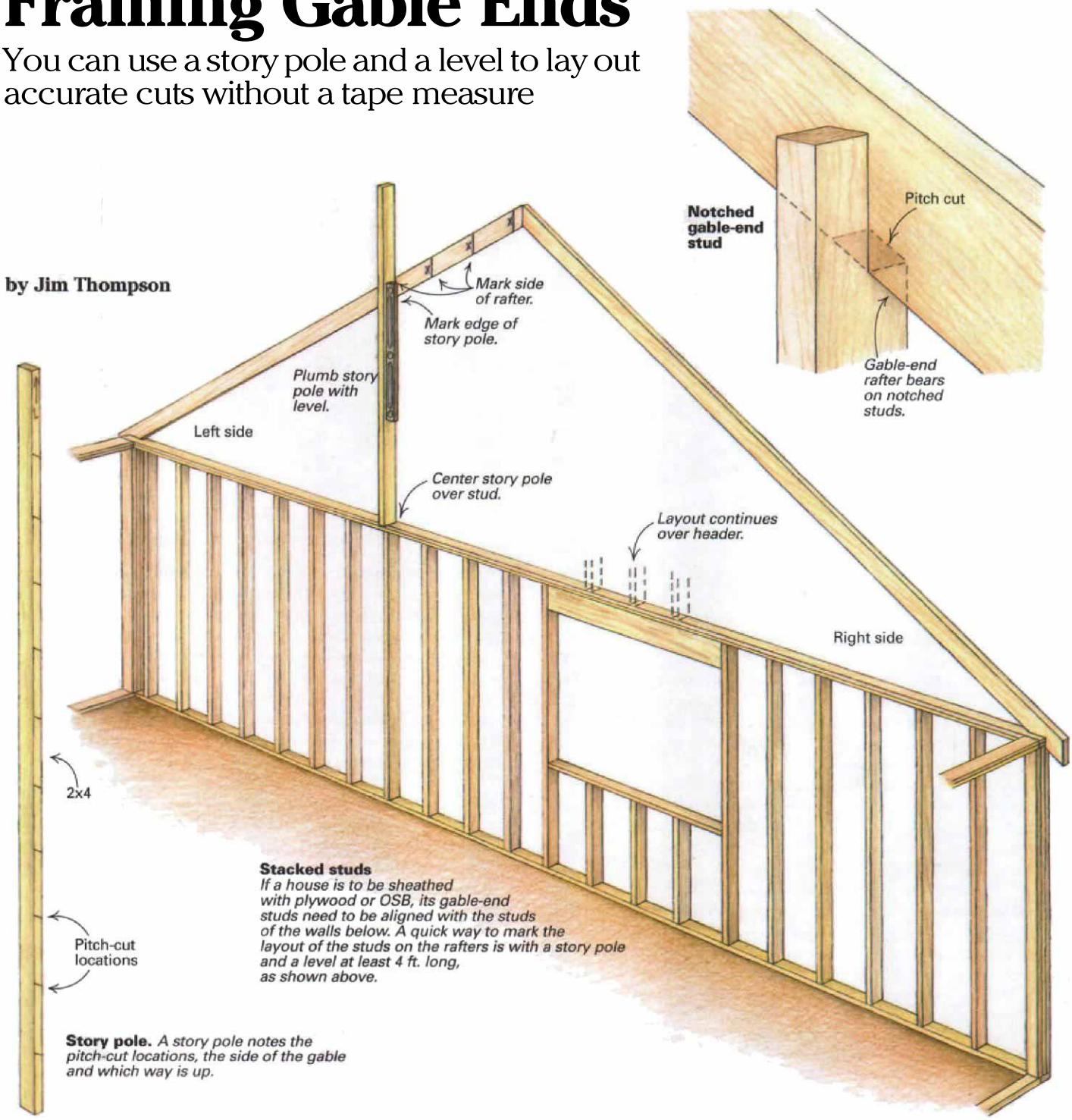
Framing Gable Ends

You can use a story pole and a level to lay out accurate cuts without a tape measure

by Jim Thompson



The first time I had to frame and sheathe the gable end of a house, I did a miserable job. The carpenter I was working for had no system for laying out the studs, which are all of different lengths and have angled cuts on their tops to match the roof pitch. He just said fill in the end between the last rafter and the plate below so that we could put sheathing on it. Then he took off. I did a lot of cutting and fitting and recutting and measuring. The job seemed to take forever.

