# How To Use Ladders

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**Introduction** Thanks for volunteering to help at a construction site. Your efforts will make a difference not only to one particular family in need of decent, affordable housing but also the whole neighborhood.

In this Construction Volunteer How-To article we discuss ladders. Some of the work that construction volunteers perform involves climbing a ladder and performing a task from that height above the ground or deck. Experience has shown that injuries from the use of ladders can be serious and are almost exclusively the result of operator error, not ladder defects.

We take the subject of fall safety seriously, and we want you to too. In this How-To article from the construction department we want you to learn how to use ladders both safely and efficiently.

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## General ladder rules TOP

Information applicable specifically to stepladders and to extension ladders can be found under those two sections, below. In this section is information applicable to all ladders.

**Ladder Rule #1: Don't use a ladder you don't trust.** Before you use a ladder, make sure everything meets your criteria for safety. Feel free to examine any ladder you're planning to climb. If you suspect a ladder is defective or is set improperly or is in any other way unsafe, don't use it or allow anyone else to until you're satisfied it's not. If necessary, consult the site supervisor.

The rest of these general ladder rules are in no particular order, so be sure to read all of them.

- Always face the ladder when climbing. Face the ladder when moving up or down.

  Also, keep in mind that people alighting from a ladder will be facing *away* from the horizontal surface they're going to step onto at the bottom. Accordingly, don't place a ladder so that just behind it is a window or door opening or a trip hazard such as a brace. Looked at the other way, don't just casually step down off the bottom of a ladder without knowing what's behind you for a step or two.

- Stand no higher than the third tread. Said another way, never stand above the third rung from the top of the ladder.

- While moving up or down, you must strive to keep a three-point contact at all times; this means either two

feet and one hand or two hands and one foot are on the ladder. Use at least one hand to grasp the ladder when climbing. Do not carry objects or loads that could cause loss of balance and falling.

- Do feel free to have someone help to stabilize any ladder you think needs it. Dealing with ladders on a construction site is sometimes a team effort.

- Balancing on a skinny ladder rung is always more tiring than standing for that same amount of time on a floor. If you're on a ladder for a long time, shift your feet around every so often, and feel free to descend and take a break whenever your body insists. Thick, hard-soled footwear such as construction boots is better than, say, sneakers.

- Almost every construction site is muddy or icy or snowy at one time or another when ladders are in use. Mud and other slick substances increase the likelihood of slipping and falling, so it is especially important to adapt your ladder behavior to slippery surfaces.

  Before you climb a ladder take the time to scrape the slick stuff off your shoes, both so you don't slip and also so you don't make it more likely the next person will slip. Where you have the opportunity, do scrape the ladder rungs of any slippery substance.

- If circumstances require you to lean a ladder a little more upright than you'd otherwise prefer – which increases the chance you'll tip over backwards – keep in mind that the higher you are on the ladder, the more stable you will be. As you climb you move the center of gravity forward, so make sure to lean extra-far forward on the first few steps up and the last few steps down.

- As you're setting a ladder, remember not to rest the top of it in a spot where you'll need to add something such as sheathing or siding or paint.

- As you're setting a ladder, remember whether you're right-handed. If you are and you have a choice, you might want to set your ladder a bit to the left of where you need to work.

- Another danger from the use of ladders is dropping things on people below. A 16-ounce pry bar to the head can kill, and a 16th-ounce nail to the eye can blind, so be especially careful when there are or might be people below you.

  If you do mistakenly drop something or see that someone else has, immediately yell, "HAMMER." The shouted word "Hammer" on a job site -- even if it's a cordless drill or a piece of wood or a screw or nail that's falling -- means "Look out below!"

  Looked at from the other perspective, needless to say, if you hear anyone yell "Hammer," make sure you know where the threat is coming from and react appropriately.

- It is especially dangerous to use a power tool such as a circular saw (e.g., a Skilsaw) or a reciprocating saw (e.g., a Sawzall) while on a ladder. Unlike a cordless drill's DC motor that brakes to a stop almost instantly when you let go of the trigger, these saws have big AC motors that take a few seconds to spin down.

