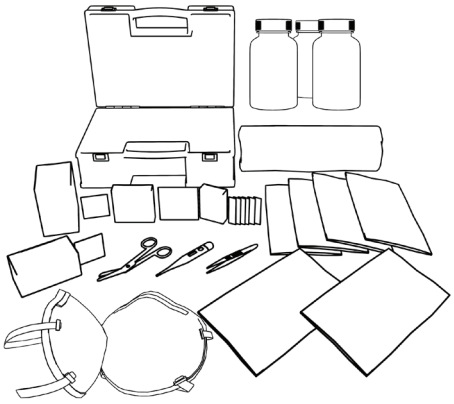
16 4-gallon
food buckets

8 7-gallon
Aquatainers

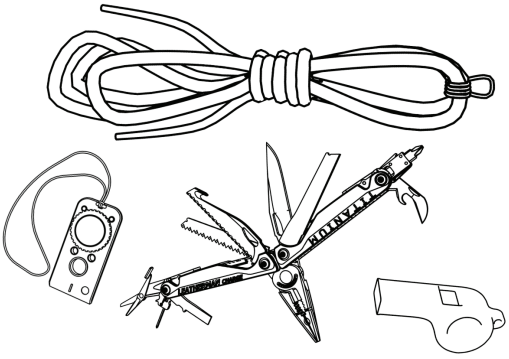
The average person needs 180-200 lbs (81.6 kg) of food per month. One standard closet could hold about 700-750 pounds of food and 56 gallons of minimum drinking water, sustaining 3-4 adults for one month. You can adjust the ratios of grains, legumes, fruits, vegetables, and other essentials for your needs.

How to Bug Out (or In)

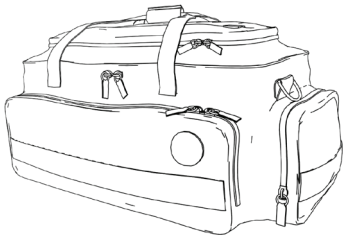
This chapter covers the basics of bugout packing. Bugout bags can double as bug-in bags, consolidating emergency items into one load. Even if you're not going anywhere, it's good to have a bag.



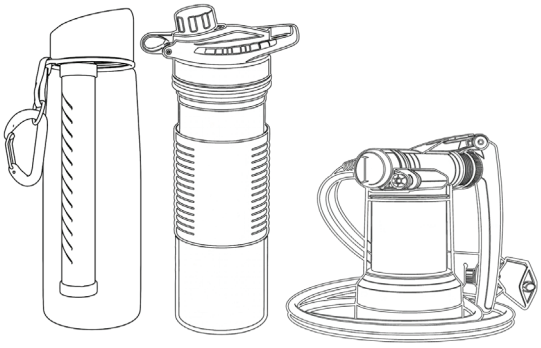
Anyone can build a bugout bag. You don't have to pack for weeks, and you don't have to buy pre-made kits. It's better to make your own, for your needs, something you know you can carry. According to conventional advice, you should plan for specific emergencies. However, we live in a world where multiple threats can hit anywhere, even at the same time. So, pack a multipurpose bag.



Sometimes, you'll bug out. Other times, you'll shelter in place. It depends on the nature of the danger and how much heads up you get. Either way, a good emergency bag will have the essentials you need to stay alive for a few days, or a few weeks.

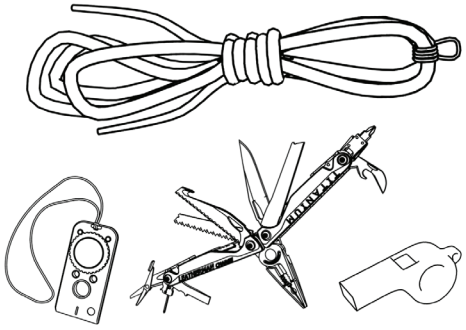


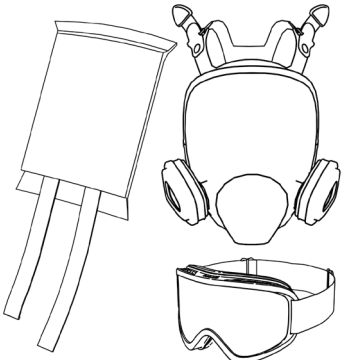
What Goes in a Bag?



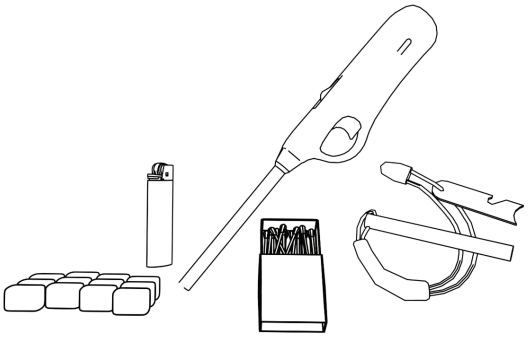
Water: 2L of water, water purifier

Basic tools: paracord, compass, multitool, camping cookware, folding stove, whistle



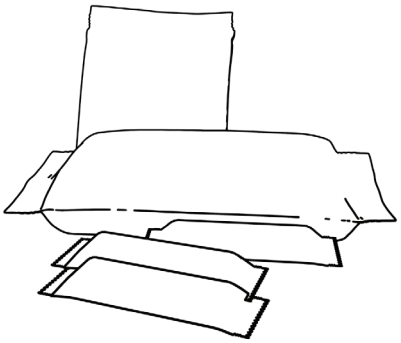


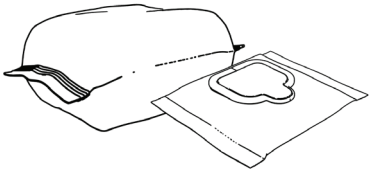
Hazard gear: fire blanket, respirators, goggles



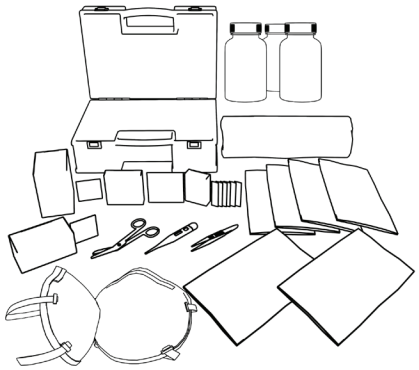
Fire: Lighters, matches, ferro rods, fuel tablets

Emergency Food: freeze-dried meals & energy bars



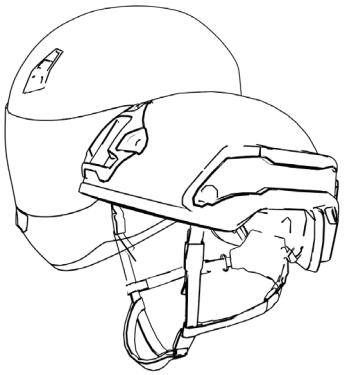


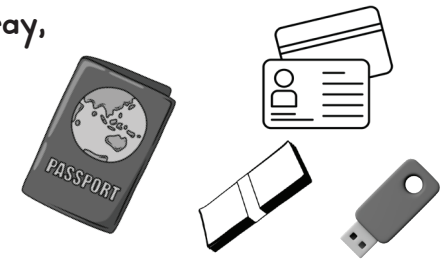
Kids: diapers, wet wipes, powdered baby formula, baby sling/harness carrier, toy



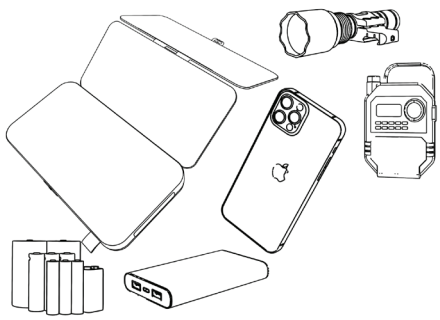
Medical: N95 masks, clotting agents, bandaids, gauze, alcohol pads, pain-killers, extra meds, thermometer

Protection: helmet, pepper spray, tire thumper, other weapons.

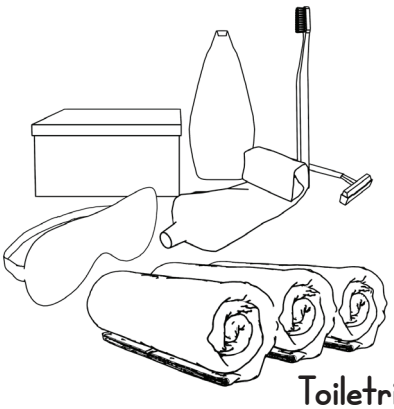




Transactions: Cash, personal identification, security key, flash drive, external hard drive

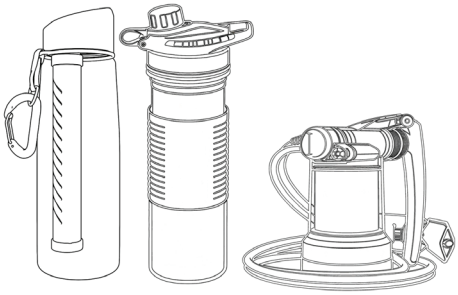


Electronics: portable solar charger, batteries, power bank, extra phone, weather radio, flashlight

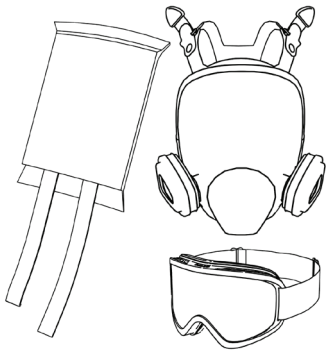


Toiletries

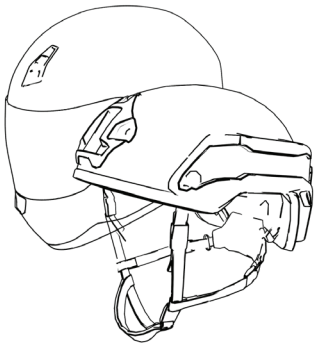
Important Details



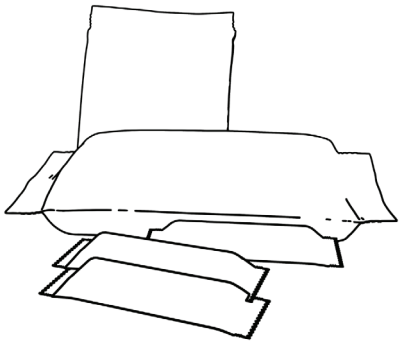
Lifestraws and Sawyer filters meet the minimum requirements. MSR Guardian filters out 99 percent of viruses and bacteria. Grayl Geopress filters out 99 percent of everything, including some heavy metals. Filters will last almost indefinitely if they're kept in their package and stored well. The highest quality purifiers have shorter lifespans once you start using them, so pack replacement filters if you can.



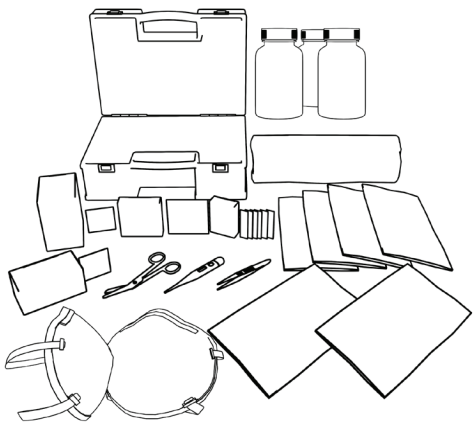
Most people in North America will choose between different half-face and full-face respirators from 3M. The easiest ones use bayonet P100 filters. The 69026 model covers the most VOCs (volatile organic compounds). With half-face respirators, use goggles from Bolle or HexArmor. If you wear glasses, you can order spectacle kits for respirators. Some Hexarmor goggles have side groves to fit over glasses. Most goggles are vented, allowing small amounts of air through. Nonvented goggles almost always fog up and obstruct vision.



Motorcycle helmets offer superior head protection during emergencies like storms, and they're affordable. Tactical impact helmets are called bump helmets. They're less bulky but cover less of your head, and they're more expensive. Ballistic helmets offer protection against low-caliber gunfire, and sometimes high-caliber rounds. Some ballistic helmets also provide impact protection, but they're very expensive. Choose something that fits your budget and offers reasonable protection.

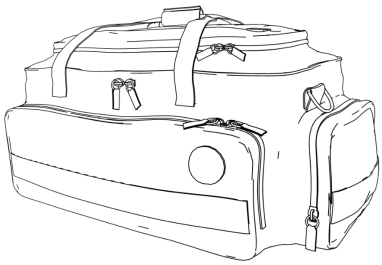


Freeze-dried meals last for years, but they're expensive. Many of them also contain a lot of sodium and other preservatives. They remain safe to eat, and they provide calories for basic survival, but their nutrients degrade over time. You can make your own with dehydrated foods, oxygen absorbers, and mylar bags. Rotate through them every 1-3 years. See the food storage chapter for more details.



A full medical kit starts with band-aids, bandages, gauze, alcohol pads, clotting agents, scissors, tweezers, a thermometer, and N95 masks. You might also want an oximeter, duct tape, military bandages, latex gloves, liquid skin, painkillers, stomach meds, tourniquets, antibiotic ointment, cold compresses, eyedrops, and extra prescription meds. Also consider hemostatic agents like Bleedstop and QuikClot (for severe injuries). Use QuikClot first, then add Bleedstop for additional clotting. Using the Bleedstop powder first can interfere with gauze clotting.

Types of Bags



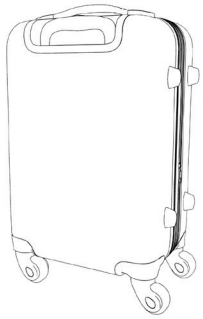
Everyday Carry (15-20L)

For emergency medical kit, gas mask, a bottle of water or two, flashlight, multitool, other small items, 1-2 meals. For shorter durations. First responder and patrol bags work well.

Tactical Backpack (20-30L)

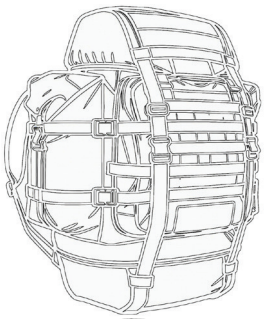
Can hold all items plus 2 1-liter bottles of water and 1-2 days of meals for one person. Good for short bugout, looking for a place to stay in another city. Basically a bookbag with pouches.

15-20 lbs (7-9kg)



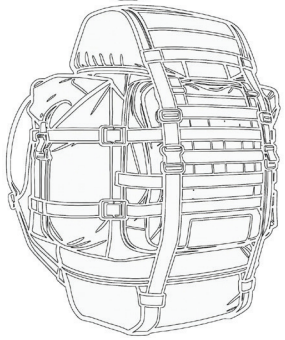
Rolling Suitcase (40-50L)

Can hold all items plus a solid 2 days of food and water. Good for longer bugouts. Good for car camping and emergency road trips. Also good for saving your back.



Medium Backpack (40-60L)

Can hold all items plus 3 days of meals for one person. A heavier bugout bag meant for longer bugouts and emergencies where food and water will be scarce.



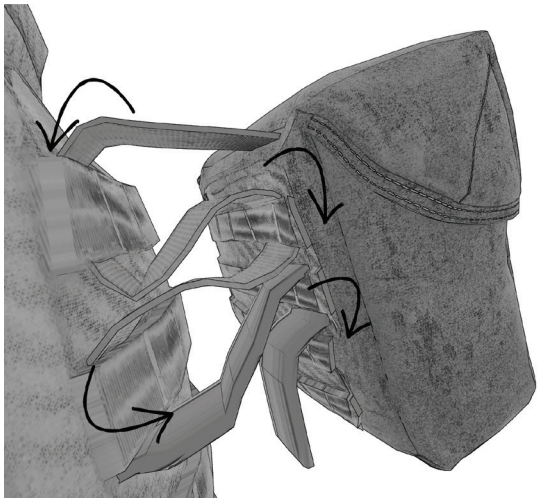
Large Backpack (60-80L)

Can hold all items plus 4-5 days of meals for one person. A very heavy backpack meant for longer term emergency situations.

40-50 lbs (18-22kg)

How to Use MOLLE

MOLLE means modular lightweight load-carrying equipment. MOLLE packs and vests let you weave smaller pouches onto the back or sides. That way, you can expand your carrying capacity without having to buy an entire new bag.



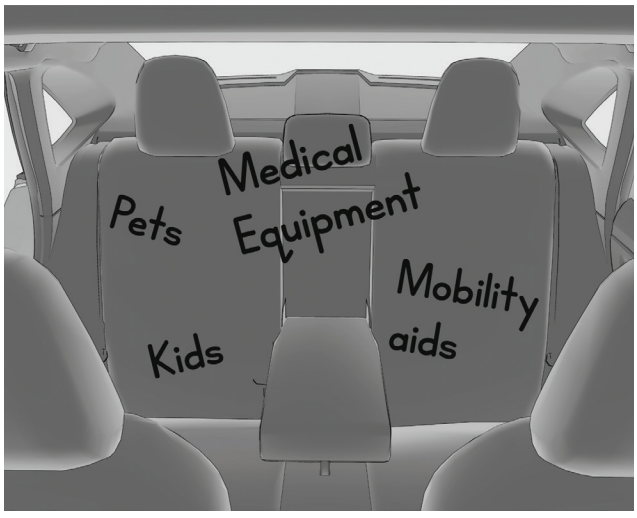
MOLLE pouches are good for emergency medical kits, water filters, gas masks, or other items that you might want to access without having to dig through your bag. You can also get MOLLE water pouches.

MOLLE vests and fanny packs let you carry tools, cash, or energy bars. They're a good addition for a light bugout bag or a camel pack. With a MOLLE system, you have more options to scale up and down your bugout plan. Many preppers love them.

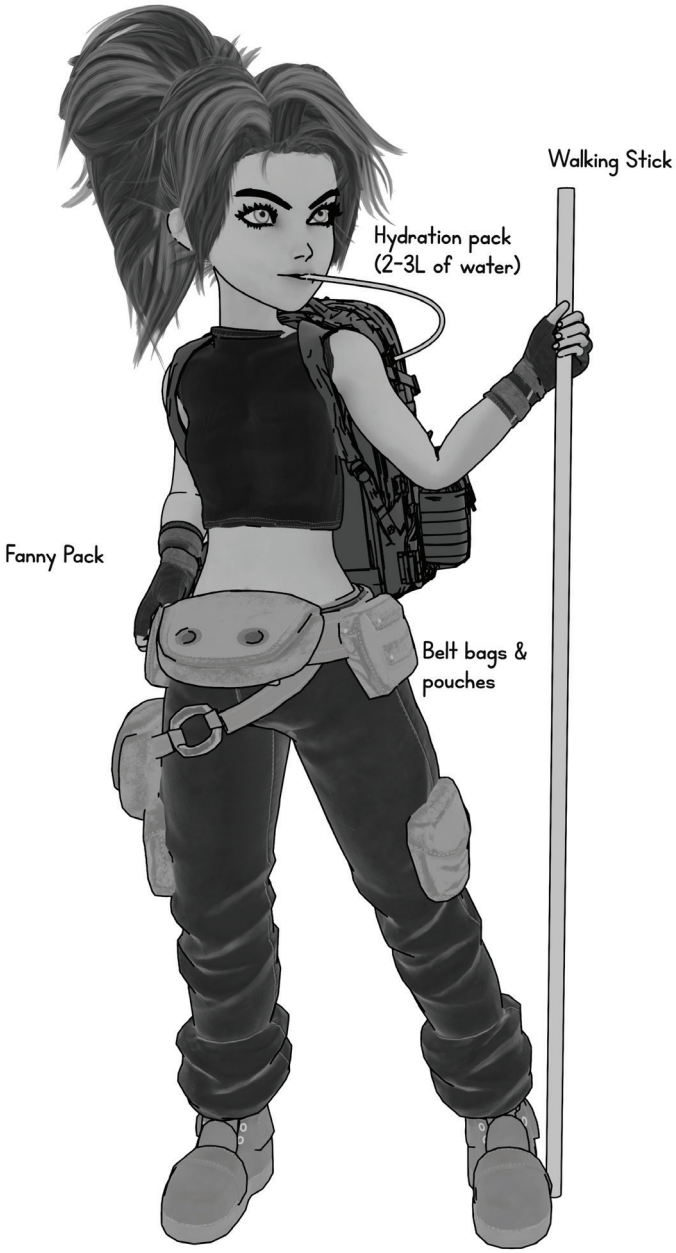
What Fits in a Car?

Even a smaller compact car can usually fit two 60-85L bags and two 20-30L bags in the trunk. That leaves room in the cabin for people and personal items. Someone can hold a first responder bag in their lap.

You'll also want to think about room for pets and pet carriers, baby carriers, walkers, and other items you'll be taking.



Bugging Out on Foot



Pro-tip: Trying to drink your own urine will only dehydrate you faster. Don't do it!

Not everyone has a car. Not everyone will be able to get to it in time.

Sometimes, you're much better off bugging out on foot if you can. Roads and highways can back up with traffic. They can turn into their own disasters.

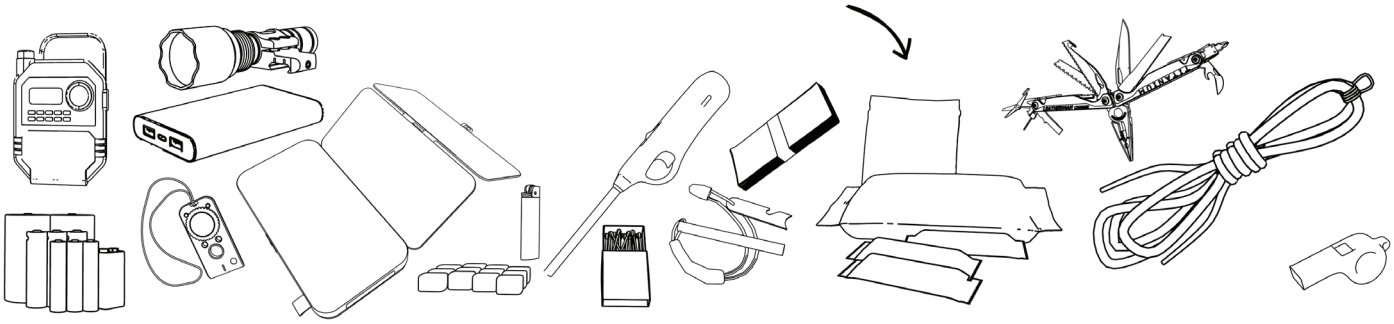
You might have to leave your car behind if things go from bad to worse.

Some preppers keep a smaller ejection pack in their larger bugout, or they just take a hydration (camel) pack with them everywhere they go. They're light. Some of them still hold 15L-20L of other gear. If you can't or don't want a bunch of extra weight, it's a good way to go.

Water is by far the most important thing you'll need during a major emergency. You can go days without food. You can find or make shelter. Your walking stick can double as a weapon. The one thing you can't go long without is... water.

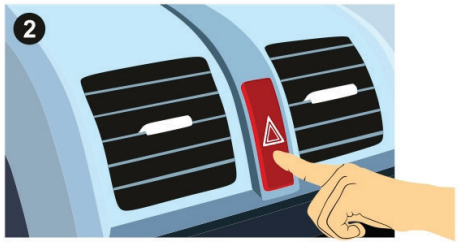
Hydration packs distribute the weight better than water bottles, but you can pack a couple of those too, especially with filters or filter adapters.

You can fit a lot of this into pouches and smaller packs



How to Change a Flat Tire?

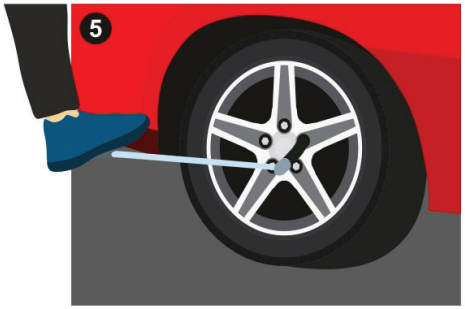
Find a Safe Location & Place a Warning Triangle



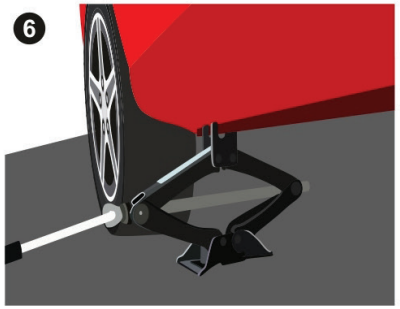
Turn On Your Hazard Lights

Apply the Parking Brake

Apply Wheel Wedges



Loosen the Lug Nuts

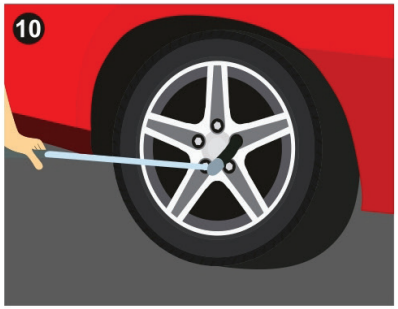


Place the Jack Under the Vehicle & Raise the Vehicle with the Jack

Unscrew the Lug Nuts

Remove the Flat Tire & Take Out the Spare Tire

Mount the Spare Tire on the Lug Bolts

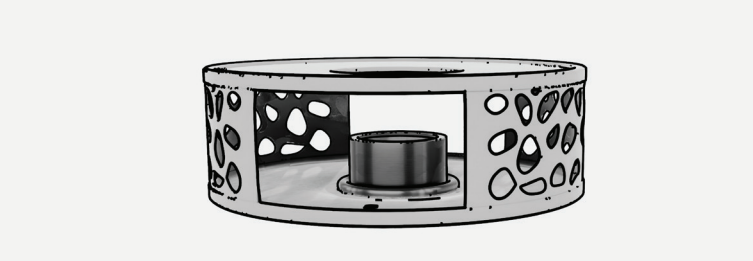


Tighten the Lug Nuts by Hand, then Lower the Vehicle & Tighten the Lug Nuts Again, after that Lower the Vehicle Completely

Stow all Equipment, Check the Pressure in the Spare tire, and take your Flat Tire to a Technician

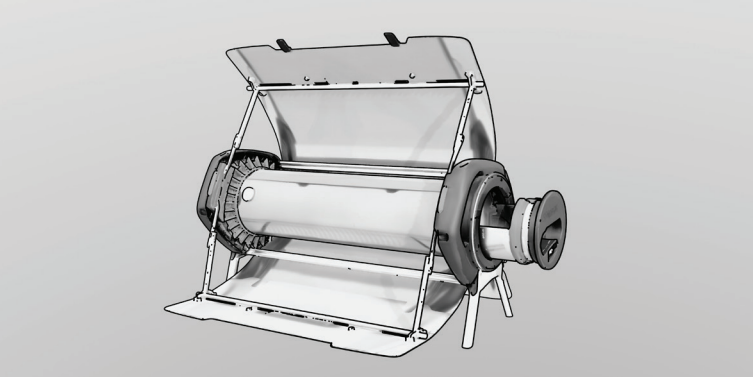
Cooking During an Emergency

Even if you have emergency food and water, you'll need a way to cook it during a power outage. You have a few options beyond propane stoves. You can use folding camping stoves with fuel tablets, but you'll need ventilation. You can also try these options:



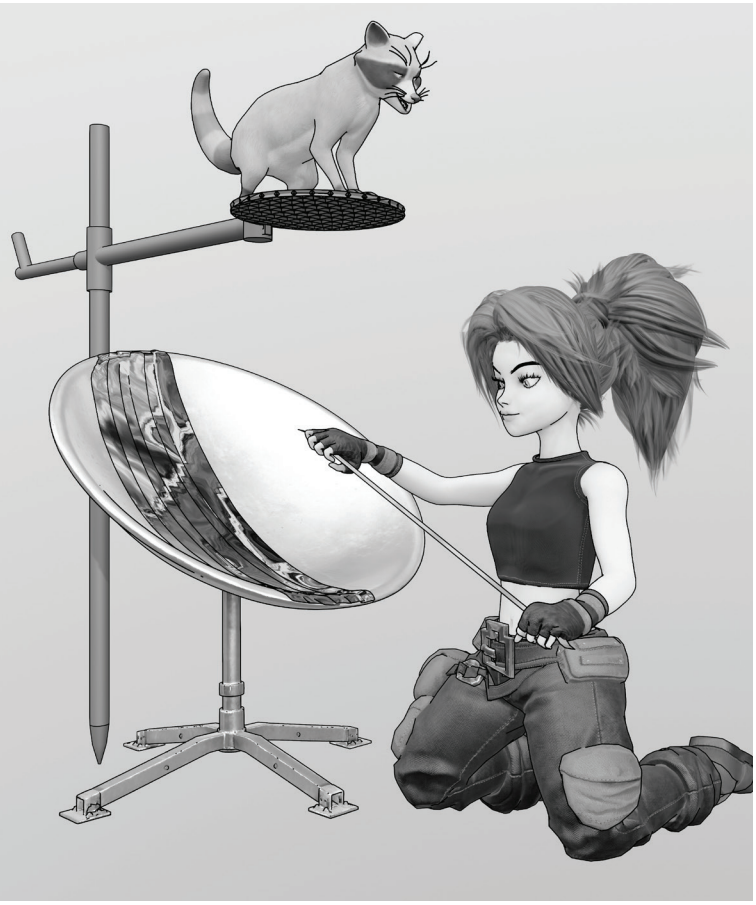
Tea Candles & Ovens

You can find tea candle ovens or teapot warmers fairly easily. It's enough to heat water for cooking. Use 3-6 candles together to boil water.



Portable Solar Cookers

Portable solar cookers cost a little more, but they can consistently cook food if you have an area where you can cook in direct sunlight. Larger ones work well if you're sheltering in place, and companies like Go Sun make smaller, portable ones. Some of them can also plug into a power source.



Parabolic Solar Cookers

You can buy parabolic solar cookers online that heat larger amounts of food even faster. You can also make your own if you can find a used satellite dish, anywhere from 3-5 feet (1-2 meters) in diameter. Cover it in reflective foil or mylar. You can find tape that does the job. Use a swivel or swing-away grill to hold your pots/pans above the parabolic cooker's focal point.

Calculating Focal Point

The focal point refers to the area where light converges above the dish. It's where your food will reach the highest cooking temperature the fastest. You can find it by holding a sheet of paper over the dish and moving it until you find the hottest point. (It will start to smoke or burn.) You can also use this formula: Diameter^2/16xdepth.

Emergency Medical Kits

It's a good idea for everyone in your group to keep a small medical kit with basic items. You can keep some of these items in a family kit, as well as extra supplies.

You can store medical kits in bugout bags, cars, and cabinets. Kits stored in cars will need more frequent inspection and rotation, because of heat/cold exposure.

Here's a fuller list:

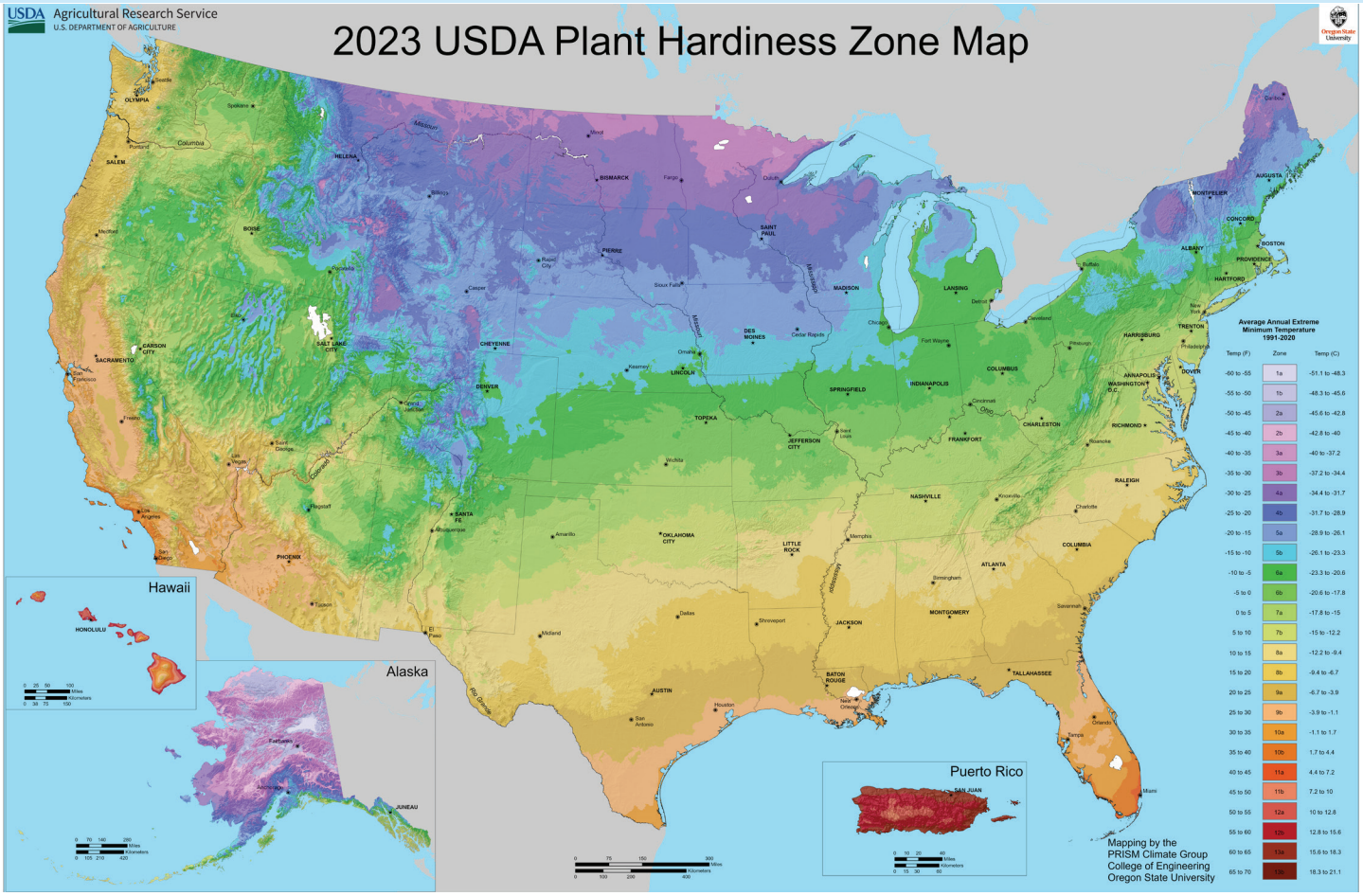
* Emergency hot/cold pack
* N95 Masks (Or Better)
* Extra Prescription Medicines
* Water Purifier Tablets
* Bandage wrap
* Compression Bandages
* Quikclot or Celox hemostatic gauze
* Tourniquets
* Steri-Strips
* Sutures
* Medical Glue (or SuperGlue)
* Tweezers
* Magnifying Glass
* Light/Head Lamp
* Bandage Scissors
* Irrigation Syringe
* Bandaids (Multiple Sizes)
* Latex/Nitrol Gloves
* Gauze Pad
* Wound Dressings
* Traction Splints
* Chest Seal
* Rolled Gauze
* Solar Blanket
* Medical Tape
* Duct Tape
* Antibiotic Ointment
* Alcohol Wipes
* Betadine Wipes
* Burn Gel
* Sting Relief Wipes
* Painkillers
* Hand Sanitizer
* Alcohol/Hydrogen Peroxide
* Eye Drops/Saline Solution
* Second Skin/Liquid Skin
* Blood Pressure Kit
* Stethoscope
* Thermometer
* Oximeter
* Cotton Swabs/Q-tips
* Cotton Balls
* Insect Repellent
* Sun block
* Hydrocortisone/Creams
* Silvadene/Burn Creams
* Lidocaine Cream
* Foot Powder/Baby Powder
* Rehydration Packs
* Nutrition Drinks
* Vitamins
* Antacids/Stomach Meds
* Disposal Bags

You can also find portable defibrillator kits and even medical stitch training kits online. These items require extra knowledge and certification, but they're worthwhile investments.

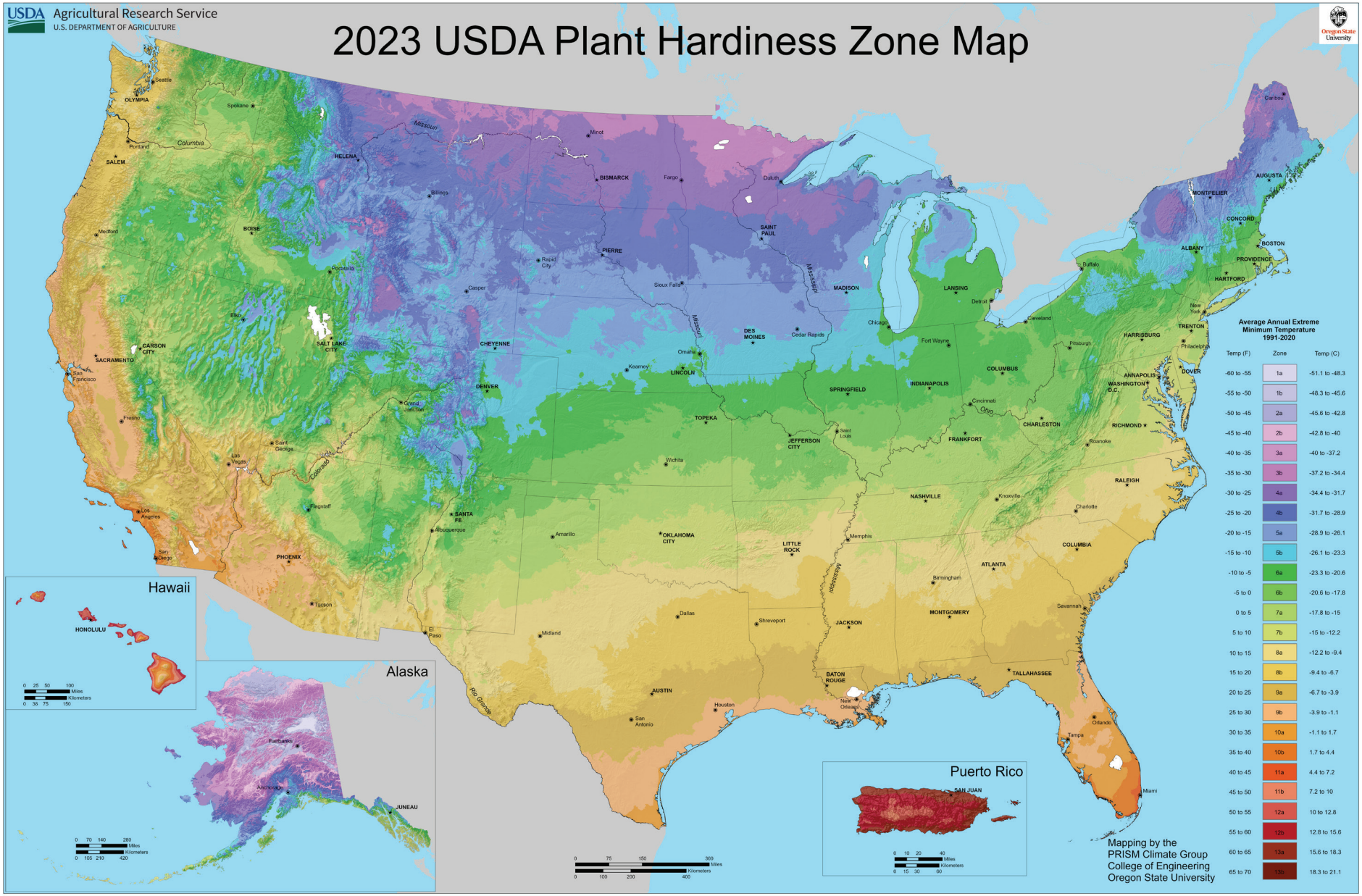
How to Grow Food

This chapter covers the basics of gardening. We're going to talk about hardiness zones, planting, and watering. You'll also find a list of common fruits and vegetables with vital information about ideal growing conditions, pollination, and pests.

Understanding Hardiness Zones



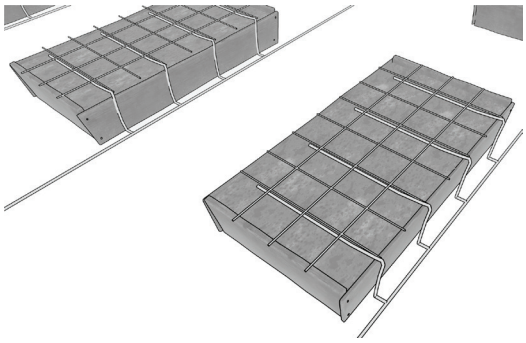
The first step is figuring out what to grow where. A hardiness zone map illustrates temperature ranges, so you have a basic idea of what plants would survive through winter. From there, you can start to gather other important information about first and last frost dates, annual and monthly precipitation, and humidity. Hardiness zones especially matter for anyone who wants to grow food during the winter. With the right equipment (like greenhouses, tunnels, row covers, outdoor blankets, etc.) it's possible. As the years go by, the hardiness zones will shift a lot. It's a good idea to start practicing and stretching your skills, growing fruits and vegetables in more extreme conditions and learning how to protect them. Start thinking about what crops you'll be growing 5-10 years from now, and what you'll need to do that.


USDA Agricultural Research Service
U.S. DEPARTMENT OF AGRICULTURE
2023 USDA Plant Hardiness Zone Map
Oregon State University
Average Annual Extreme Minimum Temperature 1991-2020
Temp (F) Zone Temp (C)
-60 to -55 1a -51.1 to -48.3
-55 to -50 1b -48.3 to -45.6
-50 to -45 2a -45.6 to -42.8
-45 to -40 2b -42.8 to -40
-40 to -35 3a -40 to -37.2
-35 to -30 3b -37.2 to -34.4
-30 to -25 4a -34.4 to -31.7
-25 to -20 4b -31.7 to -28.9
-20 to -15 5a -28.9 to -26.1
-15 to -10 5b -26.1 to -23.3
-10 to -5 6a -23.3 to -20.6
-5 to 0 6b -20.6 to -17.8
0 to 5 7a -17.8 to -15
5 to 10 7b -15 to -12.2
10 to 15 8a -12.2 to -9.4
15 to 20 8b -9.4 to -6.7
20 to 25 9a -6.7 to -3.9
25 to 30 9b -3.9 to -1.1
30 to 35 10a -1.1 to 1.7
35 to 40 10b 1.7 to 4.4
40 to 45 11a 4.4 to 7.2
45 to 50 11b 7.2 to 10
50 to 55 12a 10 to 12.8
55 to 60 12b 12.8 to 15.6
60 to 65 13a 15.6 to 18.3
65 to 70 13b 18.3 to 21.1
Hawaii
Alaska
Puerto Rico
Mapping by the
PRISM Climate Group
College of Engineering
Oregon State University

How to Prepare The Soil

Next, you'll want to study your soil. You can pick up a simple soil test kit from a number of different hardware and gardening stores. You'll learn your soil's pH levels, as well as the levels of key nutrients like nitrogen, phosphorous, and potassium. The better these levels, the healthier your plants.

Most suburban yards have poor soil. They're built on fill dirt that has very little in terms of nutrients. Years of overlandscaping and pesticides have probably made things worse. Fortunately, you can fix that buy adding soil and compost. You can have it delivered from local companies. You can probably even hire someone to move it for you. Start your own compost heap and grow your garden, and you'll eventually restore the soil.

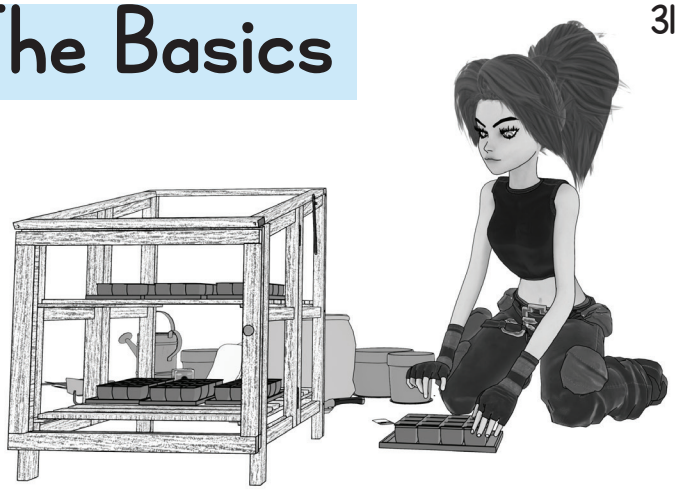


Raised bed gardening makes the most sense for urban and suburban farming. Many beds run 2x6 ft or 4x8 feet. Use square foot gardening when planning your beds. It makes everything else easier. Most plants need 1 or 2 square feet to thrive. You can plant 3-4 smaller crops in one square.

Fill the bottom with soil and dirt. Save your compost for the top six inches. Mix it with soil. You can also just scoop compost into the holes for your plants, if you don't have much. Once you've planted, you can add mulch to help conserve moisture and keep your compost from washing away.

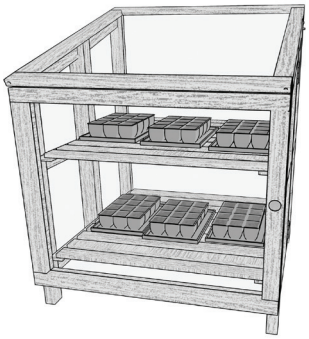
How to Plant Seeds: The Basics

Most urban and suburban gardeners will want to start seedlings indoors 4-6 weeks before the last frost. Depending on your hardiness zone, the last frost could happen anywhere from March through April. Starting early means you get the most out of your peak growing season. Keeping seedlings indoors protects them from the elements, and from critters.



You can start seedlings in several different types of containers, even egg cartons. Some kits come with pre-filled soil trays or peat pots. You plant most seeds simply by poking a hole in the soil with a finger or a chop stick, about 1/4-1/2 inch. (Wash your hands first.) Cover and pat the soil firm so the seed has good contact. Give them all a good water. One seed goes in each hole if you don't want to thin them out later. Some seeds won't germinate, so anticipate that by planting more.

Baby plants need warm temperatures, plenty of water, and plenty of sun. Keep the soil moist, but not soggy. Give them as much as 12-16 hours of light a day. It helps if you have a cold frame to maximize their exposure to the sun while keeping them warm. If you can't do that, grow lights and grow bulbs do the job.

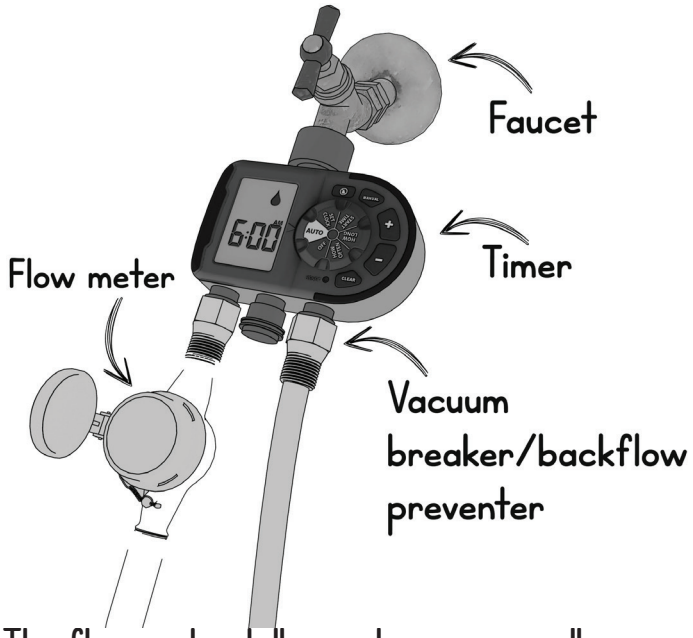


Around 4 weeks, plants are often ready to transfer outside. They should have 1-2 sets of adult leaves. Harden them off for a week. Right before transplanting, water the plant and the new soil. Hold them by root soil and leaves, not the stem.

Pat the soil down around the roots. Give them one more water.

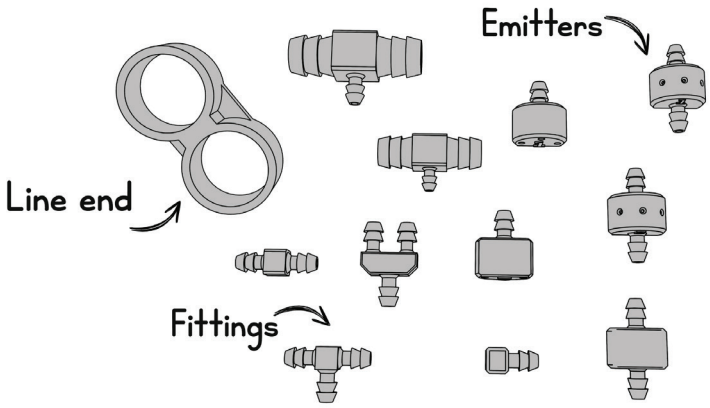
Drip Irrigation: The Basics

While your seeds take hold, you might want to rig up a drip irrigation system. They save a lot of water, and they can also make your life a lot easier. It looks complicated at first, but the parts make sense.



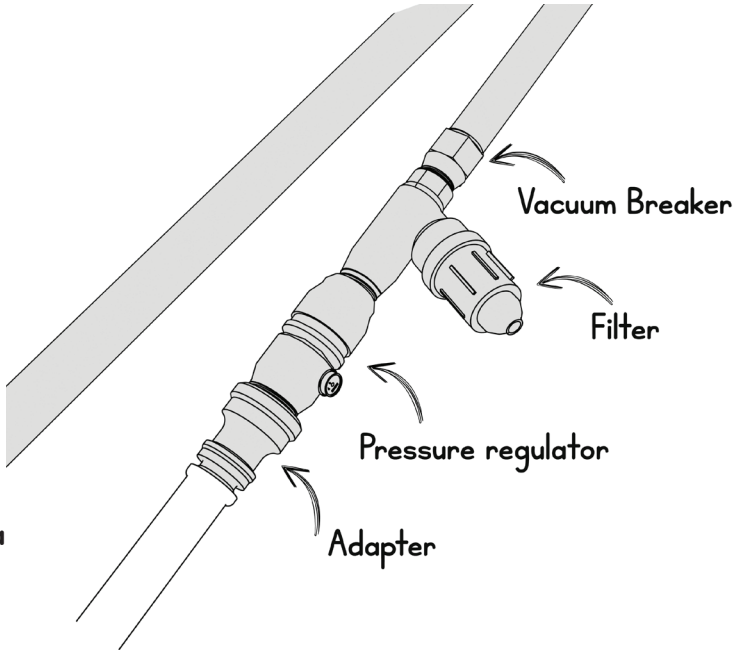
The flow meter tells you how many gallons per minute or hour are coming out of your faucet. You'll need this figure for some important calculations that help you decide on the size of your system and whether you'll need more pressure.

You'll need tubing and emitters. You'll need a vacuum breaker, also known as a backflow preventer. You'll need a filter and a pressure regulator and a flow meter. You'll also want a hose timer. Some come with up to five hose splitters, so you can set up different schedules for different beds or "zones" of your garden.



Fittings and drip emitters come in different sizes, from 1/2 GPH to 2 GPH. You'll probably want 1/2 gallon emitters. You can buy some drip irrigation tubing with emitters pre-installed.

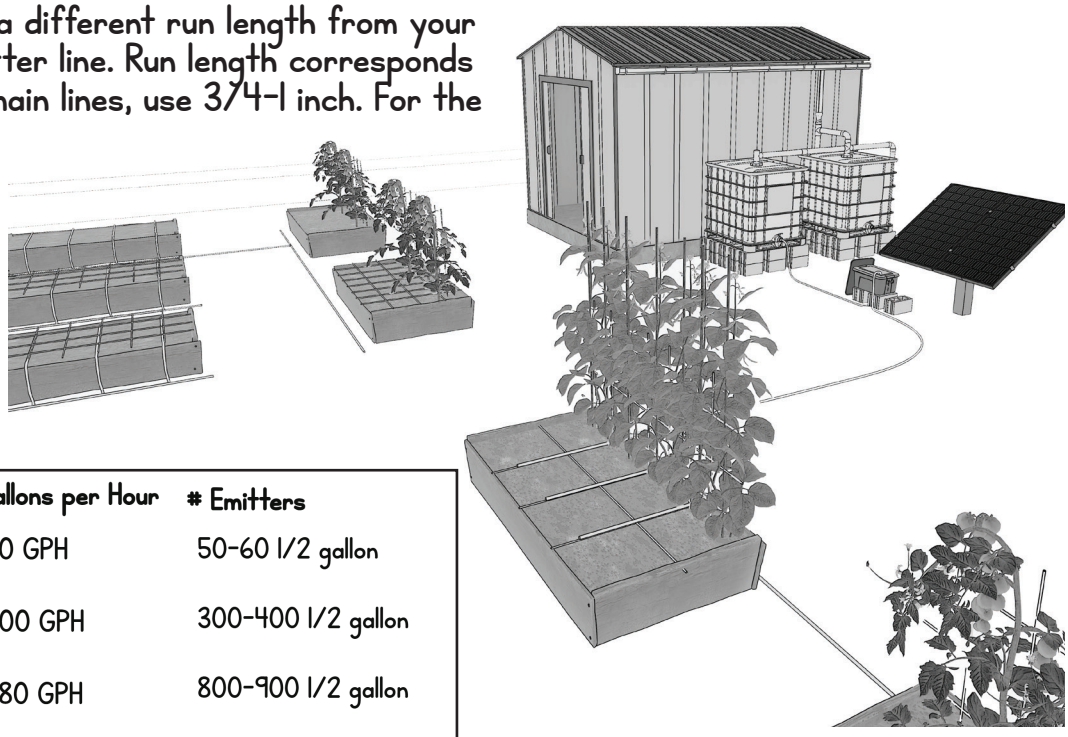
Gardeners offer different approaches to the rest of the setup. Many also strongly recommend you install a vacuum breaker closer to the junction where hose meets irrigation line. Then you'll need to install a filter and a pressure regulator. The filter keeps water going to the plants extra clean. The pressure regulator ensures 10 PSI is going to the drip lines. You don't want it any stronger. Finally, you'll need a hose to drip irrigation adapter.



Drip Irrigation: Continued

To figure out how long and how far to run your drip irrigation system, you'll need to calculate how much water you need. You can use the same basic formula we use for rain catchment. Multiply inches/centimeters of rain needed by the square footage of your crops, then multiply by .623, and that gives you gallons (liters) of water needed per week.

Drip irrigation hose comes in different diameters. Each diameter accommodates a different run length from your water source to the emitter line. Run length corresponds to gallons per hour. For main lines, use 3/4-1 inch. For the emitters, use 1/4 inch.



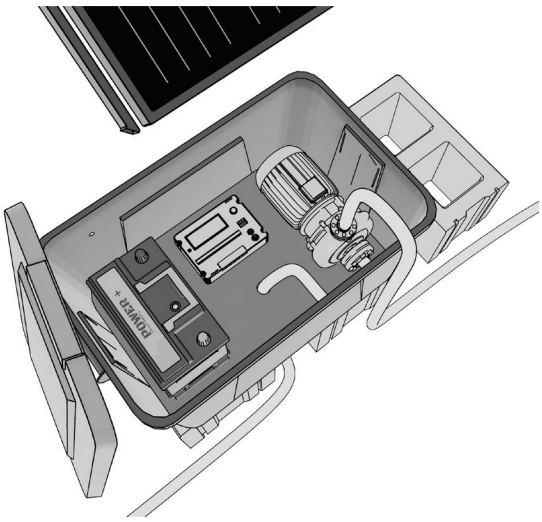
Tube Diameter	Run Length	Gallons per Hour	# Emitters
1/4 inch	30 Feet	30 GPH	50-60 1/2 gallon
1/2 inch	200 Feet	200 GPH	300-400 1/2 gallon
3/4 inch	480 Feet	480 GPH	800-900 1/2 gallon
1 inch	960 Feet	960 GPH	1,500-1,800 1/2 gallon

A standard outdoor faucet delivers about 5-6 gallons a minute at 40-50 PSI. That's about 300 gallons per hour. It can provide enough pressure for about 100 feet of hose. Drip irrigation systems significantly extend a hose's reach because they use less water pressure. The pressure regulator drops your hose from 40 PSI to 10.

Let's say you have 500 square foot of beds with plants that need 1 inch of water per week. That's about 311 gallons of water total.

If one plant takes up one square foot, and one emitter emits 1/2 gallon per hour, then the system should run a little more than 1 hour per week. Divide that by 7, and you have your daily watering schedule. Run the drip irrigation for about 9-10 minutes a day. Watch your moisture levels and plant health. Adjust as needed. Every garden is different.

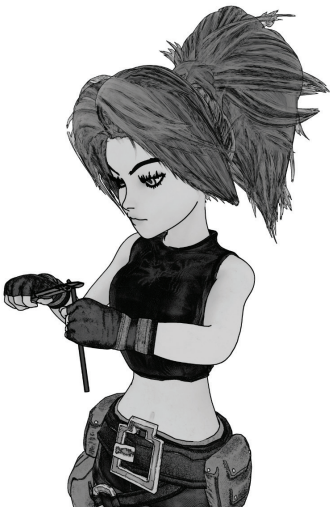
If your drip irrigation system can't get enough pressure, it's okay. You can make a booster with a simple transfer pump and a battery. You can even rig one up to run on solar energy. If that fails, you can install a manual pump. It's not ideal, but it works.



Wiring a Solar Drip Pump

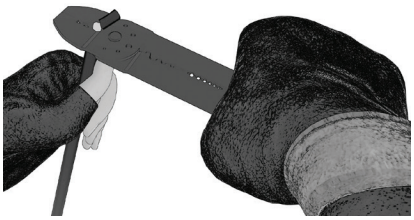
This guide devotes an entire chapter to solar power systems and wiring. For now, we're going to do a short but important rundown on wiring, so you can connect your pump to your charge controller. It boils down to a few basic steps:

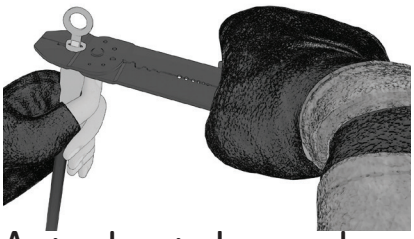
Stripping wires: Use wire strippers to remove the insulation from the end of the positive and negative wires from your pump.



Next, strip the ends of two more positive and negative wires (if you need more length).

Use the wire strippers to crimp terminal connections onto the ends of the extra wires. Make sure you get the kind that matches your battery terminals.



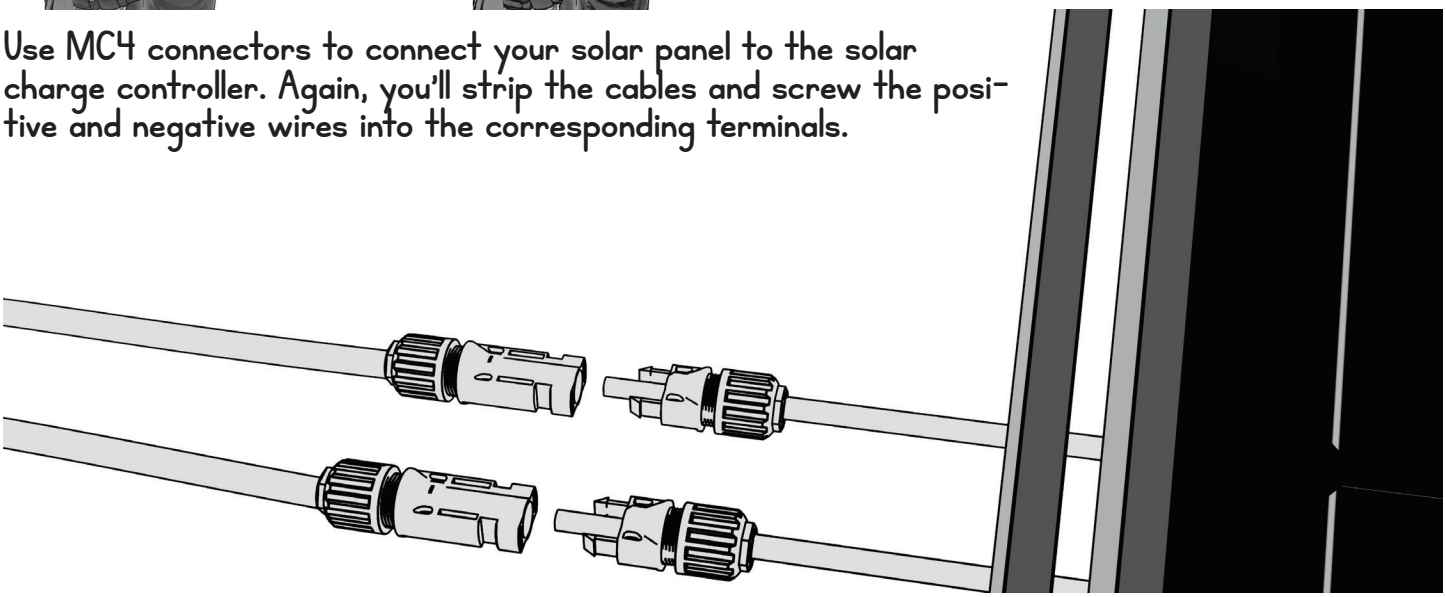


A ring terminal connector goes on battery terminals. When you're crimping, leave a little bit of wire uncovered by the insulation.

Sometimes, you'll need to splice two wires. Strip the ends. Slip them into a butt splice connector. Use a heat gun to shrink the seal.

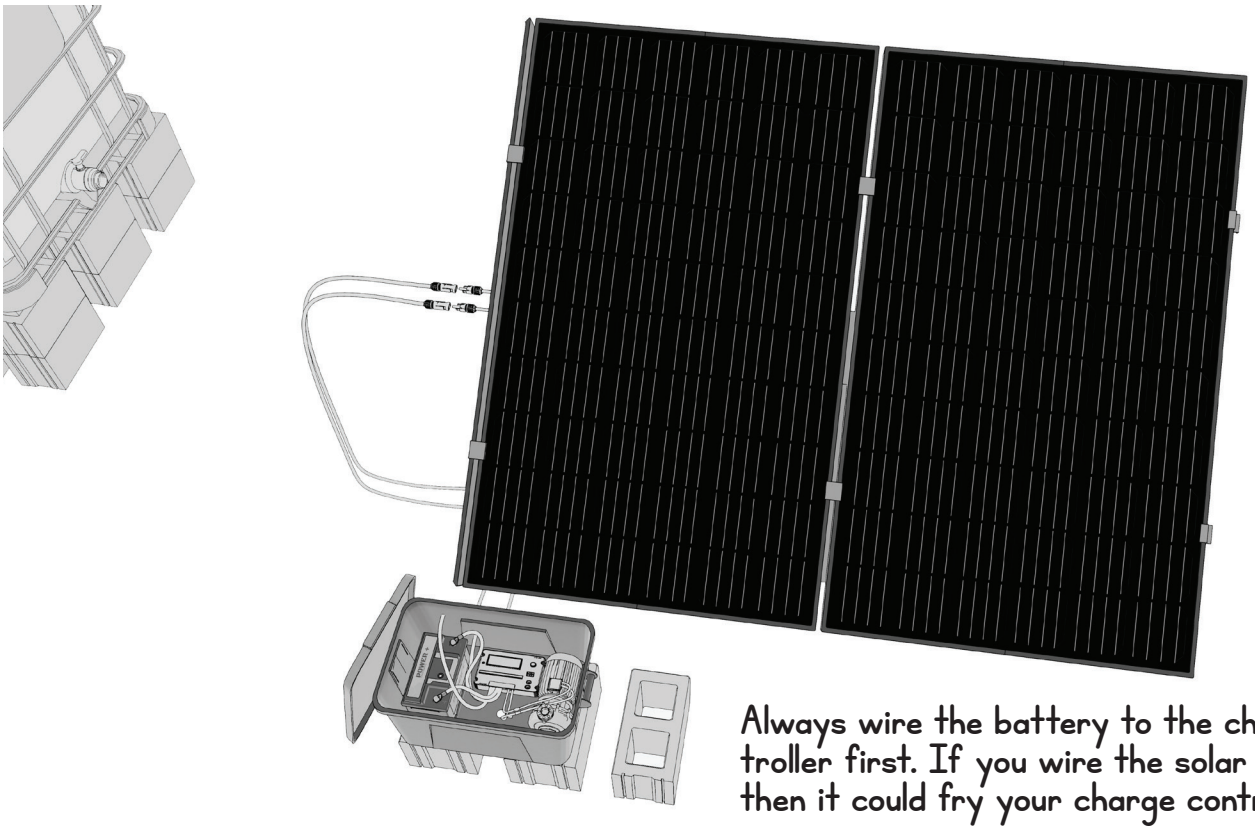
Always connect positive wires to positive terminals and negative wires to negative terminals. Otherwise, very bad things happen. They're almost always clearly marked. If they're not, don't risk it!

Use MC4 connectors to connect your solar panel to the solar charge controller. Again, you'll strip the cables and screw the positive and negative wires into the corresponding terminals.

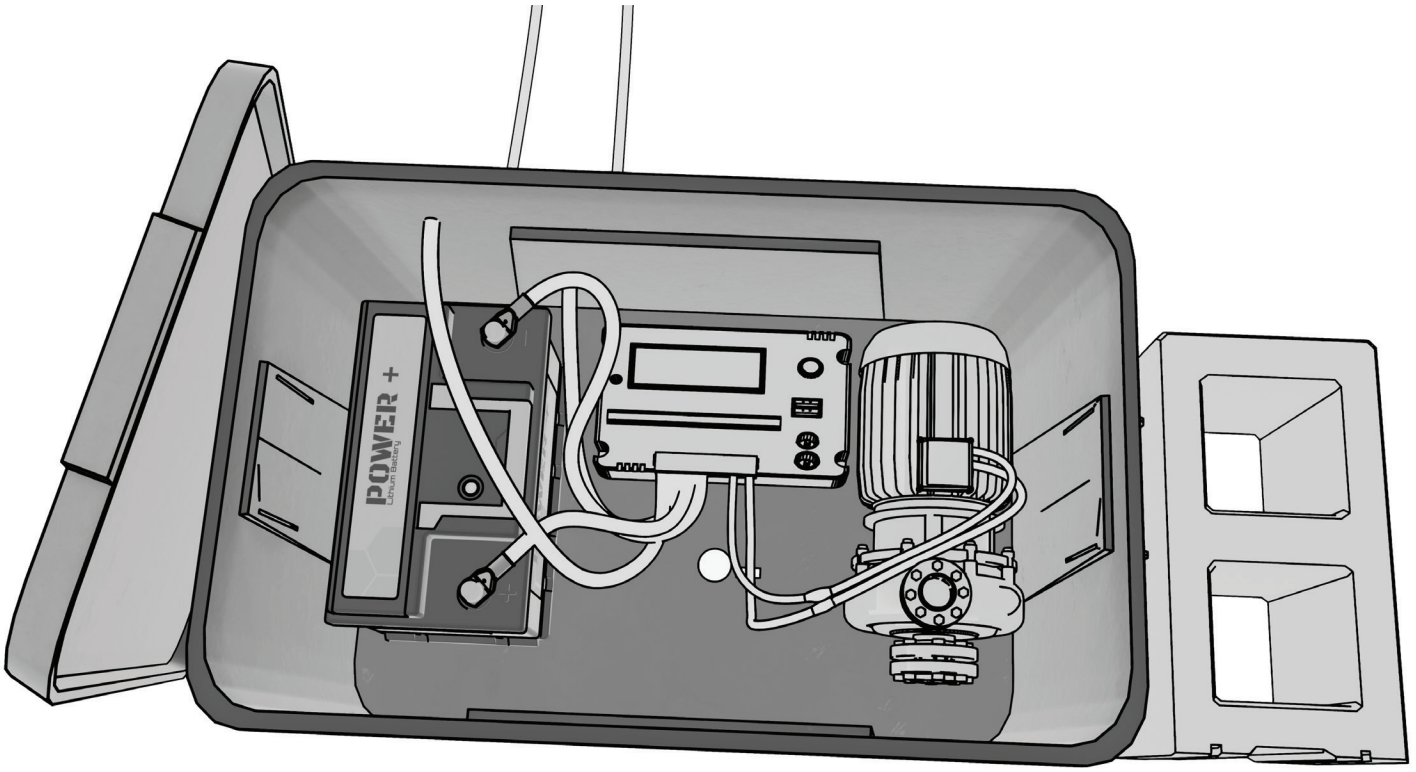


Wiring a Solar Drip Pump: Continued

Below, you see the finished setup. The solar panel sends electricity through the MC4 connectors to the charge controller. The charge controller sends electricity to your battery. It also routes electricity from the battery to any device you wire up, like a pump. The charge controller regulates everything and keeps it all from bursting into flames. We'll talk about it more later.