A few years later another carpenter taught me the method I'm going to explain here. It may look confusing at first, but once you get it, you'll have a gable end framed in less time than it takes to read this article.

The studs are lined up over the wall studs below (called stacking) and notched around the gable-end rafter (drawings above). The important part of the notch is the pitch cut, which is on the same angle as the rafter (right drawings, facing page). When the studs are cut and installed this way, they flush up to both the interior and exterior of the framing. I like the solid feel of gable walls that are framed with this method.

Before installing the gable-end studs, a little preparation is required. You should place a couple of sheets of plywood on the ceiling joists for a work area. On this work area you need a circular saw, a level that's at least 4 ft. long, a framing square and enough studs and sheathing to cover

Drawings: Christopher Clapp

the gable. It's also helpful to leave out the next-to-last rafters to give yourself adequate room to work. I only forgot that trick once.

Story pole—Begin the job by selecting a straight stud that is long enough to extend above the top of the rafter at your highest stud. This is your story pole, and it eventually will have the height of the notches for all the gable studs marked on it. Draw a big R on one edge to indicate the right side of the gable, and a big L on the opposite edge to record the left side. Then put an arrow on one edge to show which way is up.

Begin marking at the high end of the gable by putting the bottom of the story pole directly over the stud nearest the peak. As shown in the drawing on the facing page, the story pole is held against the rafter at the top and plumbed with the level. Next make a mark on the rafter to show the uphill side of the story pole and another mark on the edge of the story pole that records the bottom of the rafter. With the marks made, pull the story pole away from the rafter and draw an X on the downhill side of the line on the rafter to show where the stud will go.

Repeat this procedure for all of the studs on one side of the gable, then turn the story pole around and do the same for the studs along the other side. When you're finished, your rafters should be marked for stud layout, and your story pole should have similar markings on both sides that show the positions of the pitch cuts (left drawing, facing page).