  Here's why such a tool is dangerous to use on a ladder:

  - The tool is heavy, and the longer you hold it the heavier it gets. Also, merely holding it uses up 50% of your hands.
  - The tool is unwieldy in use, and it often requires two hands to make the cut, leaving you no hands left to hold on with.
  - Most dangerous is that if the blade unexpectedly binds in the material you're trying to cut, the inertia of the device's motor you're holding onto can throw you off balance enough to knock you off your ladder.

If you do not know that you can safely use tools such as a circ saw or a recip saw or a half-inch corded drill in these high-risk circumstances, check with your site supervisor first.

- Ladder moves. Sometimes you'll set a ladder, climb it and do work, then descend and you're done. But more often what happens is you set your ladder, climb it and do work, descend, and then make a *ladder move*, meaning you set the ladder in a new location in order to continue performing the same work. You make ladder moves left or right or up or down over and over again till the task is finished. Examples of such tasks are the sheathing and siding and painting of the outside of the house.

  But ladder moves are time-consuming and potentially dangerous. They are time-consuming because you have to carry and set the ladder and then re-climb it. With a tall ladder on uneven terrain, it can take many times longer to make the ladder move than it does to get the work done from the top of it.

  Ladder moves are potentially dangerous because each time you re-set the ladder you have new chances to make a mistake.

  And for certain tasks such as applying housewrap and siding, the work is performed by not one but two or more volunteers who work together, each on his own ladder, which means that those ladder moves must be coordinated. **(Tip:** Often it's easier to move just the one ladder all the way over rather than moving both ladders halfway over.)

  For all these reasons, you want to pay attention to exactly where you set your ladder(s) each time so as to cut down on the number of ladder moves. Look ahead not just one ladder move but two. Take note of how far you can safely reach right or left or up or down and still perform the work, and plan accordingly.

- Don't assume that a ladder is safely climbable just because you find it resting against a wall or a tree or something. It might have been leaned there temporarily by someone who never intended to climb it. (See Ladder Rule #1 above:)

## Two types of ladder TOP

Two types of ladder are typically used on a construction job site. They are stepladders and extension ladders. Stepladders are lighter but shorter than extension ladders.

There is a third type of ladder that's sometimes used on job sites, and that's the various forms of **scaffolding.** If you are helping to erect scaffolding, it's especially important that you get everything right, because likely several people will be using it over a long period of time, and they're going to blindly trust with their very lives that you've built it right. Don't let them down.

## Stepladders TOP

Stepladders you'll find on sites are typically 4, 6, 8 and 10 feet tall. Unlike some extension ladders, all such stepladders can be carried and maneuvered into position by one person.

Also unlike an extension ladder, a stepladder must be used by spreading out the four legs on a horizontal surface. Said another way, you may not close the legs and lean the top against a vertical surface. Even if you are an experienced professional carpenter, you must follow this rule.

- As you know from the rule here, you may not stand on the very top "step" of a stepladder. It's not a step at all, and if you use it as one you might well tip the ladder either left or right right out from under yourself.

**stepladder**

What that top platform is is a place to put tools and fasteners and so on on. Some are designed to accept the tabs under a paint roller tray.

● But don't leave tools such as drills or other objects such as screws on top of a stepladder you're going to walk away from, because someone might come along after you and try to move it and get whomped on the head by your hammer or blinded by one of your nails.

● Looked at from the other perspective, don't just rashly grab hold of a loose ladder and snatch it away from a wall till you've checked whether there's anything lying on the top of it that you don't want hitting you in the face or spilling all over the ground.

## Extension ladders TOP

Extension ladders are used for climbing higher distances than stepladders can reach. While the shorter extension ladders can be carried, raised and set by one person who knows how to do it, the longer ones usually cannot. If you need help carrying or raising or setting an extension ladder, get it.

