

Basic Carpentry

Module 6, Task 6	Course of Study Crosswalk:	BC 8
Module	Roof and Ceiling Framing	
Task / Topic	Cut and install common rafters	
Content Standard	The student will cut and install roof and ceiling components.	
Evaluation	Given working drawings and specifications for a roof frame (equal or unequal pitch), a structure with floor, wall and ceiling frames installed, the necessary tools, equipment and materials, the student will cut and install the common rafters for an equal or unequal pitch roof. The rafter lengths, including allowances for overhang and ridgeboard must be accurate to within 1/16 inch. Rafters must be positioned 16 inches or 24 inches O.C. and fastened to the double top plate and ridgeboard in the required pattern with crowns facing upward. Plumb and plate cuts must allow for a tight fit, and rafters must be erected in pairs for a straight, plumb installation within 1/16 inch.	
Resources (Materials, Equipment, Technology)	Drawings Stock Square Level Nails Information Sheet 6-1	Specifications Rule Hammer Saw Dimensioned lumber
Lesson Length		
Instructional Method		
<input type="checkbox"/> Lecture <input type="checkbox"/> Class Discussion <input type="checkbox"/> Team Work <input type="checkbox"/> Review <input type="checkbox"/> Demonstration <input type="checkbox"/> Multimedia <input type="checkbox"/> Individual Work <input type="checkbox"/> Other		
Assessment Strategy		
<input type="checkbox"/> Homework <input type="checkbox"/> Written Test <input type="checkbox"/> Teacher Observation <input type="checkbox"/> Other <input type="checkbox"/> Class work <input type="checkbox"/> Performance Test <input type="checkbox"/> On-Task Ability <input type="checkbox"/> Other		
Integrated Content Code		
<input type="checkbox"/> R <input type="checkbox"/> SS <input type="checkbox"/> IR <input type="checkbox"/> PS <input type="checkbox"/> VSO <input type="checkbox"/> MS <input type="checkbox"/> Other <input type="checkbox"/> W <input type="checkbox"/> M <input type="checkbox"/> CL <input type="checkbox"/> CT <input type="checkbox"/> LD <input type="checkbox"/> WA <input type="checkbox"/> C <input type="checkbox"/> S <input type="checkbox"/> DM <input type="checkbox"/> IM <input type="checkbox"/> ES <input type="checkbox"/> TW		

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Classroom Theory (*Procedures/Activities/Learning Experiences*)

1. Explain the necessary safety precautions.
 - a. Keep all tools in safe working order.
 - b. Wear appropriate clothing for work and weather conditions.
 - c. Always wear safety glasses
 - d. Avoid loose or ragged clothing.
 - e. Wear leather shoes with heavy soles to protect the feet.
 - f. Wear hard hat at all times.
 - g. Wear gloves when handling rough material.
 - h. Select the correct type tools for the job.
 - i. Avoid using tools in poor condition.
 - j. Keep edges of tools pointed down.
 - k. Keep working area clean and orderly.
2. Define equal pitch and unequal pitch.
 - a. Equal pitch is a roof frame in which both rise and run are the same on both sides of the ridge.
 - b. Unequal pitch means a different rise and run on one side than the other.
3. Identify fastening procedures for common rafters.
 - a. Select straight rafters for the gable end.
 - b. Nail one in place at the plate.
 - c. Install a rafter on the opposite side with a worker at the ridge supporting both rafters.
 - c. Place the ridge between the two rafters and nail it temporarily in place.
 - d. Move about five rafter spaces down and install another pair of rafters.
 - e. Raise the assembly and the rafters are nailed to the plate.
 - f. Plumb and brace the assembly with framing anchors.
4. Explain how to cut a bird's mouth or seat.

The bird's mouth is cut from the bottom of the rafter so the rafter will have a flat surface to rest on top of the wall plate.
5. Describe the procedure for determining run, rise, and rafter length from a working drawing.