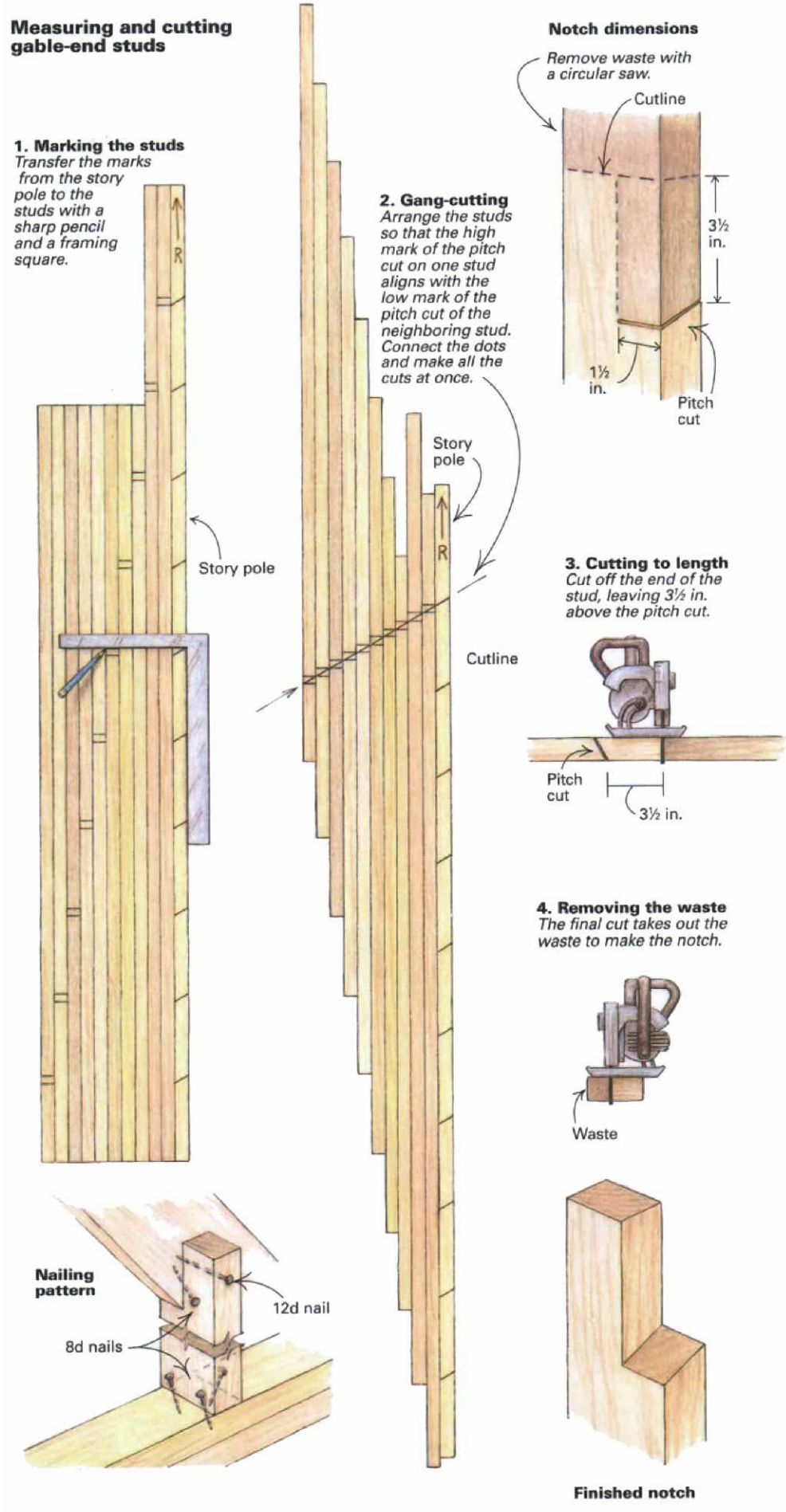
Making the cuts—Now spread out enough studs to do the right side of the gable. Lay the studs on edge, snug them up to the story pole and use a framing square and a sharp pencil to transfer the story-pole marks to the studs (left drawing, this page).

The marks on the edges of the studs are registration points for your first cut. Arrange the studs so that the marks line up (middle drawing, this page) and run the circular saw down the line with the depth set equal to the thickness of the rafter (typically 1½ in.).

The next step is to cut off the tops of the studs so that they don't extend above the rafters. I leave 3½ in. above the pitch cut. That's enough material to anchor a nail—any more wastes wood. The wide side of my saw's base (Skil 77) is 3½ in. from the edge to the blade. So I eliminate measuring and use the saw's base to tell me how far from the pitch cut to make my crosscut. As I make my crosscuts, I set aside the offcuts. They will be the studs for the left side of the gable.

Now I can cut out the waste to make the notches. Because the narrow side of my saw's base is 1½ in. wide, I use the edge of the base to line up my cut (bottom right drawing, this page). Resist the temptation to hold the stud in one hand while operating the saw with the other hand. Instead, tack or clamp the stud to a work surface to hold the stud steady during the cut.

When you flip over the story pole and line up the offcuts for marking the left side of the gable, you'll notice that most of the offcuts are usable. In this example, the job requires only two additional studs, and the story pole can be used for



one of them. This economy of material will vary with the pitch of the roof, the layout of the wall below and the length of the wall, but I've found the method to generate very little waste.

Stud and sheathing installation—To install a stud, set its bottom on the plate and align it with the stud below. (I prefer to start with the tallest stud and work toward the eaves, but it doesn't really make any difference.) Now slide the notch under the rafter until it is just snug. Be careful not to push too hard because you can easily put a hump in the rafter with the first stud. Then none of the studs will fit correctly.

Toenail the bottom of the stud to the top plate with two 8d nails on one side and a single 8d nail on the other side. Nail the top with a 12d through the top of the stud into the rafter. Then add an 8d toenail into the bottom of the rafter from the uphill side of the stud.