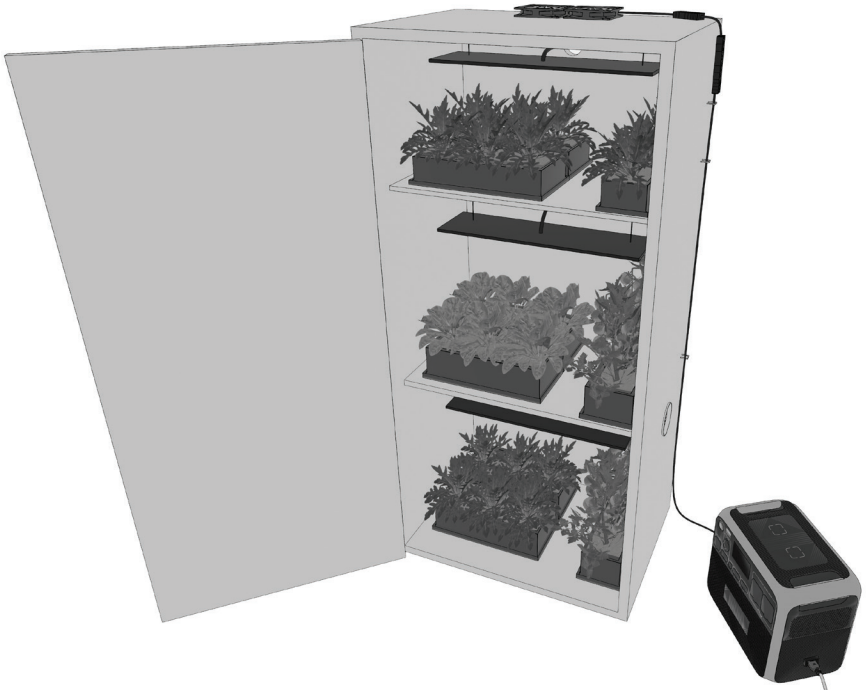
Always wire the battery to the charge controller first. If you wire the solar panel first, then it could fry your charge controller.



Growing in an Apartment

Even if you live in an apartment, you can still grow vegetables. You simply have to change strategies. You can grow herbs and microgreens in a window, on a patio, or on a balcony.

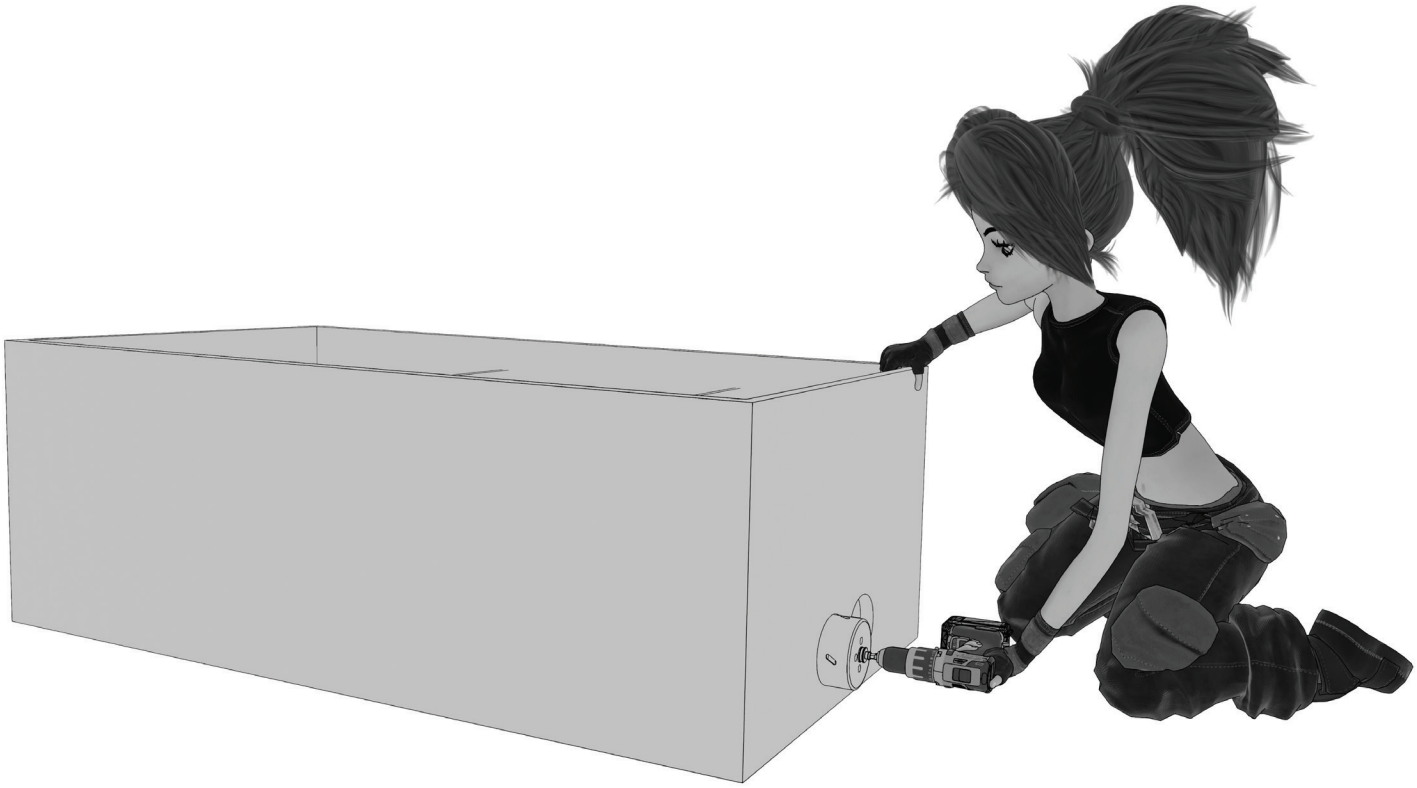
You can install window boxes. You can get railing planters, even deck planters that attach to edge beams. You can also grow plants indoors with grow lights and grow closets.



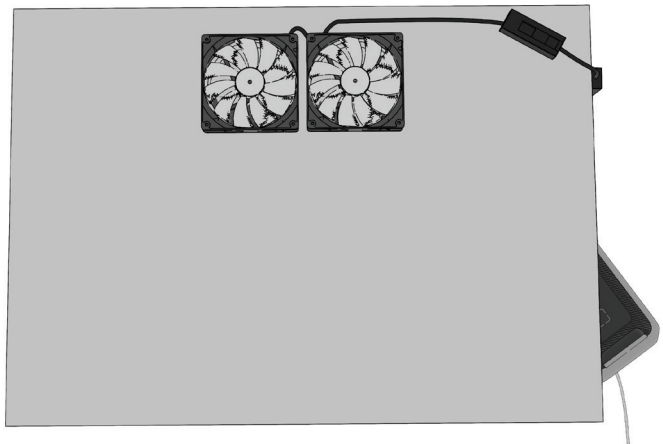
Grow closets make use of LED grow lights, usually 35 watts per square foot. They have vents at the sides and tops to facilitate airflow.

How to Make a Grow Closet

If you have limited windows and sunlight, you can still grow microgreens and herbs using grow lights. Some hardcore indoor growers use grow tents or even make grow closets to maximize control over the environment. You can make one by converting a cabinet or portable wardrobe. Use a hole saw to drill ports for the vents.



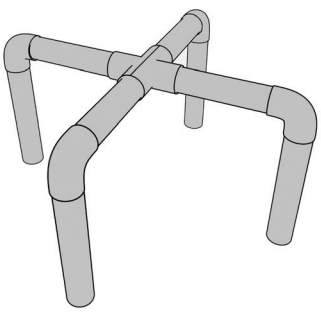
You'll also drill holes in the back to pass cables through for the grow lights. Hang the grow lights with screw hooks.



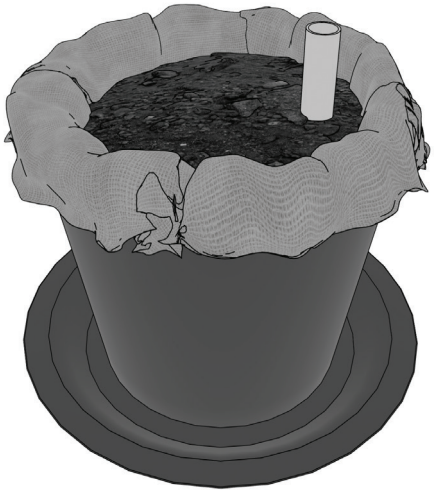
Mount PC cooling fans at the top. You can usually buy them in pairs or threes, with AC adapters for convenience.

How to Make a Self-Watering Planter

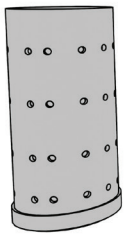
Self-watering planters can help you manage the mess of gardening and keep things neater. You pour water into a reservoir, and it travels back up through the soil via osmosis. You can make them yourself, even better than the ones sold in stores.

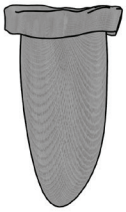


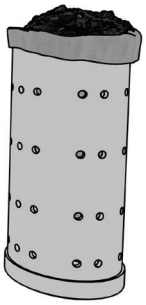
Start by making a base with PVC pipe, elbow fittings, and a cross fittings. Make it about 3 inches high.



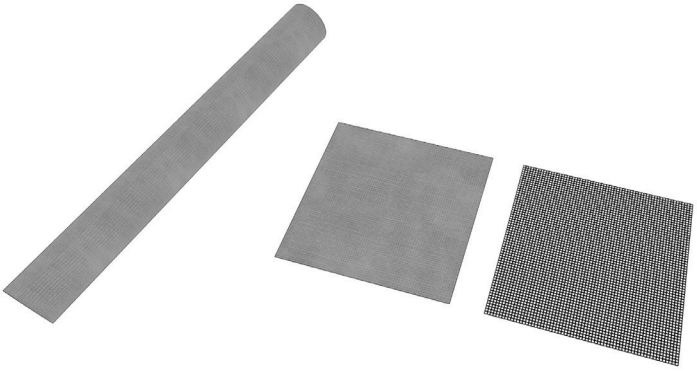
Cut a slant into a PVC pipe, tall enough so that it sticks up above your planter's rim.



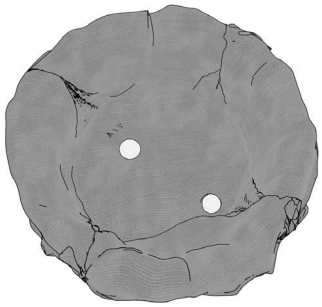


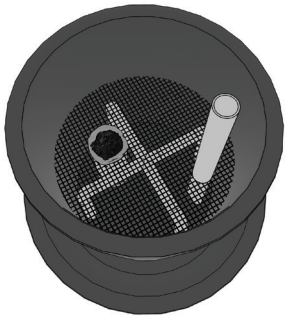


Cut about 3 inches of PVC pipe. Put a cap on the bottom. Drill holes through it. Then make a liner with burlap roll. Stuff moist soil into this chamber.

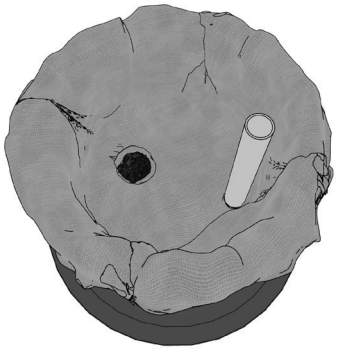


Measure and cut some hardware cloth to fit over the base. Cut two holes for the chamber and watering pipe.





Cut two holes into a sheet of burlap or any landscape fabric or netting that can hold soil.



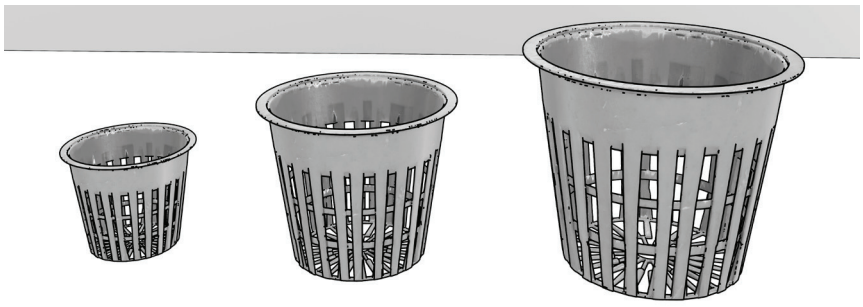
Put the burlap over the screen. Now add your soil. Water will move up from the reservoir through the dirt chamber, and your plant's roots will pull it up.

Drill an outlet hole about 3 inches high into your planter.

A Simple Hydroponics Setup

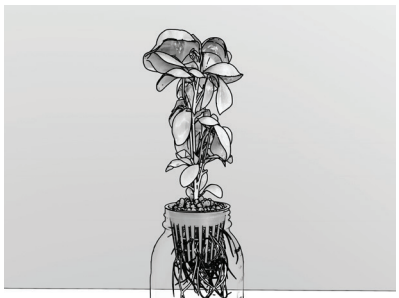
You can also ditch soil altogether indoors if you employ hydroponics. It sounds complicated, but the Kratky Method makes it possible without pumps or electricity. You simply start the plant, and then let it grow and occasionally top it off.

Start by filling some netting pots with clay pebbles called LECA (lightweight expanded clay aggregate). You can get these by the bag, and they don't cost much. They're reusable. If you want something even cheaper, you can use river pebbles and cheap plastic cups with holes drilled in them.



Net pots come in a variety of sizes, including one that fits jars.

Set the pot in a mason jar or another container. Fill it to the top with a nutrient mix. One of the most popular is called MasterBlend, which lasts indefinitely if stored in a cool dry place.



As the plant grows, the roots intake water and create a gap that allows oxygen to reach them. When you water it again, only fill it to the bottom of the net cup, to keep the gap.

You can also cover the jar with a sock or other material, to make a sleeve that blocks sunlight. This step helps prevent algae growth.

What works?

You can grow:

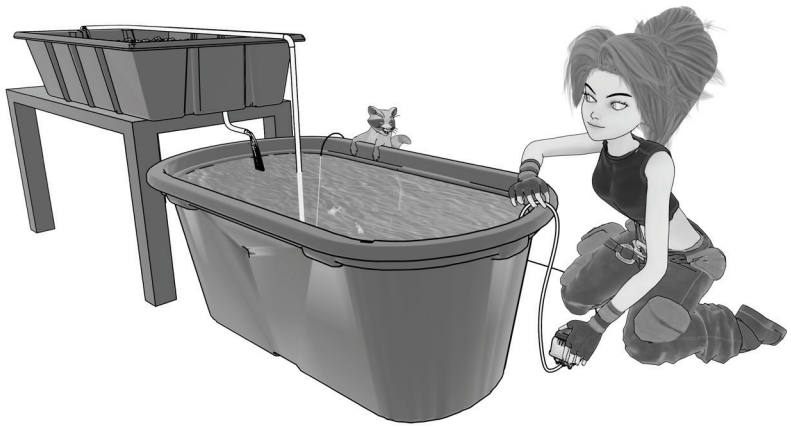
Kale
Spinach
Bok Choy
Arugula
Basil
Cilantro
Mint
Oregano
Parsley
Sage
Thyme

In buckets:

Onions
Zucchini
Eggplant
Tomatoes
Peppers
Cucumbers
Strawberries

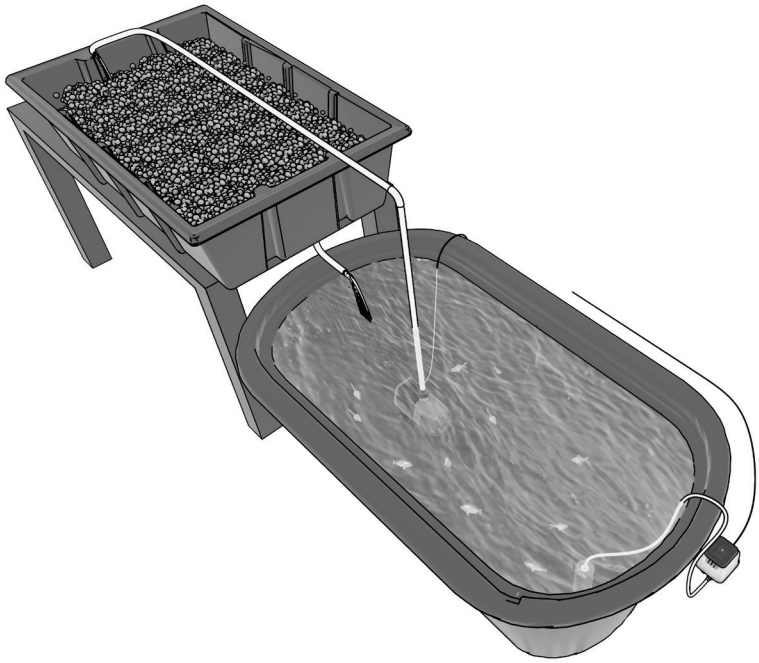
A Simple Aquaponics Setup

Many preppers and homesteaders maintain aquaponics setups to grow vegetables. They start small and go from there. Aquaponics appeals to us because the system forms a (mostly) self-contained cycle. Fish feed the plants, and then plants deliver clean water back to the fish. You can eat the fish, but you don't have to.

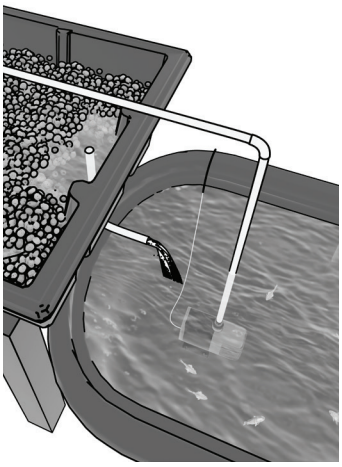


It doesn't take as much to set up an aquaponics system as many people think. To start, you just need these:

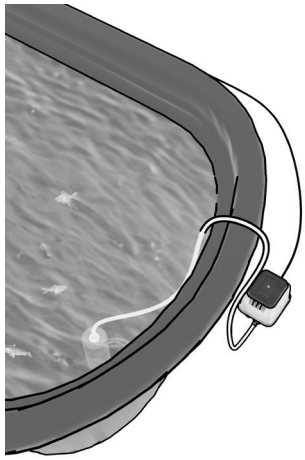
* A tank
* A grow bed
* A stand
* Water Pump
* Air Pump & Air Stone
* A Hole Saw
* PVC Pipe/Conduit



A water pump delivers water (and nutrient-rich waste) through a 1/4 or 1/2 inch PVC pipe to your grow bed. You can also use flexible irrigation hose. The grow bed fills to the level of your outlet pipe. Plant roots clean and filter the water, assisted by cultures of bacteria and other microorganisms that live on your substrate material. A timer controls the pump, shutting on and off in cycles to make sure water in the tank doesn't get too low. Like hydroponics, you can fill your bed with LECA (lightweight expanded clay aggregate). It makes an excellent substrate material for growth. Once it's setup, the tank needs a few weeks to cycle and build a basic level of bacteria before you start growing.

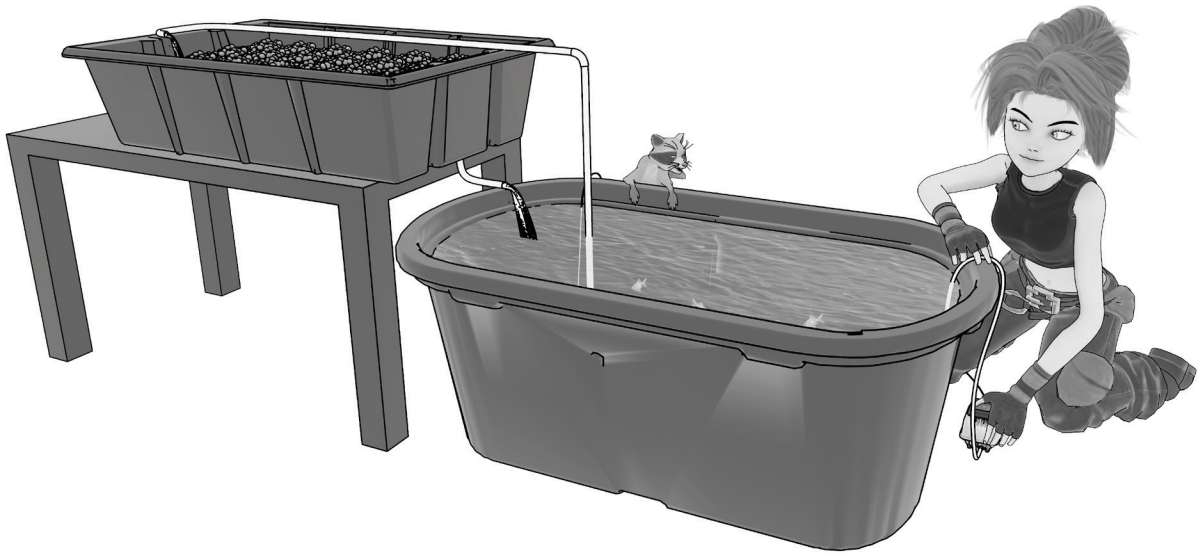


Your outlet pipe should stop about 2 inches from the surface of your substrate material. Water will rise to that level, feeding the roots of your plants, then it will drain back into your fish tank for another cycle. The pipe also needs a guard (see next page).



Your air pump will feed into at least one air stone, pushing pressurized oxygen through your water. This device keeps oxygen levels in your tank at their maximum level. That way, your fish breathe well and stay healthy. Shoot for 6 ppm (parts per million).

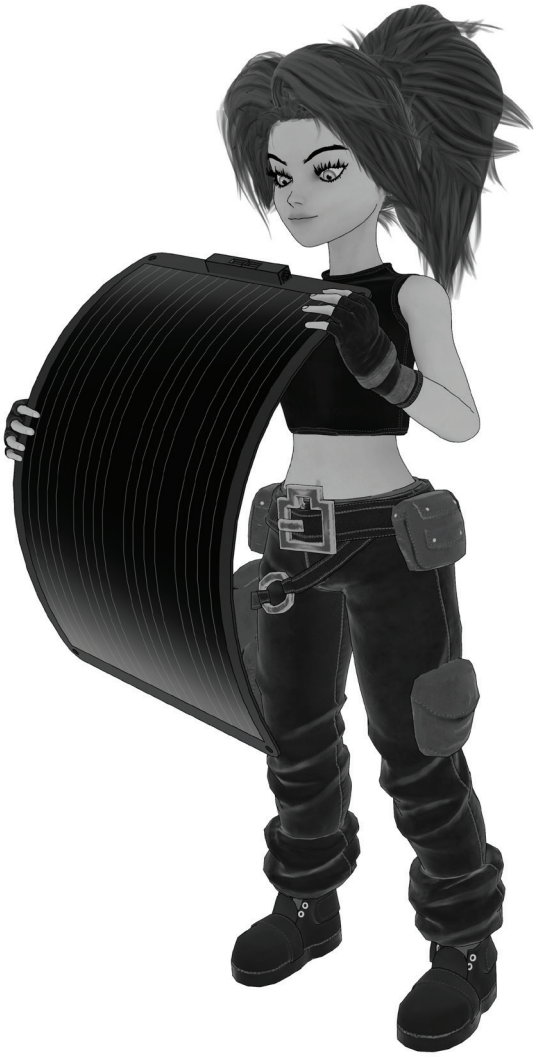
Some Aquaponics Essentials

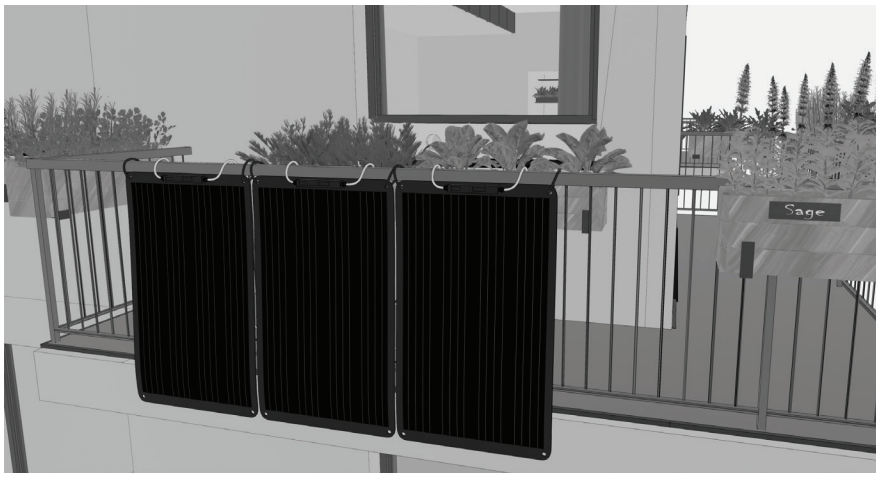


* At the beginning, follow a 1:1 ratio for your containers. Your fish tank container volume should be roughly equivalent to your grow bed. It simplifies things.
* Use sturdy, foodgrade materials. It's even okay to buy kits. Pre-made kits will save you a lot of time.
* With more experience, you can size grow beds and tanks more precisely. For every cubic foot of grow bed space, you need 7.5 gallons of fish tank. (1000 liters of tank for every cubic meter of grow bed.)
* When you're starting out, stick to these fish: Goldfish, tilapia, cod, catfish, and koi. They're the hardiest.
* Grow beds need to be at least 12 inches deep to facilitate the cycles and make for the easiest management.
* Aquaponics experts recommend a 50-gallon tank as the smallest size for beginners. It needs to be at least 18 inches deep. 100-250 gallons is fine.
* Search for "stock tanks" online. Rubbermaid makes very good ones.
* A bigger tank is better than a smaller one. Don't overcrowd your fish.
* Place your setup outdoors in the shade or indoors if possible. The water needs to stay below 100F (38C) to sustain oxygen levels. You can buy additional equipment to heat and cool your tank.
* Aquarium heaters do the best job at maintaining a warm water temperature.
* Maintain your tank pH at 6.5-7.5. Measure with digital meters and add buffering agents as needed to keep it neutral.
* The outlet pipe needs a guard to keep out roots and pebbles. It could be a simple, bigger pipe with a cap. Drill holes into it. Water will flow through the holes, but nothing big will enter.
* Keep the top 2 inches of your bed as dry as possible to control mold and algae. It also helps protect the roots.
* It's a good idea to buy a water pump with a timer to help you control the cycles. The bed needs to drain completely at intervals throughout the day in order for the roots to breathe. They need oxygen.
* Aquaponics experts recommend specialized, magnetic drive pumps made specifically for aquaponics systems. They're the most durable, and the best and delivering the nutrients to your grow bed.
* Choose a pump with a flow rate (GPH) that equals or exceeds the size of your tank. It needs to be able to cycle the entire volume in one hour or less. If you're running it for 10-15 minutes an hour, then it should pump 400 GPH. It's not hard to find affordable pumps with 1,000 GPH.

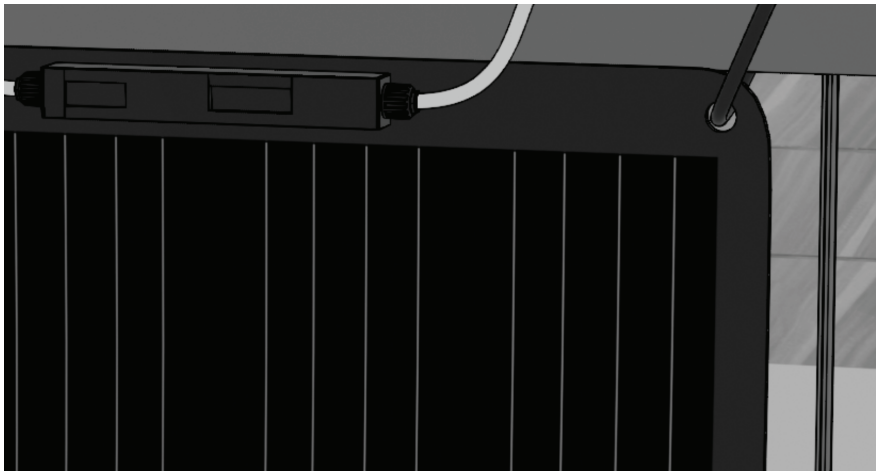
Solar Power in an Apartment?

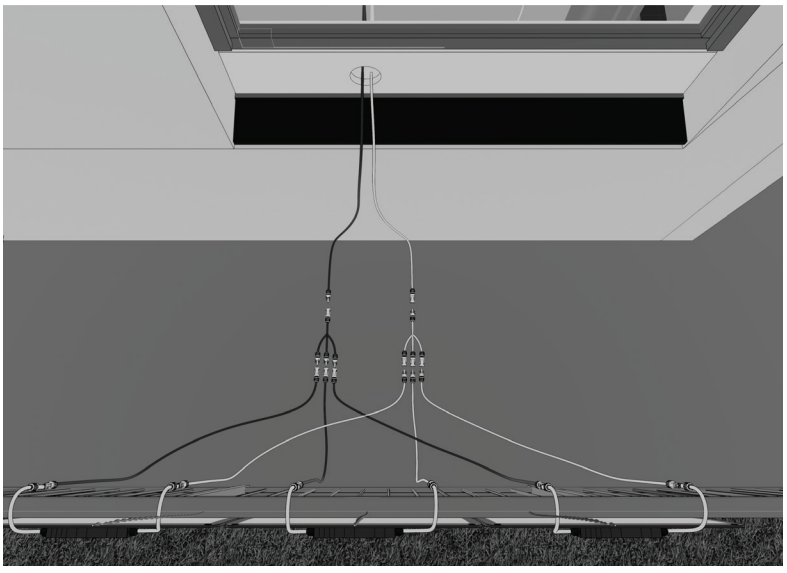
You can also harness solar power to run your indoor growing system. Companies have started making flexible solar panels that you can mount almost anywhere. Flexible solar panels can now provide anywhere from 100-300 watts per panel.





Use paracord to fasten the panels to a balcony rail or some other type of sturdy structure. Run the cord through the loop rings on the panel's edges.





Wire the panels in parallel, like it's shown in the section on solar panels. Then run them inside with a passthrough panel.

How to Manage Pests

You don't want to rely on chemicals to manage pests, because they eventually ruin your soil and also drive away helpful insects like pollinators. It's better to manage them through natural methods, especially companion planting.

Plant These To Control Different Pests

Marigolds	Aphids, Beetles, Many other Bugs, Rodents
Lavender	Mosquitoes, Moths, Fleas, Flies, Rodents
Daisies (Pyrethrum)	Mosquitoes, Flies, Mites, Many other Bugs
Chrysanthemums	Roaches, Ants, Ticks, Japanese Beetles
Nasturtiums	Aphids (Trap Crop), Beetles
Borage	Tomato Hornworms, Cabbage Worms
Catnip	Ants, Japanese Beetles, Squash Bugs, Roaches, Rodents
Lemon Grass	Mosquitoes, Other Bugs, Rodents
Daffodils	Mosquitoes, Other Bugs, Rodents

You can also plant a wide range of herbs to repel pests including basil, chives, mint, oregano, and rosemary. Chives and garlic do great against aphids. Thyme can repel deer. You can crush up daisies to make a powerful, natural insecticide. Sage, garlic, and onions also repel many pests, including rodents. Plant herbs like mint and rosemary in pots to keep them from spreading all over your garden.

Attract Helpful Predators

You can plant dill, yarrow, cosmos, and fennel to attract insects like ladybugs and laceings that eat other pests. These plants also attract birds.

Use Organic Sprays

You can make sprays from castile soap that works on aphids, mites, and other bugs with soft bodies. Sprays with capsaicin works well to kill insects and repel rodents.

How to Save Seeds

If you're after true self-reliance, then you'll need to learn how to save seeds. It's not extremely hard, but you have to follow a few basic guidelines. Annual plants produce plants at the end of the season, but biennials usually need to go dormant in winter (overwinter) and then produce seeds the following spring. Heat can often trigger plants to bolt early and "go to seed," so plant them in spring and let them grow into the summer. You won't harvest any plants you let go to seed, and you normally only have to let a few plants seed to produce enough for future seasons. Most seeds will last a few years, up to 5 or 10 if you freeze them. If you're starting out, plant heirloom seeds only. Hybrid seeds can give you bad results. If you start with heirloom seeds, then you'll continue producing heirloom seeds every season.

Some plants will cross-pollinate and ruin each other. Expert gardeners know how to prevent this, but it requires skill and patience. It's easier to just know which plants you should avoid growing during the same season. In fact, cole crops cross-pollinate so much, many experienced gardeners don't even bother trying to manage them.

Don't Plant These Together if You Want Seeds

Squash 1	Zucchini, Yellow Crookneck, Acorn Squash, Delicata, Spaghetti Squash, Pumpkin
Squash 2	Butternut Squash, Tromboncino, Long Island Cheese Pumpkin
Squash 3	Hubbard Squash, Buttercup, Kabocha, Giant Pumpkin
Cole Crops 1	Broccoli, Cabbage, Cauliflower, Kale, Brussels Sprouts, Kohlrabi, Collards
Cole Crops 2	Turnips, Bok Choy, Mizuna

General Process for Saving Seeds

* Bolt: Let the plant form flowers.
* Dry 1: Let the pods dry out until they become tan and brittle.
* Dry 2: Cut the entire plant and store it somewhere dry for another 1-2 weeks.
* Thresh: Rub or shake the pods to release the seeds.
* Winnow: Sift and separate seeds from chaff/pod husks with a screen or colander, or by hand.
* Store: Collect the seeds in a seal envelope in a metal container or something similar.
* Seeds last 2-5 years on average.

In general, collect seeds by harvesting the pods or even uprooting the entire plant if you want to make sure it dries out in a controlled environment (like a greenhouse or garage). You'll let the plant dry for 1-2 weeks, then crush the pods and sift out the seeds. Always dry seeds away from direct sunlight. For wet seed collecting from plants like squash, cucumber, and tomato, let them sit in water for a few days. It's called fermenting. It helps remove gel coating that keeps seeds from germinating. In natural settings, the gel wears off as animals eat and spread the seeds. In our case, we want to remove it as soon as possible. Afterward, scrape off the top mush and then spread them out on a plate or rack to dry. Make sure you label as you go.

Herbs: Arugula

Pollination: Self
Lifespan: Annual

When to Plant

Start early if planting outdoors, 2-3 weeks before last frost. You can also plant in mid or late fall for an early winter harvest. Start seedlings every 2-3 weeks for continuous harvest.

How to Plant

Plant seeds 1/4 inch deep, 1-2 inches apart and thin later or plant 4-6 inches apart. If you're planting outside, make 10-12 inches between rows. For square food gardening, plant 9-16 per square foot for baby arugula and less if you want it to grow bigger.

How Long It Takes

Produces food in 30-40 days (1-2 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 60-70F.
Water: 1-2 inches per week.
Soil pH: 6-7

Harvesting

Pinch or cut above leaf nodes. Harvest outer leaves first. Harvest leaves when they're young for best taste, when they're 2-3 inches long. Harvest about once a week, up to 3 times before bolting.

Yield

A single complete harvest of one plant can produce up to 2 ounces. Continuous harvest produces more over a longer period.

Nutritional Value

Vitamin K (100% DV), Vitamin A (47% DV), Vitamin C (47% DV), B9 (24% DV)
25 Calories per cup

Preserving

Wash and dry leaves, then place in a dehydrator at 95F for 4-6 hours, 12 hours max. You can also use an oven at 150-200F for 1-3 hours.

Collecting Seeds

Let the plant bolt. If you expect wet or humid weather, cut an entire stalk and let it dry indoors. Hang the stalk in a paper bag for 1-2 weeks. Thresh and winnow, then store in a cool dry container.

Good Companion Plants

Garlic, onions, beans, cucumber, beets, lettuce, spinach, celery, other herbs

Notes

Like many plants, arugula benefits from good air flow and moist soil, but moist leaves can lead to mildew and rot.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Herbs: Basil

Pollination: Self
Lifespan: Annual

When to Plant

Start seedlings 4-6 weeks before last frost if planting outside. Start seedlings every 2-3 weeks for continuous harvest.

How to Plant

Plant seeds 1/4 inch deep, 6-12 inches part. If you're planting outside, make rows 18-36 inches apart. For square food gardening, plant 1-4 per square foot.

How Long It Takes

Produces food in 30-40 days (1-2 months).

Care/Best Growing Conditions

Sun: 6-8hours full sun.
Temperature: 65-80F.
Water: 1-2 inches per week.
Soil pH: 6-7

Yield

A single complete harvest of one plant can produce up to 13 ounces. Continuous harvest produces more over a longer period.

Harvesting

Pinch or cut above leaf nodes. Harvest outer leaves first. Harvest up to a third of the plant. Pinch off flowers to maintain taste.

Nutritional Value

Vitamin A (3% DV), Vitamin K (43% DV), Calcium (4% DV), Iron (5% DV), Manganese (3% DV)
5 calories per tablespoon

Preserving

Wash and dry leaves, then place in a dehydrator at 95F for 2-4 hours, 8 hours max. You can also use an oven at 170F for 1 hour.

Collecting Seeds

Let the plant bolt. If you expect wet or humid weather, cut an entire stalk and let it dry indoors. Hang the stalk in a paper bag for 1-2 weeks. Thresh and winnow, then store in a cool dry container.

Good Companion Plants

Onions, radishes, carrots, tomatoes, peppers, oregano, marigolds, chamomile.

Notes

Basil also helps deter pests like aphids and mosquitoes. It attracts pollinators and other beneficial insects. Many herbalists consider basil highly effective at lowering blood pressure.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Herbs: Dill

Pollination: Self
Lifespan: Annual

When to Plant

Start seedlings 4-6 weeks before last frost if planting outside. Start seedlings every 2-3 weeks for continuous harvest.

How to Plant

Plant seeds 1/4 inch deep, 9-12 inches apart. If you're planting outside, make rows 12-24 inches apart. For square food gardening, plant 4-9 per square foot.

How Long It Takes

Produces food in 30-60 days (1-2 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 60-70F.
Water: 1-2 inches per week.
Soil pH: 6-7

Harvesting

Pinch or cut above leaf nodes. Harvest outer leaves first. Harvest up to a third of the plant at a time, and pinch off flowers.

Yield

A single complete harvest of several plants can produce up to 1 ounce. Continuous harvest produces more over a longer period.

Nutritional Value

Vitamin C (8% DV), Manganese (5% DV), Vitamin A (4% DV), Folate (3% DV), Iron (3% DV)
4 Calories per cup

Preserving

Wash and dry leaves, then place in a dehydrator at 95F for 2-6 hours, 12 hours max. You can also use an oven at 100-115F for 1-4 hours.

Collecting Seeds

Let the plant bolt. If you expect wet or humid weather, cut an entire stalk and let it dry indoors. Hang the stalk in a paper bag for 1-2 weeks. Thresh and winnow, then store in a cool dry container.

Good Companion Plants

Broccoli, kale, cabbage, cucumbers, lettuce, onions, asparagus, basil, marigolds, tomatoes.

Notes

Dill also helps deter pests like aphids and cabbage worms.

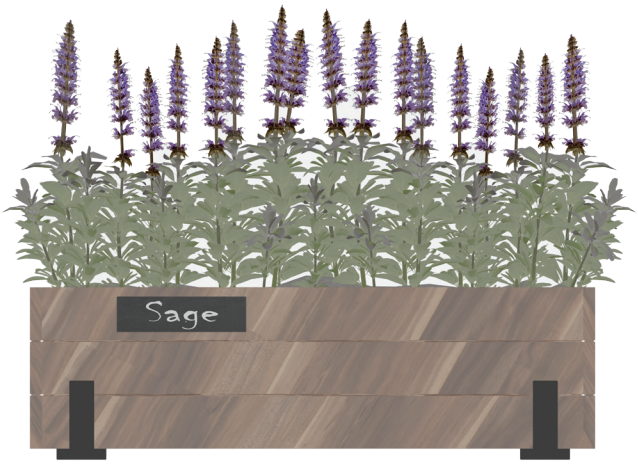
Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Herbs: Sage

Pollination: Self
Lifespan: Perennial



When to Plant

Start seedlings 4-6 weeks before last frost if planting outside. Start seedlings every 2-3 weeks for continuous harvest.

How to Plant

Plant seeds 1/4 inch deep, 12 to 36 inches apart. If you're planting outside, make rows 18 to 36 inches apart. For square foot gardening, plant 1-2 per square foot.

How Long It Takes

Produces food in 60-70 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 65-80F.
Water: 1-2 inches per week.
Soil pH: 6-7

Harvesting

Pinch or cut above leaf nodes. Harvest outer leaves first. Harvest up to a third of the plant at a time, and pinch off flowers.

Yield

A single complete harvest of one plant can produce up to 2 ounces. Continuous harvest produces more over a longer period.

Nutritional Value

Vitamin K (10% DV), Iron (1% DV), Calcium (1% DV), Magnesium (1% DV), Antioxidants
2 Calories per cup

Preserving

Wash and dry leaves, then place in a dehydrator at 95F for 2-4 hours, 8 hours max. You can also use an oven at 150-200F for 1-4 hours.

Collecting Seeds

Let the plant bolt. If you expect wet or humid weather, cut an entire stalk and let it dry indoors. Hang the stalk in a paper bag for 1-2 weeks. Thresh and winnow, then store in a cool dry container.

Good Companion Plants

Cabbage, broccoli, kale, tomatoes, lavender, rosemary, thyme, marigolds, nasturtiums, yarrow.

Notes

Like other herbs, sage helps deter a variety of pests. They attract beneficial insects like bees and butterflies.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Herbs: Rosemary

Pollination: Self
Lifespan: Perennial

When to Plant

Start seedlings 4-6 weeks before last frost if planting outside. Start seedlings every 2-3 weeks for continuous harvest.

How to Plant

Plant seeds 1/4 inch deep, 24-36 inches apart. If you're planting outside, make rows 24 to 36 inches apart. For square foot gardening, plant 1-2 per square foot.

How Long It Takes

Produces food in 6-12 months.

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 70-85F.
Water: 1-2 inches per week.
Soil pH: 6-7

Harvesting

Cut 2-8 inches of newer stems, just above leaf node. Don't harvest more than 1/3 of the plant at once.

Yield

A single complete harvest of one plant can produce up to 16 ounces or more. Continuous harvest produces more over a longer period.

Nutritional Value

Calcium, Potassium, Magnesium, Phosphorus, Iron, Vitamin A, Vitamin C, Vitamin B6, B9
11 Calories per cup

Preserving

Wash and dry leaves, then place in a dehydrator at 95-115F for 2-12 hours, 12 hours max. You can also use an oven at 170-200F for 1-2 hours.

Collecting Seeds

Let the plant bolt. If you expect wet or humid weather, cut an entire stalk and let it dry indoors. Hang the stalk in a paper bag for 1-2 weeks. Thresh and winnow, then store in a cool dry container.

Good Companion Plants

Beans, cabbage, broccoli, carrots, brussels sprouts, peppers, onions, strawberries, marigolds, zinnias, alyssum

Notes

You can make a natural pest repellent from rosemary by boiling for 30 minutes, then straining it. You can use it on plants.

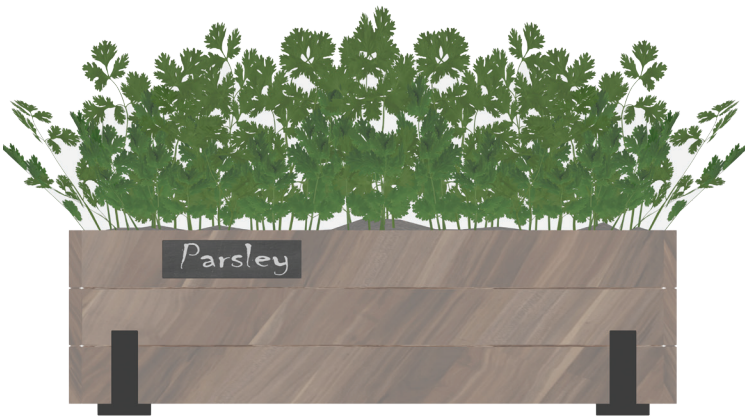
Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Herbs: Parsley

Pollination: Self
Lifespan: Biennial



When to Plant

Start seedlings 4-6 weeks before last frost if planting outside. Start seedlings every 2-3 weeks for continuous harvest.

How to Plant

Plant seeds 1/4 inch deep, 5 to 12 inches apart. If you're planting outside, make rows 12 to 18 inches apart. For square foot gardening, plant 1-4 per square foot.

How Long It Takes

Produces food in 70-90 (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 50-75F.
Water: 1-2 inches per week.
Soil pH: 6-7

Harvesting

Cut or pinch outer, lower leaves near the base. Don't harvest more than 1/3 of the plant at once.

Yield

A single complete harvest of one plant can produce up to 16 ounces. Continuous harvest produces more over a longer period.

Nutritional Value

Vitamin A (12% DV), Vitamin C (16% DV), Vitamin K (154% DV)
2 Calories per cup

Preserving

Wash and dry leaves, then place in a dehydrator at 95-100F for 2-10 hours, 10 hours max. You can also use an oven at 170F for 1 hour.

Collecting Seeds

Let the plant bolt. If you expect wet or humid weather, cut an entire stalk and let it dry indoors. Hang the stalk in a paper bag for 1-2 weeks. Thresh and winnow, then store in a cool dry container.

Good Companion Plants

Tomatoes, asparagus, marigolds, corn onions, peppers, thyme, chives, basil, oregano, lavender, mint

Notes

Like other herbs, parsley repels a variety of pests, especially asparagus beetles and aphids. It can also attract ladybugs and parasitic wasps, as well as other predators. Like basil, parsley can also help lower blood pressure.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Dry Beans

Pollination: Self
Lifespan: Perennial

When to Plant

Start seedlings 2-4 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 3-4 square inches. Thin after sprouting.
Between plants: 3-4 inches.
Between rows/trellises: 18-24 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 90-120 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 70-85F.
Water: 1-2 inches per week.
Soil pH: 6-7
Common pests: Aphids, spider mites, bean beetles, leafhoppers, stink bugs, thrips, weevils.

Harvesting

Wait for leaves to drop. Pick the pods and let them dry further on a tray or rack. You can also pull the entire plant and hang it somewhere dry with good air flow. Shell them into a container. Drying takes 2-3 weeks.

Storing

After harvesting, dry beans for an extra week. Test humidity. It should be 10-12 percent. If you hit them with a hammer, the beans should crack, not crush. Store in a cool, dry place.

Collecting Seeds

Let bean pods dry until they're brittle. If you expect wet or humid weather, cut an entire stalk and let it dry indoors. Harvest the pods and shell them, then let them dry an additional 1-2 weeks. Store them in envelops or glass/ metal containers with silica gel packs. Beans last 3-5 years.

Notes

It's best to plant beans directly in the ground after last frost. Plant 3-4 seeds at the base of trellises 24-36 inches apart. Good for soil. Add nitrogen to the ground.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Beets

Pollination: Wind
Lifespan: Perennial

When to Plant

Start seedlings 5-6 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 4-6 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 3-4 square inches. Thin after sprouting.
Between plants: 3-4 inches.
Between rows: 12-18 inches.
By square foot: 5-9 per square foot.

How Long It Takes

Produces food in 50-70 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 50-75F.
Water: 1-1 1/2 inches per week.
Soil pH: 6.5-7
Common pests: Aphids, spider mites, bean beetles, leafhoppers, stink bugs, thrips, weevils.

Harvesting

Harvest beets when they're 1-2 inches in diameter and barely visible. Gently pull by hand or use a garden fork. Trim leaves back to 1-2 inches, then wash before eating.

Storing

Don't wash. Remove the leaves and store in a cool, humid place in damp sand, sawdust, or peat moss for 3-5 months. You can also boil, peel, and slice them for freezing to last 10-12 months.

Collecting Seeds

Let a plant bolt during the second year. Let the stalks turn brown and brittle. Collect seeds in the late summer by cutting stalks and hanging them to dry 1-2 weeks. Strip seed clusters into a bag. Winnow, then store in a cool, dry place.

Notes

Beets do well in cold weather and can tolerate frost. If you star them in fall, you can grow them into winter, especially with cold tunnels and cloths. Avoid fertilizers heavy in nitrogen.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Broccoli

Pollination: Insects
Lifespan: Biennial

When to Plant

Start seedlings 4-6 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 17 square inches. Thin after sprouting.
Between plants: 12-20 inches.
Between rows: 12-20 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 60-100 days (2-3 months).

Care/Best Growing Conditions

Sun: 4-6 hours full sun.
Temperature: 60-70F. Can tolerate brief freezes if covered.
Water: 1-2 inches per week.
Soil pH: 6-6.5
Common pests: Caterpillars, aphids, flea beetles, slugs, snails, harlequin bugs, cabbage maggots, whiteflies

Harvesting

Cut stem 6-8 inches below the head. Cut at a slant to help prevent rot and encourage extra shoots. For best results, harvest before noon.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. It will then form seed pods. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the pods and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Broccoli does well in cold weather. It can tolerate frost and even freezes down to the mid 20s F. Heavy feeder. Needs plenty of fertilizer/ compost. Fertilize again after 4 weeks.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Brussels Sprouts

Pollination: Self
Lifespan: Biennial

When to Plant

Start seedlings 4-8 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 17 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 24-36 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 80-100 days (3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 50-65F
Water: 1-1.5 inches per week.
Soil pH: 6-7.5
Common pests: Cabbage aphids, cabbage worms, flea beetles, harlequin bugs, cutworms, aphids, whiteflies, moth larvae, loopers.

Harvesting

Cut stem 5-6 inches below the head, at an angle. Plants will produce second, smaller heads. After the season, pull their roots up and compost them.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. It will then form seed pods. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the pods and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Brussels sprouts do well in cold weather. They can tolerate frost and even freezes down to the 20s. Heavy feeder. Side-dress after transplanting and once per month until harvest. Stake tall plants. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Cabbage

Pollination: Insects/Wind
Lifespan: Biennial

When to Plant

Start seedlings 6-8 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 4-6 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 18-24 square inches. Thin after sprouting.
Between plants: 12-24 inches.
Between rows: 18-30 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 60-100 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 60-65F. Can tolerate brief freezes if covered.
Water: 1 inch per week.
Soil pH: 6-6.8
Common pests: Cabbage aphids, cabbage worms, flea beetles, harlequin bugs, cutworms, aphids, whiteflies, moth larvae, loopers.

Harvesting

Cut stem right below the head. Leave a few outer leaves to encourage secondary heads.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: shred and blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. It will then form seed pods. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the pods and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Cabbage does well in cold weather. It can tolerate frost and even freezes into the low 20s. Heavy feeder. Benefits from regular side-dressing. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Carrots

Pollination: Insects
Lifespan: Biennial

When to Plant

Start seedlings 4-6 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days. Be careful with root.
Outdoors: Plant right after last frost. Dense seeds per 12 square inches. Thin after sprouting.
Between plants: 2-3 inches.
Between rows: 12-18 inches.
By square foot: 16 per square foot.

How Long It Takes

Produces food in 50-80 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 60-75F
Water: 1 inch per week.
Soil pH: 6-6.8
Common pests: Carrot rust flies, aphids, wireworms, nematodes, cutworms, carrot weevils, celery worms, flea beetles, whiteflies

Harvesting

Loosen the soil with a garden fork, then pull them up by the greens. Cut the greens off before cooking or storing.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture.
Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the flower heads and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Carrots do well in cold weather. They can tolerate frost and even freezes into the high teens. Not a heavy feeder. Benefits from regular side-dressing. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Cauliflower

Pollination: Self/Insects
Lifespan: Biennial

When to Plant

Start seedlings 4-7 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 18-24 square inches. Thin after sprouting.
Between plants: 18-24 inches.
Between rows: 24-36 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 60-80 days (2-3 months).

Care/Best Growing Conditions

Sun: 12 hours as seedlings, then 6-8 hours full sun.
Temperature: 60-65F
Water: 1-2 inches per week.
Soil pH: 6-7
Common pests: Cabbage maggots, slugs, snails, aphids, flea beetles, cabbage worms, loopers

Harvesting

Cut stem right below the head. Leave a few outer leaves to encourage secondary heads.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. It will then form seed pods. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the pods and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Does well in cold weather. It can tolerate frost and freezes into the mid 20s. Heavy feeder. Tie outer leaves over head when plant reaches 2-3 inches tall. Keeps them tender.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Collard Greens

Pollination: Insects
Lifespan: Biennial

When to Plant

Start seedlings 4-6 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 18 square inches. Thin after sprouting.
Between plants: 18-24 inches.
Between rows: 24-36 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 40-50 days (1-2 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 60-70F
Water: 1-1.5 inches per week.
Soil pH: 6-6.8
Common pests: Caterpillars, aphids, flea beetles, harlequin bugs, cutworms, thrips, whiteflies

Harvesting

Cut large, outer leaves near the base. Cut at a slant to prevent rot, etc.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. It will then form seed pods. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the pods and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Does well in cold weather. It can tolerate frost and freezes into the single digits. Heavy feeder. Tie outer leaves over head when plant reaches 2-3 inches tall. Keeps them tender.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Corn

Pollination: Wind
Lifespan: Annual

When to Plant

Start seedlings 2-4 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 2-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 8-12 square inches. Thin after sprouting.
Between plants: 12 inches.
Between rows: 36 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 60-100 days (2-3 months).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 77-90F
Water: 1-2 inches per week
Soil pH: 6-6.8
Common pests: corn rootworm, armyworms, cutworms, chinch bugs, corn leaf aphids, corn borers.

Harvesting

Twist the ear and pull it down to snap off.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year. For dry storage, dry for 1-2 months on the cob, shell it off the cob, and store in airtight containers for a year or more. Flour (dent) corn can last 10-20 years.

Collecting Seeds

Wait until kernels are hard. Harvest the stalk and hang upside down, indoors for another 1-2 weeks to fully dry. Do this sooner if you're expecting wet or humid weather. Shell the kernels and dry another 1-2 weeks.

Notes

Corn does okay in cold weather and can tolerate light frosts, but not extended freezes. Heavy feeder. Benefits from regular side-dressing. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Cucumber

Pollination: Insects
Lifespan: Annual

When to Plant

Start seedlings 3-4 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-36 inches.
Between rows/trellises: 24-48 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 50-70 days (2 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 75-85F
Water: 1-2 inches per week.
Soil pH: 6-6.5
Common pests: Cucumber beetles, aphids, spider mites, whiteflies, leafminers, squash bugs, caterpillars

Harvesting

Cut the stem about 1 inch above the cap.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a cucumber overripen until it's large and soft. Slice it open and scoop out the seeds. Ferment them 2-3 days, then rinse and dry for a week before storing.

Notes

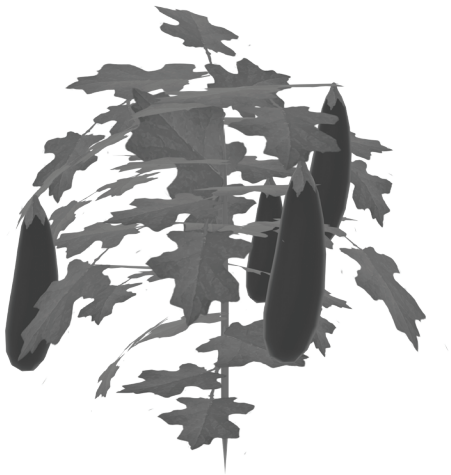
Cucumber doesn't tolerate frost. Heavy feeder. Benefits from regular side-dressing. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Eggplant



Pollination: Insects/Wind
Lifespan: Perennial

When to Plant

Start seedlings 8-10 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 18 square inches. Thin after sprouting.
Between plants: 18-36 inches.
Between rows: 36-48 inches.
By square foot: 1 per 2 square feet.

How Long It Takes

Produces food in 70-120 days (3-4 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 70-90F. Can tolerate warmer weather.
Water: 1-2 inches per week.
Soil pH: 5.8-6.5
Common pests: Aphids, flea beetles, spider mites, hornworms, stink bugs, armyworms, slugs, snails

Harvesting

Cut stem about 1 inch above the cap.

Storing (Don't Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let an eggplant overripen until it's large and soft. Slice it open and scoop out the seeds. Ferment them 2-3 days, then rinse and dry for a week before storing.

Notes

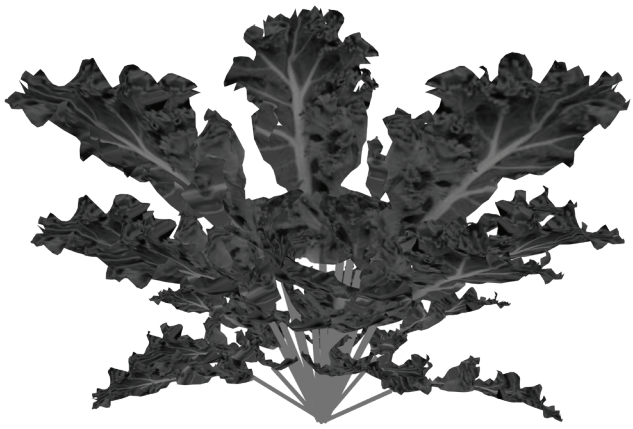
Eggplant doesn't usually survive temperatures below 40F. Heavy feeder. Side-dress after transplanting and once per month until harvest. Stake tall plants. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Kale



Pollination: Insects
Lifespan: Biennial

When to Plant

Start seedlings 4-6 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 18-30 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 55-75 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 50-75F. Can tolerate temporary freezes if covered.
Water: 1-1.5 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Cut large, outer leaves near the base. Cut at a slant to prevent rot, etc.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. It will then form seed pods. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the pods and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Kale does well in cold weather. It can survive frost and freezes down to the low 20s, even lower. Heavy feeder. Side-dress after transplanting and once per month until harvest. Stake tall plants. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Onion

Pollination: Insects
Lifespan: Biennial

When to Plant

Start seedlings 2-4 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 3/4 - 1 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 5-9 seeds per 12 square inches. Thin after sprouting.
Between plants: 3-4 inches.
Between rows: 12-15 inches.
By square foot: 5-9 per square foot.

How Long It Takes

Produces food in 90-120 days (3-4 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 55-75F. Can tolerate temporary freezes if covered.
Water: 1-1.5 inches per week.
Soil pH: 6-6.8
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest onions when about half the top stems start to turn/flop over. Lift the bulbs out with a garden fork when it's dry.

Storing (Don't Refrigerate)

Don't wash. Store in a perforated bag in cool, dry place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Also store away from potatoes. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the flower heads and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Onions handle cold better than most plants. You can even start them earlier and transplant before the last frost date, as long as the soil is workable and temperatures stay around 50F.

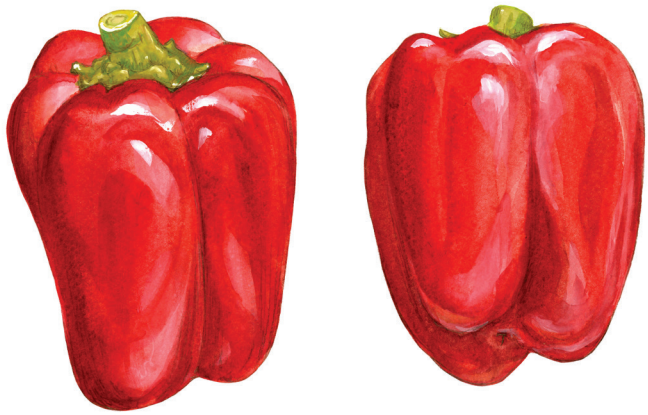
Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Peppers (Bell)

Pollination: Self
Lifespan: Perennial



When to Plant

Start seedlings 8-10 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/4-1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 8-10 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 18-24 inches.
Between rows: 30-36 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 60-90 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 65-80F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Pinch or cut them in the morning or cut them with shears, leaving a small bit of stem. Start harvesting them as soon as they reach 3-4 inches. Earlier harvesting boosts production.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Pick fully ripe peppers. Cut them open and scoop out the seeds. Dry them for 4-7 days before storing.

Notes

Bell peppers don't do very well in cold and stop growing when temperatures hit 55F and below. Even a light frost can kill them.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Peppers (Chili)

Pollination: Self
Lifespan: Perennial

When to Plant

Start seedlings 8-10 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 8-10 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 18-30 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 70-120 days (3-4 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 70-80F. Can tolerate temporary freezes if covered.
Water: 1-1.5 inches per week.
Soil pH: 6-6.8
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

You can harvest them when they're 2-3 inches in length, even when green. Let them turn red for full flavor, and harvest 3-5 days after the color turn. Twist or cut 1-2 inches above the cap. Cutting is better (less damage).

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Pick fully ripe peppers. Cut them open and scoop out the seeds. Dry them for 1-2 weeks before storing.

Notes

Chili peppers are perennial, but they don't do well in cold and frost can kill them. Heavy feeder. Side-dress after transplanting and once per month until harvest. Stake tall plants. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Spinach

Pollination: Wind
Lifespan: Annual

When to Plant

Start seedlings 4-6 weeks before last frost. Plant successions through early summer for continual harvest. You can also plant in early fall for harvest in winter.

How to Plant

Plant seeds 1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 4-6 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 2-4 inches.
Between rows: 12-18 inches.
By square foot: 6-9 per square foot.

How Long It Takes

Produces food in 40-50 days (2 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 50-60F. Can tolerate temporary freezes if covered.
Water: 1-1.5 inches per week.
Soil pH: 6.5-7
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest leaves when they're 3-4 inches long. Pinch or cut outer leaves first, 2-3 inches above the soil line. The inner leaves will keep growing.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Let a plant bolt and produce flowers. Let them turn brittle. If you expect wet or humid weather, cut the stalks and dry them indoors for 1-2 weeks. Crush the flower heads and sift out the seeds. Dry the seeds 2-3 more days, then store them in envelopes or glass/metal containers with silica gel packs. Seeds last 3-5 years.

Notes

Spinach does fine in colder temperatures, even as low as 15-20F. It's a heavy feeder. Side-dress after transplanting and once per month until last harvest. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Squash (Yellow)

Pollination: Insects
Lifespan: Annual

When to Plant

Start seedlings 3-4 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/2- 1 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 24 square inches. Thin after sprouting.
Between plants: 24-36 inches.
Between rows: 48-56 inches.
By square foot: 1 per 2-3 square foot.

How Long It Takes

Produces food in 40-60 days (2-3 months).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-1.5 inches per week.
Soil pH: 6-6.8
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Start harvesting squash when they're 4-8 inches long to encourage more production. Pinch or cut above the cap, leaving a bit of stem.

Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Pick a fully ripe squash. Cut it open and scoop out the seeds. Dry them for 3-4 days. You can also ferment them first. Make sure they're completely dry before storing.

Notes

Heavy feeder. Side-dress after transplanting and once per month until harvest. Stake or trellis vining varieties. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Tomatoes

Pollination: Self
Lifespan: Perennial/Annual

When to Plant

Start seedlings 6-8 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/4-1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 24-36 inches.
Between rows: 36-48 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 60-90 days (2-3 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun.
Temperature: 70-80F.
Water: 1-1.5 inches per week.
Soil pH: 6-6.8
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Gently twist tomatoes until they come off the vine, or cut using sheers. Leave a few leaves on to maximize shelf life. You can pick them a little early and let them finish ripening indoors, at room temperature, not in direct sunlight.

Storing (Don't Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Pick a fully ripe tomato. Cut it open and scoop out the seeds. Ferment them 2-4 days, then dry them for 2-3 more days before storing.

Notes

Tomatoes are technically perennials, but they don't survive frost. When fertilizing, avoid adding too much nitrogen. It can reduce the amount of fruit produced.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Zucchini

Pollination: Insects
Lifespan: Biennial

When to Plant

Start seedlings 3-4 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/2-1 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/ small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 18-36 inches.
Between rows: 36-48 inches.
By square foot: 1 per 1-2 square foot.

How Long It Takes

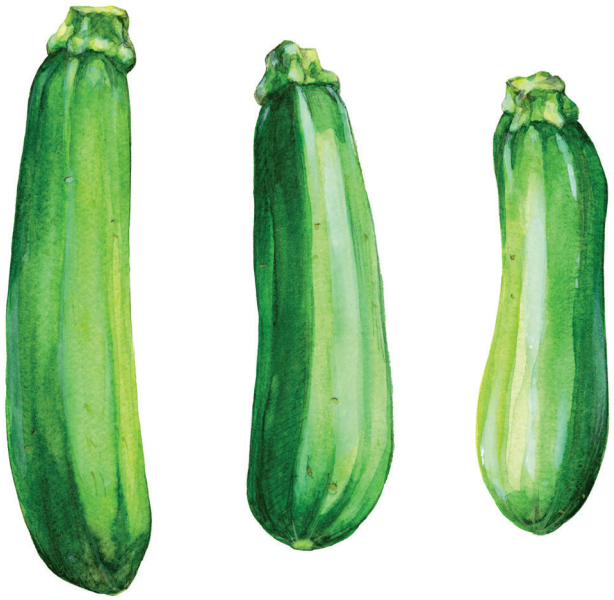
Produces food in 45-55 days (2 months).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest zucchini when they're at least 4 inches long, or 6-8 inches for full adult sizes. Twist or cut 1-2 inches above the fruit. (Cutting is best to avoid damage.)



Storing (Refrigerate)

Don't wash. Store in a perforated bag in cool, humid place away from fruits or veggies that produce ethylene gas (apples, avocados, tomatoes). Add a paper towel to absorb moisture. Long term: blanch for 3 minutes, dry, and freeze for up to a year.

Collecting Seeds

Pick a fully ripe or overripe zucchini. Cut it open and scoop out the seeds. Dry them for 3-4 days. You can also ferment them first. Make sure they're completely dry before storing.

Notes

Zucchini doesn't deal well with cold temperatures and will halt growth below 50F. Heavy feeder. Side-dress after transplanting and once per month until harvest. Stake tall plants. Likes mulch.

Conversions

1/8 inch = 3.175mm
1/4 inch = 6.35mm
1/2 inch = 12.7mm
1 inch = 2.54cm
1 foot = .3m
0 Degrees F = -17.8C
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1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

How to Forage

This chapter explains the basics of foraging. You'll learn some basic strategies as well as the best plants and weeds to harvest. You can take this knowledge wherever you go. You can also use it to cultivate a food forest in your yard or nearby areas, growing edible plants on the sly.

Can you really eat weeds?

Yes, you really can eat several types of weeds. You can forage for them, or you can grow them in your back yard. You can plant them according to square foot gardening methods like any other plant, or you can just scatter them in your yard and make a weed paradise. You can also scatter them in nearby woods or other areas to harvest in a truly worst-case scenario. Caution, they'll absorb whatever pollutants they grow around. There's some value in scattering edible weeds across your lawn. It won't look like food to the average passerby. Depending on your situation, that might be useful to you and your group. Tip: Your HOA neighbors might not like you scattering weeds that grow aggressively, so take that into consideration.

Basic Principles of Foraging

* Forage lightly. Don't take more than you need. Leave some to regrow.

* Forage with caution. Stay away from weeds growing near areas with a lot of traffic or industrial waste. Also be careful around areas treated with pesticide or weed killer. In an emergency, consume at your own risk.

* Cultivate with care. You can grow many of these weeds just like you'd grow a normal plant. You can start them indoors as seedlings in late winter (late January or early February) and transfer them outside. Many of them are resilient and self-seeding. Once you start them, you probably won't have to repeat this process. You can plant a few weeds per square foot. For weeds with deeper tap roots, plant them 1 to a square foot.

* Most of these weeds tolerate a range of soil conditions, with a pH 6-7. Some of them can tolerate slightly higher soil pH in the mid 7s.

* Just like plants, you can protect weeds from extreme cold with tunnels and row covers.

* If you're cultivating weeds in a garden, you'll need to manage them to keep them from taking over your other plants. Keep them in dedicated areas or beds. If they show up in unwanted places, snip the heads so they don't seed. Uproot them. Compost them. Don't use weed killer.

* If you struggle to identify a weed in the wild, don't eat it. Some weeds have lookalikes that are toxic. This guide lists some of the most common doppleganger-ers.

* Generally, you'll consume the leaves and stems of weeds raw or steamed, prepared however you like in salads or stir fry dishes. You can often chop up the roots for use in soups and stews.

* Wash the leaves and scrub the roots gently, like you'd do with other plants. You'll often want to have a bowl of cold water with vinegar and/or lemon to soak roots in after chopping, to keep them from discoloring.

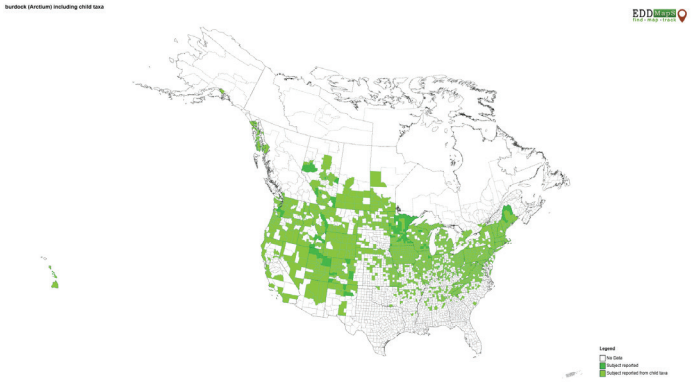
* Many of these plants also have medicinal value, something covered later.

