

Cumberland Perry Area Vocational Technical School

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Date: June 21, 2001

Program: Carpentry

Course: Carpentry

Unit: Roof Framing

Lesson Title: *Compute the Line Length of a Common Rafter*

Terminal Objective: Given the necessary tools and instruction, the student should compute the line length of a common rafter to within $\pm 1/16$ ".

Enabling Objectives:

1. Find the total run of the common rafter by dividing the span in half.
2. Find the length of rafter per foot of run on the first line of the rafter square under the rise/slope number.
3. Multiply the line length number by the total run in feet.
4. Divide the decimal portion of the number, if there is one, by six to convert the decimal into sixteenths.

Related Pennsylvania Academic Standards:

Reading, Writing, Speaking, and Listening

- 1.1.F Understand the meaning of and use correctly new vocabulary learned in various subject areas.
- 1.6A Listen to others.
- 1.6C Speak using skills appropriate to formal speech situations.
- 1.6D Contribute to discussions.

Mathematics

- 2.1A Represent and use numbers in equivalent forms (e.g., integers, fractions, decimals).
- 2.2A Develop and use computation concepts, operations, and procedures with real numbers in problem-solving situations.
- 2.3A Develop formulas and procedures for determining measurements (e.g., area, volume, distance).
- 2.3B Select and use standard tools to measure the size of figures with specified accuracy, including length, width, perimeter, and area.
- 2.3G Estimate and verify measurements.
- 2.4A Compare quantities and magnitudes of numbers.
- 2.4B Use measurements in every day situations.
- 2.4E Demonstrates mathematical solutions to problems.
- 2.5C Present mathematical procedures and results clearly, systematically, succinctly and correctly.

Introduction:

A second method to find the length of a common rafter is called the line length method. It is quicker and more accurate than the step off method you have been using to this point.

Body:

1. Find the total run of the common rafter by dividing the span of the building in half.
Example: span = 12', 12' divided by 2 = 6'.
2. Find the corresponding number equal to the line length per foot of run on the first line of your framing square under the rise/slope number. Example: Your slope is 6 / 12. Under the 6 on the framing square, look at the first line. At the end of the square it says "length per foot of run". Under the 6 is the number 13.42. This means that each horizontal foot equals 13.42" on your 6 / 12 slope.
3. Multiply the line length number (13.42) by the total run in feet (6'). In your example, this equals 80.52 inches. This is the length of the common rafter from the plumb cut at the ridge to the plumb cut at the bird's mouth.
4. Divide the decimal portion of the number by six (6) to convert the decimal into sixteenths. Examples: 52 divided by 6 equals 8 (then truncated to two places) or 8/16" which reduces to 1/2". We now have our line length which is 80 1/2". This can be measured down the top of the rafter from the plumb cut at the ridge to the plumb cut of the bird's mouth and marked. (*Note:* Final calculations must be +/- 1/16"; therefore, 9/16" is also acceptable)
5. This method may be used to calculate the length of stock needed to cut your rafters.

Summary:

Compared to the step off method, the line length method is much quicker and more accurate. This method eliminates the many chances for human error associated with the step off method. Done correctly, this method will save you time and material on the job. This method can also be used to estimate your material needs for the job.

Tools and Material Needed:

- ✂ Carpentery tool belt
- ✂ Framing/rafter square
- ✂ Pencil
- ✂ Calculator (optional)

Related Web Sites:

www.acrooftrusses.co.uk/acroof.htm
www.get-a-quote.net/quickcalc/gable_rafters.htm
www.easyrafters.com/rafter.asp