I prefer to sheathe a gable end from inside the building, so I rip my sheathing into 2 ft. by 8 ft. pieces. That's because it's easy to lean out and nail off the bottom of a 2-ft. wide piece of sheathing, but it's tough to reach the bottom of a 4-ft. wide piece. (In areas subject to earthquakes or high winds, this method may not fulfill shear-wall requirements.)

I start the first piece of sheathing so that its edge lands on the center of a stud that's on my 16-in. o. c. layout. Not all studs are placed at layout; for example, a gable-end vent may require studs to fall outside the layout.

Save the cutoffs from the pieces of sheathing that project above the rafters. You can use them for starting or finishing a course because the cutoffs already include the pitch cut. When your sheathing gets too high to reach over, nail a 2x4 across the gable-end studs to make a place to stand. Use two 16d nails in each stud for this piece. When you're finished, leave the 2x in place because it helps stiffen the gable end.

But what about...—Here are answers to the typical questions I get about this method. First, if your centers are regular, and the slope of the roof is constant, why not just mark the first stud, get the common difference and mark the studs that way? Some folks prefer that technique (see sidebar, right), but I have found that it really takes no time at all to mark the story pole, which allows me to lay out the stud position on the rafter at the same time. Having the rafter laid out helps avoid bowing it upward if the cut is a little off, and the stud is too tall or too short.

Second, why not lay out the right and left halves from the same marks? Unless your layout below is exactly centered on the peak, which I've never found to be the case, it won't work.

Probably the most important things to remember while using this method are the orientation of the story pole while transferring the marks and which direction to slide the studs when you're preparing to make the pitch cuts. You simply have to remember which end is up. □

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Cutting gable-end studs using the common difference

by Elmer Griggs

Most roofs I have worked on over my career as a rafter cutter have been gable roofs. And most of the houses I've worked on here in southern California have been finished with stucco—not plywood covered with siding as in other parts of the country. Instead of relying on plywood or OSB for diagonal braces, builders here use 1x6s that are let into the studs to brace the walls. As a consequence, the studs on a gable end don't have to line up with the studs in the wall below to continue the layout for sheathing. The gable-end studs simply have to end up on 16-in. centers to provide ample backing for the stucco.

The method I'll describe here is used by a production framer to determine the lengths and the pitch cuts of the gable-end studs by means of the common difference, which is the consistent incremental change in length of equally spaced studs under a rafter. With this method, I make a minimum number of cuts, and I can work on the ground next to the lumber pile.

Roof pitch—Designers typically show the pitch of a roof by drawing a right triangle on the elevation or the roof plan (top drawing, facing page). The base of the triangle represents 12 horizontal inches (the run), and the vertical leg of the triangle shows the amount the roof rises in that horizontal foot The hypotenuse of the triangle therefore represents the pitch of the roof. This example has a 6-in-12 pitch, and the run of the roof is 15 ft.

To calculate the lengths of the gable studs, first find the length of the longest stud. Here's the equation. Multiply the pitch (6 in.) times the run (15). The answer is 90 in. (top drawing, facing page). A 90-in. stud would be necessary to support the rafter at its highest point. But there's a curveball. A gable end typically has a vent in it, so the studs on both sides of it must be moved over a bit so that they don't interfere with the vent. To allow for the vent, I deduct half the pitch from the longest stud. That reduces the stud by 3 in. to 87 in. long, and moves the stud over 6 in.

What's the difference?—The centerlines of gable studs are normally spaced 16 in., which is equal to **1⅓** ft. To find the difference in length between adjacent studs, multiply **1⅓** by the pitch. In my example the equation is **1⅓** x 6 = 8-in. difference between studs.

This gable end needs 11, 8-ft. 2x4s. Two studs are going to come out of each one of these 2x4s—one for the right side of the gable and one for the left side. The studs will be mirror images of each other.

On a flat work surface, place the 2x4s on edge with their ends square to one another (middle drawing, facing page). Measure 87 in., and mark the 2x4 closest to you at that point with a pencil. Then mark each successive 2x4 8 in. shorter.