Burdock

Pollination: Self
Lifespan: Biennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1 plant per square foot. Can start earlier indoors.

Hardiness

Prefers cooler weather 50-75F but can tolerate heat and drought.

Which Parts Can You Eat?

You can eat the root, stems, leaves, and immature buds. Foragers say the stalks taste like asparagus or artichoke.

Nutritional Value

Fiber, Vitamins B6 (18% DV), Iron (5%), Calcium (4%), Copper (11%), Magnesium (11%), Manganese (13%), Potassium (8%), Phosphorus (5%)
85 Calories per cup

How Do You Cook It?

Peel and boil the stem. Boil 2 minutes for crunchy, 8 minutes for full cook. Then you can fry or saute. For roots, clean and quick soak them in water with vinegar. Then chop and roast or stir fry. Add other spices or ingredients of your choice. Also makes a good soup.

Notes

Burdock lives for two years. Stems and leaves taste best during the first year, before it flowers and seeds. Harvest the plant during the first 8-12 months, and collect seeds to plant the following spring. It will also seed itself, making your life easier. If you're only harvesting roots, you can harvest during the second year to maximize size. Harvest before it flowers. Avoid if you're pregnant or have kidney problems. In the wild, don't mistake it for water hemlock or belladonna. Water Hemlock has purple streaks on its stems and white flowers shaped like umbrellas. Belladonna produces black berries.

Collect burdock seeds by drying the heads for 1-2 weeks, then cracking open the burs. You can also crush the heads and winnow out the seeds, then store in a dry place.

0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Clover

Pollination: Insects
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.

EDDMaps

If You're Growing...

Direct sow after last frost, scatter casually, about 2 ounces per 1,000 square foot.

Hardiness

Once established, tolerates heat and drought very well. Treat it like grass, it will thrive.

Which Parts Can You Eat?

You can eat every part, from root to flower.

Nutritional Value

Protein, Fiber, Iron, Calcium, Vitamin A, Vitamin E, Vitamin B, Vitamin K (90% DV), Selenium (500% DV), Chromium (158% DV)
25 Calories per cup

How Do You Cook It?

You can use the leaves raw in salads or cook them up like spinach. You can also use the flowers in salads or grind them into flour or powder. The flowers also make sweet tea. You can also cook the roots. Eat in moderation to avoid stomach trouble. Boil or steam to aid digestion.

Notes

Clover belongs to the legume family. They return nitrogen to the soil. Like many other weeds, you can direct sow them by scattering after last frost. It grows fast, and it's ready for harvest in 30-40 days. White and red clover are perennial, so they last several years. Clover seeds itself, but you can also collect seeds as a backup in the late summer or early fall when the flowers wither and turn light brown. Dry the heads for 1-2 weeks, then crush them up and winnow out the seeds. Store in a cool, dry place.

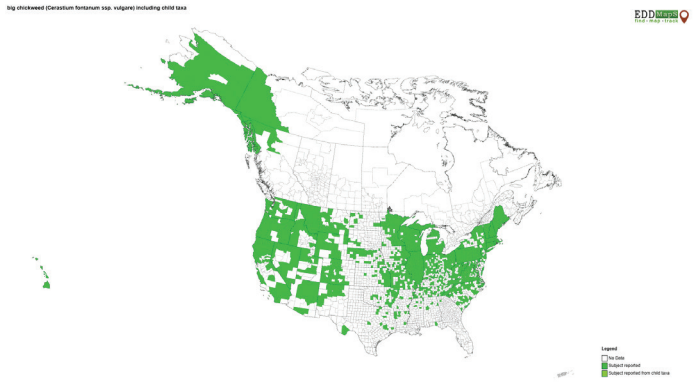
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Chickweed

Pollination: Self
Lifespan: Annual

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 2-3 plants per square foot. Can start earlier indoors.

Hardiness

Prefers cooler weather 50-68F. Doesn't do well in hot, dry weather. Does well in cold.

Which Parts Can You Eat?

You can eat every part except the root.

Nutritional Value

Vitamins A, C, D, B, Iron, Calcium, Potassium, Magnesium, Zinc, Phosphorous, Manganese, Copper, Antioxidants
25 Calories per cup

How Do You Cook It?

You can use the leaves raw in salads or cook them up like spinach. You can also use the flowers in salads or other recipes. You can use the entire plant (except root) to make tea or even pesto.

Notes

Chickweed stacks up well to spinach in terms of nutrients and flavor. You can direct sow it after last frost. Once established, it takes care of itself. Just snip the top flowers and leaves. It grows back. Like other self-pollinators, it can seed itself for the next growing season. Chickweed grows in thick mats. It grows pretty much year round. It can withstand frost, even light snow.

Collect chickweed seeds during the late summer or early fall by harvesting the pods when they turn brown and brittle. Dry for them for 1-2 weeks, then winnow and sift out the seeds to store in a coo, dry place.

Caution, experts note that it can reduce milk supply for breastfeeding moms. Also, avoid the lookalike Scarlet Pimpernel. Tell it apart by orangeish red flowers, and the lack of hairs on the stem. Other plants like spurge look similar, but the stems ooze milky sap when you break them.

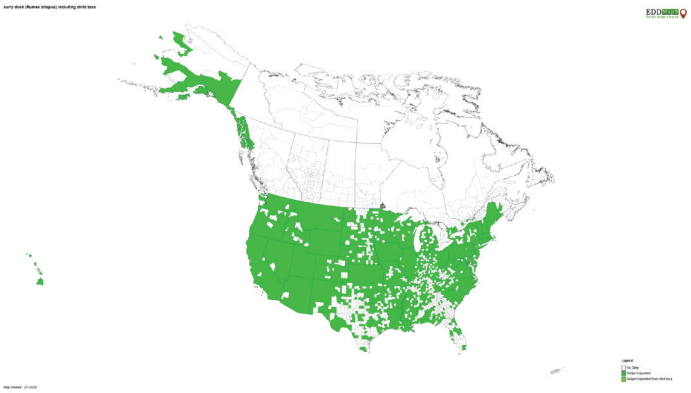
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Curly Dock

Pollination: Insects
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1 plant per square foot or even 2 square foot. Can start earlier indoors.

Hardiness

Prefers moist areas but tolerates drought. Can tolerate cold as well as heat.

Which Parts Can You Eat?

You can eat every part, but the roots are primarily used for medicine.

Nutritional Value

Protein (Seeds). Fiber. Vitamins A and C, Iron, Calcium, Potassium, Magnesium, Phosphorus.
20 Calories per cup

How Do You Cook It?

You can use the leaves raw in salads or cook them up like spinach. You can peel the stalks and prepare them like green beans. Roast the seeds or grind them into flour. Harvest leaves when they're young. Harvest the stalks before they flower. Harvest the seeds in late summer or fall.

Notes

Curly dock is a tough plant that can regrow from its long taproots. It can handle some of the harshest environments. Sow it during early spring or early fall. The root is edible, but it doesn't taste very good.

Collect curly dock seeds in later summer or fall by cutting or tearing off the stems at the base. The seeds will appear as dark reddish brown clusters. Strip them into a bag and dry for 1-2 weeks, then crush and winnow them. Store them in a cool, dry place.

Like many weeds and wild plants, curly dock contains a lot of oxalic acid that can pose a risk for anyone with kidney stones or gout.

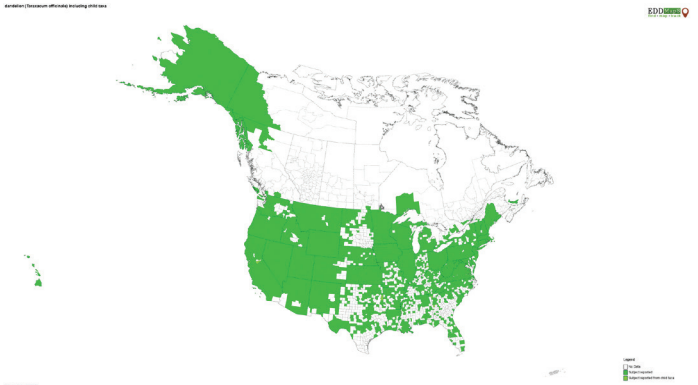
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Dandelion

Pollination: Self
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1-4 plants per square foot. Can start earlier indoors.

Hardiness

Prefers temperatures 60-70F, but it tolerates heat and drought well.

Which Parts Can You Eat?

You can eat every part, including the root.

Nutritional Value

Protein, Fiber, Vitamins K, A, and C. Antioxidants. Calcium, Potassium, Iron.
25 Calories per cup

How Do You Cook It?

You can fry the flower heads or use them to make wine, jelly, and syrup. You can also use them in salads. You can make tea or coffee from the roots (no caffeine), or cook them up like carrots. You can technically eat the stem, but it's bitter.

Notes

Dandelion is one of the lowest maintenance plants, known for its resilience. It contains more Vitamin A than spinach, and more Vitamin C than tomatoes. You can harvest it at any time. For the best taste and nutrients, harvest the leaves in early spring. Harvest the roots in early spring or late fall.

Collect dandelion seeds when any of the flower heads turn into white fluffy balls, especially drown and dried out ones. Collect the stems with the balls. Dry them for 1-2 weeks. Winnow to remove the seeds from the white pappus (parachutes). Store them in a cool, dry place.

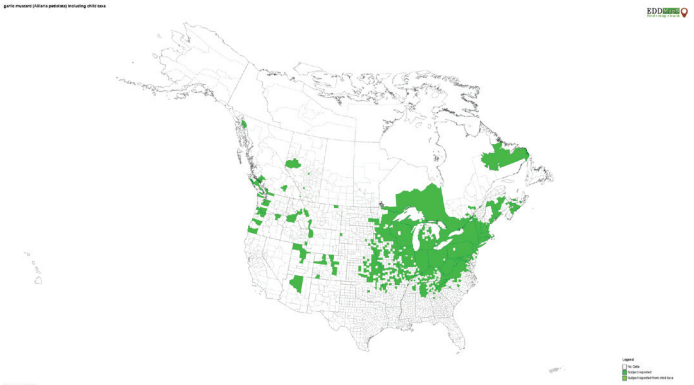
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Garlic Mustard

Pollination: Self
Lifespan: Biennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1 plant per square foot or even 2 square foot. Can start earlier indoors.

Hardiness

Does best in cool environments. Doesn't thrive in hot, dry places.

Which Parts Can You Eat?

You can eat every part, including the leaves, flowers, and roots.

Nutritional Value

High in Vitamins A, C, E, and Omega-3 fatty acids.

How Do You Cook It?

You can use the leaves raw in salads or cook them up like spinach. You can also use the leaves and flowers in pesto.

Notes

Garlic mustard contains more nutritional value than kale, spinach, and broccoli. It grows fast, and it's very hard to eradicate once it's established (a good thing for foragers). It also contains zinc and fiber. Eat them younger for best flavor and safety. Older plants contain small amounts of cyanide.

Collect garlic mustard seeds in mid-summer when the pods turn brown and brittle. Strip the pods into a bag. Dry for another 1-2 weeks, then winnow. Store them in a cool, dry place.

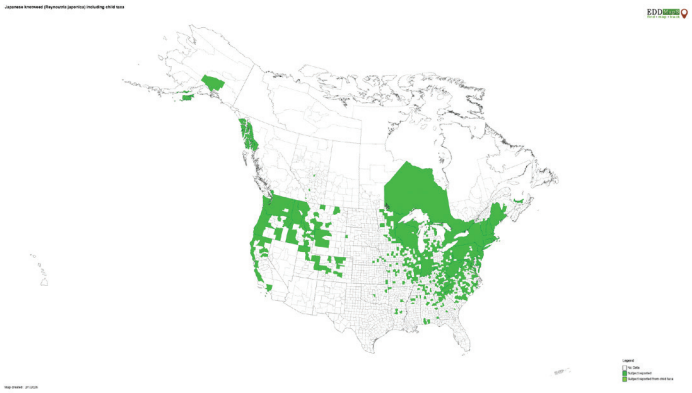
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Japanese Knotweed

Pollination: Insects
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, several plants per square foot.

Hardiness

Prefers moderate temperatures and moist soil, but very good at tolerating extreme weather.

Which Parts Can You Eat?

You can eat every part, including the root (mostly medicinal).

Nutritional Value

Vitamins A and C, Potassium, Phosphorus, Zinc, Manganese, Antioxidants, Rutin, Quercetin (Antiviral), Resveratrol (Cardiovascular).

How Do You Cook It?

Harvest young stems and leaves for use in salads. You can also use the shoots in sauces, pies, etc. Older shoots need peeling, but they're still edible. Chop and grind the root as an antioxidant, for medicine or a supplement.

Notes

Like other invasive weeds, be careful. Because Japanese knotweed is so resilient, it can overtake a garden. It's considered highly aggressive. It can regrow from its deep taproot, or even fragments of root.

Collect knotweed seeds during late fall, when the pods turn brown and brittle. Strip the pods into a bag. Winnow, then store in a cool, dry place. Handle the seeds with extreme care to avoid spreading them.

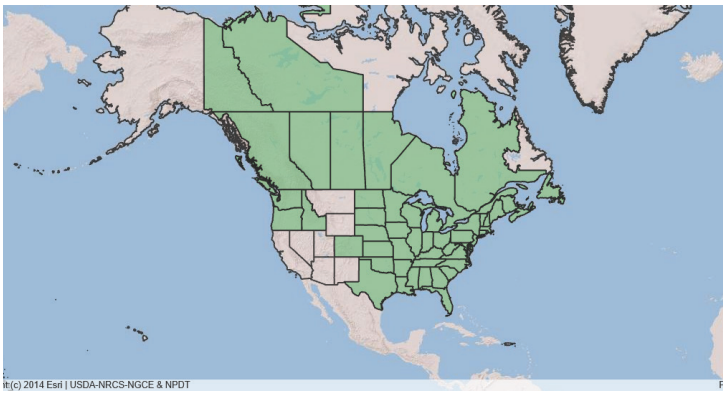
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Jewelweed

Pollination: Self
Lifespan: Annual

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1-4 plants per square foot. Can start earlier indoors.

Hardiness

Prefers wet conditions. Doesn't tolerate heat or drought very well.

Which Parts Can You Eat?

You can eat every part, including the root (mostly medicinal).

Nutritional Value

Quercetin (Antiviral), Kaempferol (Antiviral), Lawsone (Antioxidant)

How Do You Cook It?

Use stems, leaves, and flower heads in salads. Soak and boil to make them taste less bitter. Pods contain seeds that taste like nuts.

Notes

Foragers know jewelweed mainly for its medicinal use, because it's high in antimicrobial compounds like quercetin. They also use it to treat poison ivy and bug bites. Just mash them up and apply them directly to bites or rashes. They help sooth the pain. Harvest by cutting the top 1/3 of the plant, or 1/4 if you want it to regrow. It's best to harvest from the middle of summer through early fall.

Collect jewelweed seeds in late summer or early fall, when the pods turn yellow and brittle. Gently tap the pods into a bag. Dry for 1-2 weeks, then winnow. Store in a cool, dry place.

Jewelweed contains a lot of oxalic acid, which can be rough on digestive systems and especially anyone with kidney issues. You can reduce oxalic acid by boiling and tossing the water (1-2 times).

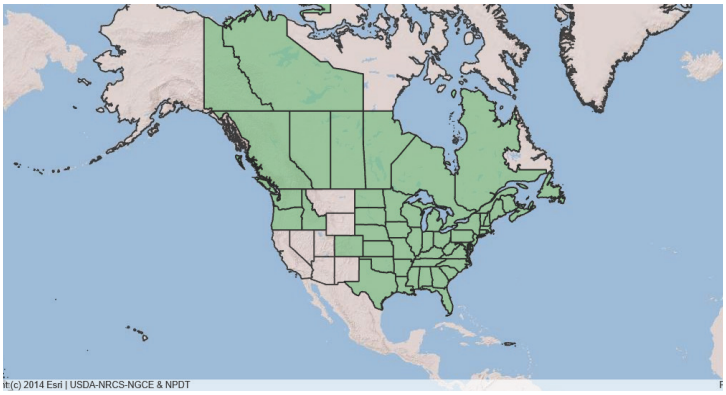
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Kudzu

Pollination: Self
Lifespan: Annual

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Extremely easy to plant. Sow or scatter seeds in late fall for spring blooming. Highly invasive...

Hardiness

Thrives in a wide range of environments. Can tolerate extreme cold and heat.

Which Parts Can You Eat?

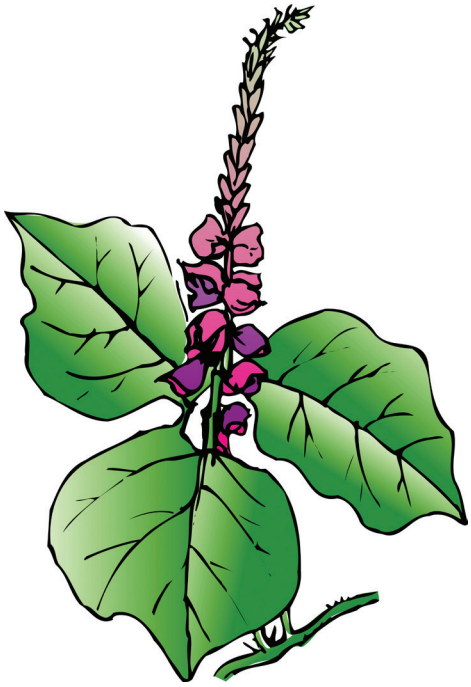
You can eat every part, including the root (high in carbs and other compounds).

Nutritional Value

Leaves and shoots are rich in protein and fiber. Roots are rich in carbs. Plus more.

How Do You Cook It?

You can eat kudzu leaves, flowers, and stems raw in salads. You can also use the roots (and other parts) in soups and stews. Some cultures grind kudzu into flower. You can make jellies and jams from the flowers. It's versatile.



Notes

Especially in the southern U.S., kudzu has developed a reputation as perhaps the most invasive and resilient weed out there. But many people don't know that it's edible and has an astonishing nutrition profile. Young leaves and shoots are high in protein and fiber. The roots also contain considerable carbohydrates. It contains a range of compounds that promote overall health, including ones (like puerarin) that help with menopause symptoms. It's also rich in antioxidants. In Chinese medicine, it's been used to treat heart problems and improve blood flow.

Kudzu is high enough in protein, vitamins, and carbohydrates to heavily supplement your diet. It's extremely easy to plant. You can literally just throw some vines in your yard. It grows incredibly fast, up to a foot a day.

Warning: It can interfere with hormone therapies and has effects similar to estrogen, especially in large quantities.

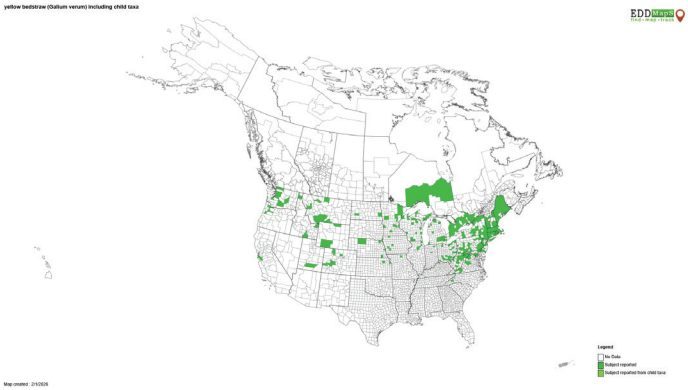
It can be easy to confuse kudzu with poison ivy. Remember, kudzu has hairy stems and very large, rounded, matte textured leaves. Poison ivy has smaller, smooth, pointed, shiny leaves.

Lady's Bedstraw

Pollination: Self
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1-4 plants per square foot. Can start earlier indoors.

Hardiness

Prefers full sun. Once established, tolerates heat and drought very well.

Which Parts Can You Eat?

You can eat the flower heads, leaves, stems, and seeds.

Nutritional Value

Antioxidants, Silica, Iodine, Potassium
55 Calories per Cup

How Do You Cook It?

Use stems, leaves, and flower heads in salads. You can use the seeds for a coffee or tea substitute. Harvest when young. You can steam or roast any part of the plant to improve the texture and taste.

Notes

It's best to harvest the flowers and stems in the middle of summer or early fall. It's best to harvest the roots later in the fall (October), from more mature plants 3 years or older.

Collect bedstraw seeds in the fall, when the seed heads turn brown and brittle. Strip the heads into a paper bag. Dry for 1-2 weeks, then winnow. Store them in a cool, dry place.

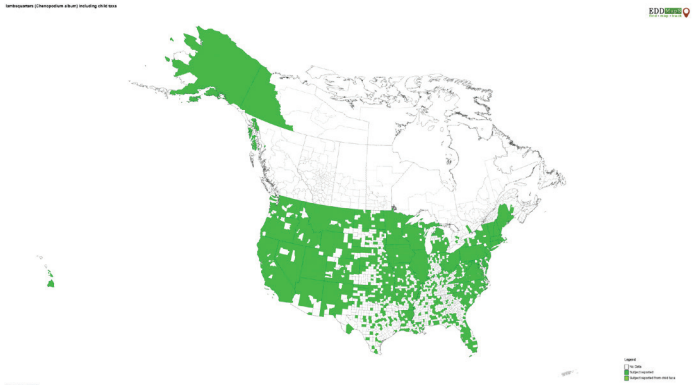
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Lambsquarter

Pollination: Self
Lifespan: Annual

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1-4 plants per square foot. Can start earlier indoors.

Hardiness

Prefers full sun, 60-70F, but can tolerate heat and drought.

Which Parts Can You Eat?

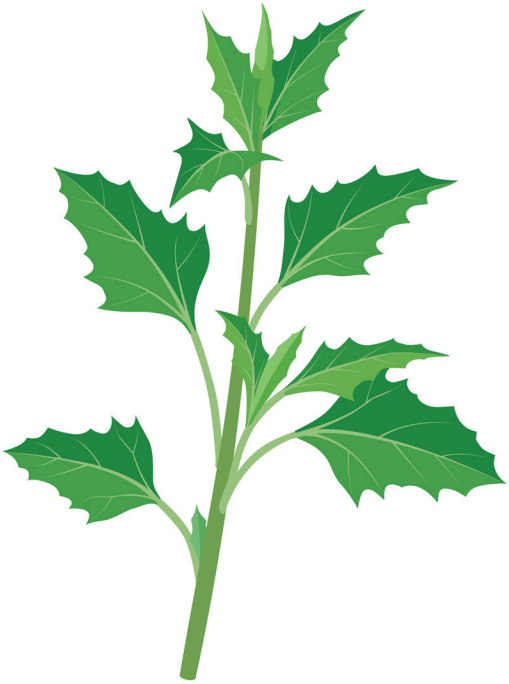
You can eat the flower heads, leaves, stems, and seeds.

Nutritional Value

Vitamin A (64% DV), Vitamin C (89% DV), Vitamin K (112 % DV), Calcium (31% DV), Iron (7% DV), Magnesium, Potassium
43 Calories per Cup

How Do You Cook It?

Use stems, leaves, and flower heads in salads. You can use the seeds in any dish, but especially soups and cereals. Cook older leaves to reduce oxalic acid.



Notes

Many parts of the world cultivate lambsquarter like spinach, because it tolerates heat and drought better. It's considered a weed in North America, despite its nutritional value. The base of leaves near the stems have a powdery white texture. It grows from late spring through early winter. You can cultivate it like many other plants, and it grows fast. You can often harvest it as early as 40 days after planting.

Collect lambsquarter seeds in later summer and fall when the seed heads turn brown and brittle. Collect the stems and dry for 1-2 weeks, then winnow. Store them in a cool, dry place.

Special note: Dog's Mercury looks like lambsquarter, but it's toxic. Dog's Mercury has hairy leaves with serrated edges, compared to lambsquarter's wavy edges. It smells bad when crushed. The leaves lack the white, powdery texture of lambsquarter leaves.

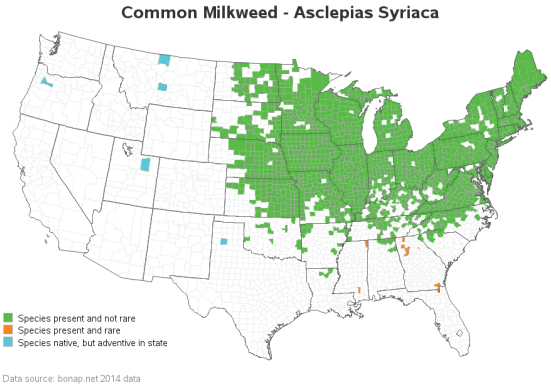
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Milkweed

Pollination: Insects
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



Bonap.net

If You're Growing...

Direct sow after last frost, 1 plant per square foot. Can start earlier indoors.

Hardiness

Does best with full sun and watering, but can tolerate drought and heat.

Which Parts Can You Eat?

You can eat the flower heads, leaves, stems, and seeds.

Nutritional Value

Protein (High), Amino Acids (High)

How Do You Cook It?

It's best to harvest when they're young. Important: Boil the entire plant and then saute. For older plants, harvest the young tender leaves. You can fry the flower heads like okra. You can harvest young seeds and pods for casseroles and soups.

Notes

Make sure you boil milkweed 10-20 minutes before eating. It's toxic when consumed raw. It's especially toxic to small animals and livestock.

Collect milkweed seeds in the fall when the pods turn brown and brittle. Strip the pods into a bag. Dry for 1-2 weeks. Then winnow. Store them in a cool, dry place.

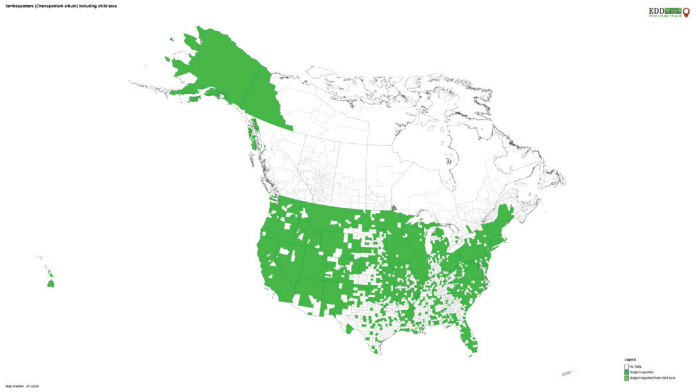
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Pineappleweed

Pollination: Self
Lifespan: Annual

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1 plant per square foot. Can start earlier indoors.

Hardiness

Does very well in hot, dry conditions as well as poor soil.

Which Parts Can You Eat?

You can eat every part, except the root.

Nutritional Value

Mainly Antioxidants

How Do You Cook It?

You can use young leaves in salads raw. You can cook older leaves in soups or stews. You can use the flower heads for tea, syrups, jellies, etc.

Notes

Pineappleweed grows fast, reaching maturity in less than 100 days. It grows throughout the year, but mainly spring through fall. If you're cultivating, sow it in spring after the last frost. The tea also works as a mild sedative, similar to chamomile, according to many foragers.

Collect pineappleweed seeds in the late summer and fall when the flower heads turn brown and brittle. Strip the heads into a paper bag. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

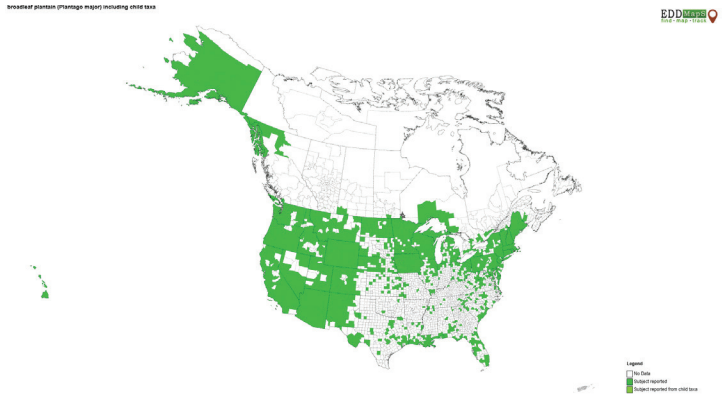
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Plantago (Plantain)

Pollination: Self
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 9-16 plants per square foot. Can start earlier indoors.

Hardiness

Does very well in hot, dry conditions as well as poor soil.

Which Parts Can You Eat?

You can eat every part, except the root.

Nutritional Value

Fiber, Vitamin B, Vitamin C (High), Potassium (High), Magnesium, Iron, Zinc, Calcium
25 Calories per cup

How Do You Cook It?

You can use young leaves in salads raw. You can cook older leaves in soups or stews. You can also eat the flower head and cook the roots. The seeds can make meals similar to quinoa.

Notes

Plantago grows from late spring to early fall. You can cultivate it like many other plants, and it's low-maintenance. It also has medicinal value for mosquito bites and rashes. Chop or mash the leaves and put them on your skin.

Collect plantago seeds in the late summer and fall when the seed spikes turn brown and brittle. Strip the spikes into a paper bag. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

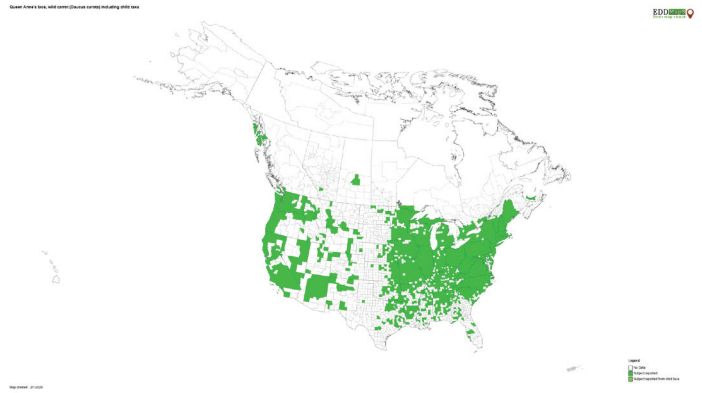
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Queen Anne's Lace

Pollination: Self
Lifespan: Biennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

Hardiness

Can tolerate heat, drought, and even poor soil very well.

If You're Growing...

Direct sow after last frost, 1 plant per square foot. Can start earlier indoors.

Which Parts Can You Eat?

You can eat every part, including the root.

Nutritional Value

Vitamin C, Vitamin Bs, Calcium, Potassium, Anti-oxidants, Fiber.

How Do You Cook It?

You can cook the plants and stems like spinach. You can use the flower heads for syrups and jellies. You can grind the seeds as a spice. You can cook the roots up like carrots, and they taste similar.

Notes

Be careful with identification. Poison Hemlock looks similar to Queen Anne's Lace, except it has smooth stems (not hairy). It also smells bad. Queen Anne's Lace has a single purple spot on the flower head, but Poison Hemlock has purple spots on the stems.

Collect queen anne's seeds in the late summer and fall when the seed heads turn brown and brittle. Strip the heads into a paper bag. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

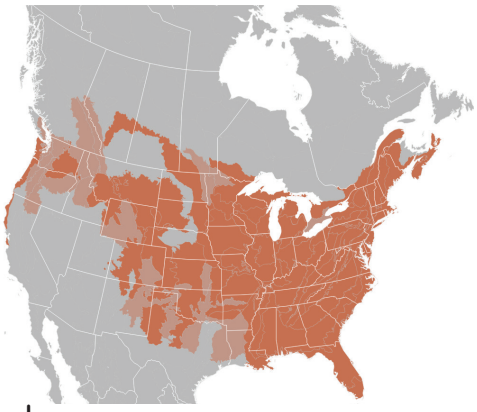
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Quickweed

Pollination: Self
Lifespan: Annual

Where Does it Grow?

Grows almost anywhere in temperate climates.



Bplant.org

Hardiness

Can tolerate heat, but doesn't do well in drought.

If You're Growing...

Direct sow after last frost, 1-2 plants per square foot. Can start earlier indoors.

Which Parts Can You Eat?

You can eat every part, including the root.

Nutritional Value

Protein, Fiber, Vitamin A, Vitamin C, Calcium (High), Magnesium, Potassium, Iron, Zinc, Vitamin Bs.

How Do You Cook It?

You can cook up the leaves and stems like spinach. You can chop the root and roast, boil, or saute.

Notes

Quickweed earns its name by growing very fast.

Collect quickweed seeds in the late summer and fall when the flower heads turn brown and brittle. Strip the heads into a paper bag. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

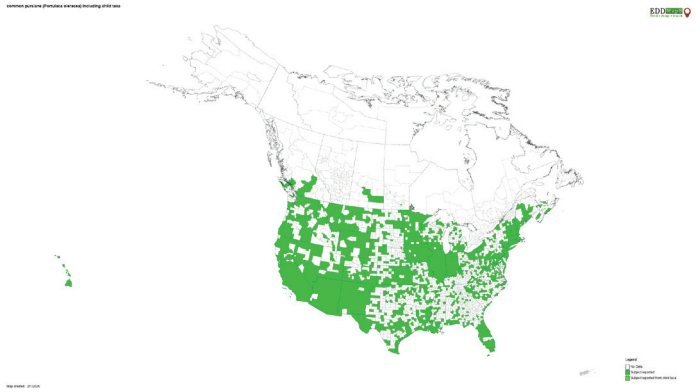
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Purslane

Pollination: Self
Lifespan: Annual

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 4-9 plants per square foot. Can start earlier indoors.

Hardiness

Does very well in hot, dry conditions.

Which Parts Can You Eat?

You can eat every part, except the root.

Nutritional Value

Vitamin A (44% DV), Vitamin C (35% DV), Vitamin E (81% DV), Potassium (14% DV), Magnesium (17% DV), Iron, Calcium, Omega 3s20 Calories per cup

How Do You Cook It?

You can cook the entire plant like spinach, or just the leaves and stems. They also go well in salads, raw. You can also grind up the seeds as flour, or put them in dishes.

Notes

Purslane tolerates a range of conditions. It grows fast, and it's ready to harvest after about 50 days. It can even grow in sidewalk cracks. The seeds can last up to 40 years. Like other weeds, it's high in oxalic acid.

Collect purslane seeds in the late summer and fall when the seed pods turn brown and brittle. Shake the pods into a paper bag. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

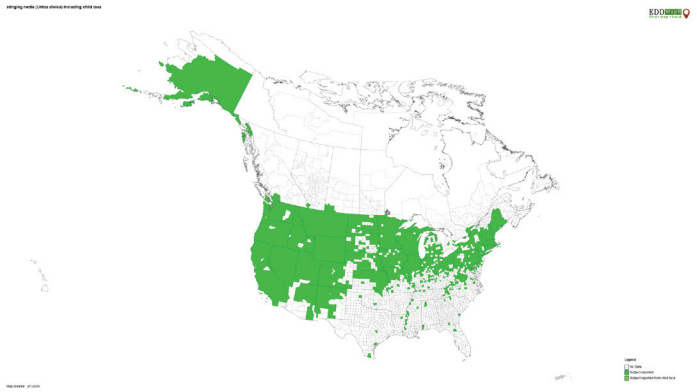
0 Degrees F = -17.8C
32 Degrees F = 0C
60 Degrees F = 15.6C
70 Degrees F = 21C
80 Degrees F = 27C
90 Degrees F = 32C
100 Degrees F = 38C

Stinging Nettles

Pollination: Self
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1 plant per square foot. Can start earlier indoors.

Hardiness

Prefers full sun. Does well in heat, but doesn't do well in drought.

Which Parts Can You Eat?

You can eat the stems, leaves, and seeds.

Nutritional Value

Vitamin K (High), Vitamin A (High), Vitamin C, Vitamin Bs

How Do You Cook It?

You can cook up the plants and stems like spinach. Unlike other weeds that can go in salads raw, you have to cook stinging nettles to neutralize the bristles. The seeds taste like nuts.

Notes

Make sure to wear gloves when harvesting, and harvest them when they're young. Adult plants don't taste good, and they develop cystoliths (crystals).

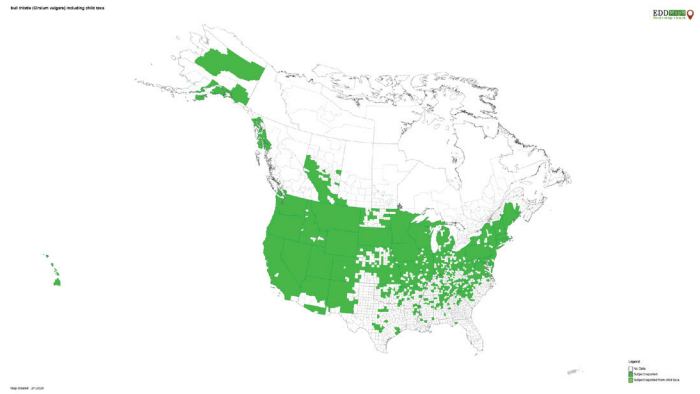
Collect nettle seeds in the late summer and fall when the seed clusters turn brown and brittle. Shake the clusters into a paper bag. Wear gloves to avoid injury. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

Thistle

Pollination: Self
Lifespan: Biennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



EDDMaps

If You're Growing...

Direct sow after last frost, 1 plant per square foot or even 2 square foot. Can start earlier indoors.

Hardiness

Prefers full sun. Once established, does well in heat and drought.

Which Parts Can You Eat?

You can eat every part, including the root.

Nutritional Value

Vitamin K (High), Vitamin A (High), Iron, Calcium, Magnesium, Phosphorus, Zinc, Copper, Fiber, Protein, Antioxidants

How Do You Cook It?

You can eat the root raw or cook it. You have to remove the spines from leaves. Eat or cook the rest like any other weed, as you prefer.

Notes

A relative of artichoke, thistle tastes and cooks up similar. Plant it in spring after last frost. The root tastes similar to burdock. You have to remove the spines from the leaves before eating. Also, use extreme caution when harvesting in general. The spines are extremely sharp, and thistle can cause permanent eye damage. In fact, harvesting thistle leaves might be more trouble than it's worth in some situations, unless you're very desperate.

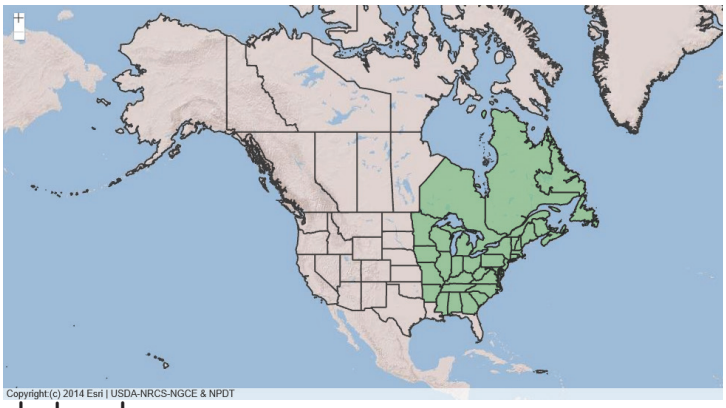
Collect thistle seeds in the late summer and fall when the heads turn brown and brittle. Strip or cut the heads into a paper bag. Wear gloves to avoid injury. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

Wild Violets

Pollination: Self
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



plants.usda.gov

If You're Growing...

Direct sow after last frost, 3-4 plants per square foot. Can start earlier indoors.

Hardiness

Does best with shade and watering, and not especially tolerant to heat or drought.

Which Parts Can You Eat?

You can eat every part, but the root is mostly medicinal.

Nutritional Value

Vitamin C (High), Vitamin A (High), Vitamin Bs, Magnesium Iron, Potassium, Manganese, Copper

How Do You Cook It?

You can eat the leaves and stems like spinach. Use the flower heads in salads, or to make jellies, syrups, teas.

Notes

Wild violets grow best in the spring, between last frost and the beginning of summer. They'll continue to grow through early fall. You can cultivate them like any other plant. They have additional medicinal value as pain killers and cold medicine, with some antiviral properties.

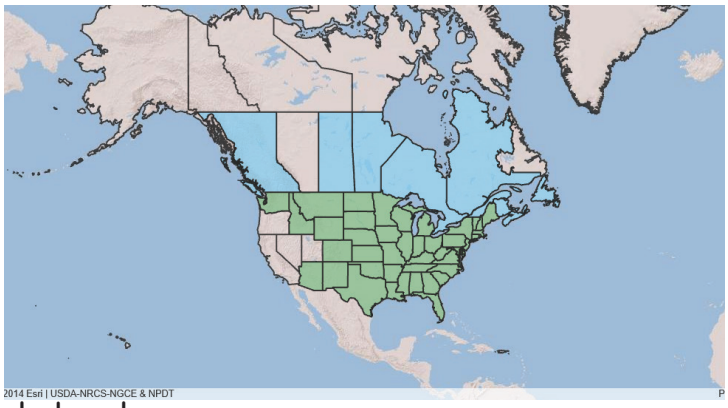
Collect wild violet seeds in the late summer and fall when the seed pods turn brown and brittle. Shake or cut the pods into a paper bag. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

Wood Sorrel

Pollination: Self/Insect
Lifespan: Perennial

Where Does it Grow?

Grows almost anywhere in temperate climates.



plants.usda.gov

If You're Growing...

Direct sow after last frost, 9-16 plants per square foot. Can start earlier indoors.

Hardiness

Does best with full sun and watering, but can tolerate drought and heat.

Which Parts Can You Eat?

You can eat every part, including roots/tubers.

Nutritional Value

Vitamin C (High), Vitamin A (High), Vitamin Bs, Magnesium Iron, Potassium, Manganese, Copper

How Do You Cook It?

You can eat the leaves and stems like spinach. The flowers can go into any dish raw. You can eat the seeds, and you can treat the roots/tubers like potatoes. Warning: Like a few other weeds, wood sorrel contains oxalic acid.

Notes

Wood sorrel typically grows best in spring and early fall, but it can survive winter. It grows fast, ready for harvesting in 30-40 days.

Collect purslane seeds in the late summer and fall just before the seed pods turn brown and brittle. Cut the pods or stems into a paper bag. Dry them for 1-2 weeks, then winnow. Store them in a cool, dry place.

Medicinal Herbs

You can use dozens of herbs to treat various conditions and illnesses, including viral infections. You can take them in supplements from stores, but eventually you might need to make your own. This section covers common herbs and methods to make them.

Herbal Measurements

Most guides list recipes and measurements using "parts" or ratios. That way, you can use whatever specific measurement you want, scaling it up or down for your needs. Sometimes, you'll only be producing 1-2 ounces. Other times, you'll produce more.

Common Measurements

Drop: One small pinch from a dropper. A drop of alcohol and water have about the same volume. Other liquids don't. Recipes will clarify.

Dropperfull: About 30 drops. Many droppers only fill halfway per squeeze, so one dropperfull might mean two squeezes.

Milliliter (1 ml): About 20 drops

Teaspoon: 5 ml or 100 drops

Tablespoon: 15 ml, 3 teaspoons, 300 drops

Ounce: 2 tablespoons, 30 ml, 6 teaspoons, 600 drops

Pint: 2 cups, 16 ounces, .47 liters, 32 tablespoons

Quart: 2 pints, .95 liters

Types of Recipes

Tinctures

You submerge the herbs in strong alcohol at least 100-140 proof (50-70 percent). You can use vodka, rum, gin, and even bourbon. Many recipes call for 190 proof alcohols like Everclear, to maximize the extraction. Ratios typically involve 1:2 parts of fresh herbs and 1:5 for dried herbs (20-30 percent water, 70-80 percent alcohol). Recipes that list sub-ratios of water to alcohol don't refer to alcohol proof; that's separate. For dried herbs, that's 1 oz of herbs, about 1 oz of water, and 4 oz of alcohol. You can use fresh or dried herbs, chopped or crushed. You can make tinctures from leaves, flowers, seeds, bark, or roots. It all depends on your use and the recipe. Leave the mixture in a cool, dark place for 4-6 weeks. Shake it every day. Strain the mixture into a container like a glass jar or bowl and squeeze/press the herbs to get the rest out. That last part matters, because the wet herbs still contain potent compounds. Then, you can pour it into a tincture bottle, using a funnel. Tinctures last 3-5 years, even a decade if stored well.

Hot Infusions

You boil water and pour it over leaves, flowers, seeds, or roots. Let them steep for 4-8 hours in a sealed container. Seeds can take less time, even 1-2 hours or less. Roots can take more time, up to 8 hours. Some recipes take much less time, 15-20 minutes. Steep 1 ounce of leaves or flowers in 1 quart of water. Steep 1 ounce of seeds or roots in 1 pint. Measurements can vary by recipe. The mixture will cool as it steeps. That's fine. You don't have to reheat it. Squeeze or press the herbs to get the rest out before discarding them. You should drink hot infusions with 24 hours, and you can also refrigerate them. You only need heat for the extraction process. Sometimes, hot infusions will call for simmering instead of steeping. Here, the line between hot infusion and decoction (next page) starts to blur a little.

More Types of Herbal Recipes

Cold Infusions

Follow the same general process for hot infusions, but don't boil the water. Use room temperature or chilled water. Cold infusions steep for much longer (12+ hours). They're less common.

Decoctions (Strong Teas & Cough Syrups)

Add herbs to water at room temperature and then bring it to a boil. Usually, you're adding 1 oz of herbs to 1 pint of water. Simmer for 15-20 minutes. Let it cool, then strain it and press the herbs to remove the rest. Add water to bring it back up to 1 pint. You can make concentrated decoctions by boiling the water down to 1/2 a pint and leaving it in the stronger form. Take decoctions by the tablespoon, usually up to 4 times a day, or in potent teas. Decoctions last about 48 hours at room temperature, up to 4 days if refrigerated.

Juices

You generally soak or steep the herbs for several hours in water or oil, then press or squeeze them to release their nutrients. You can apply juices topically or consume them. This guide mainly covers tinctures, infusions, salves, poultices, and decoctions.

Salves & Poultices

For salves, pack 1 container, usually a jar, with crushed dried herbs. Cover it with olive oil or something similar, seal, and let infuse 4-6 weeks. Add 1-2 oz of beeswax or something similar to help it harden. You can make poultices in less time, usually by chopping up fresh herbs, adding some oil, and applying them to skin. Sometimes, you can even just apply the leaves directly to wounds and irritated areas.

Notes & Cautions

Most herbal recipes for infusions and decoctions assume you're going to use dried, ground leaves and roots or powders. For tinctures, you can use fresh or dried herbs. Since the recipes follow ratios and proportions, it doesn't matter as much.

Even when hot infusions call for shorter steeping times, longer 4 hour steeps can make more potent remedies (often more bitter). The same goes for decoctions. But generally, a 15 minute steep or simmer works well enough, especially if someone is very sick and you don't want to wait hours. You can always start with quick infusions while stronger ones are steeping. For most infusions, you can make a stronger decoction.

Growing herbs, you'll often have to scarify and stratify the seeds. That means roughen them up with sandpaper or files, then soaking them in a bag of sand or moist soil for 30-60 days. Sometimes, you do this with any seed. It comes up even more for herb seeds.

Anyone pregnant or breastfeeding should be careful with herbal use. So should anyone with kidney or liver trouble. Generally, strong herb mixtures are meant for use 2-3 weeks to treat acute illness and injury. Otherwise, enjoy them in milder teas. General side effects to most medicinal herbs can include nausea, headache, fever, and rashes.

Some herbs do interact with other supplements and drugs. This guide can't list them all, but common interactions include blood thinners, diabetes meds, heart medications, and immunosuppresants. If you or members of your group have a health condition, but you're interested in herbs, it's a good idea to get a few books.

Some Effective Herb Combinations

For Viral Infections & Encephalitis (Brain Inflammation & Swelling)

* 1 Part Licorice Tincture
* 1 Part Chinese Skullcap Tincture
* 1 part Isatis Tincture
* 1 part Houttuynia Tincture
* Dosage: 1/4-1 tablespoon, 6x per day.

* 1 Part Astragalus
* 1 Part Rhodiola
* 2 Parts Cordyceps
* Dosage: 1 teaspoon, 6x per day.
* Use with licorice, skullcap, isatis, houttuynia combo.

A Quick Reference for Medicinal Properties

* Adaptogen: Helps your body and mind adapt to stress.
* Adjuvant: Boosts other herbs and/or supplements.
* Analgesic: Relieves pain
* Antiemetic: Help with nausea and vomiting.
* Aperient: Laxative and/or improves digestion.
* Astringent: Tightens tissues.
* Balsamic: Helps with inflammation
* Carminative: Improves digestion.
* Demulcent: Good for sore throat/nose.
* Emetic: Induces vomiting.
* Emmenagogue: Helps with menstrual cycles.
* Expectorant: Decongestants/Helps with cough.
* Nervine: Supports nervous system health.

Scientific Names for Medicinal Herbs

* Astragalus Root (Astragalus membranaceus)
* Boneset (Eupatorium perfoliatum)
* Chinese (Skullcap Scutellaria baicalensis)
* Chinese (Senega Root Polygala tenuifolia)
* Cordyceps (Cordyceps)
* Echinacea (Echinacea purpurea)
* Elderberry (Sambucus Negra)
* Ginger (Zingiber officinale)
* Houttuynia (Houttuynia cordata)
* Isatis (Isatis tinctoria)
* Licorice (Glycyrrhiza glabra)
* Lion's Mane (Hericium erinaceus)
* Lomatium (Lomatium dissectum)
* Mullein (Verbascum thapsus)
* Oregon Grape Root (Mahonia aquifolium)
* Pink-Striped Trumpet Lily (Crinum latifolium)
* Pluerisy Root (Asclepias tuberosa)
* Pokeweed (Phytolacca decandra)
* Red Root (Ceanothus americanus)
* Rhodiola (Rhodiola rosea)
* Yarrow (Achillea millefolium)
* Burdock (Arctium lappa)
* Chickweed (Stellaria media)
* Dandelion (Taraxacum officinale)
* Japanese (Knotweed Reynoutria japonica)
* Jewelweed (Impatiens capensis)
* Kudzu (Pueraria montana)
* Lambsquarter (Chenopodium album)
* Stinging Nettle (Urtica dioica)
* Pineappleweed (Matricaria discoidea)
* Plantain (Plantago Major)

Astragalus Root

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

Start seedlings 4-6 weeks before last frost. It helps to scarify and stratify.

How to Plant

Plant seeds 1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 24-36 inches.
By square foot: 1 per square foot.

How Long It Takes

Harvest roots fall of 2nd/3rd year.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-85F.
Water: 1-2 inches per week.
Soil pH: 5.5-8.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest the roots in the fall of the second or third year. Dig them up with a fork. For longterm storage, dry 1-2 weeks. You can also use a dehydrator.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Supports immune system health. Helps heal wounds. Can also lower blood pressure and blood sugar levels in higher doses.

Tincture: Make with 1:2 ratio for fresh leaves. Make with 1:5 ratio for dry.

Tincture Dosage: 20-30 drops, 2-4x per day.

Decoction: 1 tablespoon dry root in 1 pint, simmer 20-30 minutes. Keep covered.

Decoction Dosage: 1 cup, 2-3x per day.

Cautions & Notes: Can interfere with blood pressure and diabetes medications, as well as immunosuppressants. Milder side effects include nausea, upset stomach, headache, and skin rashes.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Boneset

Pollination: Self
Lifespan: Perennial

When to Plant

Start seedlings 6-8 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/8 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 18-24 inches.
Between rows: 18-24 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces in 90-120 days (3-4 months).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 60-80F.
Water: 1-2 inches per week.
Soil pH: 5.5-8.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest boneset for tinctures during early bloom for the flowers. Clip flower heads or harvest entire plant, hang to dry for 4-6 weeks. For tea, harvest before blooming and dry.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Relatively strong antimicrobial properties against Influenza A. Also used to treat malaria and parasites. Traditionally, also used to help set broken bones.

Fresh Flower Tincture: Make with 1:2 ratio, highest proof alcohol available.

Dry Flower Tincture: Make with 1:5 ratio, 40 percent water.

Tincture Dosage: 30-40 drops, 3x per day.

Hot Infusion: 1 teaspoon in 8 oz, steep 15 minutes. Keep covered to retain oils.

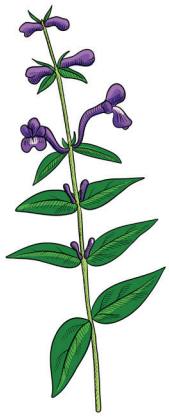
Hot Infusion Dosage: 4-6 oz, 4x per day.

Cautions & Notes: In high doses, it can cause vomiting and upset stomach. Liver toxicity can happen with use longer than 1-2 weeks. Boneset tolerates cold very well, and the roots can survive drops into the negative temperatures. For hot infusions, drink when hot for best results.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .471	1 quart = .951
	1 gallon = 3.81

Chinese Skullcap

Pollination: Self
Lifespan: Perennial



When to Plant

Start seedlings 6-8 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 12-18 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces usable roots in 3 years.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 60-75F.
Water: 1-2 inches per week.
Soil pH: 6-7
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest skullcap roots during the spring of the third year for the most potency. Dry for 1-2 weeks. Use yellow roots. Greenish or black roots have oxidized too much. Don't use.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Strong, broad antimicrobial properties against Adenovirus, EB Virus, Hepatitis, HIV, Influenza, Measles, Polio, RSV, SARS, Covid, and more. Also works against staph infections and pneumonia.

Fresh Root Tincture: Make with 1:2 ratio.

Dry Root Tincture: Make with 1:5 ratio, half water, half alcohol.

Tincture Dosage: 1/4-1/2 teaspoon 3x a day, up to 6x if very sick.

Hot Infusion: 1-2 teaspoon dried root or root powder in 8 oz of water, steep 15 minutes. Keep covered.

Hot Infusion Dosage: 3 cups per day.

Decoction: 1-2 teaspoons dried or powdered root in 8 oz of water, simmer 15-20 minutes. Keep covered.

Decoction Dosage: 2 oz, 3-4x a day.

Cautions & Notes: Side effects can include dizziness and drowsiness. Use the root for infections and respiratory health. Decoctions work best. Works well with licorice. Tends to reinforce and amplify many other herbs and pharmaceutical meds, good and bad.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .471
1 quart = .951
1 gallon = 3.81

Chinese Senega Root

Pollination: Self
Lifespan: Perennial

When to Plant

Start seedlings 6-8 weeks before last frost. Stratify for 60 days first. Can also start from young shoot cuttings.

How to Plant

Plant seeds 1-2 inches deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 14-16 inches.
Between rows: 14-16 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces usable roots in 4 years.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 60-75F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest senega root during the fall of the fourth year. Dig up entire plant root with fork. If storing long term, dry in the sun 5-8 days. You can also use a dehydrator.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Originally used by indigenous Americans for snake bites, colds, and tooth pain. Also used to enhance cognitive function and improve focus, and to treat anxiety, insomnia, and depression.

Fresh Root Tincture: Make with 1:2 ratio.

Dry Root Tincture: Make with 1:5 ratio.

Tincture Dosage: 30 drops, 3x per day.

Hot Infusion: 1-2 teaspoons dried or powdered root in 1 cup, steep 15 minutes. Keep covered.

Hot Infusion Dosage: 2-3 cups per day.

Decoction: 1-2 teaspoons dried or powdered root in 8 oz of water, simmer 15 minutes. Keep covered.

Decoction Dosage: 2 oz, 3-4x a day.

Cautions & Notes: As with most herbs, side effects can include nausea and upset stomach, rashes, etc. Decoctions work better than hot infusions.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .471
1 quart = .951
1 gallon = 3.81

Cordyceps

Pollination: Self
Lifespan: Perennial

When to Plant

It's a mushroom, so you can grow it year round indoors.

How to Plant

Starting out, you'll most likely use kits. Follow the specific instructions in them.

How Long It Takes

Ready to harvest in 7-8 weeks.

Care/Best Growing Conditions

See instructions.

Harvesting

Harvest after 7-8 weeks. Dry the mushrooms for longterm storage. Cut or crush into powder.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Supports immune health and energy levels. Also used to support kidney and liver function. Has also recently shown ability to lower blood pressure and blood sugar while increasing insulin sensitivity.

Tincture: Make with 1:5 ratio for dry mushrooms. After 4-6 weeks, strain. Simmer leftover mushrooms for 2-8 hours in 4 cups of water, then strain and press. Cool, then combine with alcohol extract in 3:1 ratio water to alcohol mix.

Tincture Dosage: 30 drops, 1-2x per day.

Hot Infusion: 1-2 teaspoons dried or powdered root in 1 cup, simmer 15 minutes. Keep covered.

Hot Infusion Dosage: 1 cup, 2-3x per day.

Cautions & Notes: Can interfere with diabetes medications and blood thinners. Too much can cause upset stomach.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .47l	1 quart = .95l
	1 gallon = 3.8l

Echinacea

Pollination: Insect
Lifespan: Perennial

When to Plant

Start seedlings 8-10 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 8-10 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-24 inches.
Between rows: 24-36 inches.
By square foot: 1 per 1-2 square foot.

How Long It Takes

Roots ready in the fall of 3rd or 4th year.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest echinacea leaves and flowers during the second year. Harvest the roots during the fall of the 3rd or fourth year. Dig up with a fork. Dry 1-2 weeks for longterm storage.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Supports immune system. Often used to fight infections. Can also be used on skin irritations, rashes, and wounds.

Root Tincture: Make with 1:2 ratio for fresh root, 1:5 for dry.

Tincture Dosage: 30 drops, 2-5x per day.

Hot Infusion: 1 tablespoon dried root in 10 oz, steep 15 minutes. Keep covered.

Hot Infusion Dosage: 1 cup, 2-3x per day.

Decoction: 1/2 oz dry root and 3 cups water, simmer 20 minutes. Keep covered.

Decoction Dosage: 1 cup, 2-3x per day.

Cautions & Notes: Can interfere with immunosuppressants. Use the roots for tinctures and infusions (most potent). Also use roots for salves. Use the flowers and leaves in milder teas.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Elderberry

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

Start seedlings 6-8 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/2-1 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 72-96 inches.
Between rows: 72-96 inches.
By square foot: 1 per 3-4 square foot.

How Long It Takes

Produces berries in 1-2 years.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 60-80F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest elderberry in late summer of the first or second year. Cut entire stems. Harvest the ripe berries and leave the green ones behind. It's best to make syrup right away.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Strong, but narrower antimicrobial properties against Influenza, HIV, Herpes, Strep, E. Coli, and more.

Special Procedure for Elderberry Syrup: 1 cup of dried elderberries or 2 cups of fresh elderberries, 2 quarts of water, and anywhere from 2-3 cups or even 20 cups of sugar. The sugar stops bacterial growth. If you don't use as much sugar, add 20 percent alcohol to the final mix. Soak the elderberries overnight. Bring the elderberries to a boil and then simmer until reducing water to half volume, or 1 quart. Let it cool and then strain. Don't skim anything off. Syrup lasts up to 3-6 months in a sealed container, sometimes longer.

Dosage: 2-4 tablespoons every 2-4 hours.

Cautions & Notes: Can interfere with immunosuppressants and autoimmune disorder meds. Eating raw berries can cause extreme sickness. Elderberry doesn't do well in extreme heat or cold, so they'll need protection from both.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .47l	1 quart = .95l
	1 gallon = 3.8l

Ginger

Pollination: Self
Lifespan: Perennial

When to Plant

Start buds/cuts from existing plant 5-6 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant buds 2-3 inches deep
Indoors: Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost.
Between plants: 6-12 inches.
Between rows: 30-36 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 240-300 days (8-10 months).

Care/Best Growing Conditions

Sun: 2-5 hours full sun, partial shade.
Temperature: 75-85F.
Water: 1-2 inches per week.
Soil pH: 5.5-6.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest ginger in late summer or early fall, after the leaves die back. Dig roots/rhizomes up with a fork and gently lift out. Can harvest "baby ginger" at 4-6 months.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Strong, general antiviral properties against Influenza, Hepatitis, Herpes, Yellow Fever, Measles, Chicken Pox, and more. Also works on burns and fungal infections. Also shows potential for managing high blood pressure and diabetes.

Fresh Root Tincture: Make with 1:2 ratio, highest proof alcohol available.

Tincture Dosage: 10-20 drops, 4x per day.

Hot Infusion: Chop or grate 1-2 inches of ginger into 1-2 cups of water, simmer 10-20 minutes. Keep covered.

Hot Infusion Dosage: 4-6 cups per day.

Cautions & Notes: High doses can interfere with blood pressure and diabetes meds. Can also cause problems with blood clotting. Ginger is a heavy feeder that depletes soil, so rotate it. Freshly juiced ginger works best for medicinal purposes, but tinctures also work. Dry root doesn't demonstrate very strong antiviral properties.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .47l
1 quart = .95l
1 gallon = 3.8l

Houttuynia

Pollination: Self
Lifespan: Perennial

When to Plant

Start seedlings 3-4 weeks before last frost.
Once started, grows everywhere.

How to Plant

Plant seeds 1/2-1 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-32 inches.
Between rows: 36-48 inches.
By square foot: 1 per 1-2 square foot.

How Long It Takes

Produces in 45-55 days (2-3 months).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 60-90F.
Water: 1-2 inches per week.
Soil pH: 5.5-6.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest houttyunia in the late spring or early summer, and harvest all year long once it's established.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Strong, relatively broad antimicrobial properties against Influenza A, SARS, Covid, Dengue, Herpes, and more. Also used to treat wounds and slow bleeding.

Fresh Leaf Tincture: Make with 1:2 ratio, highest proof alcohol available. 2 weeks, not 4-6.

Dry Leaf Tincture: Make with 1:5 ratio, half water and half alcohol.

Tincture Dosage: Up to 1/2 teaspoons 3x per day.

Decoction: 2 oz of leaf herb in 8 oz of water, simmer 15 minutes. Keep covered.

Decoction Dosage: 3-4 oz, 2-3x per day.

Cautions & Notes: High doses exceed 2-3 weeks can cause kidney damage. Once established, it grows extremely well and tolerates cold and heat very well. Considered invasive, hard to get rid of. The leaves are also edible, even raw. It's best for tinctures. Decoctions demonstrate less antimicrobial properties.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .471
1 quart = .951
1 gallon = 3.81

Isatis

Pollination: Self/Insect
Lifespan: Biennial

When to Plant

Start seedlings 4-6 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant seeds 1/4-1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 4-6 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 12-24 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces food in 45-55 days (2 months).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 50-75F.
Water: 1-2 inches per week.
Soil pH: 6-8
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest isatis leaves in late spring, before the plant flowers. Cut about 1/3 and let it regrow. Harvest the roots in late fall or early spring, before it rebuds.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Strong, broad antiviral properties against Influenza A and B, SARS, Covid, Rubella, Measles, Chicken Pox, EB Virus, Hepatitis, Herpes, and more. Also used to treat encephalitis.

Fresh Leaf and Root Tincture: 2 parts leaves, 1 part root, 1:5 ratio with 25 percent alcohol. Bring to boil, add 1 tablespoon vinegar, and simmer for 30 minutes. Only add alcohol after the boiling process. Let sit for 2 weeks.

Tincture Dosage: 30 drops, 6x per day.

Decoction: 2-4 oz in 1 pint of water, simmer 30 minutes. Keep covered.

Decoction Dosage: 1 cup, 3x per day.

Cautions & Notes: Side effects from high doses or extended use include high blood pressure, bloody discharge, and serious breathing problems. Not recommend for use longer than 3 weeks or anyone with allergic reactions to aspirin.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .471	1 quart = .951
	1 gallon = 3.81

Licorice

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

Start root cuttings with buds 4-6 weeks before last frost. Plant successions through early summer for continual harvest.

How to Plant

Plant root cuttings with buds 2-3 inches deep.
Indoors: Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 4-6 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost.
Between plants: 24-36 inches.
Between rows: 36-48 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces in 2-3 years (for roots).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest licorice root in early fall of the second year, after the leaves have died back. Wait until the third year for bigger, more potent roots. Dig up the roots with a fork.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Strong, broad antiviral properties against Influenza A, SARS, Covid, RSV, Herpes, pox viruses, and more. Also used to treat encephalitis and tuberculosis.

Dry Root Tincture: Make with 1:5 ratio, 50 percent water.

Tincture Dosage: 30-60 drops, 3x per day.

Hot Infusion: 1 teaspoon in 8 oz of water, simmer 15 minutes. Keep covered.

Hot Infusion Dosage: 3 cups per day, 1 every two hours if very sick.

Decoction: 1-2 teaspoons powdered root in 16 oz of water, boil down to 8 oz.

Decoction Dosage: 4 oz, 4x per day.

Cautions & Notes: Licorice can cause heart problems or exacerbate existing ones, especially beyond 2 weeks. Once established, tolerates heat and cold well. If you're starting with seeds, you'll need to soak them for 2-3 weeks and then rough them up with sandpaper or a nail and soak again for 2-3 hours before planing. For medicine, licorice works best when combined with Chinese Skullcap.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .471	1 quart = .951
	1 gallon = 3.81

Lion's Mane

Pollination: Self
Lifespan: Perennial

When to Plant

It's a mushroom, so start it indoors anytime. Start in a substrate bag. Best to move outdoors when it's 60-70F.

How to Plant

It's best to get a substrate/saw dust kit with lion's made included. Cut slits in the bag. Keep it in a semi-dark, cool place at 60-70F for about 2-3 weeks. Keep humidity 75 percent or above, mist 2-3 times a day. Keep them in a bag or container. Mist the container, not the mushrooms. (Keep them dry.) It's ready to transplant or harvest in about 3 weeks. They'll start to release spores around this time, and the mushroom spikes will grow longer, looking like a lion's mane (hence the name).

How Long It Takes

Produces mushrooms in 2-3 weeks.

Care/Best Growing Conditions

Sun: 8-10 hours indirect sun.
Temperature: 60-70F.
Water: Mist 2-3, keep in moist bag.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest lion's mane after 2-3 weeks. Slice and use to make tinctures or infusions. You can also dry them for longterm storage. Dry for 1-2 weeks. You can also use a dehydrator.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Shows potent ability to help repair nerve tissue in the brain, boosting memory and concentration. Also shows a lot of potential to help with sleep, anxiety, and ADHD. Also shows potential with managing blood sugar and high blood pressure.

Tincture: Two step process. Make regular alcohol tincture, 4-6 weeks. Cover remaining mushrooms with water, 2-4 hours. Let cool, then combine with alcohol tincture in a 2:1 alcohol to water ratio.

Tincture Dosage: 30-60 drops, 3x per day.

Hot Infusion: 1-2 teaspoons dried mushrooms or powder in 8 oz, steep 15-20 minutes

Hot Infusion Dosage: 1 cup 2-3x per day.

Cautions & Notes: Extended use at high doses can interfere with blood clotting, blood pressure, and diabetes medications. Can also interfere with meds for autoimmune disorders and immunosuppressants. Strain infusions and tinctures an extra time through cheesecloth or a coffee filter to remove fuzz/hairs that irritate the throat.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .471	1 quart = .951
	1 gallon = 3.81

Lomatium

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

Very difficult to start from seed. Better to translate and let it grow on its own. For seeds, direct sow in late fall for a spring start.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Start by storing in wet sandy bag in the fridge for 60-90 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 18-30 inches.
By square foot: 1 per foot.

How Long It Takes

Several years (3+) for roots.

Care/Best Growing Conditions

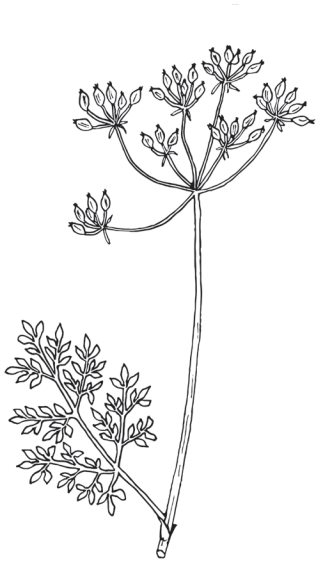
Sun: 8-10 hours full sun.
Temperature: 60-75F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest lomatium roots in the fall or winter. Dig them up, cut them, and dry them for longterm storage. Works best with a dehydrator.

Collecting Seeds

See general instructions for collecting seeds.



Medicinal Information

Facts: Strong antiviral properties against Influenza A and B, SARS, Covid, pneumonia.

Root Tincture: Make with 1:2 ratio, 30 percent water. 2 weeks. Dry Root Tincture: Make with 1:5 ratio, 30 percent water. 2 weeks.

Tincture Dosage: 100 drops per hour.

Hot Infusion: 1 teaspoon in 6 oz of water, steep 1 hour. Keep covered.

Hot Infusion Dosage: 2-3 oz, 2-3x per day.