### How an extension ladder works TOP

An extension ladder consists of two ladders that are connected so that one of them (the one at the back) always stays on the ground and the other one (the one in front) can be raised and lowered.

To extend the *fly ladder,* which is the front section that moves up and down, either push it up or pull on the rope connected through a pulley that lifts it. When it has reached the height you like, let it slowly slide back down and the two spring-loaded clips should engage to lock the fly to a particular rung of the main ladder. Test to make sure this has happened before anyone climbs the ladder.

If the fly's clips don't grab a rung on the main ladder, try again. Maybe raise it up higher and lower it more slowly before you let it drop back down. If you just can't get the clips to grab then you can't climb the ladder. One solution is to lower the whole ladder, set the clips by hand, and then raise it again.

To lower the fly, raise it up just enough so the clips spring away, then lower it rather quickly. If you lower it too slowly the clips will engage the next rung down just as they're designed to do.

The next three sections of this document describe how to carry and handle an extension ladder, how to raise one, and how to set one safely.

### Carrying and handling an extension ladder TOP

Whether you use the rungs or the rails – and whether you're by yourself or working with a partner – always try to carry and otherwise handle an extension ladder by the main ladder, not the fly. The fly can move around on you while you're carrying or handling it, but the main half -- the wider one with the feet at the bottom end -- is less likely to do so.

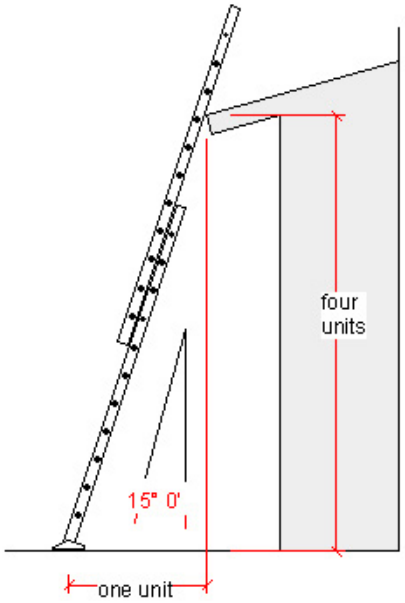
### Raising an extension ladder TOP

Raising a long extension ladder usually requires two people. Here's one way to do it.

(1) Lay the ladder on the ground with the foot end near where it is to be set.
(2) Person A puts her feet on the feet of the ladder so it can't slide.
(3) Person B, starting at the other end, lifts the ladder off the ground and walks toward Person A, taking hold of each next lower rung in turn, till the ladder is raised.

The longer and more erect a ladder gets, the higher is its center of gravity, so the more difficult it is to keep it

from falling. An extension ladder falling to the ground is dangerous to anyone nearby (and to the ladder), so get all the help you need to handle the weight as you maneuver it.




**Setting an extension ladder** TOP

Extension ladders can be really tall. For work at the peak of the gable end of a two-story house you might find yourself 30 feet above the place you'd land if you fell.

Setting an extension ladder is a serious job, and it must always be done right. The higher it goes, the more cautious you must be. Often enough, setting the ladder correctly takes longer than the job that needs to be performed at the top of it.

The goal is to set the two feet of the ladder and the top of that ladder so that work can be performed from it and it is not likely to fall over under normal, expected use.

That means you must set **two angles** correctly – the left-right angle and the front-back angle.

**Left-right angle.** One of those angles is whether the top of the ladder is right or left of the bottom. If as you're facing it the ladder tilts left or right right after you set it, which is quite common on dirt as opposed to a wood or concrete deck, you must raise the low leg or lower the high leg or a little of each.

Novices tend to think first of shoring up the lower leg with rocks or wood or something. Pros tend to think first of lowering the high leg, so you should too. After you've initially set the ladder and you know which way it's leaning, check to see whether you can dig out dirt under the high leg. To do so, just whap away with the claw end of your hammer till the dirt is dug away deep enough. It's better to place a ladder's high foot in a trench whence it can't move than to place the lower foot on top of a pile that can so easily shift.