Cutting the rafters—A gable-end stud tucks under the rafter, so its end has to be cut at the same pitch as the rafter. There are two quick ways to find the correct angle. With a framing square, align the edge of a 2x4 with the 6-in. mark on the tongue of the square and the 12-in. mark on the blade (bottom right drawing, facing page). Mark the angle with a pencil. Set the table of your circular saw on the face of the 2x4 and adjust the angle of the table so that the blade matches the pencil line. Or you can look in a book on rafter cutting to see what angle a 6-in-12 pitch equals. The answer is **26½**°. The book I use is *Full Length Roof Framer* (A. F. J. Reichers, P. O. Box 405, Palo Alto, Calif. 94302).

When you cut a stud with the saw set at an angle, the resulting mitered end gives the stud a long point and a short point (bottom left drawing, facing page). I make my measurements to the long points. And when I cut any material on a miter, I cut from the side that will allow my mark to be the long point of the cut.

To finish marking the gable studs, measure the length of the shortest stud. In my example, it's 7 in. long. As shown in the drawing, add that length to the 2x4 that has the longest stud laid out on it. The long point of the shortest stud will correspond to the short point of the longest stud.

With a framing square aligned on the mark that defines the bottom of the shortest stud, mark the waste cut across the rack of 2x4s with a pencil (middle drawing, facing page). Make this cut with the saw set for a square cut Now set the saw table at **26½**° and cut each 2x4 at the cutline marks. When you're finished, hold up the two shortest studs. They should be the same length.

Nailing—I start with the longest studs, and I use a level to make sure they're plumb. The studs should just touch the bottom of the rafter—don't wedge them in place, or you'll put a hump in the rafter.

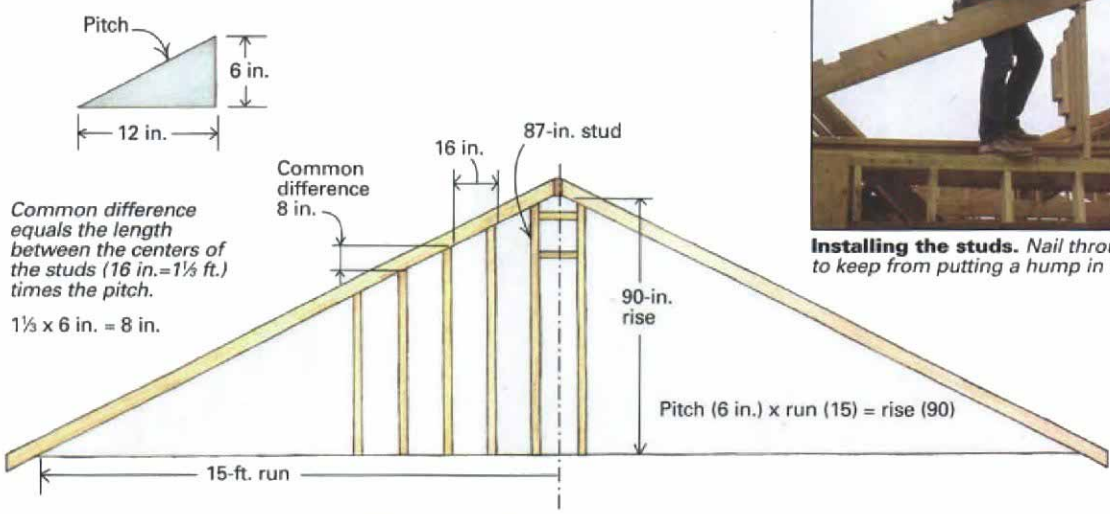
After putting in the longest stud on one side of a gable, take one that will fit about in the middle of the rafter. Look down the rafter to see if it has a hump or a sag in it Move the stud up or down to take out any hump or sag. Don't drive the nails through the stud into the rafter. Instead, toenail a couple of 16d nails through the outside face of the rafter into the tops of the studs (photo facing page).

Once you've got the middle stud in, fill in the remaining ones. Use the level to keep the long studs plumb. It's pretty easy to plumb the short ones by eye.

—Elmer Griggs is a former carpentry instructor for Ventura County and Los Angeles County apprenticeship committees. He lives in Reseda, Calif.