Cautions & Notes: In 5-10 percent of people, an alarming rash can erupt and cover the entire body during the first week. It doesn't represent a threat and resolves on its own. Fever can also occur. It's very difficult to start from seed. Roots need to be old, bitter, and oil to generate antiviral properties. Once established, tolerates a range of conditions from mid 90s F down to negative temperatures. For serious infections, combine lomatium tincture with red root, licorice, and pleurisy tinctures. Make a batch of 16 oz equal parts and take 1 teaspoon 6x per day. You can also use steam from lomatium infusions, like a humidifier mix.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .471
1 quart = .951
1 gallon = 3.81

Mullein

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

Best to direct sow in late winter. Indoors, start seedlings 6-8 weeks before last frost. Consider soaking in wet sandy bag for 30-60 days.

How to Plant

Plant seeds 1/8 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 18-24 inches.
Between rows: 24-36 inches.
By square foot: 1 per square foot.

How Long It Takes

Spring for leaves, second year for the rest.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest mullein leaves during late spring. Harvest flowers during the second summer, and roots during the first fall or second early spring for the most potency. If storing longterm, dry 2-3 weeks.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Shows some antimicrobial potential against Influenza and pneumonia. Can also be used as poultice (wet heap) on rashes, burns, and wounds. Infusions can help restore lung health and help with joint/muscle pain.

Leaf Tincture: Make with 1:2 ratio for fresh, 1:5 for dried. 6-8 weeks.

Root Tincture: Make with 1:2 ratio for fresh, 1:5 for dried. 6-8 weeks.

Tincture Dosage: 40-50 drops, 3x per day.

Hot Infusion: 1 oz in 1 pint, simmered 15 minutes and steeped 4-8 hours.

Hot Infusion Dosage: 1 cup 2-3x per day.

Cautions & Notes: Seeds are considered potentially toxic. Strain infusions and tinctures an extra time through cheesecloth or a coffee filter to remove fuzz/hairs that irritate the throat.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .47l	1 quart = .95l
	1 gallon = 3.8l

Oregon Grape Root

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

Best to plant from 6-inch root divisions.
Start seedlings 6-10 weeks before last frost.
Stratify for 30-120 days first.

How to Plant

Plant seeds 1/2-1 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 3-4 days.
Outdoors: Plant in late fall and let germinate over winter. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 36-48 inches.
Between rows: 48-72 inches.
By square foot: 1 per 1-2 square foot.

How Long It Takes

Produces food in 90-150 days (3-5 months).

Care/Best Growing Conditions

Sun: 6-8 hours full sun, partial shade.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 5.5-6.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest Oregon grape root in the middle or late fall, when the leaves die back. Dig up with a fork. Dry 1-2 weeks for longterm storage. You can also use a dehydrator.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Shows some antimicrobial properties. Also used to treat skin irritations and conditions. Can also lower blood sugar.

Salve: 1 cup, or pack one jar, cover with with olive oil or something similar, infuse 4-6 weeks. Add 1 oz of beeswax.

Root Tincture: Make with 1:2 ratio for fresh root, 1:5 for dry.

Tincture Dosage: 30-60 drops, 2-3x per day.

Hot Infusion: 1-2 teaspoons dried root in 1 cup, steep 15 minutes. Keep covered.

Hot Infusion Dosage: 1 cup, 2-3x per day.

Cautions & Notes: Poses risk to anyone with liver and kidney problems. Tolerates extreme temperatures very well, down to negative digits and up to triple digits. The bark and underground stems also show many of the same medicinal properties and can be used along with the root.

1 teaspoon = 4.9ml
1 oz = 29.57ml
1 pint = .471
1 tablespoon = 14.78ml
1 cup = 240ml
1 quart = .951
1 gallon = 3.81

Pink-Striped Trumpet Lily

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

It's best to plant bulbs in early spring or fall. If starting from seed, plant 8-10 weeks before last frost.

How to Plant

Plant seeds 1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Supplement sun with grow light as needed. Transfer after 8-10 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 18-24 inches.
By square foot: 2-3 per square foot.

How Long It Takes

Leaves ready to harvest within 60 days.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 60-75F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest trumpet lily leaves when the plant produces 15-30. It's best to let the plant grow into its second season. Harvest up to 1/3 of the plant so it can regrow. Fresh or slightly yellow leaves in summer or fall are best for medicine.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Used as a poultice to help heal wounds and bites from snakes/poisonous insects. Ointments used for rashes and burns. Teas can help with general pain and cramps. Also aids prostate health.

Poultice: Apply leaves directly to wounds or rashes. You can also chop or grind them into a mash. Can heat first.

Hot Infusion: 1-2 tablespoons of leaves and flower petals in 8 oz of water, steep 15 minutes.

Cautions & Notes: Can raise your heartrate and elevate your temperature. Some people experience hallucinations. The bulb is toxic. While the plant can be used for tinctures and teas, it's best to only use the leaves to treat external wounds and injuries.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .471	1 quart = .951
	1 gallon = 3.81

Pleurisy Root

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

Start seedlings 3-4 weeks before last frost. Good idea to stratify 2-4 weeks first.

How to Plant

Plant seeds 1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-24 inches.
Between rows: 24-36 inches.
By square foot: 1 per 1-2 square foot.

How Long It Takes

Ready to harvest fall of second year.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 65-75F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest pleurisy root the fall of the second year, after the leaves have died back. Dig up with a fork. Dry 1-2 weeks for longterm storage.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Helps fight infections and ease symptoms. Can also treat fevers, cramps, and stomach problems.

Root Tincture: Make with 1:2 ratio for fresh root, 1:5 for dry.

Tincture Dosage: 20-40 drops, 3x per day.

Hot Infusion: 1 teaspoon dried root in 1 pint, simmer 15 minutes. Keep covered.

Hot Infusion Dosage: 1 cup, 2x per day

Cautions & Notes: High doses can lead to heart problems. Can interact with heart medications. Can also cause nausea and vomiting. Works like estrogen, and can make estrogen supplements less effective. Especially avoid if you're pregnant or breastfeeding.

1 teaspoon = 4.9ml
1 oz = 29.57ml
1 pint = .471
1 tablespoon = 14.78ml
1 cup = 240ml
1 quart = .951
1 gallon = 3.81

Pokeweed

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

It's best to direct sow in winter for spring growing. Otherwise, stratify for 1-3 months. Start 6-8 weeks before last frost.

How to Plant

Plant seeds 1/2 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-8 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 18-36 inches.
Between rows: 36-48 inches.
By square foot: 1 per 1-2 square foot.

How Long It Takes

Roots ready to harvest in fall.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 4.7-8
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest pokeweed root in the fall, after leaves have died back. Dig up with fork. Dry for 1 week. You can also use a dehydrator.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Originally used to treat swollen lymph nodes, arthritis, and skin irritations. Also shows antiviral properties. Roots most used part, but sometimes berries.

Pokeweed Salve: Douse pokeweed in olive oil or something similar and infuse for 4-6 weeks. Strain out root. Use 1/2 cup with 2 tablespoons beeswax and shea butter.

Cautions & Notes: Pokeweed is highly toxic, even lethal, so don't use it unless you feel extremely comfortable with the instructions. Use externally. Don't drink. Don't consume.

1 teaspoon = 4.9ml
1 oz = 29.57ml
1 pint = .47l
1 tablespoon = 14.78ml
1 cup = 240ml
1 quart = .95l
1 gallon = 3.8l

Red Root

Pollination: Self/Insect
Lifespan: Perennial

When to Plant

It's best to direct sow in late winter. Indoors, start seedlings 6-8 weeks before last frost. Refrigerate in wet, sandy bag for 30-60 days.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: After chilling, plant 2-3 seeds per plug. Thin after sprouting. Supplement sun with grow light as needed. Transfer after 3-4 weeks. Harden off for 3-4 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 18-36 inches.
By square foot: 1 per foot.

How Long It Takes

Roots ready during second late fall.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest red root during late fall or early winter, after a frost or two. The frost activates antiviral and medicinal properties, turning the root red and pink. Dig up with a fork. Dry 5-10 days if storing long term.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Broad antiviral properties. Used by indigenous North Americans to treat infections, pneumonia, digestive problems, aches, and urinary tract infections. Also shown to help reduce blood pressure and blood sugar levels.

Fresh Root Tincture: Make with 1:2 ratio. Dry Root Tincture: Make with 1:5 ratio.

Tincture Dosage: 30-90 drops, 4x a day.

Tea: 1 teaspoon powdered root in 8 oz of water, brew 15 minutes.

Tea Dosage: 2-6 cups per day.

Decoction: 1 oz root in 16 oz water, simmer 30 minutes.

Decoction Dosage: 3-4 oz, 3-4x per day.

Cautions & Notes: Can interfere with meds for high blood pressure and diabetes. Cut, chop, and crush when it's fresh before it dries and hardens. Red root can interfere with blood clotting. It has effects similar to blood thinners.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .471
1 quart = .951
1 gallon = 3.81

Rhodiola

Pollination: Self
Lifespan: Perennial

When to Plant

You can start from root crowns. From seed, best to direct sow in late fall. Indoors, start seedlings 6-8 weeks before last frost. Stratify 4-6 weeks first.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: After chilling, plant 2-3 seeds per plug. Thin after sprouting. Supplement sun with grow light as needed. Transfer after 4-6 weeks. Harden off for 3-4 days.
Outdoors: Plant in late fall. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 18-36 inches.
By square foot: 1 per foot.

How Long It Takes

Roots ready to harvest in 4-5 years.

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 70-90F.
Water: 1-2 inches per week.
Soil pH: 6-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest during the fall of the 4th or 5th year. Dig up with a fork.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Helps with stress management. Improves mental focus and concentration. Also increases energy and physical performance.

Root Tincture: Make with 1:2 ratio for fresh root, make with 1:5 ratio for dry.

Tincture Dosage: 15-30 drops, 3-4x a day.

Hot Infusion: 1 tablespoon dry root in 1 cup. Steep 10-15 minutes.

Hot Infusion Dosage: 1 cup, 1-3x per day.

Cautions & Notes: Rhodiola root has potent effects on energy levels, so herbalists recommend taking it earlier in the day to avoid disrupting sleep. If you're a night owl, then just know that it's going to keep you up.

1 teaspoon = 4.9ml
1 tablespoon = 14.78ml
1 oz = 29.57ml
1 cup = 240ml
1 pint = .471
1 quart = .951
1 gallon = 3.81

Yarrow

Pollination: Insect
Lifespan: Perennial

When to Plant

Start seedlings 6-10 weeks before last frost. Stratifying recommended.

How to Plant

Plant seeds 1/8-1/4 inch deep
Indoors: 2-3 seeds per plug. Thin after sprouting. Can start them in a cold frame/small greenhouse. Supplement sun with grow light as needed. Transfer after 6-10 weeks. Harden off for 7-10 days.
Outdoors: Plant right after last frost. 2-3 seeds per 12 square inches. Thin after sprouting.
Between plants: 12-18 inches.
Between rows: 18-24 inches.
By square foot: 1 per square foot.

How Long It Takes

Produces in 120-130 days (4 months).

Care/Best Growing Conditions

Sun: 8-10 hours full sun.
Temperature: 60-75F.
Water: 1-2 inches per week.
Soil pH: 5.5-7.5
Common pests: Aphids, flea beetles, loopers, cutworms, slugs, snails, whiteflies, harlequin bugs, thrips

Harvesting

Harvest yarrow in mid summer during full flowering. Harvest 1/3 of the plant to allow for regrowth. If storing long term, dry for 1-2 weeks.

Collecting Seeds

See general instructions for collecting seeds.

Medicinal Information

Facts: Known for helping to stop bleeding and healing wounds. Also antimicrobial, almost like nature's baind-aid. Tinctures and hot infusions help with menstrual pain and indigestion. Can also help with high blood pressure and thrombosis. Many herbalists also testify to its use as an antiviral and cold remedy.

Leaf poultice: Apply leaves directly to wounds or chop/crush and apply.

Leaf Tincture: Use 1:2 ratio for fresh, 1:5 for dry. 4-6 weeks.

Tincture Dosage: 10-20 drops, 3x per day.

Hot Infusion: 1-2 teaspoons in 1 cup, steep 15 minutes.

Hot Infusion Dosage: 1 cup, 3x per day.

Cautions & Notes: Can interfere with meds for high blood pressure and diabetes. Can slow blood clotting. Although herbalists caution against herb use during pregnancy, this one in particular can cause problems.

1 teaspoon = 4.9ml	1 tablespoon = 14.78ml
1 oz = 29.57ml	1 cup = 240ml
1 pint = .471	1 quart = .951
	1 gallon = 3.81

Weed Herbs

Burdock

Facts: Broad antimicrobial properties. Used to treat joint pain and liver problems. Also shows potential to help manage arthritis and diabetes.

Root Tincture: Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 20-30 drops, 2-4x per day.

Hot Infusion: 1-2 tablespoons dried root in 2-3 cups water. Summer 10-15 minutes. For stronger infusion, 2-3 tablespoons dried root in 4 cups water. Boil. Steep 4-6 hours.

Hot Infusion Dosage: 1-2 cups, 3-4x per day.

Chickweed

Facts: Used to help with skin problems, rashes, bug bites, burns. Also promotes wound healing. Also shows potential to help with joint pain and arthritis.

All Purpose Tincture: Use equal parts stems, leaves, flowers. Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 30-60 drops, 1-3x per day.

Poultice: Chop or crush leaves. Mix with olive or oil something similar. Mix into thick paste. Apply directly to area that needs treatment.

Dandelion

Facts: Helps with stomach problems and supports liver health. Also shows potential to help manage high blood pressure and inhibit cancer cell growth.

All Purpose Tincture: Use equal parts roots, leaves, and flowers. Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 30-60 drops, 1-3x per day.

Hot Infusion: Use equal parts roots, leaves, and flowers. 1 cup flower parts in 1 cup water. Boil then steep 10-20 minutes.

Hot Infusion Dosage: 1 cup, 2-3x per day.

Japanese Knotweed

Facts: Somewhat strong antimicrobial properties. Also used to treat Lyme Disease, supporting nervous system and improving blood flow.

Tincture: Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 30-60 drops, 1-3x per day.

Hot Infusion: 8 oz dried root in 2 cups water. Simmer 10-15 minutes.

Hot Infusion Dosage: 1 cup, 3-4x per day.

Jewelweed

Facts: Used to treat skin irritations as well as poison ivy, poison oak, and rashes. Also used to treat insect bites and strings, as well as sunburn.

Poultice: Chop or crush leaves. Mix with olive or oil something similar. Mix into thick paste. Apply directly to area that needs treatment.

Notes: Herbalists mainly used jewelweed externally now to treat skin irritations and injuries. Although it's edible, consuming too much in high concentrations like tinctures and infusions can cause vomiting or stomach problems.

Kudzu

Facts: Known for promoting moderate alcohol consumption. Also promotes cardiovascular and neural health. Shows potential to relieve menopausal symptoms.

Root Tincture: Make with 1:2 ratio for fresh, 1:5 for dried. 6-8 weeks.

Tincture Dosage: 30-60 drops, 1-3x per day.

Hot Infusion: 1 tablespoon dried root in 1 cup water. Heat (don't boil), 2-5 minutes while stirring continuously. Will turn thick and dark.

Hot Infusion Dosage: 1 cup, 2-3x per day.

Lambsquarter

Facts: Used to treat skin irritations, sunburns, insect bites, scrapes. Can also help with stomach problems.

Tincture: Use equal parts leaves and flowers. Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 20-30 drops, 1-3x per day.

Poultice: Chop or crush leaves. Mix with olive or oil something similar. Mix into thick paste. Apply directly to area that needs treatment.

Stinging Nettle

Facts: Helps with allergy problems. Also used to treat joint pain and urinary tract infections. Also shows potential to help manage high blood pressure.

Leaf Tincture: Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 30-60 drops, 1-3x per day.

Hot Infusion: Use leaves. 1 cup in 1 quarter. Boil, steep 4-8 hours.

Hot Infusion Dosage: 1 cup, 2-4x per day.

Pineappleweed

Facts: Helps with stomach aches and cramps. Used to treat skin irritation and burns. Also used as a mild sedative to promote sleep.

Tincture: Use flower heads. Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 30-90 drops, 1-3x per day.

Poultice: Chop or crush leaves. Mix with olive or oil something similar. Mix into thick paste. Apply directly to area that needs treatment.

Plantago (Plantain)

Facts: Offers immune system support. Used to treat insect bites, stings, as well as burns and cuts. Also shows potential to help regulate blood sugar.

Tincture: Use leaves. Make with 1:2 ratio for fresh, 1:5 for dried. 4-6 weeks.

Tincture Dosage: 10-15 drops, 1-3x per day.

Poultice: Chop or crush leaves. Mix with olive or oil something similar. Mix into thick paste. Apply directly to area that needs treatment.

How to Mend Clothes

Knowing how to mend and repair clothes gives you a considerable advantage in a longterm emergency. Not only does it help items last longer, it also gives you a skill to trade. If you're not great at sewing, it makes sense to round up one or even several guides. You can find plenty of old, out-of-print books on sewing in open libraries. This guide is presenting excerpts that cover some of the most common mending methods.

Many mending procedures can be quickly and easily done by hand. Although a sewing machine is a definite time-saver on many projects, it's absolutely necessary for only a few. Once you've mastered the basics of hand sewing, you'll be able to handle nearly all of the most common repairs.

Mastery of hand sewing involves more than knowing where to push the needle in and where it pull it out; you should know which thread to use, how long to cut it, and when and how to knot it, among other things. The instructions given below will help you get started correctly.

Which Needle & Thread?

General purpose thread is suitable for nearly all mending jobs. Use heavy-duty thread only for extra-heavy jobs, such as sewing on coat buttons, or where a heavier thread has already been used for a decorative purpose, such as coat and jacket buttonholes or topstitching. Match the fabric color as closely as possible, and remember: A thread that looks a shade or two darker on the spool will match the fabric better than one that looks the same shade.

Use the finest needle that has an eye big enough to accommodate the thread easily. A short needle is best used for short, single stitches, as in backstitching; a longer needle is appropriate for longer stitches or for when you take several stitches on the needle at one time, for example, when you baste or do the running stitch.

Cutting the Thread

Always use scissors to cut thread from a spool. Don't bite it off with your teeth or break it; this leaves a ragged end that is difficult to thread through the eye of the needle. Hold the scissors at a sharp angle when cutting so the thread has a pointed end for easy threading.

Most mending projects require a single thread; some, sewing on buttons for example, require the strength of a double thread. Which you should use will be noted in each project. If you are using a single thread, cut it 16 to 20 inches (40.5 to 51 cm) long; cut a double thread 24 to 30 inches (61 to 75 cm) long so that when it is doubled it is only 12 to 15 inches (30 to 37 cm) long.

Threading the Needle

Holding the needle upright with one hand, rotate it in your fingers until you can see the eye. Hold the cut thread about ¾ inch (20 mm) from the end with the fingers of the other hand and push the thread through the eye of the needle until about ½ inch (13 mm) extends beyond the eye *(fig. 1)*. If you have trouble, try positioning the needle in front of a white surface so the eye is more visible, or stiffen the thread end by moistening it or running it through some beeswax. You can also try a needle with a larger eye or use a needle threader.

Pull the thread through the eye of the needle. Pull one-third (about 5 to 7 inches or 12 to 18 cm) the thread length through for a single thread. Match the ends if a double thread is needed for the mending job *(fig. 2)*.

Figure 2

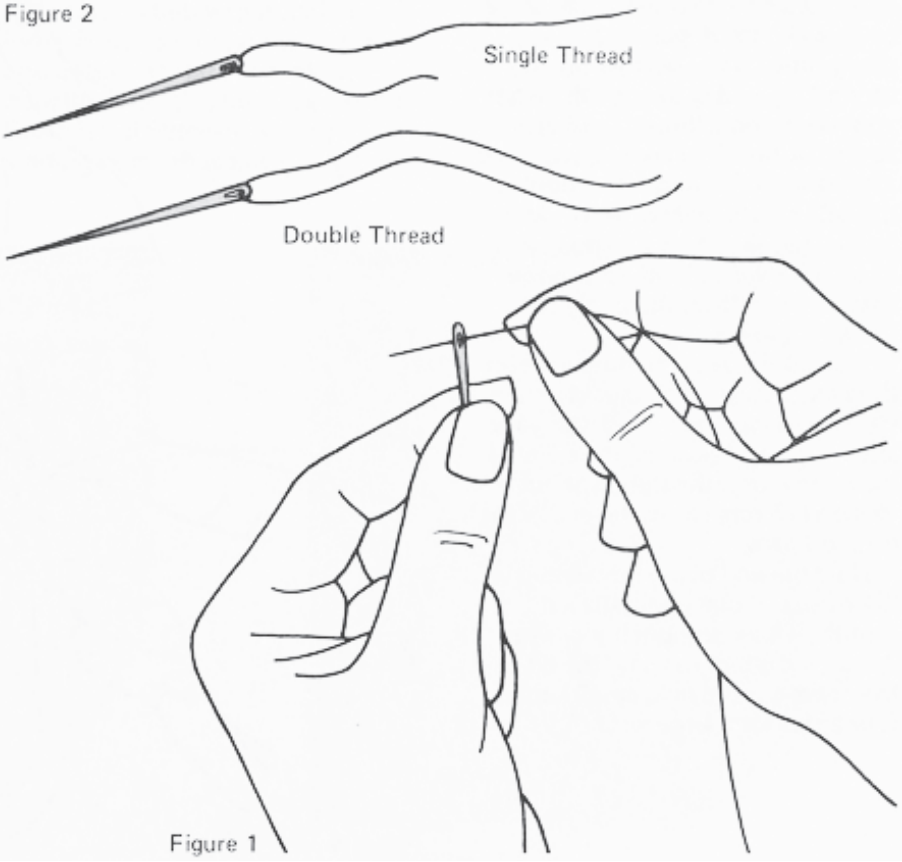


Figure 1

Knotting the Thread

For almost all hand sewing projects you will knot your thread before beginning to sew. The directions for each project will note whether you should knot the thread.

You can use the method illustrated here to make either large or small knots, depending on how many times you wrap the thread around the end of the needle. When you use a single thread or when you sew on lightweight fabrics, you need a small knot. Sewing with a double thread or on loosely woven or knit fabrics requires a larger knot. No knot, however, should be so large that it shows through, or creates a lump on the garment.

Place the end of the thread along the ball of the index finger of your left hand. Hold the thread with your left thumb and position the point of the needle over the thread about ½ inch (13 mm) from the end of the thread *(fig. 4)*.

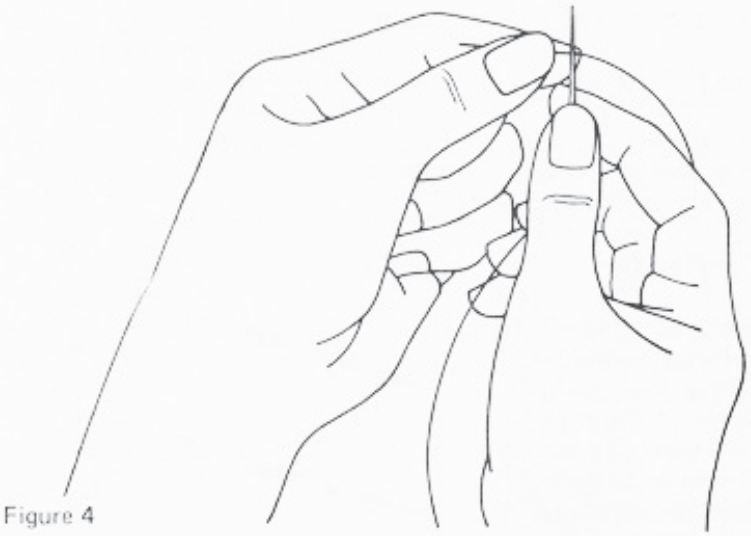


Figure 4

Hold the end of the thread and the needle in place with the left thumb. With your right hand, wrap the thread snugly around the tip of the needle, twice for a small knot or four times for a large knot *(fig. 5)*.

Figure 5

Pinch the wrapped thread between the thumb and index finger of the left hand. Push the needle up between those fingers as far as you can with the second finger of the right hand. Then, grasp the point of the needle with the thumb and index finger of the right hand and slide the wrapped thread slowly and smoothly down the needle, over the eye, and down the length of the thread into a snug knot *(fig. 6)*. Trim away the excess thread below the knot.

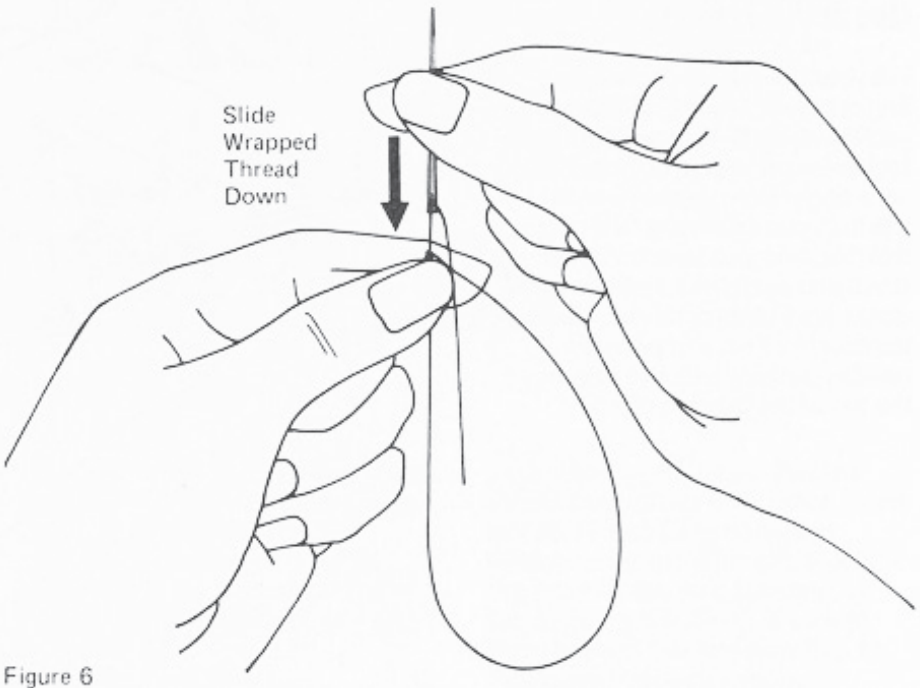


Figure 6

When Not to Knot

The knot at the end of the thread will hold it securely when you are starting a seam, beginning a hem, or replacing a button. The knot is meant to be placed out of sight between fabric layers or on the wrong side of the garment. Sometimes it's not possible to hide a knot. Use the following procedure instead:

Slip the needle between the fabric layers about ½ to 1 inch (13 to 25 mm) from where you want the stitching to begin *(fig. 7)*. Pull the thread very gently until the end is between the fabric layers. Hold the fabric layers between thumb and index finger, securing the thread end between them, and take a couple of very tiny backstitches (see Basic Hand Stitches) at your starting point, thus anchoring the thread permanently *(fig. 8)*.

At the end of your stitching, you will follow a similar procedure to secure your stitches and conceal your thread end. Take a couple of very tiny backstitches at the end of your line of stitching, then insert the needle between the fabric layers, bringing it out again about ½ to 1 inch (13 to 25 mm) away. Cut the thread very close to the fabric surface.

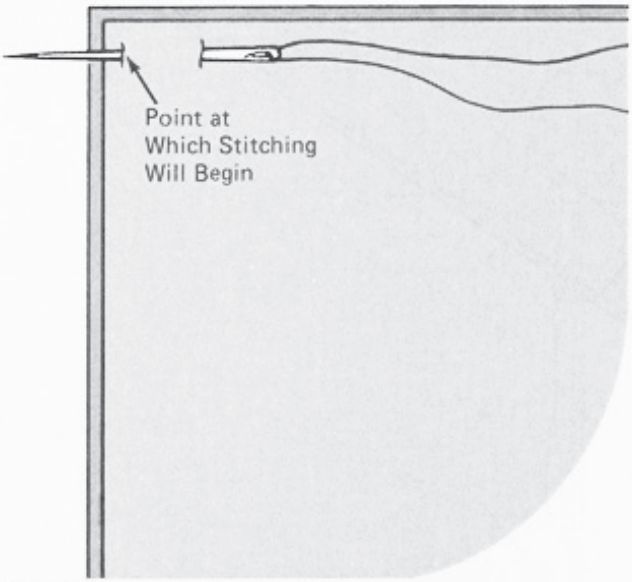


Figure 7

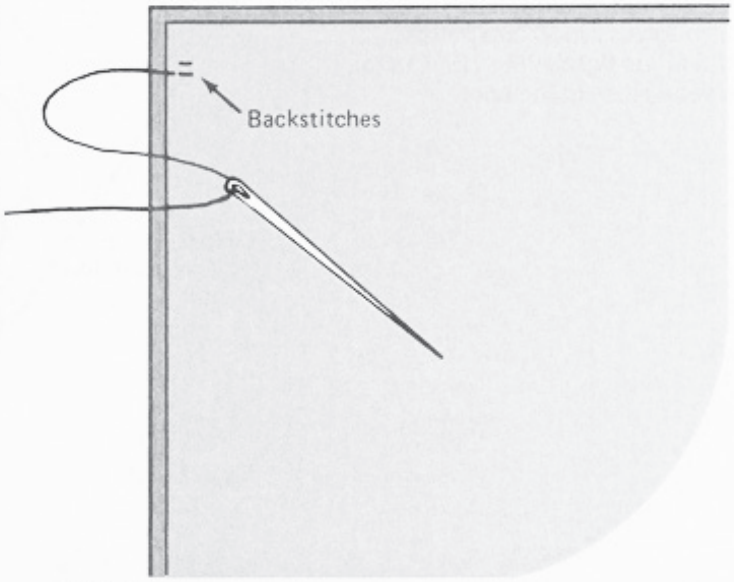


Figure 8

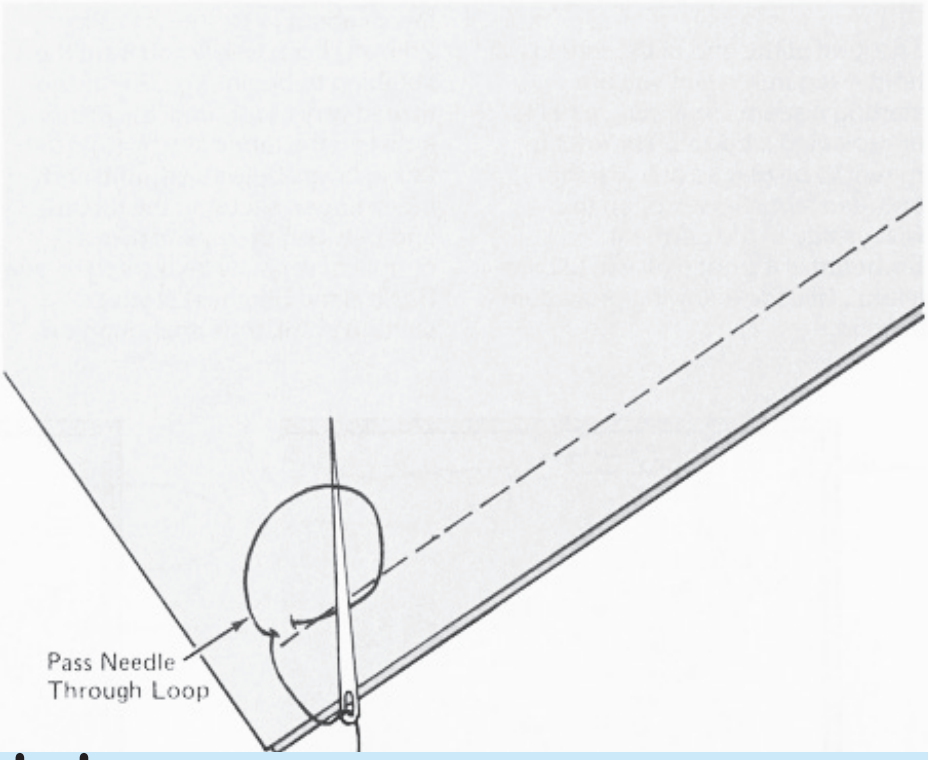
Use of the Thimble

Put your thimble on the middle finger of your sewing hand when you are ready to start sewing. It will feel awkward at first, but it will keep your finger from getting sore and will help you sew faster. With the thimble, you give an extra thrust when you push the needle through dense and/or thick fabrics. Use the thimble to direct and push the needle, pushing with the side, not the top of the thimble *(fig. 9)*.

Figure 9

Fastening Your Stitches

When you come to the end of a seam or hem, or have finished sewing on a button, you must secure your stitches. Work on the wrong side so your fastening stitches won't show. Take a small backstitch (see Basic Hand Stitches) in the fabric and pull the thread up snugly. Take another backstitch at the same point and pull up the thread, leaving just a small loop. Insert the needle through this loop and pull the thread up tightly *(fig. 10)*. Cut the thread close to the knot.



Basic Hand Stitches

You'll use these four hand stitches over and over again in your mending. You'll find directions for other kinds of hand stitches in the text for different mending projects, but these four will carry you through many, if not most, repairs. If you haven't sewn before, you may want to practice these stitches to develop the ability to stitch evenly in a straight line.

Backstitch

The strong and versatile backstitch is the best alternative to a machine straight stitch. You'll use it to fasten off your work at both the beginning and end of a line of stitches and to repair all kinds of seams. The backstitch can also be used for topstitching, the decorative line of stitching on the right side of your garments.

Viewed from the top, backstitching appears as a continuous line of even stitches. Viewed underneath, the stitches are twice as long as those on top and they overlap at the ends. Use a single knotted thread. Work from right to left. Insert the needle from the underside of the fabric layers ⅛ inch (3 mm) to the left of where your stitching will begin. Pull the thread through up to the knot. Insert needle ⅛ inch (3 mm) behind where the thread emerges, that is, at the point where your stitching will begin. Bring needle up ¼ inch (6 mm) beyond this insertion *(fig. 1)*. Pull thread through snugly.

Insert needle through all layers ⅛ inch (3 mm) behind where it emerged, i.e., at the end of the previous stitch. Bring needle up ¼ inch (6 mm) beyond insertion, and pull thread through. Continue in this manner, forming evenly spaced stitches about ⅛ inch (3 mm) long *(fig. 2)*.

Figure 1

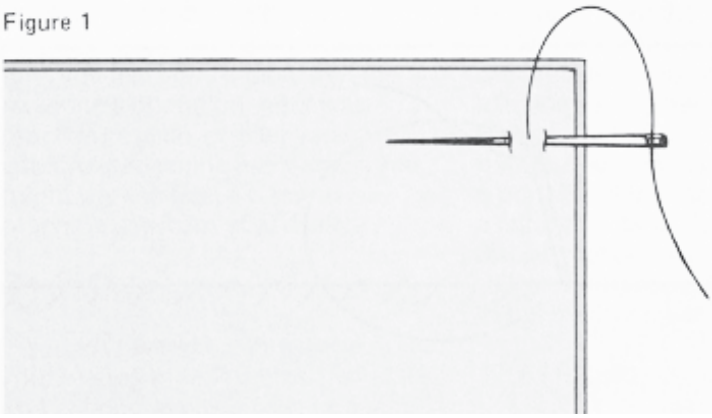
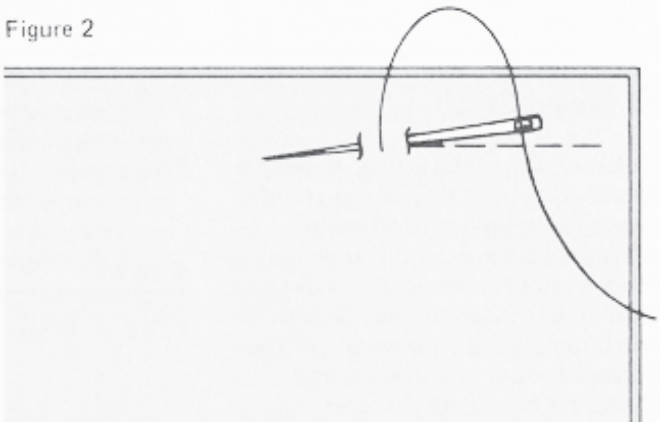
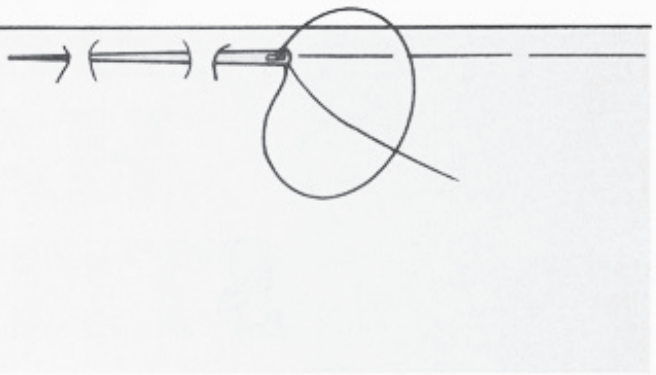


Figure 2



Basting

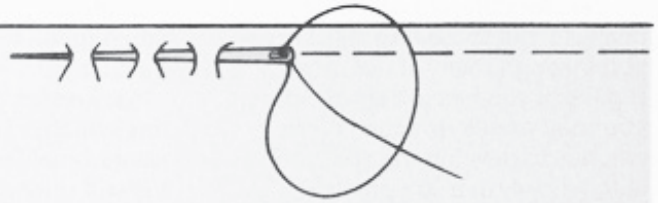
Figure 3



Basting is used to hold two or more layers of fabric together temporarily during fitting or construction. Because you will be pulling these threads out, you should use an unknotted, single thread. Work from right to left. Insert the needle from the right side, and weave the point in and out two or three times. Basting stitches may be as much as an inch long. Pull thread partially through, securing the unknotted end between thumb and index finger so that you don't pull it through entirely. Reinsert needle, and repeat process *(fig. 3)*. Do not backstitch at the end of your work, but leave the thread end loose so that the thread can be easily removed.

Running Stitch

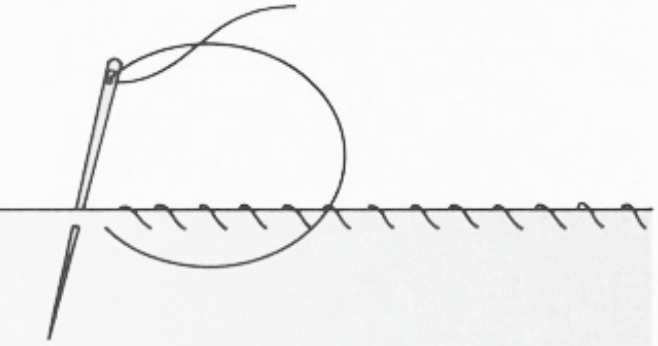
Figure 4



The running stitch is used for delicate repairs, topstitching, and gathering. It is worked in much the same way as basting, but the stitches are shorter and even and because they are permanent, you secure the thread at both ends of the work. Use a single, knotted thread. Work from right to left. Insert the needle from the wrong side, then weave the point evenly in and out of the fabric two or three times *(fig. 4)*. Make small, even stitches. Pull the thread through firmly, but avoid puckering the fabric.

Overcast Stitch

Figure 5



The overcast stitch is used to keep a fabric edge from fraying; you might overcast along hem and seam allowances, for example. Use a single, knotted thread. Work from right to left. Insert the needle from the underside of your work. Pull the thread through to the knot, and insert the needle from the wrong side again, ⅛ to ¼ inch (3 to 6 mm) to the left of the knot *(fig. 5)*. Pull thread through again, but not too tightly, or the fabric edge will curl. The more your fabric frays, the closer together your stitches should be. Keep the depth of the stitches uniform, and make them as shallow as possible without pulling the

Figure 1

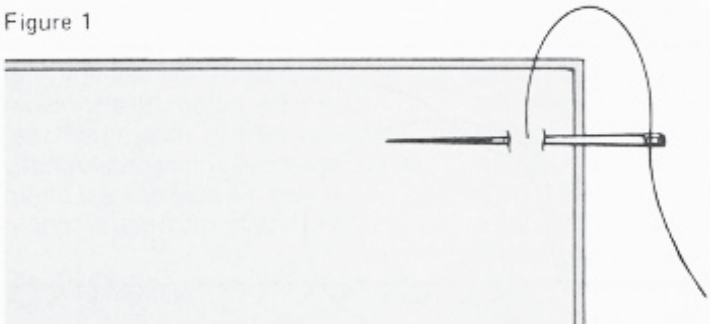
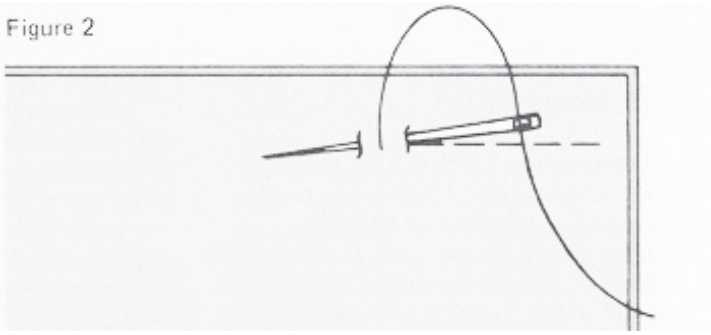


Figure 2



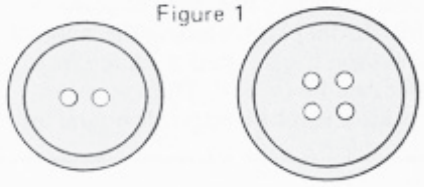
Repairing Buttons

A missing button can be a real nuisance, especially when it's missing from a very visible part of the garment. Help prevent this problem by occasionally checking your clothes to make sure the buttons are still secure. If any buttons are loose, cut them off and resew them immediately before you forget about them.

If a button does fall off, save it so you won't have to try to purchase a match. If you do lose the button, take the garment along when you shop for the replacement. The button chosen by the manufacturer complements the garment, fits the buttonhole accurately, and closes the garment properly. You're trying to match that selection in size, color, and style. It is sometimes difficult, and occasionally impossible, to find a perfect match. If you can't find a match, you will have to replace all the buttons on the garment with a new matching set. Make sure that the replacement buttons you buy can be cleaned in the same way the garment is cleaned; otherwise you'll have to remove and re-attach them each time the garment gets dirty.

There are basically two types of buttons: sew-through and shank *(fig. 1)*. Sew-through buttons have two or four holes through which the button is sewn onto the garment. Shank buttons have a small loop on the lower side through which they are sewn to the garment. Shank buttons are generally used on heavier fabrics and on outerwear. Don't switch from one type of button to another when choosing replacement buttons.

Figure 1



Sew-Through Buttons

Shank Buttons

Tip: Cut off the buttons from old garments before you discard them, and save them in a small jar. They can come in handy when you're trying to match or replace buttons on other garments.

Marking the Button Location

If the button was lost recently, there may still be some loose threads marking the button's location. Pull them out, using scissors or a seam ripper to cut tangled or knotted threads *(fig. 2)*. Sew the button on at the same spot. If there are no loose threads, you may be able to see some needle holes where the threads were, and you can use those for marking where the button belongs.

If there are neither loose threads nor needle holes to indicate where the button was, you'll have to mark the location by using the buttonholes. Button up all the buttons in line with the missing button; i.e., button up the shirt front buttons if that is where the button is missing. Make sure garment edges are aligned and the garment is lying flat. Put the point of your sharpened chalk pencil through the buttonhole and make a dot to determine button placement. If the buttonhole is horizontal, put the dot at the end of the buttonhole nearest the garment edge. If the buttonhole is vertical,

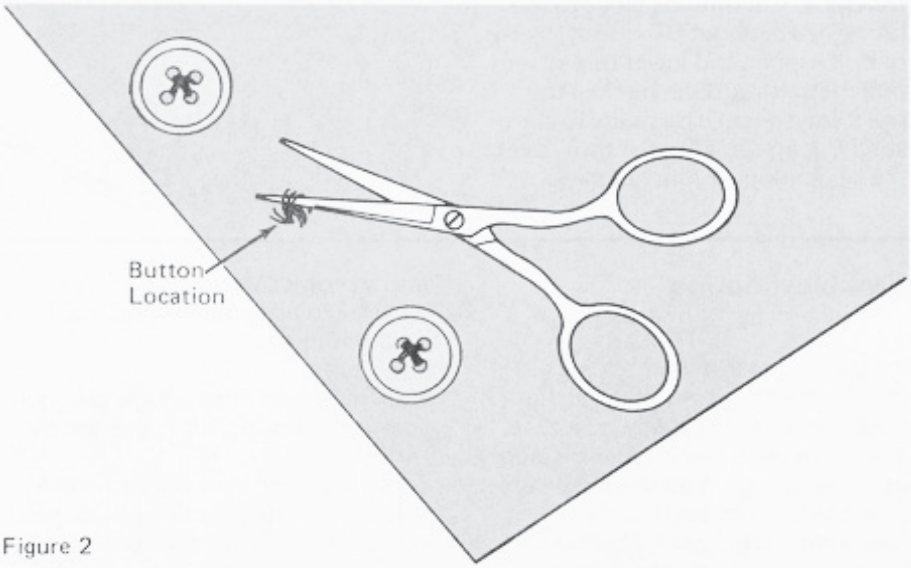


Figure 2

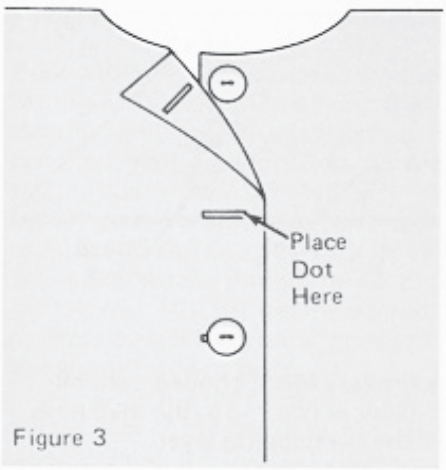


Figure 3

make the dot at the top of the buttonhole *(fig. 3)*. Place the marking for the button itself ⅛ inch (3 mm) away from the dot in the direction of the center of the buttonhole.

When the missing button stood alone, as on a one-button cuff or on a one-button jacket, and there are no thread or needle marks to guide you, there are two methods you can use to determine proper button placement. You can try on the garment, and mark the button

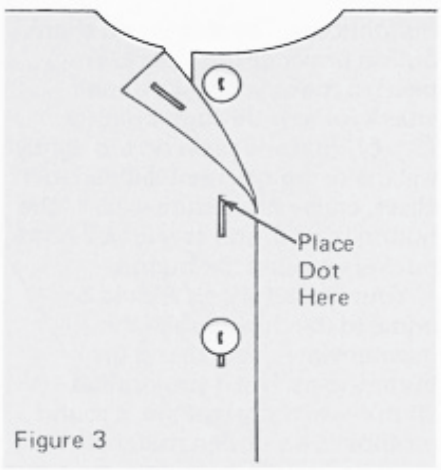


Figure 3

location through the buttonhole with a chalk pencil when the garment is held comfortably closed and properly aligned. A friend can be a great help in this procedure, especially if the button is in an awkward or hard-to-reach area. Remember to sew the button ⅛ inch (3 mm) away from the chalk dot toward the center of the buttonhole.

With some garments, a jacket for example, you can determine button placement by laying it on a work-

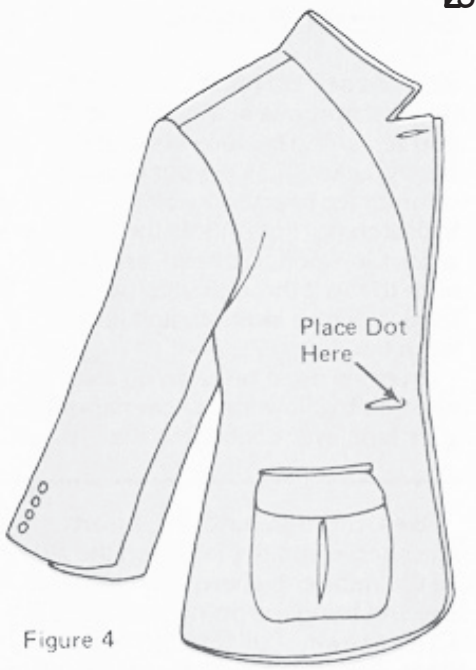


Figure 4

table, wrong sides together and closing edges aligned *(fig. 4)*. Mark the button location with a chalk pencil as described above.

Reinforcing the Fabric

Sometimes the fabric on which the button is sewn wears through or is ripped away. In such cases, you need to patch your garment before you sew the button back on. Consult the chapter on Holes & Tears for patching information.

If the fabric is worn along the entire button line, you can sew a long piece of cotton twill tape underneath the line before replacing the buttons *(fig. 5)*. Cotton twill tape is available at notions counters. Take off any remaining buttons. Pin the tape on the underside of the garment, centering it over the button line, and turning the cut ends under. Stitch it down, using a straight stitch on a sewing machine or a flat hem stitch (see Hems chapter) by hand. Then, replace the buttons.

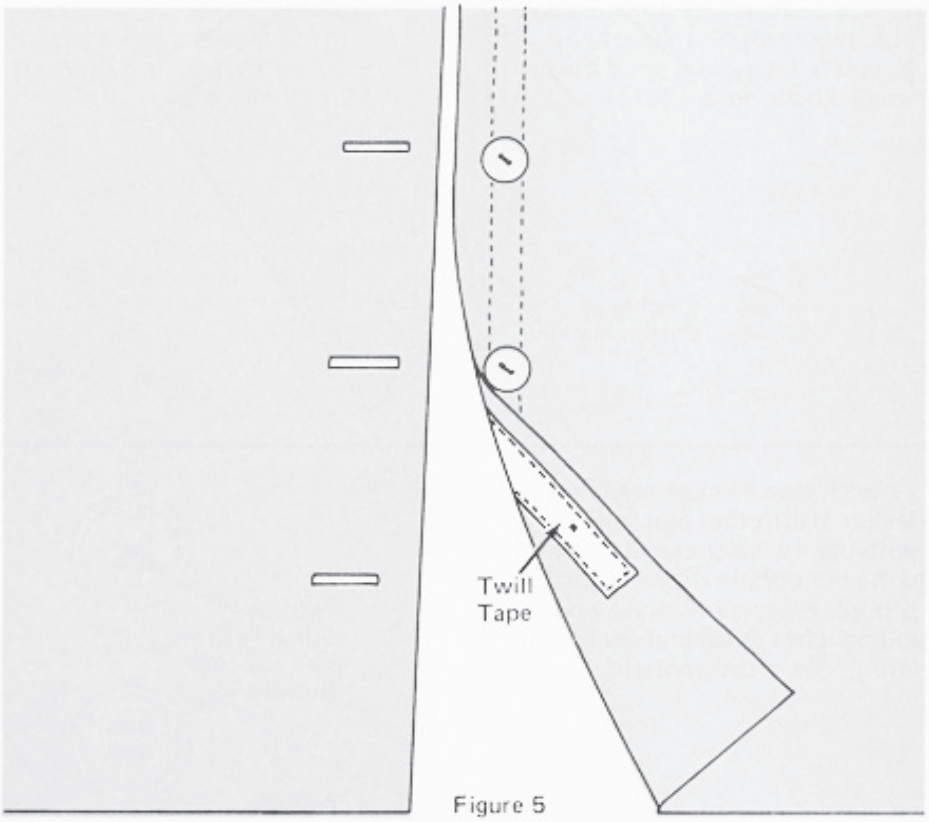


Figure 5

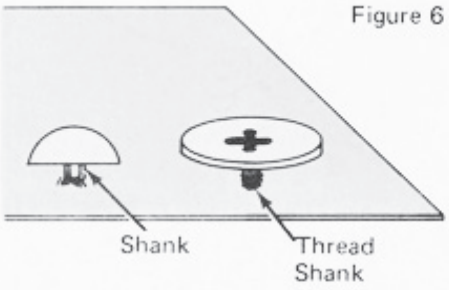
Sewing On Buttons

You can sew on most buttons with general purpose sewing thread. If you're sewing buttons on coats or heavy jackets, ask at your notions counter for heavy-duty or topstitching/buttonhole thread. Use a double, knotted thread, and be sure to run it through your beeswax to give it extra strength and keep it from tangling.

Buttons must be sewn on loosely enough to allow for the overlapping garment layer containing the buttonholes. The shank of a shank button provides this space. You need to make your own thread shank for sew-through buttons *(fig. 6)*. Buttons sewn on too tightly will make the garment difficult to close, cause premature wear of the button thread, and create pulls and puckers around the button.

Your thread shank should be equal to the thickness of the garment layer containing the buttonholes. Build your thread shank over a straight pin, a round toothpick, a wooden matchstick, or a similar object; choose a shank-builder according to the thickness of the overlapping layer.

Figure 6



Sew-through buttons. Insert the needle into the fabric on the side of the garment where the button will be, and bring the point up ⅛ inch (3 mm) away. Pull through to the knot. Take two small stitches at the marking for the button. This gives a firm base for your work; the button will cover the knot and stitches. Now insert the needle through one of the holes of the button from the wrong side of the button *(fig. 7)*. Let the button fall down the needle and the thread to the garment. Place your shank-builder across the top of the button; hold it in place with your finger and make your stitches over the shank-builder as you sew on the button *(fig. 8)*.

Figure 7

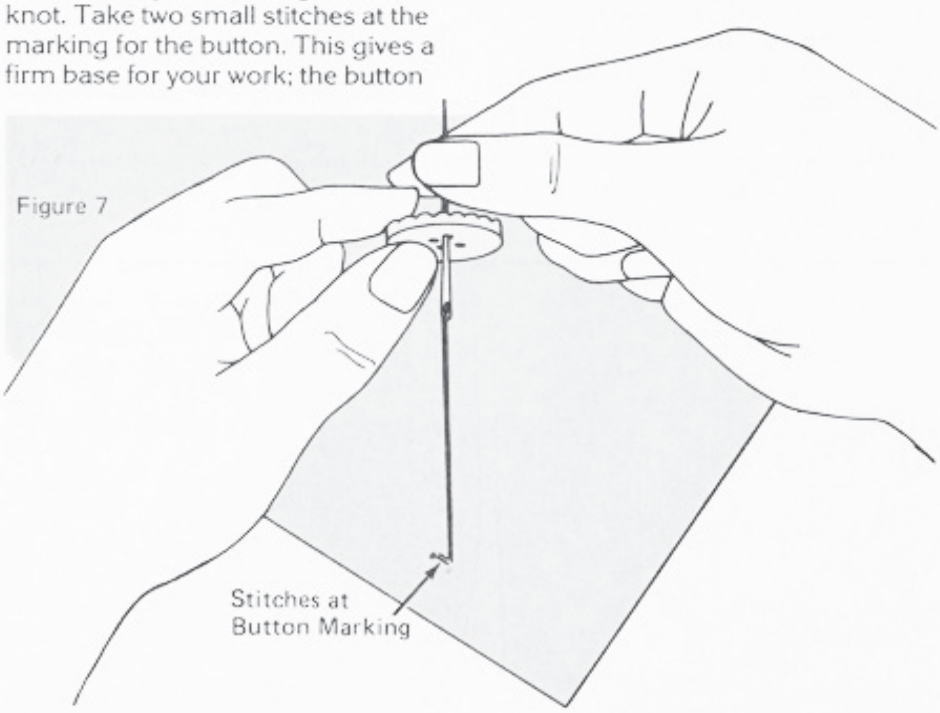
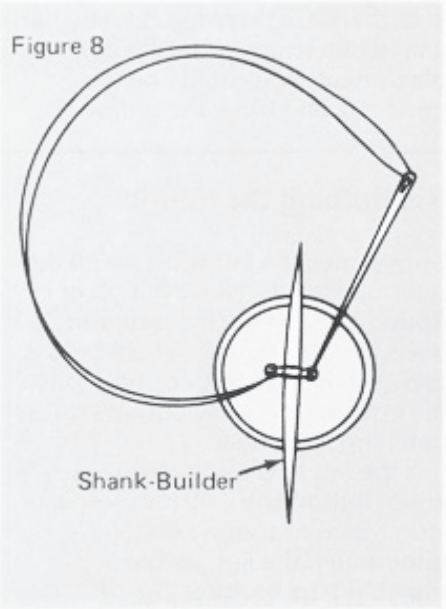


Figure 8



Match your stitches to the stitch design of the other buttons; generally the stitches will be parallel to the buttonhole *(fig. 9)*. Stitch through all layers of fabric, and keep your stitches small and neat on the wrong side of the garment.

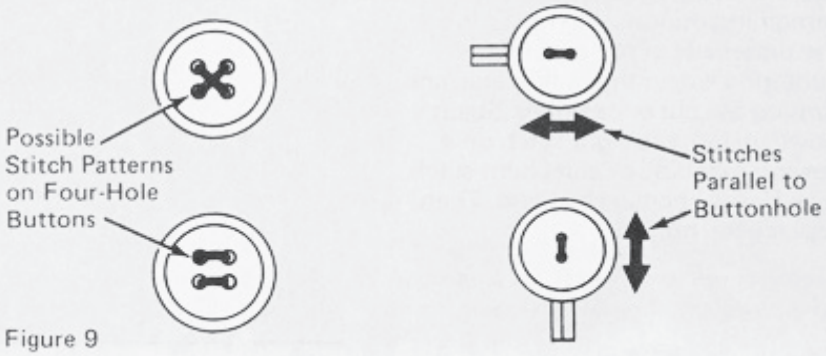


Figure 9

Take three to six stitches through each pair of the button's holes, depending on how much stress the button will receive. Then bring the needle up through the fabric, but not through the button. Remove the shank-builder, hold the button tightly away from the garment, and wind the thread snugly two or three times around the threads under the button *(fig. 10)*. Secure the wound threads by stitching back through the shank once or twice.

Insert the needle through to the wrong side of the garment. Push the needle under the button stitches. Pull thread partially through, forming a loop. Insert the needle through the loop, and pull the thread snugly to form a knot *(fig. 11)*. Cut the threads close to the knot.

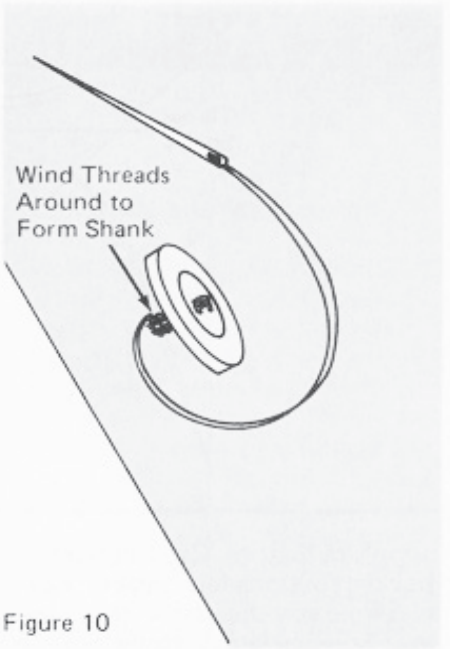


Figure 10

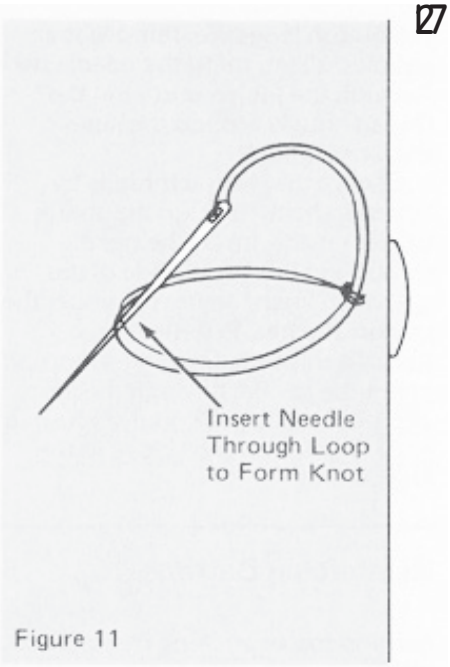
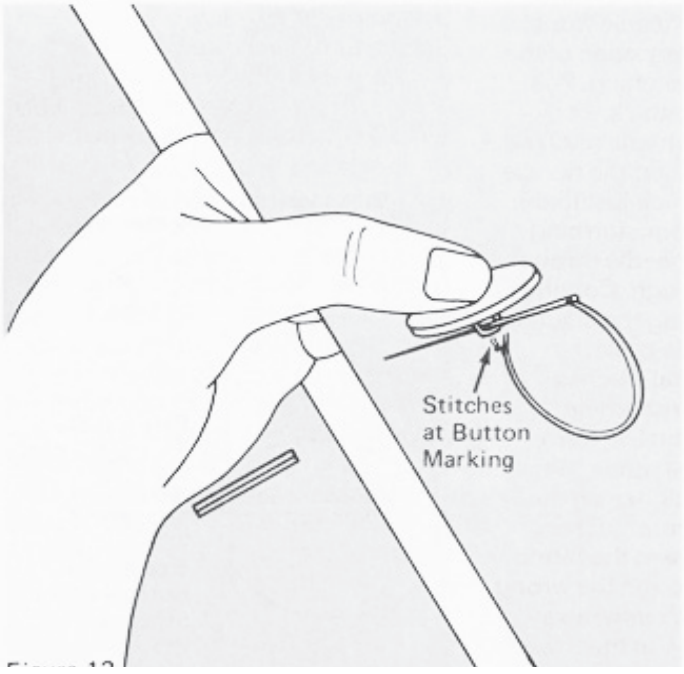


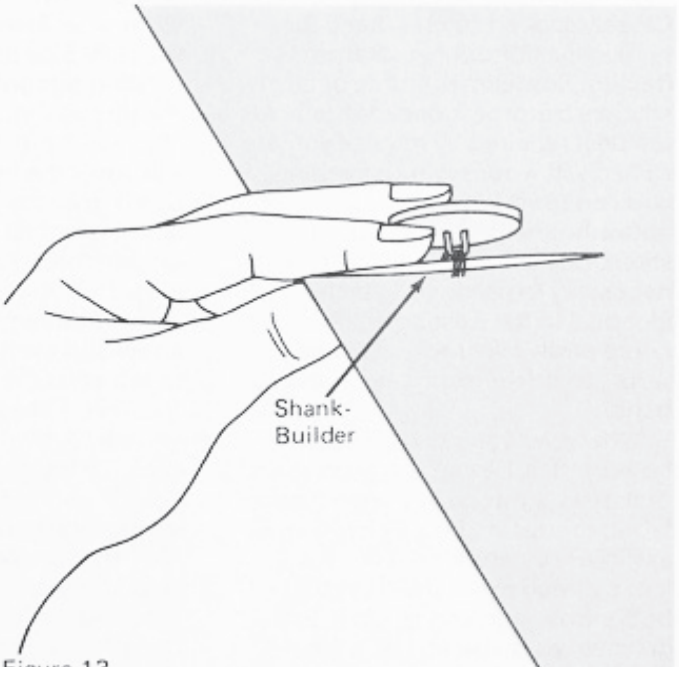
Figure 11

Shank buttons. Insert the needle on the side of the garment where the button will be. Bring needle up ⅛ inch (3 mm) away, and pull thread through to the knot. Take two small stitches at the button marking to give a firm base for your work *(fig. 12)*. The button will cover the knot and stitches. Position the button at the button marking with the shank parallel to the buttonhole. Insert the needle through the shank and then down through the fabric. Stitch through the shank four to eight times. Be careful to keep the stitches on the underside of the garment small and neat.

Finally, make a knot. On the wrong side of the garment, insert the needle under the button stitches. Pull thread partially through, forming a loop. Insert needle through the loop, and pull thread snugly to form a knot. Trim the threads close to the knot.

If you're sewing a shank button on very heavy fabric, you may need greater shank length. Therefore, sew the button on with a shank-builder. Place a toothpick or a matchstick between the bottom of the shank and the garment *(fig. 13)*. Hold it in place with the fingers of your left hand and work the thread over it and the button shank. Once

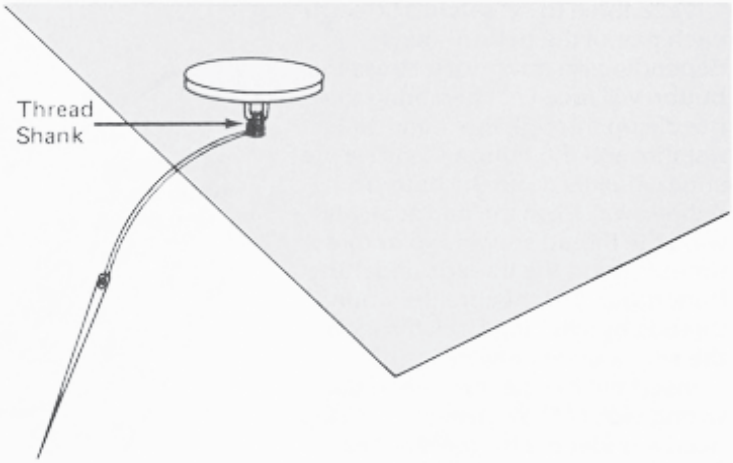




the button is secure, remove the shank-builder, bring the needle up through the fabric, and wind the thread snugly around the shank threads *(fig. 14)*.

Secure the wound threads by stitching back through the shank once or twice. Insert the needle through to the wrong side of the garment. Push the needle under the button stitches. Pull the thread partially through, forming a loop. Insert the needle through the loop, and pull the thread snugly to form a knot. Cut the threads close to the knot.

Figure 14



Reinforcing Buttons

Reinforcing or backing buttons are used on garments where extra strain is placed on buttons and on garments of heavy material. Backing buttons are small, flat buttons that are either transparent or of the same color as the garment. They make the button on the right side of the garment very secure and less likely to pull through the fabric. Buttons made for this purpose are available at stores that carry a good supply of buttons. Use two-hole backing buttons for shank type or two-hole sew-through buttons; use four-hole backing buttons for four-hole sew-through buttons.

Application is basically the same except that the backing button is placed under the button position on the wrong side of the garment *(fig. 15)*. Work through the backing button at the same time you are sewing the button in place.

Tip: *Check at your notions counter for new button ideas. New products are being introduced all the time which will allow you to attach or replace buttons without needle and thread. Some are for temporary use in emergencies; they'll hold the button on until you can sew it securely.*

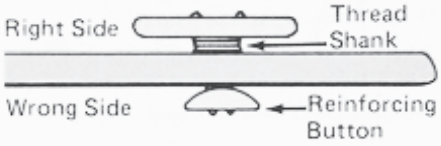


Figure 15

Repairing Buttonholes

Closely spaced stitches keep the edges of a buttonhole slit from fraying. Sometimes, some of these stitches become loose. Buttonholes are best repaired by hand. If you are skilled with your sewing machine, you can rework the edge of a buttonhole with a small zigzag stitch. However, the adjustments necessary to produce a stitch identical to the existing stitches could easily take more time than it would to do the complete repair by hand.

Whenever you need to repair buttonholes, be especially careful to match your thread to the garment fabric or existing buttonhole thread as closely as possible. Trim the loose thread ends of the existing buttonhole stitching as close to the garment as possible. Use a single, knotted thread. You will be working from right to left; start your work ⅛ inch (3 mm) to the right of the worn area. Insert the needle from the right side at the very edge of the existing buttonhole stitching. Pull the thread through to the knot *(fig. 16)*. Your subsequent stitching will cover the knot. Insert the needle again from the right side just to the left of your first insertion, forming a loop of thread. Pass needle through loop. Pull thread through. Continue in this manner, keeping the stitches small and even and as close together as the original stitches *(fig. 17)*. Extend your stitching ⅛ inch (3 mm) beyond the worn area. To fasten your stitches, take a couple of tiny backstitches on the wrong side of the garment. Then slide the needle between the fabric layers, bringing it through the wrong side about an inch (25 mm) away from the buttonhole. Cut the thread close to the garment so no end shows.

Figure 16

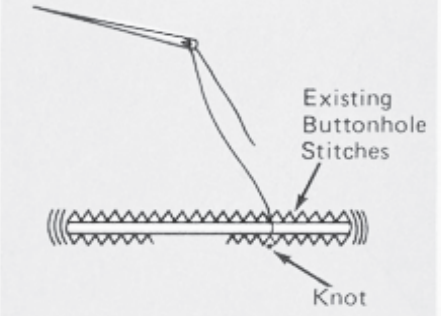
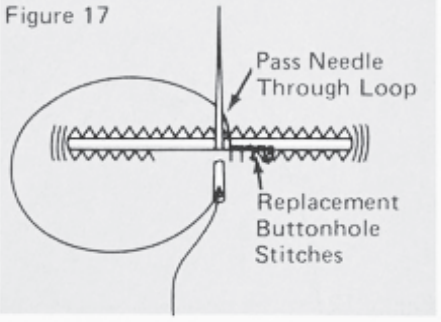


Figure 17



Repairing Holes & Tears

Holes and tears are among the most common mending problems. They are repaired by darning, using new threads to replace damaged or missing ones, or by patching, covering the damaged area with another layer of fabric. Evaluate a damaged garment carefully to determine how conspicuous a darn or patch will be. On some fabrics, particularly smooth, thin, light-colored fabrics, a darned or patched area will always show. Decorative patching can sometimes conceal a hole or tear. Holes or tears in your better clothes should be repaired by a person trained in reweaving. This technique will produce a nearly invisible repair, but it is a complicated process and requires special expertise.