Using math to find the rafter length, square the rise and the run of a roof and add the answers together; this gives the square of the rafter length.
6. Explain why a pattern rafter should be used in cutting a number of common rafters.
 - a. One should cut a pattern rafter for a trial basis.
 - b. If the patterned rafter works, it can be traced exactly for the rest of the rafter.
 - c. If the patterned rafter does not work, adjustments must be made.
 - d. This greatly reduces wasting material and time.
7. Identify the starting point for erecting gable rafters and hip rafters.
 - a. First, install vertical props 8' to 10' along the area where the ridge board will be raised. Brace each one with the temporary braces and adjust the braces until each prop is plumb.
 - b. Set the ridgeboard on top of the temporary props.
 - c. Line the ridge plumb cut of the first rafter with the mark drawn on the ridgeboard at the end wall.
 - d. Toenail the bottom end of the rafter to the rafter plate and nail it to the side of the ceiling joist.
8. Reference the local building codes regarding common rafters.
9. Describe the procedure for cutting and installing common rafters.
 - a. Mark the rafter locations on the plate.
 - b. Erect the ridgeboard.
 - c. Brace the ridgeboard temporarily.
 - d. Attach rafter to ridgeboard.
 - e. Toenail to top plate.
 - f. Install collar beams and sway bars.

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Lab Demonstration (*Procedures/Activities/Learning Experiences*)

1. Obtain pitch from blueprint.
2. Obtain span from blueprint.
3. Obtain the approximate length of rafter (rule of thumb) half the house plus 2 feet, plus overhang.
4. Select a piece of rafter lumber from the stock, and find the crown edge. All lumber will have a crown or bow along the edge. Rafters should always be installed crown side up.
5. Position the lumber across sawhorses with the crown side facing you. Mark the crown side with an arrow.
6. Lay a framing square across the right end of the stock, with the tongue leg of the square positioned so that the number corresponding to the stated unit rise lies along the crown edge.
7. Pivot the blade leg of the framing square so that the 12" mark is flush with crown edge.
8. Draw a line along the tongue leg edge.
9. Measure and mark a second ridge plumb cut line at a distance from the first line of one-half the ridgeboard thickness. A wavy line should be drawn through the first ridge plumb cut line to avoid confusion when cutting. Cutting will be done along the second, straight ridge plumb cut line, which represents actual rafter length.
10. Measure the determined body length of the rafter from the first ridge plumb cut line, and mark the point on the rafter. Determined body length represents theoretical rafter length, which was calculated from the center of the ridgeboard. It doesn't include ridgeboard width. Half the ridgeboard width must, therefore, be subtracted from the determined body length of the rafters on each side of the ridgeboard. This is the purpose of the second plumb cut line.
11. Draw a line through the mark, parallel to the ridge plumb cut line. This line marks the heel plumb cut for the bird's mouth. The bird's mouth is a notch cut into the bottom edge of a rafter in order to provide a flat surface to rest on the top side of the wall's cap plate.
12. Measure a distance equal to the width of the double plate from the heel plumb cut, and draw a second line along the right edge of the framing square.
13. From the point where the second line meets the bottom edge of the rafter, draw a line at right angles between the parallel lines.
14. Draw an X in the area to be cut out for the bird's mouth.
15. Measure down from the heel plumb cut line the distance for the 12" overhang, and draw a line across the rafter parallel to the heel plumb cut line.
16. Cut out a pattern rafter along the marks made on the lumber.
17. Use the pattern rafter to cut out the first rafter pair.

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Module 6, Task 6	Provision for Individual Differences
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<input type="checkbox"/> Check work in progress	<input type="checkbox"/> Monitor Assignments	<input type="checkbox"/> Multi-sensory Approach
<input type="checkbox"/> Immediate Feedback	<input type="checkbox"/> Review Sessions	<input type="checkbox"/> Modified Content
<input type="checkbox"/> Pre-teach Content	<input type="checkbox"/> Review Directions	<input type="checkbox"/> Study Partner
<input type="checkbox"/> Oral Reminders	<input type="checkbox"/> Provide Lecture Notes	<input type="checkbox"/> Personalized Examples
<input type="checkbox"/> Extension of Time	<input type="checkbox"/> Other	<input type="checkbox"/> Other

Extension	
Remediation	
Accommodation	
Modification	