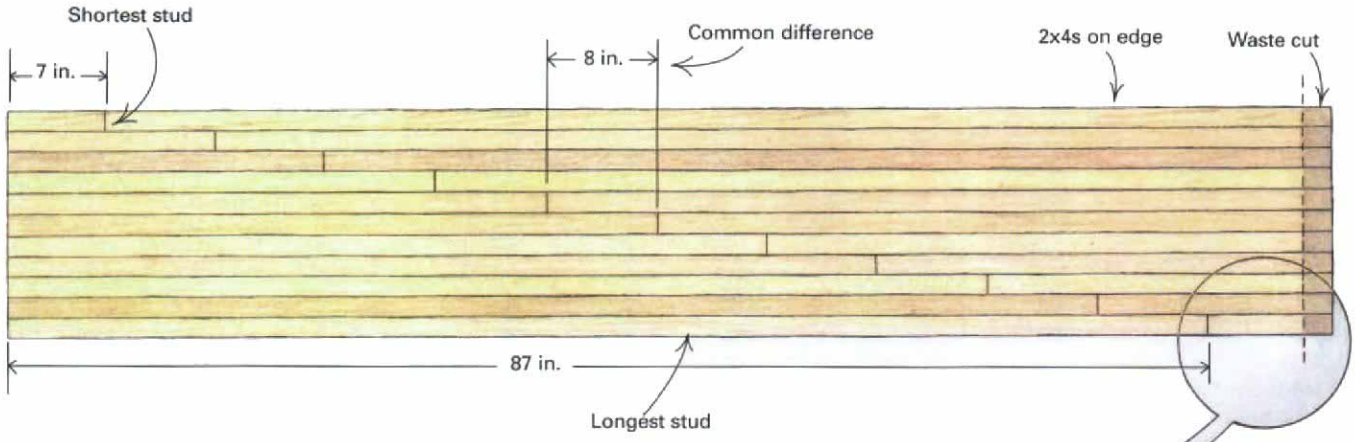
Installing the studs. *Nail through the rafter into the studs to keep from putting a hump in the rafter.*

A 6-in-12 roof pitch

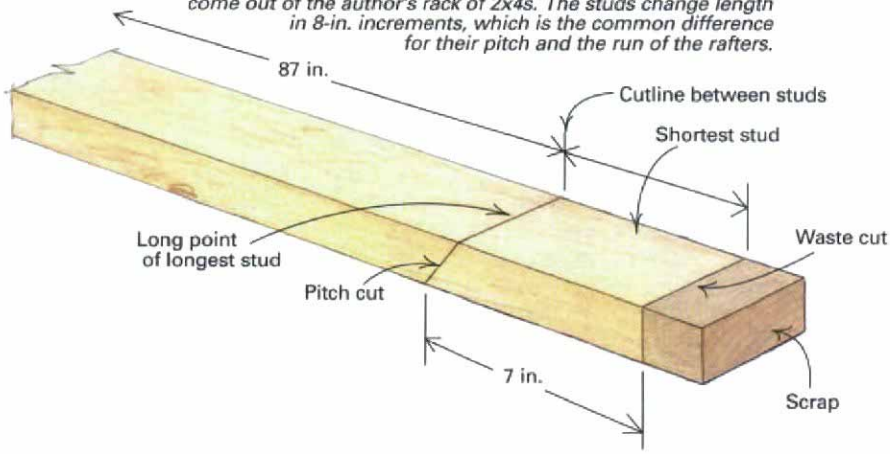


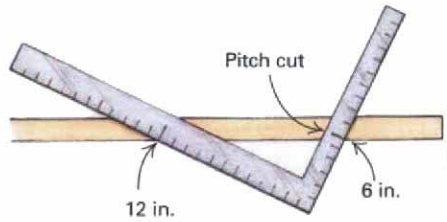
Calculating stud length. *The longest studs in a gable end fall to the side of the ridge to allow room for the gable vent. The author calculates the length of the longest studs by multiplying the pitch of the roof by the run of the rafter minus half the pitch.*

Pitch (6 in.) x run (15) - ½ pitch (3 in.) = longest stud (87 in.)
6 in. x 15 - 3 in. = 87 in.



Laying out the cuts. *Two sets of mirror-image gable-end studs come out of the author's rack of 2x4s. The studs change length in 8-in. increments, which is the common difference for their pitch and the run of the rafters.*





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