Darning is used to mend holes or worn spots in fabric and to close tears, whether straight, diagonal, or L-shaped. Darning is most suitable for woven fabrics and relatively small areas. But it also works on fairly stable knits. If carefully done by hand, darning is almost invisible on certain fabrics. You can also darn by machine, which is much quicker and stronger than hand darning. Depending on the fabric, machine darning can also be quite inconspicuous.

Patching is preferred over darning for large damaged areas, garment areas that receive excessive strain, light-colored fabrics, printed and patterned fabrics, fabrics that fray easily, and knits. You can apply patches by machine or hand. If you have a machine, use it where especially strong patches are needed. Hand stitching works best on small patches and in tight places.

Preparation for Darning

Trim away any frayed threads from the hole or tear. This provides a clean work area and allows you to make a neater darn.

Select a thread that matches the fabric threads as closely as possible in color and size. General purpose thread is suitable for many fabrics; sheers require an extra-fine thread. Use darning cotton or embroidery floss to darn socks and woolens by hand. All these threads are available at most notions counters.

If darning by hand, use a darning needle of a size appropriate for your fabric and thread. A fine embroidery/crewel needle can be used for very lightweight fabrics. Both types of needles are available at notions counters in packages of assorted sizes.

See your machine instruction booklet for help in setting up your machine for darning. If there are no instructions for darning, do your repairs by hand. Darn holes by machine with a straight stitch. Support the damaged fabric in an embroidery hoop, and move it freehand under the machine needle as you mend. Because you use the embroidery hoop, this method is not suitable for darning tight areas. Machine-darn tears using a multi-step zigzag.

Whether you're working by hand or machine, you can support large holes and weak areas with a fabric backing to make a stronger repair. Use a firmly woven, lightweight fabric of a matching color. Cut it at least ½ inch (13 mm) larger all around than the area you are darning. Position the support fabric behind the damaged area on the wrong side of the garment. Fasten by hand basting, or use pins or your glue stick *(fig. 1)*.

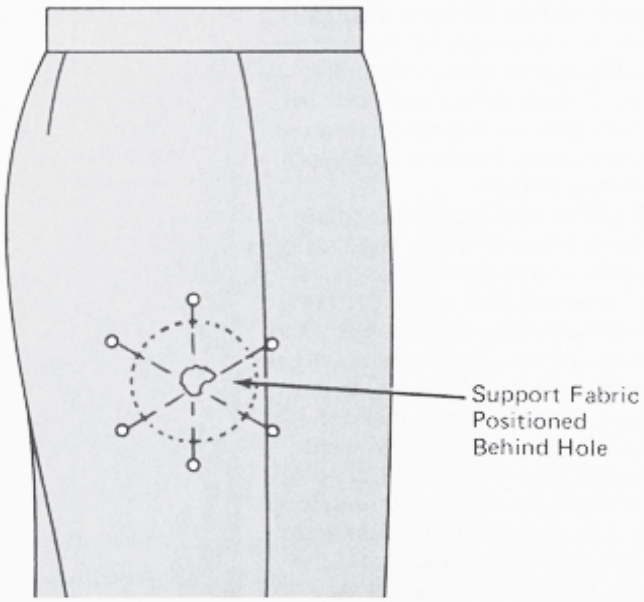


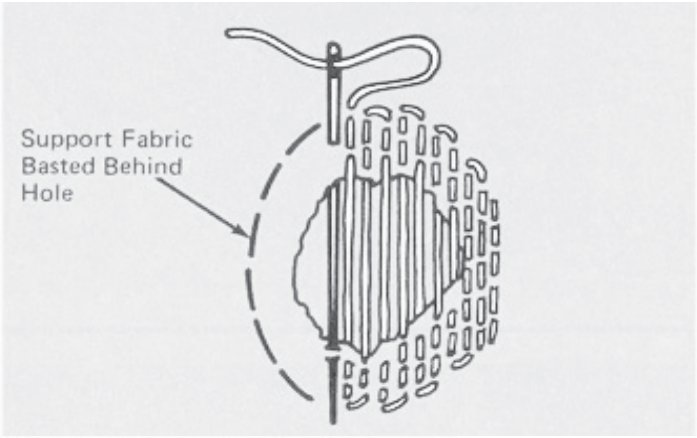
Figure 1

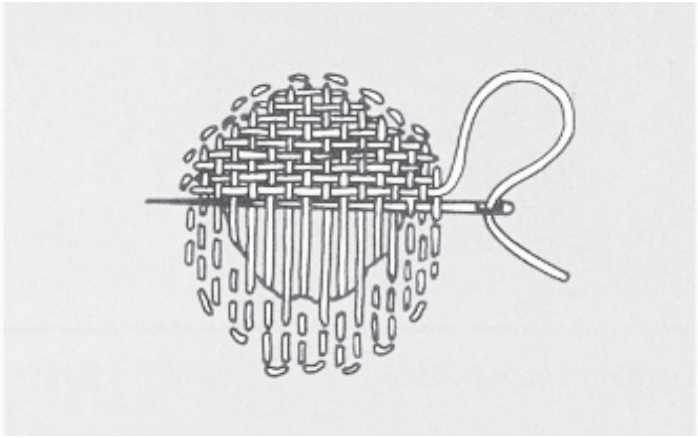
Darning Holes by Hand

If you're working without a support fabric, work on the wrong side of the garment. If you are using a support fabric, work on the right side. Use a single, unknotted thread.

Begin three or four fabric threads to the right of the damaged area, and take small vertical running stitches, passing the needle under and over equal groups of fabric threads. If the fabric threads are heavy or far apart, go under and over individual threads. As you stitch across the hole, alternately pass the thread over and under the edges of the hole. Your thread should lie fairly snug across the hole, but it should not be so tight that the fabric is puckered. Make the outer edge of your darn conform to the shape of the hole, making each row of stitching longer or shorter as needed *(fig. 2)*. Cover the hole completely with these vertical rows of stitches, and continue until the darned area extends three or four fabric threads to the left of the hole. Cut off the thread end when you have finished; you do not need to knot.

Beginning at the top of the darned area, work close rows of running stitches perpendicular to your first stitches. Weave the needle under and over each vertical thread, keeping the stitches so close together that they fill in the hole completely *(fig. 3)*. Cut the thread end. Steam-press the darn from the wrong side.

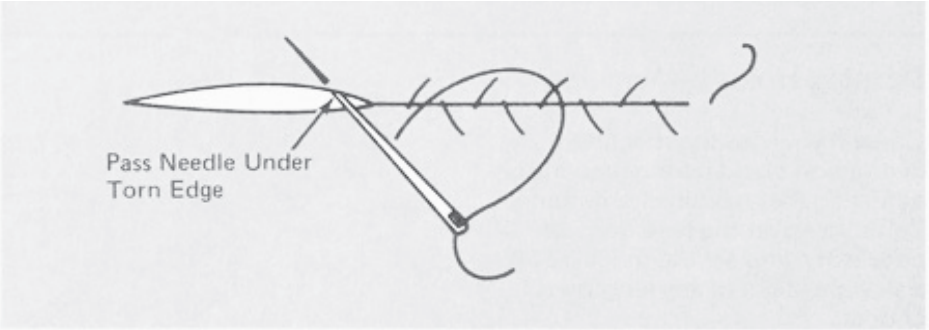


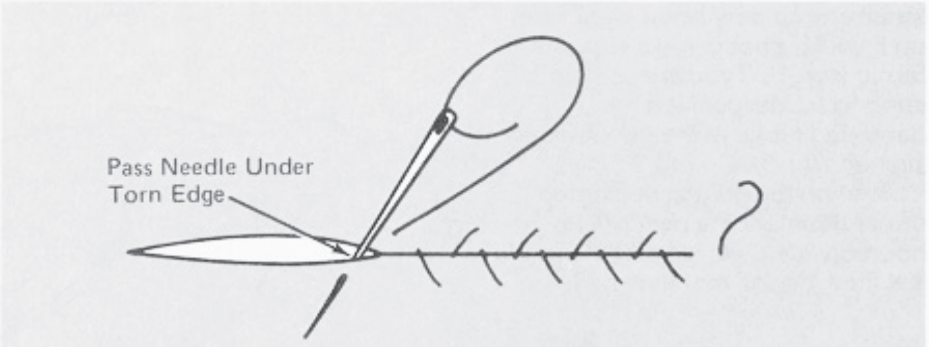


Darning Tears by Hand

First, use a single, unknotted thread to bring the edges of the tear together before you begin to darn. Insert the needle from the right side about ¼ inch (6 mm) beyond the tear, and bring it out about ¼ inch (6 mm) below the beginning of the tear. Pass the needle under the torn edge, bringing it up again through the opposite edge of the tear ⅛ to ¼ inch (3 to 6 mm) away. Continue across tear *(fig. 8)*. Do not knot. Leave a free thread end of about ¾ inch (20 mm).

When not using a support fabric, work on the wrong side of the garment. With a support fabric, work on the right side of the garment.





Using a single, unknotted thread, start working the darn ¼ inch (6 mm) beyond the end of the tear. Take tiny running stitches back and forth over the area *(fig. 9)*. Carefully weave the point of the needle through the fabric; on straight or L-shaped tears keep your stitches perpendicular to the line of the tear. (An L-shaped tear requires two rows of stitching, perpendicular to one another.) On a diagonal tear work short rows of stitches across the tear, keeping the stitches parallel to the fabric threads that run in that direction *(fig. 10)*. Keep the stitches loose enough so that they don't pucker the fabric, but tight enough to keep the fabric flat.

Do not take a stitch over the actual tear. When crossing the tear, slip the needle between the edges of the tear. End the darn ¼ inch (6 mm) beyond the tear, leaving a ¾ inch (20 mm) loose thread. Pull any loose thread ends from the right side to the wrong side.

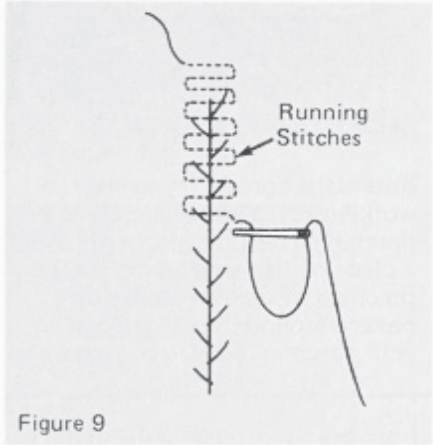


Figure 9

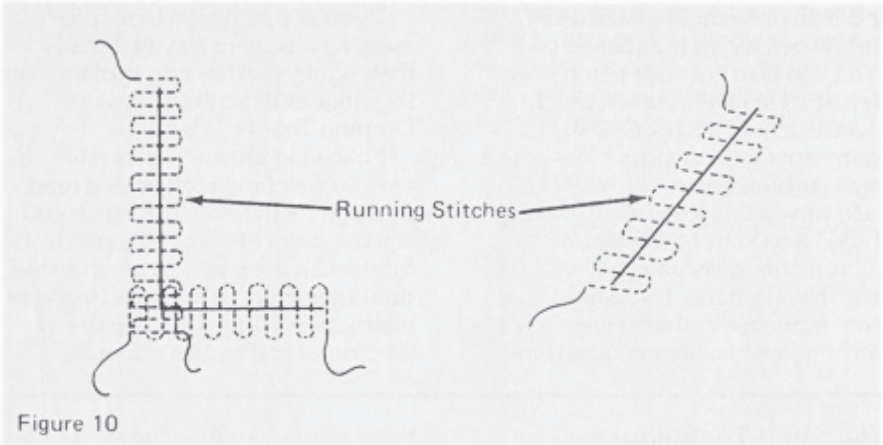


Figure 10

Preparation for Patching

Patching is the process of covering a hole, tear, or thin place with another layer of fabric. For best results, use a matching fabric. If you are repairing a home-sewn garment, cut your patch from leftover fabric. For a ready-made garment, use material from a hem, pocket, or facing; replace a self-fabric belt with a purchased one. You can also cut your patch from fabric as similar in color, weight, construction, and fiber to the garment fabric as possible—or use a decorative patch or trim. Always use woven fabric to patch woven fabric and knits for knit fabric.

You can apply patches by machine or hand. If you have a machine, use it where especially strong patches are needed. Hand stitching works best on small patches and in tight places.

If you're patching a hole, cut the hole exactly along the fabric threads into a square or rectangle. Keep the opening as small as possible. If the garment fabric tends to fray easily, use a single, knotted thread to overcast the edges of the hole by hand *(fig. 13)*.

If you're patching a tear, trim away any loose or frayed threads; then lightly pull the edges of the tear together as described above in Darning Tears by Hand.

Following are instructions for various patching techniques; read through them to decide which you will use before you cut the patch fabric. Cut the patch larger than the damaged area, as specified in these instructions, and cut along the horizontal and vertical threads.

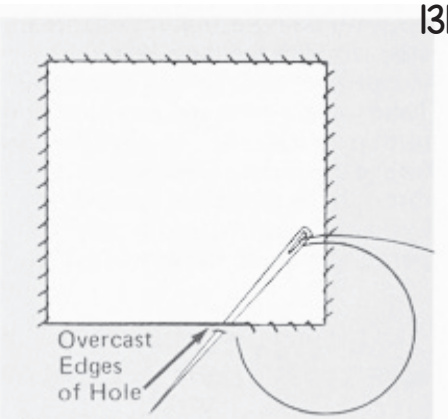


Figure 13

Round the corners if you are working with a knit fabric. If you are patching a plaid, stripe, or print with a piece of the same fabric, cut the patch so it exactly matches the pattern around the hole or tear so your patch will be less conspicuous.

Patching Techniques

The overlap patch. This is a strong patch that can be used to repair large holes or tears on fabrics that don't fray easily.

Prepare the damaged area as described above. Cut the patch ½ inch (13 mm) larger on all sides than the hole or tear. Hold both garment and patch fabric right side up. Position the patch over the damaged area. Fasten it with pins, hand basting, or the glue stick. Stitch over all edges of the patch, attaching it to the garment. By machine, use a multi-step zigzag made with a short stitch and a wide width. If your sewing machine can't do this stitch, use a regular zigzag made with a short stitch and a medium width. Reinforce the corners by overlapping the stitching *(fig. 14)*.

If working by hand, use a double, knotted thread. Insert the needle from the wrong side of the patch so that it emerges ⅛ inch (3 mm) within the patch. Insert the needle into the garment fabric just above the edge of the patch about ⅛ to ¼ inch (3 to 6 mm) to the left. Bring the needle out through the patch ⅛ inch (3 mm) below its edge and ⅛ to ¼ inch (3 to 6 mm) to the left *(fig. 15)*. Repeat this process so that you have a row of even diagonal stitches all along the edges. Secure with a knot on the wrong side.

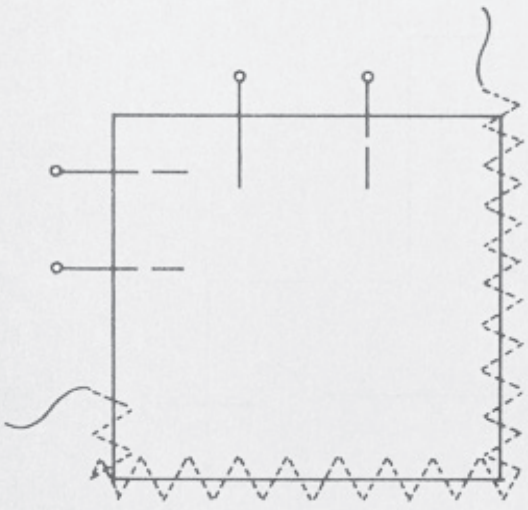


Figure 14

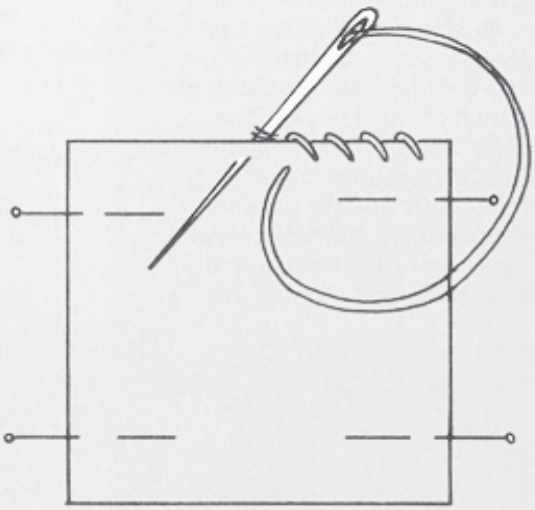


Figure 15

The hemmed patch. Use the hemmed patch on light- to medium-weight fabrics that tend to fray or where the patch needs to be particularly strong. Because two rows of stitching show on the right side of the garment, the hemmed patch is not easily hidden. Hand stitching helps to make the patch less conspicuous.

Prepare the damaged area. Cut the patch 1 inch (25 mm) larger on all sides than the hole. Fold under ¼ inch (6 mm) along each side of the patch, right sides together *(fig. 16)*. Press.

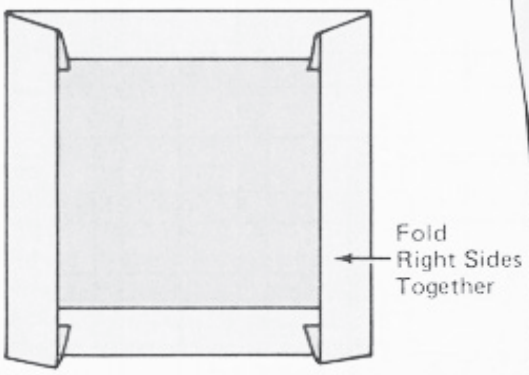


Figure 16

Position the right side of the patch against the wrong side of the damaged area. Make sure the patch is centered under the hole. Pin- or hand-baste in place—do not use the glue stick here *(fig. 17)*.

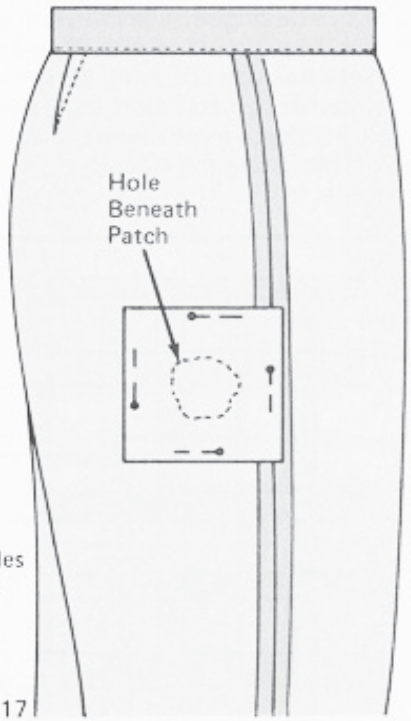


Figure 17

Working on the wrong side of the garment, stitch the patch around the outer edge *(fig. 18)*. By machine, use a small, straight stitch. By hand, use a single, knotted thread. Insert the needle through the garment fabric just under the edge of the patch. Then insert it into the fold along the edge of the patch, sliding it along the fold for ¼ inch (6 mm). Bring it out of the fold, and insert it through the garment fabric for about ¼ inch (6 mm). Repeat, pulling the thread through snugly with each stitch.

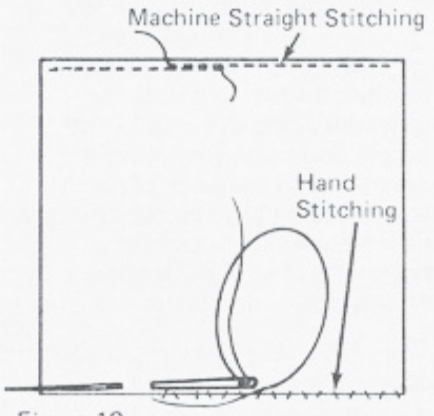


Figure 18

On the right side of the garment, cut ¼ inch (6 mm) into the corners of the hole. Carefully turn ¼ inch (6 mm) of the garment fabric to the wrong side. Tuck in the threads at the corners with the point of a pin. Press or hand-baste along the folds to keep them in place *(fig. 19)*. Hand or machine stitch around the edges. By hand, use a single, knotted thread and the same stitch you used on the wrong side. By machine, use a small, straight stitch *(fig. 20)*. Remove any basting stitches.

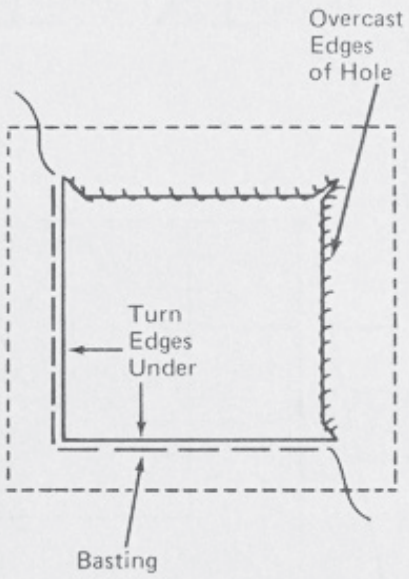


Figure 19

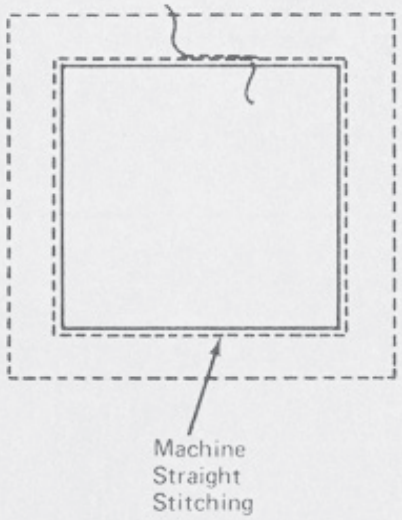


Figure 20

The oversewn patch. Use this patching technique to repair holes or tears on any light- to medium-weight fabric, especially plaid, striped, or printed fabrics. Since the stitching is done on the right side of the garment, it is easy to get a perfect match. The oversewn patch can be done by machine or hand.

Prepare the damaged area as described above. Cut the patch at least 1 inch (25 mm) larger all around than the hole or tear. If the fabric is to be matched, cut the patch so it will exactly match the area around the repair.

Turn under ⅜ inch (10 mm) along each edge of the patch, wrong sides together, and press *(fig. 21)*. Position the patch over the damaged area, wrong side of patch to right side of garment. Pin-, hand-, or glue-baste in place. Glue basting is best when you are trying to match a printed or striped fabric. It will not allow the patch to slip even the tiniest bit during the stitching process.

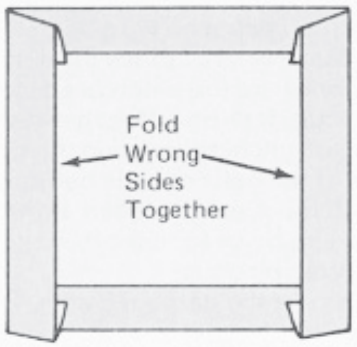


Figure 21

Stitch the patch in place. By machine, use a straight stitch *(fig. 22)*. By hand, use a single, knotted thread, fold back the garment along the edge of the patch, and catch the fold of the garment and the edge of patch together with tiny stitches *(fig. 23)*. Stitch each side in the same manner and knot the thread on the wrong side of the repair.

Tip: Most holes and tears can be covered with purchased appliqués, sew-on patches, ribbons, or trims. If you cannot match a patch or hide a darn, a decorative trim may solve the problem. Shop fabric stores and notions counters for possibilities. Fasten the patch or trim in place with fusible web, or stitch in place by machine or hand using the techniques in this chapter.

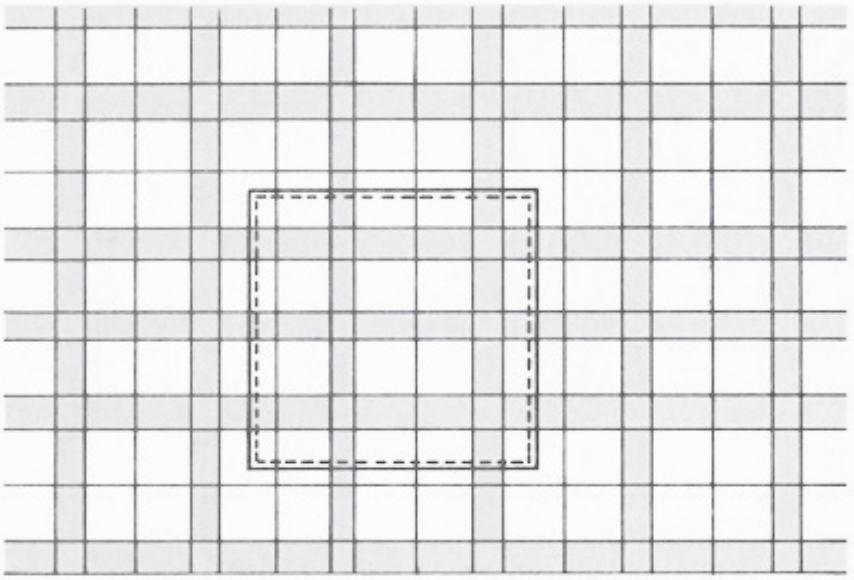
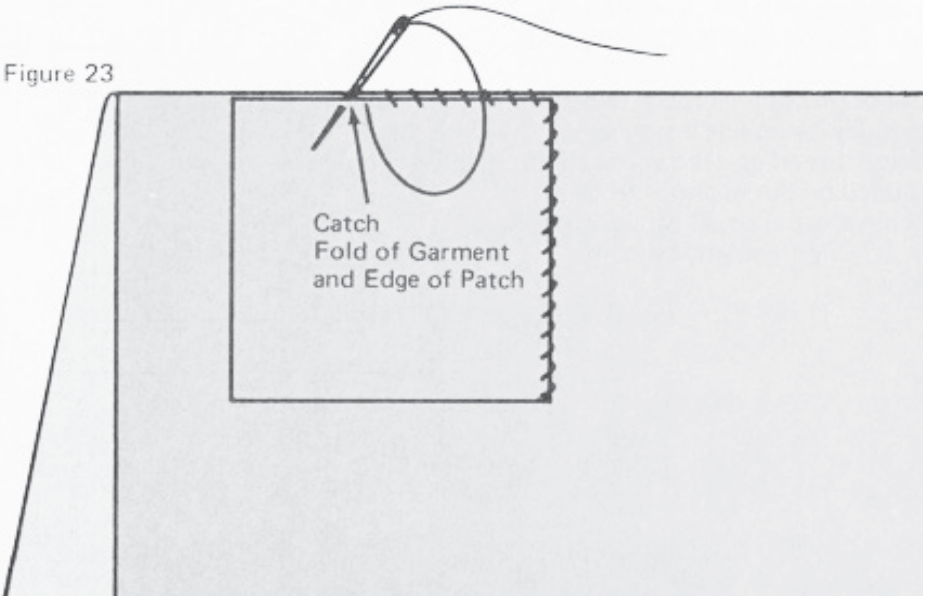


Figure 22

Figure 23



The set-in patch. This method is especially suitable for heavy fabrics. It can be done by machine or hand. Machine stitching is strong and quick, but hand stitching works better on small or tight areas.

Prepare the damaged area as described above, except carefully cut ¼ inch (6 mm) into the corners of the trimmed hole before overcasting the edges. Then turn under ¼-inch (6 mm) seam allowances to the wrong side. Be sure the seam allowances fold exactly along a thread of the fabric *(fig. 24)*. Press. Cut the patch ¾ inch (20 mm) larger on all sides than the trimmed hole.

Center the patch under the hole, right side of patch against wrong side of garment. Pin in place. Working on the wrong side, trim the edges of the patch so that they are even with the edges of the turned-under garment fabric *(fig. 25)*.

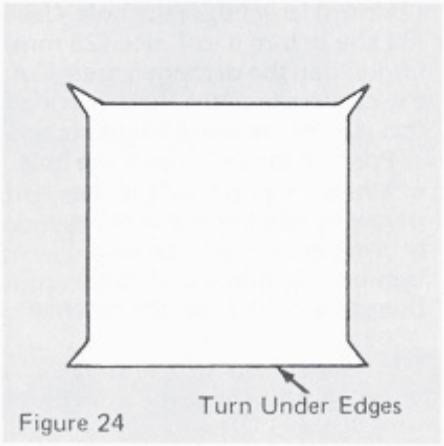


Figure 24

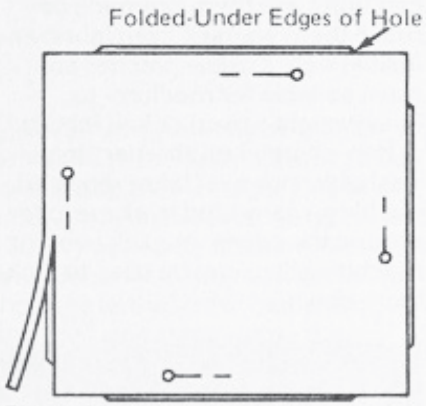


Figure 25

Unpin one side of the patch. Fold down the garment fabric as shown. Stitch exactly on the foldline through both patch and garment fabric, making sure the cut edges stay even *(fig. 26)*. By machine, use a straight stitch. By hand, use a single, knotted thread and a small, even backstitch. Work all four sides in the same manner.

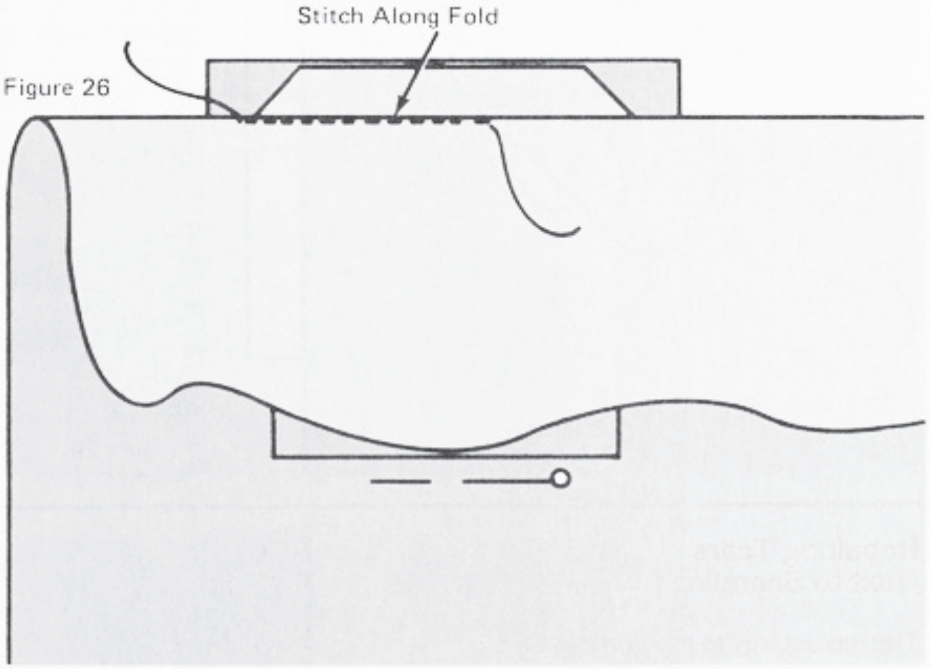


Figure 26

Trim the corners of the patch seam allowances to match those of the garment turnings. Press open the seam allowances. Use a single, knotted thread and an overcast stitch to finish the seam edges *(fig. 27)*.

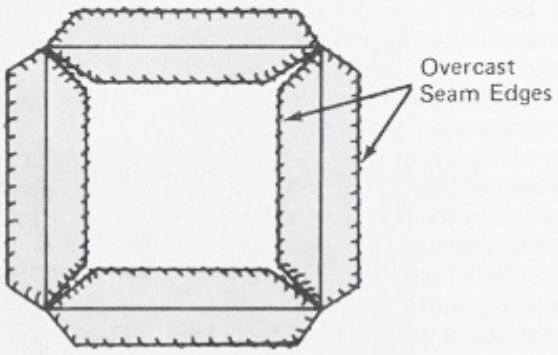


Figure 27

The iron-on patch. Fusible patches, applied with an iron, are a quick and easy way to repair holes and tears in many garments. You can purchase them premade or make them yourself from fabric and fusible web. Fusible patches are most suitable for medium- to heavyweight woven or knit fabrics.

Iron-on patches are machine washable; however, after repeated washing, many tend to come loose around the edges. A quick hand or machine stitch can be used to tack them down.

Choose a premade patch of the same or similar weight, style, and color as the garment fabric. Purchase a patch at least 1 inch (25 mm) larger than the hole. Use it full size or trim it to 1 inch (25 mm) larger than the damaged area. Cut the corners to make them rounded; this makes the patch more secure.

Position the patch over the hole or tear on the right side of the garment. Slip a piece of heavy brown paper under the hole, between the fabric and ironing board *(fig. 28)*. Fuse the patch in place with an iron, following the manufacturer's instructions.

Make your own fusible patches from a piece of fabric and a piece of fusible web cut the same size. Cut both at least 1 inch (25 mm) larger than the damaged area. With the garment right side up, position the web, then the patch fabric, over the hole or tear. Slip a piece of heavy brown paper under the hole, between the fabric and ironing board *(fig. 29)*. Fuse the patch in place with an iron, following the web manufacturer's instructions.

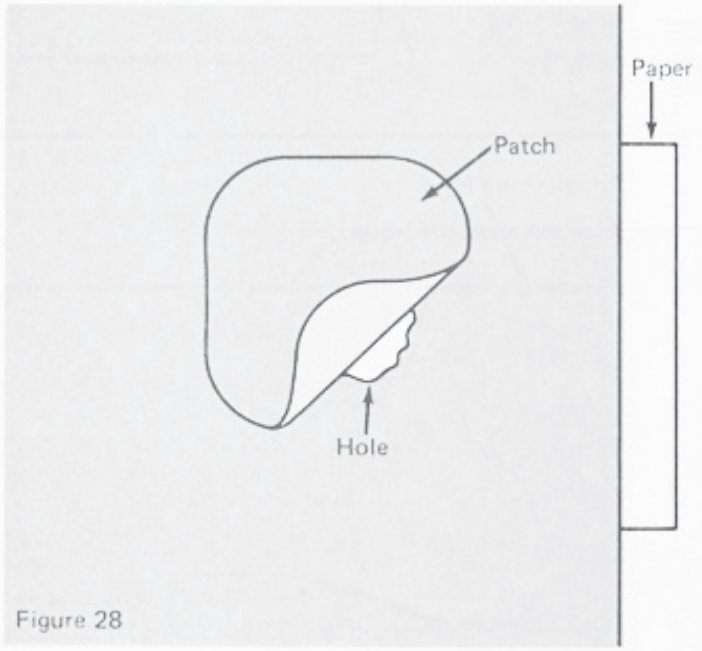


Figure 28

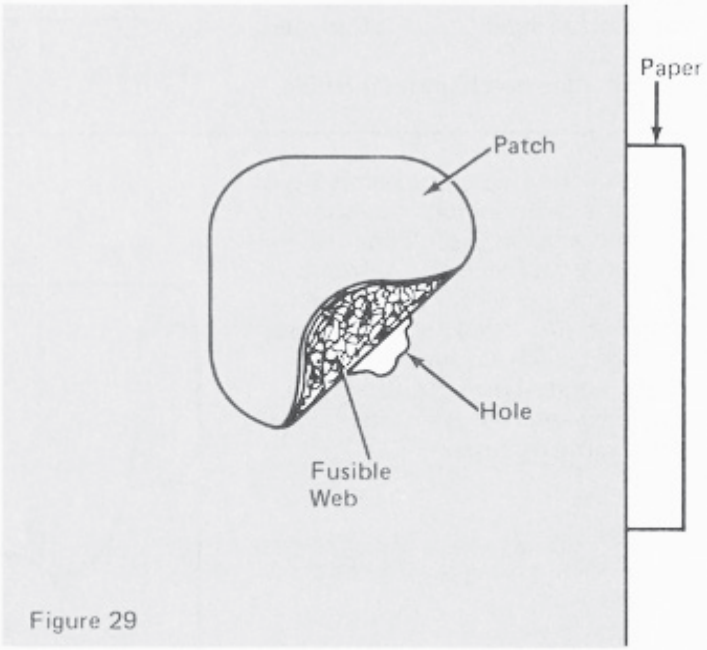


Figure 29

Repairing Zippers

All zippers are constructed in basically the same way. Interlocking metal or synthetic teeth are attached to fabric tapes. They are opened and closed with a slide, and the slide is prevented from running off the zipper by stops at the top and bottom *(fig. 1)*.

Some damaged zippers can be repaired—when a tooth comes off the tape or the slide is damaged or some stitching has broken. Other zippers must be replaced. Before attempting repair of a zipper, consider the age of the garment. If the zipper is wearing out, yet the garment is in good shape, it may be to your advantage to simply replace the zipper immediately.

Repairing Zippers

Broken stitching. If some of the topstitching around the zipper has broken, you can replace it with hand or machine stitching. Cut away any loose threads. Use a single, knotted thread and an even backstitch by hand. By machine, use a straight stitch and be sure to use the zipper foot. This is a specially designed presser foot that allows you to sew as close to the zipper teeth as you wish while still feeding the garment fabric smoothly. Extend your repair stitching ½ inch (13 mm) on either side of the broken stitches.

Broken tooth. If a tooth has come off the tape near the bottom of the zipper, you may be able to salvage the zipper by stitching a new stop above the damage. This will work only if the shortened zipper still allows you to take the garment on and off easily. To repair, first move the slide to the bottom stop. Snip into the zipper tape above the broken tooth. Slip the lowest functioning tooth into the slide. Close the zipper. Make a new stop by hand stitching a bar tack above the broken tooth. Use a double, knotted, heavy-duty thread. Insert the needle from the wrong side. Take five to eight stitches over the zipper teeth, pulling the thread through tightly *(fig. 2)*. Knot securely.

Figure 1

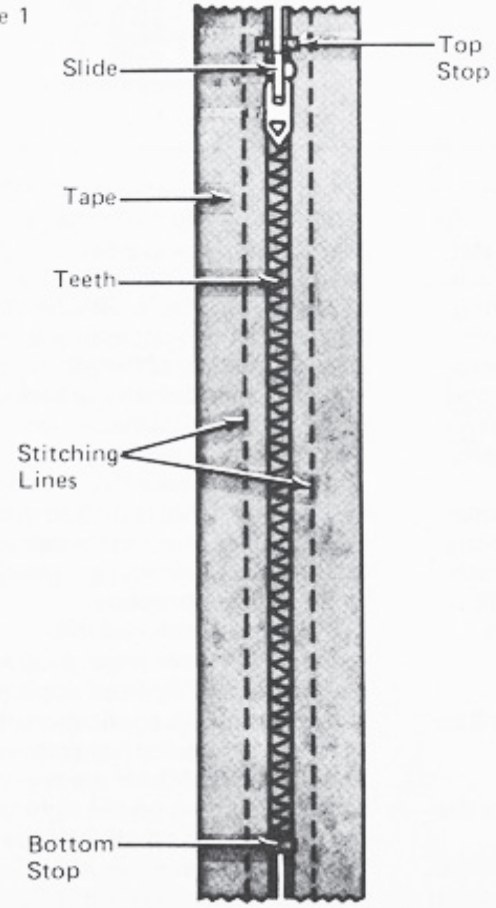
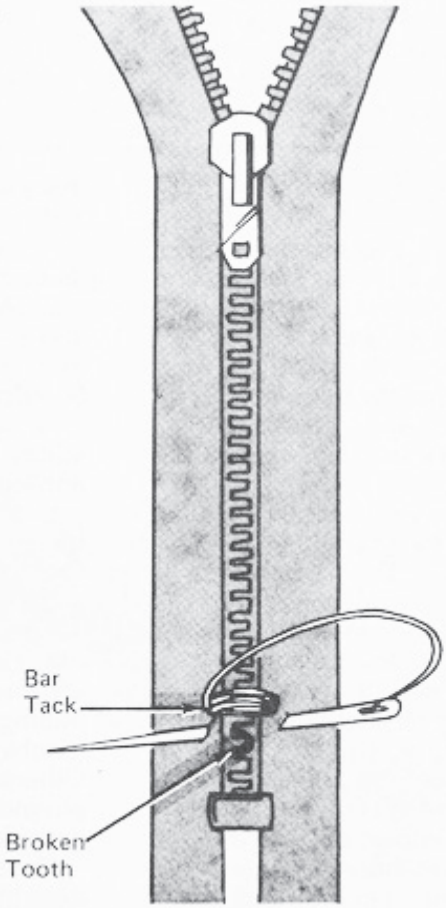


Figure 2



Damaged slide. If the slide has become damanged in some way or if it is so worn it will no longer properly close the teeth, allowing them to unmesh, you can try replacing the slide. Finding a new zipper slide that matches the damaged or worn one can be a challenge. Even the best notions counter rarely has them. Some wholesale tailors' suppliers might have them, but the best way to get replacement slides is to remove them from zippers on garments that are being discarded, and save them for future repairs.

Slides can be replaced only from the bottom end of the zipper. Use your seam ripper to remove any stitching to gain access to this area. Use the small blade of a strong pocket knife or similar tool to pry the stop off.

Slip the faulty slide off the end of the zipper. Slip the new slide in place *(fig. 3)*. Carefully feed each side of the zipper into the slide, tooth by tooth. Close the zipper. Replace the stop with a sturdy bar tack as described above *(fig. 4)*. Replace by hand or machine any stitching that has come loose or that had to be removed.

Figure 3

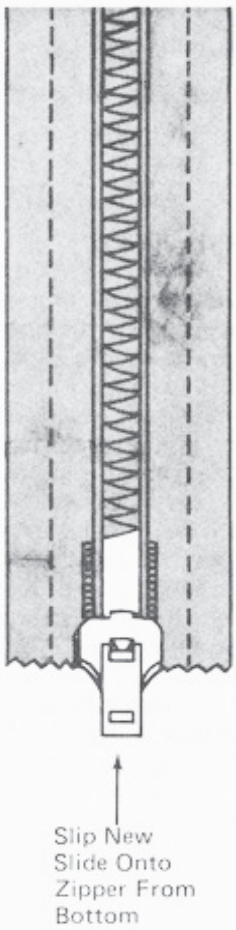
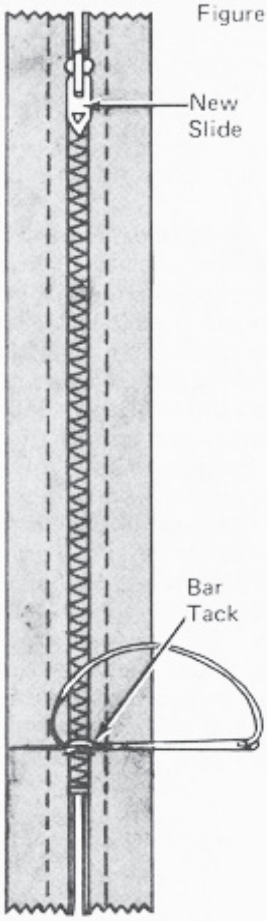


Figure 4



Replacing Zippers

When buying a replacement zipper, look for one that matches the original zipper as closely as possible in length, color, and type. (To measure a zipper, close it and measure from the bottom stop to the top of the slide. Then buy a zipper of that length or the next size larger.)

Note: You could use a zipper that is too long for an opening, but never one that is too short, otherwise a gap will show at the top of the closure. A too-long zipper should be positioned so that the extra length extends past the top of the garment. It will be cut off after the zipper is stitched in place, but before the waistband or facing is restitched. Just remember not to close the shortened zipper until after the facing or waistband has been stitched down, because until then there will be no stop to keep the slide on.

Zippers are available with metal teeth or synthetic (usually polyester) coils. A metal zipper is very strong and is often used for men's pants and other heavy-duty applications. Synthetic coil zippers are finer and more lightweight, but are still very sturdy. They are suitable for many applications.

Soak the new zipper in hot water for ten minutes. Allow it to drip-dry. Or run it through the regular wash and dry cycles of your automatic washer and dryer. This process will preshrink the zipper and is especially important if you are putting it into a garment that will be machine washed and dried. Otherwise puckers might form around the zipper opening after the garment is washed.

Carefully remove the faulty zipper from the garment, using your seam ripper to unpick and remove the stitching. As you work, take note of how the zipper was sewn into the garment so you can make your repair look as much like the original as possible. Rip out approximately 2 inches (5 cm) of the stitching holding the waistband or facing in place at the top of the zipper opening. This enables you to completely remove the old zipper, even the part that is tucked out of sight. Do not press the repair area; the folds will help you get everything back together properly.

Zippers are stitched into garments in three ways: a center slot, lapped, or fly-front application. In the center slot application, the zipper is concealed beneath two fabric flaps and there are two visible rows of stitching on the right side of the garment an equal distance from the seamline on either side. Center slot applications are commonly used for center back openings in skirts and dresses. Only one fabric flap covers the zipper and there is only one row of stitching to the left of the seamline on a lapped application. This type of application is common on left-side openings of skirts and pants. In the fly-front application, used at the center front of pants, the zipper is concealed by a wide flap of fabric and a fabric shield covers the back of the zipper.

You can replace a zipper by hand or machine. Directions for each type of application follow.

Center Slot Zipper

Slip-baste the zipper opening closed using a single, knotted thread: Slide the needle along the fabric fold of one side of the opening for about ¼ inch (6 mm) and then along the fabric fold of the other side for the same distance *(fig. 5)*. Lightly pull the thread, closing the opening smoothly.

Working on the wrong side of the garment, center the zipper face-down on the slip-basted seam allowance. The bottom of the teeth or coil should be at the bottom of the basted opening. The top of the slide should be at or slightly below the horizontal seamline at the top of the basted opening. Baste down one edge of the zipper tape and up the other edge *(fig. 6)*. Baste by hand, using a single, knotted thread. Work through both layers of fabric and the zipper tape so the basting shows on the right side.

Figure 5

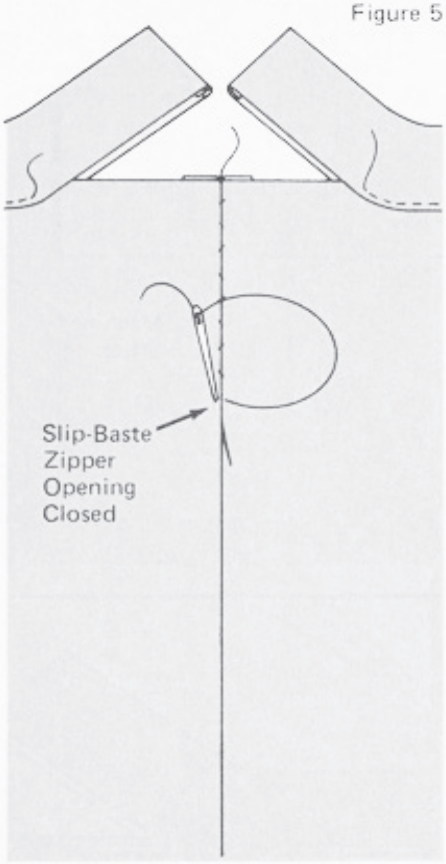
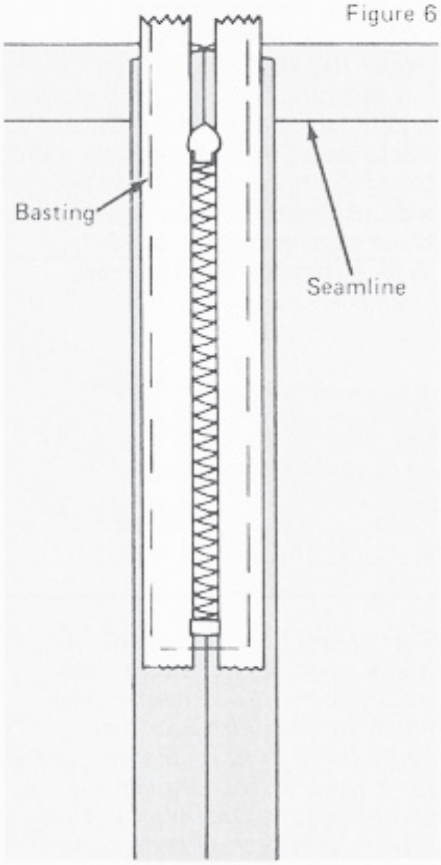
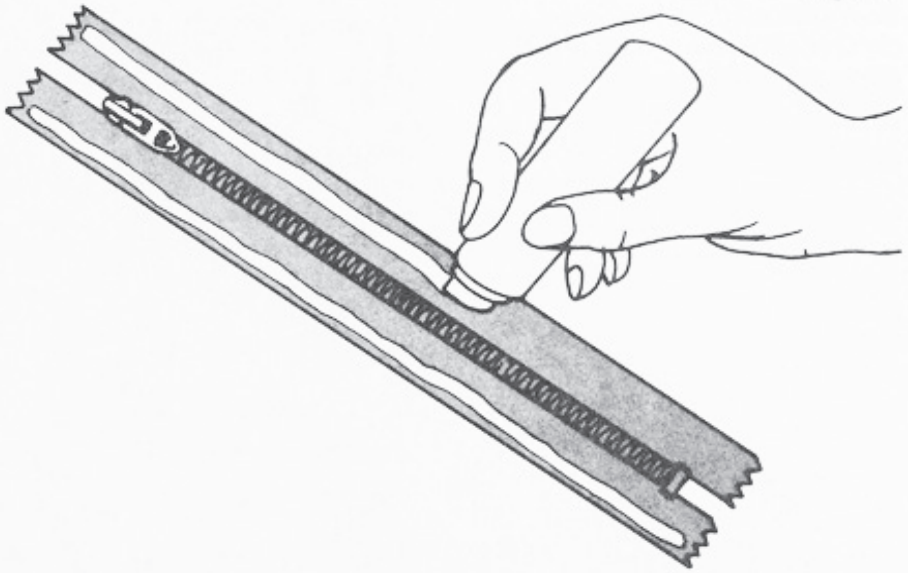


Figure 6



Tip: *Use your glue stick to baste. Apply a thin strip of glue along the outside edge of each zipper tape, then position the zipper against the seam allowance (fig. 7).*

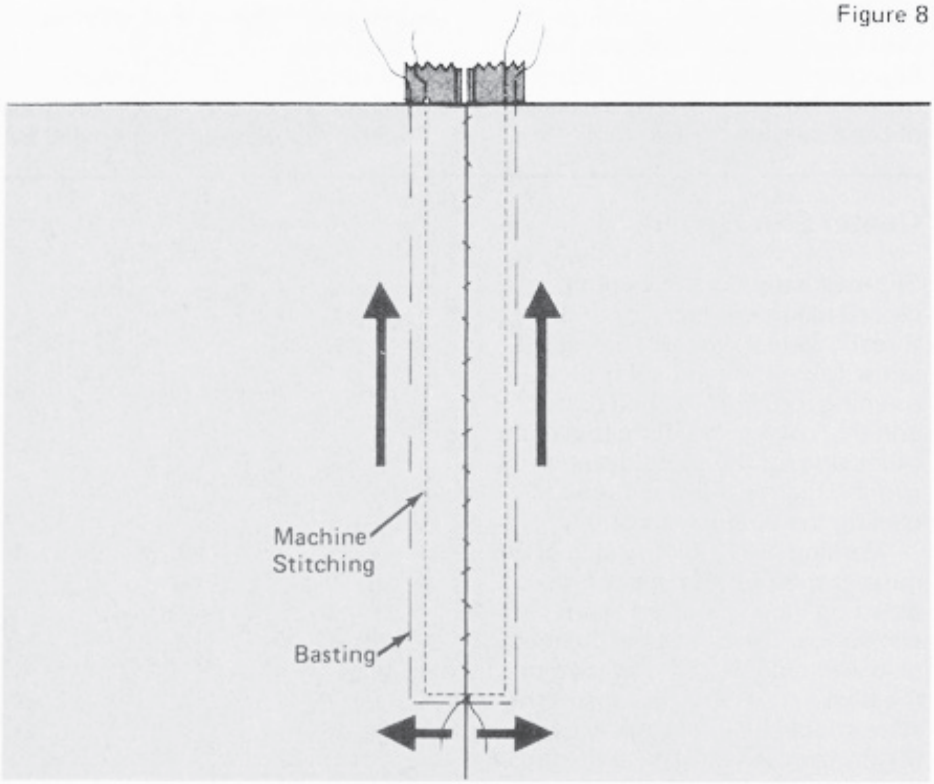
Figure 7



Now permanently stitch the zipper by machine or hand. If using the machine, start stitching ¼ inch (6 mm) below the bottom of the garment opening, stitching across the bottom of the zipper and then up one side ¼ inch (6 mm) from the seam. Repeat this stitching pattern on the other side of the zipper *(fig. 8)*.

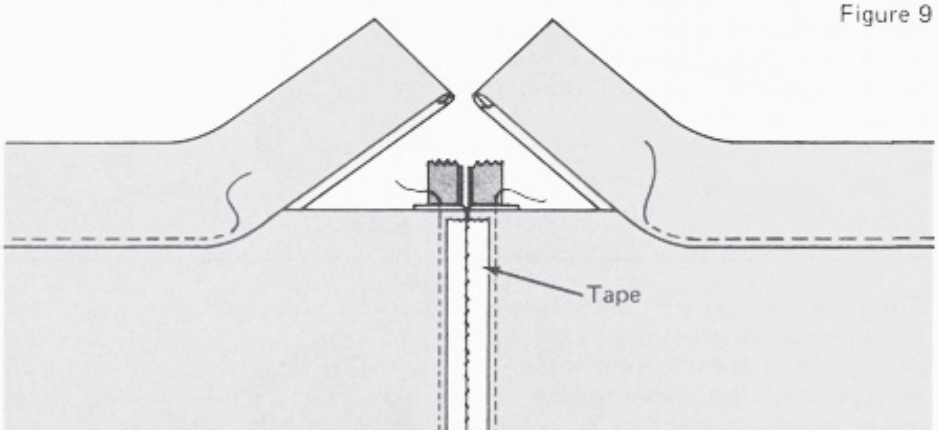
If stitching by hand, use a single knotted thread and a small even backstitch. Start the stitching at the top of the zipper, work down the side, across the bottom, and up the other side, keeping your stitches ¼ inch (6 mm) from the seam.

Figure 8



Tip: *If you have a difficult time keeping your stitches an even width from the seam, mark the stitching line with a strip of ½-inch (13 mm) wide transparent tape. Center the tape over the seamline with the bottom of the tape strip ¼ inch (6 mm) below the beginning of the garment opening (fig. 9). Use the edges of the tape as a guide for straight, even stitching, but be sure you don't stitch into the edge of the tape.*

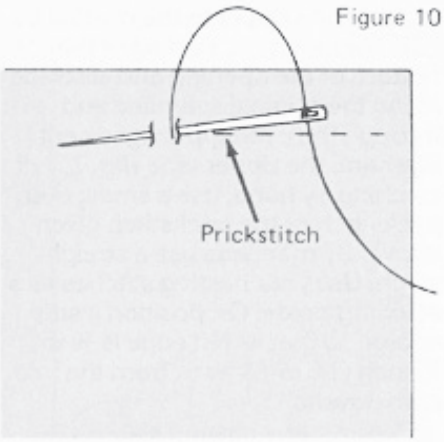
Figure 9



For a good dress or skirt, you could use a hand prickstitch for a finer finish. The prickstitch is very similar to the backstitch, except that the stitches on the right side are very tiny, nearly invisible. Use a single, knotted thread. Insert the needle from the wrong side. Take a small stitch (two or three fabric threads wide) by inserting the needle behind the point where the thread emerges. Bring the needle up through the fabric ¼ inch (6 mm) in front of where the thread emerges *(fig. 10)*. Repeat this process around the zipper opening, making small, neat stitches.

Remove all basting stitches, and open the zipper. Position the waistband or facing pieces as they were originally, and restitch them by hand or machine. If you are stitching by machine, be careful as you stitch across the zipper teeth so that you don't break the needle. Better yet, run the machine by hand for those few stitches so you can stop it immediately and reposition the fabric if the needle touches the teeth.

Figure 10



Lapped Zipper

In a lapped application, one side of the zipper is first sewn to the side of the garment which will lie under the fold of fabric that conceals the zipper; i.e., you sew one side of the zipper to the underlap. The other side of the zipper will then be sewn to the overlapping garment layer.

Do not baste the zipper opening closed. Position the closed zipper faceup under the underlap side of the garment opening so the teeth or coil are next to the fabric fold, and the bottom of the teeth or coil are at the bottom of the opening. Pin- or glue-baste in place, and stitch along the fabric fold *(fig. 11)*. By hand, use a single, knotted thread and a small, even backstitch. By machine, use a straight stitch.

Lay the overlap over the zipper, as it was originally, and hand- or glue-baste the other side of the zipper tape to the overlap *(fig. 12)*.

Figure 11

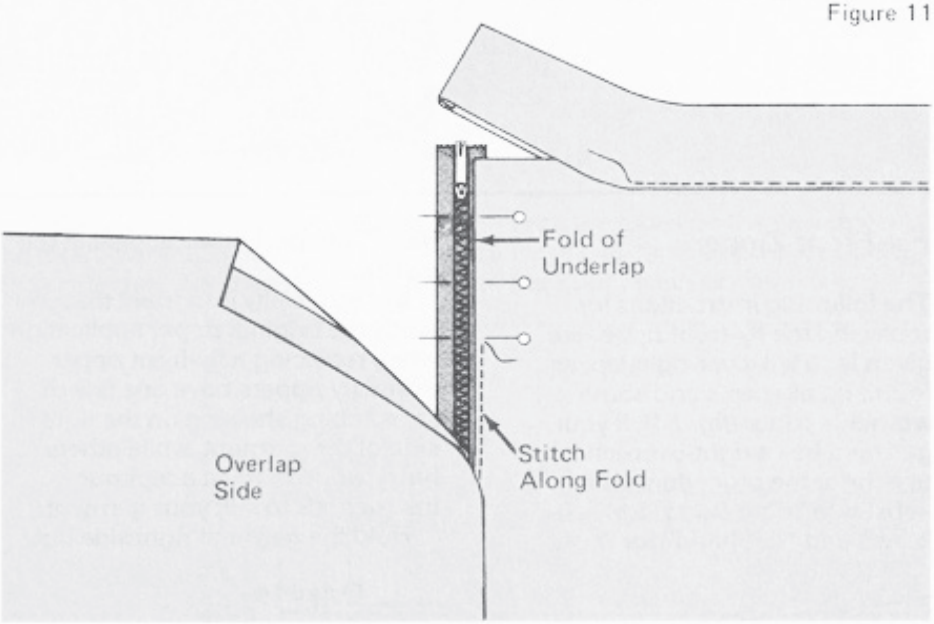
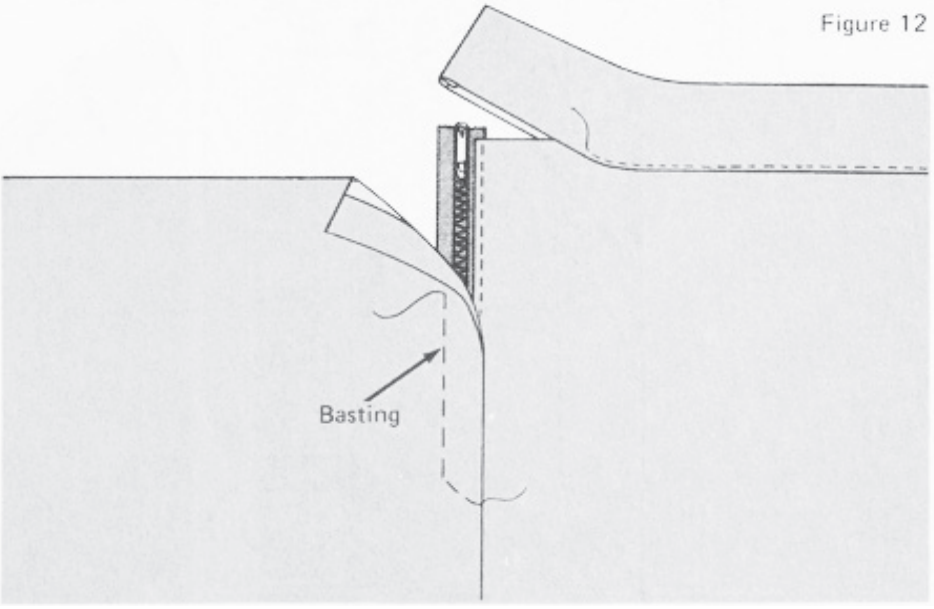


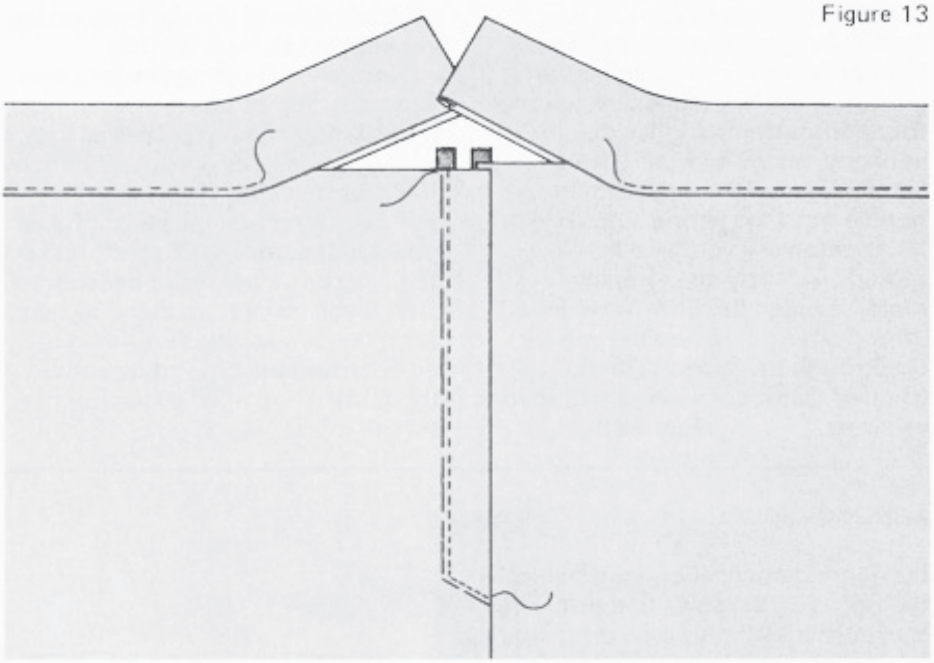
Figure 12



Stitch the zipper to the overlap by hand or machine, starting at the bottom of the opening and stitching along the original seamline and through the overlapping garment layer and the zipper tape *(fig. 13)*. If stitching by hand, use a small, even backstitch or the prickstitch given above. By machine, use a straight stitch. Use your basting stitches as a stitching guide. Or, position a strip of tape so that its left edge is ⅜ to ½ inch (10 to 13 mm) from the fold of the overlap.

Remove any basting stitches. Reposition the waistband or facing pieces, and restitch them by hand or machine.

Figure 13



Fly-Front Zipper

The following instructions for replacing the fly-front zipper are given for a left-over-right lap, as found on all men's and some women's pants *(fig. 14)*. If your garment has a right-over-left lap, use the same procedures but substitute "right-hand" for "left-hand" and "left-hand" for "right-hand" whenever they appear in the instructions.

It is especially important that you study the original zipper application when replacing a fly-front zipper. Some fly zippers have one line of topstitching showing on the right side of the garment, while others have two. You must adapt our instructions to suit your garment.

Hold the garment right side out, and open the zipper. With your seam ripper, remove the line or lines of topstitching and any bar tacks on the overlapping (left-hand) side. Mark where the topstitching line or lines were with hand basting, using a single, unknotted thread of a contrasting color *(fig. 15)*. Work the basting through just the top layer of the garment, not through the facing too. Then turn to the

Figure 14

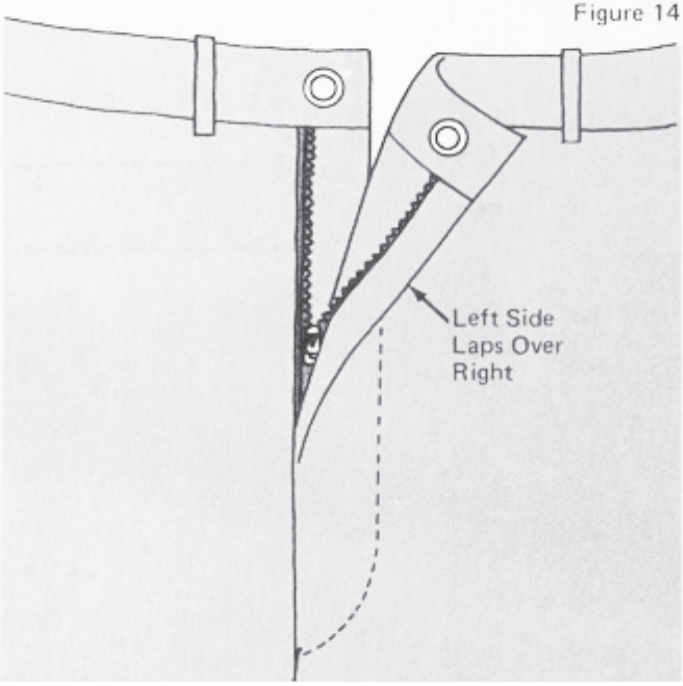
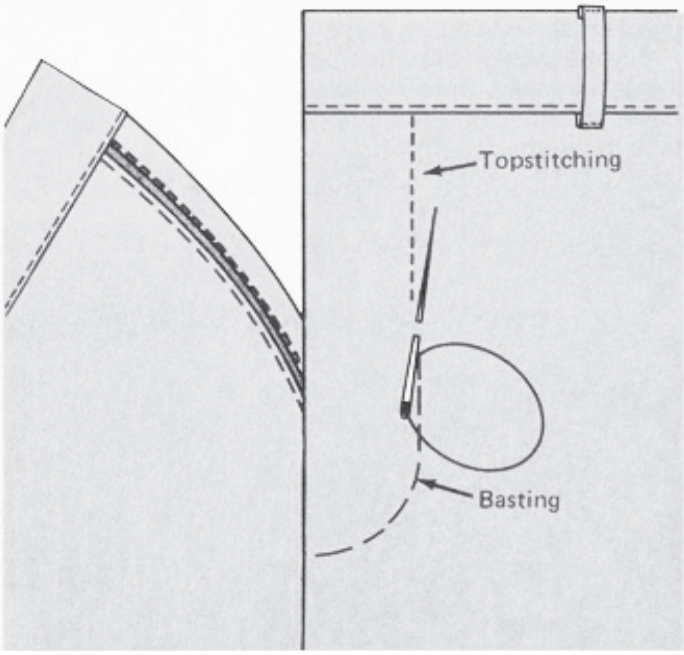


Figure 15

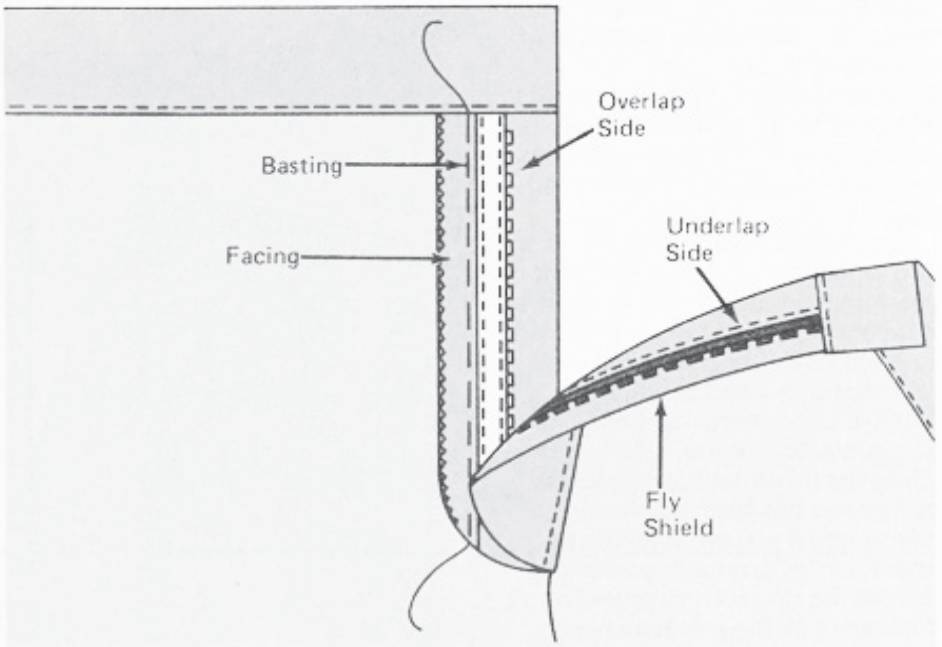


inside of the same part of the garment, and hand-baste along the edge of the zipper tape, through the facing fabric only, using a single unknotted thread *(fig. 16)*.