No matter what, you must somehow make sure that the two feet of the ladder are level so that the ladder doesn't tilt left or right when you climb it. To test a ladder for left-right lean, climb to the second rung and try swaying it back and forth. ***If it sways too much, and especially if it sways too easily to one side than the other, try again.***

**Front-back angle**. The other angle that makes a difference is the angle as viewed from off to either side of the ladder, i.e, how far away the feet should be from the wall they're leaned against.

For ladders leaned up against a structure, which is how extension ladders always work, there's a rule about how far away the feet of the ladder should be placed from the base of that structure. If the feet are close it will reach higher but it might tip over backwards when you start climbing it and finish descending it. If the feet are far away, they might slide away from the structure (also, you will be too far away, except at the very top of the ladder, to do any work such as sheathing or siding).

Here's the general rule: Place the feet of the ladder away from the base one-quarter of the height of the ladder. This is also called the **4-to-1 rule.** For example, if the ladder is resting at a point 12 feet high on a wall, then the feet of that ladder should be about 3 feet away from the base of that wall. (This arrangement results in a front-back angle of just over 14 degrees. For those of you who are interested, the angle in degrees = arctangent (rise/run) X (180/pi.)

**Note from the figure above that the height of the ladder is measured to where it rests at the top, not necessarily how high the top of the fly is. Note also that the base is determined by the point directly below where it rests against the structure, not necessarily any wall behind that.**

Needless to say, this angle may be changed depending on the circumstances. For example, if placing the feet squarely on a level concrete driveway rather than lumpy dirt means violating the 4 to 1 rule by a few degrees, go ahead and use the concrete.

A quick method of testing your ladder's front-back angle is to stand erect with the toes of your feet up against the ladder's feet and then reach straight out with your arms. If your hands can just barely grab the ladder rails, the angle will be close to 4 to 1. (Note that this will not work if you're planning to use orangutans to do the testing.)

**Tips** TOP

● When setting an extension ladder for access to a roof, you must raise the fly till it extends at least three feet above the eave. See the illustration immediately above. Ascending a ladder and stepping onto a solid roof is relatively easy. Getting down from the roof onto that same shaky ladder is considerably more difficult, and those handholds help.

● The two feet at the bottom of an extension ladder can be swivelled to either of two positions. One is a rubber pad that works better on hard surfaces. The other is a set of prongs that dig into soft surfaces such as dirt. Always choose the correct position – rubber pad or metal claw – for each foot.

● When you descend an extension ladder there will come a particular step down where you're stepping off the bottom rung of the fly and onto the next rung down on the main ladder. Note that this rung is a couple inches *forward,* so be on the lookout for it every time you descend and make sure you push your foot forward enough to catch that main ladder rung.

● You don't have to carry a heavy, unwieldy tool such as a nail gun in one hand while you climb up a ladder with the other. Instead, carry up only the hose on your shoulder, then reel it in to get the gun up to you. In the other direction, just lower the tool gently to the ground by its hose before you descend.

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**Who should climb ladders and who shouldn't** TOP

● Some people, for a variety of reasons, should not climb ladders, at least not more than a few feet up. We know that construction volunteers come in a wide range of sizes and shapes and ages and degrees of physical fitness. If you suspect you shouldn't be climbing ladders for any reason, then please don't volunteer to. Also, rest assured that no site supervisor will ever ask you to climb a ladder or do anything else you're afraid to.

● Many people, even though they haven't spent much time on ladders, can climb them and perform work. Most novice volunteers fall into this group. You must strive to remember all the safety rules above.

● And a few people are quite used to being on ladders and are rightly confident in climbing way up in the air and accomplishing various tasks safely and accurately and efficiently. If you're a member of this small group – often people who've been roofers or painters or carpenters – we hope you'll feel free to jump right in and put your experience to its highest and best use, but you must still follow all the rules.

**Thanks for volunteering on a construction site, and we hope you find the experience pleasurable and educational and worthwhile. Your hard work and earnest efforts will help a deserving family afford a house you built, and that is always uplifting.**

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