Carefully unpick all the stitching holding the zipper in place. Remove the stitching holding the waistband for about 2 inches (5 cm) on either side of the zipper. On the inside of the overlap (left-hand) side of the garment, mark the point where the bottom of the zipper teeth or coil ended with a pin, chalk dot, or small basting stitch.

Most fly-front zippers have a fly shield on the underlap side. This is a piece of fabric extending beyond the zipper teeth or coil towards the center front. Some fly shields are made from a separate piece of fabric that is stitched under the zipper, while others are cut as one with the pants front. The procedure for applying the zipper to the right-hand side of the garment will be determined by the type of fly shield.

Figure 16

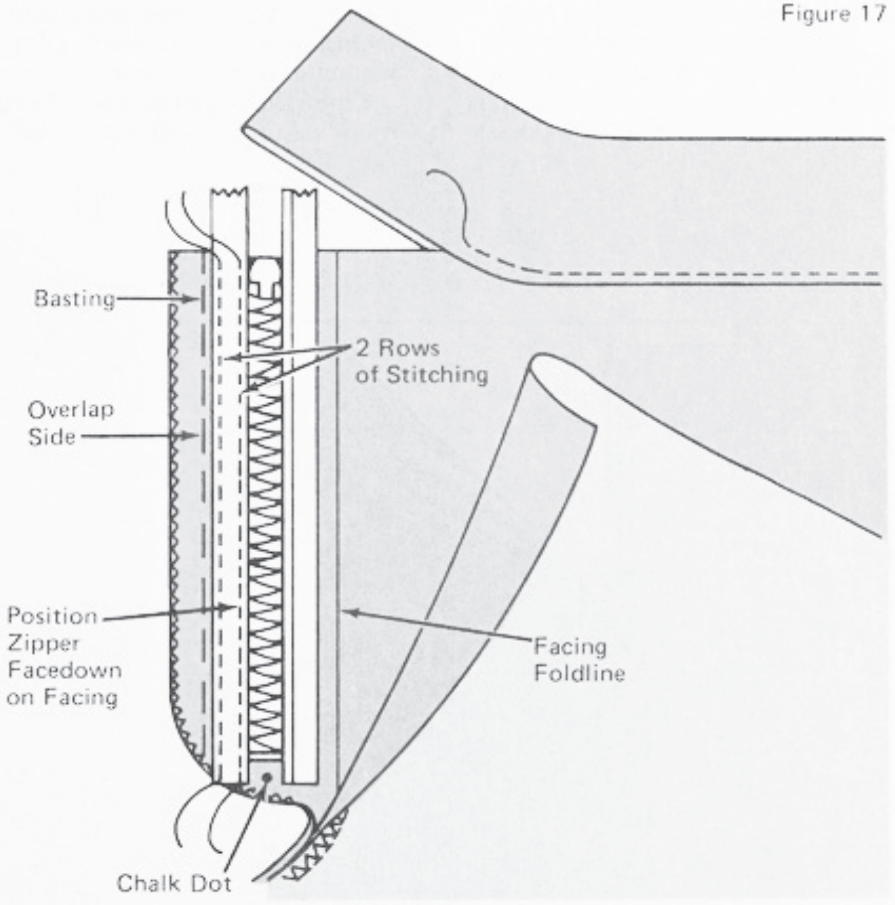


You will remove the stitches holding the fly shield when you unpick the zipper stitches. Set it aside.

Trim the tapes on the new zipper to ¼ inch (6 mm) below the bottom of the zipper teeth or coil.

The overlapping (left-hand) side. Fold the facing away from the garment front so that you are looking at the right side of the fabric of both the outer garment layer and the facing. Position the zipper face-down on the facing with the edge of the tape along the basted line, and the bottom of the teeth or coil at the pin or thread mark. Pin in place and machine or hand stitch the zipper tape to the facing only, making two rows of stitching as shown *(fig. 17)*.

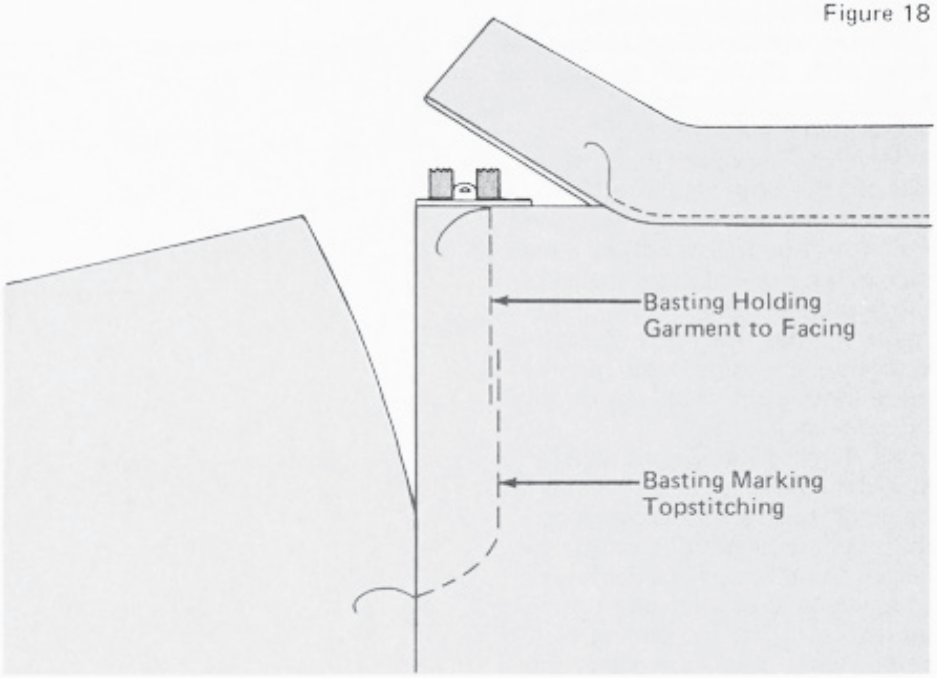
Figure 17



Fold the facing back in position against the garment, and pin in place. Working on the right side of the garment, hand-baste the garment and facing together next to the basting line or lines already there. Remove the basting stitches you used to mark the topstitching *(fig. 18)*.

Open the zipper. If your zipper is too long, trim away any excess from the top of the zipper on the stitched side only. Arrange the waistband in its original position. Restitch the waistband by hand (using a backstitch) or machine (using a straight stitch). Remember not to close the trimmed zipper until the waistband has been stitched in place, and if you are stitching by machine, be careful as you stitch across the zipper teeth so you don't hit them with the machine needle.

Figure 18



The underlapping (right-hand) side. Your procedure on this part of the garment will be determined by whether you have a separate fly shield or a cut-as-one fly shield.

If you have a separate fly shield, hold the garment right side out. Pin the folded edge of the underlapping side over the zipper tape as close to the teeth or coil as possible *(fig. 19)*. Close the zipper, and check that the garment fronts lie flat. If not, reposition the zipper, moving it up or down along the facing until the garment lies flat when the zipper is closed.

Open the zipper and position the fly shield underneath the zipper. Adjust the placement so the original seamlines are directly on top of each other and the edge of the shield meets the end of the waistband when it is back in place. Hand-baste the shield in place ¼ inch (6 mm) from the fabric fold of the garment *(fig. 20)*. Remove the pins.

Figure 19

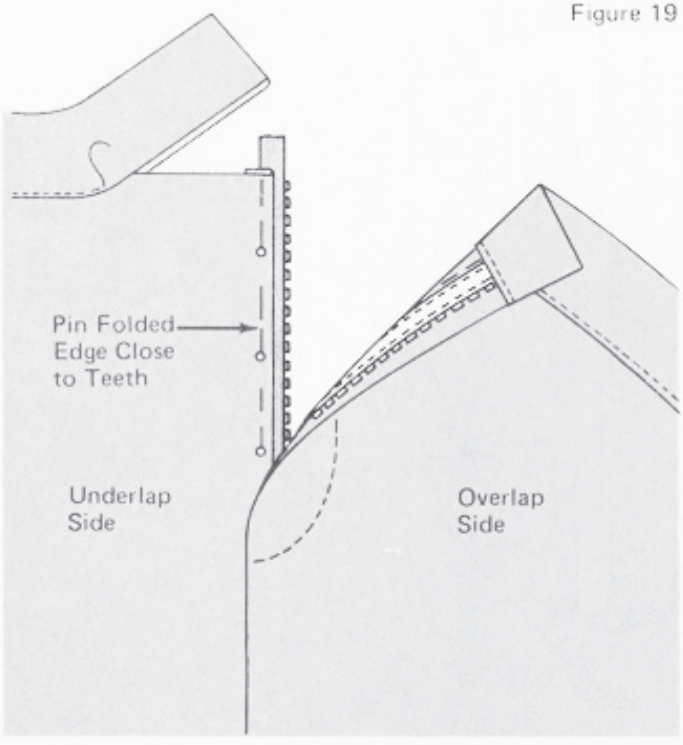
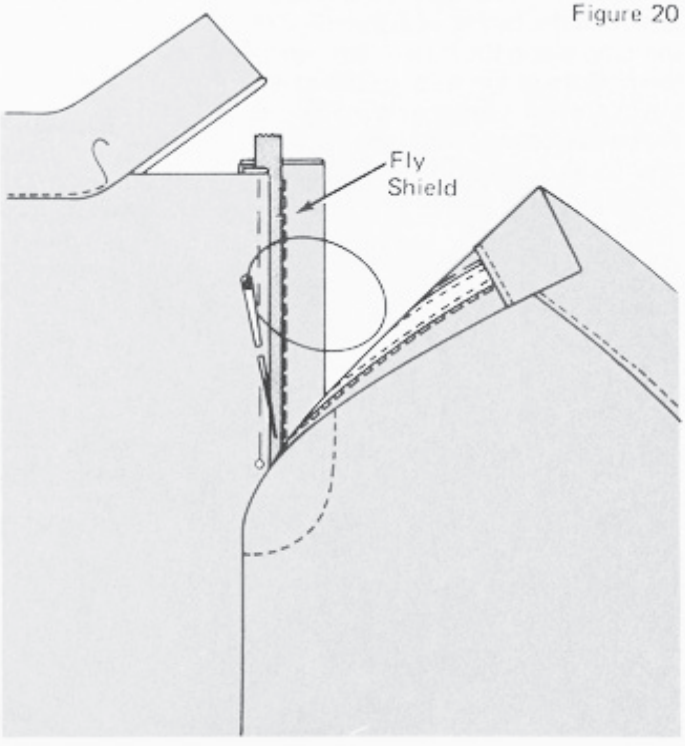


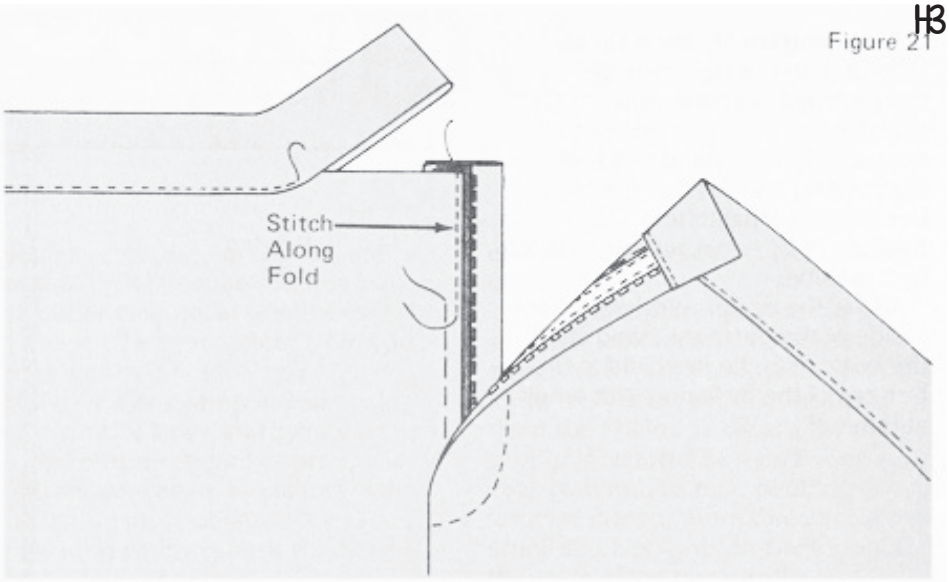
Figure 20



Trim away any excess zipper tape at the top of the zipper opening and hand or machine stitch through all fabric layers and the zipper tape, along the fold of the garment front *(fig. 21)*. Remove the basting.

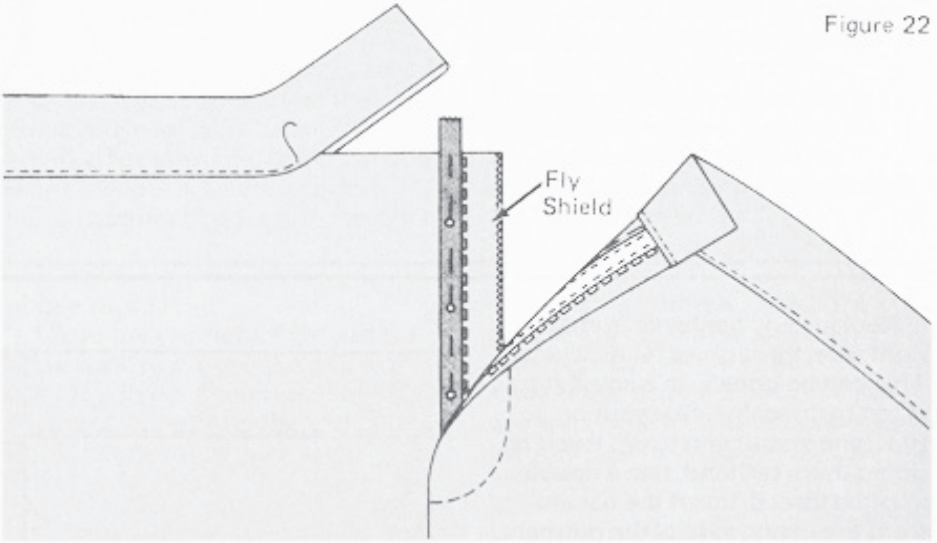
Position and restitch the waistband by hand or machine, being careful, if stitching by machine, that you don't break the needle on the zipper teeth.

Figure 21



If your fly shield was cut-as-one with the garment, follow this procedure. With the garment right side out, pin the zipper tape to the fly shield, over the original stitching line *(fig. 22)*. Close the zipper and see if the garment fronts lie flat. If not, reposition the zipper as necessary, and pin again.

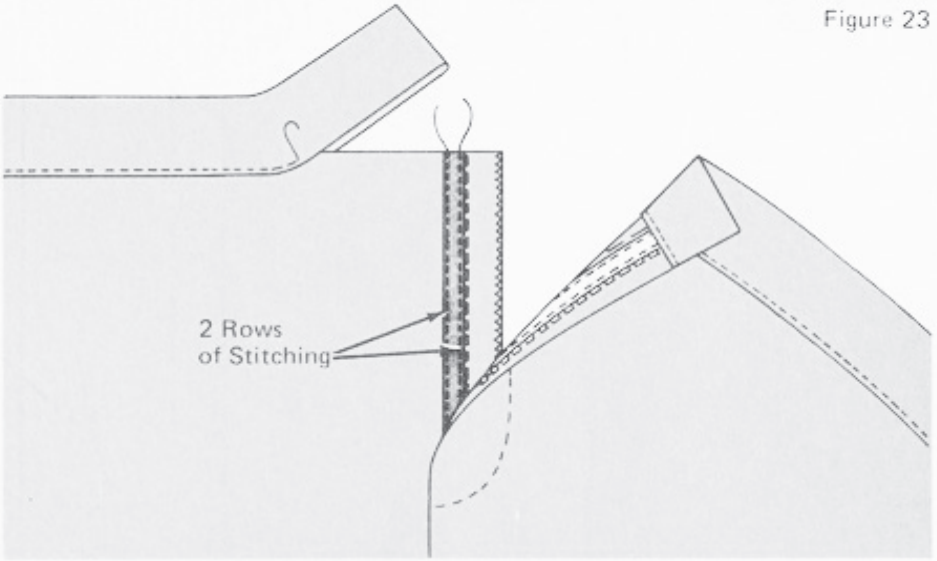
Figure 22



Open the zipper, and stitch it in place by hand (with a backstitch) or machine (straight stitch) with two lines of stitching. Trim away any excess zipper at the top of the opening *(fig. 23)*.

Position and restitch the waistband by hand or machine, being careful, if stitching by machine, that you don't break the needle on the zipper teeth.

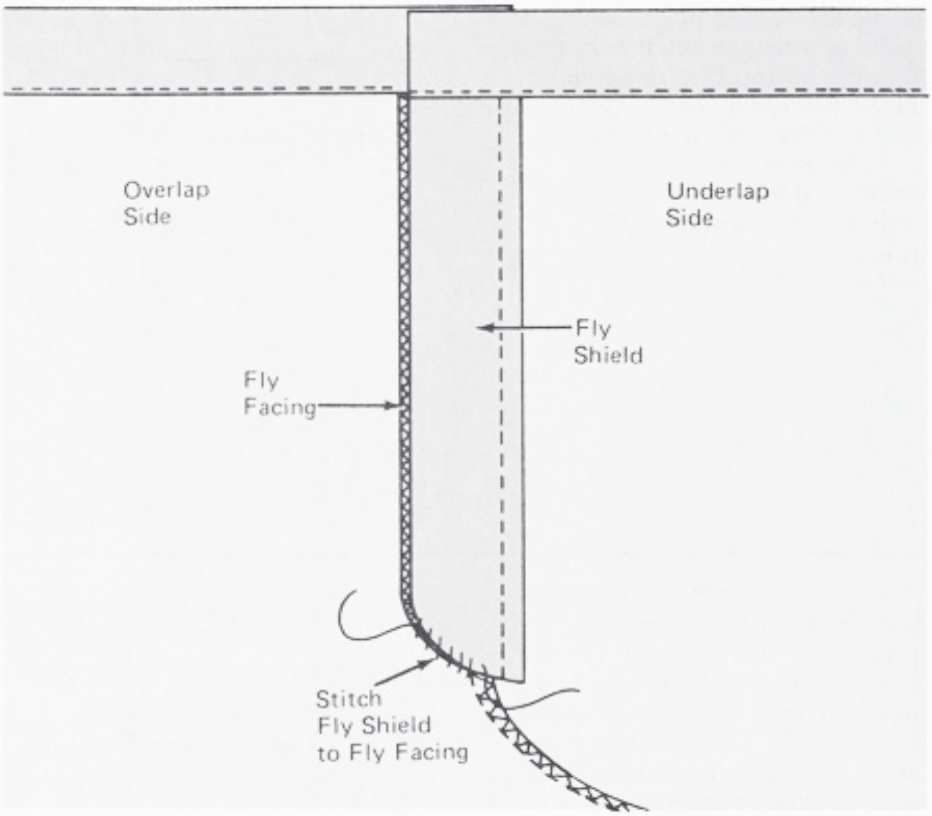
Figure 23



Finishing the fly-front zipper. Working on the right side of the garment, with the zipper open and the fly shield tucked out of the way, machine or hand stitch along the basting line or lines marking the original topstitching. Use a backstitch by hand, a straight stitch by machine.

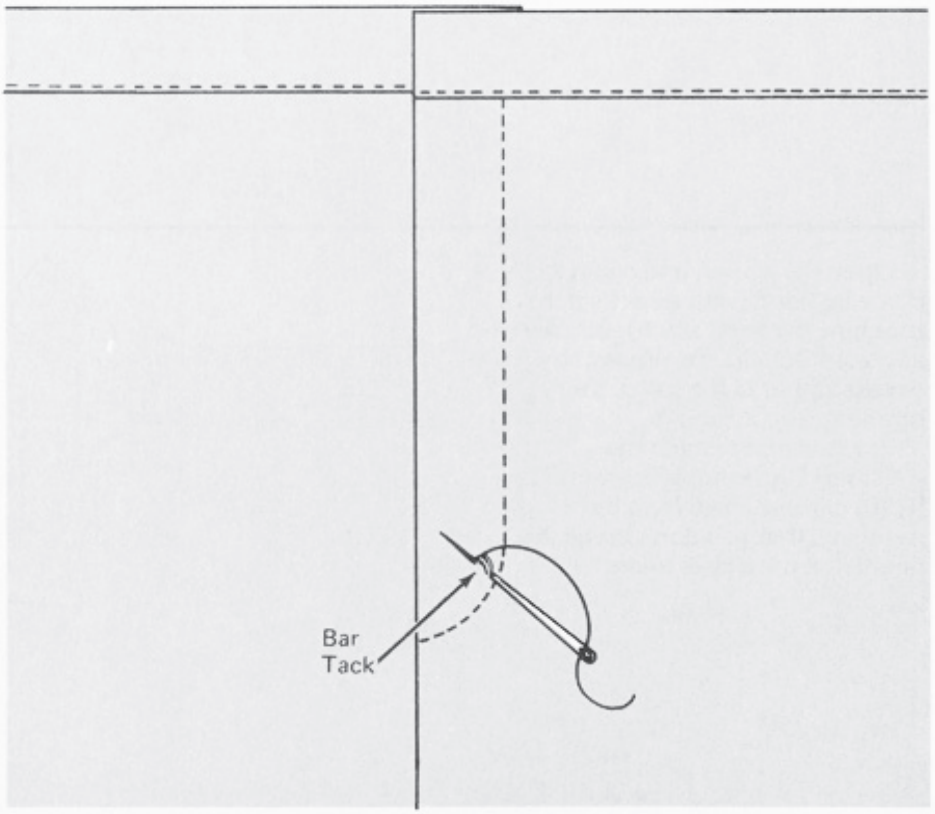
Close the zipper. Working on the inside of the garment, hand stitch the bottom of the fly shield to the bottom of the fly facing with small stitches *(fig. 24)*.

Figure 24



Replace any bar tacks from the right side, through all fabric layers. This can be done with a small zigzag stitch by machine. See your machine instruction book. If you're doing them by hand, use a double, knotted thread, insert the needle from the wrong side of the garment, and work the bar tack as shown, making it as long as the original bar tack *(fig. 25)*.

Figure 25



Repairing Pockets

Pockets can be classified into four types: patch, in-seam, front-hip, and set-in *(fig. 1)*. Patch pockets are made by attaching a separate piece of fabric to the exterior of the garment. The other types are constructed with an interior pocket bag that is attached to an opening in the garment.

The most common pocket repair is probably the replacement of some missing stitches, although sometimes pockets need to be patched or darned. Most such repairs can be done by either machine or hand. However, when working in tight areas, hand sewing may be easier.

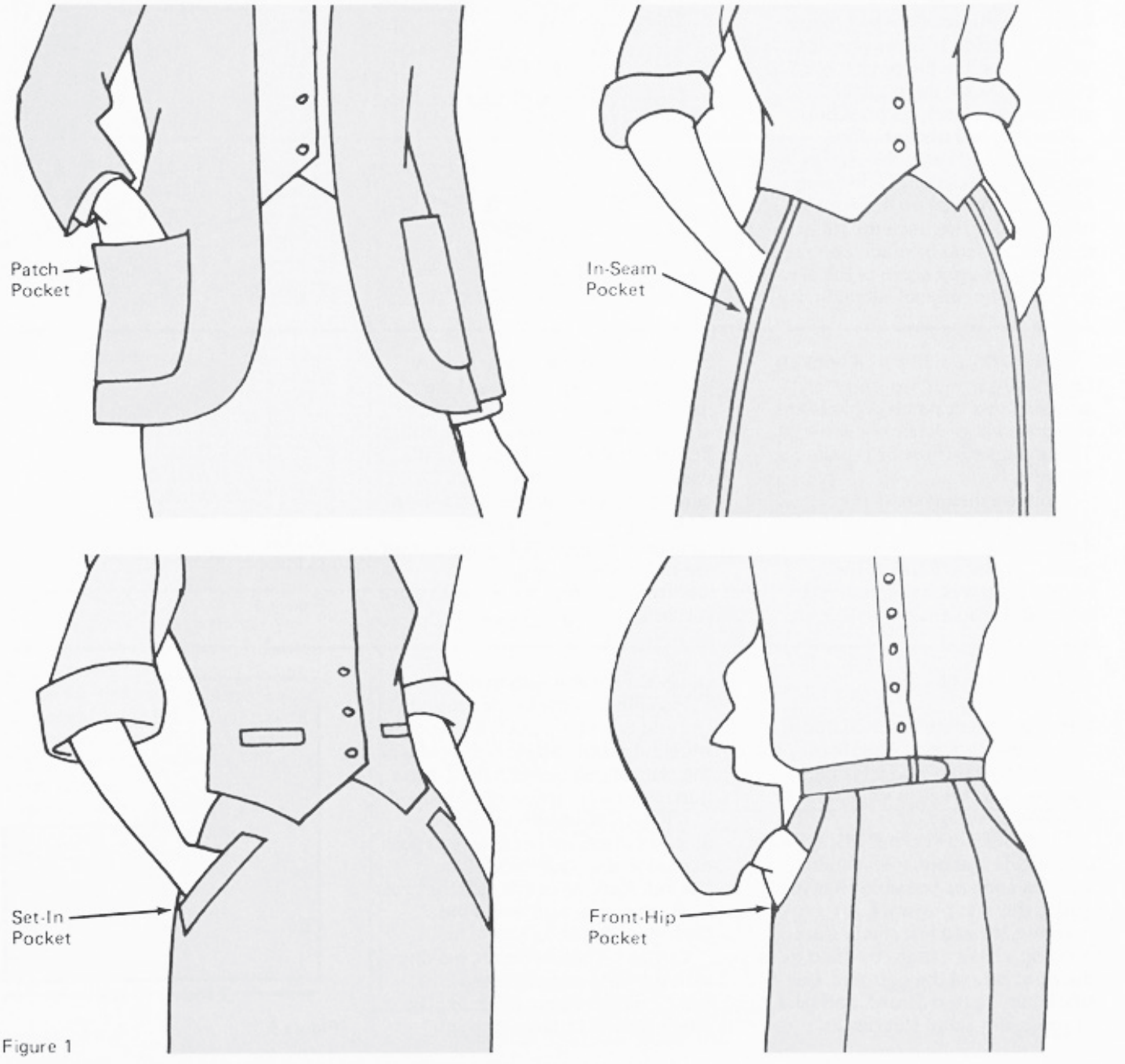


Figure 1

Patch Pockets

Mending patch pockets generally involves the replacement of a few missing or broken stitches. If the garment you're working on is lined, you'll have to rip out some of the stitches holding the lining in place to gain access to the wrong side of the pocket. When your repair is complete, replace the stitches you ripped out.

If the pocket fabric is torn, take the pocket off the garment to mend it. Use the appropriate technique from the Holes & Tears chapter. When you stitch the pocket back in place, duplicate the original stitching as closely as possible.

Topstitched pocket. Pin-, hand-, or glue-baste the pocket in position, if necessary. Trim away any loose threads on the right side of the pocket. Replace the missing stitches by hand or machine. Use a machine straight stitch of the same length as the original stitching. By hand, use a single, knotted thread and an even backstitch. Start and end the repair stitching ¼ inch (6 mm) beyond the ends of the damaged area *(fig. 2)*.

If a corner of the pocket has torn away from the garment, reinforce the corner with extra stitches using the other corner as a guide *(fig. 3)*. Finish the repair by pulling the threads to the wrong side of the garment and knotting them.

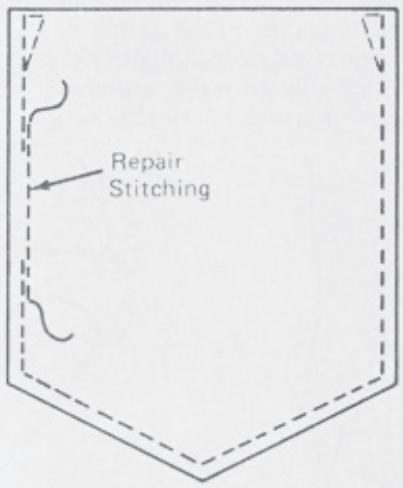


Figure 2

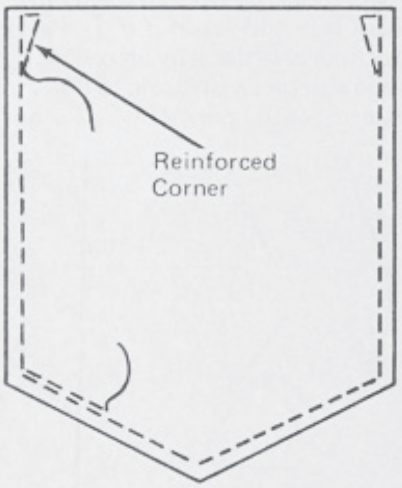


Figure 3

Invisibly stitched patch pocket. On some garments, particularly tailored jackets, patch pockets are attached without visible stitching. These pockets must be repaired by hand.

Work on the inside of the garment, ripping out lining stitches if necessary. Pin- or hand-baste the pocket in place. Replace the missing stitches, using a single, knotted thread and a small, even backstitch and catching the very edge of the pocket through the garment fabric *(fig. 4)*. You will be able to feel the pocket edge through the fabric with your fingers, so it's easy to know where to stitch. Be careful so your stitches don't show on the right side, and do not pull the stitches so tight that they pucker on the right side of the garment. Reinforce any top corners with extra stitches.

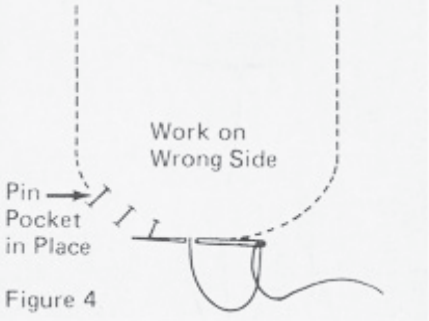


Figure 4

Set-In Pockets

Set-in pockets are reached through a slit in the garment. The slit may be covered by a flap, and it is often finished with a welt, a strip of fabric banding the edge.

Frequently the corner of a set-in pocket will tear out. Mend such tears as soon as possible after you notice them to prevent further damage. If just a few stitches are missing, replace them by hand from the right side of the garment. Use a single, unknotted thread, and take as many tiny hand stitches as necessary to strengthen the area.

Patching. If the fabric around the end of a set-in pocket is worn it must be patched before the ends of the pocket can be restitched. If the garment you're working on is lined, you'll need to unpick the lining stitches wherever necessary to gain access to the underside of the pocket. Also, rip out the stitching at the torn corner and along the bottom of the welt.

Cut an L-shaped patch, making sure the long edges measure at least 2 inches (5 cm) *(fig. 5)*. The patch should be large enough to

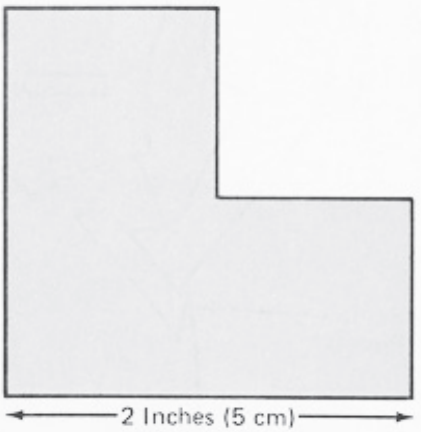


Figure 5

cover the worn area generously. Position the patch over the worn area so that its inner angle extends ¼ inch (6 mm) over the worn corner of the pocket. Using the oversewn patch technique (see Holes & Tears chapter), stitch around the four outside edges of the patch *(fig. 6)*. Do not catch any part of the inner pocket in your stitching.

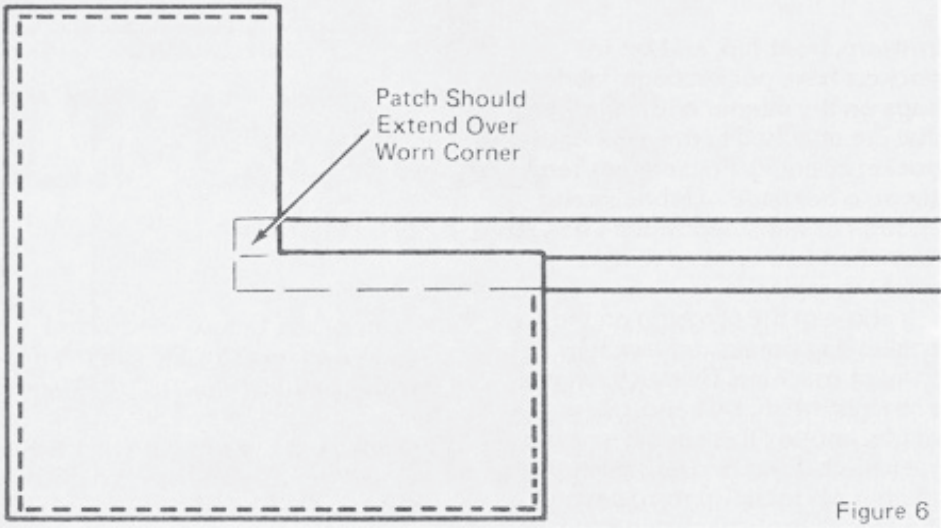


Figure 6

Working on the right side, make a ¼-inch (6 mm) clip into the inner corner of the patch. Turn under a ¼-inch (6 mm) vertical fold; tuck the ends of the welt or welts behind this edge and catch everything securely in place with small diagonal hand stitches, using a single, knotted thread *(fig. 7)*.

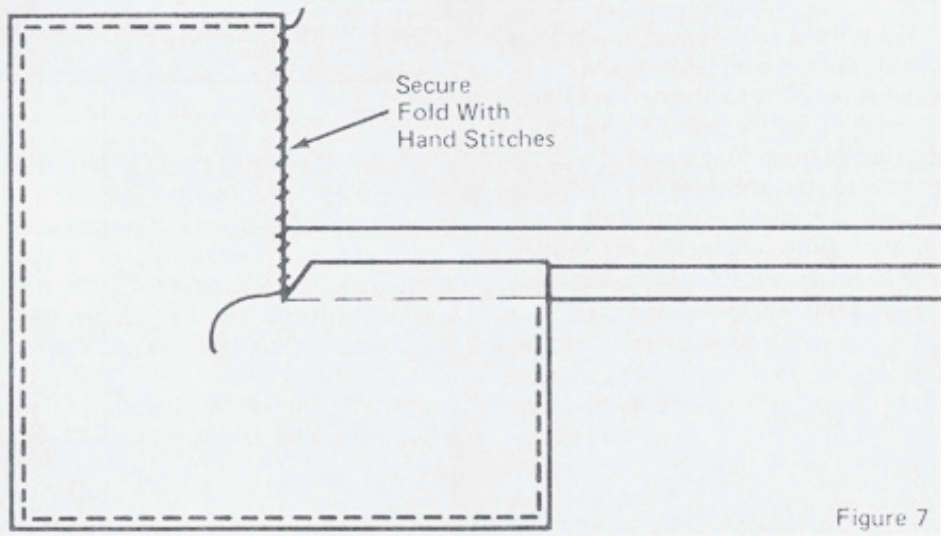
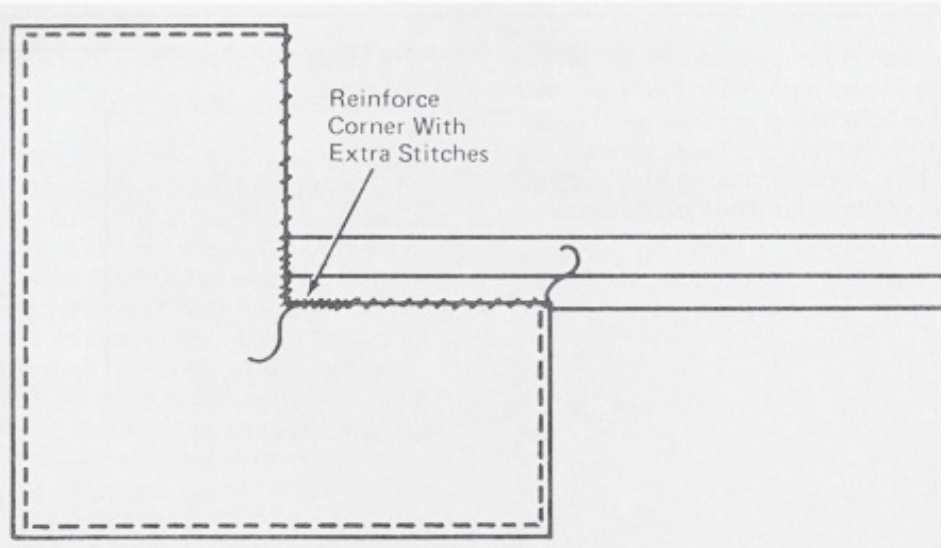


Figure 7

Turn under a ¼-inch (6 mm) horizontal fold, and catch the fold to the lower welt of the pocket by hand as above. Reinforce the inner corner with extra stitches *(fig. 8)*. Replace any other missing stitches along the edges of the pocket, making the corner secure.

Lightly steam-press the repair area, using a pressing cloth to protect the right side of the fabric.



Pocket Bags

In-seam, front-hip, and set-in pockets have pocket bags, fabric bags on the interior of the garment that are attached to the exterior pocket opening. Pocket bags rarely seem to be made of fabric strong enough to withstand much wear, so they often tear or need to have stitching replaced.

If some of the stitching on the pocket bag breaks, replace it by hand or machine. By machine, use a straight stitch. By hand, use a single, knotted thread and an even backstitch. Start and end the repair stitching ¾ inch (20 mm) beyond the area of broken stitching *(fig. 9)*.

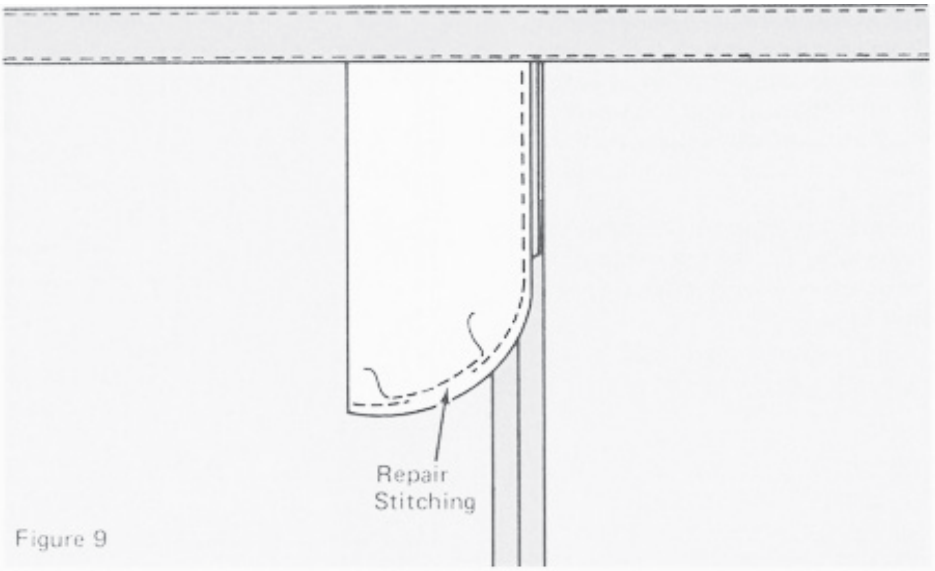


Figure 9

If a hole or tear occurs toward the bottom of the pocket bag, the easiest repair is to shorten the bag by making a new seam above the damaged area. Run a line of machine straight stitching ½ inch (13 mm) above the worn area through both bag layers. By hand, use a single, knotted thread and a small, even backstitch *(fig. 10)*.

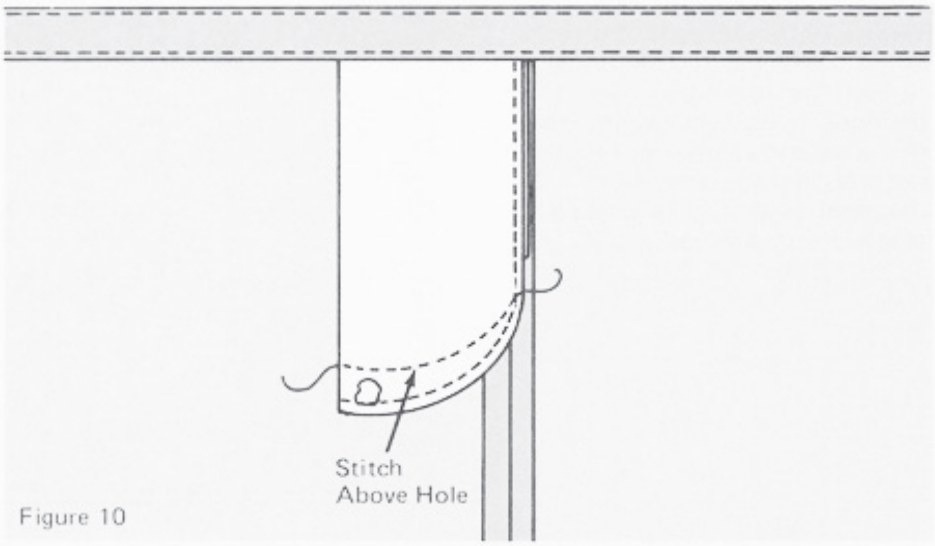


Figure 10

If the hole occurs too high on the bag to be repaired in this way, patch the hole with one of the techniques from the Holes & Tears chapter. The easiest technique for this repair would be an iron-on patch made with fusible web *(fig. 11)*.

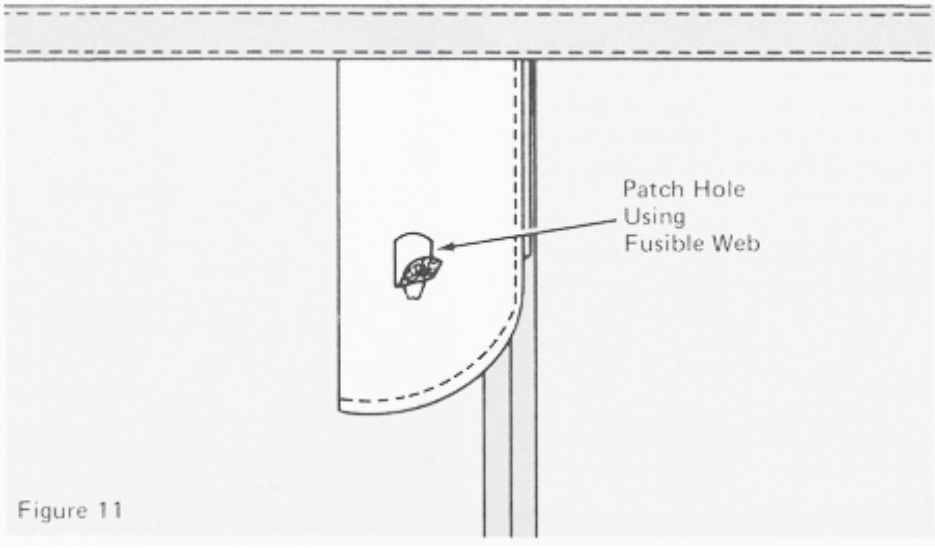


Figure 11

How to Use Solar

This chapter explains the basics of solar power. You'll learn how to calculate your electricity needs and connect a basic system. You don't need to spend tens of thousands of dollars on an expensive rooftop system. A simpler setup can work well, and it could save your life during an emergency.

How much do you need?

The average American household uses 30kWh of electricity a day. It helps to think in terms of appliances and watt-hours. A central air conditioner uses anywhere from 3-5 kW per hour. A window unit uses about 300-500 watts. A refrigerator uses about 200 watts per hour. A chest freezer uses 100-400, and a stove uses 2-5 kW. It adds up fast.

How much can you get?

A typical rooftop solar setup can produce about 20-40 kW per day, depending on the weather. They can cost tens of thousands to install. Smaller, portable setups produce much less, but you can still generate enough to run some essential equipment if you develop a strategy.

The Basics of Electricity

We measure electricity in amps, volts, and watts. Amps refers to the amount of electricity flowing through a system. Voltage refers to force or velocity. We multiply amps by volts to get watts, the total load. It's important to know, because different equipment requires different voltage.

Volts x amps = watts
Watts/amps = volts
Watts/volts = amps

For example: You have to configure solar panels to deliver a specific voltage to run a solar charger or generator. Too much, and you'll damage the system. Not enough, and the system won't run. The same goes for amps. If your appliances demand too much, it can cause hazards. Plus, solar equipment is rated for maximum volts, amps, and watts.

Is there a quickstart?

It's easy to get overwhelmed when you start learning about solar panels, charge controllers, battery management systems, and inverters. Fortunately, there's a fast way to get solar that's much simpler (and safer). It's called a solar generator. It combines all the equipment you need in one package. Just configure your solar panels and plug them into the generator.

How to choose a generator

Several companies sell solar generators: Bluetti, Jackery, Ecoflow, Renogy, Anker, and Goal Zero. Some are expandable, which means you can add batteries to them to increase your capacity.

Generators run from a few hundred watts all way up to several thousand in terms of electricity storage. Think about your needs during different types of emergencies. For example, if you need to power a portable AC during a grid outage, that would require a generator with at least 1-2 kilowatts of capacity.

How to Match Solar Panels

Companies also sell generators and solar panels in premade kits. Every generator has a maximum PV (solar) input measured in watts. For many middle tier generators, it's about 1000w per hour.

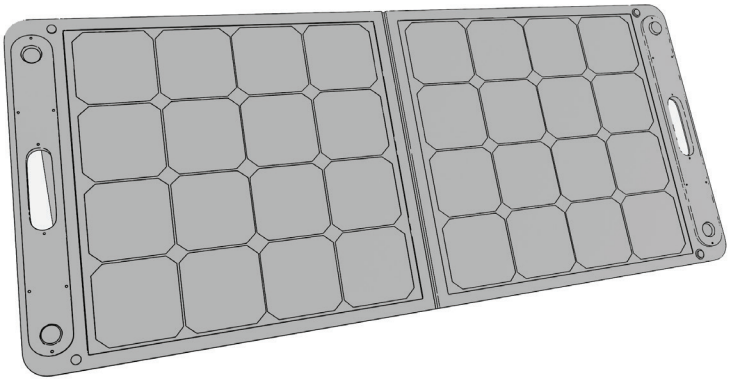
Most foldable, portable solar panels generate 200-400 watts per hour. So, many kits come with one generator and two panels.

It's okay to connect more solar panels than a generator's max wattage. It just won't draw the power. Some people deliberately "over panel" their systems to compensate for poor sunlight or to maximize solar input at the beginning and end of the day, when it's less bright.

You want to watch out for your amps at the other end, with how many devices you connect.

Solar Panel Specs

Solar panels also have technical specifications that matter when you're connecting more than a couple into one system. Here they are:



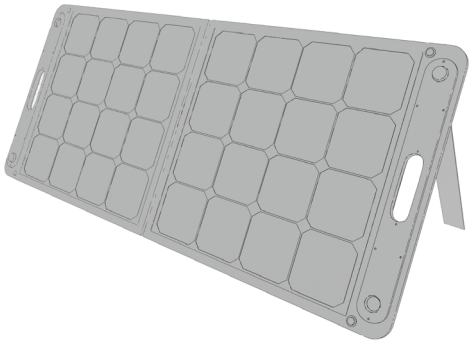
Pmax (Maximum Power Point): The max wattage a panel generates under ideal conditions.

OCV (Open Circuit Voltage)

Vmp (Voltage at Max Power)

Isc (Short Circuit Current): Use this to size fuses for panels in bigger setups.

Imp (Current/Amps at Max Power)



For example:

Pmax (Maximum Power Point): 350w

OCV (Open Circuit Voltage): 46.5V

Vmp (Voltage at Max Power): 37.5V

Isc (Short Circuit Current): 10.8 amps

Imp (Current/Amps at Max Power): 9.2 amps

This information tells us that we need a 15 amp fuse, and that we should connect the panels in parallel so we don't exceed the voltage range for most portable generators (12-60v). It will make sense in a minute...

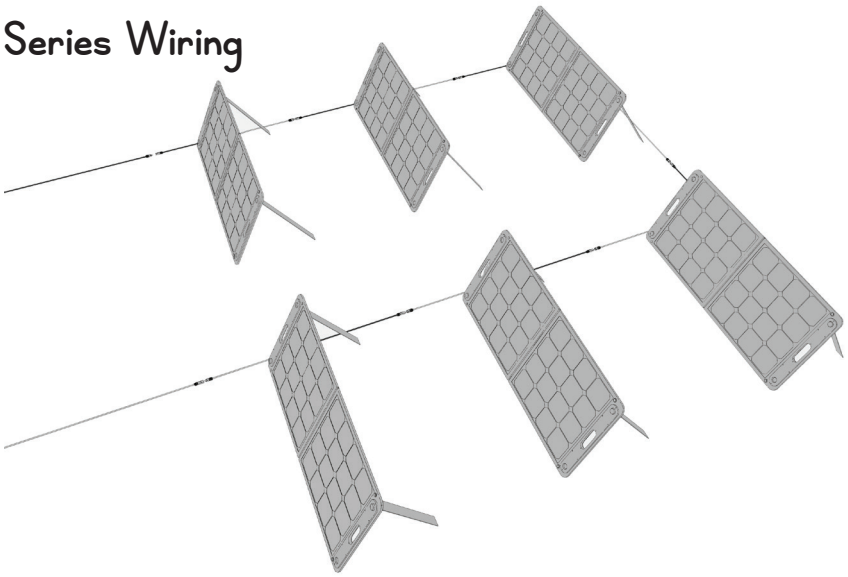
Series vs. Parallel Setup

You can hook up solar panels in two main ways: series and parallel. In series, solar panels add up or stack voltage as you connect positive to negative terminals. In parallel, they add up or stack amps as you connect positive-positive and negative-negative. Most of the time, you don't want to stack volts.

You can also hook up panels in series-parallel, discussed later.

Cables: MC4
Male and female connectors

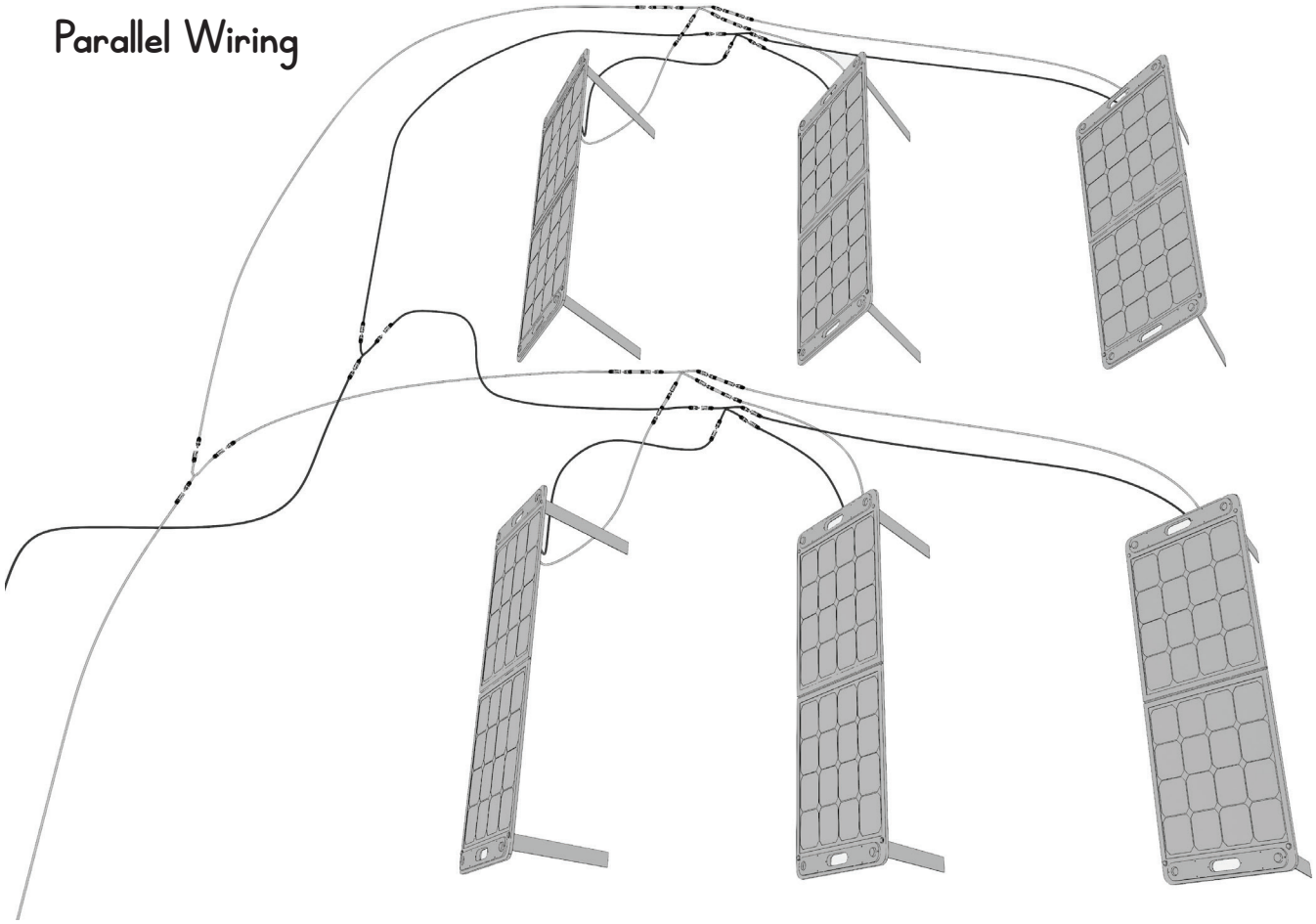
Series Wiring



Why Parallel?

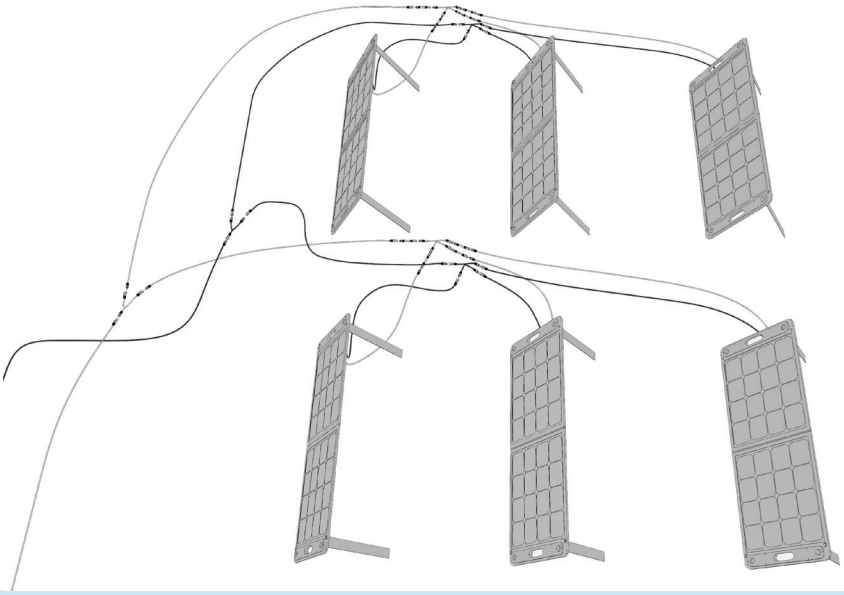
Most portable solar generators can't handle more than 60 volts, but they can handle plenty of amps. So you wire them in parallel. It requires more gear.

Parallel Wiring



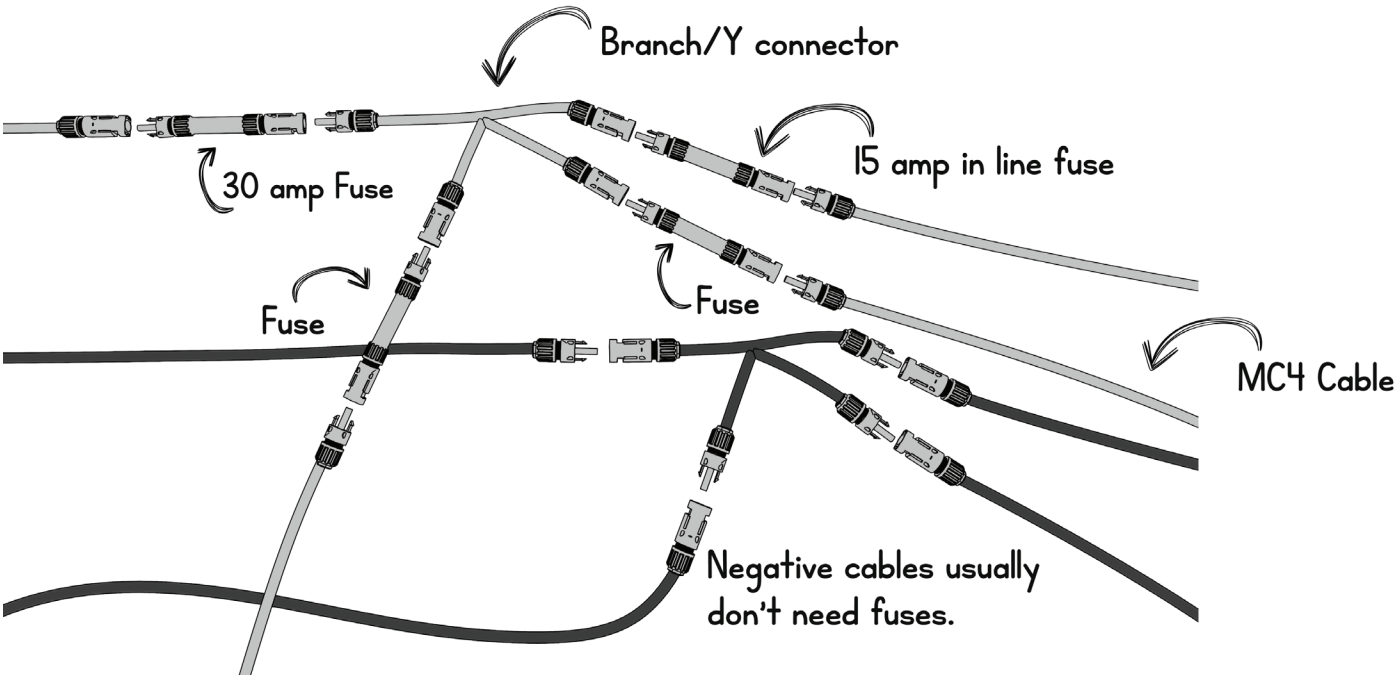
Parallel Setup in Detail

A parallel setup requires MC4 branch or y connectors, fuses, and extension cables. You're wiring all the positive wires together, and all the negative ones together, and feeding them into one positive and one negative cable. Those two cables run to your generator.



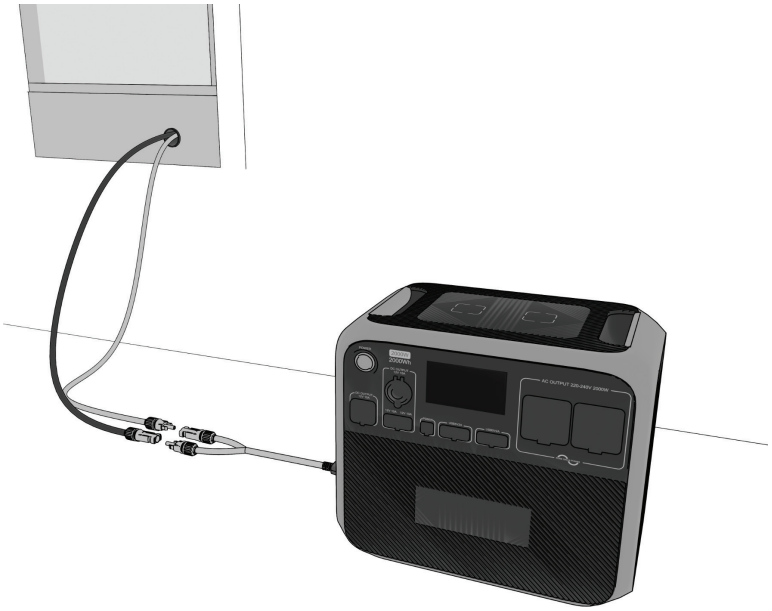
The Gear

Generally, you'll want to use 6-8 awg cable when you're connecting 3-4 solar panels. It handles 40-50 amps or better. Remember, 4 solar panels with 9-10 Imp connected in parallel generate roughly 40 amps. Lower awg means higher load tolerance, because it's thicker wire. For multiple panels, go with 8 awg or lower (bigger). The short circuit current (Isc) tells you what size fuse you need. Generally, it's 1.5x the short circuit current, or 15. It's not hard to find 15 amp inline fuses at most solar retailers. For extra safety, use a 30 amp fuse after the branch connector (3x10 amps).



Running The Cables Inside

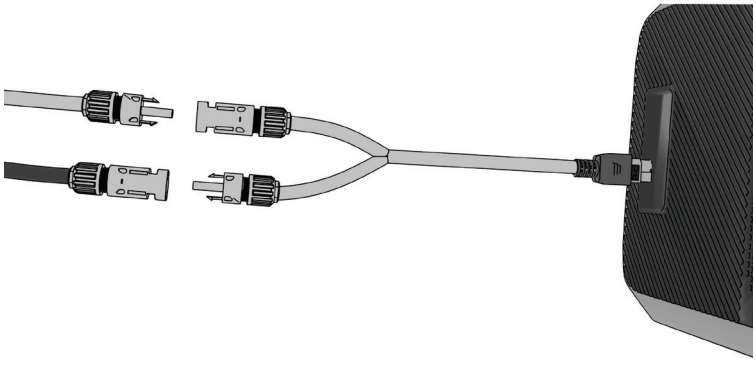
To run portable solar panels inside your home, you'll have to get creative. Try making a passthrough panel. Find some rigid foam insulation board at a hardware store. Cut it to fit a window. Use a hole saw to drill a 2-3/8 or 3-3/8 inch hole through it. That will fit the outside diameter of Schedule 40 PVC conduit pipe.



Now you can run the cables inside while keeping the elements and the bugs on the outside. To secure the window against intruders, use a security bar.

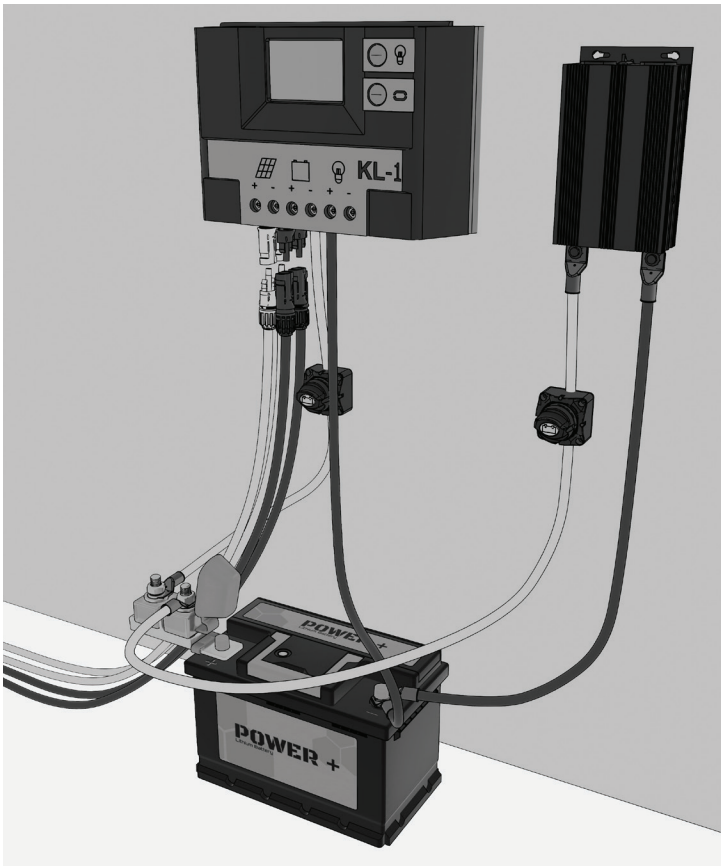
For maximum seal, run some weather stripping or rubber tape inside the pipe. The cables should come through snug, but not smothered.

Finally, you'll connect the MC4 cables to the adapter(s) that came with your generator. The XT60 is a popular one.



Hooking Up Batteries

Solar generators offer the ultimate simplicity and safety, but you can also rig your own battery system if you want more control. They can also cost less. To do that, you'll need to get a solar charge controller and an inverter at minimum, as well as a battery.



The Gear

Most experts recommend LifePO4 batteries. They're the most durable, and they last the longest. You're also going to need fuses and battery disconnect switches. Experts differ on where exactly to place fuses and disconnect switches, but you'll see a common setup in the illustrations. Marine-rated battery fuses (MRBF) offer a good mix of safety and affordability. You can get them as single or double-pole. They allow you to mount a number of connections directly to your battery terminal.

When you're working with 200-300 amp systems, use 4/0 (0000) AWG cables for maximum safety, although 2/0 (00) AWG cable can handle roughly 200 Amps.

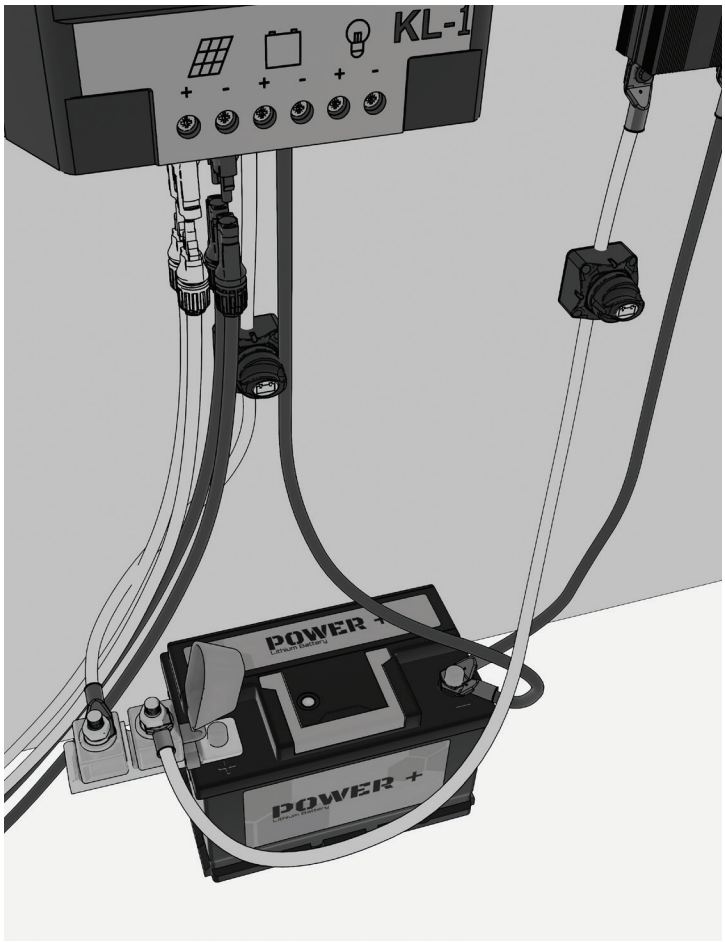
Sizing Fuses

Divide your inverter's total power rating by .9 to get its true draw. Then divide that by your battery's voltage, then divide it again by the number of batteries in your system. Multiply that by 1.25 twice for safety and battery aging.

For example:

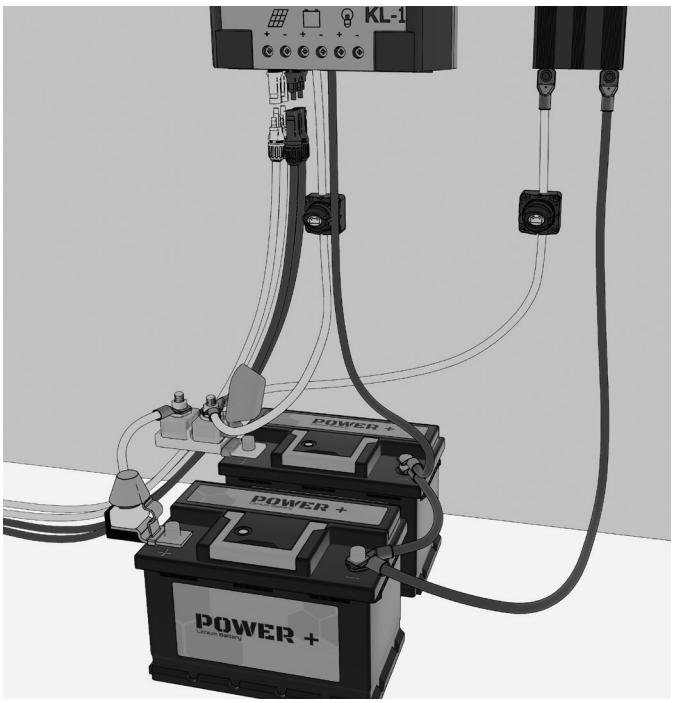
2,000W/.9 = 2,222W
2,222W/12V = 185 Amps
185/2 batteries = 92.5 Amps
92.5 x 1.25 = 115.63 Amps
115.63 x 1.25 = 144.53 Amps

If you're using one battery, you need a 200 amp fuse. If you're using 2 batteries, you need a 150A fuse, and so on.



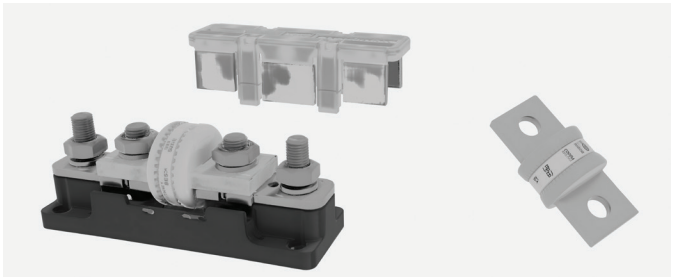
Connecting Multiple Batteries

You can generally connect up to 3-5 batteries without having to move up to Class-T fuses. With 300 amp/12-24 volt batteries, that's enough to run appliances and even small window units. More complex setups require more extensive knowledge.

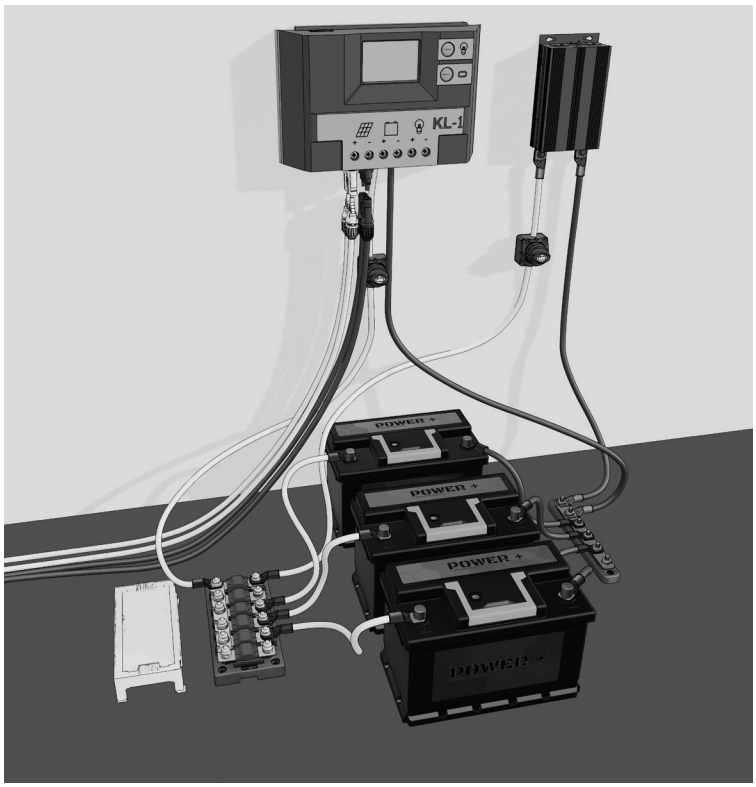


Newer systems often come with built-in PV disconnect switches. If yours doesn't, you'll want to add one for safety in addition to the battery switches. Just connect your cables, then connect the switch to your controller.

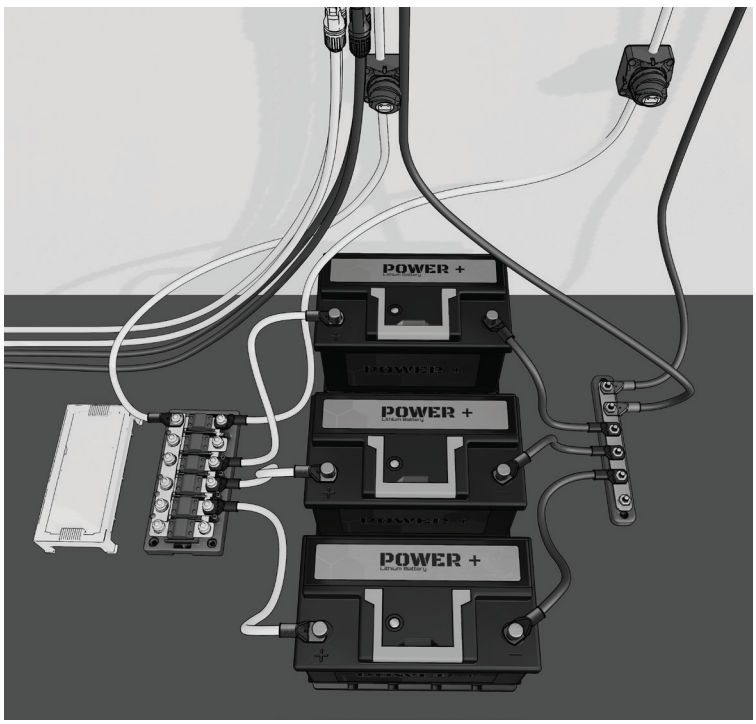
If you're wiring 3 or more batteries or larger ones (24V or above), it's also a good idea to get Class-T fuses that can handle larger currents and surges.



It's also a very good idea to run the negative battery terminals to a busbar. Doing that maximizes safety.



If you're connecting 3 or more batteries, it's recommended you upgrade to a fuse block. The inverter runs to one side. You connect the battery and inverters to the other.



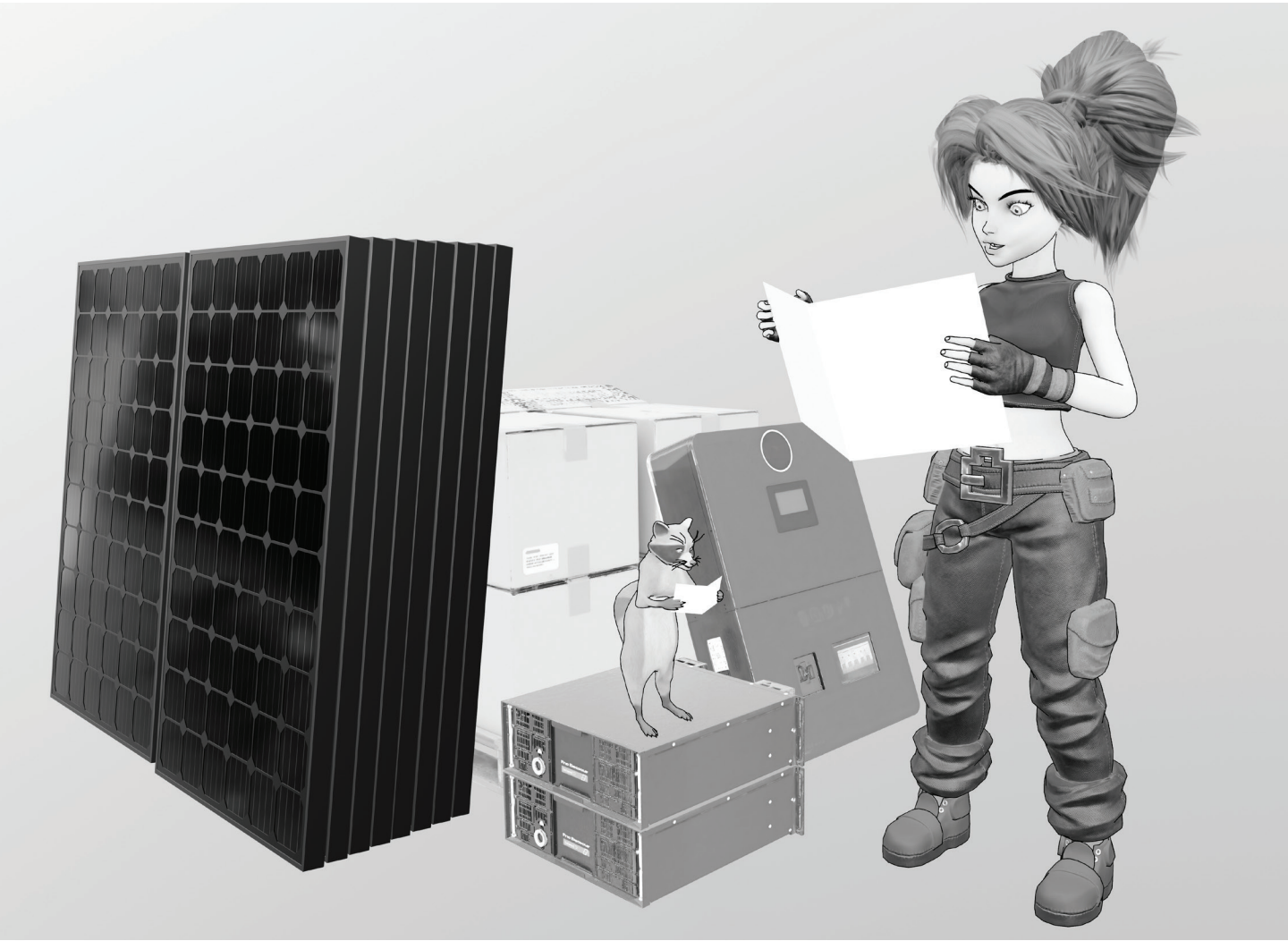
When to Go Full Solar

You might need a full-sized rooftop solar system for a variety of reasons beyond personal comfort. You might have a medical condition. You might be taking care of a vulnerable person. You might be raising a family. Children are generally more vulnerable to heat stress and exposure than adults. You might have a very good reason for wanting a larger system.

When to Go DIY

Several companies sell complete DIY solar kits, which cost a lot less than hiring a rooftop solar company. But DIY kits come with several risks. Look at reviews and complaints for these companies. Many customers report damaged or missing parts, absent or incomplete instructions, and pitiful support after the initial sale. On top of those problems, these companies often recommend you hire a licensed electrician or master installer to help you anyway, or at least check over your work. That means you have to find a reliable professional willing to work with you. Most counties and states won't let you operate a large system without an inspection. Disregarding local codes and regulations could cause serious injuries or property damage. Frankly, people have burned down their homes trying to save money on large DIY systems.

Consider all the extra time, stress, and safety issues. If you don't have much time or bandwidth in the first place, then it's a net loss.



Can You Really Live Without Electricity?

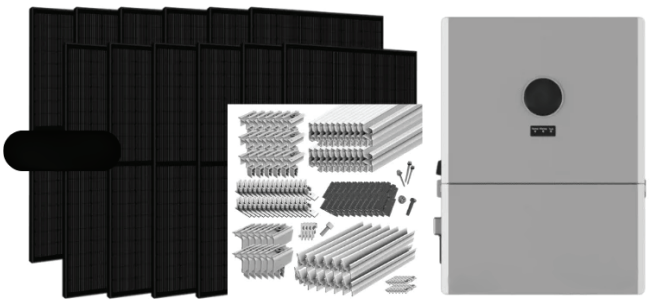
Some preppers advocate going without electricity altogether. That's just not doable for many of us in the suburbs or renting in bigger cities, with jobs and other responsibilities. We can scale back our needs a lot. We can hang-dry laundry. We can handwash clothes. We can cook food with solar ovens. We can use strategies to minimize our needs for heat and air conditioning. But even a composting toilet might require a fan to vent odors. You could cut your energy needs to a few kWh a day, compared to the average 30 for a typical American household. That doesn't mean you need to go without it entirely.

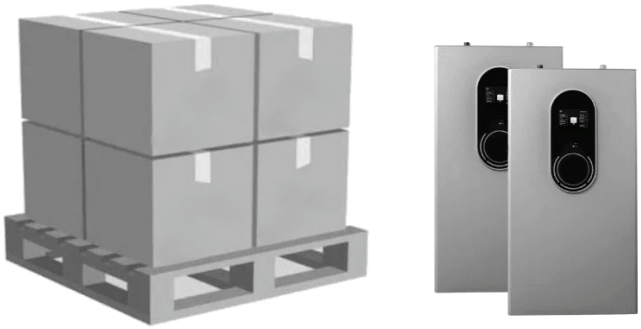
You Don't Need a Big System

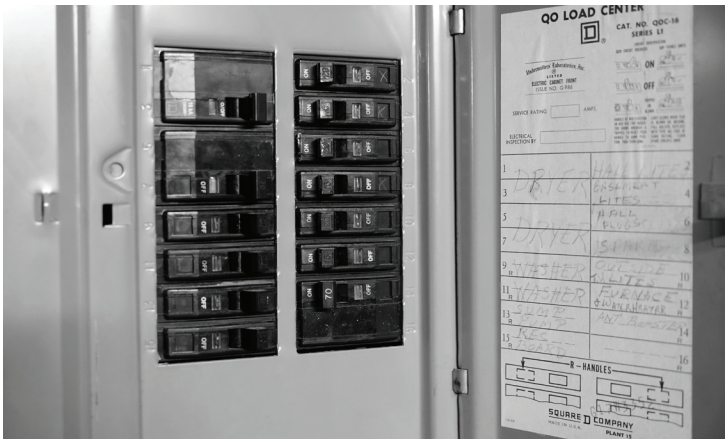
Many people think they have to power an entire home when they buy a rooftop system. That's not true. You can back up parts of your home, and it's a good way to save money. You choose which rooms, outlets, or appliances you need during a power outage. Then you size your system to those needs. A professional installer will ask you to fill out something called a "load sheet." Look at your home electrical panel. See what breakers connect to the electric loads in your house (Air conditioner, HVAC, etc). Decide your critical loads, and ask the installer to connect those to your backup battery. You could decide to power AC and one room only. Going this route, you could cut the install cost in half. From there, you can finance. Maybe it's not ideal, but it's doable.

When to Go Pro

Ads for DIY solar often exaggerate the cost of hiring professionals. An 8-10 kW system with one backup battery should run around $30-40,000. These systems can provide 90-100 percent of an average 2,000-square foot home's electricity needs. A similar DIY kit would cost $15-20,000 just for the equipment. Then you have to install it.







Solar Cheat Sheet

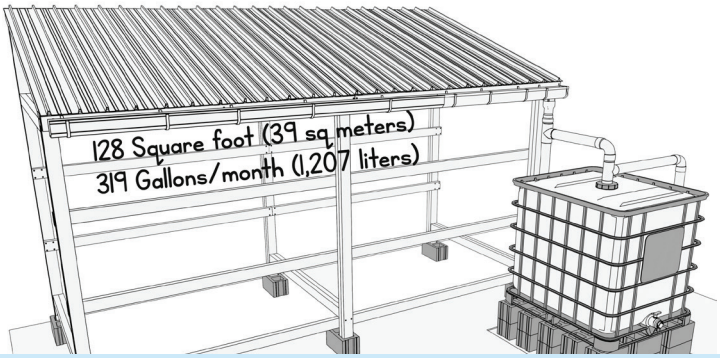
* Disasters and data center growth put many areas at a critical risk of outages and brownouts on a more regular basis over the coming decade.
* A typical American household uses 20-30 kWh a day.
* Not everyone can "get by" without electricity.
* DIY kits work well for small setups and off-grid living situations. They pose challenges if you want a larger system connected to the grid.
* A rooftop solar system on the grid will shut off during a power outage. You need a battery in order to "island" and have power during an emergency.
* A moderately-sized backup system costs $20-40,000.
* DIY kits can run as much as $20,000.
* Smaller systems cost less and still serve as good emergency backups.
* Professional installers will help you size your system and select the best, most compatible components, saving you time and stress. (It's also safer.)
* Lower electricity needs = smaller system. You can reduce your need for electricity by washing clothes and dishes by hand. You can also dry them by hand. Ditch hair driers and other high-energy appliances whenever possible. Use solar cookers to further reduce your needs. You can practice all this on a regular basis so it's easier to do during outages.
* You don't have to power your entire house. You can opt to power critical loads only, which means an even smaller, more affordable system.
* Before the install, make sure to test and label all the breakers on your home panel. Know what each breaker feeds. That helps you determine which appliances and outlets to consider critical. Make sure you communicate your critical loads to your installer. (They should ask for a sheet.)
* Batteries come in all sizes, but for larger systems they start around 5kW and run up to 15-20 kW. One smaller battery lets you run crucial loads.
* Avoid draining batteries below 50 percent, and especially discharging them down to zero. It will reduce life cycles, and it can damage the battery.
* If you need electricity to power crucial equipment, consider at least one larger battery (15-20kW) that can last you through the night.
* Remember, solar panels generate less electricity on cloudy days.
* Avoid the door-to-door sales pitches. Most of them are offering solar leasing programs. You don't own the panels. You lease them, and then you pay the company for the power they generate.
* You start with a small system and expand it later, but doing so usually carries an additional installation cost.
* You can soft-expand your system with backup batteries from companies like Bluetti, Jackery, Renogy, Ecoflow, and Anker. During the day, you can charge backup batteries from AC outlets powered by your solar, as long as they're on your critical loads list.

How to Harvest Rain

This chapter explains the basics of rain harvesting. You'll learn how to calculate rainfall in gallons (liters). You'll also learn how to harvest rain for drinking and irrigation without having to redo your entire roof.

How much water do you need?

An average person needs a gallon of water a day for survival. That's 1/2 a gallon for drinking and 1/2 gallon for hygiene, or 30 gallons a month. If you're trying to grow food, you'll need thousands of gallons. Most vegetables need at least an inch of rain per week per acre. A 1/4 acre backyard homestead would need thousands of gallons of water a week to grow off the grid. During a bad drought, you could empty a 5,000-gallon cistern quickly.

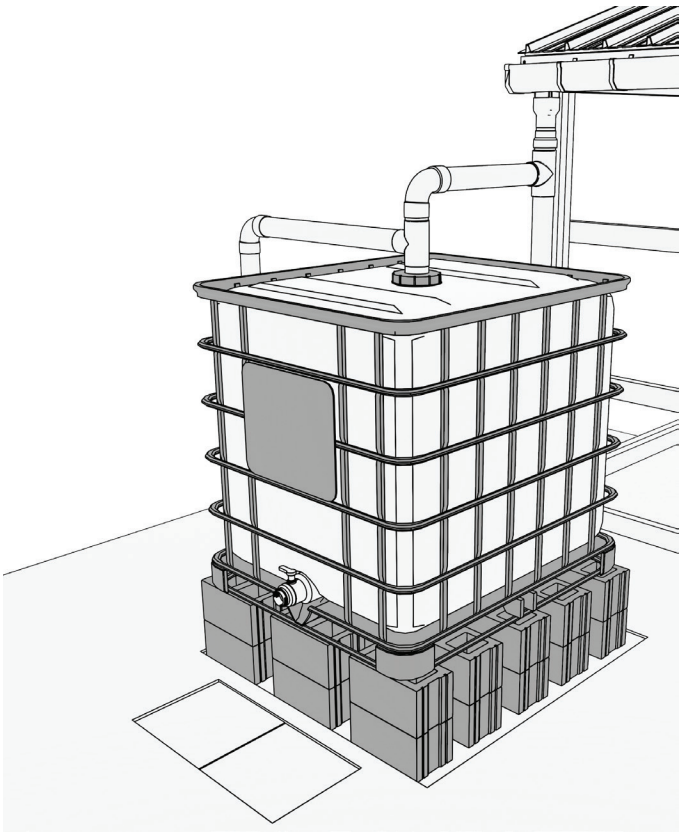


How much water can a roof catch?

Here's a simple formula:

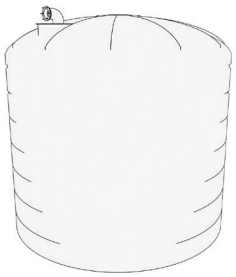
Area x inches (cm) of rain x .623 = amount collected

For example:
128 square foot (39m) x 4 inches (10 cm) x .623 = 319 gallons (1,207 liters)

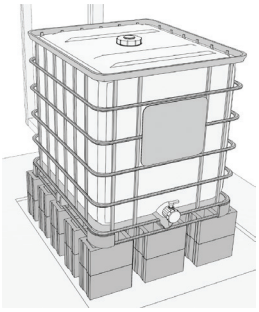


An average rain harvesting system measures about 1,000 square foot (304m) on one side of a roof. So it could collect about 2,500 gallons (9,464 liters) per month. That doesn't factor in spillage and evaporation, etc. A small rain harvesting system could supplement a backyard homestead and provide drinking water during an emergency.

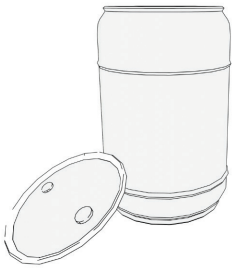
What Do You Store Water in?



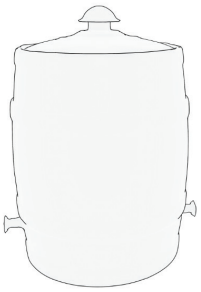
Large cisterns hold thousands of gallons, but they're expensive and hard to install. They usually require concrete slabs and special knowledge and skill to set up and maintain. The largest cisterns can hold 12,000 gallons (45K liters).



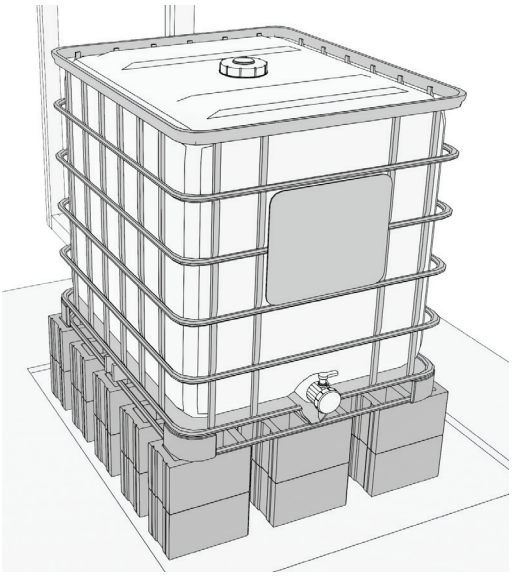
IBC Totes can hold 275 to 300 gallons (1,040 liters). They're easier to install and transport. You can find used ones online for affordable prices, and you can connect several together.



55-gallon drums (208 liters) hold small amounts of water, but they're the most affordable. Like IBC Totes, you can connect several together.



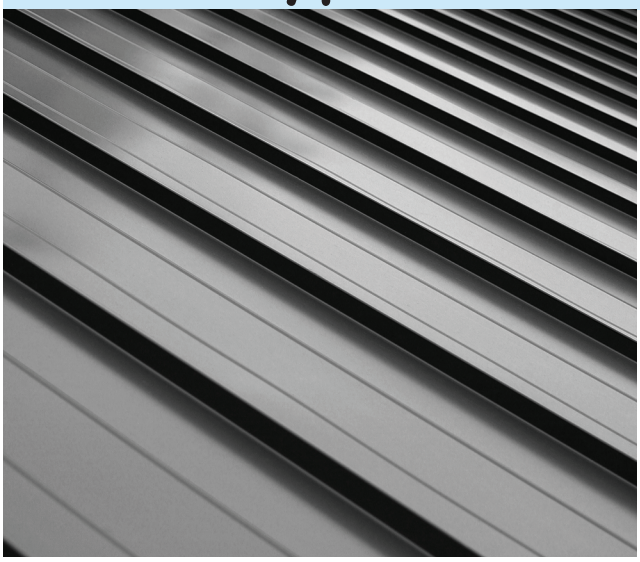
Rain barrels hold about as much as 55-gallon drums. They're pre-fitted with connections and easy to install, but they cost more.



Why an IBC Tote Makes Sense

Used IBC totes offer the best return if you can set them up. They're the best option for someone looking to do serious homesteading in a small suburban space. Rain barrels or drums still work well, but you'd need 5 barrels or drums to hold as much rain water as one IBC tote. The tote's heavy duty plastic and steel cage make them much more durable.

What Type of Roof Works Best?



Metal roofs offer one of the best surfaces for rainwater collection. They're durable, and they can produce potable water for drinking and irrigation. Galvalume, aluminum, and pre-painted metal works best. Galvanized steel can leach zinc, so it requires monitoring.

Slate roofing also works well for collecting rainwater. It's safe for drinking and irrigation, but it's also heavier.

Clay tile roofs also work extremely well as a collection surface for the same reasons. The only downside is they can produce water with a higher pH, which could affect your plants.

Asphalt shingles aren't the best collection surface, especially new roofs. They can leach harmful chemicals into the water.

Most people can't redo their roof just for the sake of installing a rain harvesting system, but you can still harvest rain. You just have to think a little outside the box. You can retrofit sheds or add a rain collecting surface in ways that don't cost a ton of money. You can just build surfaces to collect rain.

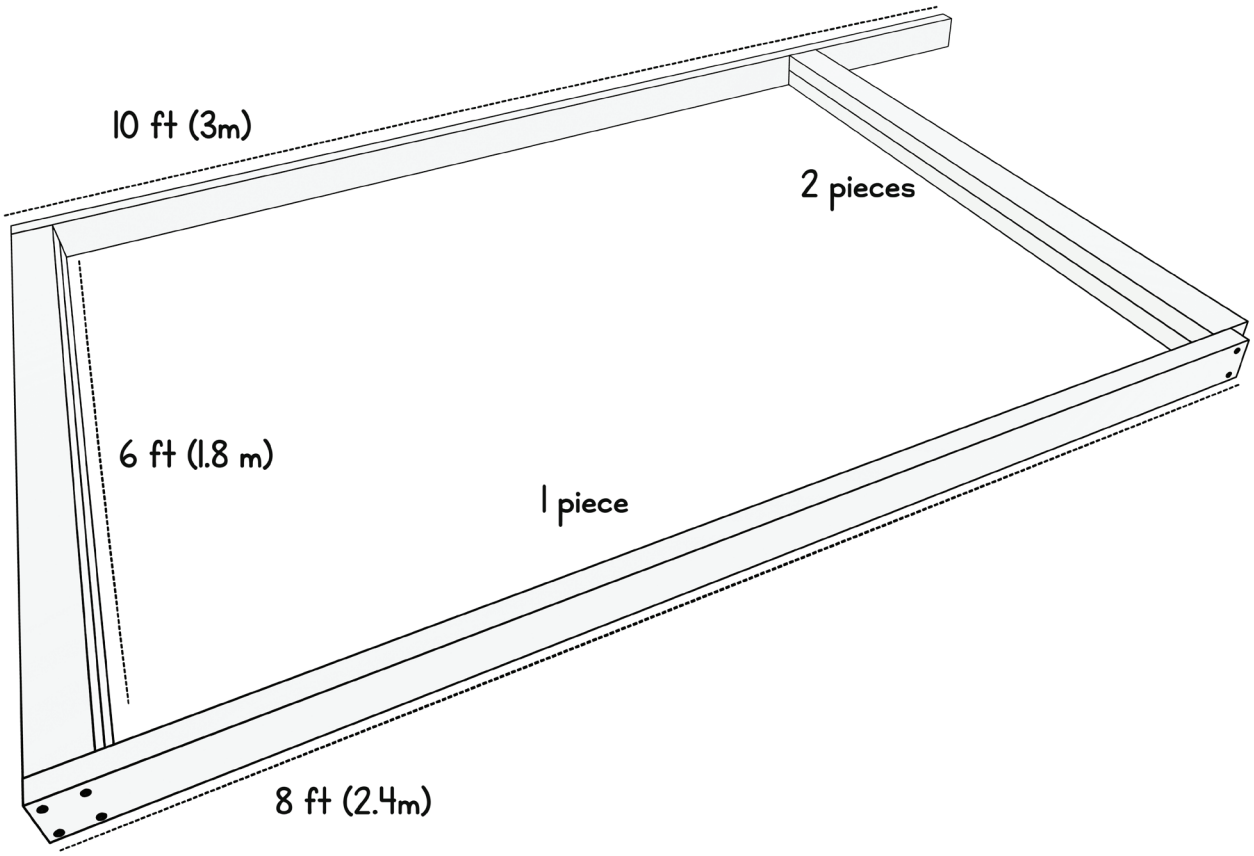
Considerations & Limitations

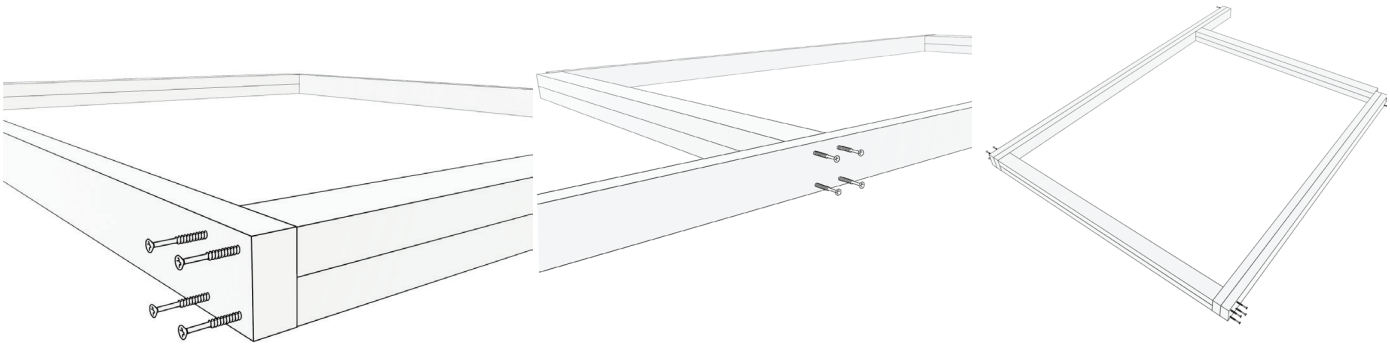
Rain catchment systems can offer practical advantages, and they bring a sense of security and peace of mind. But they're not a total failsafe. They run up against some limitations, and they're just one part of a larger water security plan.

* If you're rain harvesting system lies aboveground, you'll have to winterize it. That means emptying the tank before first frost, capping the outlet, and storing the valve inside. You can install tanks and systems below ground, but it costs more. You'll probably need to hire a cream, and you might need additional permits.
* Rain harvesting systems can fail. Parts can break. Even if you can repair them quickly, you should still store emergency water indoors.
* It's definitely possible to connect a rain harvesting system to your indoor plumbing. You can feed it with solar pumps. Doing that takes more time and money. You might have to hire professionals, and you'll definitely need approval from your city or county.
* If you're connecting your system to indoor plumbing, you'll need a multi-stage filtration system. It comes with additional upkeep costs. If you plan on using it for longterm emergencies, make sure you stock up on filters and parts. Know how the system works in detail, so you can repair and troubleshoot it as needed.
* Understand your water usage. It goes faster than you think.
* You can technically use your rainwater for whatever you want. Nobody is going to spy on you in your back yard, but you'll definitely need to filter your water, either with a full system or at least with a gravity-fed system.
* Even large tanks can run empty if you're using them on a regular basis for drinking, plumbing and gardening.
* Rain catchment systems will ultimately fail during a prolonged drought. Make sure you have additional ways of obtaining water. It's a good idea to keep 30-50 gallons of store water at minimum. It's also a good idea to have a dew catcher, a water generator if you can afford it (or even just a dehumidifier), and even a well.

Building Out Your Frame

You're going to make three big frame pieces like this one. Make these flat on the ground. Screw (or nail) one 2x4x8 ft beam to four 2x4x6 ft beams. The long side measures 10 ft long. (If you're already planning to use a shed, you can skip the next few pages.)

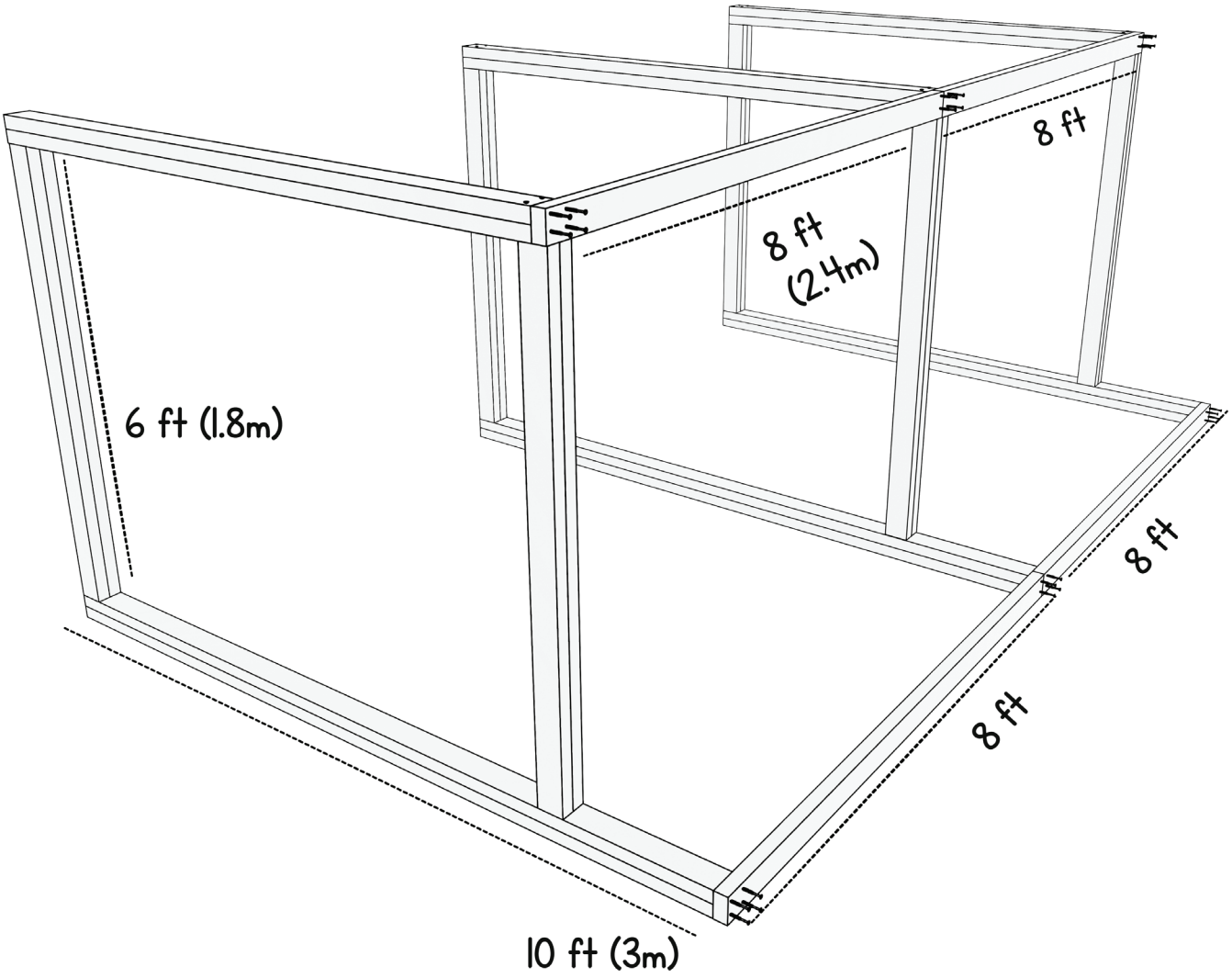


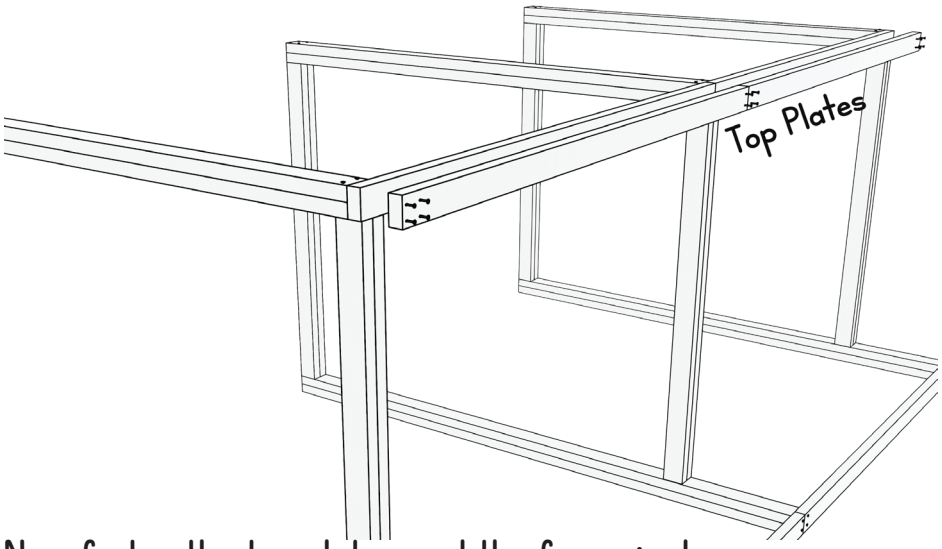


Add another 8 ft (2.4m) and another 10 ft (3m) piece to the front and back.

Finishing The Frame

Now you're going to connect the three big frames with 8 ft beams. You can put them on their sides to make the job easier.

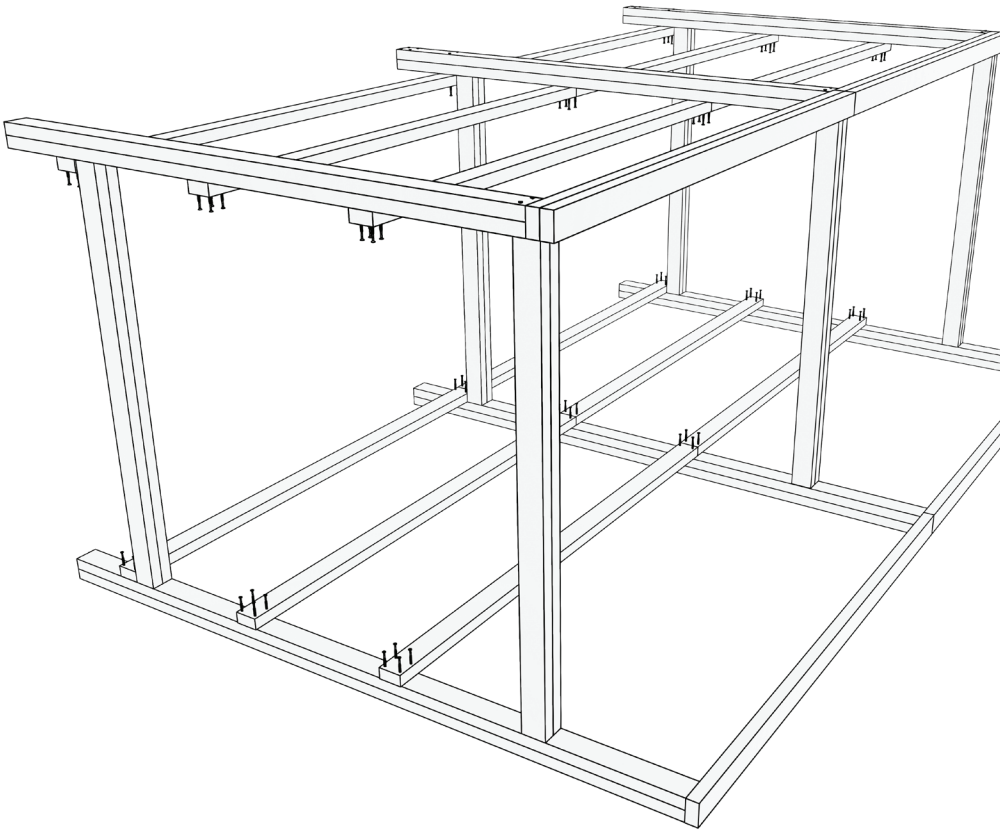


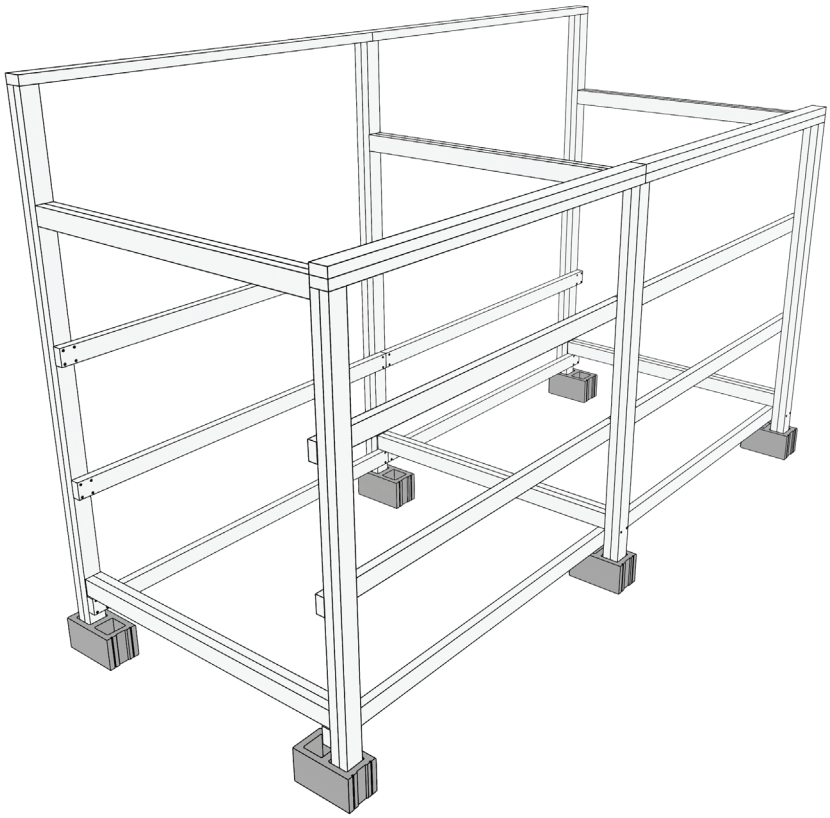


Now fasten the top plates, and the frame is done.

Adding Lateral Support

Finally, add 8 more 8 ft (2.4m) beams to give the frame some lateral support. This step especially matters in windy areas.





You can set the frame in cinder blocks to help guard it against high winds. Add quikrete or cement to give the base even more hold.

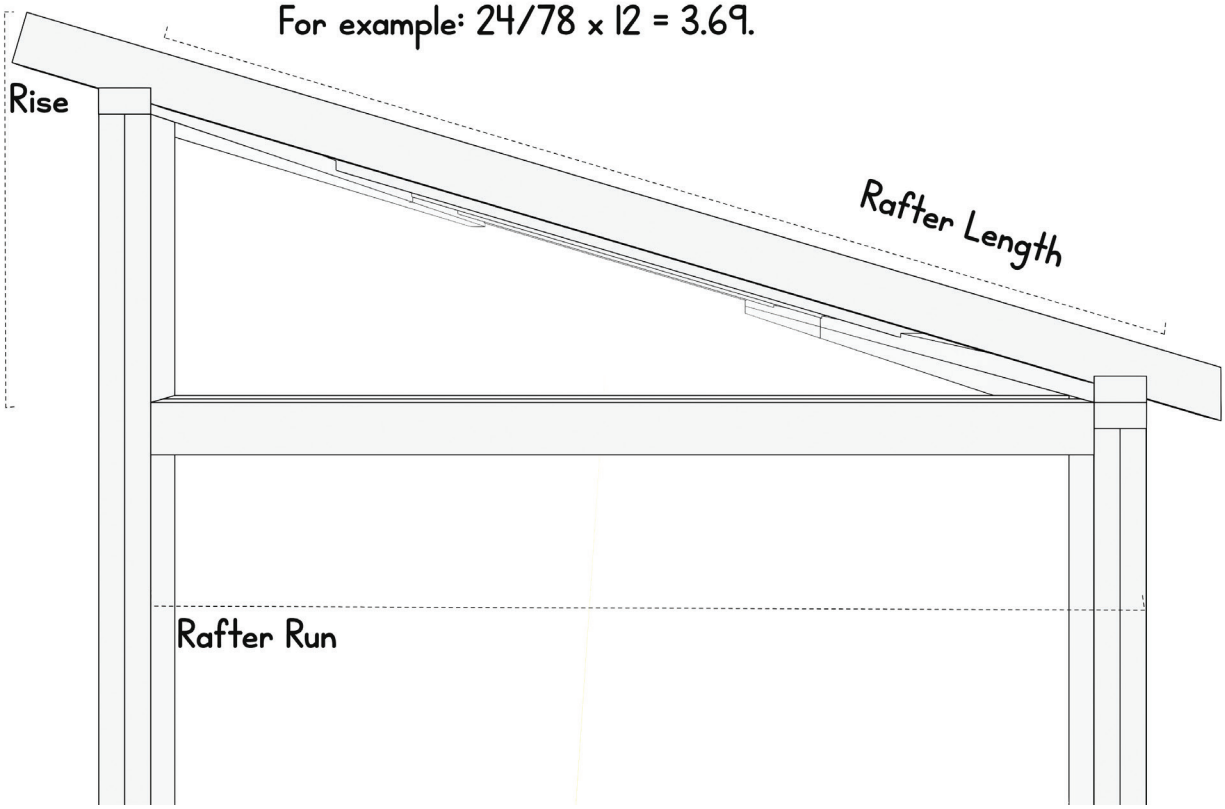
This might not look pretty, but it's easier than leveling ground and screwing post bases into concrete. (You can still do that.)

Cutting The Rafter Seats

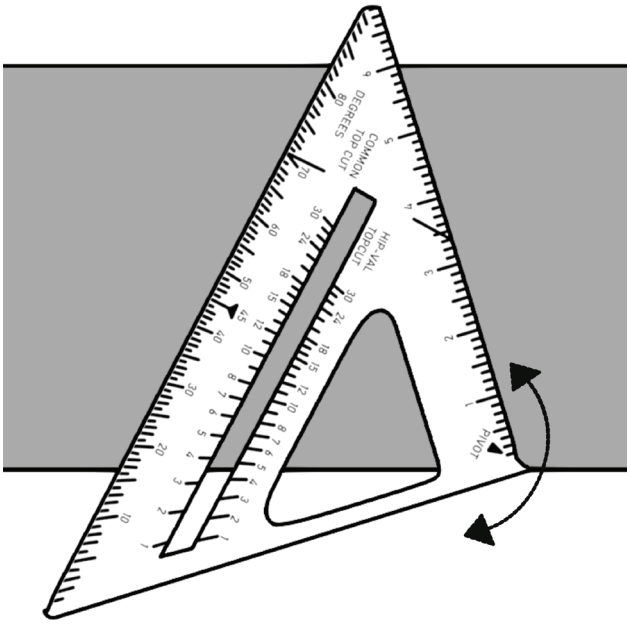
Once you've got the frame, you'll need to measure the birdsmouth cuts (seats) for your rafters. First, calculate the pitch. Use 2x6 or 2x8 beams for the rafters. 2x4s will eventually start to sag.

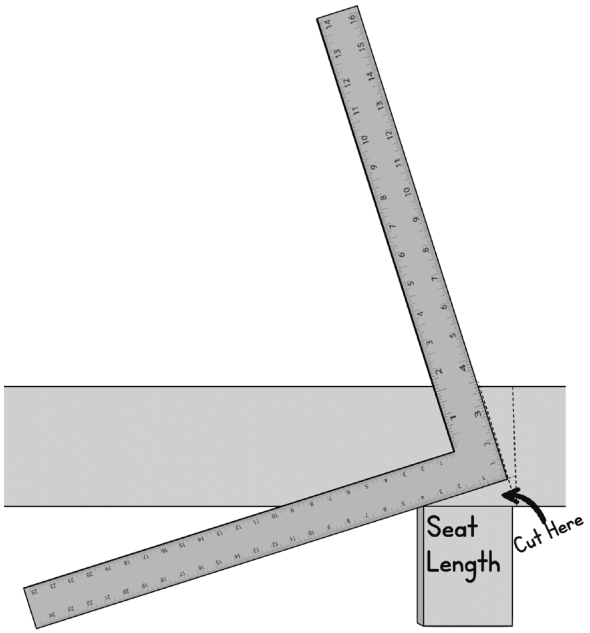
Divide rise by run, then multiply by 12.

For example: 24/78 x 12 = 3.69.



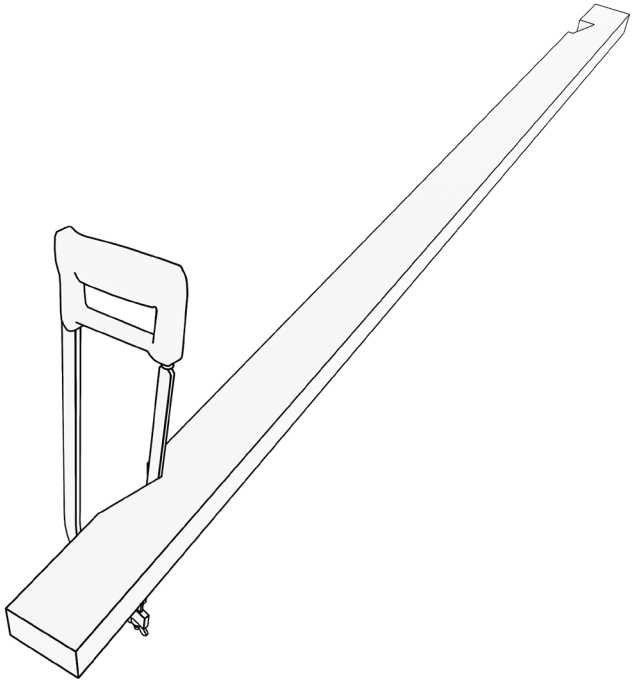
Once you calculate the pitch, use a carpenter's square and a framing square to mark the birdsmouth cuts.

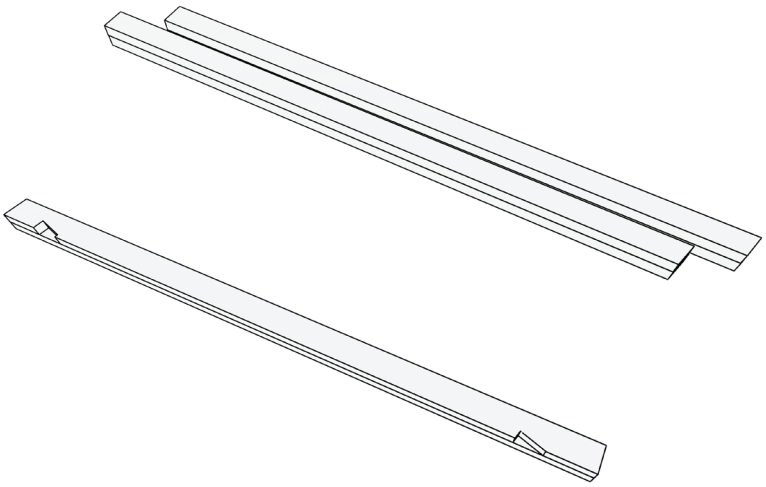


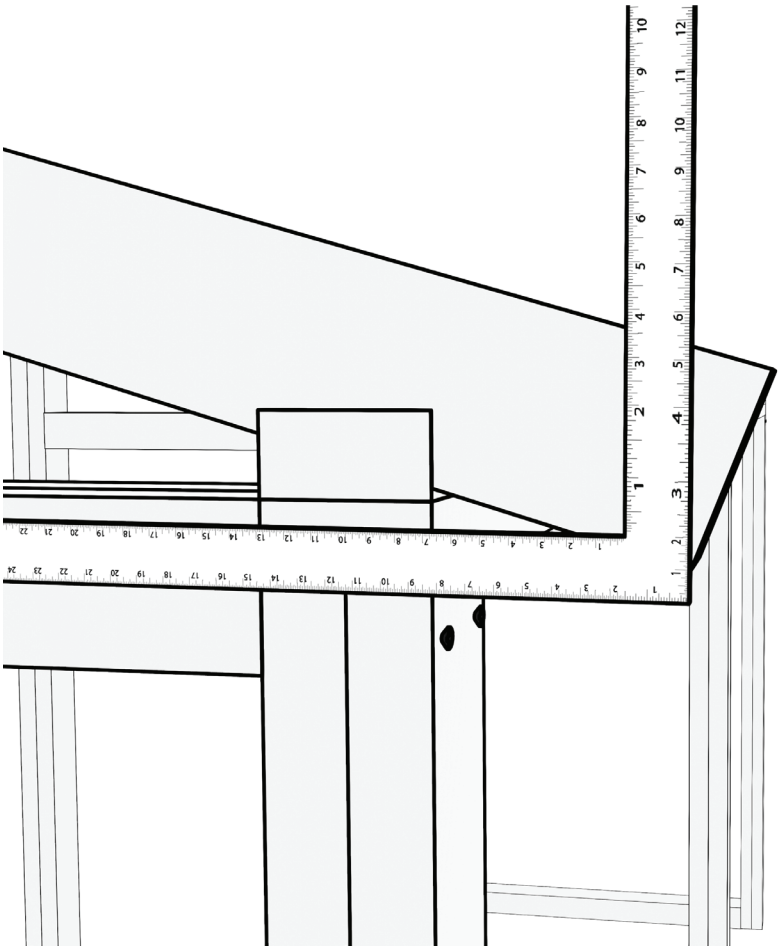


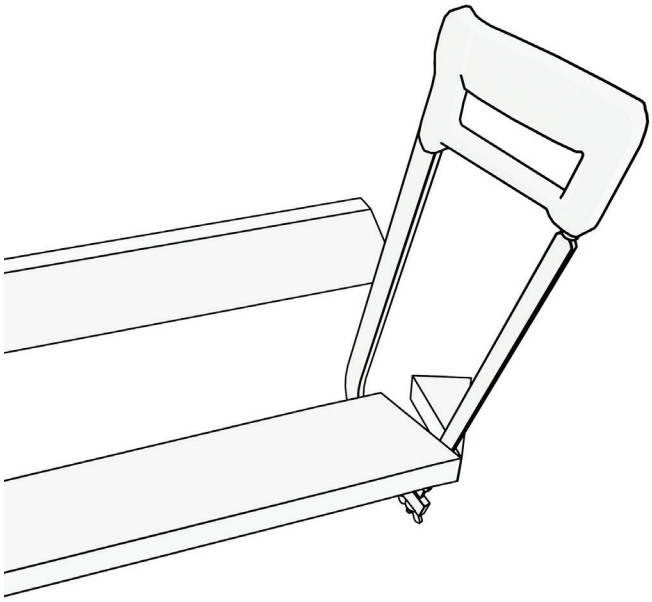
Trimming The Rafters

Cut the seats out where you marked them. Use the first rafter as a template to mark the other ones.







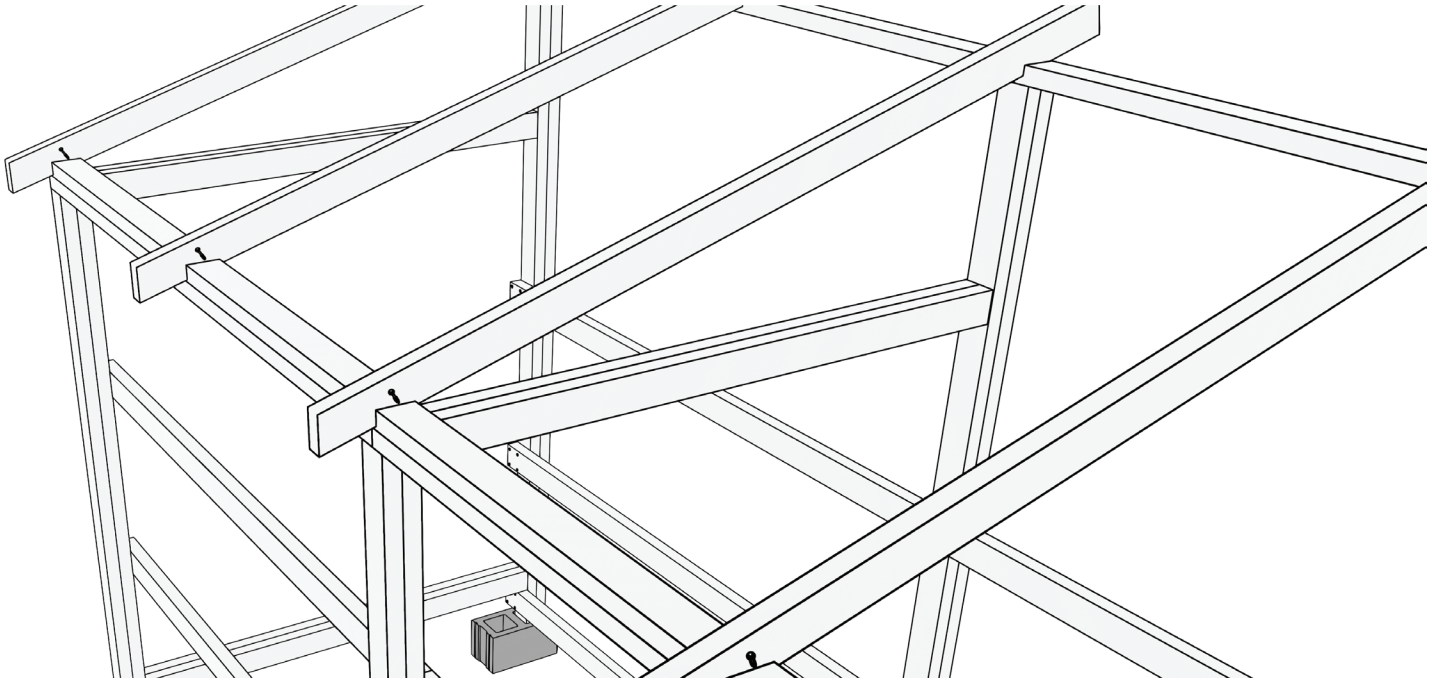


Cut a right angle on the bottom tail of the rafters. Mount the first rafter (without fastening it). Use a framing square and a level to mark a straight line.

You'll need this to mount the fascia board and hang the gutters later.

Putting on The Rafters

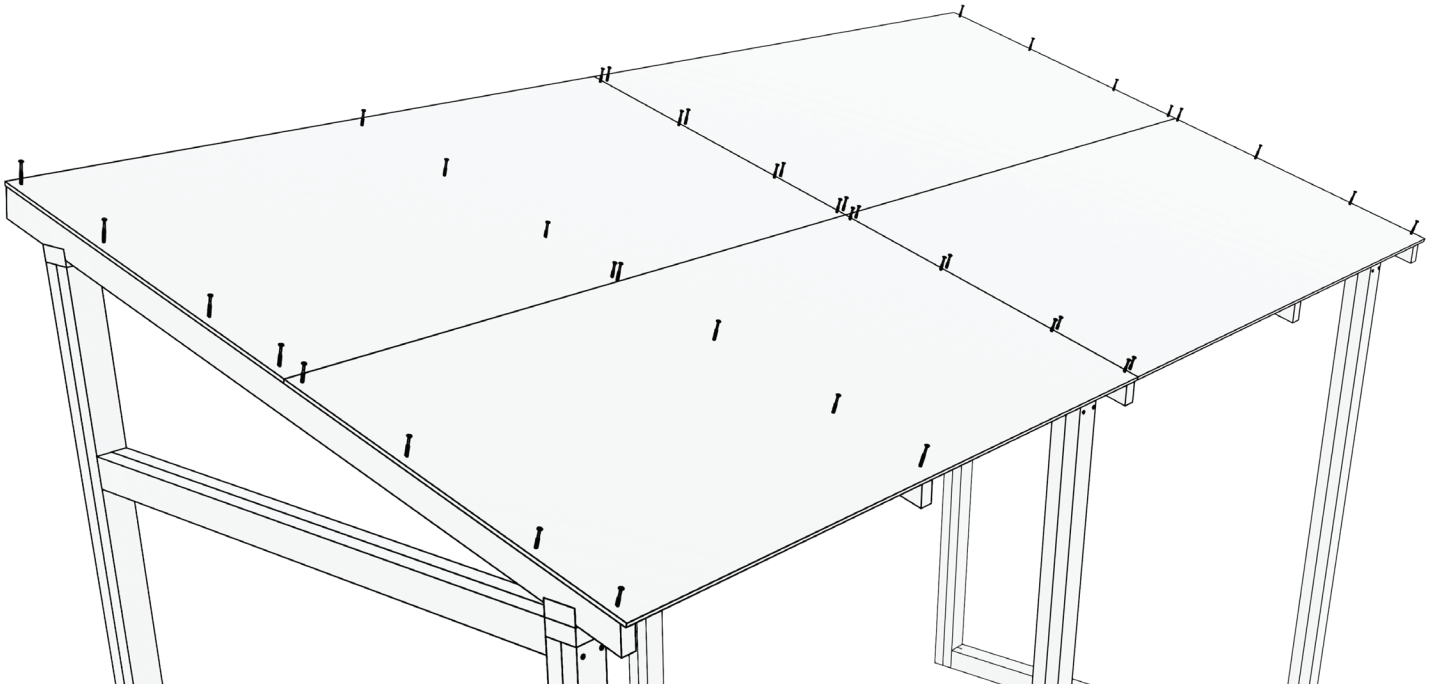
Now you're going to mount the rafters and screw (or nail) them by drilling or hammering them in at a diagonal angle. It's called toe-nailing.



The frame will look like this when you're done. Now you're ready to attach the plywood sheathing.

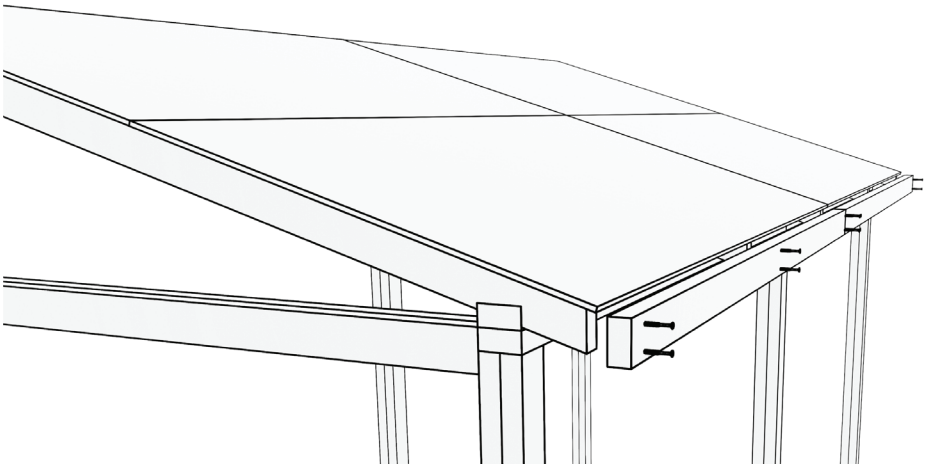
Mounting The Sheathing

Use the studs as guides to mount the plywood.

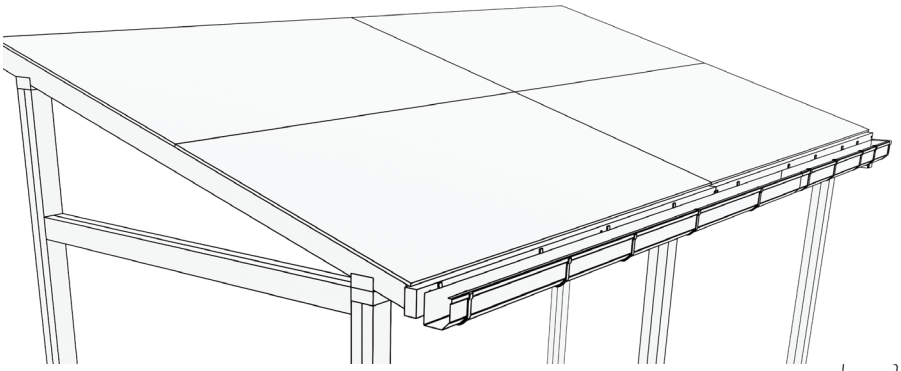


Putting on The Gutters

You need to attach the fascia and gutters before adding the final metal sheeting.

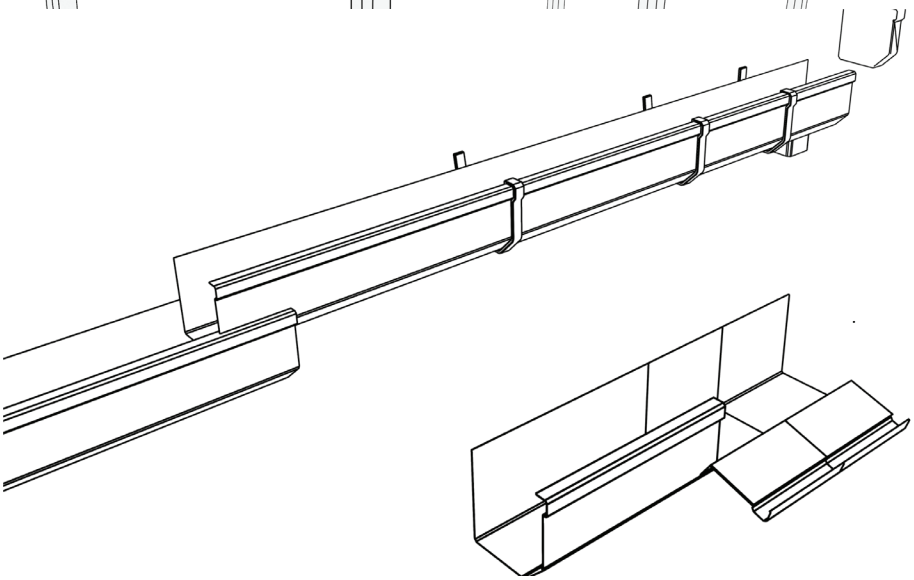


Fasten the fascia board into the rafters. Set it about an inch below the plywood sheathing to give the gutters room.

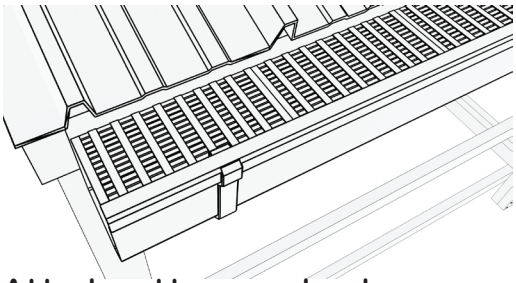


Hang the gutters at a slight slope toward the down outlet.

Gutter usually comes by 10 ft length, but you can trim it with tin snips. You can buy pieces with downspout outlets preinstalled, or you can measure and trim them with tin snips and toothsaws.



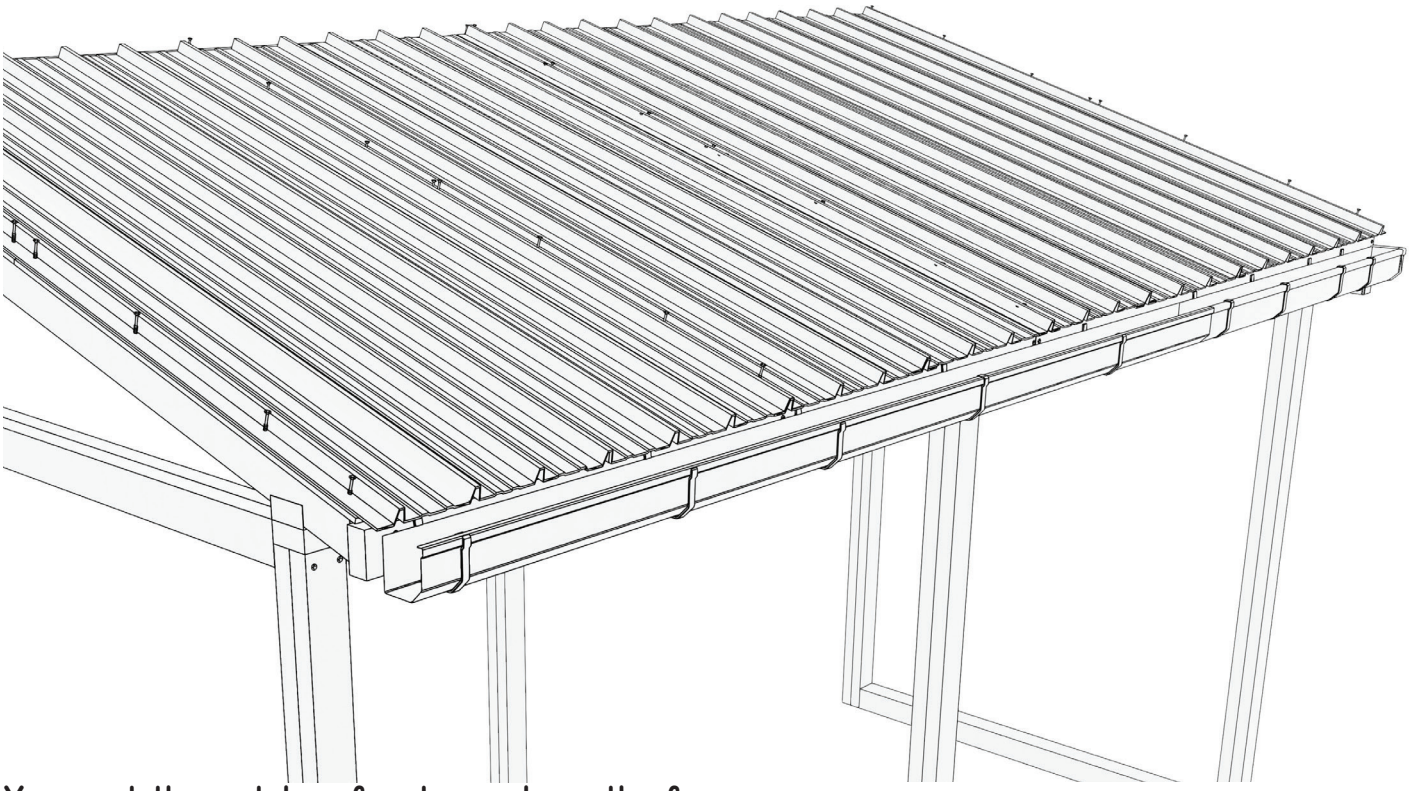
Attach gutter pieces with splice fittings, or you can just overlap the pieces by about 4 inches and seal them together. Do the same with end caps.



Attach gutter guards when you're done. They provide a first line of defense against leaves, critters, and other types of debris.

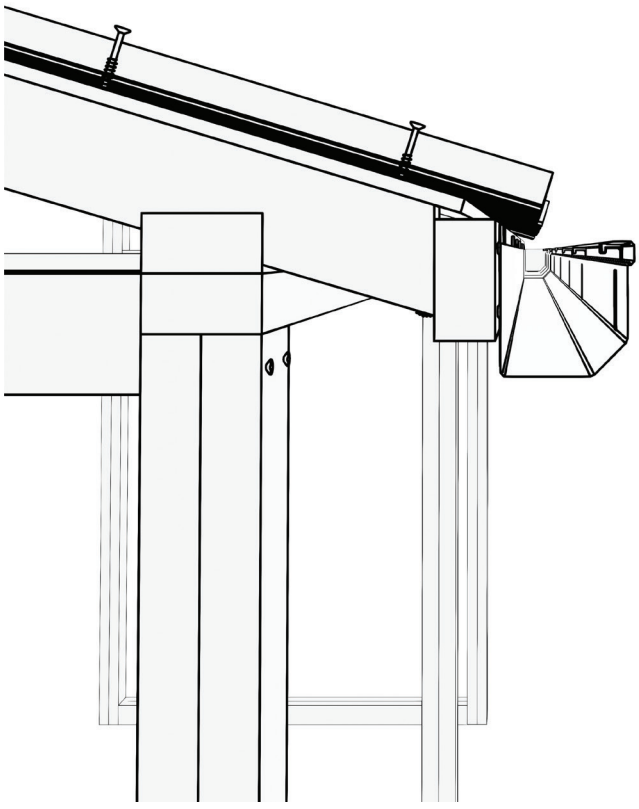
Putting on The Roof

Attach the roofing over the plywood sheathing. Follow the studs and overlap the metal sheets as you go. Metal roofing comes in various sizes, including 8x2 ft lengths, so it will go on easy.



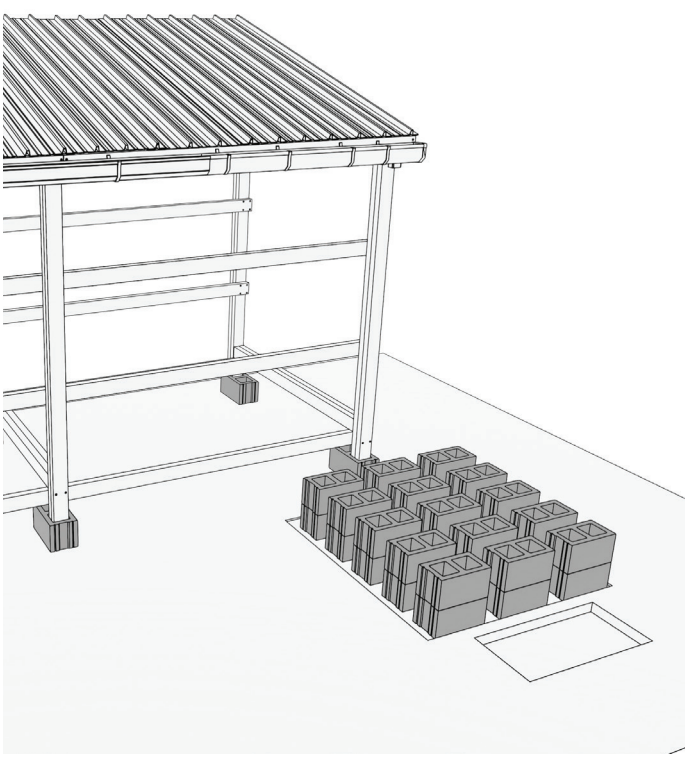
You want the metal roofing to overhang the fascia board by at least a couple of inches to ensure rain runs off the roof into the gutter.

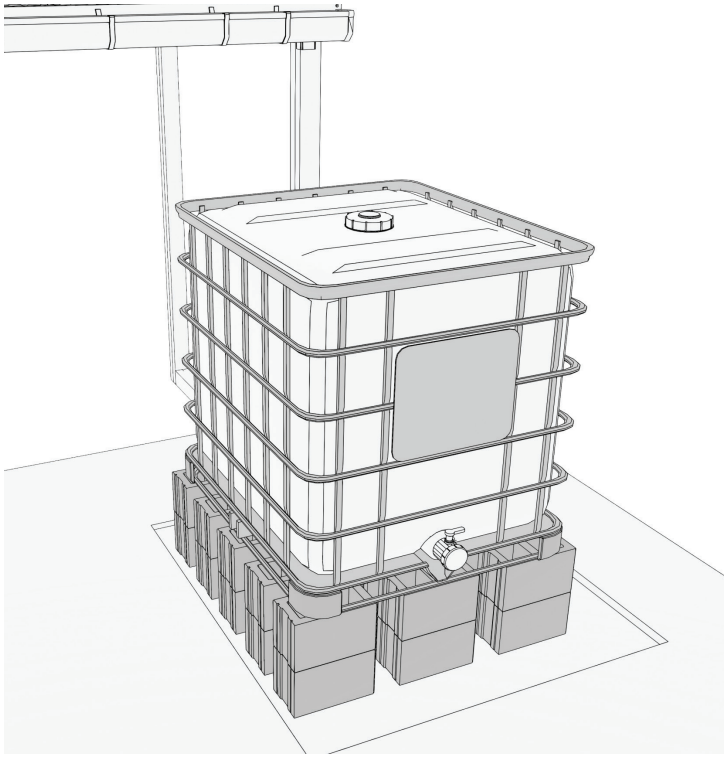
If you were installing a full roof onto a house or shed, you would put down waterproof underlayment and a slip sheet to protect against leaks. It's difficult to do, and you might not need it for this kind of structure.



Putting in The Tote

Most IBC Tote owners rest them on slab, paving stones, or cinder blocks. Dig a couple of inches out and pack the dirt before placing the blocks.

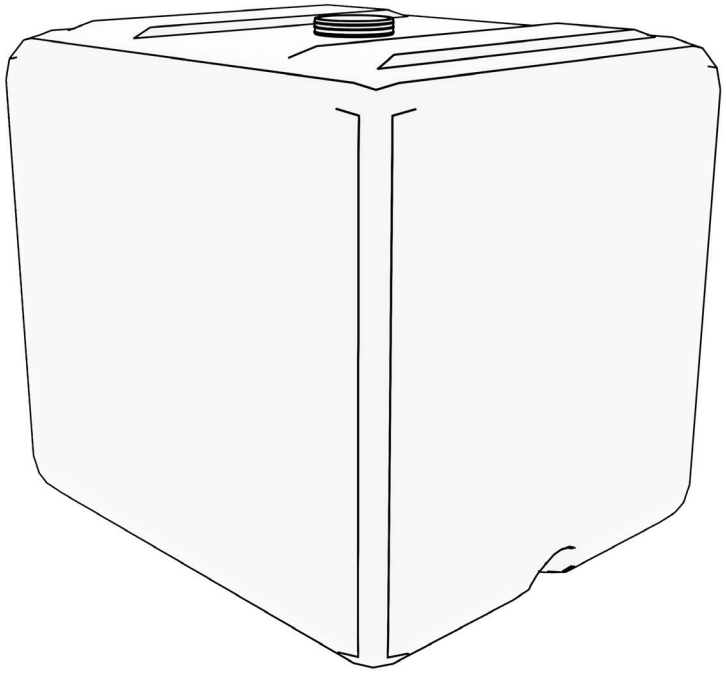




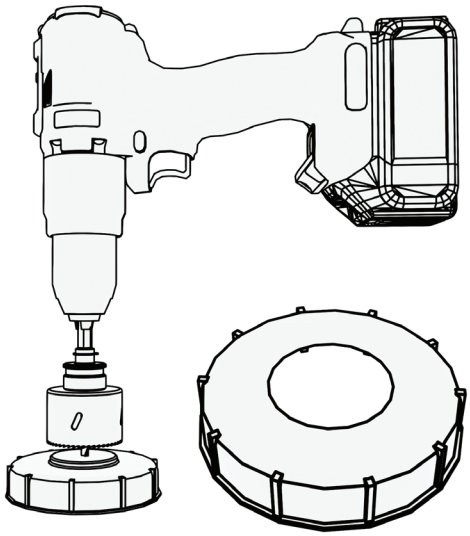
Totes get heavy when they're full. Packing the ground and resting it on cinder blocks ensures good clearance for the bottom valve, so you can fit containers under it.

IBC totes require a little modification for rainwater harvesting. First, cover them with IBC tote wrap or paint them with exterior latex or acrylic paint. Elastometric paint works very well. This step protects your tank from algae growth.

Next, you'll need to modify the cap if you want to install piping with a tight seal. While you could just direct a gutter into the tote, that can still let in contaminants, even if you add screens and filters.



Hooking Up The Tote

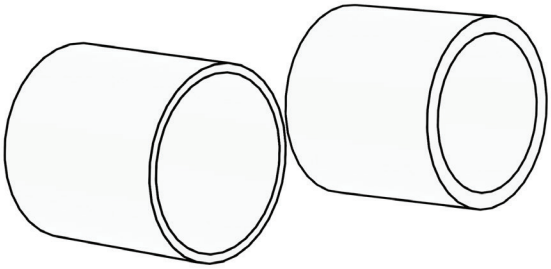


You can connect 3 inch or 4 inch PVC pipe to an IBC tote by modifying the cap. The outside diameter of Schedule 40 PVC measures 3/8 inch larger than the actual pipe size. So for a 3 inch pipe to fit, you need to make a 3 3/8 inch hole.

For the best and fastest results, use a hole saw, which attaches to a regular drill.

It's a good idea to cut a test hole into a bucket lid first, and keep a few spare IBC caps. You'll want them.

Now it's time to review some basic information about pipes.

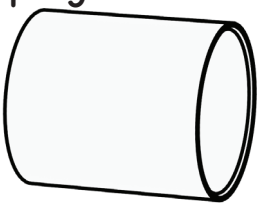


PVC comes in different types of thickness. Plumbers use Schedule 40 for most indoor plumbing. Schedule 80 handles even more pressure. Drain, Waste, and Vent (DWV) pipe works for systems with no pressure, like gravity-fed rain harvesting systems. Sewer and drainage (SD) pipe is even thinner.

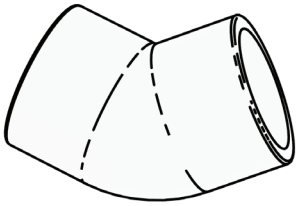
DWV and Schedule 40 can be compatible, but it's always best to stick with the same thickness of pipe. When you're buying pipe, size refers to the interior dimension.

You fit pipe together with different types of fittings or couplings.

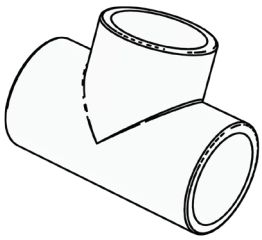
Coupling



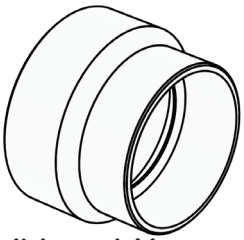
Elbow



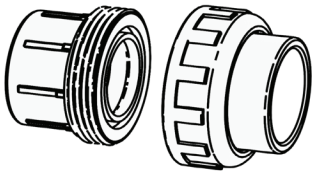
Tee



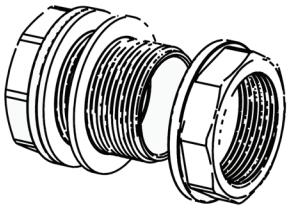
Reducer



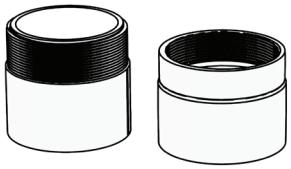
Union



Bulkhead Union

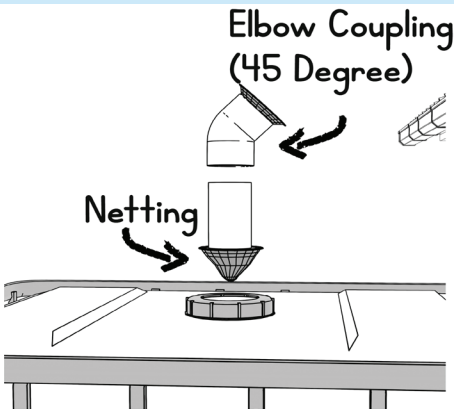


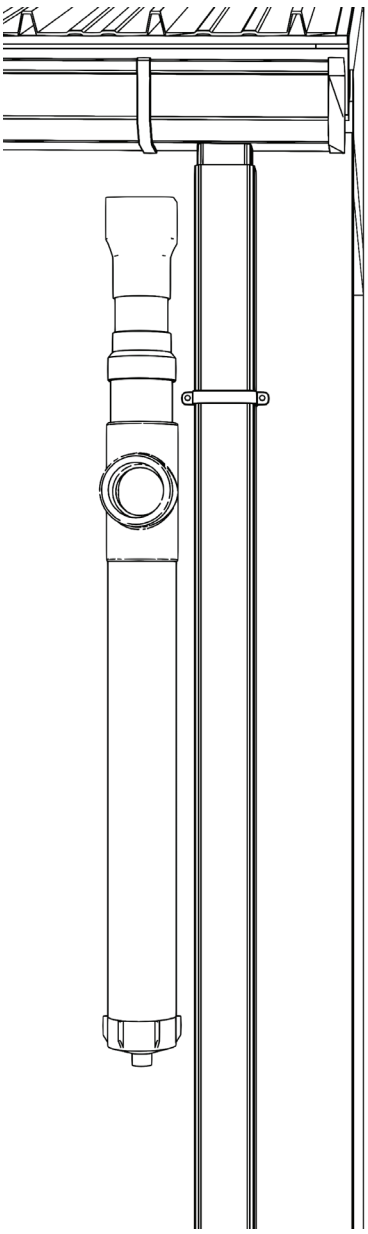
Male & Female Adapters

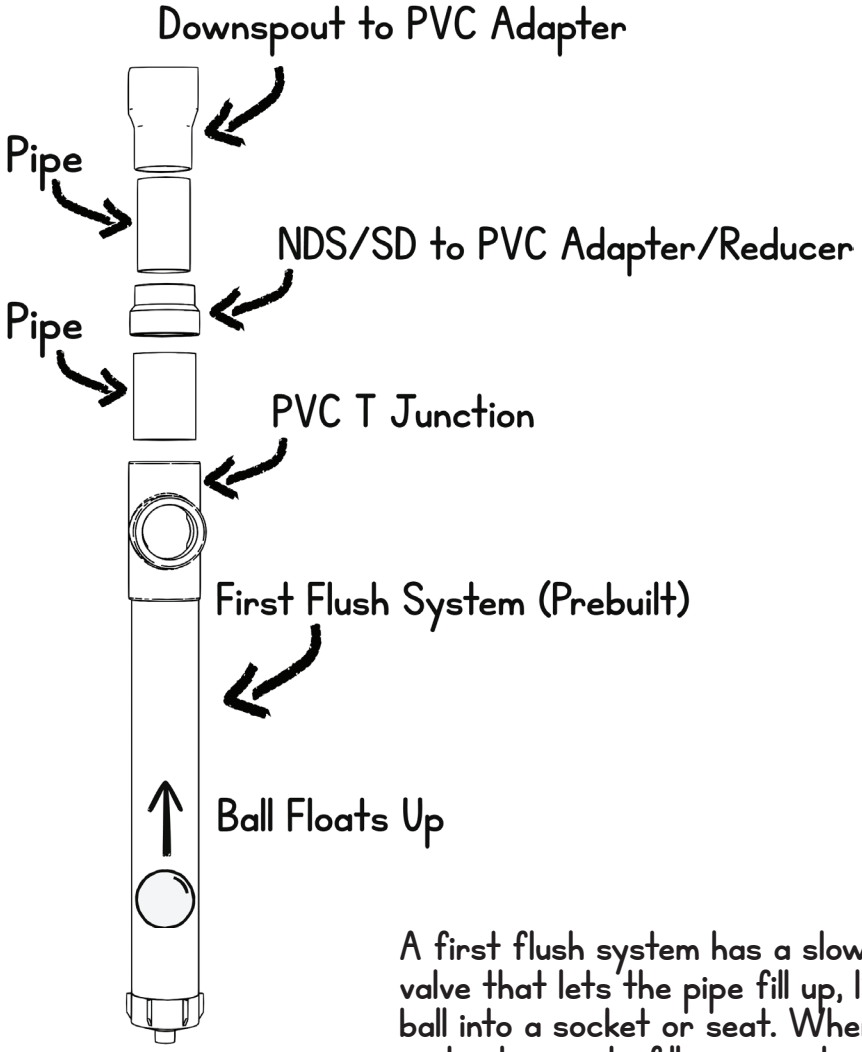


Filters and First Flush

Now you're going to assemble your first flush system and filters. You can use screen or mosquito head netting. Some homesteaders even use pantyhose. Not every homesteader uses a first flush system, but some insist. A first flush system helps eliminate debris and other contaminants before they reach your filters.





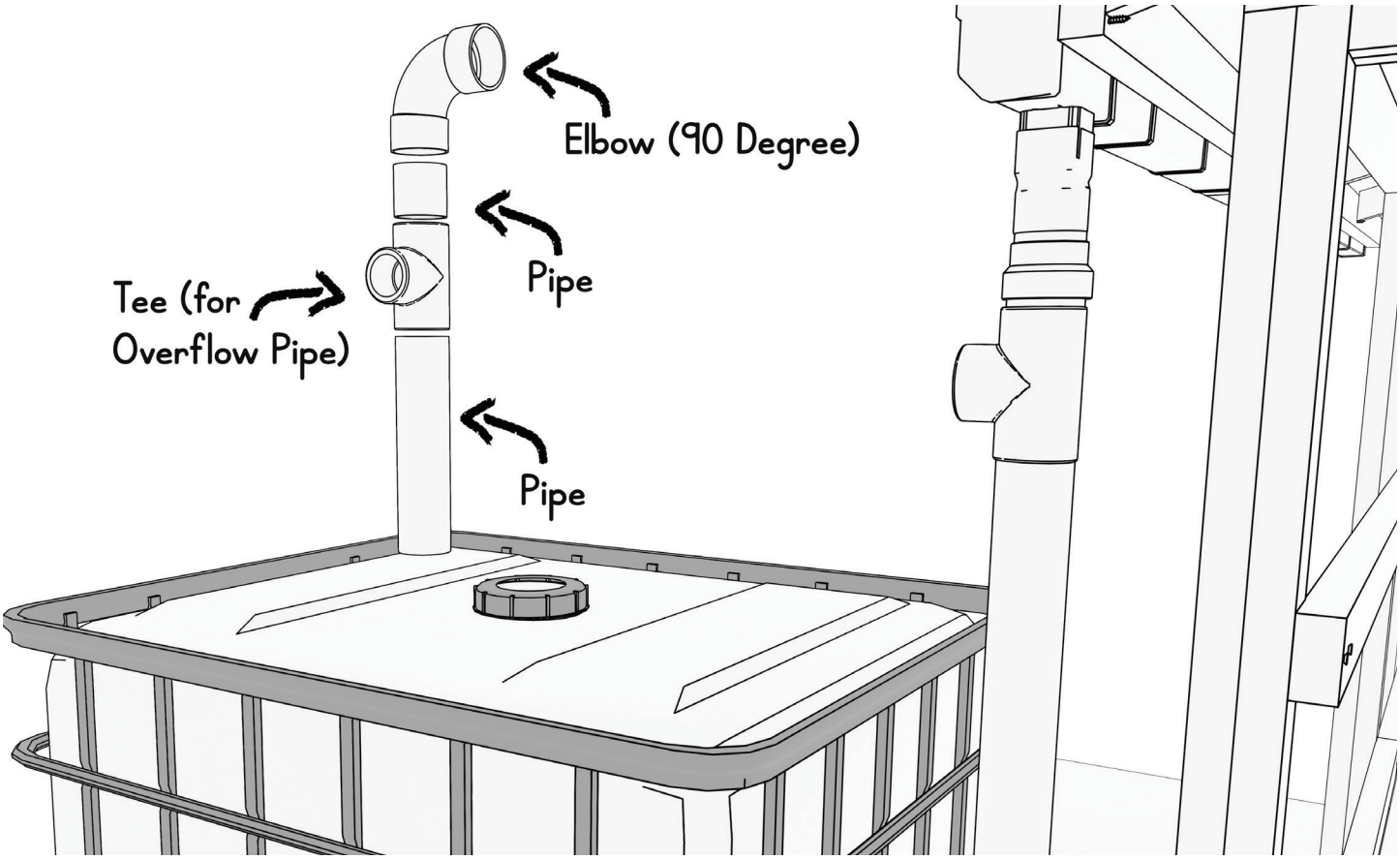


A first flush system has a slow release valve that lets the pipe fill up, lifting a ball into a socket or seat. When it's full, water begins to fill up your tank.

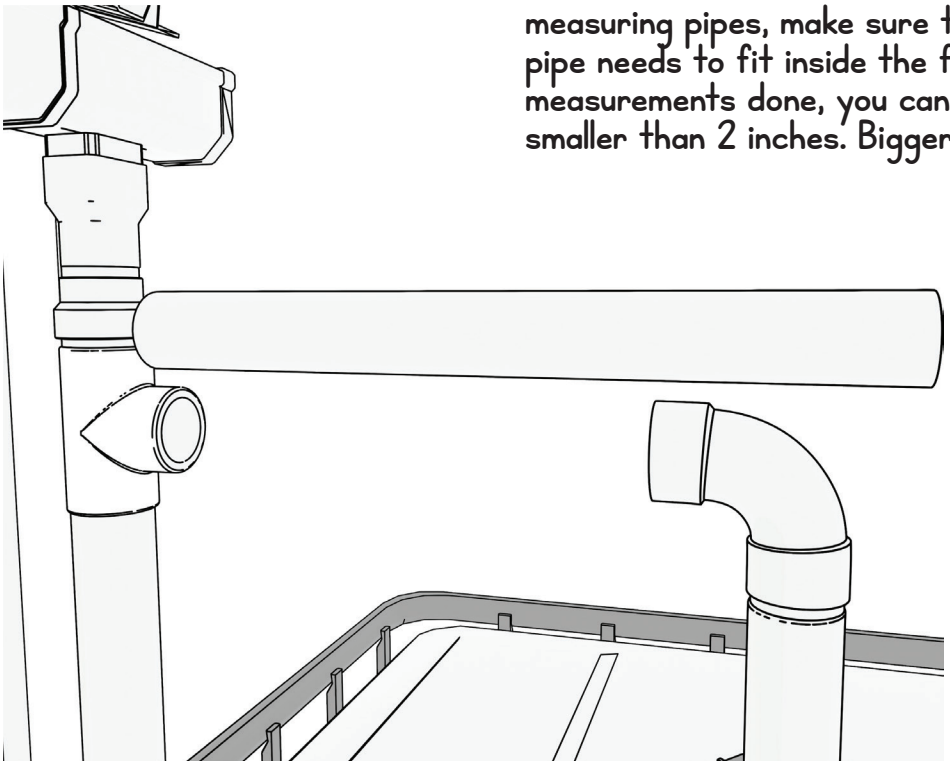
You'll be installing a downspout gutter and connecting it to PVC pipe. It's great if you can find a Schedule 40 adapter. If you can't, you can get an NDS/SD to Schedule 40 adapter. Before the final install with cement, measure and dry fit the pipes. When you're measuring, make sure you account for the inch or two pipes need to fit securely inside couplings on both ends.

Hooking Up The Rest

Now you're going to assemble the main connection to your tote. Leave the pipe that goes into your cap long for now, so you can adjust the length and make it even with your first flush system. Dry fit the pipes (without cement) so you can measure them.

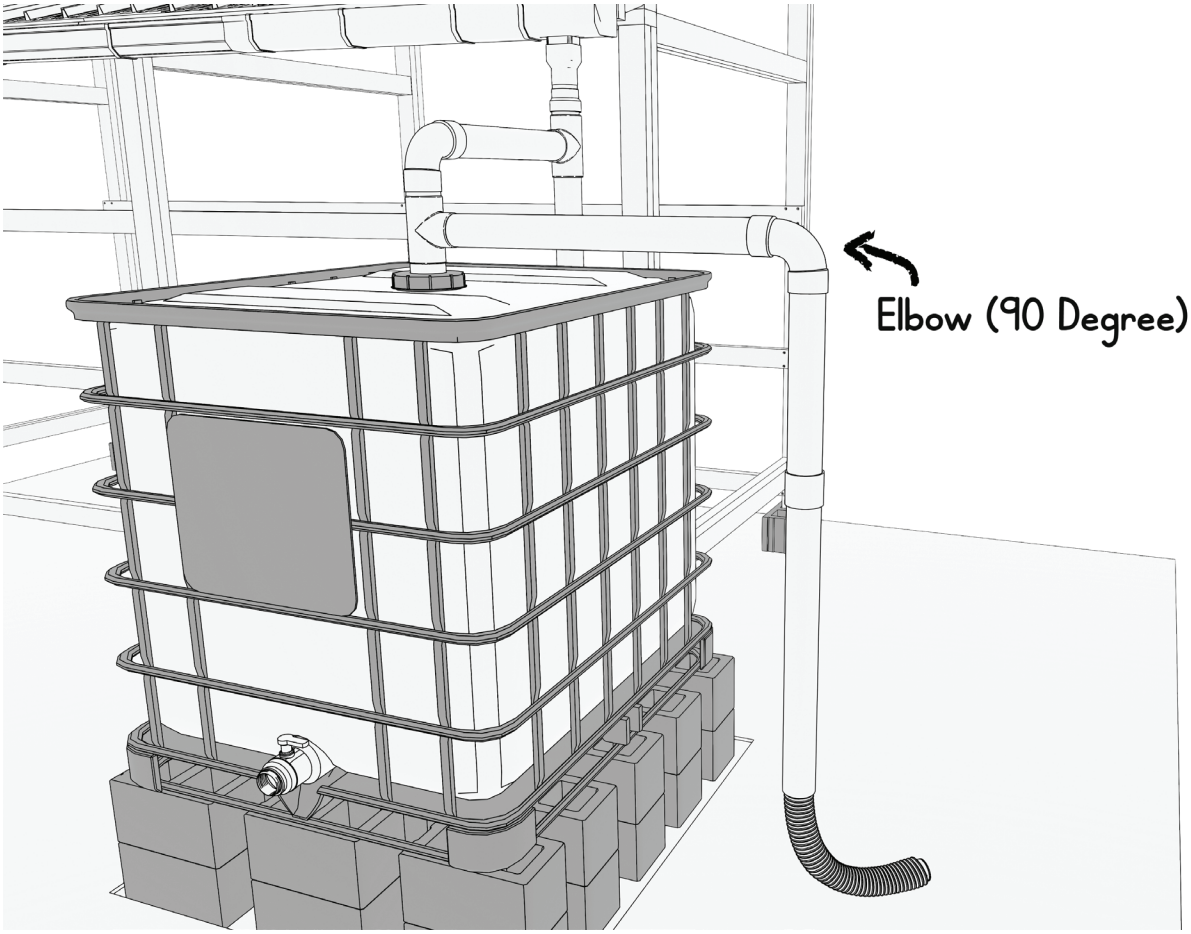


You'll measure the horizontal pipe last. Again: When you're measuring pipes, make sure to account for a few inches the pipe needs to fit inside the fittings. When you've got the measurements done, you can use a pipe cutter on most pipe smaller than 2 inches. Bigger pipe needs a hack saw.

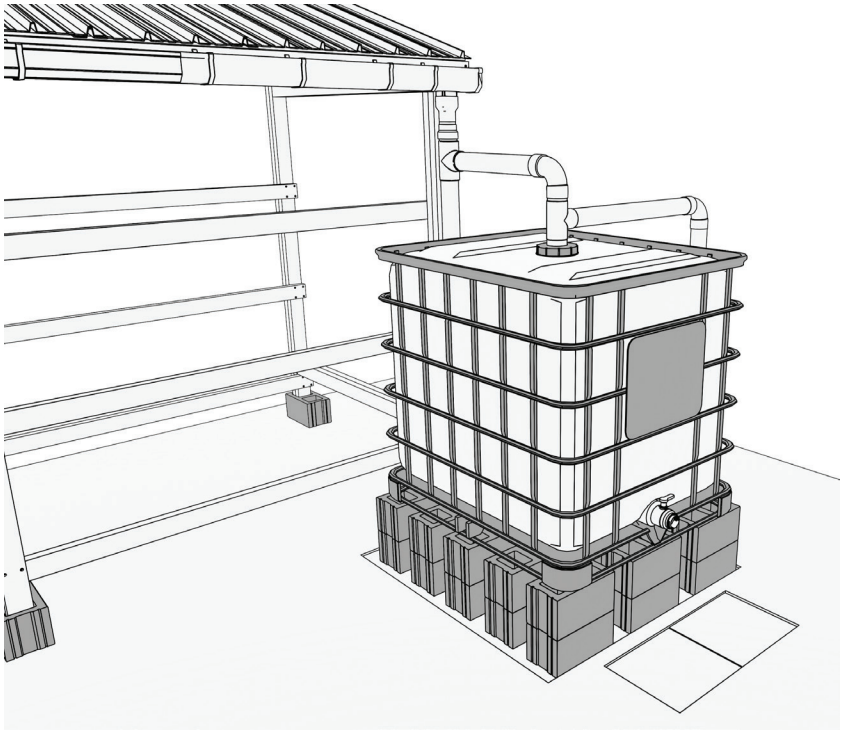


The Overflow Pipe

Once you've connected the first flush to your tote, you'll measure and connect the overflow pipe. When your IBC tote starts to overflow, water will travel out and toward the ground.



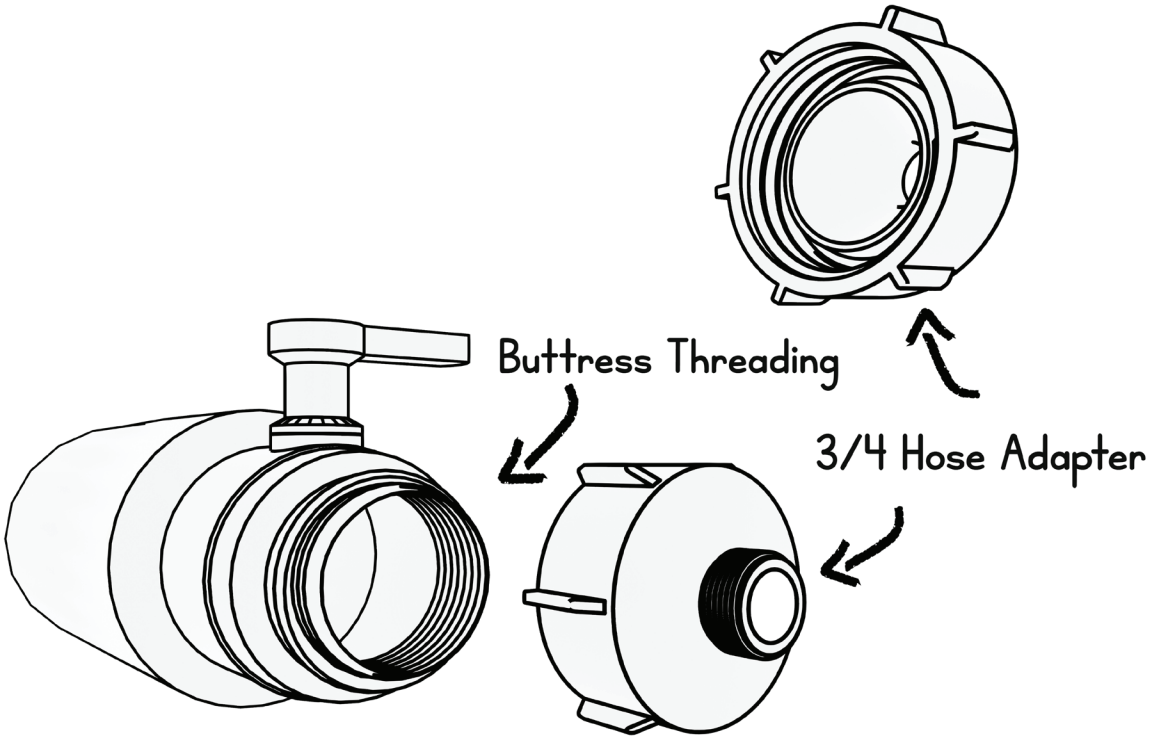
This is how your setup will look when it's done. If you need more space under the valve to fill buckets or other containers, you can dig out a filling area and add some paving stones.

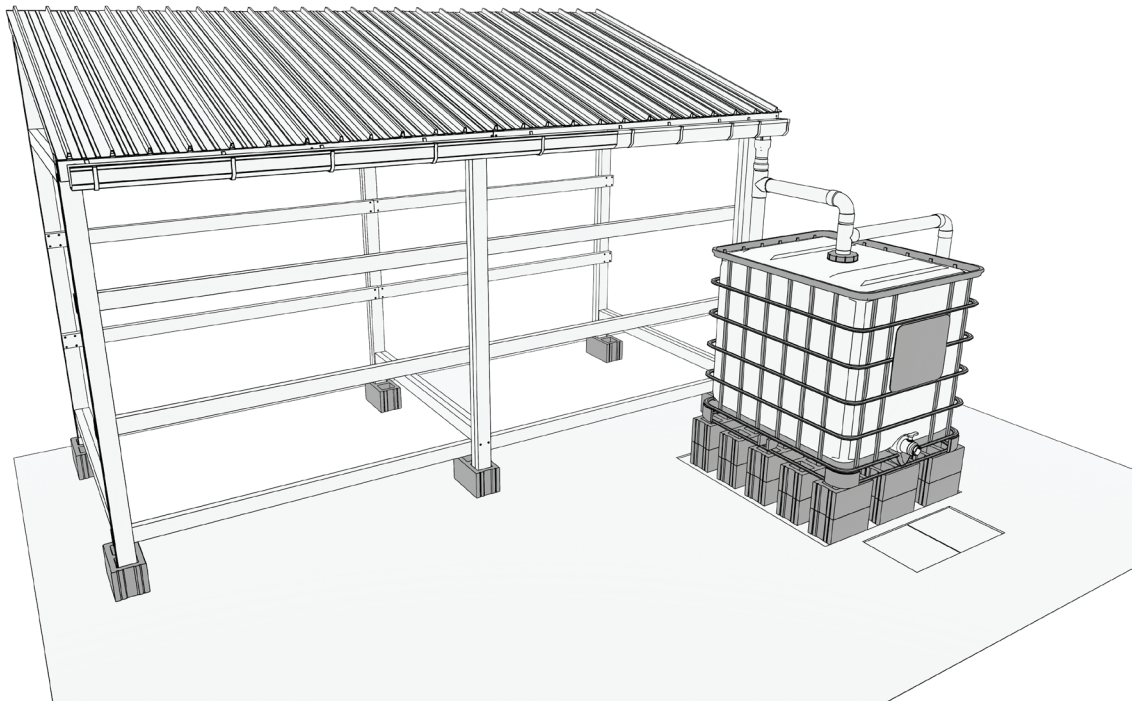


Using The Valve

The final hurdle to actually using your IBC tote: The valve. IBC Totes come with different types of threaded valves. Some come with NPT, the standard national pipe thread in the U.S. Others come with a coarser buttress thread, and a third kind comes with Camlock threading.

It can be hard to find adapters for the top cap, but it's not hard to find valve adapters. You can even find them on 3D print shops. You can connect valves to PVC, garden hose, and pretty much anything else.

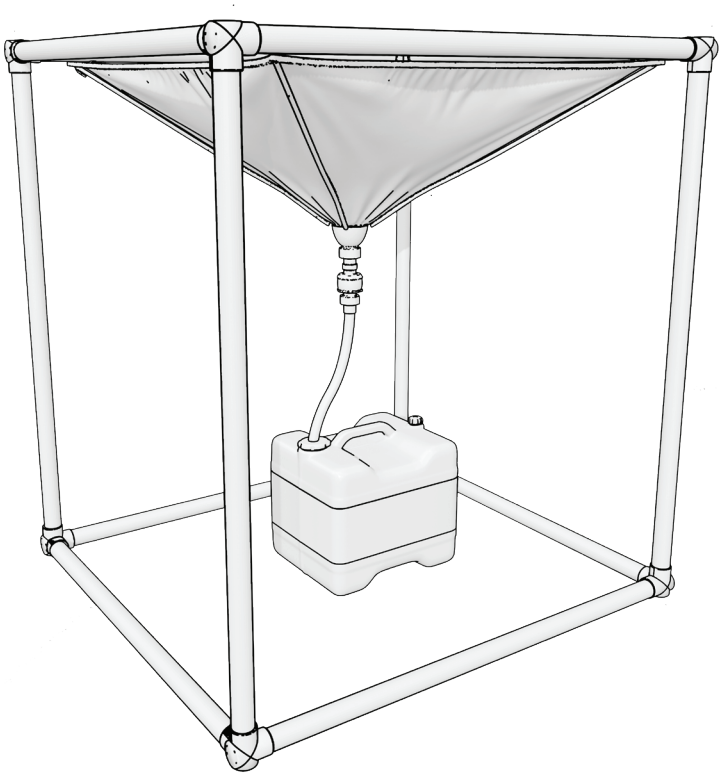




How to Harvest Dew (and Rain)

You can harvest water even if it doesn't rain. A warmer planet means the air retains more moisture. You can harness that moisture at night or during the early morning, when dew forms on cooler surfaces.

A number of portable rain harvesters are made with material that also collects dew, especially polyethylene.



You can make your own portable rain and dew harvesters with PVC pipe and leak diverters. Most of them are made with polyethylene or other materials that work well as dew collection surfaces.

Leak diverters come premade with funnels and hoses, so you just have to run them into a water container. You could even make your own leak diverter with plastic sheeting, funnels, and tubing.

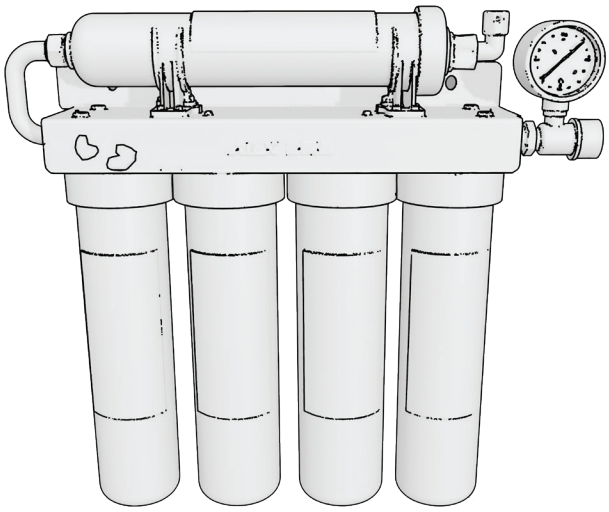
You can make simple standalone structures to hang the leak diverters on. They usually come with hooks and cord, to make it simple. If you use thinner PVC pipe and fittings, you can even pack a kit like this into your bugout bag.

As a precaution, always filter the water and dew you catch.

Atmospheric Water Generators

Atmospheric water generators also provide water when it's not raining. Many preppers disregard them because they're expensive, but they work. Manufacturers cover their components in foodsafe and materials and add water filtration systems to them. This alone makes them safer and more effective than simply using a dehumidifier.

One popular model, the H20 Machine, uses five-stage ultra-filtration to deliver clean drinking water, as long as the humidity stays above 40 percent.

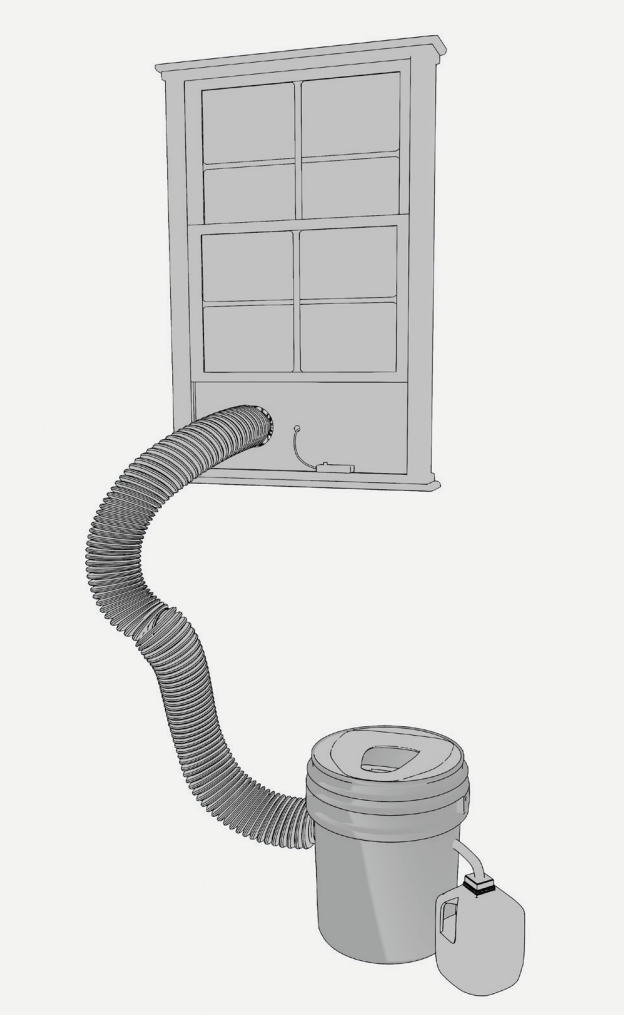


Atmospheric water generators do have one major downside. They consume a lot of electricity, often as much as a small air conditioner, especially when they're actively generating water. You need to leave them on all the time. When you turn them off for more than a few days, they need to reboot, which can take up to 72 hours. You also have to winterize or replace the filter components. Under normal operation, you have to replace the filters roughly every 18 months. That makes them useful during a medium term solution, but probably not a longterm one unless you have an independent power source, like rooftop solar.

You can drink water from a regular dehumidifier as a last resort, during an extreme emergency. Use the best filter you have for that water, because it will contain microbes and also trace metals. No filter company will officially recommend this, because it's a liability.

How to Make an Emergency Toilet

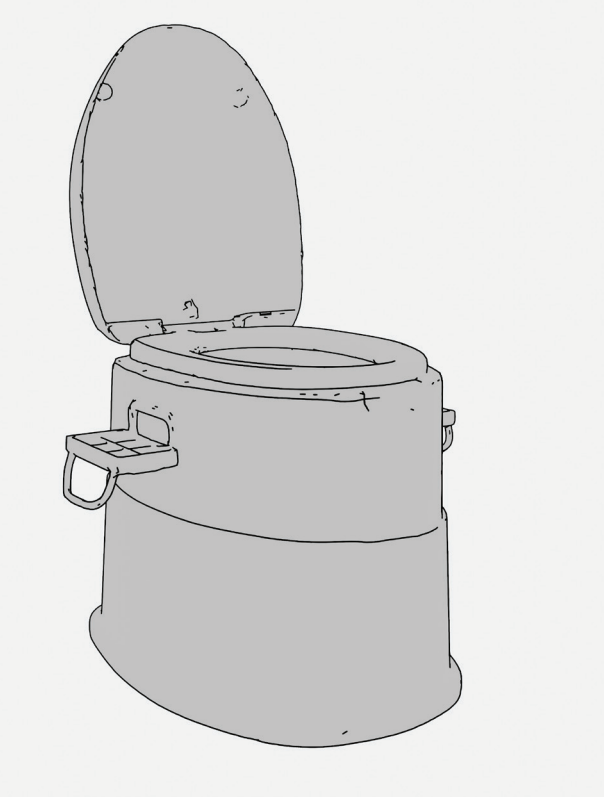
Indoor plumbing can fail for a number of reasons: disasters, droughts, or burst pipes. Many preppers and sustainability gurus have already installed composting toilets in their homes, at least in one bathroom. It makes sense. Disease from poor sanitation poses a big risk during short as well as prolonged emergencies. You need a way to deal with your waste.



Compost toilets offer the best longterm solution, but they're a commitment. Not everyone can install them in their homes. You can make something similar for a lot less money by converting emergency toilet buckets or even portable camping toilets.

Any emergency indoor toilet needs two things: A urine diverter, and cover material. These help with sanitation and decomposition.

Common cover materials include: sawdust, coconut coir, wood shavings, dry leaves, shredded cardboard, coffee grounds, pine straw, newspaper, and other "carbon" materials.

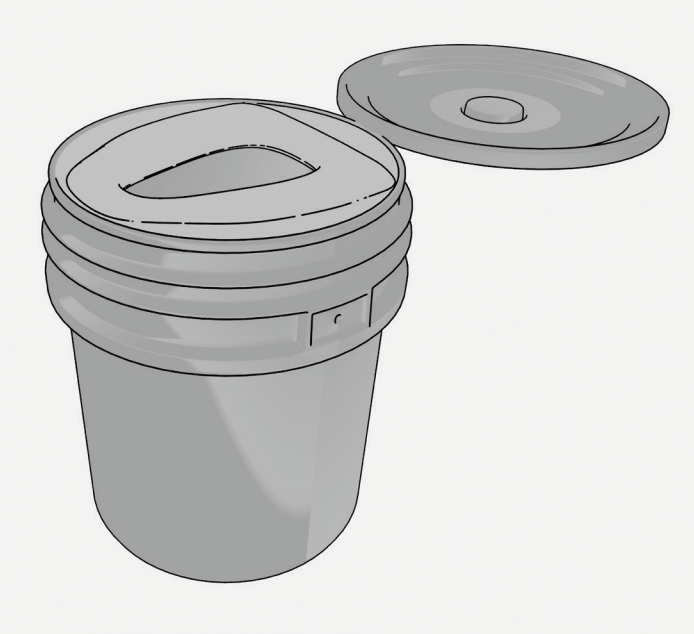


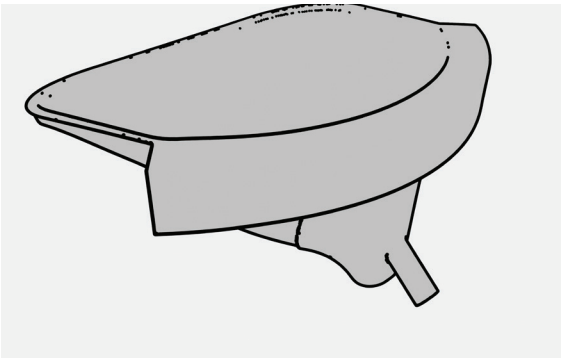
Several companies sell emergency toilets, including Reliance, who also sells Aquatainers. You can get larger portable toilets with higher seats from hardware stores for much less than it costs to install a full composting toilet. These portable toilets also fold up for easy storage.

We're going to talk about converting a bucket, but you can apply the same idea to almost anything, with a little adaptation.

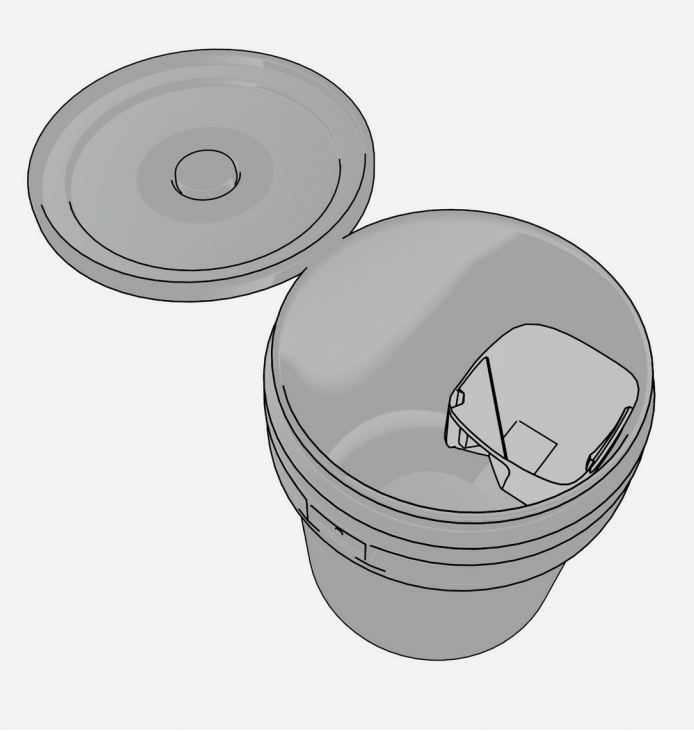
Making a Urine Diverter

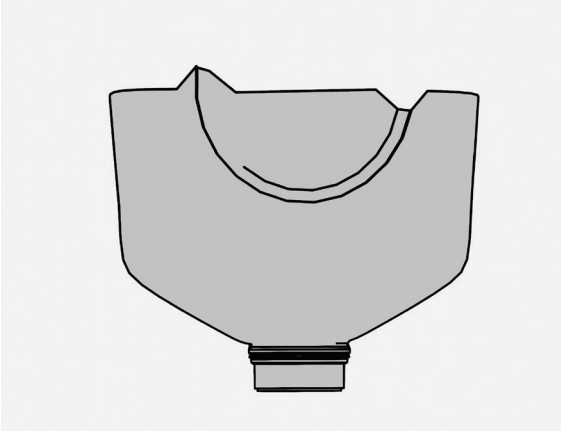
You can buy urine diverters specifically made to fit on toilet buckets, but you can also make one with almost any kind of container. Urine diverters make it possible for solid waste to dry up and start decomposing faster, and with less smell. Otherwise, you wind up with a wet mess that stinks and takes forever to dry out.





Standard urine diverters are relatively easy to get online.

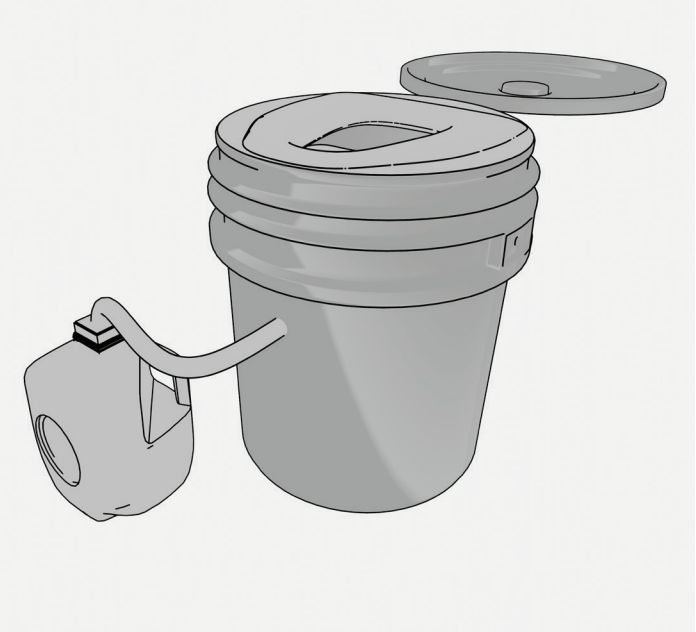




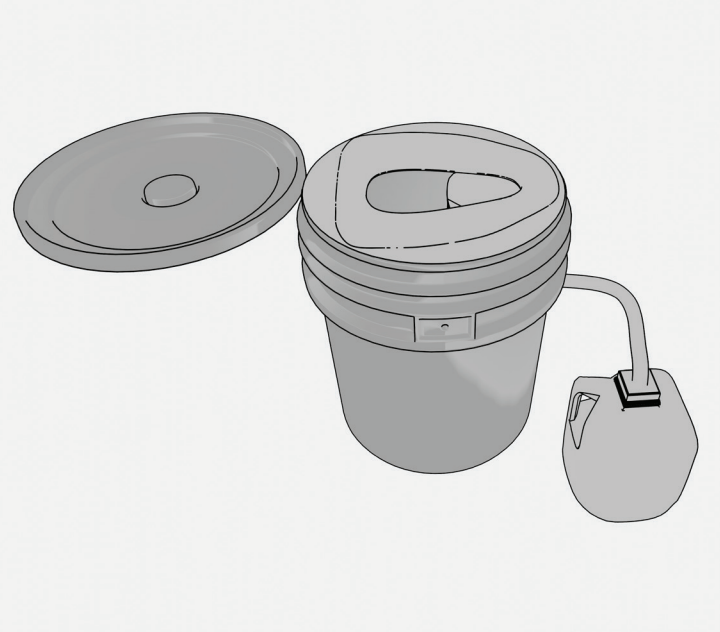
You can also simply cut a gallon jug in half. Caps run about 1-2 inches in diameter, so you can find vinyl tubing that fits the outside.

Fasten the gallon container to the top inside of the bucket with a screw.

Finishing The Urine Diverter



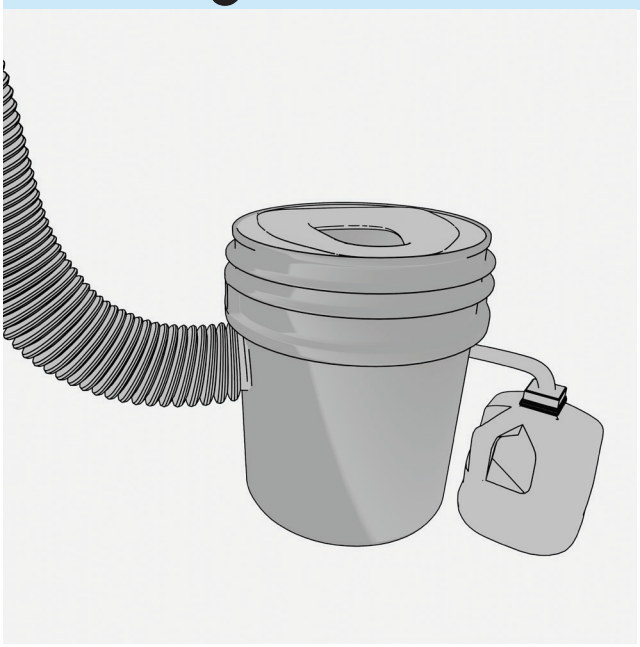
Drill a small hole in one side of the bucket to run the vinyl tubing through, then connect it inside another gallon container.

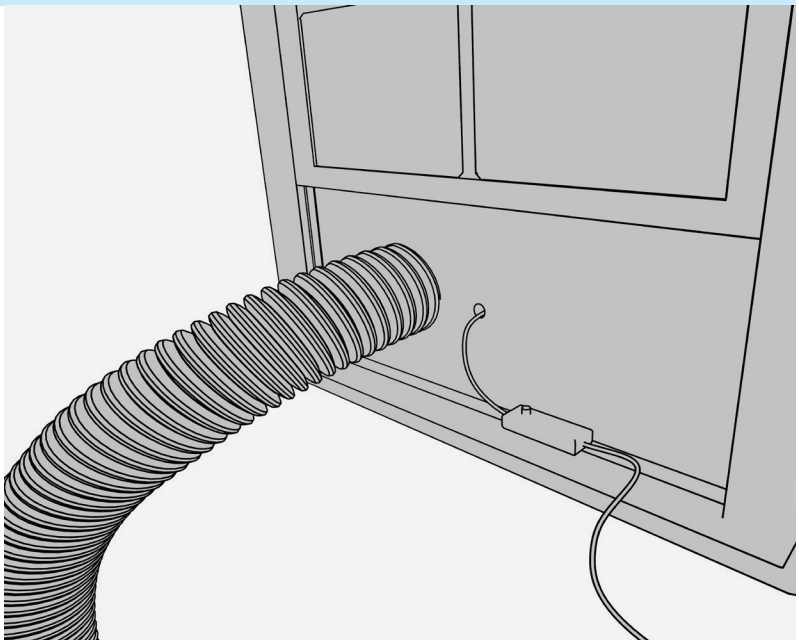


The diverter empties into the gallon, keeping liquid waste separate from solid. You're not supposed to pour any kind of waste into storm drains because they feed into rivers and streams. It's also technically illegal to bury it on your property. But during an emergency, separating them gives you more options and makes everything less hazardous.

Next, you can make a vent by drilling a 3-4 inch hole in the other side of your bucket (as close to the top as possible). You could also drill a hole into the lid. Keep a spare lid just in case. Use a hole saw, and size the cut to the outer diameter of any flexible duct you can find.

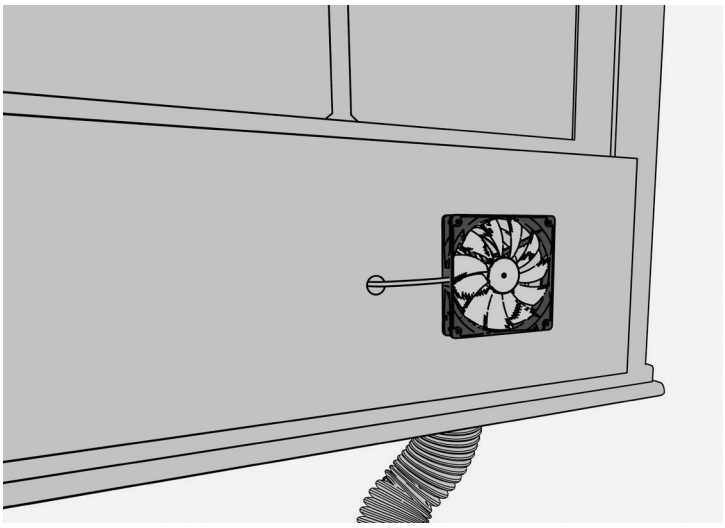
Making a Vent Port





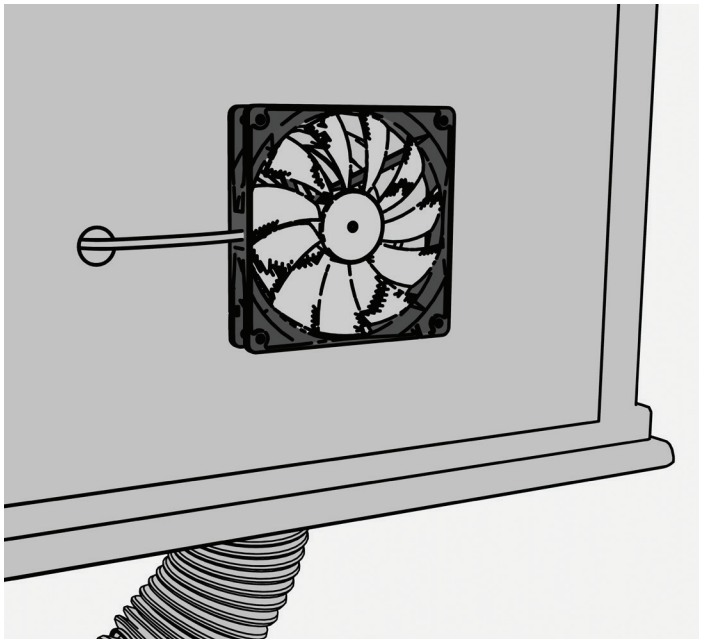
Feed the duct into the port you drilled. Feed the other end through a passthrough panel. The section on solar panels explains how to make one of these with rigid foam insulation boards. (Drill another hole with a hole saw.)

Next, you're going to mount a DC fan on the other side. It's easy to find them with AC adapters and control knobs.



You'll want to run the fan for several hours a day, even 24/7 in order to dry out the solid waste. The drier, the less smell.

Run the DC fan cable back through the panel, so you can turn it off and on from the inside. You can also usually adjust the speed.



Cold Weather Gear: Quick Guide

Layers

Base Layer: Thermal underwear made of polyester, polypropylene, or Polartec.

Mid Layer: A jacket or sweater made of wool, fleece, down, etc.

Shell: Hard shells provide the best protection, but they're bulky and not comfortable. Soft shells also offer good protection and comfort.

Wind Rating

Any good outer shell should provide a wind rating, measured in cubic feet per minute (CFM). It describes how much of a 30 mph gust can pass through one square foot of material. The lower the CFM, the better. Here's a breakdown:

CFM 60 or above: Poor wind protection

CFM 20: Some wind protection

CFM 5-10: Good protection

Waterproof Rating

Outdoor gearists measure waterproofing in mm with the hydrostatic head (HH) test. It describes how many millimeters of water can sit on the material before it penetrates. A 5,000 mm rating offers the minimum. It holds up against light rain and snow.

5,000 mm: Minimal water protection

10,000 mm: Some water protection

15-20,000 mm: Good protection

Staying Warm without Power

* Keep a tent handy or make one with blankets to conserve heat
* Keep sleeping bags on hand rated for cold temperatures
* Use candles, tea candles, and tea candle stoves for cooking and heat
* Solar power for heaters is an option, but they use a lot of energy
* Sharing body heat with other people or pets can save your life
* Be careful with candles and heaters, especially when sleeping. You might even want to turn them off and rely on sleeping bags, body heat, hand warmers, etc.
* Keep foods on hand that don't require much preparation
* Wool or polyester base layers, gloves, socks, hats, beanies, and neck gaiters

Heatwave Survival: Quick Guide

Heatwaves threaten hundreds of millions around the world now. You can potentially survive them with a few basic strategies.

One of the best things you can do if you're experiencing heat stress is take a bath. Water from plumbing stays a consistent 50-70F (21C) degrees, much cooler than summer air. Cold water immersion is a proven emergency medical strategy that has saved countless lives during heatwaves.

You can also deploy ice sheeting cooling (ISC), another strategy used by EMS and military personnel. Soak bedsheets or towels in cool or cold water, and wrap yourself up in them.

Use these to help anyone else experiencing heat stress.

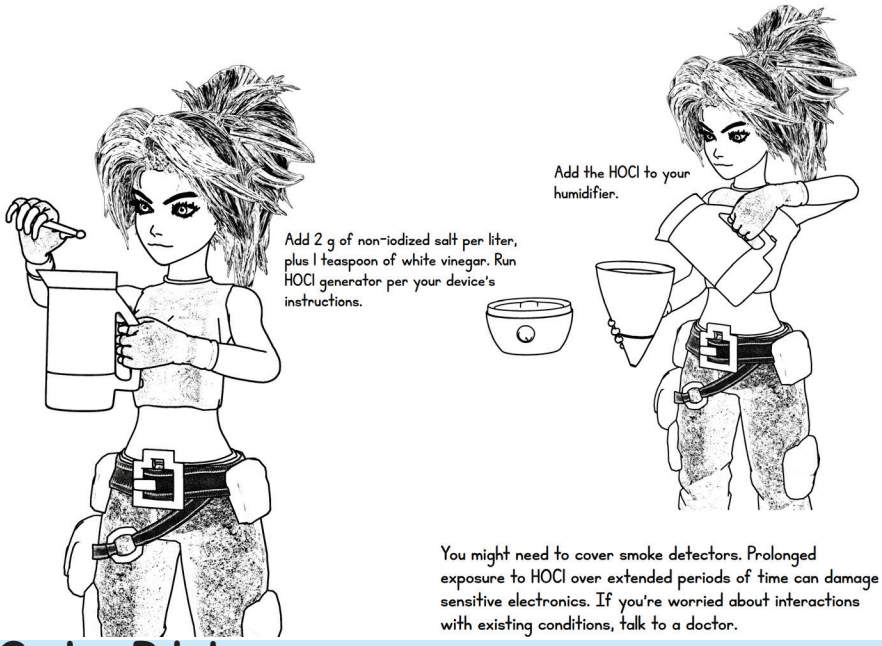
You can keep food and other items cool without electricity by making a zeer. Put a smaller, unglazed clay pot inside a larger one. Tape any holes shut. Fill the space with moist sand. Keep watering the sand, and the inside temperature of the smaller pot will remain considerably cooler than the outside temperature. These work best in less humid environments.

Ways to Treat a Viral Infection

Vaccines, air purifiers, and N95 masks (or higher) offer the best protection against viruses. If you're sick, seek medical attention. That said, other nontraditional treatments can help combat viral infections. This guide covers some of the most common ones. It strives to provide accurate information, but double check conflicts with other medications or dietary restrictions and use your own judgment.

Hypochlorous Acid (HOCl)

A 2025 article in "Viruses" confirms the potential of hypochlorous acid (HOCl) steam as a "promising respiratory antiseptic" for "therapeutic inhalation" to reduce viral load and help clear infections. The human body already produces HOCl to fight germs. Use a HOCl generator to make it at 100-200 ppm. Pour it into a humidifier. It's safe at levels 300 ppm and below. Use it like a regular humidifier, 3-4 times a day. Many users report breathing HOCl for hours a day (or at night) while sick.



You might need to cover smoke detectors. Prolonged exposure to HOCl over extended periods of time can damage sensitive electronics. If you're worried about interactions with existing conditions, talk to a doctor.

Ginko Biloba

Contains quercetin and rutin that show broad antiviral and antibacterial properties. Studies have specifically shown it blocks Covid from infecting cells.

Dose: 500-600 mg, 1 gram max per day

Brands: Life Extension, Solaray, BulkSupplements.com, Swanson.

Durations vary, but average 1-2 weeks. Be careful when mixing Ginkgo, elderberry, echinacea, and St. John's Wort. They contain quercetin and other flavonoids. According to Mount Sinai's page on supplements, if you exceed 1 gram per day, it can cause kidney and liver damage.

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A List of Supplements

Quercetin

You can just buy quercetin by itself. No need to get it from other supplements, if you want maximize efficiency.

Dose: 500-600 mg, 1 gram max per day

Brands: Life Extension, Solaray, BulkSupplements.com, Swanson.

Star Anise

Contains shikimic acid, the primary ingredient in Tamiflu. Works best when combined with quercetin. Also has broad antiviral properties.

Dose: 2.6 g x 2 per day

Brands: BulkSupplements.com

Echinacea and/or St. John's Wort

Both significantly reduce viral load of Covid and show other antiviral properties.

Dose: 900 mg x 1 per day St. John's Wort; 500-4,000 mg per day of echinacea (20 mg polyphenols)

Brands: Nutrients, Nutrilite Immunity, BulkSupplements.com for St. John's Wort; Vital Nutrients for echniacea

Elderberry

Shows broad antiviral properties. Can also potentially stimulate production of immune cells. Contains anthocyanin, the most active ingredient.

Dose: 45 g of anthocyanin per day

Brands: New Chapter Elderberry Force (Other brands don't contain enough anthocyanin.)

Olive Leaf Extract (Oleuropein)

Broad antiviral and even antifungal activity. Blocks viral replication. Effective against Covid, flu, HIV.

Dose: 500-100 mg per day (80-90 percent pure)

Brands: Swanson, Solaray, GNC, Nature's Way. (250 mg capsules contain about 100 mg actual oleuropein.)

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More Supplements

Oregano

Very broad antiviral activity, including equine influenza virus, flu, Covid, HIV. Contains carvacrol, most active ingredient.

Dose: 600 mg per day (2-3 weeks max)

Brands: No specific brand.

Cinnamon

Also effective against viruses.

Dose: 2 tablespoons of Ceylon cinnamon or safe Cassia extract.

Brands: Swanson, Nature's Bounty, Puritan's Pride

Garlic

Contains allicin, a compound with strong antiviral properties. Has shown to fight viral persistance.

Dose: 600 mg for 150 days, 300 mg for another 150 days

Brands: Nature's Way, Life Extension, Garlique

Kudzu Root & Radix Bupleuri

Broad antivirals that reportedly work well with other meds to fight HIV infections and other illnesses. Both contain quercetin, so be careful with other supplements. Also contain puerarin and kaempferol, strong antivirals.

Dose: 200-400 mg per day of puerarin, 3-10 grams of Radix Bupleuri.

Brands: No specific brand.

Other Supplements

Artemesia Annua, black cumin seeds, and dandelion extract have also shown strong potential for fighting infections, but it's hard to find standard dosage information.

On top of these supplements, stay hydrated and take plenty of vitamins, especially B, C, and D+K12.

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